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GALATI | BLEK LLP

455 Capitol Mall Suite 350
Sacramento CA 95814
Tel •916.441.6575
Fax •916.441.6553

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California Energy Commission
Dockets Unit
1516 Ninth Street
Sacramento, CA 95814-5512

Subject: **PALEN SOLAR HOLDINGS, LLC'S OPENING TESTIMONY- BATCH 2**
PALEN SOLAR ELECTRIC GENERATING SYSTEM
DOCKET NO. (09-AFC-7C)

Enclosed for filing with the California Energy Commission is the electronic version of **PALEN SOLAR HOLDINGS, LLC'S OPENING TESTIMONY- BATCH 2**, for Palen Solar Electric Generating System (09-AFC-7C).

Sincerely,

Marie Fleming

Palen Solar Holdings, LLC's Opening Testimony- Batch 2

Palen Solar Electric Generating System (09-AFC-7C)

October 9, 2013

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of: Petition For Amendment for the **PALEN SOLAR ELECTRIC GENERATING SYSTEM**	**DOCKET NO. 09-AFC-07C** **DECLARATION OF CHARLES TURLINSKI**

I, Charles Turlinski, declare as follows:

1. I am presently employed by BrightSource Energy, Inc. as Director of Project Development.

2. A copy of my professional qualifications and experience was included with my Opening Testimony and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Project Description for the Petition for Amendment for the Palen Solar Electric Generating System (California Energy Commission Docket Number 09-AFC-07C).

4. It is my professional opinion that the attached prepared testimony is valid and accurate with respect to issues that it addresses.

5. I am personally familiar with the facts and conclusions related in the attached prepared testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct to the best of my knowledge and that this declaration was executed on 10/8 2013.

Charles Turlinski

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of: Petition For Amendment for the **PALEN SOLAR ELECTRIC GENERATING SYSTEM**	**DOCKET NO. 09-AFC-07C** **DECLARATION OF MATTHEW STUCKY**

I, Matthew Stucky, declare as follows:

1. I am presently employed by Abengoa Solar LLC as Manager of Business Development.

2. A copy of my professional qualifications and experience was included with my Opening Testimony and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Project Description for the Petition for Amendment for the Palen Solar Electric Generating System (California Energy Commission Docket Number 09-AFC-07C).

4. It is my professional opinion that the attached prepared testimony is valid and accurate with respect to issues that it addresses.

5. I am personally familiar with the facts and conclusions related in the attached prepared testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct to the best of my knowledge and that this declaration was executed on October 9 2013.

Matthew Stucky

PALEN SOLAR ELECTRIC GENERATING SYSTEM
PROJECT DESCRIPTION AND OVERRIDING CONSIDERATIONS
OPENING TESTIMONY

I. Names:

Charles Turlinski
Matthew Stucky

II. Purpose:

Our testimony addresses the subject of Project Description and Overriding Considerations associated with the construction and operation of the Palen Solar Electric Generating System (PSEGS) (09-AFC-7C).

III. Qualifications:

Charles Turlinski: I am currently employed by BrightSource Energy Inc. and I am a developer of utility scale renewable energy projects with 10 years experience. I have managed the development and interconnection processes for wind and solar projects throughout the country, including the negotiation and execution of Large Generator Interconnection Agreements (LGIAs) for over 1000 megawatts of capacity in the CAISO. I have a MBA from the Massachusetts Institute of Technology (MIT). I prepared, caused to be prepared, or reviewed the Project Description section of the Petition For Amendment, as well as the post-filing information, data responses, and supplemental filings.

Matthew Stucky: I am presently Manager of Business Development at Abengoa Solar LLC and have been for the past three (3) years. I have degrees in Civil Engineering and Environmental Studies and a graduate degree in Environmental Engineering. My experience includes managing permitting and compliance activities for the California Energy Commission-licensed Mojave Solar Project. I prepared, caused to be prepared, or reviewed the Project Description section of the Petition For Amendment, as well as the post-filing information, data responses, and supplemental filings.

Detailed descriptions of our qualifications are presented in the resumes which are included in Attachment A to this Opening Testimony package.

To the best of our knowledge all referenced documents and all of the facts contained in this testimony are true and correct. To the extent this testimony contains opinions, such opinions are our own. We make these statements and provide these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

IV. Exhibits:

In addition to this written testimony, we are sponsoring the following exhibits in this proceeding.

Exhibit No.	Transaction No.	Document Title
3	68910	**PSH's Petition for Amendment**, **Project Description Section,** dated December 2012, and docketed on December 17, 2012.

V. Opinion and Conclusions:

We have reviewed the Project Description section contained in Part A of the Final Staff Assessment (FSA) and we agree that the Project is adequately described. However, we have a few clarifications.

At Page 3-7 of the FSA, Staff describes the mirror washing activities. However, the FSA describes a solitary mirror washing machine when there will be several. We request the Commission Final Decision reflect multiple mirror washing machines.

We also request that the Commission Final Decision specifically include reference to the pre-construction desert tortoise fencing that will be installed along I-10 pursuant to Condition of Certification **BIO-9** in the Project Description section to avoid any confusion of whether such action was contemplated and considered by the Commission pursuant to the California Environmental Quality Act (CEQA).

OVERRIDING CONSIDERATIONS

The Commission made Findings of Overriding Considerations in the Final Decision for the Approved Project. These findings were supported by the Testimony of Terry O'Brien. The same factual reasons for those findings exist today for the PSEGS Amendment. The following table provides direct quotes from the Final Decision regarding the Project Benefits to support the findings. The table also includes our testimony about the Project Benefits to support Amendment of the Final Decision to authorize construction and operation of the PSEGS.

FINAL DECISION		PSEGS
PSPP will provide 500 MW of renewable energy power, which will assist in meeting California's Renewable Portfolio Standard, which specifies that retail sellers of electricity serve 20 percent of their load with renewable energy by 2010. (Pub. Util. Code, § 399.11 et seq.) Gubernatorial Executive Orders increase the requirement to 33 percent by 2020. (Governor's Executive Order S-14-08.).		Same as PSPP. The PSEGS will also provide 500 MW of renewable energy power and will also assist in meeting California's Renewable Portfolio Standard. The PSEGS has two Power Purchase Agreements for the sale of its renewable electricity which is in contrast to the PSPP which did not have any Power Purchase Agreements.
Producing electricity from renewable resources provides a number of significant benefits to California's environment and economy, including improving local air quality and public health, reducing global warming emissions, developing local energy sources and diversifying our energy supply, improving energy security, enhancing economic development and creating green jobs. (2009 CEC *Integrated Energy Policy Report*, p. 231.)		Same as PSPP.
Scientific studies quantify the negative impacts of global climate change to California's and the world's population, environment, food supplies, flora and fauna, coastal regions, and public health. In order to reduce the impact, the State has adopted goals to reduce greenhouse gas emissions through renewable energy development. (PMPD, Greenhouse Gases Emissions section, p. 3, paragraph 2.)		Same as PSPP.
PSPP will assist the state in meeting its ambitious greenhouse gas reduction targets by generating 500 MW of electricity with vastly lower greenhouse gas emissions than existing fossil fuel burning generating facilities. (PMPD, Greenhouse Gases Emissions section, pp. 12; 14, findings of fact 14 and 16.)		Same as PSPP.
By generating electricity with the use of only a small amount of fossil fuels,		Same as PSPP

PSPP will reduce California's dependence on fossil fuels, a diminishing energy source. (PMPD, Greenhouse Gases Emissions section, p. 6, final paragraph.)		
PSPP will provide construction jobs for an average and peak workforce of 566 and 1,145, respectively, and approximately 134 jobs during operations. The construction work force Construction and operation of PSPP will provide a boost to the economy from the purchase of major equipment, payroll, and supplies, increased sales tax revenue, and property taxes. Additional indirect economic benefits, such as employment in local service industry jobs and induced employment, will result from these expenditures as well. (PMPD, Socioeconomics section, p. 5.)is expected to be drawn from the Riverside/San Bernardino County region. Most of those jobs will require highly trained workers. (PMPD, Socioeconomics section, p. 3, paragraphs 2 and 4.)		More benefit from PSEGS for construction jobs. The PSEGS will provide construction jobs for an average and peak workforce of 998 and 2,311 respectively. For operations the PSEGS will employee less people with approximately 100 permanent employees.
		At the time of the PSPP, the Bureau of Land Management had not yet designated its Solar Energy Zones. The PSEGS site is within the Riverside East Solar Energy Zone.
		The PSEGS will construct and operate BrightSource Energy second generation power tower technology. BrightSource Energy is committed to developing this second generation technology as a significant step toward developing its third generation technology incorporating thermal storage.

Further, the Commission Final Decision found that:

> "As is discussed in the Alternatives section, none of the project alternatives will significantly reduce the above-referenced project impacts while still meeting the defined project objectives, even though Reconfigured Alternatives #2 and #3, which we have adopted and recommend, reduce

> other significant impacts of the proposed project below the level of significance. The no-project alternative, which would eliminate the project's impacts, would also eliminate its benefits. The distributed solar energy (photovoltaic or thermal) generation and other renewable technologies are required *in addition to* large scale projects such as this in order to meet our renewable energy and GHG policy goals; the two complement, rather than compete with each other. (PMPD, Alternatives section, pp. 39 – 40, findings of fact 2, 4, 5, 6, 7, 8, 9, 10, 11 and 12.)"

The discussion of Alternatives is included in our Opening Testimony on Alternatives. However, it is our opinion that the Commission can make the same finding above for the PSEGS. While Staff has identified that a PV facility may have lower impacts than the PSEGS, for the reasons discussed in our Alternatives Opening Testimony, a PV alternative cannot meet the various project objectives.

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-07C**
Petition For Amendment for the **PALEN SOLAR ELECTRIC GENERATING SYSTEM**	**DECLARATION OF FRED NIALS**

I, Fred Nials, declare as follows:

1. I am an independent consultant currently under contract with Centerline.

2. A copy of my professional qualifications and experience was included with my Opening Testimony and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Biological Resources for the Petition for Amendment for the Palen Solar Electric Generating System (California Energy Commission Docket Number 09-AFC-07C).

4. It is my professional opinion that the attached prepared testimony is valid and accurate with respect to issues that it addresses.

5. I am personally familiar with the facts and conclusions related in the attached prepared testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct to the best of my knowledge and that this declaration was executed on October 6 2013.

Fred Nials

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of: Petition For Amendment for the **PALEN SOLAR ELECTRIC GENERATING SYSTEM**	**DOCKET NO. 09-AFC-07C** **DECLARATION OF ALICE KARL**

I, Alice Karl, declare as follows:

1. I am an independent consultant currently under contract with Centerline.

2. A copy of my professional qualifications and experience was included with my Opening Testimony and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Biological Resources for the Petition for Amendment for the Palen Solar Electric Generating System (California Energy Commission Docket Number 09-AFC-07C).

4. It is my professional opinion that the attached prepared testimony is valid and accurate with respect to issues that it addresses.

5. I am personally familiar with the facts and conclusions related in the attached prepared testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct to the best of my knowledge and that this declaration was executed on 7 October 2013.

Alice E. Karl

Alice Karl

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of: Petition For Amendment for the **PALEN SOLAR ELECTRIC GENERATING SYSTEM**	**DOCKET NO. 09-AFC-07C** **DECLARATION OF MATTHEW STUCKY**

I, Matthew Stucky, declare as follows:

1. I am presently employed by Abengoa Solar LLC as Manager of Business Development.

2. A copy of my professional qualifications and experience was included with my Opening Testimony and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Biological Resources for the Petition for Amendment for the Palen Solar Electric Generating System (California Energy Commission Docket Number 09-AFC-07C).

4. It is my professional opinion that the attached prepared testimony is valid and accurate with respect to issues that it addresses.

5. I am personally familiar with the facts and conclusions related in the attached prepared testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct to the best of my knowledge and that this declaration was executed on October 9 2013.

Matthew Stucky

PALEN SOLAR ELECTRIC GENERATING SYSTEM
BIOLOGICAL RESOURCES
OPENING TESTIMONY

I. Names:

Fred Nials
Dr. Alice E. Karl
Matthew Stucky

II. Purpose:

Our testimony addresses the subject of the Biological Resources associated with the construction and operation of the Palen Solar Electric Generating System (PSEGS) (09-AFC-7C).

III. Qualifications:

Fred Nials: I am presently a consulting geomorphologist and geoarchaeologist and have 45 years of experience performing consulting and teaching at the University level. I have degrees in Geology and a graduate degree in (AbD) Geology, graduate minors in Soils and Ecology, University of Idaho, 1967. My experience includes 28 years teaching at graduate and undergraduate levels (Univ. Nevada, Reno; Washington State Univ., and Eastern NM Univ.) I am an independent consultant to centerline in support of the Petition For Amendment for the PSEGS. I prepared, caused to be prepared or reviewed sections of the Petition For Amendment relating to Geoarchaeology, Biology, and Geology/ Paleontology, as well as the post-filing information, data responses and supplemental filings.

Dr. Alice E. Karl: I am presently the owner of Alice E. Karl and Associates. I have a M.S Degree in Biology and a Ph.D. in Ecology. I have been an environmental consultant since 1978 and have over 35 years of experience working continually in the deserts of the Southwest U.S. and Mexico. I prepared, caused to be prepared, or reviewed the Biological Resources section of the Petition For Amendment, as well as the post-filing information, data responses, and supplemental filings including the Biological Assessment. I also conducted and supervised the surveys for this Amendment.

Matthew Stucky: I am presently Manager of Business Development at Abengoa Solar LLC and have been for the past three (3) years. I have degrees in Civil Engineering and Environmental Studies and a graduate degree in Environmental Engineering. My experience includes managing permitting and compliance activities for the California Energy Commission-

licensed Mojave Solar Project. I prepared, caused to be prepared, or reviewed the Biological Resources section of the Petition For Amendment, as well as the post-filing information, data responses, and supplemental filings.

To the best of our knowledge all referenced documents and all of the facts contained in this testimony are true and correct. To the extent this testimony contains opinions, such opinions are our own. We make these statements and provide these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

IV. Exhibits:

In addition to this written testimony, we are sponsoring the following exhibits in this proceeding.

Exhibit No.	Transaction No.	Document Title
3	68910	**PSH's Petition for Amendment, Biological Resources Section**, dated December 2012, and docketed on December 17, 2012.
4	69471	**PSH's Supplement No. 1**, dated February 2013, and docketed on February 8, 2013.
5	69601	**PSH's Response to Staff's Issue Identification Report**, dated February 19, 2013, and docketed on February 19, 2013.
6	69693	**PSH's Response to Staff's Request for GIS Data**, dated February 27, 2013, and docketed on February 27, 2013.

10	70096	**PSH's Response to CEC Data Request Set 1 (1-18) Responses 1 through 5**, dated March 2013, and docketed on March 25, 2013.
12	70179	**PSH's Status Report 1**, dated March 29, 2013 and docketed on March 29, 2013.
13	70200	**PSH's Supplemental Response to CEC Staff Data Request 5**, dated March 29, 2013, and docketed on March 29, 2013.
14	70242	**PSEGS Winter 2013 Golden Eagle Survey Results**, dated April 8, 2013, and docketed on April 8, 2013.
19	70670	**PSH's Status Report 2**, dated May 8, 2013, and docketed on May 8, 2013.
21	70785	**PSH's Response to Workshop Queries, Responses 1-5 through 1-13 and 3-8 through 3-11**, dated May 2013, and docketed on May 13, 2013.
22	70813	**Email Correspondence Regarding Waters Guidance**, dated May 8, 2013, and docketed on May 13, 2013.

26	70896	**PSH's Response to CEC Staff Data Request Set 2 (19-39), Response 19**, dated May 2013, and docketed on May 20, 2013.
27	70897	**PSH's Summary of Spring Wildlife & Plant Surveys**, dated May 16, 2013, and docketed on May 21, 2013.
32	70991	**PSH's Draft Weed Management Plan**, dated May 28, 2013, and docketed on May 28, 2013.
35	71123	**PSEGS Spring 2013 Golden Eagle Nest Survey Results Interim Report**, dated April 15, 2013, and docketed on June 5, 2013.
36	71131	**PSEGS Summary of Survey for Jurisdictional State Waters**, dated June 5, 2013, and docketed on June 5, 2013.
37	71153	**PSEGS Preliminary Spring 2013 Pre-Construction & Avian Field Survey Results**, dated May 29, 2013, and docketed on June 5, 2013.
38	71154	**Scope of Work for PSEGS Summer 2013 Pre-Construction & Avian Field Surveys**, dated May 8, 2013, and docketed on June 6, 2013.

40	71280	**PSH's Response to CEC Staff Data Request Set 3 (40-72) Responses 40 through 53**, dated June 2013, docketed on June 14, 2013
41	71551	**PSH's Initial Comments on the Preliminary Staff Assessment**, dated July 11, 2013, docketed on July 11, 2013.
47	200009	**PSH's Bat Habitat Assessment**, dated July 22, 2013, docketed on July 23, 2013
48	200010	**PSH's Spring 2013 Avian Survey Results**, dated July 2013, docketed on July 23, 2013
49	200011	**PSH's Supplemental Spring 2013 Biological Surveys**, dated July 2013, docketed on July 23, 2013
50	200012-200030	**PSH's Final Sand Transport Study**, dated July 23, 2013, docketed on July 23, 2013.
57	200077	**PSH's Final Comments on the Preliminary Staff Assessment**, dated July 29, 2013, docketed on July 29, 2013.

58	200085	**PSH's Supplemental Comments on the 7/26/13 Version of Condition of Certification BIO-17**, dated July 30, 2013, docketed on July 30, 2013.
59	200090	**PSH's Status Report 3**, dated July 30, 2013, docketed July 30, 2013.
60	200098	**PSH's Response to Data Request Set 4 (73-89) Responses 73 through 75**, dated July 2013, and docketed on July 31, 2013.
61	200100	**PSH's Supplemental Response to Data Request 40d & 44**, dated July 2013, docketed on July 31, 2013.
62	200115	**PSH's Response to Center for Biological Diversity's Data Requests (1-2)**, dated August 6, 2013, docketed on August 6, 2013.
68	200188	**PSH's Response to Staff's 8/2/13 Email Request**, dated August 13, 2013, docketed on August 13, 2013.
70	200204	**PSH's Lake or Streambed Alteration Agreement Amendment Notification**, dated August 15, 2013, docketed on August 15, 2013.

71	200213	**PSH's Final Sand Transport Study Supplement No.1**, dated August 19, 2013, docketed on August 19, 2013.
72	200268	**Response to Staff's Email Request Regarding Mojave Fringe Toed Lizard GIS Data**, dated August 13, 2013, docketed on August 20, 2013.
75	200463	**Revised-Table I. Estimated Area of Impact Resulting from Construction of PSEGS Facility**, dated September 12, 2013, and docketed on September 12, 2013.

V. Opinion and Conclusions:

We have reviewed the Biological Resources section contained in Part A of the Final Staff Assessment (FSA) and we agree with most of the changes to the Conditions of Certification proposed by Staff. We have provided clarifying changes to Staff's Proposed Conditions of Certification below. While we do not agree with the methodology imposed by Staff for the analysis of avian impacts associated with solar flux, we do agree with Staff on the proposed mitigation. While we do not agree with Staff's conclusion that avian impacts may not be fully mitigated for the reasons outlined in PSH Opening Testimony in Project Description and Overriding Considerations and in PSH Opening Testimony in Alternatives, we request the Commission make a Finding of Override for impacts related to avian species. We also believe that the PSEGS will comply with all applicable laws, ordinances, regulations and standards (LORS).

For the reasons discussed below, we also disagree with Staff's evaluation of indirect impacts to Mojave Fringe Toed Lizard (MFTL) relating to sand transport.

CONDITION OF CERTIFICATION BIO-14

Staff added language to Item 4 to Condition of Certification **BIO-14** to require providing a copy of a Pesticide Use Permit obtained from BLM. As discussed in our Draft Weed Management Plan, PSEGS is not proposing to use Pesticides and therefore will not be obtaining a Pesticide Use Permit. Therefore, we propose the following modification:

4 **Safe Use of Herbicides**. The final Plan shall include detailed specifications for avoiding herbicide and soil stabilizer drift, and shall include a list of herbicides and soil stabilizers that will be used on the Project with manufacturer's guidance on appropriate use and include a copy of the Pesticide Use Permit issued by BLM ***if such permit is required***.

CONDITION OF CERTIFICATION BIO-16b

This Condition of Certification **BIO-16b** is the result of significant productive work by PSH and the Staff and is largely acceptable in its current form. PSH requests minor modifications to clarify the makeup and role of the Technical Advisory Committee (TAC) that Staff added as a new Item 2 to the condition in the FSA.

2. **Formation of a technical advisory committee (TAC)**. The TAC will ***consist of a representative of the CEC, CDFW, USFWS, one representative of the Project Owner involved in operation of the PSEGS and one representative of the Project Owner with environmental compliance responsibilities. The TAC will*** facilitate concurrent project owner, CPM, and state and federal wildlife agency review of seasonal and annual survey results, ***development of a decision-framework for evaluating*** the effectiveness of the adaptive management measures implemented by the project owner, modification of the surveys in response to the results, if necessary, and the identification of additional mitigation responses that are commensurate with the extent of impacts that may be identified in the monitoring studies. A meeting schedule for the TAC will be identified, for regular review of avian and bat injury and mortality monitoring results, and recommend any necessary changes to monitoring, adaptive management, and appropriate dissemination of mitigation funds per BIO-16a #2. The TAC will also assist the CPM in implementing the following provisions #3 - #8.

CONDITION OF CERTIFICATION BIO-17

This Condition of Certification **BIO-17** is also the result of productive work by PSH and Staff with significant input from CDFW. PSH requests one minor clarifying correction. The original language used the term "census"

to describe the type of survey. At PSH's request, Staff deleted all references to "census" except missed deletion of one reference. Therefore, PSH requests deletion of the word "census" in the first sentence of the second paragraph:

> The project owner shall conduct a baseline kit fox ~~census~~ survey and submit a summary report that includes the following procedures:

CONDITION OF CERTIFICATION BIO-29

In the same manner as for the Approved Project, Staff and PSH agree that impacts to MFTL can be divided into two main types. The first type are direct impacts that will take place within the project fenceline and related to the potential of actual ground disturbance. The second type are indirect impacts that would take place outside the project fenceline and, in this case, would be solely related to the interference with the sand transport corridor. PSH and Staff agree on the amount of direct impacts to MFTL. PSH and Staff disagree on the amount of indirect impacts to MFTL.

Staff commissioned a study to evaluate the potential for the PSEGS to interfere with sand transport which generally occurs in the northeastern portion of the site. We believe that Staff has made inappropriately relied on that study and has made some assumptions which has led to a severe overestimation of the project effects on the sand transport corridor. We also believe that Staff has severely overestimated whether those effects would cause actual loss of MFTL habitat.

Impacts to Sand Transport Corridor and Sand Dune Habitat

Staff previously evaluated the Approved Project using a sand transport model (the PWA Model). Staff commissioned an evaluation of the PSEGS using the same PWA model (Lancaster 2013). PSH commissioned a sand transport study which was conducted by Fred Nials. It is important to note that Mr. Nials and Dr. Lancaster (Staff's aeolian expert) agree that the PWA model is inaccurate because of project design changes, flawed assumptions in the original model, and inadequate climate and wind data. For lack of better alternatives, however, the PWA Model parameters were used in the model currently accepted by CEC staff.

The PSEGS project was re-designed specifically to minimize impacts on the wind transport system. Thirty-foot high impermeable wind fences have been replaced by wind-permeable tortoise and chain link fences. To the extent possible, corners and sharp angles in the project perimeter were eliminated to minimize sand trapping, and the perimeter fence was

realigned to more closely parallel prevailing wind direction. Solar troughs have been replaced by heliostats arranged concentrically about two generation towers. The concentric arrangement minimizes the wind blockage profile for a significant part of the heliostat field especially along the critical northeastern boundary and southwestern portion of the project. Water management channels will not be excavated within the heliostat field and the natural relationship of stream orders will be maintained.

PSH does not deny the fact that the PSEGS facility will cause blockage to unimpeded wind flow and sand transport, and that a change from solar trough to heliostat technology results in a change of deposition loci. In order to adequately evaluate potential effects on sand transport, the effects of fences, structures, orchards and agricultural fields in nearby areas were examined in order to see real, not modeled, effects of transport blockage. Based on these observations, extremely conservative estimates of impact on the sand transport system were calculated and a mitigation plan was devised based on the area of more than 50% estimated sand blockage. CEC has performed additional modeling using the PWA Model and arrived at similar estimates of impact to sand transport.

The primary differences between PSH and CEC, then, are evaluations of the nature of effects of sand transport blockage and impact on MFTL habitat, which leads to different proposed amounts of habitat mitigation lands.

As with the original PWA Model, some staff assumptions cannot be substantiated. For example:

ASSUMPTION: Interruption of sand transport by removal of sand automatically and inevitably results in deflation and deflation automatically and inevitably results in loss of MFTL habitat.

RESPONSE: This assumption was challenged by applicant, and the CEC aeolian consultant (Dr. N. Lancaster) agreed that the PWA model is flawed. As discussed in Dr. Lancaster's report at Page 3,

> The PWA Model differs from these and other cellular automation sand transport models in that it does not provide for erosion and/or deposition of sand and therefore does not provide information on how spatial variations in sand transport may affect landforms and associated cultural and biological resources. In addition, the model does not incorporate a time dimension. As described, sand is moved from one cell to another over one time interval only – in this case a year. All other sand transport models incorporate

> multiple time steps so that the distribution of sand evolves over a realistic time period (multiple years) and areas of net erosion and deposition can be identified. There is no feedback between the cells in the PWA model. ***In reality, sand moved from point A to point B may be transferred back to point A, or to other cells depending on the wind direction. No account is taken in the PWA model that sand may be deposited or eroded in a differential manner and pile up to form dunes or be scoured from other areas.***

And at page 4,

> The model therefore predicts the spatial pattern of the degree to which *potential* sand transport is changed by obstacles, ***but it does not provide for the effect such changes may have on the erosion and/or deposition of sand***.

And at Page 21,

> The PWA sand transport model has significant limitations in its abilities to predict where erosion and deposition of sand may occur. Such information is valuable to the Applicant for site design and implantation of any sand control measures that may be needed. It is also valuable for assessing the impacts of infrastructure on habitat for flora and fauna (e.g. the Mojave Fringe Toed Lizard).

Both Mr. Nials and Dr. Lancaster agree that the PWA model predicts that the areas on the northeastern and eastern side of the PSEGS site will have less sand transport. Mr. Nials believes that, for the reasons identified in Dr. Lancaster's report, the model over predicts the effects on the northeastern and eastern boundary of the site.

Further, both experts agree that the potential areas of effect, predicted by the PWA model and shown on Mr. Nials report, do not represent areas of erosion or deflation. They simply represent areas which receive less sand "transported" to them. In other words, despite receiving less sand than before, these areas can continue to maintain sand levels sufficient to support MFTL.

Staff's assumption that sand blockage equates to deflation at a level that cannot support MFTL is simply not supported by the model and is not supported by field observations. While some areas of deflation are likely to occur in Chuckwalla Valley, deflation is not inevitable, nor is it uniform.

Those areas where deflation will occur can be predicted only as generalities—in areas where wind speeds are at a maximum, where vegetation is minimized, and where loose sand exists because of natural or human activities. Without the large amounts of deflation that are stated by Staff, the loss of large amounts of MFTL habitat offsite cannot be presumed simply because of wind blockage of sand. MFTL are loose-sand specialists; this is the most consistent factor identifying fringe-toed lizard habitat in several studies (e.g., Barrows 1997). As long as there is sufficient loose sand in the indirectly affected sand sheets, then MFTL could still occupy them. Other factors such as patch size, grain size, distance to other occupied patches, sand depth, vegetation, exotic species, and patch location have been observed to be important components of fringe-toed lizard habitat. However, even with the well-studied Coachella Valley fringe-toed lizard, the influences of these factors is variable over time (e.g., Barrows and Allen 2007, Barrows 1997) and their contributions or synergistic effects not entirely clear.

Changes to the sand sheets offsite are likely, but the types and degree of changes are very unclear. Given the additional uncertainty associated with habitat requirements of fringe-toed lizards, other than uncompacted sand, it is difficult to state with any certainty that the changes will result in total loss of MFTL habitat as assumed by Staff.

ASSUMPTION: Sand deposited within project boundaries is “locked in place” and permanently removed from the transport system.

RESPONSE: Existing drainage systems already remove minor amounts of sand from Zone 4 within project boundaries by runoff, but at present there is little free sand to remove. Upon installation of the heliostat field, however, larger quantities of sand will be deposited in that area (Figure 1). Most of the sand will be deposited within approximately 1/3 mile of the western project boundary, an area that coincides with one of the larger drainages in the area. Runoff from occasional storms will transport a portion of the deposited sand into potential MFTL habitat. Some storms will produce large amounts of runoff and transport the sand through Zones III and II onto the floor of Palen Dry Lake. Increased sediment load (aeolian sand entrained by runoff) will result in increased deposition outside project boundaries before reaching the playa bottom, however, producing a *de facto* replacement for some sand removed in other areas of the project. This sediment can be subsequently entrained by wind and transported to the sand corridor just as it is today, only in larger quantities.

Therefore, since percentage of sand blockage does not equal deflation it cannot be argued that the resultant habitat would be unsuitable for MFTL, Staff’s indirect impact estimate of 421 acres is not supported. In order to provide a compromise, we have assumed that areas where the input of

sand is predicted to be blocked by 50 percent or more (overestimate) will result in an indirect but significant impact to MFTL habitat. This area is estimated to be 178 acres in accordance with Exhibits 50 and 71. Therefore we recommend that the Committee modify Table 29 in Condition of Certification **BIO-29** to reflect 178 indirect impacts to MFTL with the commensurate mitigation of 89 acres at a 0.5:1 ratio.

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-07C**
Petition For Amendment for the **PALEN SOLAR ELECTRIC GENERATING SYSTEM**	**DECLARATION OF MARY BARGER**

I, Mary Barger, declare as follows:

1. I am an independent consultant currently under contract with Centerline.

2. A copy of my professional qualifications and experience was included with my Opening Testimony and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Cultural Resources for the Petition for Amendment for the Palen Solar Electric Generating System (California Energy Commission Docket Number 09-AFC-07C).

4. It is my professional opinion that the attached prepared testimony is valid and accurate with respect to issues that it addresses.

5. I am personally familiar with the facts and conclusions related in the attached prepared testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct to the best of my knowledge and that this declaration was executed on October 7, 2013.

Mary Barger

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-07C**
Petition For Amendment for the **PALEN SOLAR ELECTRIC GENERATING SYSTEM**	**DECLARATION OF FRED NIALS**

I, Fred Nials, declare as follows:

1. I am an independent consultant currently under contract with Centerline.

2. A copy of my professional qualifications and experience was included with my Opening Testimony and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Cultural Resources for the Petition for Amendment for the Palen Solar Electric Generating System (California Energy Commission Docket Number 09-AFC-07C).

4. It is my professional opinion that the attached prepared testimony is valid and accurate with respect to issues that it addresses.

5. I am personally familiar with the facts and conclusions related in the attached prepared testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct to the best of my knowledge and that this declaration was executed on October 6 2013.

Fred Nials

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of: Petition For Amendment for the **PALEN SOLAR ELECTRIC GENERATING SYSTEM**	**DOCKET NO. 09-AFC-07C** **DECLARATION OF MATTHEW STUCKY**

I, Matthew Stucky, declare as follows:

1. I am presently employed by Abengoa Solar LLC as Manager of Business Development.

2. A copy of my professional qualifications and experience was included with my Opening Testimony and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Cultural Resources for the Petition for Amendment for the Palen Solar Electric Generating System (California Energy Commission Docket Number 09-AFC-07C).

4. It is my professional opinion that the attached prepared testimony is valid and accurate with respect to issues that it addresses.

5. I am personally familiar with the facts and conclusions related in the attached prepared testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct to the best of my knowledge and that this declaration was executed on October 9 2013.

Matthew Stucky

PALEN SOLAR ELECTRIC GENERATING SYSTEM
CULTURAL RESOURCES
OPENING TESTIMONY

I. Names:

Mary Barger
Fred Nials
Matthew Stucky

II. Purpose:

Our testimony addresses the subject of the Cultural Resources associated with the construction and operation of the Palen Solar Electric Generating System (PSEGS) (09-AFC-7C).

III. Qualifications:

Mary Barger: I am presently a cultural resources consultant and a part-time archaeologist with the Bureau of Reclamation and have 37 years of experience performing archaeology, cultural resource management, NEPA and as a tribal liaison. I have a degree in Anthropology. My experience includes working as an archaeologist for state and federal agencies and as the Federal Preservation Officer for Western Area Power Administration and the tribal liaison for Western. I am an independent consultant to centerline in support of the Petition For Amendment for the PSEGS. I prepared, caused to be prepared or reviewed sections of the Petition For Amendment relating to Cultural Resources, as well as the post-filing information, data responses and supplemental filings.

Fred Nials: I am presently a consulting geomorphologist and geoarchaeologist and have 45 years of experience performing consulting and teaching at the University level. I have degrees in Geology and a graduate degree in (AbD) Geology, graduate minors in Soils and Ecology, University of Idaho, 1967. My experience includes 28 years teaching at graduate and undergraduate levels (Univ. Nevada, Reno; Washington State Univ., and Eastern NM Univ. I am an independent consultant to centerline in support of the Petition For Amendment for the PSEGS. I prepared, caused to be prepared or reviewed sections of the Petition For Amendment relating to Geoarchaeology, Biology, and Geology/Paleontology, as well as the post-filing information, data responses and supplemental filings.

Matthew Stucky: I am presently Manager of Business Development at Abengoa Solar LLC and have been for the past three (3) years. I have degrees in Civil Engineering and Environmental Studies and a graduate degree in Environmental Engineering. My experience includes managing

permitting and compliance activities for the California Energy Commission-licensed Mojave Solar Project. I prepared, caused to be prepared, or reviewed the Biological Resources section of the Petition For Amendment, as well as the post-filing information, data responses, and supplemental filings.

To the best of our knowledge all referenced documents and all of the facts contained in this testimony are true and correct. To the extent this testimony contains opinions, such opinions are our own. We make these statements and provide these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

IV. Exhibits:

In addition to this written testimony, we are sponsoring the following exhibits in this proceeding.

Exhibit No.	Transaction No.	Document Title
3	68910	**PSH's Petition for Amendment**, **Cultural Resources Section** dated December 2012, and docketed on December 17, 2012.
4	69471	**PSH's Supplement No. 1**, dated February 2013, and docketed on February 8, 2013.
5	69601	**PSH's Response to Staff's Issue Identification Report**, dated February 19, 2013, and docketed on February 19, 2013.
19	70670	**PSH's Status Report 2**, dated May 8, 2013, and docketed on May 8, 2013.

26	70896	**PSH's Response to CEC Staff Data Request Set 2 (19-39)**, dated May 2013, and docketed on May 20, 2013.
40	71280	**PSH's Response to CEC Staff Data Request Set 3 (40-72)**, dated June 2013, docketed on June 14, 2013
41	71551	**PSH's Initial Comments on the Preliminary Staff Assessment**, dated July 11, 2013, docketed on July 11, 2013.
57	200077	**PSH's Final Comments on the Preliminary Staff Assessment**, dated July 29, 2013, docketed on July 29, 2013.
59	200090	**PSH's Status Report 3**, dated July 30, 2013, docketed July 30, 2013.
64	200118	**PSH's Supplemental Response to CEC Staff Data Requests 54 & 55**, dated August 6, 2013, docketed on August 6, 2013.
65	200148	**PSH's Supplemental Response to CEC Staff Data Request 56**, dated July 11, 2013, docketed August 9, 2013.

66	200170-200184	**PSH's Supplemental Response to CEC Staff Data Request 57**, dated August 12, 2013, docketed on August 12, 2013.
67	200186	**PSH's Revised Supplemental Response to DR 54 & 55**, dated August 13, 2013, docketed on August 13, 2013.

V. Opinion and Conclusions:

We have reviewed the Cultural Resources section contained in Part B of the Final Staff Assessment (FSA) and we agree with most of the changes to the majority of the Conditions of Certification. We have provided the following summary table outlining our ultimate position regarding each of the Conditions of Certification.

CONDITION OF CERTIFICATION	PURPOSE OF CONDITION	PSH POSITION	ACTION REQUESTED
CUL-1	Staff identifies that the purpose of the condition is to partially mitigate potential visual impacts to the Pacific to Rio Grande Trails Landscape (PRGTL) associated with amending the project to utilize the PSEGS tower technology.	Disagree that the Amendment to utilize the PSEGS tower technology results in significant impacts as described by Staff.	Reject Staff's revisions to **CUL-1** for the reasons discussed below and affirm the original **CUL-1** already adopted by the Commission in the Final Decision for the Approved Project.
CUL-2	Mitigation for cumulative contribution to impacts associated with the Desert Training Center Landscape (DTCL).	Agree with FSA.	Adopt Staff's minor modifications to **CUL-2.**
CUL-3	Specifies requirements form Cultural Resources Personnel.	Agree with FSA.	Adopt Staff's minor modifications to **CUL-3.**
CUL-4	Specifies project documentation	Agree with FSA.	Adopt Staff's minor modifications to

			CUL-4.
CUL-5	Cultural Resources Monitoring and Mitigation Plan.	Agree with FSA.	Adopt Staff's minor modifications to **CUL-5.**
CUL-6	Cultural Resources Report.	Agree with FSA.	No change proposed by Staff to **CUL-6.**
CUL-7	Worker Environmental Awareness Program.	Agree with FSA.	No change proposed by Staff to **CUL-7.**
CUL-8	Construction Monitoring Program.	Agree with Staff's complete re-write of this condition.	Replace **CUL-8** in Final Decision with Staff's **CUL-8** in the FSA.
CUL-9	Authority to Halt Construction and Treatment of Discoveries.	Agree with FSA.	No change proposed by Staff to **CUL-9.**
CUL-10	Flag and Avoid significant cultural resources on the transmission line or new discoveries if possible.	Agree with FSA.	Adopt Staff's minor modifications to **CUL-10.**
CUL-11	Data Recovery For Simple Prehistoric Sites.	Request minor clarifying modification to make Verification language consistent with the Condition language.	Adopt Staff's minor modifications to **CUL-11** as modified below.
CUL-12	Data Recovery For Complex Prehistoric Sites.	Request minor clarifying modification to make Verification language consistent with the Condition language.	Adopt Staff's minor modifications to **CUL-12** as modified below.
CUL-13	Data Recovery For Historic Period Refuse Scatters.	Request minor clarifying modification to make Verification language consistent with the Condition language.	Adopt Staff's minor modifications to **CUL-13** as modified below.
CUL-14	Data Recovery For Historic Period Sites With Features.	Request minor clarifying modification to make Verification language consistent	Adopt Staff's minor modifications to **CUL-14** as modified below.

		with the Condition language.	
CUL-15	Data Recovery on Historic Period Roads.	Agree with FSA.	Adopt Staff's minor modifications to **CUL-15.**
CUL-16	Compliance with the BLM Programmatic Agreement.	Disagree that the Amendment or changed circumstances require deletion of **CUL-16.**	For the reasons discussed below, reject Staff's deletion of **CUL-16.**
CUL-17	To mitigate for potential visual impacts to the Ironwood Mining District from Amending the project to use the PSEGS tower technology.	Disagree that the Amendment to utilize the PSEGS tower technology results in significant impacts as described by Staff.	Reject Staff's addition of **CUL-17** for the reasons discussed below.

CONDITION OF CERTIFICATION CUL-1

PSH strongly disagrees with Staff's assertion that the Amendment to the PSEGS results in significant interference with the viewshed to warrant rendering the loss of integrity to its new identified cultural landscape, the Chuckwalla portion of the Pacific to Rio Grande Trail Landscape (PRGTL). The Staff has modified the position held throughout the licensing of the Approved Project that the resource evaluated was the Prehistoric Trail Network Landscape (PTNL).

In order to establish that a proposed action results in a significant impact under the California Environmental Quality Act (CEQA) it is required and common practice to establish a Threshold of Significance (TOS). If the proposed action results in an effect that is above that TOS then it will result in significant impacts. If the effect is below the TOS then it will not result in significant impacts. It is this fundamental theory that allows an **objective analysis** to occur rather than a **subjective** one.

Additionally, it is important to understand what the proposed action being evaluated is. In this case, Staff fails to clearly outline that the proposed action is an Amendment to the Commission Final Decision which Approved the PSPP. Staff's entire justification for including Condition of Certification **CUL-1** is based solely on the change in visibility relating to changing technology from solar trough to the two units of power tower. Yet Staff fails to use the difference in visibility map provided by PSH as Exhibit 25 and the full Visual Resource Analysis provided in Exhibit 34. Exhibit 25 provides a clear delineation of where the PSEGS can now be seen **in areas where the Approved Project was not visible.** Staff

should be focusing on this change in visibility for its analysis of whether the change in visibility creates new or different impacts on cultural resources. To assist the Commission, we have prepared a map that identifies Staff's areas of concerns overlaid with the change in visibility areas, attached to this Testimony.

Threshold of Significance

We agree with Staff that the TOS for evaluating an impact is whether the proposed action has an effect so substantial to destroy the integrity of the characteristic for which the resource being evaluated can be potentially listed. For an evaluation of the PSEGS increased visibility on the integrity of the PRGTL, it is important to note that the analysis should include all the other industrial visible sources that exist today as well as the Approved Project.

Staff states that the PRGTL integrity is not affected by the visual effects from existing solar projects, roads, transmission lines, Eagle Mine, etc., nor would it be affected by the Approved Project. To be clear, these facilities include the Genesis Solar Energy Project, the Desert Harvest Solar Project, the Desert Sunlight Energy Project, the Red Bluff Substation, several high voltage transmission lines, Interstate-10 and its vehicular traffic, the Town of Desert Center, including its raceway and airport, and other developments that can be seen from the mountaintops identified by Staff. This analysis must also include the projected visibility of the Approved Project.

In direct contrast, the FSA (page 4.3-165) states, "The cultural resources analysis for the original licensing case already found the cumulative impact of the original project on the relatively small inventory of prehistoric and historical archaeological resources on the then-proposed facility site to be cumulatively considerable and not mitigable to a less than significant level." In the same paragraph, Staff argues that the amended project has the potential to cumulatively impact "ethnographic and archaeological resources" over an area of "452,000 acres" which is a justification for visual degradation. It would appear Staff feels that the change to solar power tower technology alone is enough to tip the balance to a much larger area, which includes the viewshed for the original permitted project.

In other words, Staff is saying that the increased visibility shown on attached map is enough to completely destroy the integrity of the PRGTL which would be eligible for listing if the Approved Project was constructed but would not be eligible for listing if the PSEGS is constructed. Staff reaches this conclusion without providing any objective analysis or specificity as to how and why the change to the PSEGS suddenly results

in an effect that is above that TOS. Staff just jumps to this end when there simply is no nexus or support for that conclusion.

The National Park Service (NPS) in Bulletin 34 has defined seven aspects of integrity to assist in determining the eligibility of a property: location, design, setting, materials, workmanship, feeling and association. In the FSA, Staff states that the integrity of the setting, feeling and association has been lost for the PRGTL due to the pronounced visual effects from the proposed project. Assessing visual effects on an historic property can be difficult and relies primarily on a subjective analysis. To remove subjectivity, it is important to determine how an historic property conveys its significance. Adding features to a landscape can have a cumulative effect, but determining at what point the cumulative effect is an impact is subjective. For example, Stonehenge is a known World Heritage Site and has a trunk road, A303, constructed less than 300 feet from it (see picture). It is still be appreciated by the public even with the visual and auditory intrusion from a major highway. Other examples include the Mission San Juan Capistrano in Orange County, California and the Alamo near downtown San Antonio, Texas.

NPS Bulletin 6A defines integrity as "the authenticity of a property's historic identity, evidenced by the survival of physical characteristics that existed during the property's prehistoric or historic period." The geological features, springs, vegetation, drainages, and valley floor are still intact in the Chuckwalla Valley. This landscape is still recognizable as the Chuckwalla Valley, even with the construction of the proposed project. Line-of-sight would not be significantly affected by the solar power towers. Following any trail segments would be relatively easy due to the visible horizon (see KOP 3 Coxcomb Mountains; KOP 8 Dragon Wash; KOP 12 Chuckwalla Mountain; and KOP 15 Palen/McCoy). In addition, trail markers (cairns) are still visible in many areas as well as segments of many trails that are located in desert pavement. Other physical characteristics still evident include archaeological sites and petroglyphs.

The visual impacts from the proposed project within the viewshed vary from a person's position in the landscape, the direction in which this person is heading and the practice that is being performed. Trails to different contributing elements for the PRGTL head away from the main trail system which tracks from east to west, so a trail leading to McCoy Springs would have no visual effects, and the last 15 miles (going from east to west) to Big Wash or Dragon Wash would not have the visual effects of the project.

National Register Bulletin 15 states that a property needs to possess integrity in all seven aspects, but "to retain historic integrity… will always possess several, and usually, most of the aspects." Staff is proposing that

only three of the seven aspects are affected: setting, feeling and association. To meet the eligibility requirements for the California Register of Historical Resources, a site must meet one of four criteria. Staff considers two of these criteria which have been met will be impacted by the proposed project. Staff argues that feeling and association, for Criterion 1, would be affected whereby the landscape could no longer convey unique historic events. Staff argues that setting, for Criterion 3, would be affected for petroglyph sites. Petroglyph sites tend to be located near springs and washes. However, the solar towers are not visible from some if not most of the petroglyph panels at Corn Springs, most of McCoy Springs and parts of Dragon Wash. A visitor to these petroglyph sites tends to look at the petroglyphs themselves, not the viewshed or the horizon. As a result, the experience at the petroglyphs is not affected by the solar towers, especially for Big Wash and Dragon Wash (KOP 7 and KOP 8) which fall into the seldom seen range. KOP 7, Big Wash, is a mile or two closer than McCoy Springs, so it is likely McCoy Springs is also in the seldom seen category.

Therefore, we request the Commission reject Staff's impact analysis and instead find that the PSEGS would result in similar cumulative impacts to cultural resources as the Approved Project, and in the Visual Resources section find that the PSEGS will result in significant and unmitigatable impacts to Visual Resources, a similar finding to the Approved Project.

Staff's addition of Condition of Certification **CUL-1** is also burdensome, requires uncapped mitigation and requires millions of dollars' worth of unwarranted surveying. For example,

- The condition requires surveys that may involve over a hundred square miles and that could take up to 200 days with multiple personnel to complete.

- The condition requires contribution to a special fund set up for revising a field manual but does not provide the amount of money required nor any financial cap.

- The condition requires funding of a steering committee without any cap and allows the steering committee to develop an unspecified compensation to those who ascribe heritage values to the resources without any direction, amount of money required or financial cap.

Uncapped financial obligations are not only unfinanceable but indefensible when the Commission is asked what relation the mitigation bears to the impact. Staff fails to provide any nexus between the impacts claimed and

the mitigation required. In fact, Staff is clear that even with the mitigation imposed by **CUL-1** the impacts are immitigable.

Since the Amendment to the PSEGS does not create the impacts to the Staff newly identified PRGTL, Condition of Certification **CUL-1** should be deleted and the Commission should reinstate **CUL-1** for the Approved Project as mitigation for the PSEGS cumulative contribution to effects on the PTNL.

CONDITION OF CERTIFICATION CUL-11

PSH provided the following comment in its Final Comments on the PSA and since it was rejected by Staff, renews its request.

Condition of Certification **CUL-11** was developed to ensure that certain sites were further evaluated and, if necessary, data recovery was performed ***prior to construction that could potentially disturb them***. However, the verification is inconsistent with the condition language which allows construction to take place elsewhere for the project as long as the activities were not within 30 meters of the potential sites. PSH proposed in its Initial Comments to simply modify the verification language to be consistent with the language in the condition. At the Workshops, Staff explained that it wanted to revisit the concept of allowing construction to occur within 30 meters of a site that would need additional evaluation pursuant to the condition and indicated that it may modify the condition to provide an interim analysis step to determine whether the buffer distance should be 30 meters of some other distance.

As described in the FSA, Staff simply rejected the concept that construction could take place on the site in the manner currently allowed by the Condition of Certification for the Approved Project. Specifically, the Approved Condition of Certification includes the language

> If allowed by BLM, prior to **ground disturbance within 30 meters of the site boundaries of each of these sites**, the project owner shall ensure that the CRS, the PPA and/or archaeological team members implement the plan, which, for sites where CARIDAP does not apply, shall include, but is not limited to the following tasks: (**emphasis added)**

The Commission allowed this specific language for the Approved Project even though the Approved Project involved mass grading across the site involving cuts and fills in excess of 4.5 million cubic yards. Yet Staff refuses to acknowledge that construction on the site for the PSEGS, which involves 22.5 times less grading than the Approved Project, poses less risk to these sites. In fact, with the additional survey work, geoarchaelogy

studies, and on-site trenching that have been performed since the original Final Decision to support the PSEGS, there has been no scientific reason associated with the amendment to the PSEGS that the Commission should remove the flexibility previously adopted by the Commission in the Final Decision.

For this exact reason that Staff has changed its interpretation of the Approved Condition language and approach, we request the specific direction be also included in the Verification in the manner outlined below:

1. At least 45 days prior to ground disturbance **within 30 meters of the "prehistoric sites"**, the project owner shall notify the CPM that data recovery for small sites has ensued.

In addition, with the additional survey work performed in support of the Amendment for the PSEGS, it is clear that Site SMP-P-2018 is simple prehistoric site without features and therefore it should be removed from Condition of Certification **CUL-12** and added to the list of sites in **CUL-11**.

CONDITION OF CERTIFICATION CUL-12

As discussed above, Staff rejected PSH's request to modify the Verification language of Condition of Certification **CUL-12** so that it is consistent with the language contained in the actual condition. For the reasons discussed under Condition of Certification **CUL-11** above, we request the following modification to the Verification.

1. At least 45 days prior to ground disturbance **within 30 meters of the "complex PreHistoric sites"**, the project owner shall notify the CPM that data recovery for large complex sites has ensued.

As discussed above, Site SMP-P-2018 should be deleted from Condition of Certification **CUL-12** and added to the list of sites in **CUL-11**. In addition, the additional 2013 archaeological surveys and field checks performed in support of the Amendment for the PSEGS identified two new prehistoric sites with features. These sites, MH-009 and MH-010 should be added to the list of sites outlined in the Condition of Certification **CUL-12.**

CONDITION OF CERTIFICATION CUL-13

As discussed above, Staff rejected PSH's request to modify the Verification language of Condition of Certification **CUL-13** so that it specifically expresses that construction activities that have no potential to

disturb these sites can proceed prior to implementation of the condition. This would be consistent with the other Conditions of Certification which allow that flexibility. For the reasons discussed under Condition of Certification **CUL-11** above, we request the following modification to the Verification.

1. At least 45 days prior to ground disturbance **within 30 meters of the "Historic Period Refuse Scatters"**, the project owner shall notify the CPM that mapping and upgraded artifact analysis has ensued on the historic-period refuse scatter sites.

In addition, the additional 2013 archaeological surveys and field checks performed in support of the Amendment for the PSEGS identified eleven new historic refuse scatters that may date to the time period of the Desert Training Center Cultural Landscape. These sites, MH-001, MH-002, MH-003, MH-006, MH-008, MH-010, MH-011, MH-012, MH-013, MH-014, and MH-015 should be added to the list of sites outlined in the Condition of Certification **CUL-12.**

CONDITION OF CERTIFICATION CUL-14

As discussed above, Staff rejected PSH's request to modify the Verification language of Condition of Certification **CUL-14** so that it specifically expresses that construction activities that have no potential to disturb these sites can proceed prior to implementation of the condition. This would be consistent with the other Conditions of Certification which allow that flexibility. For the reasons discussed under Condition of Certification **CUL-11** above, we request the following modification to the Verification.

1. At least 45 days prior to ground disturbance **within 30 meters of the "Historic Period Sites with Features"**, the project owner shall notify the CPM that mapping and upgraded artifact analysis has ensued on the historic-period sites with features.

During the August 2013 surveys to support the Amendment to the PSEGS, one historic site with two features was recorded. This site, MH-007, is an artifact concentration of cans, glass, a kerosene lamp and two lids to a wood stove. The second feature is a hearth with rocks slightly buried and historic artifacts around it. Numerous other historic artifacts are present including oil cans. This site should be added to this condition.

CONDITION OF CERTIFICATION CUL-16

Staff deleted Condition of Certification **CUL-16** over PSH's and BLM's objection. At the PSA Workshops, BLM expressed a strong preference that this condition be left in place. PSH supports inclusion of the condition because it provides clear direction if there is a dispute between Commission and BLM Staff when it comes to compliance with federal requirements applicable to cultural resources and requests. Staff is incorrect in its assertion that the reason for its inclusion for the Approved Project was related to coordination on the joint documents. The reason for its inclusion is to simply recognize that when it comes to implementation of cultural resource requirements under the PA on BLM managed land, BLM is the final arbiter.

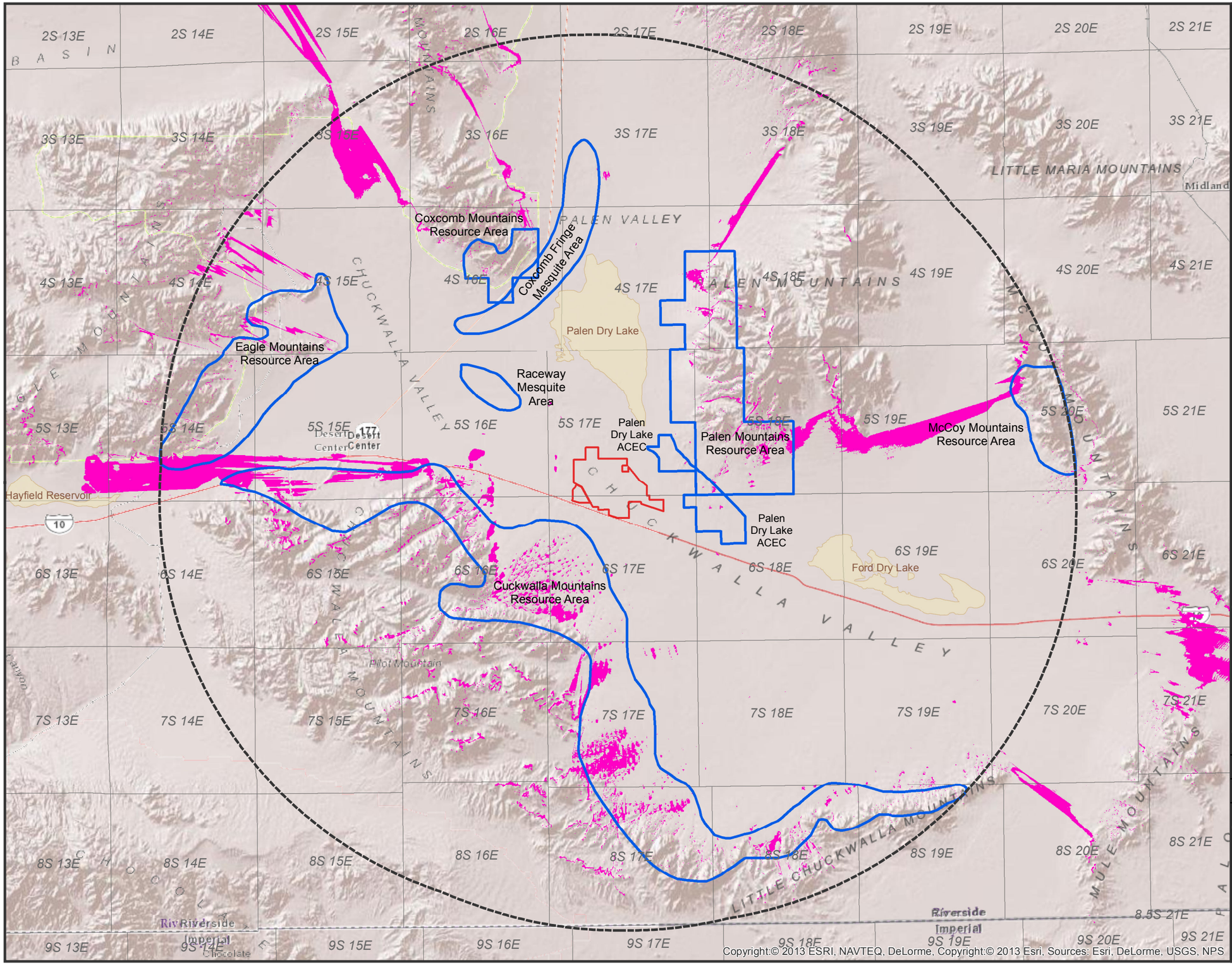
CONDITION OF CERTIFICATION CUL-17

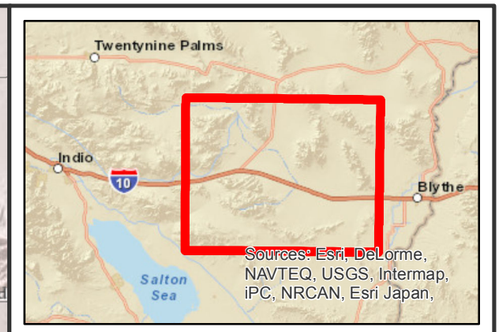
Staff has added a new burdensome and costly Condition of Certification **CUL-17** that was not required for the Approved Project and was not included in the PSA. Compliance with **CUL-17** would require PSH to survey 10 square miles to mitigate potential visual impacts to the Ironwood Mining District. For the reasons discussed below, Staff has provided no evidence that the PSEGS Amendment provides any impact due to visual degradation to the Ironwood Mining District and Condition of Certification **CUL-17** should be deleted.

As discussed in PSH's objection to Condition of Certification **CUL-1** above, any evaluation of impacts must consider whether the proposed action, in the case modifying the technology to include the two power towers, would significantly impact any attribute of a cultural landscape or resource in such a way as to prevent the landscape or resource from retaining enough of that attribute to be eligible for listing. Staff opines that the Ironwood Mining District would be eligible for listing under all the Criteria yet provides no analysis of why it comes to that conclusion. This assumption fails to take into account that the significance of the Ironwood Mining District if it was evaluated for listing would be related to subsurface geologic materials and mining methods. Subsurface geology and mining methods are completely unrelated to the viewshed. Notwithstanding the fact that the addition of the towers to the PSEGS increase the visibility of the PSEGS from portions of the Ironwood Mining District, a very small amount above the Approved Project, there simply is no impact to the eligibility of the Ironwood Mining District caused by the visibility of project components.

Equating visibility with a significant impact on any cultural resource that could be potentially listed lacks any nexus to tie the impact to the threshold of significance. This approach is inconsistent with CEQA and should be rejected. If this approach were to be applied, any industrial development would be automatically considered to be a significant impact from any resource that could be listed for any reason even if that resource's potential significance is unrelated to the surrounding viewshed. A perfect example of this is the Town of Desert Center. There are historic buildings in the Town of Desert Center that may be eligible for listing. But simply being located in an area where the PSEGS can be viewed from that building would not render the building no longer eligible for listing unless it was the viewshed that was an important characteristic of why the building was eligible.

Therefore, we request the Commission not set the harmful precedence implied by Staff's lack of nexus analysis between the effect and the characteristic of the resource. The Commission should reject finding of impact to the Ironwood Mining District and delete Condition of Certification **CUL-17** as unwarranted.





CUL-1 Geographic Extent

Legend

- PSEGS 17-Mile Buffer
- CUL-1 Resource Areas
- PLSS Township/Range
- PSEGS Project Site Boundary
- Visibible Area

RESOURCE AREA NAME	ACRES	Sq MILES
Palen Mountains Resource Area	19,669	30.7
Eagle Mountains Resource Area	16,874	26.4
Coxcomb Mountains Resource Area	3,705	5.8
Coxcomb Fringe Mesquite Area	7,926	12.4
Raceway Mesquite Area	1,703	2.7
McCoy Mountains Resource Area	4,825	7.5
Cuckwalla Mountains Resource Area	54,924	85.8
Palen Dry Lake ACEC	3,614	5.6

N W E S

Scale: 1:250,000

0 2.5 5 Miles

Scale correct when printed at 11x17

This map is for planning purposes only. The information herein was compiled from multiple sources and is considered to be reliable, however no representation is made concerning the accuracy of the data.

Project:	PSEGS	
Date:	09-30-2013	Figure No:
Revision:	A	1
Prepared By:	NS	

BrightSource

BrightSource Energy, Inc.
1999 Harrison Street, Suite 2150
Oakland, CA 94612

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of: Petition For Amendment for the **PALEN SOLAR ELECTRIC GENERATING SYSTEM**	**DOCKET NO. 09-AFC-07C** **DECLARATION OF GREGORY DARVIN**

I, Gregory Darvin, declare as follows:

1. I am presently the owner of Atmospheric Dynamics, Inc..

2. A copy of my professional qualifications and experience was included with my Opening Testimony and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Public Health for the Petition for Amendment for the Palen Solar Electric Generating System (California Energy Commission Docket Number 09-AFC-07C).

4. It is my professional opinion that the attached prepared testimony is valid and accurate with respect to issues that it addresses.

5. I am personally familiar with the facts and conclusions related in the attached prepared testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct to the best of my knowledge and that this declaration was executed on October 8, 2013.

Gregory Darvin

PALEN SOLAR ELECTRIC GENERATING SYSTEM
PUBLIC HEALTH
OPENING TESTIMONY

I. Name:

Gregory Darvin

II. Purpose:

My testimony addresses the subject of Public Health associated with the construction and operation of the Palen Solar Electric Generating System (PSEGS) (09-AFC-7C).

III. Qualifications:

Gregory Darvin: I am presently employed at Atmospheric Dynamics and have been for the past 10 years. I have a Graduate Degree in Atmospheric Science and I have 25 years of experience in air quality meteorology, dispersion model development and application, and air quality consulting. I prepared the Public Health section of the Petition For Amendment, as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is presented in my resume, which is included in Attachment A to this Opening Testimony package.

To the best of my knowledge all referenced documents and all of the facts contained in this testimony are true and correct. To the extent this testimony contains opinions, such opinions are my own. I make these statements and provide these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

IV. Exhibits

In addition to this written testimony, I am sponsoring the following exhibits in this proceeding.

Exhibit No.	Transaction No.	Document Title
3	68910	**PSH's Petition for Amendment, Public Health Section**, dated December 2012, and docketed on December 17, 2012.

7	69909	**PSH's Supplement No. 2 - Complete Air Quality and Public Health Sections**, dated March 13, 2013, and docketed on March 13, 2013.
21	70785	**PSH's Response to Workshop Queries, Response 2-3**, dated May 2013, and docketed on May 13, 2013.
43	71692	**PSEGS Air Quality Health Risk Assessment Modeling Files**, dated June 2013, docketed on July 18, 2013.
45	71690	**PSH's Revised Supplement No. 2 - Complete Air Quality and Public Health Sections**, dated July 19, 2013, docketed on July 19, 2013.
55	200046	**PSH's Response to Data Requests 78-81**, dated July 26, 2013, docketed on July 26, 2013.
56	200048	**Record of Conversation between G. Darvin & A. Chu Regarding Palen HRA with Mirror Washing - Reduced Risk Values in Table**, dated July 26, 2013, docketed on July 26, 2013.
60	200098	**PSH's Response to Data Request Set 4 (73-89), Responses 78 through 81**, dated July 2013, docketed on July 31, 2013.

V. Opinion and Conclusions

I have reviewed the Public Health section contained in Part A of the Final Staff Assessment and I agree with the Proposed Condition of Certification. I also agree that with incorporation of the Proposed Condition of Certification, the PSEGS will not result in significant Public Health impacts and will comply with all applicable Public Health-related laws, ordinances, regulations and standards (LORS).

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of: Petition For Amendment for the **PALEN SOLAR ELECTRIC GENERATING SYSTEM**	**DOCKET NO. 09-AFC-07C** **DECLARATION OF MATTHEW STUCKY**

I, Matthew Stucky, declare as follows:

1. I am presently employed by Abengoa Solar LLC as Manager of Business Development.

2. A copy of my professional qualifications and experience was included with my Opening Testimony and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Traffic & Transportation for the Petition for Amendment for the Palen Solar Electric Generating System (California Energy Commission Docket Number 09-AFC-07C).

4. It is my professional opinion that the attached prepared testimony is valid and accurate with respect to issues that it addresses.

5. I am personally familiar with the facts and conclusions related in the attached prepared testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct to the best of my knowledge and that this declaration was executed on October 9 2013.

Matthew Stucky

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of: Petition For Amendment for the **PALEN SOLAR ELECTRIC GENERATING SYSTEM**	**DOCKET NO. 09-AFC-07C** **DECLARATION OF CHARLES TURLINSKI**

I, Charles Turlinski, declare as follows:

1. I am presently employed by BrightSource Energy, Inc. as Director of Project Development.

2. A copy of my professional qualifications and experience was included with my Opening Testimony and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Traffic & Transportation for the Petition for Amendment for the Palen Solar Electric Generating System (California Energy Commission Docket Number 09-AFC-07C).

4. It is my professional opinion that the attached prepared testimony is valid and accurate with respect to issues that it addresses.

5. I am personally familiar with the facts and conclusions related in the attached prepared testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct to the best of my knowledge and that this declaration was executed on 10/8 2013.

Charles Turlinski

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of: Petition For Amendment for the **PALEN SOLAR ELECTRIC GENERATING SYSTEM**	**DOCKET NO. 09-AFC-07C** **DECLARATION OF RAFAEL COBIAN**

I, Rafael Cobian, declare as follows:

1. I am presently employed by Fehr and Peers as a Senior Transportation Engineer.

2. A copy of my professional qualifications and experience was included with my Opening Testimony and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Traffic & Transportation for the Petition for Amendment for the Palen Solar Electric Generating System (California Energy Commission Docket Number 09-AFC-07C).

4. It is my professional opinion that the attached prepared testimony is valid and accurate with respect to issues that it addresses.

5. I am personally familiar with the facts and conclusions related in the attached prepared testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct to the best of my knowledge and that this declaration was executed on October 8, 2013.

Rafael Cobian

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of: Petition For Amendment for the **PALEN SOLAR ELECTRIC GENERATING SYSTEM**	**DOCKET NO. 09-AFC-07C** **DECLARATION OF DAN FRANCK**

I, Dan Franck, declare as follows:

1. I am presently employed by BrightSource Energy Inc. as Manager of O&M.

2. A copy of my professional qualifications and experience was included with my Opening Testimony and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Traffic & Transportation for the Petition for Amendment for the Palen Solar Electric Generating System (California Energy Commission Docket Number 09-AFC-07C).

4. It is my professional opinion that the attached prepared testimony is valid and accurate with respect to issues that it addresses.

5. I am personally familiar with the facts and conclusions related in the attached prepared testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct to the best of my knowledge and that this declaration was executed on 10/7 2013.

Dan Franck

Dan Franck

PALEN SOLAR ELECTRIC GENERATING SYSTEM
TRAFFIC AND TRANSPORTATION
OPENING TESTIMONY

I. Names:

Matthew Stucky
Charlie Turlinski
Rafael Cobian
Dan Franck

II. Purpose:

Our testimony addresses the subject of Traffic and Transportation associated with the construction and operation of the Palen Solar Electric Generating System (PSEGS) (09-AFC-7C).

III. Qualifications:

Matthew Stucky: I am presently Manager of Business Development at Abengoa Solar LLC and have held this position for the past three (3) years. I have degrees in Civil Engineering and Environmental Studies and a graduate degree in Environmental Engineering. My experience includes managing the permitting and compliance activities for the California Energy Commission-licensed Mojave Solar Project. I prepared, caused to be prepared, or reviewed the Traffic and Transportation section of the Petition For Amendment, as well as the post-filing information, data responses and supplemental filings.

Charles Turlinski: I am currently employed by BrightSource Energy Inc. and I am a developer of utility scale renewable energy projects with ten (10) years' experience. I have managed the development and interconnection processes for wind and solar projects throughout the country, including the negotiation and execution of Large Generator Interconnection Agreements for over 1000 megawatts of capacity in the CAISO. I have a MBA from the Massachusetts Institute of Technology. I prepared, caused to be prepared, or reviewed the Traffic and Transportation section of the Petition For Amendment, as well as the post-filing information, data responses and supplemental filings.

Rafael Corbin: I am currently employed as a Senior Transportation Engineer with Fehr and Peers. I have a Bachelor's degree in Civil Engineering and have over five (5) years of experience in performing various transportation analyses including traffic studies. I am a Registered Professional Engineer in Traffic Engineering in the State of California. I prepared the traffic analysis and Data Responses for the Petition For

Amendment, as well as supplemental filings related to construction and operation traffic analyses.

Daniel Franck: I am the Manager of O&M for the Solar Steam Plant at Coalinga and for the Ivanpah Solar Electric Generating System (ISEGS). I am responsible for the operations of the Coalinga Plant and startup at ISEGS. I was also the Site Manager for the Solar to Steam Coalinga plant for BrightSource Energy Inc. from 2012-2013 and the Site Manager for the BSII Solar Energy Development Center (SEDC) from 2008 -2011, responsible for their operations I prepared the glint and glare analysis and glint and glare-related Data Responses for the Petition For Amendment.

Detailed descriptions of our qualifications are presented in the resumes which are included in Attachment A to this Opening Testimony package.

To the best of our knowledge all referenced documents and all of the facts contained in this testimony are true and correct. To the extent this testimony contains opinions, such opinions are our own. We make these statements and provide these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

IV. Exhibits:

In addition to this written testimony, we are sponsoring the following exhibits in this proceeding.

Exhibit No.	Transaction No.	Document Title
3	68910	**PSH's Petition for Amendment, Traffic and Transportation Section**, dated December 2012, and docketed on December 17, 2012.
10	70096	**PSH's Response to CEC Data Request Set 1 (1-18), Responses 9 through 17**, dated March 2013, and docketed on March 25, 2013.
40	71280	**PSH's Response to CEC Staff Data Request Set 3 (40-72)**, **Responses 58 through 69,** dated June 2013, docketed on June 14, 2013

41	71551	**PSH's Initial Comments on the Preliminary Staff Assessment, Traffic and Transportation**, dated July 11, 2013, docketed on July 11, 2013.
42	71554	**Response to Staff's Email Request Regarding Traffic & Transportation**, dated July 11, 2013, and docketed on July 11, 2013.
44	71688	**PSH's Supplemental Response to Data Request 14 ; Traffic Study Update**, dated July 3, 2013, docketed on July 19, 2013
57	200077	**PSH's Final Comments on the Preliminary Staff Assessment**, **Traffic and Transportation,** dated July 29, 2013, docketed on July 29, 2013.
59	200090	**PSH's Status Report 3**, dated July 30, 2013, docketed July 30, 2013.
63	200116	**Supplemental Traffic Data Information Requested by Staff in 7/31/13 Email**, dated August 5, 2013, docketed on August 6, 2013.
69	200190-200196	**Response to Traffic Questions from CEC and CalTrans**, dated August 13, 2013, and docketed on August 14, 2013.

73	200371	**FAA Determinations of No Hazard to Air Navigation**, dated July 18, 2013, docketed on August 29, 2013.
74	200381	**Response to Staff's Email Request Regarding Palen Operations Traffic**, dated on August 19, 2013, docketed on August 30, 2013.

V. Opinion and Conclusions:

We have reviewed the Traffic and Transportation section contained in Part A of the Final Staff Assessment (FSA) and we agree with Staff's Proposed Conditions of Certification, as modified below. We further agree that with incorporation of the Proposed Conditions of Certification, as modified below, PSEGS will not result in significant Traffic and Transportation impacts and will comply with all applicable Traffic and Transportation-related laws, ordinances, regulations and standards (LORS).

CONDITION OF CERTIFICATION TRANS-1

Staff modified the Condition of Certification adopted by the Commission in the Final Decision by adding a new requirement to the Traffic Control Plan (TCP). Specifically, Staff added the requirement that the Traffic Control Plan be required to ensure that the intersection at Corn Springs Road and I-10 always operate at Level of Service (LOS) C or better when no such requirement existed in the original condition. While PSH acknowledges that the peak and average construction traffic have increased, this increase does not warrant the additional requirement. The original condition included, and Staff's proposed condition continues to include, a more appropriate and measurable standard. Specifically, the condition states that the TCP shall use:

> "one or more of the following measures designed to prevent stacking: staggered work shifts, off-peak work schedules, and/or restricting travel to and departures from each project site to 10 or fewer vehicles every three minutes".

We disagree with replacement of the vehicle based performance standard with Staff's new LOS C performance standard (LOS Standard) for the following reasons. While the project-related vehicle trips are a part of the LOS Standard, project-related trips are not the only component. Even if

PSEGS adds zero vehicle trips, the LOS may fall below LOS C due to other traffic at the intersection. We believe it is unreasonable to impose a LOS Standard that could be impossible to comply with even when the project is not adding any vehicle trips to the intersection.

The performance standard contained in the Condition of Certification for the Approved Project is based on limiting the actual Project Vehicle Trips (PVT Standard). This is a requirement which is quantifiable as it can easily be checked (i.e., cameras) for project trips and more importantly is under the direct control of the Project Applicant. The LOS based requirement will not be instantaneously quantifiable, as it will require traffic counts to be taken and an engineer to perform LOS analysis, which can take a few days from data collection to analysis and results. Furthermore, as noted above, the LOS may be worse than LOS C even with no project traffic being added. Setting a vehicle based performance standard is immediately quantifiable, enforceable, and will directly mitigate the PSEGS's traffic. Therefore we propose the following modifications to the first two bullets of Condition of Certification **TRANS-1**:

- A work schedule designed to ensure that stacking does not occur at intersections necessary to enter and exit the project site.~~,~~ **~~and that LOS at these intersections and on I-10 remains at LOS C or better.~~**

- A plan for monthly monitoring of traffic volume and/or delay ~~and LOS~~ at study roadways and intersections during periods of higher construction employment (Months 19 through 25, including Month 22, the peak construction month).

CONDITION OF CERTIFICATION TRANS-3

Staff added a requirement to conduct pavement testing for all County roadways that could be utilized by PSEGS construction and operations activities. This was not required by the original conditions adopted by the Commission in the Final Decision and is not warranted by the increase in construction traffic from the PSEGS. The condition already requires photographs of County roads to be taken prior to and after construction with any damage caused by the PSEGS to be repaired. Requiring pavement testing and possible rebuilding of miles of roadway prior to construction and then the repairs to be made after construction is redundant, not warranted by the increase in peak and average construction tips from the PSEGS amendment, and has not been required of other Commission projects (including the previously Approved Project).

As a compromise, PSH will agree to the following modification to limit pavement testing to those portions of Corn Springs Road that will be utilized by the PSEGS heavy haul activities.

> **TRANS-3** The project owner shall coordinate with Riverside County to conduct pavement testing for ~~all County roadways~~ ***that portion of Corn Springs Road*** that could be utilized by PSEGS ***heavy haul*** construction ~~operation~~ activities. Based on results of the pavement testing and prior to the first heavy haul delivery, the project owner shall make any necessary improvements to ensure ***that portion of Corn Springs Road that will be utilized for heavy haul construction actives will***~~the roads~~ provide sufficient load-bearing capacity for ***heavy haul construction activities***~~construction and operation traffic~~. Improvements must meet the minimum Riverside County or Caltrans standard (whichever is applicable) for a roadway that accommodates heavy trucks.
>
> Following construction, the project owner shall ensure that any roads damaged due to project-related construction activities are restored to original or near-original condition in a timely manner, as directed by the CPM and in coordination with Caltrans and/or Riverside County. Repair and restoration of access roads may be required at any time during the construction phase of the project to assure public safety. Repairs required during construction shall be made as soon as ***practical*** ~~possible~~.
>
> **Verification:** Prior to ~~site mobilization~~***heavy haul activities***, the project owner shall provide a copy of the pavement test to the CPM and Riverside County for review. Sixty (60) days prior to start of construction, the project owner shall establish a schedule for approval and completion of any roadway improvements.

CONDITION OF CERTIFICATION TRANS-6

Staff made several changes to the Approved Condition of Certification that are acceptable to PSH. However, we recommend that the following language be deleted from the Condition as it is informational, does not require any action on the part of the Project Owner, and should therefore be considered to be part of the analysis as opposed to enforceable condition language.

~~The FAA has proposed publishing guidance on the use of Audio Visual Warning Systems (AVWS) for obstruction lighting. The project owner has the future option to change the tower obstruction lighting system to an Audio Visual Warning System. An AVWS was recommended by the National Park Service in a comment on the FAA Notice of Construction or Alteration for the PSEGS to preserve the natural darkness in this portion of the Mojave Desert. If it is feasible and the project owner wishes to implement an AVWS in the future, the project owner shall consult with the FAA and the CPM as necessary.~~

CONDITION OF CERTIFICATION TRANS-7

PSH proposed in its Petition For Amendment a Condition of Certification for a Heliostat Positioning and Monitoring Plan that was identical to that imposed by the Commission in its Final Decision for the Rice Solar Energy Project. Subsequent to filing the Petition For Amendment, PSH representatives met with Riverside County to discuss and address its concerns that the heliostats may potentially interfere with the use of one of its nearby microwave towers that support its Public Safety Enterprise Communication Project (PSEC). After two meetings with Riverside County representatives, PSH proposed modifications to the Heliostat Positioning and Monitoring Plan condition to specifically address Riverside County concerns. Riverside County agreed to PSH's proposed modifications and the modified condition was docketed. Staff did not include the modified condition language in the Preliminary Staff Assessment (PSA). Staff did, however, include Condition of Certification **TRANS-7** in the FSA, but it did not include any of the modifications proposed by PSH with agreement of Riverside County to address its concerns for the PSEC. Additionally, Staff proposed additional requirements relating to covering the heliostats and inserted a definition of what would be an event that would trigger mitigation by the project. We propose the following modifications to the Staff's proposed Condition of Certification **TRANS-7** to address the PSEC and to provide clarity and flexibility.

TRANS-7 Heliostat Positioning and Monitoring Plan

To reduce glint and glare from the project, the project owner shall prepare a Heliostat Positioning and Monitoring Plan (HPMP) which includes the following information. The HPMP shall be implemented during installation of the heliostats and during project operation.

1. Identify the heliostat movements and positions (including during normal operations, daytime mirror-washing, removal of solar flux due to high winds, and all non-normal known operational scenarios and possible

malfunctions) that could result in potential exposure of observers at various locations, including pilots, motorists, pedestrians and hikers in nearby wilderness areas ***and the Riverside County PSEC Project Tower***, to direct solar reflections from the heliostats (DSRH).

2. Describe within the HPMP how programmed heliostat operation would address potential ***human health and safety hazards from*** DSRH ***(DSRH*** ~~e~~***E***vents***)*** at locations of observers, and how it would maximally limit or avoid potential exposures. This shall include heliostat positioning and transition algorithm exclusion zones that maximally avoid ground-based DSRH events.

3. Describe how the mirrored surfaces of the heliostats would ***either*** be covered ***or oriented to minimize DSRH Events on I-10 and at the Riverside County PSEC Project Tower*** during construction until ***calibration activities whereby*** the heliostats are properly seated, oriented, and under computer control to avoid exclusion zones.

4. Implement a set of baseline heliostat positioning and control algorithms to minimize DSRH ***E***events as soon as realistically possible after heliostat installation. The baseline control algorithms shall initially minimize ground-based DSRH ***E***~~e~~vents during site set-up, testing and calibration prior to power generation operations. If this does not work to minimize ground-based DSRH ***E***events ***on I-10***, the project owner shall modify the perimeter fencing along I-10 to ~~prevent~~ ***minimize*** motorists from experiencing DSRH ***E***~~e~~vents ***on I-10***.

5. Prepare a monitoring plan to quantify the frequency and locations of DSRH ***E***~~e~~vents and validate that the DSRH ***E***~~e~~vents are minimized by HPMP implementation. This may be implemented with a staring camera system along a known line of sight to ground-based observation points (e.g., I-10).

   The monitoring plan shall be made available to interested parties, including the Department of Defense (DoD), California Department of Transportation (Caltrans), California Highway Patrol (CHP), Federal Aviation Administration (FAA), Riverside County Economic Development Agency Department of Aviation, the

Riverside County ALUC, and the Riverside County Transportation and Land Management Agency. The monitoring plan shall be updated on an annual basis for the first 5 years and at 2-year intervals thereafter for the life of the project.

6. Obtain field measurements in candela per meters squared and watts per meter squared to validate that the HPMP avoids the potential for human health and safety hazards consistent with the methodologies detailed in the 2010 Sandia Lab document presented by Clifford Ho, et al., including those studies and materials related to ocular damage referenced within.

7. The HPMP shall include a communication protocol for Riverside County with specific contact information whereby Riverside County can speak to a representative at the PSEGS site 24 hours a day/seven days a week to respond to requests from the Riverside County PSEC Project to investigate potential interference with operation of the PSEC microwave tower.

8. Provide requirements and procedures to document, investigate and resolve legitimate complaints regarding glint and glare events. This includes establishing a toll-free number for the public to report complaints related to glint and glare and posting this number in the same location as that required in Condition of Certification COMPLIANCE-9.

   The project owner shall notify the CPM within 3 days of receiving a glint or glare complaint. As soon as the complaint has been resolved or within 10 days of the complaint, the project owner shall submit to the CPM a report in which the complaint(s) as well as the actions taken to resolve the complaint are documented. The report shall include (a) a complaint summary, including the name and address of the complainant; (b) a discussion of the steps taken to investigate the complaint; (c) the reasons supporting a determination of whether or not the complaint is legitimate; and (d) the steps taken to address the complaint and the final results of these efforts. This information shall be included in the Monthly Compliance Reports.

Verification: 60 days prior to the start of construction, the project owner shall prepare and submit to the CPM for review and approval a plan for baseline heliostat positioning and control algorithms to minimize DSRH events after heliostat installation and during site set-up, testing, and calibration. 90 days prior to the start of operation of any unit, the project owner shall submit the remainder of the HPMP describing how the above measures will be implemented to reduce glint and glare during project operation, and how monitoring will occur.

If the project owner receives a complaint regarding glint or glare, the owner shall conduct an investigation to determine whether the complaint is legitimate and if the project is the source of such glint or glare. If it is determined that the ***complaint is legitimate and the*** project is the source of such glint or glare, the project owner shall take all feasible measures to eliminate or reduce the glint or glare. Such measures may include localized screening.

The project owner shall notify the CPM within 3 days of receiving a glint or glare complaint. As soon as the complaint has been resolved or within 10 days of the complaint, the project owner shall submit to the CPM a report in which the complaint(s) as well as the actions taken to resolve the complaint are documented. The report shall include (a) a complaint summary, including the name and address of the complainant; (b) a discussion of the steps taken to investigate the complaint; (c) the reasons supporting a determination of whether or not the complaint is legitimate; and (d) the steps taken to address the complaint and the final results of these efforts. This information shall be included in the Monthly Compliance Reports.

If no legitimate complaints are received and/or if a legitimate complaint is received and the project owner has resolved the source of the complaint(s) within the first 12 months of project operation, project owner can request that the CPM release the project owner from the obligations under Section***s 5 and 6*** 4 of this condition after the 12th month of project operations.

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of: Petition For Amendment for the **PALEN SOLAR ELECTRIC GENERATING SYSTEM**	**DOCKET NO. 09-AFC-07C** **DECLARATION OF WESLEY A. ALSTON**

I, Wesley A. Alston, declare as follows:

1. I am presently the owner of Pacific Development Solutions Group.

2. A copy of my professional qualifications and experience was included with my Opening Testimony and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Worker Safety & Fire Protection for the Petition for Amendment for the Palen Solar Electric Generating System (California Energy Commission Docket Number 09-AFC-07C).

4. It is my professional opinion that the attached prepared testimony is valid and accurate with respect to issues that it addresses.

5. I am personally familiar with the facts and conclusions related in the attached prepared testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct to the best of my knowledge and that this declaration was executed on October 7, 2013.

Wesley A. Alston

PALEN SOLAR ELECTRIC GENERATING SYSTEM
WORKER SAFETY AND FIRE PROTECTION
OPENING TESTIMONY

I. Name:

Wesley A. Alston

II. Purpose:

My testimony addresses the subject of Worker Safety and Fire Protection associated with the construction and operation of the Palen Solar Electric Generating System (PSEGS) (09-AFC-7C).

III. Qualifications:

Wesley A. Alston: I am presently employed at Pacific Development Solutions Group, and have been for the past 10 years and am presently a principal consultant with that organization. I have a Degree in Bachelor of Science in Engineering and I have over 40 years of experience in the field of Worker Safety and Fire Protection. I prepared or assisted in the preparation of the Fire and Emergency Services Risk Assessment (Risk Assessment), Exhibit 51 for the Palen Solar Electric Generating Station (PSEGS). A detailed description of my qualifications is contained in the resume included in Attachment A to my Opening Testimony.

I possess unique credentials related to the analysis of fire protection services in Riverside County, which I used to prepare the FNA for the PSEGS. In addition to my current consulting practice which provides fire compliance and fire protection analysis services to the public and private sector, I have served in both an administrative capacity and at the Staff level for the Riverside County Fire Department (RCFD) as well as for the State of California Department of Forestry and Fire Protection (CAL FIRE). During my 31-year tenure with RCFD/CAL FIRE, I served in the following positions: RCFD Deputy Fire Chief for four years, during which I was assigned as City of Moreno Valley Fire Chief; City of Moreno Valley Battalion Chief/Fire Marshal for three years; and Fire Captain Specialist for 15 years. I was instrumental in the preparation of the *Riverside County Fire Protection and Emergency Medical Master Plan* adopted by the County Board of Supervisors in 1987 and the corresponding amendments to the *Riverside County Fire Ordinance*. These documents are still in effect today.

I have a working knowledge of the 2010 and 2013 California Fire Code and the County Ordinances related to the 2010 California Fire Code, building codes, and the use, storage and disposal of hazardous materials. In addition, I possess knowledge and expertise in the National Fire

Protection Association (NFPA) Codes and Standards, including NFPA Code 30a, NFPA 1006 Standard for Technical Rescuer Professional Qualifications, and NFPA 1670 Standard on Operations and Training for Technical Search and Rescue Incidents.

To the best of my knowledge all referenced documents and all of the facts contained in this testimony are true and correct. To the extent this testimony contains opinions, such opinions are my own. I make these statements and provide these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

IV. Exhibits:

In addition to this written testimony, I am sponsoring the following exhibits in this proceeding.

Exhibit No.	Transaction No.	Document Title
3	68910	**PSH's Petition for Amendment Worker Safety and Fire Protection Section**, dated December 2012, and docketed on December 17, 2012.
12	70179	**PSH's Status Report 1**, dated March 29, 2013 and docketed on March 29, 2013.
19	70670	**PSH's Status Report 2**, dated May 8, 2013, and docketed on May 8, 2013.
41	71551	**PSH's Initial Comments on the Preliminary Staff Assessment**, dated July 11, 2013, docketed on July 11, 2013.

51	200031	**PSH's Fire & Emergency Services Risk Assessment**, dated July 2013, docketed on July 23, 2013.
57	200077	**PSH's Final Comments on the Preliminary Staff Assessment**, dated July 29, 2013, docketed on July 29, 2013.
59	200090	**PSH's Status Report 3**, dated July 30, 2013, docketed July 30, 2013.
60	200098	**PSH's Response to Data Request Set 4 (73-89) Responses 84 through 89**, dated July 2013, and docketed on July 31, 2013.

V. Opinion and Conclusions:

I have reviewed the Worker Safety and Fire Protection section contained in Part A of the Final Staff Assessment (FSA) and I agree with most of the changes to the Conditions of Certification proposed by Staff. I have provided clarifying changes to Staff's Proposed Conditions of Certification below. I also believe that the PSEGS will comply with all applicable laws, ordinances, regulations and standards (LORS) and with implementation of the Conditions of Certification as modified below the PSEGS will not result in significant worker safety and fire protection related impacts.

For the reasons discussed below, we disagree with Staff's analysis and determination of mitigation compensation required to fund fire and emergency services over the life of the PSEGS.

CONDITION OF CERTIFICATION WORKER SAFETY-5

PSH requests that the Verification to this Condition of Certification **WORKER SAFETY-5** be modified as follows. The purpose of the modification is that the current Verification language requires equipment to be on-site prior to mobilization, which would be impractical since there is no reason to have first aid and trauma equipment on site in the absence of

workers who may need the equipment. Also, there are no structures or vehicles on site prior to site mobilization that could be used to house the equipment. Therefore, we recommend the following modification be made to the Verification language of **WORKER SAFETY-5**

> **Verification:** ~~At least 60~~ ***Within 14*** days ~~prior to~~ ***after*** the start of site mobilization, the project owner shall submit to the CPM proof that a portable automatic external defibrillator (AED) and trauma/first aid kits exists on-site***. At least 60 days prior to the start of site mobilization, the project owner shall provide*** ~~and~~ a copy of the training and maintenance program for review and approval.

CONDITION OF CERTIFICATION WORKER SAFETY-7

PSH recognizes that the construction and operation of the PSEGS will have a cumulative impact on the Riverside County Fire Department. Indeed, PSH has proposed mitigation compensation for equipment, training and ongoing support in Risk Assessment which I consider to be extremely generous considering the level of impact the PSEGS would actually cause to the Riverside County Fire Department (RCFD).

The Final Decision required mitigation compensation to RCFD in an amount equivalent to $12.1 Million over the life of the project. Staff and PSH agree that the Amendment for the PSEGS reduces risk and therefore mitigation compensation to RCFD should be reduced. However, Staff required a mitigation compensation amount equivalent to $10.39 Million over the life of project but then added an escalation component not previously required by the CEC.. This total mitigation compensation will be in excess of the amount required for the Approved Project even though every expert agrees that the risks of the PSEGS are less than the risks of the Approved Project due to the removal of millions of gallons of flammable therminol from the solar fields. PSH believes that Staff's mitigation amount is too large and overly burdens PSH to the benefit of other Riverside County solar projects currently in development or under construction.

Staff's analysis of the amount of compensation mitigation is based on assigning a portion of the costs that RCFD has requested to construct its infrastructure and providing ongoing services. It is extremely important to note that neither RCFD nor Staff conducted any assessment of exactly what infrastructure or level of support would be required solely due to the addition of the PSEGS. Staff and PSH agree on the amount of new equipment (high angle rescue) and training. PSH's proposal of $1.2 million specifically allows RCFD to purchase high angle rescue equipment and providing training to its firefighters to use that equipment.

PSH's dispute with Staff's mitigation compensation is solely related to the amount Staff attributes annually to provide for firefighter support. Staff's analysis used a risk matrix assigning percentage responsibilities to each of four solar projects: the Rice Solar Energy Project, the Blythe Solar Energy Project (which will now be converted to PV), the Genesis Solar Energy Project, and the PSEGS. This approach expressly acknowledges that any mitigation compensation provided for ongoing fire and emergency services is for a cumulative effect on the ability of the RCFD to provide services to the region. In that regard we believe that Staff has failed to incorporate the fact that any ongoing resources added to the RCFD from these four projects would also be available to support fire and emergency response for other non-Commission jurisdiction projects. In fact, Staff acknowledges these other projects throughout the FSA in its Cumulative Impact scenario. Similarly, the Commission should recognize that the RCFD will receive contributions from these other projects and, therefore, it is fundamentally unfair to place the entire burden for constructing infrastructure and manpower on the four projects over which the Commission has jurisdiction.

In support of the contention that any of the solar projects do not result in frequent responses from the RCFD, our Risk Assessment included an analysis that the RCFD existing infrastructure is extremely underused and that its current level of staffing has significant capacity available to the very infrequent calls during construction or operation. The Risk Assessment outlined the number and types of calls that the three closest fire stations for the last few years. Specifically,

> Based on a "reasonable standard" for an engine company workload of 6.5 calls per day (or 2,190 calls on an annual basis) as defined in the *Riverside County Fire Department Strategic Plan 2009-2029*, the three fire stations closest to the PSPGS site have the capability of responding to a total of 6,570 calls per year. The total of 665 annual calls between the 3 stations in the year 2012 represents 10% of the maximum workload capacity for these three stations. The total number of calls between the 3 stations is down 75 calls from the 2011 or a reduction in calls of 9%. During this time, the Genesis Solar Energy Project, the Desert Sunlight Project, and the SCE Red Bluff Substation were under construction.
>
> Therefore, based on workload capacity alone, the addition of the PSEGS facility to their service area would not justify the addition of an engine company, a fire station, or any additional staff. (Page 7-5 of Risk Assessment, Exhibit 51)

Again, this is not to say that PSH believes RCFD should not be equipped and staffed to respond. However, Staff failed to take into account that existing staffing is capable of responding to the calls that may be necessary during construction and operation of the solar facilities. Further, Staff fails to account for the additional financial support that the non-Commission jurisdictional projects would contribute to Riverside County, which should specifically be applied to RCFD. The Commission ultimately included these factors in the Final Decision on the Rice Solar Energy Project which resulted in significantly less mitigation compensation.

While Staff correctly stated in the FSA that there are few requests for service for both EMS and fire response to solar power plants in Riverside County, and that there is little impact on their overall operation, Staff still concluded that its high mitigation amount was proper and it was proper to allocate all of the regional costs across the four Commission projects identified above. A more accurate and fair approach would be to determine the correct amount that should be allocated to the PSEGS in relation to the other funding recourses Riverside County has available to it, the contribution that should be provided by all projects that would benefit from the RCFD increased infrastructure, and to the very low impacts on the RCFD when the existing unused capacity of the existing fire stations is considered.

The Commission should consider the numerous solar projects under development or construction in Riverside County which should proportionally share the burden with the PSEGS. Currently there are eight (8) Riverside Conditional Use Permits (CUP) filed for solar projects, and one county project under construction. The CEC currently has four (4) solar projects, two (2) of which are under consideration and two (2) under construction. The attached table provides an overview of the solar projects currently under consideration in Riverside County and at the CEC, and shows how much revenue is expected to flow to the county.

The four (4) CEC solar projects have been earmarked for approximately $2.8 million in one-time costs to the Riverside County fire department and annual payments of $589,000. In addition, the County of Riverside passed Board Policy B-29 in November 2011 and revised the policy in May 2013 requiring that no encroachment permit shall be issued for a solar power plant unless the Board first grants a franchise to the solar power plant owner. The B-29 policy, as revised, requires a solar power plant owner to pay annually pay $150 for each acre of land involved in the power production process. If the eight (8) active CUPs under consideration by Riverside County are approved they would receive $4.2 million annually.

It should also be noted that the Board of Supervisors in June, 2013 passed a spending plan for the money whereby 25% would stay in the area of the solar plants and the other 75% to the remainder of the county for public services, which should be used for EMS and fire response since a these solar project do not burden other public services such as sewer, water, and police services. In addition to the B-29 monies, Riverside County is currently receiving $600,000 annually from the Desert Sunlight project under a separate development agreement. It is Riverside County's responsibility to allocate the B-29 monies appropriately. If half of the money Riverside County received for public services under Policy B-29 were to be allocated to the RCFD, it would result in more than $2.5 Million annual revenue without the PSEGS (See Attached Table). As noted in Riverside County comments on the PSA, Attachment A (Attached to this Testimony) RCFD estimates it needs $1.435 Million annually to support solar development planned within eastern Riverside County.

Lastly, Staff ignores any of the real tax revenue that will be generated by construction and operation of the PSEGS. Please refer to the Socioeconomic section of the FSA for an estimate of those taxes. While I have not prepared an analysis of the specific tax revenue that will be received by Riverside County during construction and operation, I have ignored this additional revenue in the mitigation compensation I propose below. For an analysis of the types and amounts of tax revenue Riverside County can expect, it would be similar to those amounts projected in the Commission's own analysis conducted by Aspen Environmental for the Hidden Hills Solar Energy Generating System.

Given the low impact the PSEGS will have on the fire department's overall operation, which Staff itself recognizes in the FSA, and given that multiple other solar projects are expected to come online in Riverside County in the near future, projects which will share in ongoing EMS and fire response use, to require PSH to pay in excess of $12.1 Millionis overly burdensome. Therefore, PSH respectfully requests that Condition of Certification **Worker Safety 7** be revised to reflect a lower amount to mitigate fire department costs. Specifically, PSH has generously offered the following:

1. During construction PSH will fund the cost of a medium rescue vehicle and equipment. The estimated cost of a medium rescue unit fully equipped and training is $1.2 million.

2. During construction PSH would fund one Fire Captain and half the cost of a firefighter to staff the medium rescue unit. Staffing cost of 1 fire captain @ $167.000 X 3 positions = $501,000 and 1/2 firefighter @

$61,000 X 3 positions= $183,000 for total staffing cost of the first 3 years of $684,000 annually.

3. During operation the staffing funded during construction would continue but PSEGS would only contribute 1/8th of the ongoing costs to account for the contribution of the 7 other approved projects even though there are more projects planned that will contribute in accordance with Policy B-29. For operations PSH will contribute 1/8th of $684,000 = $85,500 annually[1]. It is important to note that PSH has not relied on projects that are not approved, although there are many planned for the area in determining its annual contribution.

Therefore Condition of Certification **WORKER SAFETY-7** should be modified to incorporate the above outlined compensation package.

[1] *Costs where provided by Riverside County Fire Department Administration Chief, Deputy Chief Patterson June 2013.*

SOLAR PROJECTS IN RIVERSIDE COUNTY

PROJECT NAME	CUP NUMBER	TYPE OF TECHNOLOGY	ACREAGE	SUBJECT TO B-29	CEC PAYMENTS ONE TIME PAYMENT	COUNTY OF RIVERSIDE ANNUAL PAYMENTS	MITIGATION AMOUNT[1]
Indigo Ranch Project	CUP 03693	Solar PV	50	Yes		$7,500	$2,812
Renewable Resources Group	CUP03685	Solar PV	3250	Yes		$487,500	$182,812
Renewable Resources Group	CUP03684	Solar PV	3250	Yes		$487,500	$182,812
McCoy Solar	CUP03682	Solar PV	5363	Yes		$804,450	$301,668
US Solar Holdings	CUP03680	Solar PV	452	Yes		$67,800	$25,425
Renewable Resources Group	CUP03677	Solar PV	4000	Yes		$600,000	$225,000
McCoy Solar	CUP03671	Solar PV	5363	Yes		$804,450	$301,668
Renewable Resources Group	CUP03670	Solar PV	3660	Yes		$549,000	$205,875
PSEGS	**CEC**	**Solar Thermal**	**3952**		**$1,200,000**		**$684,000 for first three years and $85,500 annually thereafter**
Genesis Solar Energy Project	CEC	Solar Thermal	4,640		$850,000		$375,000
Desert Sunlight		Solar PV				$600,000[2]	$600,000
Blythe	CEC	Solar PV	1,400		$250,000		$100,000[3]
Rice Solar Energy Project	CEC	Solar Thermal	1,410		$570,000		
Totals					$2,870,000	$4,408,200	$2,503,075

[1] Riverside County has stated that 75 percent of the B-29 fee would be used for public services. Assumes half of that amount is applied to RCFD. Other Mitigation Sources include CEC Final Decision or Agreements with RCFD.
[2] Agreement with Riverside County, not a result of B-29.
[3] Reflects Staff's Proposal in the BSPP PV Amendment Staff Assessment

ATTACHMENT A

RIVERSIDE COUNTY FIRE DEPARTMENT

IN COOPERATION WITH
THE CALIFORNIA DEPARTMENT OF FORESTRY AND FIRE PROTECTION

John R. Hawkins ~ Fire Chief
210 West San Jacinto Avenue ~ Perris, CA 92570
(951) 940-6900 ~ www.rvcfire.org

PROUDLY SERVING THE UNINCORPORATED AREAS OF RIVERSIDE COUNTY AND THE CITIES OF:

BANNING
BEAUMONT
CALIMESA
CANYON LAKE
COACHELLA
DESERT HOT SPRINGS
EASTVALE
INDIAN WELLS
INDIO
JURUPA VALLEY
LAKE ELSINORE
LA QUINTA
MENIFEE
MORENO VALLEY
NORCO
PALM DESERT
PERRIS
RANCHO MIRAGE
RUBIDOUX CSD
SAN JACINTO
TEMECULA
WILDOMAR

Battalion 8 Solar Project Impacts and Mitigation

Eastern Riverside County Solar Projects – Issue Summary

In an effort to meet growing energy demands, and decrease reliance on petroleum or less ecologically friendly resources such as coal, there has been a national push to harness "Green" energy from the sun. The vast expanses of open desert in eastern Riverside County are experiencing this growth in the form of huge tracts of land being turned into industrial complexes dedicated to solar energy. The impact to the Fire Department of this large scale industrialization is the added potential for accidents and injuries related to the construction and operation of these various projects. The type of accidents which accompany these projects can include trench collapse, confined space entry, physical entrapment, as well as elevated or high angle rope rescue needs. Current fire department resources serving that area are not adequately staffed, trained or equipped to handle these specialized technical rescues.

Fire Protection Overview

Riverside County Fire Department (RVC Fire) Blythe Battalion (Battalion 8) covers about 4900 square miles. Battalion 8 spreads from Chiriaco Summit on the west to the California/Arizona border at the east, the Riverside/San Bernardino county line to the north and the Riverside/Imperial County line to the south. Battalion 8 has 4 staffed fire stations. These stations are operated with 3 person engine companies, except for Fire Station 49 at Desert Center. This engine is now staffed with 4 persons on duty daily – which is consistent with the goals of this program. At least one employee on each engine daily is a certified Paramedic providing Advanced Life Support.

The RVC Fire engines in Battalion 8 are limited in their ability to handle Technical Rescue responses. These limitations are directly related to the availability of equipment, personnel and the training levels/certifications needed to mitigate these types of emergencies. Paid staff on engines are only certified to a very basic *Awareness* level for Confined Space and Hazardous Materials, and are not trained in trench rescue and high angle rope rescue systems.

Their engines are not adequately equipped with the necessary equipment for these rescues. Within Riverside County, complex Technical Rescues such as these are handled by "Truck Companies". These truck companies are each staffed by 4 of our highest trained firefighters, responding with a veritable rolling tool box of specialized equipment and outfitting to affect these rescues. Currently RVC Fire has 7 truck companies covering the urbanized and industrial areas of Riverside County. The closest RVC Fire Truck Company to the Blythe/Palo Verde area is located a considerable distance away in Indio, and would have a response time in excess of an hour and forty minutes. Based on the extended response times for existing Technical Rescue resources to the eastern County area, the RCOFD recognizes the need to expand the capability of our Fire and Rescue services in Battalion 8.

Recommended Staff, Equipment, Facility, and Training Enhancement

It is the goal of the RCOFD to staff, equip and train our Battalion 8 personnel to a level providing them the capability to initiate and handle most technical rescues in an expedient fashion without waiting extensively for additional responders from outside the area. Although this normally and consistent with our County-wide operations would be provided by the addition of a Truck Company, it was felt that a non-standard approach would be a better fit to the service area. After much discussion and review, the following service enhancement program has been designed:

Establish and maintain 4 person staffing on E-49 (Lake Tamarisk Fire Station). Due to the remoteness of this station (approximately 45 minutes from the next closest stations), 4 person staffing is to be maintained on this unit, allowing for immediate "2-in/2-out" entries. Training for officers will be upgraded to include technical rescue training. Additional Technical Rescue equipment will be allocated to this station to assist with these type incidents. (note: 4 person staffing has already been initiated)

Establish and maintain a 2 person rescue squad at Fire Station 45 (Blythe Airport). A two person/paramedic equipped medium duty squad will be staffed at Fire Station 45, which will be task-forced (joined) with adjacent engine companies to provide Technical Rescue services. This unit will be equipped with confined space entry equipment, rope rescue equipment, trench shoring, jacks and airbags, cutting torches, saws and many other tools normally carried by a Truck Company. Additional shoring materials will be carried in a small utility support trailer.

Increase Training Program for Battalion 8 staff. Training program will be designed to provide qualified personnel to respond to technical rescues. This will include compliance with CCR Title 8 GISO Sections 5156, 5157 and 5158 as well as appropriate State recognized certifications. The training-needs mitigation will cover both initial training and ongoing in-service and recertification.

Provide increased Battalion Chief Coverage. Due to the technical nature of the Solar facilities and the potential complex rescues associated with construction and operations, in-area Battalion Chief response coverage is needed beyond current 3-day per week local administrative coverage. As projects come online, and funding allows, the goal will be 7/24 Chief Officer presence in the area.

Update Fire Stations to accommodate increased equipment and staffing. Current Stations in the area are undersized in their ability to accommodate the required personnel and equipment. The goal is to ultimately replace both structures (Fire Stations 45 – Blythe Airport and 49 – Lake Tamrisk) using a combination of Solar mitigation, DIF and other available funds.

Provide a replacement program for rescue tools and equipment as they wear out or reach the end of their normal service life. Budget the cost of replacing equipment needed due to general wear and damage incurred during training and emergencies as well as those times which may reach the end of their acceptable service life.

Cost Estimates

The design of this program is to provide a specific plan with quantifiable upgrades to personnel, equipment and training, and account for those mitigating costs in a direct auditable trail to monies spent from any Solar Project developer.

The cost impacts to the fire department as a result of under construction and currently proposed Solar Development in the region are estimated below. The cost estimates are made based on current personnel costs and recent equipment quotes where possible. It is intended to provide an estimate only, and is not a specific nor minimum/maximum figure. These are total dollar figures and do not reflect any cost allocation.

	One-time	Annual
Equipment Upgrades		
Type 2 US&R Equipment for Squad	$158,000	
Facility Upgrades		
Fire Station 45 and Fire Station 49 non-allocated replacement cost.	$5,000,000	
Personnel Upgrades		
4th - Person staffing at Fire Station 49 (completed – personnel in place)		$334,000
2- Person staffing for rescue squad at Fire Station 45.		$831,000
24/7 Battalion Chief Staffing		$230,000
Technical Rescue Training - Initial		
Confined Space Certification, Trench Rescue, Rescue Systems I & II.	$120,000	
Technical Rescue Training - Recurrent		
Recertification and annual skills refreshers	$40,000	
Total	**$5,278,000**	**$1,435,000**

In Closing

Although it is impossible to predict every emergency and the complexity of its mitigation, it is the goal of Riverside County Fire Department to be as prepared as possible. This program is intended to increase our preparedness and allow us to respond to and mitigate emergencies associated with the industrial solar plants being developed in the Eastern Riverside County area. The design of this program is to provide a specific plan with quantifiable upgrades to personnel, equipment and training, and account for those mitigating costs in a direct auditable trail to monies spent from any Solar Project developer.

Ultimately it is the intention of the Riverside County Fire Department to provide superior customer service while helping to assure a safe work environment for everyone.

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-07C**
Petition For Amendment for the **PALEN SOLAR ELECTRIC GENERATING SYSTEM**	**DECLARATION OF FRED NIALS**

I, Fred Nials, declare as follows:

1. I am an independent consultant currently under contract with Centerline.

2. A copy of my professional qualifications and experience was included with my Opening Testimony and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Geology & Paleontology for the Petition for Amendment for the Palen Solar Electric Generating System (California Energy Commission Docket Number 09-AFC-07C).

4. It is my professional opinion that the attached prepared testimony is valid and accurate with respect to issues that it addresses.

5. I am personally familiar with the facts and conclusions related in the attached prepared testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct to the best of my knowledge and that this declaration was executed on October 6 2013.

Fred Nials

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of: Petition For Amendment for the **PALEN SOLAR ELECTRIC GENERATING SYSTEM**	**DOCKET NO. 09-AFC-07C** **DECLARATION OF MATTHEW STUCKY**

I, Matthew Stucky, declare as follows:

1. I am presently employed by Abengoa Solar LLC as Manager of Business Development.

2. A copy of my professional qualifications and experience was included with my Opening Testimony and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Geology and Paleontology for the Petition for Amendment for the Palen Solar Electric Generating System (California Energy Commission Docket Number 09-AFC-07C).

4. It is my professional opinion that the attached prepared testimony is valid and accurate with respect to issues that it addresses.

5. I am personally familiar with the facts and conclusions related in the attached prepared testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct to the best of my knowledge and that this declaration was executed on October 9 2013.

Matthew Stucky

PALEN SOLAR ELECTRIC GENERATING SYSTEM
GEOLOGY AND PALEONTOLOGY
OPENING TESTIMONY

I. Names:

Fred Nials
Matthew Stucky

II. Purpose:

Our testimony addresses the subject of Geology and Paleontology associated with the construction and operation of the Palen Solar Electric Generating System (PSEGS) (09-AFC-7C).

III. Qualifications:

Fred Nials: I am presently a consulting geomorphologist and geoarchaeologist and have 45 years of experience performing consulting and teaching at the University level. I have degrees in Geology and a graduate degree in (AbD) Geology, graduate minors in Soils and Ecology, University of Idaho, 1967. My experience includes 28 years teaching at graduate and undergraduate levels (Univ. Nevada, Reno; Washington State Univ., and Eastern NM Univ.) I am an independent consultant to centerline in support of the Petition For Amendment for the PSEGS. I prepared, caused to be prepared or reviewed sections of the Petition For Amendment relating to Geoarchaeology, Biology, and Geology and Paleontology, as well as the post-filing information, data responses and supplemental filings.

Matthew Stucky: I am presently Manager of Business Development at Abengoa Solar LLC and have held this position for the past three (3) years. I have degrees in Civil Engineering and Environmental Studies and a graduate degree in Environmental Engineering. My experience includes managing the permitting and compliance activities for the California Energy Commission-licensed Mojave Solar Project. I reviewed the Geology and Paleontology section of the Final Staff Assessment, as well as the post-filing information, data responses and supplemental filings.

Detailed descriptions of our qualifications are presented in the resumes which are included in Attachment A to this Opening Testimony package.

To the best of our knowledge all referenced documents and all of the facts contained in this testimony are true and correct. To the extent this testimony contains opinions, such opinions are our own. We make these statements and provide these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

IV. Exhibits:

In addition to this written testimony, we are sponsoring the following exhibits in this proceeding.

Exhibit No.	Transaction No.	Document Title
3	68910	**PSH's Petition for Amendment, Geology and Paleontology Section**, dated December 2012, and docketed on December 17, 2012.
60	200098	**PSH's Response to Data Request Set 4 (73-89) Responses 76 and 77**, dated July 2013, and docketed on July 31, 2013.

V. Opinion and Conclusions:

We have reviewed the Geology and Paleontology section contained in Part A of the Final Staff Assessment (FSA) and we disagree with Staff that the PSEGS will result in greater impacts to Paleontological Resources requiring any different mitigation than the Conditions of Certification for the Approved Project as they are outlined in the Commission Final Decision. Specifically, PSH requests that the Commission reject Staff's proposed modifications and affirm the findings and Conditions of Certification contained in the Final Decision. Further, with the incorporation of the original Conditions of Certification, we agree that the PSEGS will not result in significant impacts to Geologic and Paleontologic Resources and will comply with all applicable laws, ordinances, regulations and standards.

CONDITION OF CERTIFICATION PAL-5

The FSA includes flawed analyses that conclude that the PSEGS will result in more impacts to paleontological resources. The basic premise upon which Staff relies is that the vibratory installation of the heliostat pylons does not result in the excavation of subsurface material. In Staff's opinion it is this sole lack of excavated material that could result in an impact to a buried fossil from insertion of the pylon that may render the fossil "undiscovered". Staff then claims that this will be an impact. For the reasons discussed in detail in our opposition of Staff's new proposed Condition of Certification **PAL-9**, we strongly disagree.

However, after discussing this issue with Staff in workshops and for the sole purpose of providing a compromise, we suggested adding language to **PAL-5** requiring additional monitoring of geotechnical borings within the solar field. Staff incorporated that suggestion **AND** included a new burdensome condition that would render the PSEGS unfinanceable. PSH withdraws its proposed compromise and requests the Commission adopt the version of Condition of Certification **PAL-5** contained in the Final Decision without Staff's changes.

CONDITION OF CERTIFICATION PAL-9

Staff has proposed Condition of Certification **PALEO-9** solely because it believes that the PSEGS poses more of a risk of impact to paleontological resources than the original project. This opinion is based solely on Staff's speculation of destruction of fossil resources with the vibratory technique of pylon insertion and that uncovering of fossils during mass grading is preferred to leaving them in place. This concept is new and runs contrary to many other environmental disciplines where avoidance is preferred; most notably, Cultural Resources.

First, Staff overestimates the sensitivity of the site for the presence of fossil resources. While it is clear that there is some potential for fossil resources, Staff ignored the information provided by PSH in its Response to Data Requests 76, Attachment 76-1 of Exhibit 60. Attachment 76-1 of Exhibit 60 is provided here for the Committee's convenience and clearly indicates that the potential for fossil discovery is low across most of the PSEGS site.

Second, Staff overestimates the potential disturbance activities associated with constructing the solar field. The PSEGS disturbance should be compared to the amount of disturbance for the Approved Project. The original project would have conducted mass grading across the site, including the installation of miles of large drainage channels. The total amount of mass grading for the Approved Project would have been 4.5 million cubic yards of cut and fill. In contrast, the PSEGS grading would include approximately 200,000 cubic yards of cut and fill. This represents 22.5 times less grading, a reduction of over 95 percent in the amount of disturbance over the Approved Project.

Lastly, Staff overestimates the probability that a pylon would encounter **AND** destroy a fossil resource. While it is true that the PSEGS will install up to 170,000 heliostats across the solar fields, Attachment 76-1, or Exhibit 60 correctly places this into context and concludes:

> Consider, however, the following: emplacement of the 8-inch diameter pylons for the entire field will disturb a total surface area of only 1.4 acres. The disturbance over the total area of the project is thus less than 0.04 % of the total facility area. Further, it is conservatively estimated that less than 20 % of the total project area has any possibility of encountering anything other than coarse-grained fanglomerates within a depth of 4-8 feet. Thus, less than 0.01 % of the pylons have any realistic probability of encountering significant fossils. Given the frequency of fossil recovery in the previous paleontological survey, the probability of damaging buried fossil remains is astronomically small.

Notwithstanding the lack of impact from the PSEGS, Condition of Certification **PAL-9** simply renders the project unfinanceable because it defers analysis to after the Commission Decision is issued and contains undefined mitigation requirements including stopping construction and excavating an unknown area and unknown quantity of material. Additionally, the approach of **PAL-9** abandons the long held conservation strategy of leaving artifacts in place and minimizing disturbance. If Staff's approach were followed, the PSEGS would have the potential to result in far greater impacts to cultural resources and potential biological habitat.

In summary, we respectfully request the Commission to find that the PSEGS would result in less impact to paleontological resources than the Approved Project and reject the addition of this condition.

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of: Petition For Amendment for the **PALEN SOLAR ELECTRIC GENERATING SYSTEM**	**DOCKET NO. 09-AFC-07C** **DECLARATION OF CHARLES TURLINSKI**

I, Charles Turlinski, declare as follows:

1. I am presently employed by BrightSource Energy, Inc. as Director of Project Development.

2. A copy of my professional qualifications and experience was included with my Opening Testimony and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Alternatives for the Petition for Amendment for the Palen Solar Electric Generating System (California Energy Commission Docket Number 09-AFC-07C).

4. It is my professional opinion that the attached prepared testimony is valid and accurate with respect to issues that it addresses.

5. I am personally familiar with the facts and conclusions related in the attached prepared testimony and if called as a witness could testify competently thereto.

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct to the best of my knowledge and that this declaration was executed on 10/8 2013.

Charles Turlinski

PALEN SOLAR ELECTRIC GENERATING SYSTEM
ALTERNATIVES
OPENING TESTIMONY

I. Name:

Charles Turlinski

II. Purpose:

My testimony addresses the subject of Alternatives associated with the construction and operation of the Palen Solar Electric Generating System (PSEGS) (09-AFC-7C).

III. Qualifications:

Charles Turlinski: I am currently employed by BrightSource Energy Inc. and I am a developer of utility scale renewable energy projects with 10 years' experience. I have managed the development and interconnection processes for wind and solar projects throughout the country, including the negotiation and execution of Large Generator Interconnection Agreements (LGIAs) for over 1000 megawatts of capacity in the CAISO. I have a MBA from the Massachusetts Institute of Technology (MIT). I have reviewed the FSA Alternatives section and am familiar with the Project Objectives.

Detailed descriptions of my qualifications are presented in the resume which is included in Attachment A to this Opening Testimony package.

To the best of my knowledge all referenced documents and all of the facts contained in this testimony are true and correct. To the extent this testimony contains opinions, such opinions are my own. I make these statements and provide these opinions freely and under oath for the purpose of constituting sworn testimony in this proceeding.

IV. Exhibits:

In addition to this written testimony, I am sponsoring the following exhibits in this proceeding.

Exhibit No.	Transaction No.	Document Title
3	68910	**PSH's Petition for Amendment**, **Project Description and Project Objectives Section,** dated December 2012, and docketed on December 17, 2012.

V. Opinion and Conclusions:

I have reviewed the Alternatives section contained in Part A of the Final Staff Assessment (FSA) and I agree that the section evaluates a reasonable range of alternatives to the PSEGS. However, I believe that Staff has not appropriately analyzed the importance of some of the Project Objectives. Specifically, Staff underestimates the importance of the project having an Executed Large Generation Interconnection Agreement (LGIA) and Power Purchase Agreements (PPAs) for the output of the PSEGS. Quite simply, projects without PPAs and LGIAs are speculative in today's economic market. Staff states when reviewing potential feasibility of the Approved Project:

> Construction and operation of Reconfigured Alternative #2 or #3 could potentially satisfy most of the project objectives, although it is uncertain whether the change of technology back to parabolic trough would allow development of this alternative in a timely manner. (FSA page 6.1-28)

Additionally, Staff states:

> The Petition to Amend for the proposed modified project states that each of the two 250-MW units has an approved PPA (Palen Solar Holdings 2012). The project owner's objectives address fulfilling its existing approved PPAs for electrical sales from the facility. Approval of the PPAs by CPUC demonstrates that CPUC deems the PSEGS appropriate for helping to meet the state's RPS program goals. Once a PPA is approved, submittal of an amended advice letter to CPUC requesting an amended PPA is required unless the change to the project was accounted for in the original PPA (e.g., a PPA that allows a change in technology). It is unknown whether changing the technology of the PSEGS back to a parabolic trough project would require amending the PPAs. It is also unknown whether

> CPUC would approve amendments to the PPAs allowing the change, if such approvals would be necessary.
>
> The Petition to Amend also states that Palen Solar Holdings has a Large Generator Interconnection Agreement (LGIA) with CAISO for 500 MWs of interconnection rights to deliver electricity from the PSEGS to SCE's Red Bluff Substation (Palen Solar Holdings 2012). CAISO is focused on advancing projects in the queue to commercial operation. A schedule delay could result in a project's failure to meet its milestones and a breach of the LGIA. Changing the project technology back to a parabolic trough technology could at least cause a project schedule delay, and it is not known at what point a project schedule delay would affect project viability. (FA Page 6.1-28 and 29)

While Staff correctly discusses the issues, additional context is needed. Though the terms of the PPA's in question are indeed confidential, it can be stated with certainty that the PPA's in question do not allow for a change in technology without the requisite counterparty and CPUC approval, both would be a lengthy and uncertain process. Additionally, any LGIA amendment to revert back to solar trough technology would also be a lengthy process. Therefore amendment to either the PPA's or the LGIA would essentially make the project infeasible because it would no longer be able to be constructed in sufficient time to qualify for the Investment Tax Credit. Similarly any amendment to the LGIA would delay the project such that it could not be constructed in time to deliver energy pursuant to the PPAs.

While Staff highlights the modification to the PPAs and to the LGIA if the PSEGS were to revert back to a solar trough project, it does not highlight these issues for the PV Alternative, which Staff says may be environmentally superior. Any modification of the PSEGS to utilize PV technology would require amendments to the PPA (and subsequent CPUC approval) and would require a material modification analysis and subsequent amendment to the LGIA. I believe that any request to amend the LGIA would likely result in reduction in the project output by the California Independent System Operator (CAISO) due to the difference in power quality and reliability from a large injection of PV electricity.

Staff's view gives the impression that the PSEGS could quickly and easily obtain amendments to PPAs and amendments to the LGIA, which is not the case. First, there is no guarantee that the utility or the CAISO would ultimately approve any such amendments. Second, it could take months or even years to negotiate and finalize any such amendments, thereby putting the key Project Objectives (e.g., delivering high quality renewable

electricity to California consumers and qualifying for the Investment Tax Credit which will expire in 2016) in serious peril.

For these reasons I believe that the PV Alternative cannot feasibly meet the Project Objectives and therefore should be rejected.

Attachment A

Resumes

WESLEY A. ALSTON

Community Planning / Entitlement / Environmental Analysis
Fire Compliance Analysis / Fire Protection Services

CLIENTS SERVED

As Principal of Pacific Development Solutions Group (**PDSG),** Wes Alston has been an active participant in the endeavors of many California builders and developers. **PDSG** has provided services to relatively small entrepreneur developers, mid-size development firms, and major landowners.

Alliance Residential
Andland Properties, LLC
Beazer Homes Southern
BrightSource Energy
Braddock and Associates
Bren/Osgood Company
Canaday & Company
Centex Homes
Empire Companies
Highpoint Communities
K. Hovnanian Homes
KB Homes
Kohl's
Lincoln Properties
Lowes
Nevis Development Company
Pacific Century Homes
Pulte Homes
Rael Development Corporation
R.C. Hobbs Company
Starbucks
Stoneridge Commercial
Solar Reserve
Target
Taylor Woodrow Homes
Trumark Companies
William Lyon Company

PROFESSIONAL EXPERIENCE

Riverside County Fire Department **July 1971 – December 2002**
The Riverside County Fire Department provides all risk emergency management to the County of Riverside and 18 contract Cities. Responsible for a $143 million dollar budget and the supervision and overall management of the Fire department.

Fire Chief, City of Moreno Valley **February 2000 – December 2002**
Accountable for administering $6 million budget and maintaining effective cost controls. Managed staff of 150 firefighters and administrative personnel. Coordinated resource exchanges with other California Department of Forestry (CDF) facilities and fire departments. Responsibilities included:

- *Fire Stations:* Sponsored program to facilitate reducing response time by 5 minutes.
- *Equipment Acquisition and Fire Stations:* Responsible for submitting RFP's, preparing and reviewing specifications, negotiating contracts, and awarding bids.
- *Financial Management:* Maintained the lowest per capita cost of cities in California with a population between 100,000 and 200,000.

Battalion Chief/Fire Marshal, City of Moreno Valley **November 1997 – February 2000**

Supervised clerical and engineering staff in preparation of files, records, drafts, and maps pertaining to Fire Protection Planning for the City of Moreno Valley Fire Prevention office. Provided technical assistance to Fire Protection staff, Building and Safety staff, Code Enforcement, Planning staff, and others within the City that requires technical fire protection and planning information. Assisted in development of the Fire Department budget and monitor expenditures within the general Fire Department fund, development fees, and fire mitigation fees. Developed the Fire Department section of the City of Moreno Valley's new General Plan, presented to the City's Planning Commission and received approval. Attended all meetings throughout the City and County requiring the Fire Department representation. Provided a leadership role in all meetings.

Fire Captain Specialist **July 1984 – November 1997**

Managed the operation of the Fire Protection Planning and Engineering Division. Activities included:

- Participation in committees developing local and state ordinances.
- Serving as representative of the County Fire Department on planning matters before the Riverside County Board of Supervisors and Planning Commission.
- Negotiation of deal terms and purchase agreement conditions with property owners and brokers for new fire stations within the county.
- Preparation of economic and market feasibility analyses for specific plans within the county.

Responsibilities included:

- Management of current planning functions including subdivision, boundary adjustment, annexation, covenant modification, variance, and condition change.
- Preparation and presentation of staff reports and recommendations to Design Review Board and Board of Directors.
- Research and preparation of information on application processing, land use, governing documents, and regulatory code questions for staff, decision-makers, the membership, realtors and land-use professionals.
- Special projects in support or furtherance of Association policies and goals.
- Review and analyze regional plans and projects that have local impacts and generally tracking development in adjacent jurisdictions.
- Representing the Association at meetings of other jurisdictional entities.

EDUCATION

Bachelor of Science in Engineering, 1976
San Diego State

Associate of Arts in Fire Science, 1972
San Diego City College

PROFESSIONAL TRAINING AND CERTIFICATIONS

POST Basic
POST Supervision
NFPA Fire Sprinklers
Fire Command 1A, 2D, 2E
ICS S- 300,390,400,430
POST Intermediate
SFM Fire Investigator 1
NFPA Fire Alarms
Fire Control 6,7

CURRENT COMMUNITY INVOLVEMENT / PROFESSIONAL AFFILIATIONS

Board Member Riverside Area Rape Crisis Center
Moreno Valley Community Hospital Foundation
RCC Community Partnership
Moreno Valley Chamber of Commerce
National Fire Protection Association
California Fire Chiefs Association
California Conference of Arson Investigators
Board Member United Way of Inland Valleys
Riverside Community College Foundation
Silver Eagles
Building Committee, St. Patrick Church
International Conference of Building Officials
California League of Cities

RESUME

Mary E. Barger
4841 W La Mirada Drive
Laveen, AZ 85339
Home 602-466-2335
barger@ecentral.com

EDUCATION
B.A. Anthropology, Western Illinois University, 1974
Graduate Studies. Anthropology, Western Michigan University, 1975-76

AREAS OF SPECIALIZATION
Cultural Resources Compliance, Project Management, Federal Law and Archaeology, Southwest Archaeology, Tribal Consultation, National Environmental Policy Act Compliance.

HONORS
Title IX Scholarship 1972
Graduated Cum Laude Western Illinois University
BLM's Management and Leadership Program 1988
OPM's Women's Executive Leadership Program 1989

PROFESSIONAL AFFILIATIONS
Society for American Archaeology

PROFESSIONAL POSITIONS HELD
June 2012--present
Independent Consultant to centerline
455 Capitol Mall, Suite 350
Sacramento, CA 95814
Archaeologist

November 2011-Present
Bureau of Reclamation
125 S State Street
Salt Lake City, UT
Archaeologist (Retired annuitant)

July 2008-January 2011
Western Area Power Administration
615 S 43rd Avenue
Phoenix, AZ 85009

NEPA specialist; Regional Preservation Officer

January 1993-July 2008
Western Area Power Administration
12155 W Alameda Blvd
Lakewood, CO 80401
Archaeologist; Federal Preservation Officer

December 1990-January 1993
Bureau of Land Management
Colorado State Office
2850 Youngfield St.
Lakewood, CO 80215
Natural Resources Recruiter

August 1990-December 1990
Bureau of Land Management
Building 41, DFC
Denver, CO 80225
Archaeologist

July 1981-November 1990
Bureau of Land Management
Phoenix District Office
2015 W. Deer Valley Road
Phoenix, AZ 85027
Archaeologist

July 1979-July 1981
Bureau of Reclamation
714 S. Tyler, Suite 201
Amarillo, TX 79101
Archaeologist

September 1978-February 1979
Missouri State Highway Department
Highway Building
Jefferson City, MO 65101
Archaeologist

March 1977- April 1978
Bureau of Land Management
2370 S 2300 W
Salt Lake City, UT 84119
Archaeologist

May 1975- September 1976
Bureau of Land Management
P.O. Box 1869
Rock Springs, WY 82901
Archaeologist

August 1974-December 1974
Dickson Mounds Museum
Lewistown, IL 61542
Museum Aid

MANUSCRIPTS (sample)

"Cultural Resources Inventory for Maintenanceat Newman Peak Microwave Site, Pinal County, AZ." March 1994.

"A Cultural Resources Inventory of the ED2 Substation, Pima County, Arizona." August, 1994.

"Cultural Resources Protection Manual." Western Area Power Administration 1997

"A Cultural Resources Inventory of the Green Mountain Radio Tower 2.3-kV Transmission Line, Grand and Summit Counties, Colorado." July, 1997.

"A Cultural Resources Inventory of the Proposed Modifications to the Pima-Chandler Substation, Maricopa County, Arizona." June, 1998.

"Cultural Resources Inventory for the Nogales Tap Expansion, Santa Cruz County, AZ." January, 1999.

"Cultural Resources Inventory for a Staging Area for the Gila-Wellton Cross Arm Replacement Project, Yuma County, AZ." January, 1999.

"Cultural Resources Inventory for the Northern Expansion of the Gila Substation, Yuma County, AZ." February, 1999.

"Cultural Resources Inventory for Relocating Part of the Davis-Kingman Transmission Line for Highway 68 Expansion Project." September, 1999.

"Cultural Resources Inventory for a Staging Area at Kofa Substation for the Parker-Gila 161kV Transmission Line Pole Replacement Project, La Paz County, AZ." December, 1999.

"A Cultural Resources Inventory of the Proposed Modifications to the Glen Canyon Communication Site, Coconino County, Arizona." December 1999.

“A Cultural Resource Inventory for Western Area Power Administration’s Casa Grande Substation Expansion, Pinal County, Arizona.” March 2002.

Rafael Cobian, PE, LEED GA

Senior Transportation Engineer

About

Mr. Cobian has five years of experience in transportation engineering with Fehr & Peers. He has assisted in a wide variety of projects including the development of a travel demand forecasting models, operations studies, traffic studies, parking and circulation studies, and long range development plans. Mr. Cobian has experience working with TransCAD, VISSIM, Synchro, and many other transportation software programs. He has worked extensively with the SCAG 2008 RTP Model and RIVTAM Model and has aided in the modeling effort for the LAX Bradley West Project EIR, Westside Mobility Study, Los Angeles Transportation Strategic Plan, City of Santa Barbara Model, Cornfield/ Arroyo Seco Specific Plan Project and aided in the development of the UC Santa Barbara Long Range Development Plan. He has also worked on large transportation planning projects, such as the USC Master Plan, Beverly Hills General Plan, and Mission Canyon Community Plan. He has developed traffic operations models to evaluate operational conditions for traffic impact reports for projects in a variety of locations. Projects include the OCTA TLSP Project, Los Angeles State Historic Park Traffic Study, Metro Gold Line Eastside Extension Quad Gate Study, and the Santa Barbara – Ventura Highway 101 HOV Project.

Education

Bachelor of Science in Civil Engineering, California Polytechnic State University, San Luis Obispo, 2008

Registrations

Licensed Traffic Engineer, State of California (TR 2628)
LEED Green Associate, GBCI (10681078)

Professional Affiliations

Institute of Transportation Engineers (ITE)
American Society of Civil Engineers (ASCE)

Publications

Cobian, et al., Vehicle Emissions and Level-of-Service Standards: Exploratory Analysis of Effects of Traffic Flow on Vehicle Greenhouse Gas Emissions, ITE Journal, April 2009, p 30-41

Project Experience

Palen Solar Facility Traffic Study Update

Mr. Cobian served as Project Manager on this effort, where Fehr & Peers updated the traffic study previously prepared for the Plane Solar Facility. New traffic counts were collected at all study facilities, which included two freeway segments, two intersections, and one roadway segment. Project trip generation, trip distribution, and trip assignment estimates were developed for peak construction and operations of the proposed project. Potential traffic impacts were identified and mitigation measures were developed.

8141 E. Kaiser Blvd.
Suite 110
Anaheim, CA 92618
(714) 941-8800

Traffic Impact Analysis for the LADWP Sylmar to Pacific Ocean DC Electrode Replacement Project

Mr. Cobian served as Project Engineer on this effort, where Fehr & Peers conducted a traffic impact analysis for the Sylmar to Pacific Ocean DC Electrode Replacement Project, an infrastructure project of the City of Los Angeles Department of Water & Power. The project would replace and upgrade the existing electrode (an electric transmission line) that runs from the Sylmar Converter Station to the ocean off Pacific Palisades via overhead, underground and undersea lines. Coordination with Caltrans was required, as the project included construction activity that would cross several freeways and Pacific Coast Highway (PCH, SR 1). The traffic impact analysis provided a qualitative assessment of the construction-period effects that could occur, as well as detailed quantitative analysis of the potential magnitude of those effects for three distinct alignment options. Temporary effects included project-generated trips as well as temporary lane closures or full street closures due to in-street construction and construction staging, the temporary relocation of bus stops, the possible temporary closure of bicycle lanes and sidewalks and the temporary prohibition of on-street parking. The location where each of these potential effects could occur was identified and discussed and appropriate mitigation measures identified.

LADWP Tujunga Spreading Grounds Enhancement Project EIR

Mr. Cobian served as Project Engineer on this effort, where Fehr & Peers prepared a traffic study for the environmental documentation for the Tujunga Spreading Grounds Enhancement project in the Sun Valley community of Los Angeles. The proposed project would deepen, reconfigure and otherwise improve the existing Tujunga Spreading Grounds to increase their capacity to recharge the groundwater basin in this area. Project alternatives included variations of the improvements within the Tujunga Spreading Grounds and the storage/disposal of the export soil at alternate sites. Fehr & Peers analyzed potential temporary construction-related project traffic impacts at intersections and freeway segments in the vicinity of the spreading grounds and additional intersections and freeway segments in the area where the soil would be deposited.

Summit Reservoir Replacement Project

Mr. Cobian serves and Project Engineer for this project that analyzed construction impacts related to replacement of the Summit Reservoir in Berkeley, and prepared a transportation impact analysis for inclusion in an EIR. Mr. Cobian coordinated with the City to identify the preferred truck route and potentially impacted intersections. Impacts were assessed for both worker vehicle and truck traffic on narrow residential streets passing an elementary school and preschool. Fehr & Peers met in the field with the nursery school staff and parents to discuss their concerns, including parking and safety. Mitigation measures were developed to address their concerns, including additional flaggers to assist with school traffic and limiting the number of trucks to the extent possible during drop-off and pick-up times.

8141 E. Kaiser Blvd.
Suite 110
Anaheim, CA 92618
(714) 941-8800

GREGORY S. DARVIN
Chief Meteorologist

Summary of Experience

Mr. Darvin has specialized in the meteorological aspects of air quality issues for the last sixteen years. He has extensive experience in air quality management, dispersion modeling, meteorological modeling, greenhouse gas emission inventories, monitoring, major source permitting, complex terrain model development and implementation, emission inventory and health risk assessments. His experience spans more than 25 different states and several countries.

He has been actively involved with recent PSD permits for many large-scale solid fuel and gaseous fuel projects across the United States. Mr. Darvin has performed the following in support of PSD applications for utilities: baseline air quality and air quality modeling analyses (including preparation and negotiation of the modeling protocol), prepared the PSD and air permit regulatory applicability analyses, managed the preparation of the air quality emissions inventory, and assisted with the Best Available Control Technology (BACT) evaluations.

Specific project experience includes emissions calculations, modeling of impacts, evaluation of regulatory applicability and compliance, New Source Review (NSR) and Prevention of Significant Deterioration (PSD) permitting, and minor source permitting. He has used and is thoroughly familiar with a number of air quality models, including AERMOD, ISC3, CALPUFF, CALMET, COMPLEX I AND II, IGM, FDM, RTDM, CTSCREEN, CTDMPLUS, UAM, DEGADIS, SPILLS, VISCREEN, PLUVUEII, MESOPUFF, INPUFF, BLP, PAL, CAMEO, CALINE4, OCD5, RAM, TRACE, MM5, SLAB, and the Paris Airshed Model. These models have been used in scientific and development settings as well as in regulatory settings.

Education

M.S. Atmospheric Science, San Francisco State University, 1993
B.A. Physical Geography/Meteorology, University of California, Santa Barbara, 1985.

Select Project Experience

A representative selection of Mr. Darvin's projects is included below.

Western GeoPower ATC (June 2009-September 2009). Provided air dispersion modeling assessments for a 39 MW geothermal power plant, located in the Geysers area. Project modeling included normal and upset scenarios for H_2S impact analyses.

Caithness Blythe II AFC and PSD Permit Applications (June 2009-Present). Project manager and lead modeler for the preparation of the air quality permits for a 600 MW combined cycle power plant in Blythe, California. Project included Class I impact assessments, BACT and secondary impact assessments.

Select Project Experience (continued)

Calpine Geysers (Ongoing). Air quality modeling in support of ongoing permitting for both criteria pollutants and toxics. Performed wind field analyses in support of upgrading the Geysers Air Monitoring Program for use with AERMOD.

British Petroleum Carson Refinery AFC and PSD Permit Applications (2008-Present) Air Quality Project Manager and lead modeler for preparation of the permit applications for expansion of the refinery cogeneration facility. The project includes regulatory review, offset acquisition, Class I impact assessments, and BACT.

Mountainview Power Plant – SCE (2005 to Present). Project Manager for preparing an air quality permit modification related to commissioning activities and plant startup/shutdown. The project includes preparing a CEMS certification protocol, siting a meteorological tower, and ongoing compliance and regulatory consulting.

Roseville Electric Project AFC, City of Roseville, Ca. (January 2003 to Present). Air Quality Project Manager for air quality analysis related to a proposed new 200 MW natural gas fired power plant. Analysis included evaluation of CEQA, Class I impacts, visibility impacts, complex terrain, and cooling tower plume modeling.

Pico Power Project AFC, City of Santa Clara. (January 2002 to November 2004). Air Quality Project Manager and lead air quality modeler for permitting a 180 MW power plant in the City of Santa Clara, Ca. Prepared and negotiated air quality permit with BAAQMD and prepared air section(s) of AFC for the California Energy Commission.

Russell City Energy Center AFC, Calpine (January 1999 to November 2002, September 2006-Present). Air Quality Project Manager for obtaining PSD permit and AFC for a large natural gas fired power plant, located near Hayward, Ca. Project required detailed emission calculations, air quality modeling, combined impact assessments, BACT analysis and demonstration, Title IV compliance, and Title V compliance issues.

Metcalf Energy Center AFC, Calpine. *(1998 to 2003)* Lead air quality modeler for modeling a large natural gas fired power plant, located near San Jose, Ca. Project included CEQA, using refined modeling techniques to determine nitrogen deposition impacts, Class I analysis, and downwash analysis.

Otay Mesa Generating AFC, Calpine. (1999 to 2004). Lead Meteorologist for permitting a combined cycle power plant, located near San Diego, Ca. Project included Class I impacts, a nitrogen deposition impact assessment, and a downwash analysis in complex terrain. Modeling was used to prepare PSD permit application as well as the AFC application which was submitted to CEC.

CalEnergy Blackrock Geothermal Expansion (2007-Present). Lead Meteorologist for permitting three geothermal power plants in the Salton Sea area. Project was in support of a CEC license as well as local District Permits.

Select Project Experience (continued)

East Altamont Energy Center AFC (2000-2002) Lead Meteorologist for permitting large power plant, located near Tracy, Ca. Project included meteorological data set assessments, criteria pollutant and toxics impacts analysis, and constructon impact modeling. Modeling was used to prepare PSD permit application as well as the AFC application for submittal to the CEC.

San Joaquin Energy Center AFC (2001-2002) Lead Meteorologist for permitting large power plant, located near the town of San Joaquin in the San Joaquin Valley. Project included preparing modeling assessments for toxics and criteria pollutants, meteorological data set assessments, construction impacts, and plume visibility assessments for the CEC and local air agency.

Prevention of Significant Deterioration (PSD) Permit Modification, Kettle Falls Generating Station, Avista Corporation, Kettle Falls Washington. Prepared a PSD application for modification to the Kettle Falls Generating Station, a wood-waste fired generating facility to address emission increases resulting from a capacity increase modification at the facility. Air quality modeling analyses were required to assess compliance with ambient air quality standards and PSD increments. A toxic air pollutant evaluation was also prepared.

PSD Permitting and EIS For 2000-MW Coal-Fired Power Plant, Sierra Pacific Resources, Nevada. Managed the preparation of a Prevention of Significant Deterioration (PSD) permit application for a 2000-megawatt coal-fired power plant in northeastern Nevada proposed by Sierra Pacific Resources. Evaluation of PSD increments involved extensive air quality modeling for regions with complex terrain. Detailed air quality analyses were performed to address complex issues including: long-range transport of pollutants and subsequent effects on acid deposition, effects of plant emissions on visibility in nearby and distant Class I areas, evaluation of pollutant buildup during stagnation conditions and its effect on visibility, dust emissions from the construction and operation of the power plant, and PSD increments. As part of the state's permitting requirements, an evaluation of air toxics was performed.

PSD Permitting for Rinker Materials Cement Kiln in Brooksville, Florida. Mr. Darvin performed the baseline air quality and air quality modeling analyses, prepared the PSD and air permit regulatory applicability analyses, managed the preparation of the air quality emissions inventory and assisted with the BACT evaluation. The project fuel sources included coal, oil, and natural gas.

Select Project Experience (continued)

Air Quality Permitting for an Ammonia/Urea Plant, Btu Nitrogen Company, Wallula, Washington. Prepared a Notice of Construction application for the proposed Btu Nitrogen Plant near Wallula, Washington which included a 600 ton per day ammonia plant and 1,000 ton per day urea fertilizer plant. The facility was to be located in a PM_{10} nonattainment area. Air quality modeling was used to demonstrate compliance with PM_{10} requirements and air quality standards for criteria and toxic air pollutants. Additionally, Best Available Control Technology analyses were prepared for both criteria and toxic air pollutants.

Power Generation Facility – 1250 MW Combined-Cycle, PSD Air Quality Permitting, Kootenai Generation LLC, Rathdrum, Idaho. Managed preparation of a PSD permit application for a proposed 1,250 MW gas-fired combined-cycle turbine power generation facility to be located in Rathdrum, Idaho. Evaluation of local and regional air quality impacts were assessed with the ISCST3 model and CTSCREEN model for impacts in complex terrain. Potential impacts on regional haze and acid deposition on distant federal Class I areas were evaluated with the CALPUFF modeling system. Other air quality evaluations required for the PSD permit application include evaluation of impacts from toxic air pollutants and evaluation of Best Available Control Technology (BACT).

Clean Fuels Refinery Modification, Chevron, Los Angeles, California. Lead air quality modeler for preparation of an Environmental Impact Report (EIR) and New Source Review permit for a large refinery modification in Los Angeles to support the Clean Fuels Program. Project also included toxic emissions calculations and preparation of a Health Risk Assessment.

Prevention of Significant Deterioration - Calpine Rocky Mountain Energy Center. Project manager for preparing PSD application for a 620 MW power plant, located near Hudson Colorado. Project required completion of a PSD permit application, air quality impact modeling analysis in both near and distant from the source, BACT demonstration, and assessment of Class I area impacts. Project was deemed complete by agency in less than 4 weeks.

Arctic Ocean Permitting, Arco Alaska. Task Leader and lead modeler for the first OCS permit ever submitted to the USEPA. Permit was for several off-shore oil exploration drilling platforms in the Arctic Ocean off Alaska. Project involved use of OCD to calculate impacts from exploratory drilling rig and support vessels. Impacts at ANWR were also assessed.

Select Project Experience (continued)

Mesoscale Complex Terrain Model Development, Italian Government and Alyeska. Developed a mesoscale complex terrain wind field model to determine impacts of topographically induced winds on a large man-made lake in the Italian Alps. This model has also been used to diagnose trajectories of potential oil spills in Alaskan waters.

Lead Dispersion and Deposition Study, ASARCO, Leadville, Colorado. Lead scientist for assessing potential deposition of lead from smelting operations over a 130-year period. Results of emissions calculations, modeling and deposition were used to develop a soil sampling program and subsequent cleanup criteria.

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.

ALICE E. KARL, Ph.D.
ALICE E. KARL & ASSOCIATES, INC.
P.O. Box 74006
Davis, California 95617
Phone: (530) 666-9567 (office) (530) 304-4121 (cell) FAX: (612) 465-4822 E-mail: heliophile@mindspring.com

Alice has been an environmental consultant since 1978 and is the principal for the firm Alice E. Karl & Associates, which qualifies for and has been certified as a woman-owned business. She has an extensive knowledge of the arid southwest, having worked continually in the southwestern deserts of the United States and Mexico for nearly 35 years. She has also completed biological surveys in the coastal ranges of California and the Central and San Joaquin valleys. She is a highly experienced botanist, herpetologist, small-mammalogist, and a recognized desert tortoise authority. She holds permits that allow her to conduct all activities on desert tortoises (e.g., handle tortoises, apply transmitters, collect blood for health analyses) and conduct independent Mohave Ground Squirrel trapping. She also holds a California scientific collecting permit.

Alice conducts field surveys on special-status species, assists with project permitting, conducts research and monitors construction. She regularly organizes and leads large crews to conduct the necessary biological resource surveys for projects, but also is contracted as a reviewer for other firms' biological surveys and reports. Agency coordination and permitting is a critical component of her projects and she works with agency biologists and project proponents in an efficient and scientifically credible manner to develop conservation-oriented, practical and feasible project design and mitigation measures. Research has included long-term and geographically extensive projects on (a) desert tortoise reproduction, translocation, population viability, and habitat relationships; (b) rare plants; (c) vertebrate community relationships; and (d) sampling methods, especially for desert tortoise.

In addition to being an accomplished field biologist, crew chief, and project manager, Alice has worked with agency biologists to develop protocols for desert tortoise surveys, translocation, handling, and other procedures. She has developed a sampling technique for estimating tortoise densities over large areas (TRED), which is currently being employed on large military projects. She has also contributed to several area-wide plans (West Mojave Plan, Northern and Eastern Colorado Desert Plan, Clark County HCP).

MAJOR TASK CATEGORIES

- Special-status species surveys
- Mitigation and monitoring plan development
- Permitting (ESA, CESA, CEQA, HCPs, BAs, 2081, 1603, 404, SMARA)
- Agency coordination and workshops
- Designated Biologist/Authorized Biologist
- Scientific research

SPECIAL-STATUS PLANTS and REVEGETATION

- Principal botanist for numerous rare plant surveys in the Mojave, Colorado and Great Basin deserts (California and Nevada), the Tehachapi Mountains, Sonora (Mexico), and the Central and San Joaquin valleys
- Thousands of quantitive plant transects in many desert, subtropical, and forest habitats, using multiple sampling techniques for biomass, density, frequency, vigor, percent cover, etc.
- Extensive knowledge of Mojave and Colorado Desert flora and habitats
- Restoration and revegetation plans and investigations throughout the Mojave, Colorado and Great Basin deserts and northern California
- Wetlands delineation

DESERT TORTOISE

- Recognized desert tortoise authority, with over 34 years experience studying desert tortoises in California, Nevada, Utah, and western Arizona; habitat specialist
- 2 advanced degrees involving desert tortoises
- Holds own handling and research permits from the USFWS and the California Department of Fish and Game
- Author of or contributor to many desert tortoise translocation plans and tortoise permitting documents for solar and other projects
- Designed and implemented three desert tortoise translocation projects, including one of the largest and longest desert tortoise research projects to date - approximately 130 tortoises were telemetered for 10

years to study reproduction, growth, home range, burrow use, dispersal within the context of forage production, size and gender
- Instructor for Desert Tortoise Council Technical Workshops and telemetry use; train construction employee groups and tortoise monitors for construction projects
- Over 25 Bureau of Land Management (BLM)-type trend plots or other mark-recapture plots for population studies and >3000 transects to assess relative densities
- Impacts assessment, mitigation development - numerous projects
- Development of TRED sampling model for region-wide and fine-grained density estimates, used for both the Fort Irwin and the MCAGCC Twentynine Palms base expansions.
- Construction monitoring and development of monitoring protocol
- Contributor to development of methodologies for USFWS survey and handling protocols
- A primary reviewer of USFWS original listing package for desert tortoises
- Contributor to Clark County Habitat Conservation Plan, West Mojave Plan, and Northern and Eastern Colorado Coordinated Management Plan

OTHER WILDLIFE
- Extensive knowledge of southwestern reptile and amphibian fauna
- Extensive small-mammal (rodents) trapping studies in California, Nevada and Arizona, including Mohave ground squirrel and other special-status rodents.
- Survey, research, and permitting experience with the following listed species: Valley elderberry longhorn beetle, Shasta salamander (permitted), Tehachapi slender salamander, San Joaquin kit fox
- Burrowing owl surveys and mitigation
- Numerous bird surveys in desert habitat.
- Mojave ground squirrel - permitted to conduct trapping

PERMITS HELD
- Federal 10(a)(1)(A) for Desert Tortoise (permit in Alice Karl's name) (TE 746058-11)
- State MOU for Desert Tortoise
- California Scientific Collection Permit (SC001368)
- Mohave Ground Squirrel trapping (Authorized field Investigator on W. Vanherweg permit)

EDUCATION

Ph.D., Ecology - University of California, Davis. January 1998. Dissertation: Reproductive strategies, growth patterns, and survivorship of a long-lived herbivore inhabiting a temporally variable environment.

M.S., Biology - California State University, Northridge. 1982. Thesis: The distribution, relative densities, and habitat associations of the desert tortoise, *Gopherus agassizii*, in Nevada.

PROJECT LIST

PROJECT MANAGER and/or SOLE/LEAD BIOLOGIST:

Military Projects

Twentynine Palms Marine Corps Air Ground Combat Center (MCAGCC), Twentynine Palms, California. 2009- ongoing. Directed and conducted desert tortoise, special-status animal, rare plant and habitat surveys to support impacts analysis for potential base expansion and to revise management on base. Over 3000 TRED tortoise transects plus other surveys. Consultant to NREA, MCAGCC.

Nellis Air Force Base, Las Vegas and Tonopah, California. 2005 - ongoing. Surveys for rare plants on the Nellis North Training Ranges. Consultant to Nellis AFB, Las Vegas, Nevada.

Fort Irwin Expansion Project, Barstow, California. 2002-2003. Authored all desert tortoise sections for the Fort Irwin Expansion Biological Assessment. Initial plan for translocation studies for translocation of several hundred tortoises from the expansion area. Contracted to Charis Corporation, Temecula, California.

Fort Irwin Expansion Project, Barstow, California. 1998-2003. Developed and tested methods to quantitatively assess population levels and impacts to desert tortoises from proposed land expansion. Included mark-recapture plots (1998, 2001, 2002) and new methodology for region-wide, quantitative population assessments. Consultant to Charis Corporation, Temecula, California (1999-2002) and Chambers Group, Irvine, California (1998).

Desert Scimitar (U.S. Marine Corps), 2001. BA for training exercise from Colorado River to *Twentynine Palms Marine Corps Air Ground Combat Center*

Twentynine Palms Marine Corps Air Ground Combat Center (MCAGCC), Twentynine Palms, California. 1996-7. Consultant on desert tortoise issues for housing area expansion. Consultant to Merkel and Associates, San Diego, California.

U. S. Air Force MX Missile Project, Coyote Springs Valley, Nevada. Summer, l981. Intensive field survey (300 transects) of potential facility site to determine the relative densities of the desert tortoise. For Biosystems Analysis, Inc., San Francisco, California.

Miscellaneous Projects

Hyundai Motor America Mojave Test Track, western Mohave Desert, California. 2003 - ongoing. Wrote and/or reviewed permitting documents, including HCP. Wrote and conducted 5-year translocation plan and study. Assessed compensation properties. Consultant to Hyundai Motor America, California City, California.

Sonoran Desert Tortoise Project, Sonora, Mexico. 2005- ongoing. Ecology and genetics study of the desert tortoise in Sonora, Mexico. Field work includes continuous cohort of over 20 telemetered tortoises since 2005, habitat analyses, habitat use analyses, genetics, health assessments.

Unnamed Housing Project, Lancaster, California. 2007. Mohave ground squirrel protocol trapping. Consultant to Sundance Biology, Inc., Paso Robles, California.

San Diego County Water Authority, 2002 - 2005. Technical consultant for biological issues relating to Quantification Settlement Agreement water transfer on Colorado River. Consultant to Greystone Environmental Consultants, Sacramento, California.

Los Angeles County Sanitation District Palmdale Water Reclamation Plant, Palmdale, California. 2003. Agency meetings, survey protocol development and surveys for desert tortoise presence and impacts; surveys for burrowing owl; Mohave ground squirrel trapping; habitat assessment for special-status plants. Consultant to Environmental Science Associates, Oakland, CA.

Los Angeles County Sanitation District, Lancaster, California. 2002. Surveys of proposed pipeline for special-status plants and animals. Special-status plants and animals of greatest concern included desert tortoise, Mohave ground squirrel, burrowing owl, alkali mariposa lily, Lancaster milk-vetch. Consultant to Los Angeles County Sanitation District, Whittier, California.

Burlington-Northern Santa Fe Landfarm Project, Barstow, California. 2001-2003. Assessment of desert tortoise impacts , mitigation development, agency coordination for landfarm closure. Consultant to TRC Environmental Solutions, Irvine, California.

Central Washington University and Cal-Tech, Barstow, California. 1994. Monitoring trenching and closure activities for Endangered Species Act compliance (desert tortoises) on Emerson Fault research project. Consultant to Dr. Charles Rubin, Central Washington University.

U.S. Geological Survey, Landers, California. 1993 and 1994. Monitoring trenching and closure activities for Endangered Species Act compliance (desert tortoises) on Landers' Fault project. Consultant to Dr. David Schwartz, U.S. Geological Survey, Menlo Park, California.

Twentynine Palms Marine Corps Air Ground Combat Center (MCAGCC), Twentynine Palms, California. 1993. Tustin military base relocation project. Desert tortoise surveys to determine impacts and mitigation to tortoises from relocation of the base to MCAGCC . Authored several interim reports and co-authored final report to MCAGCC with Ogden Environmental, San Francisco, California

County of San Bernardino Medical Center, San Bernardino, California. September. 1990 General species inventory, and focused surveys for special-status plants and animals at three proposed sites for location of new medical center. Consultant to Higman-Doehle, Inc., Los Angeles, California.

Lake Minerals Corporation, Owens Valley, California. August, 1990 to present. Field surveys to determine tortoise presence at site of soda ash processing plant. Consultant to McClenahan and Hopkins Associates, Inc., San Mateo, California.

Del Webb Housing Development, Palm Desert, California. August, 1990. Assessment of tortoise habitat quality and likelihood of tortoise presence on proposed site. Consultant to Environmental Science Associates, Los Angeles, California.

Miller Housing Development, Palm Desert, California. 1990. Assessment of tortoise habitat and densities at proposed housing site; development of mitigation. For ERC Environmental, San Diego, California

Great Basin Unified Air Pollution Control District, Owens Lake Dust Control Project. December, 1989. Determined impacts to small mammal special-status species on sites proposed for disturbance. Consultant to McClenahan and Hopkins Associates, Inc., San Mateo, California.

Pacific Agricultural Holdings, Inc., Piute Valley, California. Fall, 1989. Field assessment of tortoise presence on site. Consultant to Pacific Agricultural Holdings, Inc., Fresno, California.

City of Rosamond, California, Expansion. Spring, 1989. Field survey of expansion site to determine impacts to sensitive flora, tortoises, and Mojave Ground Squirrel. Tortoise transects, live-trapping for diurnal rodents. Consultant to CWESA, Sanger, California.

Jet Propulsion Lab Site, Edwards Air Force Base, California. Fall and Winter 1988. Field determination of impacts to tortoises (transects, habitat analyses) from new facility siting. Consultant to WESTEC Services, San Diego, CA.

City of Ridgecrest Off-Road Vehicle Park, Searles Valley, California. January to March 1988. Field determination (transects, habitat analyses) of impacts to local desert tortoise populations from siting of proposed park. Consultant to CWESA and Saito Associates, Fresno, California.

Bullhead City Airport Expansion, Laughlin, Nevada. October, 1987. Assessment of potential impacts to the desert tortoise from expansion of the Bullhead City Airport. Transects, habitat analyses. Consultant to Heron, Burchette, Ruckert, and Rothwell Washington, D.C.

U.S. Borax and Chemical Co., Boron, California. May, 1986. Field assessment of impacts to sensitive flora and fauna on proposed Cogeneration II facility. Consultant to Dames and Moore, Santa Barbara, California.

Propeace, Inc., Victorville, CA to Nevada. March, 1986. Assessment of impacts to wildlife and development of mitigation on proposed route of peace march in the Mojave Desert portion of route. Consultant to Propeace, Inc., Los Angeles, California.

Utilities and Transportation (Power Plants, Transmission Lines, Pipelines, Solar or Wind Facilities, Telecommunications, Railroads)

Blythe Solar Power Project, Blythe area, California. 2012 - ongoing. Directed and conducted fall botanical surveys for license compliance. Consultant Tetra Tech, Lakewood, Colorado.

*McCoy Solar Generating Facilit*y, Blythe area, California. 2007 - ongoing. Directed and conducted all botanical and biological surveys for permitting, including spring and fall rare plant surveys. Lead permitting biologist with Tetra Tech, Lakewood, Colorado, through all phases of permitting process; permits are pending.

Copper Mountain and Silver State South Solar Projects, Eldorado Valley and Ivanpah Valley, Nevada. 2011. Rare plant surveys. Consultant to Ironwood Consulting, Inc., Redlands, CA.

Stateline Solar Energy Project (approximate name), Primm, Nevada. 2010. Rare plant surveys. Consultant to Ironwood Consulting, Inc., Redlands, CA.

*Genesis Solar Generating Facilit*y, Blythe area, California. 2007 - ongoing. Directed and conducted all botanical and biological surveys for permitting. Lead permitting biologist with Tetra Tech through all phases of California Energy Commission permitting process (hearings and workshops, preparer and/or reviewer of all plans and documents) and permits with Fish and Wildlife Service and U.S. Bureau of Land Management. Currently implementing the site revegetation plan, authored by myself. Consultant to Tetra-Tech, Inc., Irvine, California.

Eagle Mountain Pumped Storage Project, Desert Center, California. 2007-ongoing. Directed and conducted all botanical and biological surveys for permitting. Lead permitting biologist with GEI through all phases of FERC, USFWS, and BLM permitting processes (meetings, preparer and/or reviewer of all plans and documents) . Consultant to Eagle Crest Energy, Palm Springs, California.

*Abengoa Mojave Solar Project, w*estern Mojave Desert, California. 2008 - ongoing. Advisory role: reviewer and advisor for all biological permitting and mitigation documents; direction to company conducting

mitigation (AECOM). Participant in hearings and workshops. Wrote desert tortoise translocation plan. Consultant to AECOM, Camarillo, California.

Solar Millennium, Blythe, Palen and Ridgecrest Solar Projects. 2009-ongoing. Advisory role: reviewer and advisor for desert tortoise, Mojave fringe-toed lizard and other permitting and mitigation documents. Participant in hearings and workshops. Consultant to AECOM, Camarillo, California.

Palmdale Hybrid Power Project, Palmdale, California. 2008 - ongoing. Advisory role: reviewer and advisor for biological permitting. Consultant to AECOM, Camarillo, California.

Victorville II Hybrid Power Project, Victorville, California. 2007 - 2009. Advisory role: reviewer and advisor for all biological permitting and mitigation documents; direction to company conducting mitigation (AMEC). Participant in hearings and workshops. Consultant to AECOM, Camarillo, California.

Beacon Solar Energy Project, western Mojave Desert, California. 2007 - 2009. Advisory role: reviewer and advisor for all biological permitting and mitigation documents; direction to company conducting biological surveys (AECOM). Conducted field surveys to ssess compensation properties and alternative routes. Consultant to AECOM, Camarillo, California.

Southern California Edison Palo Verde-Devers II Transmission Line, Colorado River to Devers, California. 1985, 1987, 1988, 2002, 2003, 2004, 2005, 2007. Surveys of proposed transmission line for special-status plants and animals; technical reports. Consultant to: E. Linwood Smith and Associates, Tucson, Arizona (1985-8); EPG Inc., Tucson, Arizona (2002-4; 2007); Tetra-Tech, Inc., Irvine, California (2005).

Blythe Energy Project 230 kV Transmission Line, Blythe to Desert Center, California. 2004 and 2005. Surveys of proposed transmission line alternatives, for special-status plants and animals; technical reports. Consultant to Tetra-Tech, Inc., Irvine, California (2005).

Blythe Energy Project, Blythe, California. 2000 - ongoing. Designated biologist for proposed power plant, with attendant duties including surveys; biological technical reports; B.A.; AFC assistance; development of mitigation (BRMIMP), monitoring, and education programs (WERP); implementation of mitigation measures; agency coordination; public hearings; and general document reviewer. Special-status plants and animals of greatest concern included desert tortoise, burrowing owl, Harwood's milk-vetch. Consultant to Greystone Environmental Consultants, Sacramento, California (2000-2002), Blythe Energy, LLC (2003 to present).

Desert Southwest Transmission Project (Imperial Irrigation District) Blythe to Niland and Blythe to Devers, California. 2000-2002, 2005. Surveys of multiple, proposed transmission lines for special-status plants and animals, technical reports, EIR. Consultant to: Greystone Environmental Consultants, Sacramento, California (2000-2002); Tetra-Tech, Inc., Irvine, California (2005).

Moapa Power Project, Las Vegas, Nevada. 2001. Initial surveys for special-status plants and animals for proposed power plant, transmission line and pipeline. Consultant to URS Corp, Santa Barbara, California.

Ocotillo Power Project, Palm Springs, California. 2000-2001. Surveys and biological technical report for special-status plants and animals for proposed power plant, transmission line and pipeline. Consultant to URS Corp, Santa Barbara, California.

Imperial Irrigation District, Blythe to Desert Center, California. 2000. Surveys for special-status plants and animals for proposed transmission line upgrade. Consultant to Greystone Environmental Consultants, Sacramento, California.

Enron Pastoria, Tejon Ranch (Bakersfield), California. 1999-2001. Surveys, biological technical report, and AFC preparation for special-status plants and animals for proposed power plant, transmission line and pipeline. HCP preparation for San Joaquin kit fox. Consultant for CEC hearings. Consultant to URS Corp, Santa Barbara, California.

Enron Antelope Valley, Victorville, California. 1999-2001. Surveys and biological technical report for special-status plants and animals for proposed power plant, transmission line and pipeline. Consultant to URS Corp, Santa Barbara, California.

PG&E Generating Company Harquahala Power Project, Toquop, Arizona. 1999-2000. Surveys and biological technical report for special-status plants and animals for proposed power plant and transmission pipeline. Consultant to URS Corp -Dames and Moore, Phoenix, Arizona.

Santa Fe Pacific Pipeline Company, Concord to Colton Pipeline, Mojave to Adelanto, California. Spring 1995. Surveys for special-status plants, desert tortoises, and Mojave
Ground Squirrels (CHIEF protocol); project leader. Consultant to Woodward-Clyde Consultants, San Diego, California.

Harper Lake Company, San Bernardino County, California. 1994. Re-evaluation of and assistance with position paper on primary compensation measures for LUZ Harper Lake solar project. Consultant to ENSR, Fort Collins, Colorado.

Santa Fe Railroad Company, San Bernardino County, California. Spring 1994. (1) Monitoring construction for Endangered Species Act compliance (desert tortoises) on bridge upgrades and (2) educational presentation to Santa Fe employees. Consultant to Environmental Solutions, Inc., Walnut Creek, California.

Western Area Power Administration, Parker to Yuma, California. 1994. Led large crew to survey transmission line for determining impacts to desert tortoises, special-status plants, birds, amphibians, and mammals from future transmission line upgrades. Consultant to Woodward-Clyde Consultants, Denver, Colorado.

Mojave Pipeline Operating Company, Mojave Desert, California. 1993. Survey of five proposed compressor station sites for desert tortoise impacts. Consultant to CWESA, Sanger, California. Report submitted to Woodward Clyde Associates, Denver, Colorado.

Mojave Pipeline Operating Company, Kramer Junction, California. 1992-93. Led large crew to survey proposed pipeline from Kramer Junction to Inyokern for impacts to desert tortoises, special-status plants, and Mojave ground squirrels. Consultant to CWESA, Sanger, California. Report submitted to Woodward Clyde Associates, Denver , Colorado.

Lake Minerals-Vulcan Mine Railroad Upgrade, Searles, Indian Wells, and Owens Valley, California. 1991. Desert tortoise surveys along existing railroad to determine future impacts to desert tortoises from upgrade of railroad. Report submitted to McClenahan and Hopkins, San Mateo, California.

U. S Ecology Radioactive Waste Facility, Beatty, Nevada. August 1990. Survey of
proposed power line route to radioactive waste site for impacts to tortoises.

Mojave Pipeline Project, Toquop, Arizona to Bakersfield, California. Spring, 1989-90. Lead botanist and wildlife biologist for species of concern in the Mojave Desert and Tehachapi Mountains portion of line. Included: field surveys and agency meetings; development of mitigation and relocation techniques for tortoises and training program for field observers; development of portions of Environmental Quality

Assurance Program for construction phase. For CWESA, Sanger, California, and Woodward Clyde Consultants, Denver, Colorado.

Southern California Edison Victorville/Kramer High Voltage Transmission Line. Spring 1990. Directed field study to determine tortoise abundance along proposed route. Consultant to ERC Environmental, San Diego, California.

AT&T Fiber Optics Cable Route, southern Nevada. 1990. Field survey of route to determine relative tortoise abundance, impacts on tortoise populations, and appropriate mitigation from burial of cable. Also involved relocation of tortoises and training of field personnel during construction. Consultant to ENSR, Fort Collins, Colorado.

Los Angeles Department of Water and Power Telecommunications Network Project, Los Angeles Basin, California. Winter and Spring, 1989. Field survey of proposed microwave facility sites in mountains surrounding the Los Angeles Basin to determine impacts to
wildlife and botanical species of concern. Consultant to Higman Doehle, Inc., Los Angeles, California.

AT&T Fiber Optics Line, Victorville, California to Las Vegas, Nevada. Fall, 1988 to Winter, 1989. Field survey of route to determine relative tortoise abundance, impacts on tortoise populations, and appropriate mitigation from burial of cable. Also involved relocation of tortoises and training of field personnel during construction. Consultant to ENSR, Fort Collins, Colorado.

Luz Engineering, Kramer Junction and Harper Lake, California. Spring, 1987 to 1990. Led large crew to assess tortoise densities and habitat quality on relocation site for solar generating facility; density analyses and habitat assessments on facility expansion sites and relocation of tortoises during construction. Consultant to CWESA, Sanger, California, and ENSR, Fort Collins, Colorado.

U.S. Telecom, Banning to Blythe, California- May, 1986 - Field assessment of impacts to special-status plants and fauna along proposed route. Consultant to E. Linwood Smith and Associates, Tucson, Arizona.

Los Angeles Department of Water and Power, Intermountain Power Project (IPP), Nevada-Utah. July, l982 to August, l985. Field determination of impacts to the desert tortoise (transects), development of mitigation procedures, and implementation of mitigation along two routes of the HVDC Transmission Line in southern Nevada and southeastern Utah. Also, monitoring of sensitive flora and tortoises during construction. Consultant to E. Linwood Smith and Associates, Tucson, Arizona.

Los Angeles Department of Water and Power, Sylmar-Celilo (HVDC) Transmission Line Upgrade, Owens Valley, California. July, l984 to December, 1987. Field determination of impacts to special-status flora and wildlife and development of mitigation procedures along the line from Sylmar, California north to Nevada. Construction monitoring and crew education. Consultant to Applied Conservation Technologies, Inc., Newport Beach, California.

Mines and Aggregate Operations:

Ballast Rock Project, Hinkley, California. 2002- continuing. Special-status species impacts assessments, surveys. Special-status plants and animals of greatest concern included desert tortoise, Mohave ground squirrel, burrowing owl, chuckwalla, Mojave monkeyflower and Barstow woolly sunflower. Consultant to Resource Design Technology, Inc., Folsom, California.

S and V Cinder Mine, Big Pine, California. 2002. Baseline, quantitative vegetation surveys for SMARA compliance. Consultant to Resource Design Technology, Inc., Folsom, California.

Lehigh South (Calaveras) Cement (limestone, shale), Shasta County, California. 1998, continuing. Field surveys, biological impacts assessment, reclamation plans, Shasta salamander 2081, Shasta salamander research, revegetation. Consultant to Resource Design Technology, Inc., Folsom, California.

Carone Properties (hard rock), Napa County, California. 2000, continuing. Field surveys, biological impacts assessment, California red-legged frog issues. Consultant to Resource Design Technology, Inc., Folsom, California.

RMC Lonestar (aggregate), Tulare County, California. 1997, continuing. Biological inventory and impacts assessment; Valley Elderberry Longhorn Beetle surveys; wetlands issues; biological portion of EIR. Consultant to RMC Lonestar, Pleasanton, California, and Resource Design Technology, Inc., Folsom, California.

RMC Pacific Materials (hard rock), Fresno, California. 1999, continuing. Field studies, impacts assessment. Consultant to Resource Design Technology, Inc., Folsom, California.

Lehigh South (Calaveras) Cement (limestone), Tehachapi, California. 1999, continuing. Field studies, impacts assessment. Consultant to Resource Design Technology, Inc., Folsom, California.

Last Chance Sand and Gravel (aggregate), Beatty, Nevada. 1998-9 Biological consultant for all phases of project. Surveys for desert tortoise, special-status plants, mammals, reptiles, birds. Consultant to Bill Marchand (operator), Beatty, Nevada.

San Benito Supply (aggregate). 1997-present. Vegetation survey to determine baseline conditions for SMARA reclamation compliance; developed revegetation plan. Consultant to Lilburn Corporation, San Bernardino, California, and Resource Design Technology, Inc., Folsom, California.

M&T Chico Ranch (aggregate), Butte County, California. 1997-present. Wrote biological portion of EIR. Consultant to Resource Design Technology, Inc., Folsom, California.

Granite Construction Co. (aggregate), Whitewater, California. 1997. General species inventory; surveyed for desert tortoises, special-status plants, mammals, reptiles, birds. Consultant to Lilburn Corporation, San Bernardino, California.

Teichert Aggregates (aggregate), Esparto, Yolo County, California. 1996. Wrote biological portion of EIR. Consultant to Lilburn Corporation, Folsom, California.

Teichert Aggregates (aggregate), Woodland, Yolo County, California. 1996. Wrote biological portion of EIR. Consultant to Lilburn Corporation, Folsom, California.

Cache Creek Aggregates (aggregate), Yolo County, California. 1996. Wrote biological portion of EIR. Consultant to Lilburn Corporation, Folsom, California.

Asphalt Construction Company (aggregate), Ridgecrest, California. 1995. Vegetation surveys to determine baseline and regrowth conditions for SMARA compliance. Consultant to Lilburn Corporation, Folsom, California.

Castle Mountains Gold Mine (mineral), San Bernardino County, California, 1995, 1996. Assessment of desert tortoise impacts from proposed expansion (field surveys, habitat analysis). Also included re-evaluation of existing mitigation and compensation measures. Consultant to Lilburn Corporation, Folsom, California.

Santa Fe Pacific Gold (mineral), Glamis, California. 1994. (1) Examination of potential drilling sites for desert tortoise impacts (field surveys) and (2) developed proposal to assess remaining tortoise habitat on mine site. Consultant to Santa Fe Pacific Gold Corporation, Reno, Nevada.

Goldfields Mining Company (mineral), Brawley, California. 1991-92. Field surveys and habitat analysis of gold mine site. Co-authored Biological Assessment. Developed mitigation plan and impacts studies. Led large crew for desert tortoise clearance surveys. Trained core group of facility employees in tortoise handling. Consultant to Environmental Solutions, Inc., Irvine, California.

Cactus Gold Mine (mineral), Mojave, California. August, 1990. Assessment of tortoise presence on site of heap leach pad extension. Consultant to McClenahan and Hopkins Associates, Inc., San Mateo, California.

Waste Facilities

Los Angeles County Sanitation Districts Mesquite Regional Landfill, Brawley, California. 2004 - 2008. Developed approximately 18 mitigation plans for construction and operations phases of landfill to ensure that the project remains in compliance with all permits. Conducted baseline biological surveys for identification of project impacts, including quantitative plant surveys, small-mammal trapping, exotic weeds, quantitative and qualitative habitat monitoring and revegetation; developed and directed other baseline surveys on birds and ravens. Conducted tortoise clearance of 1800+ acres. Planned and conducted translocation study for desert tortoises. Co-produced Worker Environmental Awareness Program video. Consultant to Resource Design Technology, Inc., Folsom, California.

Arid Operations Mesquite Regional Landfill, Brawley, California. 1992 to 2000. Led large crew to conduct desert tortoise surveys for determining impacts and mitigation to tortoises from construction and maintenance of proposed landfill and associated rail spur. Co-authored Biological Assessment. Expert witness to address activists' concerns. Developed research program (mitigation) to track ecosystem health effects from landfill development. Consultant to Environmental Solutions, Inc., Irvine, California, Arid Operations, El Centro, California, and Resource Design Technology, Inc., Folsom, California.

NORCAL Sanitary Landfill, Victorville, California. Spring, 1997. General species inventory on expansion area; special surveys for desert tortoises, special-status plants, mammals, reptiles, birds. Consultant to Lilburn Corporation, San Bernardino, California.

NORCAL Sanitary Landfill, Landers, California. Spring, 1997. General species inventory on expansion area; special surveys for desert tortoises, special-status plants, mammals, reptiles, birds. Consultant to Lilburn Corporation, San Bernardino, California.

U.S. Ecology/California Department of Health Services Low-level Radioactive Waste Facility, Ward Valley, California, March. 1987 to 2001. Determined impacts to and developed mitigation for desert tortoises in association with construction and maintenance of proposed facility. Developed and conducted a ~10 year, continuous research project on tortoise translocation that focused on effects to reproduction, movements, physiology and mortality. Study cohort included ~150 radiotelemetered tortoises. Principal author of two biological assessments. Reviewer of numerous project opponents' papers and author of response documents. Consultant to U.S. Ecology, Rocklin, California.

RAIL-CYCLE (Waste Management of North America, Inc. and the Atchison, Topeka, and Santa Fe Railway Company). 1994, 1997. Expert witness for biological impacts at County of San Bernardino hearings for proposed landfill. Consultant to Waste Management of North America, Inc., Pasadena, California.

RAIL-CYCLE, Amboy, California, 1991 - Led large crew for desert tortoise surveys to determine impacts and mitigation to tortoises from construction and maintenance of proposed landfill. Report submitted to Ecological Research Services, Claremont, California and Jacobs Engineering, Pasadena, California.

Yucca Mountain Nuclear Waste Project, Nevada Test Site, Nevada. Fall 1989-90. Determination of tortoise abundance, distribution and habitat associations on proposed site of high-level nuclear waste. With Environmental Science Associates, San Francisco, California

Hidden Valley Resources Toxic Waste Disposal Facility, Newberry Springs, California. June to September 1988. Determination of impacts to and mitigation for desert tortoises from construction and maintenance of facility. Transects and habitat analyses. Consultant to J&M Land Restoration, Bakersfield, California.

Non-Military Government Contracts:

U.S. Army Corps of Engineers Construction Engineering and Research Laboratory (CERL). Spring 2003. Trained biologists in desert tortoise telemetry techniques, handling, and behavior for tortoise activity project near Barstow, California. Contacts: Mr. Andrew Walde and Dr. Larry Pater.

Joshua Tree National Monument, Twentynine Palms, California. 1987-88. Assessed status of the desert tortoise throughout the monument (transects, habitat analyses); developed relocation techniques and assessed sites for tortoises turned in to headquarters. Contact: Dr. Jerry Freilich.

Bureau of Land Management, Las Vegas, Nevada. June to October, 1987 (employee). Developed new method for estimating tortoise densities from transects; led team to estimate tortoise densities from transects throughout southern Nevada; developed habitat assessment technique from quantitative habitat analyses. Supervisor: Sidney Slone.

Nevada Department of Wildlife, Las Vegas, Nevada. Spring, l984 to 1989. Development of a comprehensive, computerized data base of locations and habitat associations of all vertebrate taxa in Nevada through field, literature, and museum collections' surveys. Field research included live-trapping of all taxa, quantitative censuses of birds, rodents, and carnivores, statistical analyses, and development of baseline research methods for the Department of Wildlife. Contract No. 84-33.

Bureau of Land Management, Riverside, California. March to August, l980. Independent, 60-day quantitative and qualitative study of a population of desert tortoises in eastern California. Included extensive analysis of the site's vegetation. Technical report emphasized the relationship of primary production, disturbance, and geo-characteristics to the population demographics of the desert tortoise in this area. Contract No. CA-060-CTO-3.

Bureau of Land Management, Las Vegas, Nevada. March, l979 to August, l982. Sole project to date to determine the distribution and relative densities of the desert tortoise in Nevada; also delineated habitat requirements of the tortoise in Nevada. Solitary research involving foot-transecting over 450 miles in Clark, Lincoln, and Nye counties. Also included qualitative and quantitative examinations of three populations of tortoises similar to those mentioned above. Contract No. YA-512-CT9-90.

Bureau of Land Management, Riverside, California. Spring, l979. Independent, 60-day quantitative and qualitative study of a population of desert tortoises in the western Mojave Desert. Included aforementioned aspects. Contract No. CA-960-CT9-106.

Bureau of Land Management, Riverside, California. Spring, l978. Independent 30-day quantitative and qualitative study of population of desert tortoises in eastern San Bernardino County, California. Included aforementioned aspects. Contract No. CA-060-CT8-000042.

California Department of Fish and Game, Chino, California. June to December, l978 - Independent, foot-transecting of over 400 miles of the Mojave and Colorado deserts in California to assist in the determination of the status of the desert tortoise in California. Additional study of pupfish (*Cyprinodon maculatus*) in the Salton Sea, California.

ASSOCIATE PROJECT BIOLOGIST:

Mojave Ground Squirrel Behavioral Project. 2003. Trapping and telemetry with Drs. Phil Leitner and John Harris near Ridgecrest, California.

Eagle Mountain Landfill, Desert Center, California. 1996**.** Desert tortoise surveys on proposed site. Consultant to Circle Mountain Consultants, Wrightwood, California.

City of Rosamond General Plan. 1992. Trapping ssessment of Mohave Gound Squirrel population status. Consultant to CWESA, Sanger, CA.

*Clark County Desert Tortoise Habitat Conservation Pla*n. 1990-91. Reviewer and partial author of HCP and member of biological technical team; also included field assessments of tortoise habitat quality. Consultant to RECON, San Diego, California.

Desert Tortoise Council. 1990-present. Requested by Council to present techniques for finding tortoises, identifying sign and analyzing data to biologists, developers, and consultants at annual techniques workshop.

American Motorcycle Association/U.S. Fish and Wildlife Desert Tortoise Listing. 1989-90. Review of U.S. Fish and Wildlife Service's basis for Emergency Endangered Listing of the desert tortoise. Examination of all available data, both published and unpublished, to analyze status of the desert tortoise. Draft report heavily cited by U.S. Fish and Wildlife as support for their final listing determination. Subcontracted to Biosystems Analysis, Inc., Tiburon, California.

Salt River Project, Quemado, New Mexico. September, l985, 1987. Determination of impacts to vegetation and evaluation of re-vegetation success (quantitative vegetation transects) from mining coal reserves. In association with E. Linwood Smith and Associates, Tucson, Arizona.

Sonora Mining Corporation, Sonora, California. Fall, 1986. Assessment of impacts to fish populations (electro-shocking)in Woods Creek, from mining operations. CWESA, Sanger, California.

UNOCAL Platform Irene Project, Lompoc, California. September, 1986. Monitoring of pipeline construction for sensitive wildlife and floral issues. CWESA, Sanger, California.

Southern California Edison, Kingman, Arizona. May, 1986. Botanical survey along proposed transmission line route; Kingman, Arizona to Boulder City, Nevada. Biosystems Analysis Inc., Santa Cruz, California

Belridge Cogeneration Project, Bakersfield, California. Spring, 1985. Field survey of the blunt-nosed leopard lizard (Gambelia silus) and analysis of vegetation. CWESA, Sanger, California.

CWESA , Sanger, California- September, l984. Field survey of the blunt-nosed leopard lizard in the San Joaquin Valley, California, to determine population dynamics and ecology.

U.S. Forest Service, Klamath Forest, California. Summer, l983. Project to determine the population dynamics, behavior, and effective control techniques of pocket gophers (Thomomys bottae) in red fir clearcuts. Field work included use of radio telemetry and live trapping. Walter E. Howard, U.C., Davis.

Southwest Biological Associates, Encinitas, California. Winter, l978. Literature search on the herpetofauna of central and southern California.

Bureau of Land Management, Riverside, California. Summer, l978 - Field study of the effects of grazing and urbanization on reptiles at two Mojave Desert sites.

EDUCATIONAL EMPLOYMENT:

Collector and preparer, Museum of Vertebrate Zoology, Wildlife and Fisheries Biology, University of California, Davis, California. l983-l985 - Included trapping, preparation (skeletal and study skin preparation, live-pose taxidermy, freeze-drying), and cataloguing of specimens.

Teaching Assistant, U. C. Davis. l983-85. Courses in wildlife ecology and museum science.

Teaching Assistant, California State University, Northridge. September, l981 to June, l982. Courses in general biology, physiological ecology and local California flora and fauna.

PUBLICATIONS AND PRESENTED PAPERS (not including technical reports and documents associated with projects):

Karl, A. l980. The distribution and relative densities of the desert tortoise, *Gopherus agassizi,* in Nevada. *In*: K. Hashagen, ed., Proceedings of the l980 Desert Tortoise Council Symposium, Riverside, California. Pp 75-87. (Paper also presented.)

Karl, A. l981. The distribution and relative densities of the desert tortoise, *Gopherus agassizi,* in Nevada. Part II. *In*: K. Hashagen, ed. Proceedings of the l981 Desert Tortoise Council Symposium, Riverside, California. Pp76-92. (Paper also presented.)

Karl, A. and E. Smith. l984. - Densities of and impacts to the desert tortoise, *Scaptochelys agassizii,* along the proposed 500 kv D.C. Intermountain Power Project Transmission Line in Nevada and Utah. Paper presented at the Desert Tortoise Council Symposium, Lake Havasu, Arizona.

Karl, A. 1994. Reproduction in desert tortoises - ecological and evolutionary perspectives. Paper presented at both the 1994 Desert Tortoise Council Symposium, Las Vegas, Nevada and the American Society of Ichthyologists and Herpetologists Meetings, Los Angeles, California.

Karl, A. 1995. Indirect censusing methods for desert tortoises. Paper presented at an invitational workshop on censusing desert tortoises. Reno, Nevada.

Karl, A. 1997. Factors affecting reproduction of desert tortoises and resultant implictions for management. Paper presented at the 1997 Desert Tortoise Council Symposium, Las Vegas, Nevada

Karl, A. 1997. Reproductive strategies of the desert tortoise. Paper presented at the 1997 American Society of Ichthyologists and Herpetologists Meetings, Seattle, Washington.

Karl, A. 1998. Growth patterns of the desert tortoise in an East Mojave population. Paper presented at the 1998 Desert Tortoise Council Symposium, Tucson, Arizona.

Karl, A. 2002. Revised techniques for estimating desert tortoise abundance in the Fort Irwin National Training Center Expansion Area in 2001 and the results of those studies. Paper presented at the 2002 Desert Tortoise Council Symposium, Palm Springs, California.

Karl, A. 2004. Drought effects on the desert tortoise and population recovery. Paper presented at the 2004 Desert Tortoise Council Symposium, Palm Springs, California.

Karl, A. 2005. Revised Techniques for Estimating Desert Tortoise Abundance in the Fort Irwin National Training Center Expansion Area in 2001 and the Results of Those Surveys. Paper presented at the 2005 Western Section of the Wildlife Society Meetings, Sacramento, California.

Karl, A., Ma. Cristina Melendez Torres, Cecil R. Schwalbe, Mercy Vaughn, Philip C. Rosen, Daren Riedle and Lisa A. Bucci. 2006. The Morphologically Distinct Sinaloan Desert Tortoise. Paper presented at the 2006 Desert Tortoise Council Symposium, Tucson, Arizona.

Freilich, J., R. Camp, J. Duda and A. Karl. 2005. Problems with sampling desert tortoises: a simulation analysis based on field data. J. Wildl. Manage. 69(1):45-55.

MEMBERSHIPS:

California Native Grass Association
California Native Plant Society
Southern California Botanists
Desert Tortoise Council
Society for the Study of Amphibians and Reptiles
Society for Ecological Restoration

FRED L. NIALS

Address: 4841 W. La Mirada Dr.
Laveen, AZ
E-mail: fnials@earthlink.net
Telephone: 602-616-4709

EDUCATION

Logan High School, Logan New Mexico, 1958-1961
Eastern New Mexico University, BS Geology, Minor Botany 1961-1966
University of Idaho, Geology PhD program (AbD) 1966-1969 NDEA Research Fellow

EMPLOYMENT, FIELD, AND RESEARCH EXPERIENCE

The following summary includes only the most pertinent positions and project experience. In the interest of brevity, numerous short-term consulting and pre-professional positions are not included.

Independent Consultant to centerline: 2012-present. Geoarchaeology/geomorphology investigations in Chuckwalla Valley, Riverside County, California.

Desert Archaeology, Inc.: 2005-present. Senior Geomorphologist

Typical examples of projects include:
Geoarchaeologist/Specialist in prehistoric irrigation systems; Las Capas project (project expansion), J. Vint, Director.
Geoarchaeologist; New Los Pozos Project (multiple phases), H. Wöcherl, Director.

Center for Desert Archaeology: 2005-2008. Research Geoarchaeologist

Geoarch, Inc.: January 1998-present. Geomorphology/Geoarchaeology consulting service, self-owned.

Typical examples of consulting positions include:
Geomorphology Consultant, Las Capas Project; Desert Archaeology, Inc.; J. Mabry, Director.
Geomorphology Consultant, Los Pozos Project; Desert Archaeology, Inc.; D. Gregory, Director.
Principle Investigator, Horse Canyon Geomorphology Project; U.S. Navy, Fallon, Nevada.
Geoarchaeological Consultant, Sundance Archaeological Research Fund; Dr. D. Fowler, Director.
Geomorphology Consultant, San Pedro River Investigations Project, Desert Archaeology, Inc.; B. Doelle, Director.
Geomorphology Consultant, Wilmot Rd. Corrections Center Project; Old Pueblo Archaeology; A. Dart, Director.
Geomorphology/geoarchaeology Consultant, Cactus Flat Basin Evaluation- USAF Tonopah Test Range; WCRM; R. Kolvet, Director.

University of Nevada, Reno: January 1989-1998.

Taught Geomorphology at Mackay School of Mines (Dept. of Geology) 1990-1998 (as part of Desert Research Institute position).
Taught various graduate-level geoarchaeology/geomorphology-related courses in Department of Anthropology.
Taught Geomorphology In Archaeological Analysis, a training workshop for the Heritage Resources Management Program.

Desert Research Institute (University of Nevada System): August 1988-January 1998. Asst. Research Geoarchaeologist. Larger project involvements included:

Geologist- Quaternary geological mapping in Griffith Canyon Quadrangle, western Nevada, project in conjunction with Nevada Bureau of Mines and Geology; Dr. L. Garside, Director.
Geoarchaeologist, Chinchorro Investigations, *Museo Azapa*, northern coastal Chile, Dr. B. Arriaza, Director.
Geoarchaeologist, Pintwater Cave-Indian Springs Valley Project, Nellis AFB; Dr. P. Buck, Director.
Geoarchaeologist/Field Director, Sundance Project, northern Great Basin; Dr. Don Fowler, Director.
Geoarchaeologist- numerous projects on Lake Roosevelt, Columbia River Basin area, Washington; Dr. J. Galm, Director.

Geoarchaeological Consultant- numerous projects in Yakima Training Center area, Washington. Dr. J. Galm, Director.

Geoarchaeologist, Hourglass Cave Project, Colorado; Dr. Pat Watson, Director.

Geoarchaeologist, Investigations of aceramic neolithic sites in southern Cyprus; Dr. A. Simmons, Director.

Geoarchaeological Consultant to WCRM, Inc., Giroux Canyon Project, eastern Nevada; E. Stoner, Director.

Geomorphologist- DOE Paleoenvironmental Studies of Northern Great Basin. Various directors or principal investigator.

Geomorphologist-geoarchaeologist- Black Rock Desert Project, northern Nevada. Principal investigator.

Geomorphologist- Sunshine Wells Paleoenvironmental Studies, eastern Nevada. Principal investigator

Geoarchaeological consultant- Skyrocket Site, near Angels Camp, west-central California.

Geoarchaeological Consultant to WCRM, Inc., Desert Valley area, northern Nevada; E. Stoner, Director.

Geomorphologist-Geoarchaeologist, numerous projects on Nevada Test Site, southern Nevada.

Geomorphologist- Dogbone Lake Project, Nellis AFB, southern Nevada; Dr. S. Livingston, Director.

Co-Investigator, Ash Meadows Project, southern Nevada.

Desert Research Institute (University of Nevada System): 1987-1988, Geomorphology Consultant- Rio Puerco region, northwestern New Mexico. Dr. C. Irwin-Williams, Director.

Eastern New Mexico University: Assistant Professor 1969-1978(full-time except for 1974-1975-sabbatical leave), 1980-1988 (half-time); Research Assistant Professor, 1982-1984 (full-time, concurrent with teaching position). Other concurrent investigations conducted through ENMU include:

1986-1987, Geoarchaeologist- Chupadera Drainage Project, central New Mexico

1974, Geologist/Co-investigator- Pony Hills Project, southwestern New Mexico

1973, Geologist/Co-investigator- Klondike Hills Project, southwestern New Mexico

1972-1979, Geologist- Rio Puerco Project, northwestern New Mexico

1972-1976, Geologist- Salmon Ruins Project, northwestern New Mexico

1972, Geologist/Co-investigator- Brockman Hills Project, southwestern New Mexico

1971, Geologist/Co-investigator- Salado River Project, northwestern New Mexico

Washington State University: 1974-1975. Taught graduate level courses in Geoarchaeology, Archaeological Site Contexts.

Soil Systems, Inc.: 1985-1986. Geomorphological Consultant- various projects in Phoenix, Arizona area; Dr. C. Breternitz, Director.

Arizona State Museum: 1982-1986, Consultant- Las Colinas Project, Arizona; D. Gregory, Director.

University of Kansas: 1983, Geoarchaeological Consultant- Chaco Archaic Rockshelters Project, northwestern New Mexico; Dr. A. Simmons, Director.

Bureau of Land Management, Albuquerque District: 1982, Field Director- Chaco Roads Phase II Project, northwestern New Mexico. J. Roney, Supervisor.

Desert Research Institute: 1982, Geomorphological Consultant- Rio Salado Project, northwestern New Mexico.

Bureau of Land Management, New Mexico State Office (on loan from Eastern New Mexico Univ.): 1981, Geologist- Chaco Roads Project, northwestern New Mexico; C. Kincade, Director.

West Florida Archaeological Center: 1980, Geomorphological Consultant- Tennessee-Tombigbee Waterway Project, western Mississippi; Dr. J. Bense, Director.

Museum of New Mexico, Laboratory of Anthropology: 1980, Consultant- Tucumcari Bypass Project, northeastern New Mexico; T. Seaman, Director.

Center for Archaeological Research (University of Texas at San Antonio): 1980, Geoarchaeological Consultant- Investigations at Fort Polk Military Reservation, Louisiana; Dr. J. Gunn, Director.

Cultural Resource Management Division (New Mexico State University): 1980, Geoarchaeological consultant- Eddy County Project, southeastern New Mexico; D. Kirkpatrick, Director.

Pro-Lyst, Inc.: 1979, Geoarchaeologist- Navajo Indian Irrigation Project, Blocks IV and V, northwestern New Mexico; Dr. A. Simmons, Director.

ESCA-Tech Corp.: 1979, Geoarchaeologist- Navajo Indian Irrigation Project, Blocks VI and VII, northwestern New Mexico; Dr. W. Reynolds, Supervisor.

Archaeological Research Associates: 1979, Consultant- Candy Creek Project, north-central Oklahoma; B. Bouseman, Supervisor.

Benham-Blair Corp. (TECHRAD): 1979-1980, Geomorphologist/geoarchaeologist- Tennessee- Tombigbee Waterway Project, Mississippi and Alabama; Dr. G. Muto, Supervisor.

Oklahoma Archaeological Survey: 1978, Geomorphologist- Parris Mound Project, eastern Oklahoma; Dr. G. Muto, Director.

Oklahoma River Basin Survey: 1977-1979, Geomorphological consultant- Clayton Reservoir Project, Lake Wister Project, and others; Dr. J. Galm, Director.

Oklahoma Conservation Commission: 1977, Principle investigator, Cedar Creek Project, southwestern Oklahoma.

Cultural Resource Management Division (New Mexico State University): 1977, Geoarchaeologist- Navajo Indian Irrigation Project, Block II, northwestern New Mexico; D Kirkpatrick, Director.

Field Museum of Natural History: 1974-1979, Geomorphologist/geoarchaeologist- *Programa Riego Antiguo*, northern coastal Peru; Dr. M. Moseley, Director.

***Instituto Nacional de Arquelogía* (*Tesoro* Foundation):** 1978, Consultant- Early Agricultural Systems Investigations, *Lago Titicaca* and *Rio Desaguadero* areas, Bolivia.

Washington State University: Lecturer- Department of Anthropology

PUBLICATIONS AND WRITTEN REPORTS

Mr. Nials has more than 100 sole- and co-authored publications, monographs, chapters in edited volumes, abstracts, site reports, chapters in site reports, and letter reports. Publications have appeared in a diverse variety of regional, national, and international outlets, including:

Arizona State Museum Archaeology Series;
Bulletin of American Association of Petroleum Geologists;
Bulletin of California and Great Basin Archaeology;
Bureau of Land Management, New Mexico State Office Monograph Series;
ESCA-Tech Corp.; Technical Series
Eastern New Mexico University Technical Report Series;
Eastern New Mexico University Contributions in Anthropology;
Field Museum of Natural History Bulletin;
New Mexico Geological Society Guidebook Series;
New Mexico State University Cultural Resource Management Division Publication Series;
Proceedings of the Geological Society of America;
Proceedings of the American Nuclear Society;
Proceedings of the New Mexico Archaeological Council;
Proceedings of the Society for American Archaeology;
Quaternary Sciences Center (Desert Research Institute) Technical Report Series;
Tech-Rad (Benham-Blair) Technical Publications;
University of Arizona Press;
University of New Mexico Office of Contract Archaeology Publication Series;
University of Oklahoma Research Series; and
University of Utah Press.

Some of the more recent of these include:

Nials, F.L., D.A. Gregory, B. Hill

2011 The stream reach concept and the macro-scale study of riverine agriculture in arid and semi-arid environments. Geoarchaeology 26(5):724-761.

Gregory, D.A. and F.L. Nials
2007 The Environmental Context of Linguistic Differentiation and Other Cultural Developments in the Southwest. In *Zuni Origins: Toward a New Synthesis of Southwestern Archaeology*. Edited by D.A. Gregory and D.R. Wilcox. University of Arizona Press, Tucson. Pp. 49-76.

Graybill, D.A., D.A. Gregory, G.S. Funkhouser, and F.L. Nials
2006 Long-term Streamflow Reconstructions, River Channel Morphology, and Aboriginal Irrigation Systems along the Salt and Gila Rivers. In *Environmental Change and Human Adaptation in the Ancient American Southwest.* Edited by Doyel, D.E. and J.S. Dean, pp. 69-123. University of Utah Press, Salt Lake City.

Arriaza, B.T., V.G. Standen, E. Belmonte, E. Rosello, F.L. Nials
2001 The Peopling of the Arica Coast During the Preceramic: A Preliminary View. Chungará: Revista de Antropologia 33(1).

PROFESSIONAL PRESENTATIONS

Mr. Nials has presented more than 60 submitted and invited papers at professional conferences, annual meetings, and workshops at the international, national, and regional level. These include:

American Association of Petroleum Geologists,
American Nuclear Society,
American Quaternary Association,
Arizona Archaeological Council Hohokam Symposium,
Association of American Anthropologists,
Geological Society of America,
Great Basin Archaeological Conference,
Idaho Academy of Science,
New Mexico Archaeological Council,
New Mexico Geological Society,
Northwest Science Conference,
Pecos Conference,
Society for American Archaeology, and
Southwest Archaeological Conference.

SUMMARY OF EXPERIENCE

Mr. Nials has examined well over 5,000 archaeological sites ranging in age from Paleoindian to Historic in western North and South America and in the Mediterranean area. The following summary includes some of his more significant accomplishments or participatory efforts as principal investigator, co-investigator, or geomorphological consultant:

- Developed, or assisted in the refinement of regional alluvial chronologies in the American Southwest (Four Corners area), northern Great Basin, and Pacific Northwest.
- Assisted in the development of a Late Pleistocene/Holocene aeolian chronology for the Four Corners region.
- Participated in one of the most comprehensive early studies of prehistoric irrigation in coastal South America.

- Co-authored one of the first papers relating the effects of prehistoric El Nino events with the South American archaeological record (Field Museum of Natural History).
- Assisted (with Graybill and Gregory) in the pioneering development of dendroclimatology-based streamflow retrodiction allowing annual reconstruction of streamflow in the Salt River of Arizona, and the application of these data to archaeological and geological interpretations. Conducted (with Graybill) extensive research in the application of dendroclimatological reconstructions to investigations of geomorphic process/climate relationships and paleo-landscapes in the Basin and Range physiographic province.
- Partially responsible for the development of a methodology and terminology for the study of prehistoric irrigation features in Arizona, and the interpretation and archaeological implications of irrigation systems in several areas in North and South America.
- Described and analyzed the oldest yet-known prehistoric canals in the contiguous US, in the Tucson Basin, Arizona.
- Participated in and/or directed several of the most comprehensive and definitive studies of prehistoric Puebloan roads in the Southwest. Developed a methodology and terminology for the recognition, ground-truthing, analysis, and description of prehistoric roads.
- Developed geomorphology-based models of prehistoric site location patterns for a variety of physiographic settings in the Southwest and in South America.
- Taught numerous courses in Geomorphology, Geoarchaeology, and Geomorphology for the Archaeologist at various universities. For more than ten years instructed Geomorphology In Archaeological Analysis, a training workshop for the Heritage Resources Management Program, a national program for the advanced training of professional archaeologists.
- Co-instructed (with E. Hattori) a course on the Role of Field Investigations in Determinations of National Register Site Eligibility, a training workshop for the Heritage Resources Management Program.
- Consultant and Field Director for the Sundance Archaeological Research Fund, an endowed research project devoted to exploration for Paleoindian and Early Archaic sites in the Great Basin. Exploration efforts utilize a geomorphology-based model of early occupation patterns that I was responsible for developing.
- Geomorphologist for the Early Agriculture Project, a long-term grant-funded research project to determine the advent of agriculture in the Southwest. Work involved development of a geomorphic model for prediction of Early Agricultural phase site locations in a broad area of SE Arizona-SW New Mexico and mapping of more than 2700 km of floodplains in SE Arizona and SW New Mexico.
- Completed (with Gregory and Funkhauser) a dendroclimatology-based reconstruction of discharge and geomorphology on the Salt and Gila Rivers for the period 572 A.D.-Present.
- Developed a system for location and identification of buried individual prehistoric fields in southern Arizona. This has resulted in location of the most extensive set of field systems yet discovered in the world. The site was named one of the ten most important sites in the world in 2012 by Archaeology Magazine.

Matt Stucky
Manager, Business Development

Summary

Mr. Stucky joined Abengoa Solar in 2010, after eight years as a consulting engineer in the municipal water and wastewater industry. He has bachelors' degrees in both civil engineering and environmental studies, as well as a master's degree in environmental engineering, and has been a registered civil engineer in the state of California since 2004. Aided by his experience with technical, interdisciplinary projects and his environmental background, he adds his management and organizational skills to the Abengoa Solar business development team, where his primary focus is on project permitting.

Professional Experience

Abengoa Solar LLC — Oakland, California
Manager, Business Development — 5/10 – Present

- Manage and coordinate the development of projects, including due diligence, permitting, interconnection, and financing.
- Led the federal permitting process for the Mojave Solar Project, a 250 MW CSP project. The US Department of Energy was the lead agency under the National Environmental Policy Act, and the Bureau of Land Management was a coordinating agency. Although Southern California Edison was responsible for the transmission upgrades serving the project, these upgrades were also covered by the project's federal environmental documents, adding further complexity to a time-constrained permitting process. All approvals were received in time for the project to be successfully financed with a Federal Loan Guarantee.
- Managed compliance activities for the Mojave Solar Project, ensuring that all pre-construction reports, plans, surveys, and other activities were executed to the satisfaction of the California Energy Commission prior to the commencement of project construction. Successfully met critical deadlines to ensure that pre-construction activities occurred during the allowable windows and that full project construction started in time to allow the project to qualify for expiring federal incentives.

Carollo Engineers — Walnut Creek, California
Engineer — 7/02 – 5/10

- Managed design teams of engineers and drafters in the production of construction documents.
- Acted as resident engineer during the construction of a $105 million wastewater treatment plant expansion. Responsible for coordinating the efforts of supporting engineers and administrative staff, answering requests for information, producing design changes, and evaluating and negotiating change orders with the contractor.

- Designed sludge mixing and heating processes, solids handling and dewatering processes, an onsite sodium hypochlorite generation system, chemical storage and delivery systems, an ultraviolet disinfection process, a trickling filter, and various pump stations.
- Performed complex hydraulic analyses of both open channel and closed piping systems.
- Evaluated various water treatment processes and technologies, produced cost estimates, and presented design ideas and options to clients.
- Prepared contractual and technical documents such as scopes of work, specifications, and operations and maintenance manuals.

U.S. Public Health Service — Seattle, Washington
Junior Commissioned Officer — 6/01-8/01

- Interned with the U.S. Public Health Service's Indian Health Service, a federal health program for Native Americans.
- Assisted with water and wastewater projects on Native American reservations in the Seattle area.
- Modeled a community water distribution system, sited a water reservoir, and inspected the construction of a sewer main and lift station.

Education

- M.S. in Environmental Engineering, University of California-Berkeley, 2002
- B.S. in Civil Engineering, University of Kansas, 2001
- B.S. in Environmental Studies, University of Kansas, 2001

Licenses and Accreditation

- Professional Engineer, Civil, State of California

Charles Turlinski

San Francisco, California • cturlinski@gmail.com • (415) 990 8746

Experience

BRIGHTSOURCE ENERGY OAKLAND, CA 2011-PRESENT

Senior Director – Project Development

Development lead for 500 MW Palen Project

Project Management and Pipeline Development:

- Managed interconnection process to LGIA and Full Capacity Deliverability in line with PPA obligations.

Origination, Technology Commercialization and Project Financing

EDP RENOVAVEIS/HORIZON SAN FRANCISCO, CA 2008-2010

General Manager - Solar (SPM) - Direct Report to EDPR's Chief Development Officer

Led the creation of EDPR's solar development team resulting in a 700+ MW project pipeline.

Project Management and Pipeline Development:

- Built and managed EDPR's 4 person North American solar development team responsible for site assessment, land acquisition, interconnection, permitting and early-stage engineering activities.
- Responsible for $2.5mm+ annual budget and definition of team's annual, quarterly and monthly goals.
- Led financial performance analysis of each project for executive committee approval.
- Managed company's RFP responses for utility scale solar PPA's in Arizona and California markets.

Market Analysis & Technology Assessment:

- Defined company's entry strategies for high value North American and European markets.
- Spearheaded comparative technology suitability assessments (CSP vs PV; Trough vs Power Tower; CdTe vs c-Si).
- Represented the company in multiple speaking engagements at various industry conferences (Platts, CSPToday).
- Participated in EDPR's investment analysis and exit of Andasol (50 MW solar trough with storage in Spain).

HORIZON WIND ENERGY ALBANY, NY 2005-2008

Project Manager

Development lead for the 227 MW Marble River Wind Farm and Horizon's New York project pipeline (300+ MWs).

Project Development & Management:

- Responsible for project definition, land acquisition, permitting (local, county, state & federal), engineering, resource assessment, and maintaining a constructive relationship with the community.
- Managed annual project budget of $3-5mm and project team of 3 project developers.
- Led successful bidding strategy for $100mm NYSERDA REC contract.
- Negotiated Payment in Lieu of Taxes (PILOT) and Host Community Agreement with local jurisdictions.
- Deeply involved in BOP, EPC contract negotiation and project finance efforts.
- Executed $20mm buy-out of project joint venture parties.

Regional Team Leadership Activities:

- In charge of early-stage definition, development & progress of two adjacent wind farms (300 MWs) in upstate NY
- Participated in Goldman Sachs acquisition, re-branding and subsequent sale of Horizon Wind Energy.

CITIZENS ENERGY BOSTON, MA 2004

Project Manager (Summer & Fall Internship)

Headed by Joseph Kennedy, Citizens Energy is active in the development of wind and alternative energy.

- Successfully led NYSERDA RFP response for a $400,000 grant to fund early stage project development.
- Authored a market comparison and analysis of wind energy in developing nations.

INTEGRATED SOLUTIONS TECHNOLOGY HONG KONG/PHILIPPINES 1999-2003

Co-Founder - Director Sales & Marketing

Start-up focused on software development and integration for the apparel supply chain. IST grew to 80+ employees.

- Reported directly to the CEO and quarterly to the board with P&L responsibility.
- Built IST"s external revenues from 0 to $1.2 million in 2 years.
- Managed a cross-disciplinary team of 27 developers, account managers, and support staff.

LUEN THAI INTERNATIONAL GROUP HONG KONG 1998-1999

Manager

A privately held apparel-manufacturing group with 12,000 employees and $500 million per year in revenues.

- Managed the planning & implementation of a project plan to re-engineer the garment group by business process.
- Implemented internationally recognized ISO 9000 quality programs through multiple factories in four countries.

Education

MIT Sloan School of Business *MBA* *2005* Cambridge, MA

- MIT Energy Club Founding Officer; MIT $100k Cleantech Business Plan Mentor/Coach

Stanford University *Non-Degree Coursework* *2002* Palo Alto, CA

- Decision Analysis in Uncertainty; Computer Science

Skidmore College *Bachelor of Science* *1998* Saratoga, NY