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DOCKET
09-AFC-6
DATE JUN 11 2010
RECD. JUN 11 2010

June 11, 2010

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

Subject: **PALO VERDE SOLAR I, LLC'S OPENING TESTIMONY**
BLYTHE SOLAR POWER PROJECT
DOCKET NO. (09-AFC-6)

Enclosed for filing with the California Energy Commission is the original of **PALO VERDE SOLAR I, LLC'S OPENING TESTIMONY**, for the Blythe Solar Power Project (09-AFC-6).

Sincerely,

Marie Mills

Palo Verde Solar I, LLC's

Opening Testimony

Blythe Solar Power Project (09-AFC-6)

June 11, 2010

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Alice Harron

I, Alice Harron, declare as follows:

1. I am presently employed by Solar Millennium, as a Senior Director.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Project Description for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 8, 2010.

Alice Harron

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Elizabeth Ingram

I, Elizabeth Ingram, declare as follows:

1. I am presently employed by Solar Millennium, as a Project Manager, Development.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Project Description for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 9, 2010.

Elizabeth Ingram

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Ralph Hollenbacher

I, Ralph Hollenbacher, declare as follows:

1. I am presently employed by Solar Millennium LLC, as a Director, Project Development Engineering.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Project Description for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 8, 2010.

Ralph Hollenbacher

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of: Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DOCKET NO. 09-AFC-06** **DECLARATION OF** Trevor Thor

I, Trevor Thor, declare as follows:

1. I am presently employed by Solar Millennium LLC, as the Vice President of EPC Management.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Project Description for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 JUNE 9, 2010.

Trevor Thor

Trevor Thor

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Shawn Kelly

I, Shawn Kelly, declare as follows:

1. I am presently employed by AECOM, as a Senior Manager.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Project Description for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 9, 2010.

Original Signed
Shawn Kelly

BLYTHE SOLAR POWER PROJECT
PROJECT DESCRIPTION
OPENING TESTIMONY

I. Name: Alice Harron, Elizabeth Ingram, Ralph Hollenbacher, Trevor Thor and Shawn Kelly

II. Purpose:

Our testimony addresses the subject of Project Description associated with the construction and operation of the Blythe Solar Power Project (09-AFC-06).

III. Qualifications:

Alice Harron: I am presently employed at Solar Millennium, LLC, and have been for the past 9 months and am presently a Senior Director Masters Degree in Business Administration and a Bachelor's Degree in Economics and I have over 15 years of experience in the field of energy development and finance. I prepared or assisted in the AFC post-filing information, data responses, and supplemental filings for Project Description. A detailed description of my qualifications is contained in the attached resume.

Elizabeth Ingram: I am presently employed at Solar Millennium LLC, and have been for the past 5 months and am presently a Project Manager, Development with that organization. I have a Masters Degree in Business Administration and a Bachelor's Degree in Government and Economics and I have over 3 years of experience in the field of renewable energy project development. I prepared or assisted in the AFC supplemental filings for Project Description. A detailed description of my qualifications is contained in the attached resume.

Ralph Hollenbacher: I am presently employed at Solar Millennium, LLC, and have been for the past 4 months. I am presently Director of Project Development Engineering with that organization. I have a Bachelor's Degree in Mechanical Engineering and a Masters in Business Administration and I have over 25 years of experience in the field of energy development, engineering and consulting. I prepared or assisted in the preparation of the AFC as well as the post-filing information, data responses, and supplemental filings for Project Description. A detailed description of my qualifications is contained in the attached resume.

Trevor Thor: I am presently employed at Solar Millennium, LLC, and have been for the past 5 months. I am presently Vice President, EPC Management with that organization. I have a Bachelor's Degree in Marine Engineering Technology and a Masters in Business Administration and I

have over 20 years of experience in the field of engineering and construction management for the power industry. I prepared or assisted in the AFC supplemental filings related to Project Description. A detailed description of my qualifications is contained in the attached resume.

Shawn Kelly: I am presently employed at AECOM, and have been for the past several years and am presently a Senior Manager with that organization. I have 29 years of experience in senior management. I prepared or assisted in the preparation of the Project Description section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

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 1	**Application for Certification Volumes I & II**, dated August 24, 2009, and docketed on August 24, 2009, Sections 1.0 and 2.0.
Exhibit 3	**Letter from Assembly Person V. Manuel Perez (Project Support Letter for PSPP & BSPP)**, dated October 21, 2009, and docketed on October 26, 2009.
Exhibit 4	**Data Adequacy Supplement**, dated October 26, 2009, and docketed on October 26, 2009.
Exhibit 29	**Palo Verde Solar I, LLC's Initial Comments on the SA, DEIS**, dated April 19, 2010, and docketed on April 19, 2010.
Exhibit 39	**Application/ Report of Waste Discharge --Proposed Evaporation Ponds**, dated May 14, 2010, and docketed on May 17, 2010.

Exhibit 42	**Notification of Revision Memorandum—Blythe Solar Power Project Gen-Tie**, dated May 28, 2010 and docketed on May 28, 2010.

V. Opinion and Conclusions

Page B.1-1, Section B.1.1, Introduction

"Construction and operation of the project would disturb a total of about ~~7,043~~***7,025*** acres, which includes the final transmission line route, temporary construction power line and telecommunication line (see figure 1)."

Page B.1-1, Section B.1.2, Description

> BSPP would consist of four adjacent, independent~~, and identical~~ units of 250 megawatt (MW) nominal capacity each for a total nominal capacity of 1,000 MW.
>
> A weather station located in each power block provides real-time measurements of weather conditions that affect the solar field operation. ***Two to four additional weather stations may be required per unit may be required for energy-scheduling accuracy. These additional weather stations would be located within the solar fields.*** Radiation data is used to determine the performance of the solar field.

Page B.1-2, Individual Components of the Proposed Project

> **Heat Collection Elements -** The HCEs of the four solar plants are comprised of a steel ~~tube~~ ***pipe*** surrounded by an evacuated glass tube insulator. The steel ~~tube~~ ***pipe*** has a coated surface, which enhances its heat transfer properties with a high absorptivity for direct solar radiation, accompanied by low emissivity.

Page B.1-4, 5, Major Project Components

> The major components and features of the proposed Blythe project include:
>
> - ***Solar Field &*** Power Block Unit #1 (northeast);
> - ***Solar Field &*** Power Block Unit #2 (northwest);
> - ***Solar Field &*** Power Block Unit #3 (southwest);
> - ***Solar Field &*** Power Block Unit #4 (southeast);
> - Access road ~~from~~ ***including upgraded portion of*** Black Rock Road to onsite office;

- Office and parking;
- Land Treatment Unit (LTU) for bioremediation/land farming of HTF-contaminated soil;
- Warehouse/maintenance***, Assembly Hall*** and laydown area;
- Concrete Batch plant;
- Fuel depot;
- Onsite transmission facilities, including central internal switchyard;
- ***Telecommunications Lines;***
- ***Natural Gas Pipeline;***
- Dry wash rerouting; and
- Groundwater wells used for water supply.

The four power blocks are ***nearly*** identical in design.

Page B.1-8, Wastewater Treatment

The waste water treatment system will require two 4-acre evaporation ponds per power block. Two ponds were selected for reliability. The plant will operate on one pond for approximately ~~24~~ ***4*** months, and then switch to the second pond. Approximately 18 months is required for one ***full*** pond to evaporate and be ready for use again. If a pond requires maintenance or solids removal, the plant can still operate with the other pond. The evaporation ponds will be double-lined and covered with narrow-mesh netting to prevent access by ravens and migratory birds in accordance with applicable regulations.

Page B.1-9, Fire Protection

Fire protection systems are provided to limit personnel injury, property loss, and project downtime resulting from a fire. The systems include a fire protection water system, foam generators, ***two foam trucks,*** carbon dioxide fire protection systems, and portable fire extinguishers. The location of the project is such that it would fall under the jurisdiction of the Riverside County Fire Department.

Page B.1-10, Telecommunications and Telemetry

The project would have telecommunications service from Frontier Communications, the telecommunications service provider for the city of Blythe. Voice and data communications would be provided by a new twisted pair telecommunications cable. The routing for this cable will ~~follow the routing of the redundant telecommunications line from~~ ***end at the existing infrastructure near Mesa Drive***~~the project to the Colorado River Substation~~. The routing for both of these lines will be adjacent to BlackRock Road, and the site access road ***for the portion north of I-10.***

The redundant telecommunications line continues south of I-10 to the Colorado River Substation following the route of the gen-tie line. Wireless telecom equipment will be used to support communication with staff dispersed throughout the project site. The project would utilize electronic telemetry systems to control equipment and facilities operations over the site

Page B.1-11, Roads, Fencing and Security

Access to the Blythe project site would be via a new ~~public~~ road heading north from the frontage road. This road would be accessed from an improved section of Black Rock Road, along I-10, from the plant access road to the Airport/Mesa Drive exit.

Page B.1-14, Transmission System

The BSPP facility would be connected to the SCE transmission system at the new Colorado River substation planned by SCE approximately five miles southwest of the Blythe project site. The proposed generator-tie line would consist of a ~~bundled~~ double circuit 230 kV line.

Page B.1-14, Section B.1.4.3 TRANSMISSION LINE ROUTE

The route has now been finalized. Generally speaking, the gen-tie line is expected to proceed ~~directly~~ ***generally*** south from the project site, eventually both crossing I-10 and turning westward to SCE's planned Colorado River substation.

Page B.1-16, PROJECT DESCRIPTION-FIGURE 1

A new figure was docketed on May 28th depicting the final linear routes. It is identified as Exhibit 42 and should supersede the figure in the RSA.

In addition to the specific references to the Project Description Section of the RSA above, PVSI has reviewed the entire RSA. The RSA is inconsistent in its description of the following components. These components are highlighted here and we request the Committee use the following when writing the Project Descriptions in each section of the Presiding Member's Proposed Decision rather than relying on the descriptions contained in the various sections of the RSA.

- In several places the RSA describes that the two private parcels near the site are within the site boundaries and that these parcels would not be developed or used by the proposed project, but they would be rendered publicly inaccessible through development of the proposed project. Only the northern parcel will be publicly inaccessible. The southern Porter property will be outside the fenceline.

- 7,025 acres is the current disturbance area estimate (not 7,043)
- The new access road is not public. Strike public (this comes up in other sections too)
- The access road is longer than 1.5 miles
- The number of wells onsite should be listed as “up to 10 wells” not “Ten on-site groundwater wells…”
- There are two LTUs, not four.
- The fuel depot is fixed in place, not moveable. Only the concrete batch plant will be mobile.

The following table addresses the corrections to the transmission system components

Reference	CEC Text	Correction
Page 945, Paragraph #1, Section C.11.1 n	*“The project’s tie-in line would be a single-circuit 500-kilovolt (kV) transmission line connecting the project’s on-site 500-kV switchyard to the proposed SCE Colorado River Substation.”*	The project’s tie-in line would be a ***double-circuit 230-kilovolt (kV)*** transmission line connection the project’s on-site ***230-kV*** switchyard to the proposed SCE Colorado River Substation.
Page 945, Paragraph #1, Section C.11.1 & Page 948, Paragraph #1, Section C.11.4.1	The proposed route would proceed directly south from the project site eventually crossing over Interstate Highway 10 and turning westward to connect to the SCE’s planned Colorado Substation.	The Gen-Tie proceeds in a southerly direction but there are some line angle deviations. North of the Interstate Highway 10, Solar Millennium relocated part of the Gen-Tie to be approximately 0.35 miles west of the original alignment and 120-feet from the western edge of the Ashton private property.
Page 945, Paragraph #1, Section C.11.2	CEC The generated power would be transmitted to the Southern California Edison’s (SCE’s) proposed Colorado River Substation using an	The generated power would be transmitted to the Southern California Edison’s (SCE’s) proposed Colorado River Substation using an overhead ***double-circuit 230-kilovolt (kV)*** line.

	overhead single-circuit 500-kilovolt (kV) line	
Page 948, Paragraph #1, Section C.11.4.1	As more fully discussed by the applicant, each of the four proposed units would have its own solar power but the generated power would be transmitted to the SCE power grid from a central switchyard using a single-circuit overhead, 500-kV line.	As more fully discussed by the applicant, each of the four proposed units would have its own solar power but the generated power would be transmitted to the SCE power grid from a central switchyard using a ***double-circuit overhead, ~~500~~230-kV line.***
Page 948, Paragraph #3, Section C.11.4.1	"The proposed BSPP 500-kV tie-in line would consist of the following individual segments: • A new, single-circuit 500-kV overhead transmission line extending the 5 miles from the on-site project switchyard to the planned SCE Colorado River Substation to the southwest; and • The project's on-site 500-kV switchyard from which the conductors would extend to the planned Colorado River Substation."	The proposed BSPP ***230-kV*** tie-in line would consist of the following individual segments: • A new, ***double-circuit 230-kV line*** overhead transmission line extending **10 miles** from the on-site project switchyard to the planned SCE Colorado River Substation to the southwest; and • The project's on-site **230-kV** switchyard from which the conductors would extend to the planned Colorado River Substation.
Page 948, Paragraph #4, Section C.11.4.1	The conductors for the proposed BSPP line would be aluminum steel-reinforced cables supported on steel pole structures placed between 400 feet and 1,3	The aluminum steel-reinforced conductors for the proposed BSPP will be supported by 90' to 145' double circuit tubular steel monopoles. A 1300-ft section of line

	feet apart and with heights of from 90 feet to a maximum of 145 feet as typical of similar SCE lines.	perpendicular to Blythe Airport Runway 8-26 (oriented east-west) will be supported by 70' H-Frame single circuit structures.
Page 948, Paragraph #4, Section C.11.4.1	The width of the right-of-way would be approximately 175 feet (Solar Millennium 2009a, p. 2-31).	The right-of-way width is approximately 120'. Where larger H-frame structures are used it is approximately 250'. The finalized ROW widths are subject to detailed transmission line design development.
Page 949, Paragraph #2, Section C.11.4.2	The project site is located one mile north of the Blythe Airport triggering specific height restrictions on its structures to prevent collision hazards for utilizing aircraft. To minimize this hazard, the proposed line structures in the 3,900-foot segment that poses this hazard would be limited to a height of 90 feet to comply with the height restrictions required under FAA regulations.	Solar Millennium acknowledge that the project footprint would be within the Blythe Airport Influence Zone (Area) and would extend into airport safety zones C, D, and E of the Blythe Airport Compatibility Zone. In response to ALUC's concern, Solar Millennium has adjusted the Gen-Tie route further west of Blythe Airport Runway 8-26 (oriented east-west) and proposed no poles greater than 70-foot in Zone C and 90-foot in Zone D. Specifically, Solar Millennium has relocated part of the Gen-Tie approximately 0.35 miles west of the original alignment and 120-feet from the western edge of the Ashton private

		property. The total length of this re-route is approximately 2.3 miles thereby adding an additional 1600-foot to the original linear circuit length. The adjusted gen-tie alignment has been subjected to protocol level biological and cultural resources surveys. The results of the biological surveys were docketed on May 21, 2010.

In closing, PVSI wishes to clarify the Project Description and Objectives to be attained as set forth in the AFC, Workshops, Responses to Data Requests and Workshop Queries, and Testimony that confirm the benefits of the project far outweigh the impacts, whether mitigation is required or not.

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** RAY DRACKER

I, Ray Dracker, declare as follows:

1. I am presently employed by Solar Millennium LLC, as Vice President of Project Development.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Alternatives for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 9, 2010.

R J Dracker

Ray Dracker

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Mark Luttrell

I, Mark Luttrell, declare as follows:

1. I am presently employed by AECOM, as a Vice President.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Alternatives for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 9, 2010.

Mark Luttrell

BLYTHE SOLAR POWER PROJECT
ALTERNATIVES
OPENING TESTIMONY

I. Name: Ray Dracker and Mark Luttrell

II. Purpose:

Our testimony addresses the subject of Alternatives associated with the construction and operation of the Blythe Solar Power Project (09-AFC-06).

III. Qualifications:

Ray Dracker: I am presently employed at Solar Millennium LLC, and have been for the past 5 years and am presently a Senior Vice President with that organization. I have a Masters Degree in Nuclear Engineering and I have over 30 years of experience in the field of Renewable Energy. I prepared or assisted in the preparation of the Alternatives section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

Mark Luttrell: I am presently employed at AECOM, and have been for the past 6 years and am presently a Vice President with that organization. I have a Masters of Science Degree in Civil Engineering and I have over 36 years of experience in the field of environmental consulting. I prepared or assisted in the preparation of the Alternatives section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

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 1	**Application for Certification Volumes I & II**, dated August 24, 2009, and docketed on August 24, 2009, Section 4.0.

Exhibit 9	**Palo Verde Solar I, LLC's Responses to CEC Data Request, Set 1 (1 through 260)**, dated January 2010, and docketed on January 22, 2010, Responses 30 through 44.
Exhibit 29	**Palo Verde Solar I, LLC's Initial Comments on the SA, DEIS**, dated April 19, 2010, and docketed on April 19, 2010.

V. Opinion and Conclusions

We have reviewed the Alternatives section of the Staff Assessment and with incorporation of the minor modifications set forth below, we agree with the analysis and conclusions contained therein.

Project Objectives

PVSI provided the following comment on the SA/DEIS and requested Staff include it as a project objective in the Alternatives analysis. Staff rejected the comment. We offer it again here for the Committee to include in the Final Decision.

> The state and federal governments are moving rapidly toward a policy of clustering renewable energy development within areas, or zones, rather than permitting that development to be spread across the State. Coequal goals in this effort are: minimizing environmental impact, maximizing renewable energy production, minimizing sprawl, and reducing infrastructure investment to bring the power to market thus reducing overall costs to ratepayers.
>
> The Blythe Solar Power Project is located within an area that has been selected by two key planning efforts to be a priority area for renewable energy development based on the area's resource quality, transmission access, and lack of significant biological resources. Those two key planning efforts are the Renewable Energy Transmission Initiative, or RETI, and proposed Solar Energy Study Areas (SESAs) identified by the Department of Energy and Bureau of Land Management's Solar Energy Development Programmatic Environmental Impact Statement (PEIS) process.

> The State's RETI process was initiated in 2007 and is focused on identifying renewable energy development zones and planning the transmission to access those zones. The SESA process within the PEIS is focused on designating zones in which renewable energy projects could be permitted on an expedited basis. Finally, the Desert Renewable Energy Conservation Plan (DRECP) process is focused on gathering data and mapping priority biological areas and wildlife movement corridors. Each of these planning efforts will ultimately be combined to provide the basis to implement a policy in which renewable energy development is concentrated in certain geographic areas.

In addition, co-locating multiple solar thermal power plants minimizes disturbance across the region. By co-location, there is an "economy of scale" that allows the design to utilize shared/common facilities for multiple power plants (e.g., offices, construction laydown areas, solar array assembly facilities, warehouses and maintenance facilities). Further, co-located facilities minimize regional disturbance to natural and visual resources by reducing the need for additional transmission corridors, and by reducing the need for other infrastructure such as water wells and/or water pipelines, natural gas pipelines, temporary laydown areas and temporary/permanent access roads that would be required if the units were developed at separate locations. Co-located facilities also consolidate impacts of lighting, noise, and human presence at a single location rather than introducing them to multiple environments.

Finally, consolidated facilities also geometrically reduce edge effects compared to individual plants on separate sites. For the BSPP, boundaries with adjacent undisturbed areas are reduced by over 50 percent over what they would be for individual plants (replacing four plants that each has an 8 mile outer perimeter, for a combined total outer perimeter of 32 miles, with four contiguous plants having a combined outer perimeter of 15.5 miles). Without the ability to share facilities, each separate plant also has its own office, warehouse area, switchyard, parking areas, and LTU which quadruples these land commitments. This edge advantage of consolidation only increases when the multiple gen-tie routes required for plants built at isolated locations is considered.

Staff's rejection of this objection is primarily based on the contention that clustering of units may not be environmentally preferable in all cases but this contention fails to recognize the environmental benefits ***at this site*** for clustering of the units.

The Sections of the RSA that discuss US Army Corps of Engineers Alternatives (including those on pages B.2-6 and B.2-7 should be deleted as the US Army Corps of Engineers has determined that the BSPP will not affect jurisdictional waters of the United States and therefore this analysis is not required. The decision is no longer pending.

The RSA fails to recognize that the Reduced Acreage Alternative fails to meet the project objectives by reducing 25 percent of the output. By reducing 25 percent of the output, in order for California to attain its Renewable Portfolio Standards and the goals of AB 32 it would be necessary to construct a 250 MW facility elsewhere. This would increase land disturbance beyond the land disturbance that would occur for the proposed project as the proposed project clusters the units and shares related facilities. Constructing the 250 MW unit elsewhere would not allow this sharing of facilities and would substantially increase edge effects as described above.

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of: Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DOCKET NO. 09-AFC-06** **DECLARATION OF** RUSS KINGSLEY

I, Russ Kingsley, declare as follows:

1. I am presently employed by AECOM, as a Senior Project Manager.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Air Quality for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 7, 2010.

Russell Kingsley

Russ Kingsley

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of: Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DOCKET NO. 09-AFC-06** **DECLARATION OF** SARA J. HEAD

I, Sara J. Head, declare as follows:

1. I am presently employed by AECOM as a Vice President.

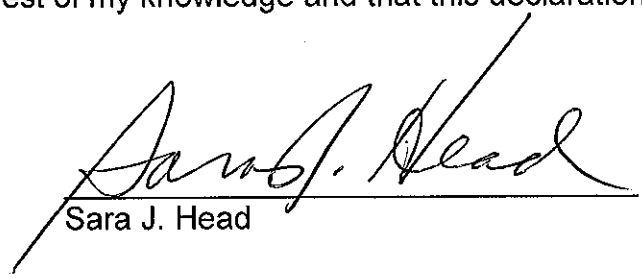
2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I assisted with the preparation of the attached testimony relating to Air Quality for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 7, 2010.



Sara J. Head

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Richard Hamel

I, Richard Hamel, declare as follows:

1. I am presently employed by AECOM, as an Atmospheric Meteorologist.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Air Quality for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 6/7, 2010.

Richard Hamel

BLYTHE SOLAR POWER PROJECT
AIR QUALITY
OPENING TESTIMONY

I. Name: Russ Kingsley, Sara J. Head, and Richard Hamel

II. Purpose:

Our testimony addresses the subject of the Air Quality Resources associated with the construction and operation of the Blythe Solar Power Project (09-AFC-6).

III. Qualifications:

Russ Kingsley: I am presently employed at AECOM, and have been for the past 10 years and am presently a Senior Project Manager with that organization. I have a Bachelor of Science Degree in Chemical Engineering and I have over 20 years of experience in the field of environmental compliance and air quality consulting. I prepared or assisted in the preparation of the Air Quality section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

Sara J. Head: I am presently employed at AECOM, and have been for the past 17.5 years and am presently a Vice President with that organization. I have a Bachelor of Science Degree in Atmospheric Sciences and I have over 35 years of experience in the field of air quality consulting. I assisted in the preparation of the Air Quality section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

Richard Hamel: I am presently employed at AECOM, and have been for the past 4.5 years and am presently an Atmospheric Meteorologist with that organization. I have a Master of Science Degree in Atmospheric Science and I have over 4 years of experience in the field of air quality consulting. I assisted in the preparation of the Air Quality section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

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 1	**Application for Certification Volumes I & II**, dated August 24, 2009, and docketed on August 24, 2009, Section 5.2, and Appendix E.
Exhibit 2	**Air Quality Modeling Files**, dated August 2009, and docketed on August 31, 2009.
Exhibit 4	**Data Adequacy Supplement**, dated October 26, 2009, and docketed on October 26, 2009.
Exhibit 9	**Palo Verde Solar I, LLC's Responses to CEC Data Request, Set 1 (1 through 260)**, dated January 2010, and docketed on January 22, 2010, Responses 1 through 29.
Exhibit 12	**Palo Verde Solar I, LLC's Supplemental Responses to CEC Data Request Set 1**, dated January 2010, and docketed on January 22, 2010, Responses 5, 10, 13, 27 and 28.
Exhibit 13	**Mojave Desert Air Quality Management District's Preliminary Determination of Compliance**, dated January 28, 2010 and docketed on January 29, 2010.
Exhibit 19	**Responses to January 14, 2010 CEC Workshop Queries**, dated February 2010, and docketed on February 8, 2010.

Exhibit 23	**Heat Transfer Fluid Emissions Conference Call Record of Conversation (Between W. Walters (Aspen) and CEC, Abengoa Solar, Inc, Abener N. America, Atmospheric Dynamics & Solutia, Inc)**, dated January 27, 2010, and docketed on February 24, 2010.
Exhibit 24	**Palo Verde Solar I, LLC's Comments on the Preliminary Determination of Compliance**, dated February 26, 2010, and docketed on March 3, 2010.
Exhibit 29	**Palo Verde Solar I, LLC's Initial Comments on the SA, DEIS**, dated April 19, 2010, and docketed on April 19, 2010.
Exhibit 41	**Mojave Desert Air Quality Management District's Revised Preliminary Determination of Compliance,** dated May 25, 2010, and docketed on May 26, 2010.
Exhibit 44	**Revised Health Risk Assessment for the Preliminary Determination of Compliance**, dated May 2010, and docketed on May 20, 2010.

V. Opinion and Conclusions

We have reviewed the Air Quality section of the Revised Staff Assessment and agree that with incorporation of the modified tables and the Conditions of Certification and for the reasons articulated below the Project will not result in significant Air Quality impacts and will comply with all applicable Air Quality-related laws, ordinances, regulations and standards (LORS).

AIR QUALITY

Page C.1-16, Project Operation

Changes to the list of operational equipment found in this section should be revised as shown below to reflect the engineering refinements previously submitted to Staff. Text of the RSA on these pages should be revised to reflect these changes.

Stationary emissions sources (total equipment for all four power blocks):

- Auxiliary Boiler (4 total): 35 MMBtu per hour natural gas-fired auxiliary boiler used for start up. Daily operation would be limited to 15 hours per day at 25% load and ~~two~~ 12 hours per day at full load. Annual operation would be limited to ***5,100*** ~~5,000~~ hours (***600*** ~~500~~ hours at a full load and 4,500 hours at 25% load).

Page C.1-19, Project Operation

Staff has added the HTF piping system to the list of stationary source emissions even though it is noted (on page C.1-28) that the District does not include HTF piping as a stationary source. Furthermore, in the equipment description that accompanies the unit identification, Staff asserts that the emissions should be calculated according to the protocol developed by the KCAPCD that involves the use of "light liquid" emission factors for 16 hours per day and "heavy liquid" emission factors for 8 hours per day. The use of light liquid emission factors is inappropriate for HTF regardless of the operating temperature or pressure of the HTF system during normal daytime operations and, thus, the protocol developed by KCAPCD is inappropriate for HTF piping systems. "Light liquid" and "heavy liquid" are common terms of art within the refinery industry and Synthetic Organic Chemical Manufacturing Industries (SOCMI), from which the emission factors are derived for piping fugitives. The background research and studies and the associated reports prepared by the U.S. EPA in its efforts to identify appropriate emission factors for fugitive components in these industries is abundant and consistent with respect to how light and heavy liquids are defined for the purpose of developing emission factors. Under the definitions used for light and heavy liquid, HTF is a heavy liquid under all operating conditions and pressures. The discussion of how emissions are calculated should be deleted from the equipment list.

In addition, the calculation procedure for HTF piping fugitives should be revised to reflect the use of heavy liquid emission factors as was provided in both the AFC and the revised PDOC from MDAQMD.

Pages C.1-23 – C.1-25, Construction and Operations Impacts

As noted in Exhibit 29, PVSI disagrees that any new emissions of non-attainment pollutants/precursors are automatically "significant" under CEQA. With respect to PM10 emissions, PVSI provided an analysis regarding the Project's effect on the background PM10 levels to determine if the project is likely to cause or contribute to a violation of any ambient air quality standards. The current status of this part of the Mojave Desert Air Basin as non-attainment for PM10 is because of natural conditions, i.e., high winds rather than local industrial sources. Although the area is currently designated non-attainment for PM10, PVSI demonstrated that the BSPP will reduce existing windblown fugitive dust emissions that are the source of current air quality problems. PVSI's modeling of the BSPP's PM10 emissions shows that the BSPP does not cause an exceedance of the applicable ambient air quality standards. It is only when added to the background concentrations, which currently exceed the standards that the result is over the standard. Therefore, the fact that the background concentrations of PM10 will be lower once the BSPP is operating is relevant. For these reasons, the PVSI does not agree with Staff's conclusion that the BSPP will have significant air quality impacts simply because it emits nonattainment pollutants.

Page C.1-43, Section C.1.10, Noteworthy Public Benefits

PVSI had provided additional noteworthy public benefits in its comments in Exhibit 29 that were not incorporated into the RSA. We believe that these additions should be considered by the Committee.

Page C.1-49, Condition of Certification AQ-SC7

PSVI provided comments on this condition in Exhibit 29. Although changes were made to the condition, the changes are different than suggested and are still of concern. Condition of Certification AQ-SC7 requires that the Operations Dust Control Plan prevent all fugitive plumes from leaving the project, but now refers to "performance standards identified in AQ-SC4. Condition AQ-SC4 does not contain performance standards, but rather specifies measures that must be taken if a plume is seen leaving the site. This requirement presumes that a dust plume leaving the site is a significant impact. As noted above, PSVI disagrees that BSPP PM10 emissions are significant under CEQA, and believes that requirement that work be stopped if measures cannot be taken to prevent the visible plume from leaving the site to be unreasonable and infeasible.

Although not commented on previously, Subparts A and B have unreasonable standards as well. Subpart A requires dust mitigation for any portion of the site that "could be disturbed by vehicles or wind". Since the entire site could be exposed to wind continuously, this standard would require dust mitigation on portions of the site that are not disturbed. Subpart B does not allow visible dust emissions from vehicles. These are not appropriate thresholds of significance as the mere existence of a plume is in and of itself not an impact. PVSI requests the following modification to set a reasonable standard that can be achieved during activities in the desert environment.

AQ-SC7 The project owner shall provide a site Operations Dust Control Plan, including all applicable fugitive dust control measures identified in the verification of **AQ-SC3** that would be applicable to minimizing fugitive dust emission creation from operation and maintenance activities and preventing all fugitive dust plumes ~~that would comply with the performance standards identified in **AQ-SC4** ~~from ~~leaving the project site~~ ***impacting offsite sensitive receptors or interfering with traffic***; that:

A. describes the active operations and wind erosion control techniques such as windbreaks and chemical dust suppressants, including their ongoing maintenance procedures, that shall be used on ***active*** areas that could be disturbed by vehicles or wind ~~anywhere~~ within the project boundaries; and

B. identifies the location of signs throughout the facility that will limit traveling on unpaved portion of roadways to solar equipment maintenance vehicles only. In addition, vehicle speed shall be limited to no more than 10 miles per hour on these unpaved roadways, with the exception that vehicles may travel up to 25 miles per hour on stabilized unpaved roads as long as such speeds do not create visible dust emissions ***that leave the project site***.

Section C.1.11.2 (*sic*, should be C.1.12.2), District Conditions

This section contains the District-required conditions. As noted in the RSA, the MDAQMD released a Revised PDOC on May 25 (Exhibit 41), and it is Staff's intention to incorporate any changes made to the Final Determination of Compliance in a Supplemental Staff Assessment (see pages 12 and A-13 of the RSA). Therefore, rather than providing comments to these conditions herein, PSVI will submit comments to the MDAQMD on the Revised PDOC.

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Bill Graham

I, Bill Graham, declare as follows:

1. I am presently employed by AECOM, as a Vice President.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Biological Resources for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 8, 2010.

Bill Graham

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Michael Anguiano

I, Michael Anguiano, declare as follows:

1. I am presently employed by AECOM, as a Wildlife Biologist.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Biological Resources for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 7, 2010.

Michael Anguiano

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Jennifer Guigliano

I, Jennifer Guigliano, declare as follows:

1. I am presently employed by AECOM, as a Project Director and Associate Principle.

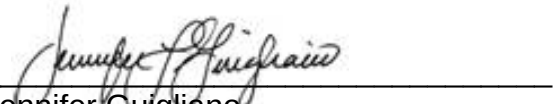
2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Biological Resources for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 Wednesday, June 10, 2010.



Jennifer Guigliano

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Scott McMillan

I, Scott McMillan, declare as follows:

1. I am presently employed by AECOM as a senior botanist/restoration ecologist, and have been for over 5 years.

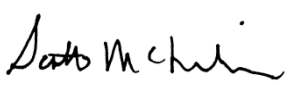
2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Biological Resources for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

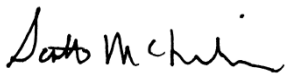
4. It is my professional opinion that the attached prepared testimony is valid and accurate with respect to issues that it addresses.

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 June 9, 2010.



Scott McMillan



STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Angie Harbin-Ireland

I, Angie Harbin-Ireland, declare as follows:

1. I am presently employed by AECOM as a senior biologist, and have been for 3 years.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Biological Resources for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 9, 2010.

Angie Harbin-Ireland

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Alice Karl

I, Alice Karl, declare as follows:

1. I am presently self-employed as a biological consultant.

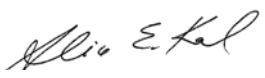
2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I assisted in the preparation of the attached testimony relating to Biological Resources for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

4. It is my professional opinion that the sections of the attached prepared testimony with which I was involved are valid and accurate, to the best of my knowledge.

5. I am personally familiar with the facts and conclusions related in the attached prepared testimony in my particular subject area 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 June 6, 2010.



Alice Karl

BLYTHE SOLAR POWER PROJECT
BIOLOGICAL RESOURCES
OPENING TESTIMONY

I. Name: Bill Graham, Michael Anguiano, Jennifer Guigliano, Scott McMillan, Angie Harbin-Ireland, and Alice E. Karl, Ph.D.

II. Purpose:

Our testimony addresses the subject of Biological Resources associated with the construction and operation of the Blythe Solar Power Project (09-AFC-06).

III. Qualifications:

Bill Graham: I am presently employed at AECOM, and have been for the past 11 years and am presently a Vice President with that organization. I have a Masters Degree in Regional Planning and I have over 25 years of experience in the field of Ecological Planning. I prepared or assisted in the preparation of the Biological Resources section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

Michael Anguiano: I am presently employed at AECOM Inc., and have been for the past 1 year and am presently a Wildlife Biologist with that organization. I have an M.S. Degree in Ecology and I have over 6 years of experience in the field of Ecology and Wildlife Biology. I prepared or assisted in the preparation of the Biological Resources section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

Jennifer Guigliano: I am presently employed at AECOM Design and Planning, and have been for the past 5 years and am presently a Project Director and Associate Principle with that organization. I have a Masters of Engineering Degree in Environmental Engineering and a Bachelors of Science Degree in Combined Science with Biology and Environmental Sciences Minors and I have over 12 years of experience in the field of environmental consulting and natural resources management, including biological resources, water resources and storm water management, and environmental compliance and permitting. I prepared or assisted in the preparation of post-filing information, data responses, and supplemental filings, including the mitigation planning documents for Biological Resources. A detailed description of my qualifications is contained in the attached resume.

Scott McMillan: I am presently employed at AECOM Inc., and have been for the past 6 years and am presently a Senior Botanist with that organization. I have an B.S. Degree in Biology and I have over 17 years of experience in the field of Botany and Restoration Ecology. I prepared or assisted in the preparation of post-filing information, data responses, and supplemental filings for Biological Resources. A detailed description of my qualifications is contained in the attached resume.

Angie Harbin-Ireland: I am presently employed at AECOM Inc., and have been for the past 3 years and am presently a Senior Biologist with that organization. I have a B.S. Degree in Wildlife Biology, an M.S. Degree in Ecology, and I have over 12 years of experience in the field of wildlife biology and ecology. I prepared or assisted in the preparation of the post-filing information, data responses, and supplemental filings to the Application for Certification related to Biological Resources. A detailed description of my qualifications is contained in the attached resume.

Alice Karl: I am presently self-employed and have been for the past 32 years. I have M.S. and Ph.D. degrees in Ecology and I have over 32 years of experience in the field of Desert Ecology. I assisted in the preparation of the desert tortoise translocation plan. A detailed description of my qualifications is contained in the attached resume.

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 1	**Application for Certification Volumes I & II**, dated August 24, 2009, and docketed on August 24, 2009, Section 5.3, and Appendix F.
Exhibit 4	**Data Adequacy Supplement**, dated October 26, 2009, and docketed on October 26, 2009.

Exhibit 5	**Streamed Alteration Agreement Application**, dated November 2009, and docketed on November 25, 2009.
Exhibit 6	**Pre-Development Drainage Conditions Report**, dated November 25, 2009, and docketed on November 30, 2009.
Exhibit 9	**Palo Verde Solar I, LLC's Responses to CEC Data Request, Set 1 (1 through 260)**, dated January 2010, and docketed on January 22, 2010, Responses 45 through 97.
Exhibit 10	**Application for the California Endangered Species Act Incidental Take Permit and Revised Desert Tortoise Technical Report**, dated January 2010 and docketed on January 13, 2010.
Exhibit 12	**Palo Verde Solar I, LLC's Supplemental Responses to CEC Data Request Set 1**, dated January 2010, and docketed on January 22, 2010, Response 69.
Exhibit 15	**Palo Verde Solar I, LLC's Data Response to DR-BIO-58 (Post Development Drainage Conditions Report)**, dated January 29, 2010 and docketed on January 29, 2010.
Exhibit 16	**Report of Conversation (Between S. Sanders & J. Mace (United Army Corps of Engineers)) Regarding Status of Jurisdictional Determination**, dated January 28, 2010 and docketed on February 1, 2010.
Exhibit 18	**Palo Verde Solar I, LLC's Response to January 14, 2010 Workshop Query and January 29, 2010 Email Query**, dated February 2010, and docketed on February 4, 2010.
Exhibit 20	**Responses to January 28, 2010 CEC Email Queries**, dated February 2010, and docketed on February 11, 2010.

Exhibit 26	**Palo Verde Solar I, LLC's Draft Biological Assessment**, dated March 2010, and docketed on March 8, 2010.
Exhibit 28	**Palo Verde Solar I's Issues Statement for April 15, 2010 Status Conference**, dated April 12, 2010, and docketed on April 12, 2010.
Exhibit 29	**Palo Verde Solar I, LLC's Initial Comments on the SA DEIS,** dated April 19, 2010, and docketed on April 19, 2010.
Exhibit 30	**Palo Verde Solar I, LLC's Biological Resources Spring Survey Protocols**, dated April 2010, and docketed on June 11, 2010.
Exhibit 31	**Comments on the Draft Desert Tortoise Relocation/ Translocation Plan**, dated April 15, 2010, and docketed on April 29, 2010.
Exhibit 33	**Palo Verde Solar I, LLC's Draft Summary Preliminary Spring 2010 Survey Results for Desert Tortoise, Rare Plants, and Jurisdictional Waters**, dated May 7, 2010, and docketed on May 11, 2010.
Exhibit 38	**Response to CEC April 28, 29 and May 7 Workshop Queries Re: Southern CA Edison Colorado River Substation Project Description**, dated April 15, 2010, and docketed on May 17, 2010.
Exhibit 43	**Responses to CEC April 28, 29 and May 7, 2010 CEC Workshop Queries Re: Biological Resources (Preliminary Spring 2010 Biological Survey Results)**, dated May 14, 2010, and docketed on May 20, 2010.

V. Opinion and Conclusions

We have reviewed the Biological Resources section of the Revised Staff Assessment (RSA) and disagree with the analysis regarding impacts and proposed mitigation for certain species. We do agree that with incorporation of the Conditions of Certification as modified below, the Project will not result in significant Biological Resource impacts and will comply with all applicable Biology-related laws, ordinances, regulations and standards (LORS).

Page C.2-18, Vegetated Ephemeral Washes of Creosote Bush-Big Galleta Grass Association

This section title suggests that the habitat type is a vegetated ephemeral wash as opposed to a swale with a Creosote Bush-Big Galleta Grass Association. This needs to be clarified as there is a disagreement on the status of these features as washes versus swales. The swale features are not considered as ephemeral dry washes. Swales do not, by definition, ecologically perform (in any way) as ephemeral washes do. Swales occurring in desert regions do not and cannot conduct seasonal surface flow. Any flows occurring within a swale are the result of a unique/rare/exceptional events. Unlike ephemeral washes, the morphology of swales are heavily wind dependant. That is, swales are shaped by wind and wind can have a greater influenced on the shape and form of a swale than water.

In addition, the Sawyer-Keeler Wolfe (SKW) habitat type is based on a Creosote Bush Big Galleta Grass Community, not on vegetated ephemeral washes; therefore, the title is misleading. SKW considers Creosote Bush-Big Galleta Grass Association a vegetation community only. It usually occurs in Bajada type topography. This habitat community is an Upland community and not a waters or wetland community.

Neither SKW nor Thomas et. al. 2004 say anything about the creosote bush – big galleta association being in "washes". In fact, Big Galleta series is defined as an Upland vegetation community:

> *http://davisherb.ucdavis.edu/cnpsActiveServer/SeriesDetail.aspx?seriesname=Big+galleta+series*

The 2003 CNDDB listing also shows creosote – big galleta under the heading of "Sonoran and Mojavean Desert Scrub" which is also upland.

> *http://www.dfg.ca.gov/biogeodata/vegcamp/pdfs/natcomlist.pdf*

In more extreme cases where Big Galleta exceeds 2 percent cover, Big Galleta Grass falls into its own herbaceous shrub-steppe alliance, which is also upland per the most recent Manual of California Vegetation (Sawyer Keeler-Wolf).
.

Page C.2-19, Functions and Values of Ephemeral Drainages/Waters of the State

This section states that Staff agrees with PVSI's analysis of functions and values for Waters of the State. The RSA accurately represents the Applicant's analysis. However, it should be noted that all functions and values were determined qualitatively based upon federal guidance and methodology (which is outlined in the Jurisdictional Delineation Report submitted as part of the August 2009 AFC submittal). Additionally, the qualitative functions and values of swales which support Creosote Bush -Big Galleta Grass Association were also included based upon the request of the CDFG.

Page C.2-28-30, Desert Tortoise Habitat

The last paragraph at the bottom of the page concludes that the there are 7,077 acres of suitable desert tortoise habitat in the Project Disturbance Area. It should be noted that this total includes impacts associated with the substation. Impacts associated with the substation were included in the impacts and compensation tables reported in the Habitat Mitigation and Monitoring Plan (AECOM 2010) submitted as part of the Data Responses, dated January 4, 2010. Subsequently, PVSI submitted a letter to the CEC and CDFG on February 12, 2010 reporting revised impact numbers for state jurisdictional waters and sensitive species to reflect removal of the substation impacts. The impacts associated with the substation and the compensatory mitigation are the responsibility of Southern California Edison (SCE), the future developer and operator of the substation. The first table reflects the removal of the substation impacts and resulting compensation from these calculations.

Table BIO-1. Impacts to Mojave Desert Tortoise Habitat

Species	Low Quality Habitat[1] (acres)	Moderate Quality Habitat[2] (acres)	Total Impact (acres)
Desert Tortoise	3,024.7	3,990.1	7,014.8

1 *Low Quality Habitat* – Limited availability of easily accessible washes that have sufficient cover and forage for desert tortoises or alternatively the habitat has sufficient vegetation disturbance that reduces the quality of the cover and forage for desert tortoise. Low quality habitat is typically unoccupied or has very rare observations of desert tortoises and has limited or no sign indicating use by desert tortoise.

2 *Moderate Quality Habitat* – Contains annual vegetation or shrub cover within the area sufficient to support forage and cover needs, but the habitat quality will include areas with high amounts of cover/forage interspersed with areas with low amounts of cover/forage (i.e. desert washes with upland desert pavement). Moderate quality may also be considered more "upland" for the desert and have lower amounts of cover/forage but are within an area where desert tortoises can readily access washes. Moderate quality habitat is typically occupied by desert tortoises, but at densities that are considered sparse and has desert tortoise sign present. Alternatively, high quality habitat would be considered habitat with annual vegetation and shrub cover sufficient to support forage and cover requirements for desert tortoise (shrubs for burrows, annual vegetation within the spring sufficient to meet nutritional requirements for desert tortoises and is typically within or directly adjacent to a desert wash. High quality habitat is typically occupied by desert tortoises and has substantive sign indicating use of the habitat.

Page C.2-32, Couch's Spadefoot Toad

The RSA states: "2010 survey results which indicate multiple potential breeding pond sites." This statement is misleading. The 2010 survey results indicated that there were multiple potential ponding areas that may pond long enough to support breeding habitat for the Couch's spadefoot toad; however, there is no confirmation on the ponding potential and there is no evidence that toads are in the area. Therefore, it is speculation that they are potential breeding ponds.

Page C.2-53 through 57, Summary of Impacts

In light of the continued mis-characterization of impacts, direct and cumulative, by Staff in the SA/DEIS and the current RSA, PVSI requests that the Biological Resource Table 5 and the subsequent related tables be modified to reflect the actual values associated with the NECO habitat (and Palo Verde as appropriate).

Replete in the RSA is the apparent attempt to mislead the Committee by neglecting to identify the actual and direct values/impacts of the project which are negligible. Instead Staff presents the project impacts as a percentage of possible future cumulative impacts only. Staff acknowledges that it is unlikely that all of these projects would be constructed but does not present the value of the BSPP impacts alone. Also noteworthy, the Staff diminishes the very important fact (buried within the Summary Table) that the project is not located on or within any DWMA, ACEC, WHMA, or DTCH.

Accordingly PVSI submits the following and requests that the following be read concurrently when reading Staff's Biological Resources Table 5, Summary of Impacts and Mitigation Table as well as all concomitant Tables. The information below will help the Committee better understand the project impacts. Please note that the NECO and Palo Verde totals are gathered from Staff's Tables and used as the denominator; the results are as follows:

Biological Resource	**Impact to total NECO Planning Area acreage (and to the Palo Verde Valley*, as noted) in percentages**
Sonoran Creosote Bush Scrub and Associated Wildlife	0.15 – fifteen one hundredths of one percent
Stabilized and Partially Stabilized Dunes	0.008 – eight one thousandths of one percent
Waters of the State / Sensitive Plant Communities component example - Desert Dry Washes	NECO (0.042) – forty two one thousandths of one percent; *Palo Verde (0.5) - one half of one percent - 0.014 – fourteen one

Biological Resource	Impact to total NECO Planning Area acreage (and to the Palo Verde Valley*, as noted) in percentages
	thousandths of one percent
Desert Tortoise (potential habitat; no actual occupancy)	0.11 – eleven one hundredths of one percent
Mojave Fringe-Toed Lizard (dune habitat)	0.0009 – nine ten thousandths of one percent
Western Burrowing Owl	0.12 – twelve one hundredths of one percent
Golden Eagle (possible foraging habitat) - 140 mile foraging range (GE)	NECO (0.1) – one tenth of one percent - 0.017 – seventeen one thousandths of one percent
Special Status Birds and Migratory Birds: Components: - Le Conte's Thrasher - Desert Dry Wash Woodland	 - 0.16 – sixteen one hundredths of one percent - 0.014 – fourteen one thousandths of one percent
Desert Kit Fox and American Badger	0.12 – twelve one hundredths of one percent
Nelson's Bighorn Sheep	• 0.0 - Project site not recognized by NECO as occupied or connectivity corridor • Potential foraging loss: 0.042 (forty-two on thousandths of one percent)
Couch's Spadefoot Toad	0.38 = thirty-eight one hundredths of one percent
Las Animas colubrine	0.0 percent of NECO habitat
Harwood's milk-vetch	0.12 – twelve one hundredths of one percent
Harwood's phlox	0.0006 – six ten thousandths of one percent

Page C.2-57, Table 6

PVSI does not agree with the mitigation ratios in Table 6. Staff states that CDFG considers vegetated swales as jurisdictional waters of the states that require mitigation at a 1.5:1 ratio. This is contrary to the prior discussions PVSI and its consultants have held with CDFG regarding vegetated swales. During a November site visit with CEC and CDFG, the CEC requested that creosote bush-big galleta grass association be considered a special vegetation community (not waters of the State). CDFG then requested that the PVSI map all vegetated swales and that they would consider them jurisdictional, but not consider them significant aquatic features that would require mitigation. PVSI provided the mapping in order to be cooperative but has not conceded that such swales are jurisdictional nor should require mitigation. It is agreed that the swales support a special community type consisting of Creosote Bush – Big Galleta Grass Association, and these vegetated swales have been delineated within the project area. However, these vegetated swales are not considered jurisdictional waters of the State in accordance with the definition of waters in the California Fish and Game Code.

Page C.2-53 to 57, Table 5 Summary of Impacts and Mitigation, and Table 6 Direct and Indirect Impacts to Waters of the State and Recommended Mitigation

Some of the impacts to biological resources reported in Tables 5 and 6 are inaccurate based on data collected in surveys conducted by PVSI's biological consultant, or they are inconsistent with other numbers stated elsewhere in the RSA. Tables BIO-2 and BIO-3 provide a comparison of the impact numbers reported in the RSA and the impact numbers reported in the 2010 spring survey summary prepared by the PVSI. As shown in the tables, the impacts reported in the RSA are higher for desert tortoise, Mojave fringe-toad lizard, direct and total impacts to swales with big galleta grass association, and indirect impacts to unvegetated ephemeral dry wash. Impacts in the RSA are lower than impacts identified subsequent to 2010 data for direct impacts to desert dry wash woodland and unvegetated ephemeral dry wash, and indirect impacts swales with big galleta grass association.

Other concerns include the requirement for mitigation for the Nelson's big-horn sheep and the Couch's spadefoot. These are further discussed in the associated measures below.

Table BIO-2. Summary of Impacts and Mitigation as Stated in the SA/DEIS

Resource		Impact Acreage or Linear Feet			Mitigation Requirement	
		Total Impact	Impact by Quality		Ratio	Acreage
Desert Tortoise (DT)	*Outside habitat conservation areas*	*7077*	*M*	*Not specified*	*-*	*-*
			L	*Not specified*	*-*	*-*
	Total:	***7077[1]***			***1:1***	***7077***
Mohave Fringe Toed Lizard (MFTL)		*4.0*			*3:1*	*12.0*
Western burrowing owl (WBO)		*2 individuals*			*19.5 ac each[2]*	*39*
Creosote bush scrub-big galleta grass community		*406.0*			*NA*	*NA*
Jurisdictional Waters - Direct	*Desert dry wash woodland*	*175.4*			*3:1*	*526.2*
	Unvegetated ephemeral dry Wash	*7.5*			*1:1*	*7.5*
	Swale supporting wash-dependent vegetation	*367.4*			*1.5:1*	*551.1*
	Total:	***550.3[3]***			***NA***	***1084.8***
Jurisdictional Waters	*Desert dry wash woodland*	*94.5*			*1.5:1*	*141.8*
	Unvegetated ephemeral dry Wash	*0.8*			*0.5:0*	*0.8*
	Swale supporting wash-dependent vegetation	*38.5*			*0.75:1*	*57.8*
	Total:	***133.8***			***NA***	***200.3***
Total:		***NA[4]***			***NA[4]***	

Notes:

NA Not Applicable

M Moderate Quality Habitat (habitat that would necessitate higher mitigation ratios within the category)

L Lower Quality Habitat (habitat that would justify lower mitigation ratios within the category)

1 The SA/DEIS inconsistently reports impacts to desert tortoise habitat. Page C.2-28 states that there are 7,077 acres of suitable habitat within the Project Disturbance Area while page C.2-51 states that the Project will result in 7,040 acres of permanent loss to desert tortoise habitat.

2 Acres per pair or individual.

3 The SA/DEIS inconsistently reports impacts to jurisdictional waters of the State. Page C.2-51 states that the Project will result in 551.1 acres of permanent direct impacts to State waters while Table 6 on page C.2-54 stated tha the Projec twill result in 550.3 acres of permanent direct impacts to State waters.

4 The total impact/mitigation acreage is not provided because it is not additive. The mitigation acreage/fee would not be additive where multiple species and habitat exist on site, or where conservation areas for species overlap (p. 2-35, WEMO BLM).

Table Bio-3. Summary of Impacts Updated by Applicant (2010) and Proposed Mitigation

Resource		Impact Acreage or Linear Feet			Mitigation Requirement	
		Total Impact	Impact by Quality		Ratio	Acreage
Desert Tortoise (DT)	*Outside habitat conservation areas*	7014.8	M	3990.1	1:1	3990.1
			L	3024.7	1:1	3024.7
	Total:	**7014.8**			**NA**	**7014.8**
Mohave Fringe Toed Lizard (MFTL)		3.7			1:1	3.7
Western burrowing owl (WBO)		1 individual			19.5 ac each[1]	19.5
Creosote bush scrub-big galleta grass community		401.2			NA[2]	NA
Potential Jurisdictional Waters (Direct)[3]	Desert dry wash woodland	197.0			3:1	591.0
	Unvegetated ephemeral dry Wash	8.6			1:1	8.6
	Swale supporting wash-dependent vegetation	365.6			NA[4]	NA
	Total:	**571.2**			**NA**	**599.6**
Potential Jurisdictional Waters (Indirect)[3]	Desert dry wash woodland	137.5			1.5:1	206.3
	Unvegetated ephemeral dry Wash	0.3			0.5:1	0.2
	Swale supporting wash-dependent vegetation	44.6			NA[4]	NA
	Total:	**182.1**			**NA**	**206.5**
Total:		**NA[5]**			**NA[6]**	

Notes:

NA Not Applicable

H Higher Quality Habitat (habitat that would necessitate higher mitigation ratios within the category)

L Lower Quality Habitat (habitat that would justify lower mitigation ratios within the category)

1 Acres per pair or individual. This ratio assumes project proponent will find occupied habitat.

2 It is assumed Creosote bush scrub-big galleta grass community could possibly be accomplished in combination with required mitigation for State jurisdictional waters and sensitive wildlife species. This acreage is duplicative with the swale acreage defined under jurisdictional waters.

3 Acreage total includes direct and indirect impacts.

4 It is assumed swales are not jurisdicational and would not require mitigation as jurisdictional state waters.

5 The total impact/mitigation acreage is not provided because it is not additive. The mitigation acreage/fee would not be additive where multiple species and habitat exist on site, or where conservation areas for species overlap (p. 2-35, WEMO BLM).

6 Mitigation may be achieved by a combination of land acquisition and a fee program (payment of a acreage based fee) to be determined in coordination with the agencies.

Page C.2-101, Last Paragraph, Decommissioning and Reclamation Plan

Staff states in this paragraph that the Decommissioning and Reclamation Plan must "explicitly state that the goals of reclamation include restoration of the site's topography and hydrology to a relatively natural condition and restoration of native plant communities." However, this may not be the case. BLM, as the ultimate manager of the land, may elect in the future that it may want the site decommissioned or reclaimed to a different land use (continued utility-scale energy generation, OHV, other industrial use, use of some of the buildings, etc.) as opposed to restoration. Since the project has provided full habitat compensation to mitigate for all project disturbance and that habitat compensation mitigates for the life of the project and beyond, there is no environmental reason to restore the land to a natural state unless BLM, as the land manager requests restoration.

Under the provisions of the BLM ROW lease, PVSI will provide the BLM a conceptual reclamation plan prior to start of construction and a detailed reclamation plan years later as the BSPP approaches the end of its operational life. The purpose of the plan is comply with BLM regulations and is neither a state or local LORS over which the Commission has jurisdiction nor is such a plan required to mitigate any significant outstanding impact. PVSI requests that the objectives and detailed content of the reclamation plan for the BSPP site be determined by BLM when BLM determines its long-term interests and objectives for the land it is charged with managing.

Page C.2-117, Table 10

All aquatic features; including desert Dry Wash Woodland, Unvegetated Ephemeral Dry Wash, and vegetated swale features (populated by the Creosote Bush -Big Galleta Grass Association [and to a much lesser extent desert lavender and desert star vine]) occurring within the BSPP area have been formally delineated, discretely mapped, and field verified by qualified ecologists within the boundary of the BSPP utilizing and applying the most up to date Federal and State delineation guidance (including on-site agency guidance by the CDFG) and methodology. The National Hydrography Dataset and California Interagency Watershed Map are *general reference* maps, and are based at the watershed level (primarily utilizing topographic features) to ascertain the presence, location, extent and amount of riverine and/or riverine-like features. Therefore, the amount (in linear feet and area) of aquatic features occurring within the BSPP is accurate based upon field studies. No field studies (e.g., delineations) of aquatic features were conducted outside the BSPP project boundary except along linear corridors for Project-related roads and transmission lines.

Page C.2-118, Cumulative Impacts, First Paragraph

Assessments of habitat quality can be conducted using both a model and field evaluations; however, a model should not be applied or used in a vacuum. Any model has limitations and should be verified and refined based on field observations. The USGS Model was applied to the site and did identify the site as having low quality lands, which is consistent with our field findings. As stated in the SA/DEIS the model should not be used, or viewed, as "a substitute for ground-based and site-specific field surveys" therefore, it is important to make decisions based on specific field conditions as observed during surveys. The surveys of the site identify site disturbances and conditions that result in low quality habitat that is unoccupied by desert tortoise. It is believed that mitigation for both direct and cumulative impact to desert tortoise for this project can be mitigated to a less than significant level with the implementation of compensatory mitigation at a ratio agreed to with the resource agencies.

Pages C.2-172 to 176, Condition of Certification BIO-8

This condition includes provision No. 8, in which the staff restricts the time of year during which steam blows may occur, regardless of type (low versus high pressure). This restriction is excessive and unreasonable. PVSI has agreed to use noise attenuation devices that would maintain the noise levels at or below 89 dBA at 100 feet from the source. The nearest undisturbed area (i.e., native habitat) that would potentially support nesting birds is located approximately 3,200 feet away from each steam blow source location. Given these variables, the expected noise level at the potential nesting areas would be approximately 59 dBA, well below the normally applied threshold of 65 dBA (65 dBA would occur approximately 1,600 feet from the source). Given this information, PVSI requests that Point No. 8 be deleted from the COC.

In addition, the second paragraph of the Verification to this Condition of Certification requires submittal of a Revegetation Plan no less than 30 days after the CEC issues the License or BLM issues the ROW. PVSI requests this be modified consistent with other conditions that measure the verification timeline "prior to" an activity such as mobilization or construction. We request the Verification be modified as follows.

> No less than 30 days ***prior to construction*** ~~following the publication of the Energy Commission License Decision or the Record of Decision/ROW Issuance, whichever comes first,~~ the project owner shall submit to the CPM and BLM's Authorized Officer a final agency-approved Revegetation Plan that has been reviewed and approved by BLM's Authorized Officer and the CPM. All modifications to the Revegetation Plan shall be made only after approval from BLM's Authorized Officer and the CPM.

Pages C.2-176-179, Condition of Certification BIO-9

PVSI is requesting that BIO-9 be changed to reflect the project phasing plan and allowance for clearance surveys in the Phase 1a non-linear areas to be conducted outside of the desert tortoise active season. This approach was presented to the agencies in meetings held with the USFWS, CDFG, and BLM in May 2010 and summarized in a subsequent memorandum forwarded to the agencies on June 4, 2010. The resource agencies generally agreed with the approach pending review of more details as summarized in the memorandum and to be concurred with by all parties. Linear features can be cleared during any season after project approval for all sites.

The USFWS' 2009 *Desert Tortoise Field Manual* (Chapter 6 – Clearance Survey Protocol for the Desert Tortoise – Mojave Population) stipulates protocol for clearance surveys for "*occupied* desert tortoise habitat" (emphasis added). It is important to note that only one (1) adult desert tortoise was observed in the southwest corner of the BSPP disturbance area. As previously stated, the lack of desert tortoise sign in the eastern side of the Biological Resources Survey Area (other than disarticulated and scattered bone fragments that likely have washed down from carcasses on the western side of the BRSA) suggest that desert tortoises do not occupy the eastern side of the BRSA. Therefore, it should be feasible to conduct clearance surveys for unoccupied desert tortoise habitat throughout the year. PVSI requests that the language of Condition BIO-9 be revised according to the suggested edits below.

This condition requires tortoise exclusion fencing to be included in the permanent security fencing for the plant site and allows temporary tortoise exclusion fencing for linear features. In order to facilitate construction and meeting the ARRA funding start of construction deadline, it would be helpful to be allowed to install temporary exclusion fencing around some portion of the plant site so that clearance surveys and construction could begin within a subset of the site. In addition, transect surveys over a 90-foot width can be excessive depending upon the area of disturbance and PVSI is requesting flexibility based on impact area for surveys prior to exclusionary fencing installation.

Therefore PVSI recommends the following modification to the proposed condition.

1. Desert Tortoise Exclusion Fence Installation. To avoid impacts to desert tortoises, permanent desert tortoise exclusion fencing shall be installed along the permanent perimeter security fence and temporarily installed along the ~~utility corridors~~ ***linear features or around any subset of the plant site where construction would be localized***. The proposed alignments for the permanent perimeter fence and ***alignments of temporary fencing***

along linear features or any subset of the plant site where construction would be localized ~~utility rights-of-way fencing~~ shall be flagged and surveyed within 24 hours prior to the initiation of fence construction. Clearance surveys of the perimeter fence ***alignment and the alignment of any temporary fencing along linear features or around any subset of the plant site where construction would be localized*** ~~and utility rights-of-way alignments~~ shall be conducted by the Designated Biologist(s) using techniques outlined in the USFWS' 2009 *Desert Tortoise Field Manual*. And may be conducted in any season with USFWS and CDFG approval. Biological Monitors may assist the Designated Biologist under his or her supervision. These fence clearance surveys shall provide 100% coverage of all areas to be disturbed and an additional transect along both sides of the fence line. ***Disturbance associated with fence construction shall not exceed 30 feet on either side of the proposed fence alignment. Prior to the surveys the project owner shall provide to the CPM, CDFG and USFWS a figure clearly depicting the limits of construction disturbance for the proposed fence installation. The fence line survey area shall be 90 feet wide centered on the fence alignment. Where construction disturbance for fence line installation can be limited to 15 feet on either side of the fence line, this fence line survey area may be reduced to an area approximately 60 feet wide centered on the fence alignment.*** ~~This fence line transect shall cover an area approximately 90 feet wide centered on the fence alignment.~~ Transects shall be no greater than 15 feet apart. All desert tortoise burrows, and burrows constructed by other species that might be used by desert tortoises, shall be examined to assess occupancy of each burrow by desert tortoises and handled in accordance with the USFWS' 2009 *Desert Tortoise Field Manual*. Any desert tortoise located during fence clearance surveys shall be handled by the Designated Biologist(s) in accordance with the USFWS' 2009 *Desert Tortoise Field Manual*.

a. <u>Timing, Supervision of Fence Installation.</u> The exclusion fencing shall be installed ***in an area*** prior to the onset of site clearing and grubbing ***in that area***. The fence installation shall be supervised by the Designated Biologist and monitored by the

Biological Monitors to ensure the safety of any tortoise present.

c. ~~Security Gates.~~ ~~Security gates shall be designed with minimal ground clearance to deter ingress by tortoises. The gates may be electronically activated to open and close immediately after the vehicle(s) have entered or exited to prevent the gates from being kept open for long periods of time.~~

2. Desert Tortoise Clearance Surveys within the Plant Site. Following construction of the permanent perimeter security fence and the attached tortoise exclusion fence, the permanently fenced power plant site shall be cleared of tortoises by the Designated Biologist, who may be assisted by the Biological Monitors. ***Portions of the power plant site may be fenced with temporary tortoise exclusion fence to facilitate construction of the power plant site in stages in accordance with the phasing plan approved pursuant to Condition of Certification BIO-12 and in such cases the area within the temporary tortoise exclusion fence shall be cleared of tortoises.*** Clearance surveys shall be conducted in accordance with the USFWS' 2009 *Desert Tortoise Field Manual* (Chapter 6 – Clearance Survey Protocol for the Desert Tortoise – Mojave Population) and shall consist of two surveys covering 100% the project area by walking transects no more than 15-feet apart. If a desert tortoise is located on the second survey, a third survey shall be conducted. Each separate survey shall be walked in a different direction to allow opposing angles of observation. ***Clearance surveys of the power plant site that contain unoccupied and/or inactive desert tortoise habitat (i.e. the eastern portion and the northwestern corner of the power plant site where power block units #1, 2 and 4 would be located) may be conducted outside of the active season .*** Clearance surveys of the power plant site ***remaining portions of the project site*** may only be conducted when tortoises are most active (April through May or September through October). ***Clearance surveys of linear features may be conducted during any time of year.*** Surveys outside of these time periods ***in occupied desert tortoise habitat*** require approval ***(via e-mail or authorization letter)*** by USFWS and CDFG. Any tortoise located during clearance surveys of the power

plant site ***and linear features*** shall be relocated and monitored in accordance with the Desert Tortoise Relocation/Translocation Plan.

Pages C.2-132-136, Condition of Certification BIO-12

Condition of Certification BIO-12 provides the framework and criteria for habitat compensation and land acquisition. PVSI requests that this condition be revised to allow the mitigation to more closely match the timing of construction. We have revised the condition for Staff's consideration in a manner to allow funding and acquisition to be independently tied to an approved construction phasing plan. The condition also includes a section (Section 3.i) that conflicts condition BIO-27. To maintain consistency and clarity of conditions, PVSI requests that Section 3i of BIO-12 be deleted. Requested changes are summarized below..

BIO-12 To fully mitigate for habitat loss and potential take of desert tortoise, the Project owner shall provide compensatory mitigation at a 1:1 ratio for impacts to ~~7,044~~ ***7025*** acres, adjusted to reflect the final Project footprint. For purposes of this condition, the Project footprint means all lands disturbed in the construction and operation of the Blythe Project, including all linears, as well as undeveloped areas inside the Project's boundaries that will no longer provide viable long-term habitat for the desert tortoise. To satisfy this condition, the Project owner shall acquire, protect and transfer 1 acre of desert tortoise habitat for every acre of habitat within the final Project footprint, and provide associated funding for the acquired lands, as specified below. Condition BIO-27 may provide the Project owner with another option for satisfying some or all of the requirements in this condition. In lieu of acquiring lands itself, the Project owner may satisfy the requirements of this condition by depositing funds into the Renewable Energy Action Team (REAT) Account established with the National Fish and Wildlife Foundation (NFWF), as provided below in section 3.i. of this condition.

The timing of the mitigation shall correspond with the timing of the site disturbance activities using the following method.

1. ***The project owner shall prepare and submit a construction phasing plan to the CPM for review and approval that will identify specific areas that will be disturbed for each phase of construction.***
2. ***Construction activities cannot occur until the CPM approves and authorizes construction for each phase identified in the construction phasing plan.***
3. ***Within 18 months after construction activities commence for any phase identified in the construction phasing plan, the project owner shall provide the mitigation commensurate with the disturbance area associated with each approved phase of construction.***

If compensation lands are acquired in fee or in easement, the requirements for acquisition, initial improvement and long-term management of compensation lands include all of the following:

1. Selection Criteria for Compensation Lands. The compensation lands selected for acquisition ***in fee or in easement*** shall:

    a. be within the Colorado Desert Recovery Unit, with potential to contribute to desert tortoise habitat connectivity and build linkages between desert tortoise designated critical habitat, known populations of desert tortoise, and/or other preserve lands;
    b. provide habitat for desert tortoise with capacity to regenerate naturally when disturbances are removed;
    c. ***to the extent practicable*** be ***prioritized*** near larger blocks of lands that are either already protected or planned for protection, or which could feasibly be protected long-term by a public resource agency or a non-governmental organization dedicated to habitat preservation;
    d. ***to the extent practicable*** be connected to lands currently occupied by desert tortoise, ideally with populations that are stable, recovering, or likely to recover;

e. not have a history of intensive recreational use or other disturbance that is of an extent that does not have the capacity to regenerate naturally when disturbances are removed or might make habitat recovery and restoration infeasible;
f. not be characterized by high densities of invasive species, either on or immediately adjacent to the parcels under consideration, that might jeopardize habitat recovery and restoration;
g. not contain hazardous wastes that cannot be removed to the extent that the site is suitable for habitat*.*
~~h. have water and mineral rights included as part of the acquisition, unless the CPM, in consultation with CDFG, BLM and USFWS, agrees in writing to the acceptability of land without these rights.~~

2. Review and Approval of Compensation Lands Prior to Acquisition. The Project owner shall submit a formal ~~acquisition~~ proposal to the CPM, CDFG, USFWS and BLM describing the parcel(s) intended for purchase. This ~~acquisition~~ proposal shall discuss the suitability of the proposed parcel(s) as compensation lands for desert tortoise in relation to the criteria listed above. Approval from CDFG and the CPM, in consultation with BLM and the USFWS, shall be required for acquisition of all parcels comprising the ~~7,040~~ ***the compensatory acreage or portion thereof*** ~~acres~~.

3. Compensation Lands Acquisition Conditions: The Project owner shall comply with the following conditions relating to acquisition of the compensation lands after the CPM, in consultation with CDFG and the USFWS have approved the proposed compensation lands.

   a. Preliminary Report: The Project owner, or approved third party, shall provide a recent preliminary title report, initial hazardous materials survey report, biological analysis, and other necessary documents for the

proposed compensation land to the CPM and CDFG. All documents conveying or conserving compensation lands and all conditions of title are subject to a review and approval by the CPM and CDFG, in consultation with BLM and the USFWS. For conveyances to the State, approval may also be required from the California Department of General Services, the Fish and Game Commission and the Wildlife Conservation Board.

b. Title/Conveyance: The Project owner shall transfer fee title to the compensation lands, a conservation easement over the lands, or both fee title and conservation easement as required by the CPM and CDFG. Transfer of either fee title or an approved conservation easement will usually be sufficient, but some situations, e.g., the donation of lands burdened by a conservation easement to BLM, will require that both types of transfers be completed. Any transfer of a conservation easement or fee title must be to CDFG, a non-profit organization qualified to hold title to and manage compensation lands (pursuant to California Government Code section 65965), or to BLM under terms approved by the CPM and CDFG. If an approved nonprofit organization holds title to the compensation lands, a conservation easement shall be recorded in favor of CDFG in a form approved by CDFG. If an approved non-profit holds a conservation easement, CDFG shall be named a third party beneficiary.

c. Initial Habitat Improvement Fund. The Project owner shall fund the initial protection and habitat improvement of the compensation lands. Alternatively, a non-profit organization may hold the habitat improvement funds if they are qualified to manage the compensation lands (pursuant to California Government Code section 65965) and if they meet the approval of CDFG and the CPM. If CDFG takes fee title to the compensation lands, the habitat

improvement fund must paid to CDFG or its designee.

d. Conduct a Property Analysis Record. Upon identification of the compensation lands, the property owner shall conduct a Property Analysis Record (PAR) or PAR-like analysis to establish the appropriate long-term maintenance and management fee to fund the in-perpetuity management of the acquired mitigation lands.

e. Long-term Management Endowment Fund. ***Within 30 days after acquisition of mitigation lands in accordance with the approved construction phasing plan, t*** ~~T~~he Project owner shall deposit in NFWF's REAT Account a non-wasting capital long term maintenance and management fee in the amount determined through the Property Analysis Record (PAR) or PAR-like analysis that would be conducted for the compensation lands. If compensation lands will not be identified and a PAR or PAR-like analysis completed within the time period specified for this payment (see the verification section at the end of this condition), the Project owner shall instead deposit ~~$10,213,800~~ ***funds*** in the REAT Account to fund long-term maintenance and management of the compensation lands. *This amount is calculated at $1,450 an acre for* ***the amount of acreage approved for each phase in the construction phasing plan.*** ~~*7,044 acres.*~~ The amount of the required deposit shall be adjusted for any change in the ***construction phasing*** ~~Project~~ footprint as described above. Once a PAR or PAR-like analysis is completed, the Project owner shall deposit additional money as may be needed to provide the full amount of long-term maintenance and management funding indicated for the compensation property. If the approved analysis indicates less than $1,450 an acre will be required for long-term maintenance and management, the excess paid will be returned to the Project owner. The CPM, in consultation

with CDFG, may designate another non-profit organization to hold the long-term maintenance and management fee if the organization is qualified to manage the compensation lands in perpetuity. If CDFG takes fee title to the compensation lands, CDFG shall determine whether it will hold the long-term management fee in the special deposit fund, leave the money in the REAT Account, or designate another entity to manage the long-term maintenance and management fee for CDFG and with CDFG supervision.

f. Interest, Principal, and Pooling of Funds. The Project owner, CDFG and the CPM shall ensure that an agreement is in place with the endowment holder/manager to ensure the following conditions:

   i. Interest. Interest generated from the initial capital endowment shall be available for reinvestment into the principal and for the long-term operation, management, and protection of the approved compensation lands, including reasonable administrative overhead, biological monitoring, improvements to carrying capacity, law enforcement measures, and any other action approved by CDFG designed to protect or improve the habitat values of the compensation lands.

   ii. Withdrawal of Principal. The endowment principal shall not be drawn upon unless such withdrawal is deemed necessary by the CDFG or the approved third-party endowment manager to ensure the continued viability of the species on the compensation lands. If CDFG takes fee title to the compensation lands, monies received by CDFG pursuant to this provision shall be deposited in a special deposit fund established solely for the purpose to manage lands in unless CDFG designates NFWF or another entity to manage the long-term

maintenance and management fee for CDFG.

iii. Pooling Long-Term Maintenance and Management Fee Funds. CDFG, or a CPM-and CDFG-approved non-profit organization qualified to hold long-term maintenance and management fees solely for the purpose to manage lands in perpetuity, may pool the endowment with other endowments for the operation, management, and protection of the compensation lands for local populations of desert tortoise. However, for reporting purposes, the long-term maintenance and management fee fund must be tracked and reported individually to the CDFG and CPM. Other expenses. In addition to the costs listed above, the Project owner shall be responsible for all other costs related to acquisition of compensation lands and conservation easements, including but not limited to title and document review costs, expenses incurred from other state agency reviews, and overhead related to providing compensation lands to CDFG or an approved third party; escrow fees or costs; environmental contaminants clearance; and other site cleanup measures.

iv. Reimbursement Fund. The Project owner shall provide reimbursement to CDFG or an approved third party for reasonable expenses incurred during title, easement, and documentation review; expenses incurred from other state or state approved federal agency reviews; and overhead related to providing compensation lands. The Project owner is responsible for all compensation lands acquisition/easement costs, including but not limited to, title and document review costs, as well as expenses incurred from other state agency reviews and overhead related to providing compensation lands to the department or approved third

party; escrow fees or costs; environmental contaminants clearance; and other site cleanup measures.

g. Other expenses. In addition to the costs listed above, the Project owner shall be responsible for all other costs related to acquisition of compensation lands and conservation easements, including but not limited to title and document review costs, expenses incurred from other state agency reviews, and overhead related to providing compensation lands to CDFG or an approved third party; escrow fees or costs; environmental contaminants clearance; and other site cleanup measures.

h. Mitigation Security. The Project owner shall provide financial assurances to the CPM and CDFG with copies of the document(s) to BLM and the USFWS, to guarantee that an adequate level of funding is available to implement the mitigation measures described in this condition. These funds shall be used solely for implementation of the measures associated with the Project in the event the Project owner fails to comply with the requirements specified in this condition, or shall be returned to the Project owner upon successful compliance with the requirements in this condition. The CPM‘s or CDFG‘s use of the security to implement measures in this condition may not fully satisfy the Project owner‘s obligations under this condition. Financial assurance can be provided to the CPM and CDFG in the form of an irrevocable letter of credit, a pledged savings account or another form of security (—Security||). Prior to submitting the Security to the CPM, the Project owner shall obtain the CPM‘s and CDFG‘s approval, in consultation with BLM and the USFWS, of the form of the Security. Security shall be provided in the amount***s*** ~~of $5,846,520,~~ calculated as follows:

   i. land acquisition costs for compensation land, calculated at $500/acre ***multiplied times the amount of land***

to be disturbed in accordance with the construction phasing plan.= ~~$3,522,000.~~

ii. initial protection and improvement activities on the compensation land, calculated at $330/acre ***multiplied times the amount of land to be disturbed in accordance with the construction phasing plan. =*** ~~$2,324,520.~~

~~Total security required = $5,846,520.~~

The amount of security shall be adjusted for any change in the Project footprint as described above. ~~Security is not required for long-term maintenance and management funding requirements because money to fund those activities must be provided separately under section 3.e., above.~~

~~i. The Project owner may elect to fund the acquisition and initial improvement of compensation lands through NFWF by depositing funds for that purpose into NFWF's REAT Account. Initial deposits for this purpose must be made in the same amounts as the security required in section 3.h., above, and may be provided in lieu of security. If this option is used for the acquisition and initial improvement, the Project owner shall make an additional deposit into the REAT Account if necessary to cover the actual acquisition costs and administrative costs and fees of the compensation land purchase once land is identified and the actual costs are known. If the actual costs for acquisition and administrative costs and fees are less than $500 an acre, the excess money deposited in the REAT Account shall be returned to the Project owner. Money deposited for the initial protection and improvement of the compensation lands shall not be returned to the Project owner.~~

~~i. The responsibility for acquisition of compensation lands may be delegated to a third party other than NFWF, such as a~~

~~nongovernmental organization supportive of desert habitat conservation, by written agreement of the Energy Commission and CDFG. Such delegation shall be subject to approval by the CPM and CDFG, in consultation with BLM and USFWS, prior to land acquisition, initial protection or maintenance and management activities. Agreements to delegate land acquisition to an approved third party, or to manage compensation lands, shall be implemented with 18 months of the Energy Commission's approval.~~

Pages C.2-136 and 137, Condition of Certification BIO-13

PVSI requests that the fee identified in this condition be revised to more accurately reflect impacts anticipated from the project. The project is in an area that contains low desert tortoise densities and project design features are included to avoid and minimize any impacts to desert tortoise from the proposed project and potential changes to raven populations. PVSI has also prepared a draft Raven Management, Monitoring, and Control Plan that outlines additional measures to minimize and mitigate for potential impacts. The fee is not commensurate with the potential impacts. Revised language for BIO-13, Point No. 2 is summarized below.

2. <u>USFWS Regional Raven Management Program</u>. The Project owner shall submit payment to the project sub-account of the REAT Account held by the National Fish and Wildlife Foundation (NFWF) to support the USFWS Regional Raven Management Program. The amount shall be ***made*** ~~a one-time payment of $105 per acre of permanent disturbance~~ ***at the start of operation of the end of each construction phase***. ***The fee shall be $105 per acre multiplied by the areas of the project site and linear features that may provide new subsidies for ravens. The estimated acreage includes the evaporation ponds (32 acres), gen-tie, access road, and administrative building for a total of 213 acres.***

Page C.2-189-190, Condition of Certification BIO-16

This condition requires nest surveys. To facilitate staged construction, PVSI requests the following modifications so that nest surveys can be concentrated to only those portions of the project site that may be undergoing construction.

BIO-16 Pre-construction nest surveys shall be conducted if construction activities would occur from February 1 through August 31. The Designated Biologist or Biological Monitor conducting the surveys shall be experienced bird surveyors familiar with standard nest-locating techniques and shall perform surveys in accordance with the following guidelines:

1. Surveys shall cover all potential nesting habitat in the ***portion of the area to be constructed*** ~~Project site~~ or within 500 feet of the boundaries of the ***portion of the area to be constructed*** ~~site~~ (including linear facilities);

Page C.2-190-191, Condition of Certification BIO-17

American badger and kit fox surveys should only be required within the Project Disturbance Area and not within a 250 foot buffer. No direct impacts to these species would occur in the buffer that would require actions, including passive relocation, therefore, surveys provide no information relevant to the start of construction or mitigation.

BIO-17 To avoid direct impacts to American badgers and desert kit fox, preconstruction surveys shall be conducted for these species concurrent with the desert tortoise surveys. Surveys shall be conducted as described below:

1. Biological Monitors shall perform pre-construction surveys for badger and kit fox dens in the Project area~~, including areas within 250 feet of all Project facilities~~, utility corridors, and access roads. If dens are detected each den shall be classified as inactive, potentially active, or definitely active.

Page C.2-191-193, Condition of Certification BIO-18

This condition requires preconstruction burrowing owl surveys. To facilitate staged construction, PVSI requests the following modifications so that the surveys can be concentrated to only those portions of the project site that may be undergoing construction. The Verification to this Condition of Certification requires submittal of a Burrowing Owl Mitigation Plan no less than 10 days after the CEC issues the License or BLM issues the ROW. PVSI requests this be modified consistent with other conditions that measure the verification timeline "prior to" an activity that gives rise to the potential impacts. In the case of

potential impacts to burrowing owls the appropriate timeline would be construction. Additionally, PVSI requests this be modified to allow participation in an in lieu fee program for mitigation of burrowing owls.

Additionally, PVSI recommends this condition be modified to reflect that only one pair of WBO are within the project disturbance area. The second owl referenced was observed in a buffer and would not be directly impacted. No additional WBO were observed during 2010 surveys in the project disturbance area. We therefore we request the following modifications:

BIO-18 The Project owner shall implement the following measures to avoid, minimize and offset impacts to burrowing owls:

1. Pre-Construction Surveys. The Designated Biologist or Biological Monitor shall conduct pre-construction surveys for burrowing owls no more than 30 days prior to initiation of construction activities. Surveys shall be focused exclusively on detecting burrowing owls, and shall be conducted from two hours before sunset to one hour after or from one hour before to two hours after sunrise. The survey area shall include ***that portion of*** the Project Disturbance Area ***that would be disturbed in accordance with the approved construction phasing plan*** and surrounding 500 foot survey buffer.

2. Implement Burrowing Owl Mitigation Plan.
    a. Identify suitable ~~relocation~~ sites within 1 mile of the Project Disturbance areas ***for creation or enhancement of burrows prior to passive relocation efforts***;
    b. …
    c. …
    d. Describe monitoring and management of the ***passive relocation effort, including the created or enhanced burrow location and the project area where WBO were relocated from*** ~~relocated burrowing owl site~~, and provide a reporting plan.

3. …

4. Acquire ~~39~~ ***19.5*** Acres of Burrowing Owl Habitat. The Project owner shall acquire, in fee or in easement ~~39~~ ***19.5*** acres of land suitable to support a resident population of burrowing owls and shall provide funding for the enhancement and long-term management of these compensation lands. The responsibilities for acquisition and management of the compensation lands may be delegated by written agreement to CDFG or to a third party, such as a non-governmental organization dedicated to habitat conservation, subject to approval by the CPM, in consultation with CDFG and USFWS prior to land acquisition or management activities. Additional funds shall be based on the adjusted market value of compensation lands at the time of construction to acquire and manage habitat. Alternatively, the Applicant may achieve compensatory mitigation through payment into an approved habitat enhancement fund or other in-lieu fee program.
    a. Criteria for Burrowing Owl Mitigation Lands. The terms and conditions of this acquisition or easement shall be as described in BIO-12 [Desert Tortoise Compensatory Mitigation], with the additional criteria to include: 1) the ~~39~~ ***19.5*** acres of mitigation land must provide suitable habitat for burrowing owls, and 2) the acquisition lands must either currently support burrowing owls or be no farther than 5 miles from an active burrowing owl nesting territory. The ~~39~~ ***19.5*** acres of burrowing owl mitigation lands may be included with the desert tortoise mitigation lands ONLY if these two burrowing owl criteria are met. If the 39 acres of burrowing owl mitigation land is separate from the acreage required for desert tortoise compensation lands, the Project owner shall fulfill the requirements described below in this condition.
    b. Security. If the ~~39~~ ***19.5*** acres of burrowing owl mitigation land is separate from the acreage required for desert tortoise compensation lands, the Project owner or an approved third party shall complete acquisition of the proposed compensation lands within the time period specified for this acquisition (see the verification

section at the end of this condition). Alternatively, financial assurance can be provided by the Project owner to the CPM and CDFG, according to the measures outlined in BIO-12. These funds shall be used solely for implementation of the measures associated with the Project. Financial assurance can be provided to the CPM in the form of an irrevocable letter of credit, a pledged savings account or another form of security (—Security‖) prior to initiating ground-disturbing Project activities. Prior to submittal to the CPM, the Security shall be approved by the CPM, in consultation with CDFG and the USFWS, to ensure funding. The final amount due will be determined by an updated appraisal and PAR analysis conducted as described in BIO-12.

Verification: If pre-construction surveys detect burrowing owls within 500 feet of proposed construction activities, at least 10 days prior to the start of any Project-related site disturbance activities the Designated Biologist shall provide to the CPM documentation indicating that non-disturbance buffer fencing has been installed. The Project owner shall report monthly to the CPM, CDFG and USFWS for the duration of construction on the implementation of burrowing owl avoidance and minimization measures. Within 30 days after completion of construction the Project owner shall provide to the CDFG and CPM a report identifying how mitigation measures described in the plan have been completed. If pre-construction surveys detect burrowing owls within the Project Disturbance Area and relocation of the owls is required, the Project owner shall do the following:

a. Within 30 days of completion of the burrowing owl pre-construction surveys, submit to the CPM, CDFG and USFWS a Burrowing Owl Mitigation Plan.
b. No less than 90 days prior to acquisition of the burrowing owl compensation lands, the Project owner, or an approved third party, shall submit a formal acquisition proposal to the CPM, CDFG, and USFWS describing the ~~39~~ ***19.5*** -acre parcel intended for purchase. At the same time the Project owner shall submit a PAR or PAR-like analysis for the parcels for review and approval by the CPM, CDFG and USFWS.
c. Within 90 days of the land or easement purchase, as determined by the date on the title, the Project owner shall provide the CPM with a management plan for review and approval, in consultation with CDFG and USFWS, for the compensation lands and associated funds.
d. No later than 30 days prior to beginning Project ground-disturbing activities, the Project owner shall provide written verification of Security in accordance with this condition of certification.

e. No later than 18 months from a initiation of construction the Project owner shall provide written verification to the CPM and CDFG that the ~~39~~ ***19.5*** acres of compensation lands or conservation easements have been acquired and recorded in favor of the approved recipient.
f. As part of the Annual Compliance Report, each year following construction for a period of five years, the Designated Biologist shall provide a report to the CPM, USFWS and CDFG that describes the results of monitoring and management of the burrowing owl relocation area.

Page C.2-194, Condition of Certification BIO-19

"Section A of BIO-19 does not apply to the Project, since there would be no direct impacts outside the permitted Project Disturbance Area. The permitted Project Disturbance Area encompasses all permanent and temporary direct impacts arising from construction and operations of the Project; thus, all direct impacts to special status species arising from the Project would be considered permanent. Indirect impacts would be unavoidable outside the Project Disturbance Area; minimization measures are already included in construction BMPs to reduce indirect impacts outside the Project Disturbance Area. PVSI requests that Section A of BIO-19 be stricken.

Sections B through D of BIO-19 contain extraneous measures that do not ultimately affect mitigation and/or are redundant with Desert Tortoise mitigation. Land acquisition for Desert Tortoise (BIO-12) will include habitat for the six non-listed special status plant species documented within the Project Disturbance Area, which may or may not already contain one or more of these species. Seed collection will occur within portions of the Project Disturbance Area that are not undergoing Phase I construction, and if necessary to collect sufficient seed bulk in the case of annual species, within areas of the Project buffer or adjacent habitat beyond the Project buffer known to contain the species. This seed will be collected by the Rancho Santa Ana Botanic Gardens (RSABG) and stored at RSABG facilities for later use. This seed would be used for enhancement of Project buffer areas and/or the land Desert Tortoise land acquisition. Monitoring for special status plant species within the Project Disturbance Area would not be required during operations of the Project because it is assumed the entire Project Disturbance Area would not contain vegetation.

Regarding late-season special status plant species (Section B), 2009 late-season surveys have already been conducted with negative findings for within the 2009 Project Disturbance Area and buffer. It is possible that the 2010 summer rainfall may be greater than 2009, resulting in increased germination. It is also possible that portions of the Project Disturbance Area have not been surveyed with complete coverage due to Project design changes occurring after fall 2009 surveys were completed. The 2009 survey data indicate a high probability there are no late-season plant species occurring within the Project Disturbance Area, but the survey data are not complete for the entire Project Disturbance Area.

Because survey data are incomplete and construction would be authorized prior to the survey window for these late-season plant species, it is in the best interest of the Project owner to take the most conservative approach and assume presence of special status late-season plant species with potential to occur within the Project Disturbance Area. Presence of these species would not affect mitigation in the form of compensatory mitigation (e.g., land acquisition), which would be covered by Desert Tortoise mitigation (BIO-12). The Project owner shall provide funding for seed collection to be conducted by RSABG from the nearest known offsite locations of the following eight plant species, to aid in future enhancement: Abram's spurge (*Chamaesyce abramsiana*), flat-seeded spurge (*Chamaesyce platysperma*), glandular ditaxis (*Ditaxis claryana)*, pink velvet mallow (*Horsfordia alata*), lobed ground cherry (*Physalis lobata*), California ditaxis (*Ditaxis serrata* var. *californica*), jackass clover (*Wislizenia refracta* ssp. *refracta*), and Palmer's jackass clover (*Wislizenia refracta* ssp. *palmeri*).

As such, PVSI recommends that BIO-19 be deleted. If however, the Committee believes some mitigation is required PVSI proposes the following simple mitigation strategy to replace Staff's complex condition

BIO-19 ***The Project owner shall provide funding for seed collection to be conducted by RSABG from the nearest known offsite locations of the following eight plant species, to aid in future enhancement: Abram's spurge (Chamaesyce abramsiana), flat-seeded spurge (Chamaesyce platysperma), glandular ditaxis (Ditaxis claryana), pink velvet mallow (Horsfordia alata), lobed ground cherry (Physalis lobata), California ditaxis (Ditaxis serrata var. californica), jackass clover (Wislizenia refracta ssp. refracta), and Palmer's jackass clover (Wislizenia refracta ssp. palmeri).***

Page C.2-143, Condition of Certification BIO-20

The sand dunes/partially stabilized sand dunes that would be directly impacted are already invaded by Saharan mustard; therefore, Staff's conclusion that the project would result in indirect impacts as a result of the introduction and facilitation of invasive mustard is inaccurate. The mitigation for impacts to these dunes, characterized by invasive vegetation, should reflect the degraded nature. Therefore, it is recommended that the mitigation ratio for impacts to this habitat be 1:1 and not 3:1. It is also requested that fulfillment of required mitigation be allowed to occur through the REAT program as with desert tortoise (BIO-12). Requested changes to the condition are summarized below.

BIO-20 To mitigate for habitat loss and direct impacts to Mojave fringe-toed lizards the project owner shall provide compensatory mitigation at ~~a 3:1~~ **11:1** ratio, ***which may include compensation lands purchased in fee or in easement or implementation of BIO-27 in whole or in part***, for impacts to 4 acres of stabilized or partially stabilized desert dune habitat (or the acreage of sand dune/partially stabilized sand dune habitat impacted by the final project footprint). ***If compensation lands are acquired***, the project owner shall provide funding for the acquisition ***in fee or in easement***, initial habitat improvements and long-term management endowment of the compensation lands.

1. Criteria for Compensation Lands: The compensation lands selected for acquisition shall:

a. Be sand dune or partially stabilized sand dune habitat within the ~~Chuckwalla Valley~~ ***NECO*** with potential to contribute to Mojave fringe-toed lizard habitat connectivity and build linkages between known populations of Mojave fringe-toed lizards and preserve lands with suitable habitat;

a. ***To the extent feasible, b***~~B~~e within the same (or contributing) sand transport corridor as the proposed Project;

b. To the extent feasible, be connected to lands currently occupied by Mojave fringe-toed lizard;

c. To the extent feasible, be near larger blocks of lands that are either already protected or planned for protection, or which could feasibly be protected long-term by a public resource agency or a non-governmental organization dedicated to habitat preservation;

d. Provide quality habitat for Mojave fringe-toed lizard, that has the capacity to regenerate naturally when disturbances are removed;

f. Not have a history of intensive recreational use or other disturbance that might make habitat recovery and restoration infeasible;

g. Not be characterized by high densities of invasive species, either on or immediately adjacent to the parcels under consideration, that might jeopardize habitat recovery and restoration;

h. Not contain hazardous wastes ***that cannot be removed to the extent that the site is suitable for habitat***;

i. Not be subject to property constraints (i.e. mineral leases, cultural resources); and,

j. Be on land for which long-term management is feasible.

Page C.2-209, Condition of Certification BIO-21

The RSA concludes that big horn sheep are unlikely to use the Project site or the nearby McCoy Mountains. This conclusion was based upon consultation with local experts and agency resource staff. This conclusion is supported by the results of recent Golden Eagle helicopter surveys that detected big horn sheep in other desert mountain ranges further west, but not in the McCoy Mountains. The RSA includes a mitigation measure requiring establishment of an artificial water source for big horn sheep in the McCoy Mountains as mitigation for "potential future impairment to connectivity" and use of foraging habitat that could occur if the McCoy Mountains someday were host to resident big horn sheep population a result of future translocation or recolonization.

It is a legal requirement that there be a nexus between a mitigation measure and an identified project impact. The proposed BSPP would not adversely affect big horn sheep. A potential future impact to a big horn sheep population that does not currently exist is speculative and not reasonably forseeable.

In addition, addition of an artificial water source could likely have more significant adverse impacts. It would create dependency of a population of sheep on an artificial water source and could affect population dynamics in an unnatural way. It also creates a potential new subsidy for ravens that could negatively affect desert tortoise by increasing this predatory species.

This mitigation measure/Condition of Certification BIO-21 should be deleted.

Page C.2-145, Condition of Certification BIO-22

The NECO Plan includes the option of directing equivalent funds towards desert dry wash woodland community enhancement or rehabilitation as opposed to simply requiring land acquisition for impacts to this community and other wash habitats. PVSI requests that BIO-22 be modified to allow this flexibility for mitigating impacts to State waters. We also request that the following language be revised to allow greater flexibility given the limited private lands available in the area:

BIO-22 1. … ***To the extent practicable***, ~~M~~mitigation for impacts to state waters ***will be prioritized*** ~~shall~~ within the Palo Verde and surrounding watersheds, as close to the project site as ***practicable*** ~~possible~~.

PVSI requests that Staff reconsider the mitigation ratios in Table 6, p. 57. The RSA states that CDFG considers vegetated swales to be jurisdictional waters of the State that require mitigation at a 1.5:1 ratio. This is contrary to the prior discussions we have had with CDFG regarding vegetated swales. During a November site visit with CEC and CDFG, the CEC requested that creosote bush-big galleta grass association be considered a special vegetation community (not waters of the State). CDFG then requested that we map all vegetated swales and that they would consider them jurisdictional, but not consider them significant aquatic features that would require mitigation (Personal Communication with Craig Weightman, Senior Environmental Scientist CDFG Inland Deserts Region, Magdalena Rodriguez, Environmental Scientist CDFG Inland Deserts Region, Susan Sanders, Biologist, CEC, and Carolyn Chainey-Davis,Consulting CEC Biologist. November 2009). The swales are generally poorly defined features characterized by low volume, infrequent or short duration flow and are usually shallow topographical features in the landscape that may convey water across upland areas during and following storm events. It is unlikely that these swales convey runoff every year, but there is evidence, through hydrological indicators, that they move surface water across the landscape. However, the swales abate into the landscape prior to reaching and connecting into a more prominent watercourse (e.g., the McCoy Wash). See comment C.2-18 above for further discussion of swales and the big-galleta grass association.

Page C.2-212, Condition of Certification BIO-23

This condition requires a Decommissioning and Reclamation Plan. PVSI agrees that such a plan is required by federal regulations but does not believe that it can prepare a plan now to restore the site to natural conditions. The full disturbance area will have been mitigated by the Conditions of Certification and therefore the only requirement for such a plan is BLM administering regulations. The ultimate decision of what land use to which the site should be reclaimed lies with BLM and not the Commission. PVSI recommends this condition be deleted entirely

from the Commission Decision as it is not necessary to mitigate any significant environmental impact nor is it necessary to comply with any LORS over which the Commission has jurisdiction. If, however, the Commission desires to include a condition to ensure the project complies with a federal regulation, PVSI recommends the following modifications.

BIO-23 Upon Project closure the Project owner shall implement a final Decommissioning and Reclamation Plan The Decommissioning and Reclamation Plan shall include a cost estimate for implementing the proposed decommissioning and reclamation activities, and shall be consistent with the guidelines in BLM's 43 CFR 3809.550 et seq., ~~subject to review and revisions from the BLM in consultation with USFWS and CDFG.~~

Verification: ***No fewer than*** 30 days prior to the start of ***Project-related ground disturbing activities*** the Project owner shall provide to the ***BLM*** a draft Decommissioning and Reclamation Plan. The plan shall be finalized prior to the start of commercial operation and reviewed every five years thereafter and submitted to the ~~CPM~~ ***BLM*** for approval. Modifications to the approved Decommissioning Plan shall be made only after approval from ***BLM. The Project Owner shall provide a copy of the approved Decommissioning and Reclamation Plan and any BLM approved revisions to the CPM.*** ~~the CPM~~.

~~Prior to initiating Project-related ground disturbance activities the Project owner shall provide financial assurances to the CPM to guarantee that an adequate level of funding would be available to implement measures described in the Decommissioning and Reclamation Plan, consistent with the provisions set forth in 43 C.F.R. sections 2805.12 and 3809.500-.599.~~

Page C.2-213, Condition of Certification BIO-24

This condition requires that PVSI conduct golden eagle surveys during each year of construction and if an occupied nest is found it shall implement a Golden Eagle Monitoring and Management Plan. PVSI believes this requirement is excessive. PVSI conducted the eagle surveys as required by the agencies during the breeding season of 2010 to verify presence/absence within a 10-mile radius of the project and evaluate potential eagle nesting foraging habitat. The surveys did not detect active golden eagle nests but did identify one unoccupied nest within the defined 10-mile radius of the project site. One unoccupied nest, in poor condition indicating it hasn't been used in greater than 5 years, was found within 3 miles of the project. No nesting habitat was detected within one mile of

the project site. The results of these surveys are scheduled to be published in June 2010.

In the RSA, Staff concluded that "Project construction activities could potentially injure or disturb golden eagles if nests were established sufficiently close to Project boundaries to be affected by the sights and sounds of construction. Staff considers these potential impacts unlikely, however, because suitable nesting substrate (i.e., cliff ledges, rocky outcrops, or large trees) do not occur within one mile of the proposed Project area." This information was verified by 2010 eagle results. It is highly unlikely that once construction starts eagles will nest within one mile of the Project area. In the remote possibility they were to reoccupy the nest 3 miles away, as stated by the RSA this is sufficient distance to prevent agitation behavior (displacement, avoidance, and defense) at the nest; increased vigilance behavior at the nest; or nest site abandonment. PVSI recognizes that foraging habitat may be affected, but implementation of BIO-12 will mitigate these impacts through desert tortoise mitigation lands. As stated in the RSA, because these targeted areas are also within 10 miles of potential nesting sites for golden eagles, acquisition of the desert tortoise mitigation lands would also provide protected golden eagle foraging grounds. There would be no significant impact on eagle foraging areas with implementation of BIO-12.

A reasonable buffer to adequately minimize potential indirect impacts from construction disturbance for the golden eagle is one mile (Suter and Joness 1981) and a range has been presented for energy projects of 0.25 to 2 miles (Tesky 1994). Because there is no nesting habitat within at least one mile, and no existing nests (active or inactive) are present closer than three miles, no impacts are anticipated on golden eagle nesting as a result of project construction activities. In addition, eagles do not typically begin adding nesting material to their nest until January. The proposed timing of construction initiation in late fall/early winter 2010 indicates that there will be no construction activities occurring within 10 miles of any nesting golden eagles based on surveys conducted during the 2010 breeding season for purposes of evaluating potential project impacts to foraging habitat. PVSI acknowledges that eagles may elect to use the one old nest or build a new nest during spring 2011 or in a future year when construction might be ongoing; however, it is beyond a reasonable buffer for indirect construction impacts. Also, if unoccupied nests were to become occupied after the winter/fall construction initiation period, then it would suggest that the occupancy was initiated during the construction activities and therefore those activities did not disrupt the nesting behavior and no further action should be required.

Therefore, PVSI requests that this condition be deleted.

References:

Suter, G.W. and J.L Joness 1981. Criteria for Golden Eagle, Ferruginous Hawk, and Prairie Falcon Nest Site Protection. Journal of Raptor Research 15(1):12-18.

Tesky, Julie L. 1994. Aquila chrysaetos. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2010, June 9].

Page C.2-214, Condition of Certification BIO-25

PVSI requests the following clarification regarding this condition:

BIO-25 The Project owner shall cover the evaporation ponds prior to any discharge with 1.5-inch mesh netting designed to exclude birds and other wildlife from drinking or landing on the water of the ponds. Netting with mesh sizes other than 1.5-inches may be installed if approved by the CPM in consultation with CDFG and USFWS. The netted ponds shall be monitored regularly to verify that the netting remains intact, is fulfilling its function in excluding birds and other wildlife from the ponds, and does not pose an entanglement threat to birds and other wildlife. The ponds shall include a visual deterrent in addition to the netting, and the pond shall be designed such that the netting shall never contact the water. Monitoring of the evaporation ponds shall include the following:

1. Monthly Monitoring. The Designated Biologist or Biological Monitor shall regularly survey the ponds at least once per month starting with the first month of operation of the evaporation ponds. The purpose of the surveys shall be to determine if the netted ponds are effective in excluding birds, if the nets pose an entrapment hazard to birds and wildlife, and to assess the structural integrity of the nets. The monthly surveys shall be conducted in one day for a minimum of two hours following sunrise (i.e., dawn), a minimum of one hour mid-day (i.e., 1100 to 1300), and a minimum of two hours preceding sunset (i.e., dusk) in order to provide an accurate assessment of bird and wildlife use of the ponds during all seasons. Surveyors shall be experienced with bird identification and survey techniques. Operations staff at the Project site shall also report finding any dead birds or other wildlife at the evaporation ponds to the Designated Biologist within one day of the detection of the carcass. The Designated Biologists shall report any bird or other wildlife deaths or entanglements within two days of the discovery to the CPM, CDFG, and USFWS.

2. Dead or Entangled Birds. If dead or entangled birds are detected, the Designated Biologist shall take immediate action to correct the source of mortality or entanglement. The Designated Biologist shall make immediate efforts to contact and consult the CPM, CDFG, and USFWS by phone and electronic communications prior to taking remedial action upon detection of the problem, but the inability to reach these parties shall not delay taking action that would, in the judgment of the Designated Biologist, prevent further mortality of birds or other wildlife at the evaporation ponds.

3. Quarterly Monitoring. If after 12 ~~consecutive~~ monthly site visits no ***significant*** bird or wildlife deaths or entanglements are detected at the evaporation ponds by or reported to the Designated Biologist, monitoring can be reduced to quarterly visits.

4. Biannual Monitoring. If after 12 ~~consecutive~~ quarterly site visits no ***significant*** bird or wildlife deaths or entanglements are detected by or reported to the Designated Biologist and with approval from the CPM, USFWS and CDFG, future surveys may be reduced to two surveys per year, during the spring nesting season and during fall migration. If approved by the CPM, USFWS and CDFG, monitoring outside the nesting season may be conducted by the Environmental Compliance Manager.

5. Modification of Monitoring Program. Without respect to the above requirements the Project owner, CDFG or USFWS may submit to the CPM a request for modifications to the evaporation pond monitoring program based on information acquired during monitoring, and may also suggest adaptive management measures to remedy any problems that are detected during monitoring or modifications if bird impacts are not observed. Modifications to the evaporation pond monitoring described above and implementation of adaptive management measures shall be made only after approval from the CPM, in consultation with USFWS and CDFG.

In addition, the Project owner shall prepare and implement measures that will prevent Couch‘s spadefoot toads from using the evaporative basins (see Condition of Certification BIO-26)

Page C.2-213, Condition of Certification BIO-26

The RSA required mitigation for Couch's spadefoot is excessive. Impacts to the toad are not considered significant and should not require additional mitigation beyond the already defined avoidance and minimization measures and required compensatory mitigation. The RSA misrepresents the potential and total impact. No Couch's spadefoot have been detected in the project area during any surveys. Limited ponding potential has been identified and the nearest record of a toad is 5 miles from the project site. As stated above (C.2-32), the 2010 surveys detected evidence of potential ponding areas, but did not make a conclusion that these were potential breeding habitat areas as no toads have been detected in the vicinity or nearby. None of the potential ponds were holding water during spring 2010 surveys. They merely have the potential to pond for a sufficient period to support habitat, though even the ponding potential is a qualitative assessment only. Quantitative data regarding length of potential water retention, depth of water (if any), size of the pond, and suitability for breeding were not documented. The RSA's conclusion suggests that the three ponds identified in 2010 are occupied and that is speculative at best. As stated above, there is no assurance that these ponds have standing water long enough, it is just a qualitative assessment of potential.

Staff's statement on p. C.2-56, regarding the BSPP's contribution to Couch's spadefoot impacts is also misleading. The RSA states that BSPP contributes 5.3 percent to cumulative loss of habitat from future projects within the NECO planning area. That is the percent of all future impacts, not the percent of impacts to all NECO habitat. The BSPP only impacts 0.3 percent of all NECO habitat.

In addition, page C.2-130 states that the BSPP contributes substantially to Couch's spadefoot habitat loss. As stated above only 0.3 percent of the impact is attributed to potential impacts from the BSPP. Although no impacts have been verified, the project mitigation as proposed for other resources, including mitigation for the desert tortoise would offset impacts to the Couch's spadefoot. Also Staff state "Urbanization and agriculture have eliminated historical Couch's spadefoot toad habitat (Morey 2005)." However, Morey also states, "However, as with other desert spadefoot toads, Couch's spadefoot toads readily breed in ephemeral artificial impoundments such as stock tanks and pools that form at the base of road and railroad grades. They have colonized many areas where natural pools are rare or nonexistent." Dimmit (1977) also states, "Couch's spadefoot toads are probably more abundant than in the past wherever open country still exists and human activities have created ephemeral impoundments. Examples of this can be found in southeastern California." Given the lack of observations of the species, the negligible impact on potential habitat, the characteristics of the species and potential artificial sources of habitat that support it, and the already substantial compensatory mitigation required for the project (that would very likely support similar potential habitat), no additional mitigation should be required.

PVSI requests that condition BIO-26 be deleted.

Page C.2-218, Condition of Certification BIO-27

BIO-27 The Project owner may choose to satisfy its mitigation obligations by paying an in lieu fee instead of acquiring compensation lands, pursuant to Fish and Game code sections 2069 and 2099 or any other applicable in-lieu fee provision, to the extent the in-lieu fee provision is found by the Commission to be in compliance with CEQA and CESA requirements. ***Such fee, and its use toward satisfying the Project owner's mitigation obligations, will be based upon the biological and mitigation analyses conducted herein.***

Verification: If electing to use this provision, the Project owner shall notify the Commission that it would like a determination that the Project's in-lieu fee proposal meets CEQA and CESA requirements. ***Such determination shall account for the biological and mitigation analyses conducted herein.***

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of: Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DOCKET NO. 09-AFC-6** **DECLARATION OF** Benjamin Vargas

I, Benjamin Vargas, declare as follows:

1. I am presently employed by AECOM as an Archaeologist

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Cultural Resources and Native American Values for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 7, 2010.

Benjamin Vargas

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Stacey Jordan

I, Stacey Jordan, declare as follows:

1. I am presently employed by AECOM as a Senior Archaeologist

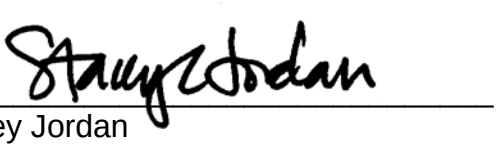
2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Cultural Resources and Native American Values for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 7, 2010.



Stacey Jordan

BLYTHE SOLAR POWER PROJECT
CULTURAL RESOURCES AND NATIVE AMERICAN VALUES
OPENING TESTIMONY

I. Name: Benjamin Vargas and Stacey Jordan-Connor

II. Purpose:

Our testimony addresses the subject of Cultural Resources and Native American Values associated with the construction and operation of the Blythe Solar Power Project (09-AFC-06).

III. Qualifications:

Benjamin Vargas: I am presently employed at AECOM and am a Senior Archaeologist / Principal Investigator with that organization. I have both a BA and Master's Degree in Anthropology and I have over 20 years of experience in the field of Cultural Resource Management. I prepared or assisted in the preparation of the Cultural Resources and Native American Values section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

Stacey Jordan-Connor: I am presently employed at AECOM, and have been for the past 1.5 years, and am presently a Senior Archaeologist with that organization. I have a Ph.D. in Anthropology and I have over 10 years of experience in the field of Cultural Resources Management. I prepared or assisted in the preparation of the Cultural Resources section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

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 1	**Application for Certification Volumes I & II**, dated August 24, 2009, and docketed on August 24, 2009, Section 5.4, and Appendix G.
Exhibit 4	**Data Adequacy Supplement**, dated October 26, 2009, and docketed on October 26, 2009.
Exhibit 7	**New Alternative Approach to Staff Review for Cultural**, dated December 1, 2009, and docketed on December 1, 2009.
Exhibit 8	**Selection of Cultural Resources Evaluation Approach**, dated December 21, 2009, and docketed on December 22, 2009.
Exhibit 9	**Palo Verde Solar I, LLC's Responses to CEC Data Request, Set 1 (1 through 260)**, dated January 2010, and docketed on January 22, 2010, Responses 98 though152.
Exhibit 14	**Palo Verde Solar I, LLC's Data Responses to CEC Queries & Attachment DR-CR-120a & b (Cultural Resources Impact Blocks)**, dated January 2010, and docketed on January 29, 2010.
Exhibit 18	**Palo Verde Solar I, LLC's Response to January 14, 2010 Workshop Query and January 29, 2010 Email Query**, dated February 2010, and docketed on February 4, 2010.
Exhibit 29	**Palo Verde Solar I, LLC's Initial Comments on the SA, DEIS**, dated April 19, 2010, and docketed on April 19, 2010.

V. Opinion and Conclusions

We have not reviewed Staff's analysis of the Cultural Resources and Native American Values of the Revised Staff Assessment (RSA) because Staff did not provide any analysis in the RSA. We did however review the

SA/DEIS and requested minor modifications to the analysis. We have reproduced those comments here. Additionally, since Staff did not proposed Conditions of Certification, we have provided those as well. While we understand that Staff will prepare a Supplemental Staff Assessment sometime in the future, we believe that with the Exhibits contained herein and the following proposed Conditions of Certification the Committee would have enough evidence to proceed to evidentiary hearing and conclude that that Project will not result in significant Cultural resource impacts and will comply with all laws, ordinances, regulations and standards (LORS)

CULTURAL RESOURCES

Page C.3-48, Last Paragraph

Staff states that it will be including into the inventory a private parcel that PVSI may be acquiring. PVSI will not be impacting this property as it will be outside the current project boundaries, will not be disturbed, and therefore there can be not potential impact to cultural resources that may exist on that property. Staff should not include this property within the inventory.

Page C.3-89, Section 3.5.1.3.7.3.2

In Section C.3.5.1.3.7.3.2, Staff identifies three cultural landscapes as assumed-eligible historic districts. PVSI proposed that the resources within the BSPP be understood with reference to four broad interpretive landscapes, which were clearly described as being distinct from historic districts as defined by law for cultural resources management purposes. Staff suggests that PVSI interpret and mitigate any contributors to the three cultural landscapes/historic districts described in Section C.3.5.1.3.7.3.2, but Staff does not identify the boundaries of the landscapes, nor does Staff specify the contributors to those landscapes. PVSI requests further clarification on how these districts would be defined, if applicable, and the resource attributes Staff anticipates will be included.

Page C.3-108, Section C.3.5.2.3.3

Staff also suggests that the mitigation measures outlined in Section C.3.5.2.3.3 be included in the Programmatic Agreement (PA), and thereby become conditions of certification. In general terms, PVSI accepts the mitigation measures proposed by Staff. PVSI also supports the creation of a project-specific cultural resources PA under the direction of the Bureau of Land Management. Nevertheless, there are a few issues where PVSI requests clarification.

According to the SA/DEIS, based on the basis of current information, Staff was unable to determine whether any of the 234 identified cultural resources within the BSPP survey area are eligible or ineligible for nomination to the NRHP or CRHR. Staff argues that PVSI's mitigation recommendations are "inadequate" under the CEC-defined "Approach 3" to the treatment of cultural resources, but suggests that these recommendations would be acceptable under a "more typical approach to determining what resources are significant" (Section C.3.5.2.2). PVSI requests that Staff clarify how the choice of Approach 3 substantively changes the threshold of eligibility for archaeological sites.

Due to Staff's inability to assess the significance of cultural resources on the basis of existing Class III survey data, Staff assumes the eligibility of all sites within the Project APE. Further, Staff suggests that under Approach 3 "the project's impacts to all assumed register-eligible resources would have to be mitigated by means of avoidance or mitigation in the form of data recovery" (Section C.3.5.1.3.7). This understanding of mitigation under Approach 3 appears different from the language used in the November 24, 2009 letter wherein the CEC described Approaches 1, 2, and 3 for the BSPP. In that letter, the CEC specified that sites assumed eligible under Approach 3 would be mitigated with a "phased treatment plan" through which most sites would be mitigated without full data recovery. As specified in Staff's proposed mitigation measures (Section C.3.5.2.3.2), some sites may require "no additional field work," only the revising of site record forms under Staff and BLM guidance. In addition, as proposed by Staff, some sites may require further archival research, but limited or no additional field work.

If approved by BLM, the Applicant may conduct evaluation investigations prior to Certification and signing of the Record of Decision. These investigations would be phased according to the Project phasing.

CUL-1 Prior to the start of ground disturbance the project owner will obtain the services of a Cultural Resources Specialist (CRS). The CRS will manage all consultation, monitoring, mitigation, curation, and reporting activities required in accordance with the Conditions of Certification (Conditions). The CRS may elect to obtain the services of Cultural Resource Monitors (CRMs) and other technical specialists, if needed, to assist in monitoring, mitigation, and curation activities.

CULTURAL RESOURCES SPECIALIST

The resumes for the CRS will include information demonstrating to the satisfaction of the BLM's Authorized Officer and the Compliance Project Manager (CPM) that their training and background conform to the U.S. Secretary of Interior Guidelines, as published in the Code of Federal Regulations, 36 CFR Part 61.

CULTURAL RESOURCES MONITORS

CRMs will have the following qualifications:
1. a BS or BA degree in anthropology, archaeology, historical archaeology or a related field and one year experience monitoring in California; or 2. an AS or AA degree in anthropology, archaeology, historical archaeology or a related field, and two years experience monitoring in California; or 3. be pursuing a degree in the field of anthropology, archaeology, historical archaeology or a related field, and two years of monitoring experience in California.

CULTURAL RESOURCES TECHNICAL SPECIALISTS
The resume(s) of any additional technical specialists, e.g., historical archaeologist, historian, architectural historian, and/or physical anthropologist, will be submitted to the BLM's Authorized Officer and the CPM for approval.

Verification:
1. At least 45 days prior to the start of ground disturbance, the project owner will submit the resume for the CRS to the BLM's Authorized Officer and the CPM for review and approval.

2. At least 10 days prior to beginning tasks, the resume(s) of any additional technical specialists will be provided to the BLM's Authorized Officer and the CPM for review and approval.

CUL-2 Prior to the start of ground disturbance, if the CRS has not previously worked on the project, the project owner will provide the CRS with copies of the AFC, data responses, and confidential cultural resources reports for the project. The project owner will also provide the CRS, the BLM's Authorized Officer, and the CPM with maps and drawings showing the footprint of the power plant and all linear facilities. At a minimum, the CRS will consult with the project construction manager to confirm area(s) to be worked during the next week, until ground disturbance is completed, and the project owner will ensure that the project construction manager is available for such consultations. The project owner will notify the CRS and CPM of any changes to the scheduling of the construction phases.

Verification:
1. If there are changes to any project related-footprint, revised maps and drawings will be provided at least 10 days prior to start of ground disturbance and construction for those changes.

2. During ground disturbance, a current schedule of anticipated project activity will be provided to the CRS and CPM by letter, email, or fax.

CUL-3 Prior to the start of ground disturbance, the project owner will submit a Historic Properties Treatment Plan (HPTP) that identifies measures to minimize potential impacts to sensitive cultural resources. Implementation of the HPTP will be the responsibility of the CRS and the project owner. Copies of the HPTP will reside with the CRS, alternate CRS, each monitor, and the project owner's on-site construction manager. No ground disturbance will occur prior to CPM approval of the HPTP, unless specifically approved by the BLM's Authorized Officer. The HPTP will include, but not be limited to, the following:

1. A research design that includes a discussion of archaeological research questions applicable to the local prehistory and history of the project area.

2. A mitigation/treatment plan for any NRHP-eligible resource (as determined by the BLM's Authorized Officer) or any CRHR-eligible resource (as determined by the CPM) where impacts cannot be avoided.

3. A description of impact avoidance measures (such as monitoring, flagging or fencing), to prohibit or otherwise restrict access to sensitive resource areas that may be found during construction and/or operation, and identification of the areas where these measures are to be implemented.

4. Provisions for curation of all materials collected as a result of the archaeological investigations (survey, testing, and data recovery).

5. A Discovery Plan that provides a protocol for the treatment of inadvertent discoveries.

5. A description of the contents and format of the Cultural Resource Report (CRR), which will be prepared according to ARMR Guidelines.

Verification:
1. At least 30 days prior to the start of ground disturbance, the project owner will submit the HPTP to the BLM's Authorized Officer and the CPM for review and approval. Ground disturbance may not commence until the CRMMP is approved, unless specifically approved by the BLM's Authorized Officer.

3. At least 30 days prior to the start of ground disturbance, a letter will be provided to the BLM's Authorized Officer and the CPM indicating that the project owner agrees to pay curation fees for any materials collected as a result of the archaeological investigations (survey, testing, data recovery).

CUL-4 The project owner will submit a Cultural Resources Report (CRR) documenting the implementation of the HPTP to the BLM's Authorized Officer and the CPM for approval. The report will be written by or under the direction of the CRS and will be provided in the ARMR format.

Verification:
1. Within 180 days after completion of ground disturbance, the project owner will submit the CRR to the BLM's Authorized Officer and the CPM for review and approval.

CUL-5 Prior to and for the duration of ground disturbance, the project owner will provide Worker Environmental Awareness Program (WEAP) training to all new workers at the project site.

Verification:
1. At least 30 days prior to the beginning of ground disturbance, the CRS will provide the training program draft text and graphics and the informational brochure to the BLM's Authorized Officer and the CPM for review and approval,

CUL-6 The project owner will ensure that construction is immediately halted should anyone discover buried archaeological materials on the project site. In the event of such a Discovery, the project owner will ensure the immediate notification of the CRS. Redirection of ground disturbance will be accomplished under the direction of the construction supervisor, in a manner agreed to by the CRS. The protocol established in the Discovery Plan will be implemented to evaluate, and if needed, to treat the discovery.

Verification:
1. At least 30 days prior to the start of ground disturbance, the project owner will provide the BLM's Authorized Officer and the CPM, and the CRS with a letter confirming that the CRS and CRMs have the authority to halt construction activities in the vicinity of a cultural resources Discovery, and that the project owner will ensure that the CRS notifies the BLM's Authorized Officer and the CPM.

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Mike Dudasko

I, Mike Dudasko, declare as follows:

1. I am presently employed by AECOM, as a Senior Program Manager for Air Quality Compliance.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Hazardous Materials Management for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 JUNE 7, 2010.

Mike Dudasko

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Mark Luttrell

I, Mark Luttrell, declare as follows:

1. I am presently employed by AECOM, as a Vice President.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Hazardous Materials Management for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 9, 2010.

Mark Luttrell

BLYTHE SOLAR POWER PROJECT
HAZARDOUS MATERIALS MANAGEMENT
OPENING TESTIMONY

I. Name: Mike Dudasko and Mark Luttrell

II. Purpose:

Our testimony addresses the subject of Hazardous Materials Management associated with the construction and operation of the Blythe Solar Power Project (09-AFC-06).

III. Qualifications:

Mike Dudasko: I am presently employed at AECOM, and have been for the past 7 years and am presently a Senior Program Manager for Air Quality and Compliance with that organization. I have a Bachelor's Degree in Chemical Engineering and I have over 30 years of experience in the field of process and environmental engineering. I prepared or assisted in the preparation of the Hazardous Materials section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

Mark Luttrell: I am presently employed at AECOM, and have been for the past 6 years and am presently a Vice President with that organization. I have a Masters of Science Degree in Civil Engineering and I have over 36 years of experience in the field of environmental consulting. I prepared or assisted in the preparation of the Hazardous Materials Management section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

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 1	**Application for Certification Volumes I & II**, dated August 24, 2009, and docketed on August 24, 2009, Section 5.6 and Appendix D & I.
Exhibit 29	**Palo Verde Solar I, LLC's Initial Comments on the SA, DEIS**, dated April 19, 2010, and docketed on April 19, 2010.
Exhibit 34	**Responses to Questions from CEC April 28, 29 and May 7 Workshops Re: Worker Safety, Hazardous Materials, and Water Resources**, dated May 13, 2010, and docketed May 13, 2010.
Exhibit 35	**Responses to Questions from CEC April 28, 29 and May 7 Workshops Re: Worker Safety & Hazardous Materials**, dated May 14, 2010, and docketed on May 14, 2010.
Exhibit 36	**Responses to April 28, 29 & May 7 Workshops Re: Operation Phase Fire Protection**, dated May 14, 2010, and docketed on May 14, 2010.
Exhibit 37	**Responses to April 28, 29 & May 7 Workshops Re: HTF Fluid (Burn Rate Discussion)**, dated May 14, 2010, and docketed on May 14, 2010.

V. Opinion and Conclusions

We have reviewed the Hazardous Materials Management section of the Staff Assessment and agree that with incorporation of the Conditions of Certification, the Project will not result in significant Hazardous Materials impacts and will comply with all applicable Hazardous Materials-related laws, ordinances, regulations and standards (LORS). We offer the following modifications for clarity

Section C.4.4.2 (page C.4-8)

The following modification to the RSA is necessary to provide clarity regarding the amount of HTF that will be used by the BSPP.

Therminol VP-1

Therminol VP1 is the heat transfer fluid (HTF) that will be used in the solar panels to collect solar heat and transfer it in order to generate steam to run the steam turbines. Therminol is a mixture of 73.5% diphenyl ether and 26.5% biphenyl, and is a solid at temperatures below 54 °F. Therminol can therefore be expected to remain liquid if a spill occurs. While the risk of off-site migration is minimal, Therminol is highly flammable and fires have occurred at other solar generating stations that use it. Approximately 1,300,000 gallons of HTF will be stored ***in each power block*** at the BSPP, contained in the pipes and heat exchanger. Isolation valves would be placed throughout the HTF piping system designed to automatically block off sections of the piping in which a loss of pressure is detected (Solar Millennium 2009a, Section 5.6.3.3).

Condition of Certification HAZ-1

A revised list of Hazardous Materials is included attached to this testimony and PVSI request this table replace the table contained in Appendix A.

Table 5.6-3R Summary of Special Handling Precautions for Large Quantity Hazardous Materials (Rev.1)

Hazardous Material and CAS No.[1]	Relative Toxicity[2] and Hazard Class[3]	RQ[4] pounds (kg)	Permissible Exposure Limit (PEL)	Storage Description; Capacity[6]	Storage Practices and Special Handling Precautions
Sulfuric Acid, 29.5% solution CAS No. 7664-93-9	High toxicity; Hazard class – Corrosive, water reactive	1,000 lbs	PEL: 1 milligram per cubic meter (mg/m^3)	Contained in batteries; 2,000 gal total inventory	Isolated from incompatible chemicals and secondary containment
Carbon Dioxide CAS No. 124-38-9	Low toxicity; Hazard class – Nonflammable gas	Not Applicable	TLV: 5,000 ppm (9,000 mg/m^3) TWA	Carbon steel tank; 15 tons maximum onsite inventory	Carbon steel tank with crash posts
Therminol VP-1 Biphenyl (26.5%) CAS No. 92-52-4 Diphenyl ether (73.5%) CAS No. 101-84-8	Moderate toxicity, Hazard class – Irritant; Combustible Liquid (Class III-B)	Biphenyl = 100 lbs (45.4 kg) Diphenyl ether = Not applicable	Biphenyl = PEL: 0.2 milliliters per cubic meter (ml/m^3) (8-hr TWA) TLV: 0.2 ml/m^3 (1 mg/m^3) (8-hr TWA) Diphenyl ether = TLV: 1 ml/m^3 (8-hr TWA) TLV: 2 ml/m^3 (15-min TWA) PEL: 1 ml/m^3 (7 mg/m^3) (15-min TWA)	1.3 million gal in system, no additional onsite storage.	Continuous monitoring of pressure in piping network; routine inspections (sight, sound, smell) by operations staff; isolation valves throughout piping network to minimize fluid loss in the event of a leak; prompt clean up and repair
Lube Oil CAS No. 64742-65-0	Low toxicity Hazard class – NA	Not applicable	None established	Carbon steel tanks, 10,000 gallons in equipment and piping, additional maintenance inventory of up to 550 gallons in 55-gallon steel drums	Secondary containment area for each tank and for maintenance inventory

Table 5.6-3R Summary of Special Handling Precautions for Large Quantity Hazardous Materials (Rev.1)

Hazardous Material and CAS No.[1]	Relative Toxicity[2] and Hazard Class[3]	RQ[4] pounds (kg)	Permissible Exposure Limit (PEL)	Storage Description; Capacity[6]	Storage Practices and Special Handling Precautions
Mineral Insulating Oil CAS No. 8042-47-5	Low toxicity Hazard class – NA	Not applicable	None established	Carbon steel transformers; total onsite inventory of 36,000 gallons	Used only in transformers, secondary containment for each transformer
Diesel Fuel CAS No. 68476-34-6	Low toxicity; Hazard class – Combustible Liquid	Not applicable	PEL: none established TLV: 100 mg/m^3 (ACGIH)	Carbon steel tank (1,150 gallon [generator & fire water pump engine])	Stored only in fuel tank of emergency engine, secondary containment
Hydrogen	Low toxicity; Hazard class – Flammable gas	Not applicable	None Established	In generator cooling loop and “tube trailer”; piping system inventory 350 pounds; plus 650 lbs in storage trailer	Pressure safety tank, crash posts, pressure relief valves
Nitrogen CAS No. 7727-37-9	Low toxicity; Hazard class – Non-Flammable Gas	Not applicable	None established	Carbon steel tank; 7,500 lbs total inventory	Carbon steel tank with crash posts
Hydraulic fluid CAS No. 64741-89-5	Low to moderate toxicity; Hazard class – Class IIIB Combustible Liquid	Not applicable	TWA (oil mist): 5 mg/m^3 STEL: 10 mg/m^3	Carbon steel tanks and sumps; 500 gallons in equipment, maintenance inventory of 110 gallons in 55-gallon steel drums	Found only in equipment with a small maintenance inventory; maintenance inventory stored within secondary containment
Welding gas Acetylene CAS No. 74-86-2	Moderate toxicity; Hazard class – Toxic	10,000 lbs	PEL: none established	Steel cylinders; 200 cubic feet each, 800 cubic feet total on site	Inventory management, isolated from incompatible chemicals

Table 5.6-3R Summary of Special Handling Precautions for Large Quantity Hazardous Materials (Rev.1)

Hazardous Material and CAS No.[1]	Relative Toxicity[2] and Hazard Class[3]	RQ[4] pounds (kg)	Permissible Exposure Limit (PEL)	Storage Description; Capacity[6]	Storage Practices and Special Handling Precautions
Welding gas Oxygen CAS No. 7782-44-7	Low toxicity; Hazard class – Oxidizer	Not applicable	PEL: none established	Steel cylinders; 200 cubic feet each, 800 cubic feet total on site	Inventory management, isolated from incompatible chemicals
Welding gas Argon CAS No. 7440-37-1	Low toxicity; Hazard class – Non-flammable Gas	Not applicable	PEL: none established	Steel cylinders; 200 cubic feet each, 800 cubic feet total on site	Inventory management
Activated Carbon CAS No. 7440-44-0	Non-toxic (when unsaturated), low to moderate toxicity when saturated, depending on the adsorbed material; Hazard class – combustible solid	Not Applicable	TWA (total particulate): 15 mg/m^3 TWA (respirable fraction): 5 mg/m^3 TLV (graphite, all forms except graphite fibers): 2 mg/m3 TWA	Used in two x 2,000-lb canisters, 4,000 lbs total inventory, no additional storage	No excess inventory stored on site, prompt disposal when spent
Calcium Hypochlorite 100% CAS No. 7778-54-3	Moderate toxicity; Hazard Class – Corrosive, Irritant	10 lbs	PEL: none established Acute oral toxicity (LD50): 850 mg/kg [Rat].	Minimal onsite storage for water treatment, not expected to exceed 50 lbs	Inventory management, isolated from incompatible chemicals
Water treatment chemical Sodium Carbonate (soda ash)	Low toxicity; Hazard class – Irritant	Not Applicable	TBD	10 tons	Stored in steel silos. Inventory management, isolated from incompatible chemicals

Table 5.6-3R Summary of Special Handling Precautions for Large Quantity Hazardous Materials (Rev.1)

Hazardous Material and CAS No.[1]	Relative Toxicity[2] and Hazard Class[3]	RQ[4] pounds (kg)	Permissible Exposure Limit (PEL)	Storage Description; Capacity[6]	Storage Practices and Special Handling Precautions
Water treatment chemical Lime (calcium oxide)	Moderate toxicity; Hazard class - Irritant	Not Applicable	TBD	10 tons	Stored in steel silos. Inventory management, isolated from incompatible chemicals
Water treatment chemical Magnesium Chloride	Non-toxic; Hazard class – NA	Not Applicable	TBD	500 gallons	Inventory management
Water treatment chemical Sodium Bisulfate (aka sodium hydrogen sulfate)	Low toxicity; Hazard class – Irritant	Not Applicable	Sodium bisulfite = PEL: none established: TLV: 5 mg/m^3 TWA	500 gallons	Inventory management, isolated from incompatible chemicals
Boiler water treatment chemical Ferric Sulfate (35% solution) CAS Number 10028-22-5	Moderate toxicity; Hazard class - Irritant	1,000 lbs	TBD	10,000 gallons	Inventory management, isolated from incompatible chemicals and secondary containment

Table 5.6-3R Summary of Special Handling Precautions for Large Quantity Hazardous Materials (Rev.1)

Hazardous Material and CAS No.[1]	Relative Toxicity[2] and Hazard Class[3]	RQ[4] pounds (kg)	Permissible Exposure Limit (PEL)	Storage Description; Capacity[6]	Storage Practices and Special Handling Precautions
Water treatment chemical NALCO Tri-Act 1800 *or equivalent* Cyclohexlyamine (5 – 10%) Monoehtanolamine (10 – 30%) Methoxyproplyamine (10 – 30%)	High toxicity; Hazard class – Corrosive, Class II Combustible liquid	Not Applicable	Cyclohexlyamine = TLV: 10 ppm (41 mg/m^3) Monoethanolamine = TLV: 3 ppm (7.5 mg/m^3) TWA: 3 ppm (7.5 mg/m^3) STEL: 6 ppm (15 mg/m^3) Methoxyproplyamine = TLV: 5 ppm TWA STEL: 15 ppm	Plastic totes, 2 x 400 gallons	Inventory management, isolated from incompatible chemicals and secondary containment
Water treatment chemical NALCO Elimin-Ox Carbohydazide (5 - 10%) *or equivalent*	Moderate toxicity; Hazard class – Sensitizer	Not Applicable	Carbohydazide = PEL: none established	Plastic totes, 2 x 400 gallons	Inventory management, isolated from incompatible chemicals and secondary containment
Water treatment chemical NALCO 3D Trasar 3DT185 Phosphoric Acid (60 -100%) *or equivalent*	High toxicity; Hazard class – Corrosive	Not Applicable	Phosphoric acid = PEL: 1 mg/m^3 (TWA) TLV: 1 mg/m^3 (TWA), STEL: 3 mg/m^3	Plastic totes, 2 x 400 gallons	Inventory management, isolated from incompatible chemicals and secondary containment

Table 5.6-3R Summary of Special Handling Precautions for Large Quantity Hazardous Materials (Rev.1)

Hazardous Material and CAS No.[1]	Relative Toxicity[2] and Hazard Class[3]	RQ[4] pounds (kg)	Permissible Exposure Limit (PEL)	Storage Description; Capacity[6]	Storage Practices and Special Handling Precautions
Water treatment chemical NALCO 3D Trasar 3DT177 *or equivalent* Phosphoric acid (30%)	Moderate toxicity; Hazard class – Irritant	Not Applicable	Phosphoric acid = PEL: 1 mg/m^3 (TWA) TLV: 1 mg/m^3 (TWA), STEL: 3 mg/m^3	Plastic totes, 2 x 400 gallons	Inventory management, isolated from incompatible chemicals and secondary containment
Water treatment chemical NALCO 3D Trasar 3DT190 *or equivalent*	Low toxicity; Hazard class – Irritant	Not Applicable	None established for mixture	Plastic totes, 2 x 400 gallons	Inventory management, isolated from incompatible chemicals and secondary containment
Water treatment chemical NALCO Acti-Brom (R) 7342 *or equivalent* Sodium bromide	Low toxicity; Hazard class – Irritant	Not Applicable	Sodium bromide = PEL: none established	Plastic totes, 2 x 400 gallons	Inventory management, isolated from incompatible chemicals and secondary containment
Water treatment chemical NALCO pHreedom® 5200M *or equivalent* Sodium salt of phosphonomethylated diamine	Low to moderate toxicity; Hazard class – Irritant	Not Applicable	Sodium salt of phosphonomethylated diamine = PEL: none established	Plastic totes, 2 x 400 gallons	Inventory management, isolated from incompatible chemicals and secondary containment
Water treatment chemical NALCO PCL-1346	Low toxicity; Hazard class – Irritant	Not Applicable	None established for mixture	Plastic totes, 2 x 400 gallons	Inventory management, isolated from incompatible chemicals and secondary containment

Table 5.6-3R Summary of Special Handling Precautions for Large Quantity Hazardous Materials (Rev.1)

Hazardous Material and CAS No.[1]	Relative Toxicity[2] and Hazard Class[3]	RQ[4] pounds (kg)	Permissible Exposure Limit (PEL)	Storage Description; Capacity[6]	Storage Practices and Special Handling Precautions
Water treatment chemical NALCO Permacare (R) PC-7408 Sodium bisulfite	Low toxicity; Hazard class – Irritant	Not Applicable	Sodium bisulfite = PEL: none established: TLV: 5 mg/m^3 TWA	Plastic totes, 2 x 400 gallons	Inventory management, isolated from incompatible chemicals and secondary containment
Water treatment chemical NALCO BT-3000 *or equivalent* Sodium hydroxide Sodium tripolyphosphate	High toxicity; Hazard class – Corrosive	Not Applicable	Sodium hydroxide = PEL: 2 mg/m^3 Sodium tripolyphosphate = PEL: none established	Plastic totes, 2 x 400 gallons	Inventory management, isolated from incompatible chemicals and secondary containment
Boiler water treatment chemical, pH adjustment Sodium Hydroxide (50%) CAS Number 1310-73-2	High toxicity; Hazard class – Corrosive	1,000 lbs	Sodium hydroxide = PEL: 2 mg/m^3	10,000 gallons	Inventory management, isolated from incompatible chemicals and secondary containment
Water treatment chemical NALCO 8338 *or equivalent* Sodium nitrite Sodium tolytriazole Sodium hydroxide	Moderate toxicity; Hazard class – Toxic	Not Applicable	Sodium nitrite = PEL: none established Sodium tolytriazole = PEL: none established Sodium hydroxide = PEL: 2 mg/m^3	Plastic totes, 2 x 400 gallons	Inventory management, isolated from incompatible chemicals and secondary containment

Table 5.6-3R Summary of Special Handling Precautions for Large Quantity Hazardous Materials (Rev.1)

Hazardous Material and CAS No.[1]	Relative Toxicity[2] and Hazard Class[3]	RQ[4] pounds (kg)	Permissible Exposure Limit (PEL)	Storage Description; Capacity[6]	Storage Practices and Special Handling Precautions
Water treatment chemical 93%-98% sulfuric acid CAS No. 7664-93-9	High toxicity; Hazard class – Corrosive, water reactive	1,000 lbs	PEL: 1 mg/m^3	1,000 gallons	Inventory management, isolated from incompatible chemicals and secondary containment
Water treatment chemical Sodium Hypochlorite (13% solution) CAS No. 7689-52-9	High toxicity; Hazard class – Poison-B, Corrosive	100 lbs	Workplace Environmental Exposure Limit (WEEL) - STEL: 2 mg/m3 PEL: 0.5 ppm (TWA), STEL: 1 ppm as Chlorine TLV: 1 ppm (TWA), STEL: 3 ppm as Chlorine	1,000 gallons	Inventory management, isolated from incompatible chemicals
Oxygen Scavenger Reagent Acetic Acid 60% CAS No. 64-19-7 Iodine 20% CAS No. 7553-56-2 De-ionized water 20% CAS No. 7732-18-5	Moderate toxicity; Hazard Class – Corrosive, Irritant	5,000 lbs	PEL: 10 ppm TWA PEL: 0.1 ppm N/A	Minimal onsite storage for water treatment, not expected to exceed 50 lbs	Inventory management, isolated from incompatible chemicals

Table 5.6-3R Summary of Special Handling Precautions for Large Quantity Hazardous Materials (Rev.1)

Hazardous Material and CAS No.[1]	Relative Toxicity[2] and Hazard Class[3]	RQ[4] pounds (kg)	Permissible Exposure Limit (PEL)	Storage Description; Capacity[6]	Storage Practices and Special Handling Precautions
Boiler water treatment oxygen scavenger Carbohydrazide CAS No. 497-18-7	High toxicity; Hazard class – Irritant	Not applicable	Carbohydazide = PEL: none established	600 gallons	Inventory management, isolated from incompatible chemicals
Herbicide Roundup® or equivalent CAS No. 38641-94-0	Low toxicity; Hazard class – Irritant	Not applicable	Isopropylamine salt of glyphosphate = no specific occupational exposure has been established	No onsite storage, brought on site by licensed contractor, used immediately	No excess inventory stored on site
Soil stabilizer Active ingredient: acrylic or vinyl acetate polymer or equivalent CAS No. Active ingredient is 'Not Hazardous'	Non-toxic; Hazard class – NA	Not applicable	None established	No onsite storage, supplied in 55-gallon drums or 400-gallon totes, used immediately	No excess inventory stored on site

[1] CAS No. – Chemical Abstracts Service registry number. This number is unique for each chemical.

[2] Low toxicity is used to describe materials with an NFPA Health rating of 0 or 1. Moderate toxicity is used describe materials with an NFPA rating of 2. High toxicity is used to describe materials with an NFPA rating of 3. Extreme toxicity is used to describe materials with an NFPA rating of 4.

[3] NA denotes materials that do not meet the criteria for any hazard class defined in the 1997 Uniform Fire Code.

[4] RQ - Reportable Quantity for hazardous substance as designated under section 102(a) defined under CERCLA. (To note: As previously discussed in the text, Table 5.6-3 includes those chemicals stored or used in excess of 55 gallons for liquids, 500 pounds for solids, and 200 cubic feet for compressed gases. These quantities coincide with the thresholds for reporting under California's HMBP requirements).

[5] RQ - Reportable Quantity for extremely hazardous substance as designated under section 302(a)(2) defined under CERCLA.

[6] Consistent with the AFC these storage capacities are per power block.

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of: Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DOCKET NO. 09-AFC-06** **DECLARATION OF** Sara J. Head

I, Sara J. Head, declare as follows:

1. I am presently employed by AECOM, as a Vice President.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I assisted with preparation of the attached testimony relating to Health and Safety for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 7, 2010.

Sara J. Head

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Russ Kingsley

I, Russ Kingsley, declare as follows:

1. I am presently employed by AECOM, as a Senior Project Manager.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Health and Safety for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 7, 2010.

Russell Kingsley

Russ Kingsley

BLYTHE SOLAR POWER PROJECT
PUBLIC HEALTH AND SAFETY
OPENING TESTIMONY

I. Names: Sara J. Head and Russ Kingsley

II. Purpose:

Our testimony addresses the subject of Public Health and Safety associated with the construction and operation of the Blythe Solar Power Project (09-AFC-6).

III. Qualifications:

Sara J. Head: I am presently employed at AECOM, and have been for the past 17.5 years and am presently a Vice President with that organization. I have a Bachelor of Science Degree in Atmospheric Sciences and I have over 35 years of experience in the field of air quality consulting. I assisted in the preparation of the Public Health section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

Russ Kingsley: I am presently employed at AECOM, and have been for the past 10 years and am presently a Senior Program Manager with that organization. I have a Bachelor of Science Degree in Chemical Engineering and I have over 20 years of experience in the field of regulatory compliance and air quality consulting. I prepared or assisted in the preparation of the Public health section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

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 1	**Application for Certification Volumes I & II**, dated August 24, 2009, and docketed on August 24, 2009, Section 5.10.
Exhibit 9	**Palo Verde Solar I, LLC's Responses to CEC Data Request, Set 1 (1 through 260)**, dated January 2010, and docketed on January 22, 2010, Responses 157 through 164.
Exhibit 44	**Revised Health Risk Assessment for the Preliminary Determination of Compliance**, dated May 2010, and docketed on May 20, 2010.

V. Opinion and Conclusions

We have reviewed the Health and Safety section of the Revised Staff Assessment and agree that with incorporation of the Conditions of Certification, the Project will not result in significant Public Health and Safety impacts and will comply with all applicable Public Health and Safety-related laws, ordinances, regulations and standards (LORS).

Section C.5.4.2, Page C.5.17

The RSA incorrectly states that the Applicant estimated that the HTF fugitive emissions would be comprised primarily of benzene (99%). This statement is incorrect, as only the fugitive emissions from the ullage system were assumed to be high in benzene as a breakdown product. The HTF fugitive emissions should contain very little benzene, as benzene would be present in the circulating HTF at very low concentrations. This inaccuracy does not impact the analysis as fugitive emissions were not included in the HRA.

Pages C.5-18 – C.5-19 Public Health Tables 5 and 7, Operations Impact Analysis

PSVI submitted a revised Health Risk Assessment to the MDAQMD per their request on May 20, 2010 (Exhibit 44) to reflect the changes discussed in the RSA on page C.5-14. The RSA discusses staff's review of the revised HRA and correctly surmises that HRA results would not be significantly different than the analysis prepared by staff, since these changes would be small, and hence the analysis was not redone. However, because staff's HRA was not redone, Public Health Tables 5 and 7 (as well as other information) contain out-dated information such as

the emissions for the HTF heaters. While differences are expected to be small, it would be less confusing if staff were to use the applicant's submittal as the basis for the risks reported.

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Bill Graham

I, Bill Graham, declare as follows:

1. I am presently employed by AECOM, as a Vice President.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Land Use, Recreation and Wilderness for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 8, 2010.

Bill Graham

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Elizabeth Ingram

I, Elizabeth Ingram, declare as follows:

1. I am presently employed by Solar Millennium, as a Project Manager, Development.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Land Use, Recreation and Wilderness for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 9, 2010.

Elizabeth Ingram

BLYTHE SOLAR POWER PROJECT
LAND USE, RECREATON AND WILDERNESS
OPENING TESTIMONY

I. Name: Bill Graham and Elizabeth Ingram

II. Purpose:

Our testimony addresses the subject of Land Use, Recreation and Wilderness associated with the construction and operation of the Blythe Solar Power Project (09-AFC-06).

III. Qualifications:

Bill Graham: I am presently employed at AECOM, and have been for the past 11 years and am presently a Vice President with that organization. I have a Masters Degree in Regional Planning and I have over 25 years of experience in the field of Ecological Planning. I prepared or assisted in the preparation of the Land Use, Recreation, and Wilderness sections of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

Elizabeth Ingram: I am presently employed at Solar Millennium, LLC, and have been for the past 5 months and am presently a Project Manager, Development with that organization. I have a Masters Degree in Business Administration and a Bachelor's Degree in Economics and Government and I have over 3 years of experience in the field of renewable energy project development. I prepared or assisted in the preparation of the AFC supplemental filings in Land Use, Recreation, and Wilderness sections. A detailed description of my qualifications is contained in the attached resume.

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 1	**Application for Certification Volumes I & II**, dated August 24, 2009, and docketed on August 24, 2009, Section 5.7 and Appendix A.
Exhibit 22	**Letter from Riverside County Planning Department (Re: Comments on AFC and NOI for BSPP & PSPP)**, dated February 16, 2010, and docketed on February 17, 2010.
Exhibit 29	**Palo Verde Solar I, LLC's Initial Comments on the SA, DEIS**, dated April 19, 2010, and docketed on April 19, 2010.
Exhibit 45	**Land Use Consistency Letters**, dated June 11, 2010, and docketed on June 11, 2010.

V. Opinion and Conclusions

We have reviewed the Land Use, Recreation and Wilderness section of the Staff Assessment and agree that with incorporation of the minor modifications set forth below to the analysis, the Project will not result in significant Land Use or Wilderness impacts and will comply with all applicable Land Use-related laws, ordinances, regulations and standards (LORS).

The RSA concludes that the BSPP would be incompatible with the Riverside County Airport Land Use Compatibility Plan (Plan) and that the BSPP is required to be reviewed by the Riverside County Airport Land Use Commission (ALUC). As acknowledged by the ALUC in its letter dated January 19, 2010 to the CEC, the ALUC is preempted by federal law and therefore the ALUC does not have jurisdiction to review the BSPP. Notwithstanding this preemption, PVSI has applied to the Riverside County Airport Land Use Commission for an advisory opinion regarding compatibility. That application was docketed on March 3, 2010. As described in the Traffic and Transportation Testimony for the BSPP, additional information has been provided to the ALUC for review. While unnecessary, BSPP expects that with the new information, the ALUC will find the BSPP to be consistent with its airport plan.

Page C.6-15, Section 6.4.3, Agricultural Lands, Rangeland Management, and Open Space

Staff concludes here that "BSPP would contribute to a significant cumulative impact in open space" but does so only on the reliance of the Visual component of its analysis within the assessment as explained on the following page[1]. However, the Staff fails to acknowledge two important points: First, the need to utilize the desert for solar energy resources is recognized in applicable land use/resource management and planning documents (e.g., CDCA Plan/NECO), Federal legislation (Energy Policy Act of 2005), and an order issued by Secretary of Interior Salazar in June 2009. Thus, while the cumulative effects of these projects will be to effect a substantial change in land uses in the vicinity of the I-10 corridor, these changes are and will be compatible with applicable plans and policies that encourage renewable energy development. Second, the Staff analysis should be placed in its appropriate context: the Riverside County Planning Department has already indicated in the Palen Solar Power Project and Rice Solar Energy Project that utility scale solar power plants located in Open Space (like BSPP) are consistent with their General Plan. Accordingly, staff should defer to federal, state and local law as to what is intended and consistent with the Open Spaces in the Riverside County desert.

<u>Page C.6-16</u>, Land Use Compatibility and LORS Compliance

Staff states in their CEQA analysis that "…the proposed project would be incompatible with the surrounding land uses because it would cause significant and unavoidable visual impacts." Unfortunately, the reliance on the Visual analysis to support a finding/conclusion that the "…project would be incompatible with the surrounding land uses…" is misplaced in that it errantly mis-states Riverside County's own interpretation of their General Plan and land assets (as discussed above). And, Staff patently neglects to recognize what is the actual view-shed from the Palin/McCoy Wilderness towards the Blythe Solar Power Project. They state that it includes a view from the Wilderness area of what staff refers to as "small rural communities" (at Page C.6-4). But, it is in fact, the City of Blythe; including its commercial, residential, industrial, airport and other development. The opposing viewshed - towards the Wilderness area from anywhere in the Palo Verde valley (Blythe) - has little, if any, impact to the otherwise extensive view-shed towards the Palen/McCoy Wilderness area since the valley is just under 300 feet in elevation, the project is at 450 feet elevation, and according to the Staff's own Land Use Figure 1 in the RSA, the Wilderness area begins 5 miles east of the project boundary (which places it on top of the 2000 feet elevation mountain range to the west or, more likely, on the opposite side of that mountain range) – There is no impairment to any Wilderness view – from either direction. See Visual Resources Testimony for PVSI's opinion that the BSPP will not cause a significant Visual Impact.

[1] In opposition to Staff's errant conclusion in this section regarding "open space", PVSI agrees with Staff's CEQA conclusions in Sections C.6.5.3 and C.6.6.3 (pages C.6-17 and C.6-18) when they state "…similar to the proposed project, impacts…on…open space would be less-than-significant."

Page C.6-21 and 22, Section 6.8.2, Wilderness, Areas of Critical Environmental Concern (ACEC) and Recreation

Staff concludes that the BSPP will not have a direct impact to recreation and wilderness resources but concludes that the Project will contribute to loss of recreation and wilderness resources. Staff then concludes with no supporting analysis that this impact is significant and unavoidable under CEQA "to some visitors" of the Palen/McCoy Wilderness. Staff should acknowledge the vast recreation and wilderness opportunities within the general region (the Colorado and Mojave desert areas of southern California) that would give the public far greater outdoor experiences than those that could be obtained by views from the Palen/McCoy Wilderness area towards the BSPP site which is located near the City of Blythe and its residential, commercial, industrial facilities, near the I-10 freeway and near an operating airport. PVSI believes that the BSPP will not contribute to any significant impact related to loss of recreational or wilderness opportunities when considered in context of the regional opportunities available to the public.

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of: Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DOCKET NO. 09-AFC-06** **DECLARATION OF** Steve Petto

I, Steven R. Petto, declare as follows:

1. I am presently employed by AECOM, as an Engineering Department Manager.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Noise and Vibration for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 5, 2010.

Steven R. Petto

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Jeff Goodson

I, Jeff Goodson, declare as follows:

1. I am presently employed by AECOM, as a Senior Environmental Engineer.

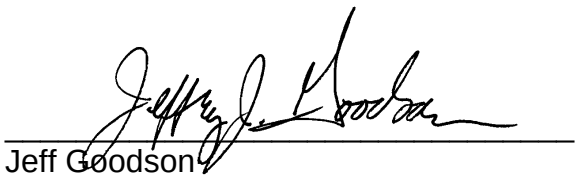
2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Noise and Vibration for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 7, 2010.



Jeff Goodson

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Mark Luttrell

I, Mark Luttrell, declare as follows:

1. I am presently employed by AECOM, as a Vice President.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Noise and Vibration for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 9, 2010.

Mark Luttrell

BLYTHE SOLAR POWER PROJECT
NOISE AND VIBRATION
OPENING TESTIMONY

I. Name: Steve Petto, Jeff Goodson and Mark Luttrell

II. Purpose:

Our testimony addresses the subject of Noise and Vibration associated with the construction and operation of the Blythe Solar Power Project (09-AFC-06).

III. Qualifications:

Steve Petto: I am presently employed at AECOM, and have been for the past 5+ years and am presently an Engineering Department Manager with that organization. I have a Bachelor of Science Degree in Chemical Engineering and a Master in Business Administration and I have over 30 years of experience in the field of engineering and construction of energy-related facilities. I prepared or assisted in the preparation of the Noise section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

Jeff Goodson: I am presently employed at AECOM and have been for the past 10 years and am presently a Senior Environmental Engineer specializing in noise impact analysis with that organization. I have BS Degrees in Civil Engineering and Geology and I have over 20 years of experience in the field of environmental impact analysis. I prepared or assisted in the preparation of the Noise section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

Mark Luttrell: I am presently employed at AECOM, and have been for the past 6 years and am presently a Vice President with that organization. I have a Masters of Science Degree in Civil Engineering and I have over 36 years of experience in the field of environmental consulting. I prepared or assisted in the preparation of the Noise section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

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 1	**Application for Certification Volumes I & II**, dated August 24, 2009, and docketed on August 24, 2009, Section 5.8.
Exhibit 29	**Palo Verde Solar I, LLC's Initial Comments on the SA, DEIS**, dated April 19, 2010, and docketed on April 19, 2010.

V. Opinion and Conclusions

We have reviewed the Noise and Vibration section of the Revised Staff Assessment and agree that with incorporation of the Conditions of Certification set forth therein, the Project will not result in significant Noise and Vibration impacts and will comply with all applicable Noise and Vibration-related laws, ordinances, regulations and standards (LORS).

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Mike Flack

I, Mike Flack, declare as follows:

1. I am presently employed by AECOM, as a Senior Program Manager.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Soil and Water Resources for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 7, 2010.

_____

Mike Flack

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-6**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** William C. Hagmaier

I, Bill Hagmaier, declare as follows:

1. I am presently employed by AECOM, as a Senior Project Manager.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Soil and Water Resources for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-6).

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 June 8, 2010.

William C. Hagmaier

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of: Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DOCKET NO. 09-AFC-06** **DECLARATION OF** Trevor Thor

I, Trevor Thor, declare as follows:

1. I am presently employed by Solar Millennium LLC, as the Vice President of EPC Management.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Soil and Water Resources for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 JUNE 9, 2010.

Trevor Thor

Trevor Thor

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Jeffrey Harvey

I, Jeffrey Harvey, declare as follows:

1. I am presently employed by Harvey Consulting Group, as a Principle.

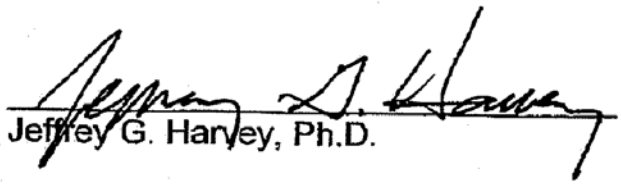
2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Soil and Water Resources for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 8, 2010.



Jeffrey G. Harvey, Ph.D.

BLYTHE SOLAR POWER PROJECT
SOIL AND WATER RESOURCES
OPENING TESTIMONY

I. Name: Mike Flack, Bill Hagmaier, Trevor Thor, and Jeffrey G. Harvey, Ph.D.

II. Purpose:

Our testimony addresses the subject of Soil and Water Resources associated with the construction and operation of the Blythe Solar Power Project (09-AFC-06).

III. Qualifications:

Mike Flack: I am presently employed at AECOM, and have been for the past 15 years and am presently a Senior Program Manager with that organization. I have a Masters of Science Degree in Geology and I have over 27 years of experience in the field of groundwater and water resource investigation and remediation. I prepared or assisted in the preparation of the Soil and Water Resources section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

Bill Hagmaier: I am presently employed at AECOM, and have been for the past 15 years and am presently a Senior Project Manager with that organization. I have a Bachelors Degree in Civil Engineering and I have over 31 years of experience in the field of civil engineering, (utilities, roadways, drainage, and site design). I prepared or assisted in the preparation of the Soil and Water section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

Trevor Thor: I am presently employed at Solar Millennium, LLC, and have been for the past 5 months. I am presently Vice President, EPC Management with that organization. I have a Bachelor's Degree in Marine Engineering Technology and a Masters in Business Administration and I have over 20 years of experience in the field of engineering and construction management for the power industry. I prepared or assisted in the AFC supplemental filings related to Soil and Water Resources. A detailed description of my qualifications is contained in the attached resume.

Jeffrey G. Harvey, Ph.D.: I am Principal and Senior Scientist for the Harvey Meyerhoff Consulting Group, (HMCG), an environmental consulting firm based in Sacramento, California. I have more than 25 years of professional experience as a consultant in project planning and

environmental reporting for local, state, and federal government agencies, nonprofit environmental groups, and private resource developers. In that time I have organized and managed more than 300 projects, leading multi-disciplinary teams of scientists, engineers, lawyers, economists, and planners. Projects have included environmental reports and assessments, and special resource analyses for a variety of proposals including water transfers, water conservation, energy development, mining, policy analysis of state-wide water resources and energy systems management problems, public infrastructure projects, and aggregate mining. For the past decade I have been deeply involved in complex water, power, and environmental restoration projects in the southern California desert region, with a focus on the Colorado River, regional groundwater, the All American and Coachella canals, and the Salton Sea.

I hold degrees in Geography, including a B.A. (emphasis in physical geography), and M.A. (emphases in environmental planning, water resources development, and impact analysis) from CSU Chico, and a Ph.D. from UCLA, (emphases in environmental and policy, natural resources management, western water resources, and impact analysis).

I have worked on western water, energy and related natural resources policy issues since 1983, including power plant and hydroelectric power development, water development, management, and planning, and analyses of land and agricultural water use practices and conservation. From 1998 to 2009 I served as the Transfer Program Consultant to the San Diego County Water Authority (SDCWA) for the agricultural water transfer of 200,000 acre-feet of Colorado River water between SDCWA and the Imperial Irrigation District. This work also included SDCWA representation for the Colorado River Quantification Settlement Agreement Joint Powers Authority (QSA JPA); the Lower Colorado River Multi-Species Conservation Program (LCR MSCP), and monitoring of policy development and environmental impact assessment for the California Department of Water Resources Salton Sea Restoration Program. From 2005 to 2009 I served as Environmental Coordinator for the Coachella Canal Lining Project, starting with completion of environmental permitting, and concluding with final construction and mitigation implementation. Since 2007, I have served as Project Director for the Eagle Mountain Pumped Storage Project, a proposed 1,300 MW hydroelectric generation facility located in a former mine site in the western Chuckwalla Valley.

In the late 1980s and early 1990s I worked on the San Joaquin Valley Drainage Program conducting water resource management and policy studies of irrigated agriculture for the purpose of reducing toxic levels of selenium in drainage water, and to improve water use efficiency and water supply through improved on-farm water conservation and management.

As a consultant to the Natural Heritage Institute in 1993-1994 I also prepared initial hydrological investigations and inventory of groundwater basins and resources for development of a statewide conjunctive water use plan. I served as Project Manager for preparation of the Environmental Report for the California Public Utilities Commission to address statewide policy and environmental issues related to restructuring the electric utility industry. I was also Project Manager for the preparation of an environmental report on the Sand Hollow Reservoir Project in southwest Utah, including comprehensive analysis of hydrology, conjunctive groundwater and surface water management, and aquatic habitat effects on the Virgin River, a tributary to the lower Colorado River. A resume is included in Appendix A.

I was also the Project Manager for environmental planning for the Blythe Energy Project, (I and II) beginning in 1998, responsible for preparation of environmental documentation including the AFC, permitting documents, and related submittals to the CEC.

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 1	**Application for Certification Volumes I & II**, dated August 24 2009, and docketed on August 24, 2009, Sections 5.12, 5.17 and Appendices B, J and L.
Exhibit 4	**Data Adequacy Supplement**, dated October 26, 2009, and docketed on October 26, 2009.
Exhibit 5	**Streamed Alteration Agreement Application**, dated November 2009, and docketed on November 25, 2009.

Exhibit 6	**Pre-Development Drainage Conditions Report**, dated November 25, 2009, and docketed on November 30, 2009.
Exhibit 9	**Palo Verde Solar I, LLC's Responses to CEC Data Request, Set 1 (1 through 260)**, dated January 2010, and docketed on January 22, 2010, Responses 166 through 229.
Exhibit 11	**Attachment G WSA, (Attachment G- Water Supply Assessment of Response to DR 206)**, dated January 2010 and docketed on January 18, 2010.
Exhibit 15	**Palo Verde Solar I, LLC's Data Response to DR-BIO-58 (Post Development Drainage Conditions Report)**, dated January 29, 2010 and docketed on January 29, 2010.
Exhibit 21	**Responses to January 14, 2010 CEC Workshop Queries**, dated February 2010, and docketed on February 11, 2010.
Exhibit 27	**Palo Verde Solar I, LLC's Responses to January 14, 2010 CEC Workshop Queries (Groundwater)**, dated March 2010, and docketed on March 11, 2010.
Exhibit 28	**Palo Verde Solar I's Issues Statement for April 15, 2010 Status Conference**, dated April 12, 2010, and docketed on April 12, 2010.
Exhibit 29	**Palo Verde Solar I, LLC's Initial Comments on the SA, DEIS**, dated April 19, 2010, and docketed on April 19, 2010.
Exhibit 34	**Responses to Questions from CEC April 28, 29 and May 7 Workshops Re: Worker Safety, Hazardous Materials, and Water Resources**, dated May 13, 2010, and docketed May 13, 2010.

Exhibit 39 **Application/ Report of Waste Discharge --Proposed Evaporation Ponds**, dated May 14, 2010, and docketed on May 17, 2010.

Exhibit 40 **Assessment of Impacts from a Revision in Well Configuration for Proposed Water Supply**, dated April 17, 2010, and docketed on May 17, 2010.

V. Opinion and Conclusions

We have reviewed the Soil and Water Resources section of the Revised Staff Assessment and with incorporation of the modifications set forth below to the Conditions of Certification, the Project will not result in significant Soil and Water impacts and will comply with all applicable Soil and Water Resource laws, ordinances, regulations and standards (LORS).

COLORADO RIVER

Summary:

A. Project Description: The proposed Blythe Solar Power Project (BSPP) is a thermal solar power generating plant located on the Palo Verde Mesa in eastern Riverside County, west of the City of Blythe, and north of Interstate 10 and the Blythe Airport. The plant is comprised of four units of 250 MW generating capacity each, for a total plant capacity of 1,000 MW. The project proposes to use approximately 4,100 acre-feet of groundwater for grading and dust control during construction, and approximately 600 acre-feet per year for operations. Up to two (2) wells will be developed on-site, approximately 500-600 feet deep.

B. I contest substantial portions of staff testimony regarding water issues as presented in the Revised FSA, particularly with regard to staff's unsupported assertion that California groundwater is actually Colorado River surface water, and staff's unsupported claim that legal use of California groundwater has the potential to impact downstream surface water users of the Colorado River. I also disagree with staff's contention that mitigation is required with regard to Colorado River water (proposed Conditions of Certification Soil&Water-2 and Soil&Water-16 requiring acquisition of offsets to Lower Colorado River water, and complex groundwater modeling), and with staff's contradictory claims that water drawn from BSPP's well(s) will simultaneously deplete the Colorado River

and the regional aquifer. Therefore, the following testimony will focus primarily on two areas:

1) water supply issues identified in the staff's Revised FSA testimony related to the distinction between California groundwater and Colorado River surface water; and

2) groundwater depletion and the potential for Colorado River water to be affected in any detectable way by pumping groundwater from the Palo Verde Mesa Aquifer more than 10 miles from the Colorado River.

The body of staff's testimony regarding project water supply and groundwater use is based entirely upon unsupported and erroneous assumptions regarding the potential for project groundwater pumping to induce flows from the Colorado River (staff testimony pages C.9-2 and C.9-44-45). Although staff acknowledges (and the Commission has ruled) that the Colorado River accounting surface is a model and does not constitute applicable LORS, they have nonetheless contrived their analysis to claim that legitimate use of California groundwater will impact a surface water system more than 10 miles away in a manner requiring mitigation for the surface water system.

1. Groundwater is distinct from surface water, geologically, hydrologically, and legally. Groundwater is not surface water, and surface water is not groundwater.

Groundwater and surface water are distinct water systems physically, in practice and in law. They are universally related in the hydrologic cycle, and virtually all groundwater in unconfined and confined aquifers is derived from recharge by seepage and deep percolation of surface waters. That the groundwater body under the Palo Verde Mesa was predominantly recharged by the percolation of surface waters of the Colorado River, other local surface sources (McCoy Wash and stormwater detention ponds), and percolation losses of applied irrigation water on the Palo Verde Mesa *and the Palo Verde Valley* is not disputed. Simply having identified the source of recharge at present and over geologic time does not change the fact that the recharged groundwater is groundwater – distinct from surface water – and governed by California water law pertaining to groundwater.

Staff's primary assertion, and fundamental error throughout their technical report, is that groundwater drawn from a well located more than ten (10+) miles from the Colorado River and 500-600 feet below the surface, is actually depleting a surface water system in any detectable quantity or over any reasonable time frame. In its proposed Conditions of Certification (S&W-2 and S&W-16), staff also

asserts that this use of California groundwater should be accounted for and mitigated as surface water of the Colorado River. Since the Lower Colorado River is fully allocated, staff concludes that this accounting of groundwater as surface water constitutes a finding of significant adverse impact on downstream surface water rights holders.

As we have testified consistently in the Blythe Energy Project cases (Phases I and II), and in numerous responses to data requests for the BEP II case and this BSPP case, each of these premises is false, and staff has failed to cite any LORS or provide any supporting evidence from the very agencies whose jurisdiction and interests they claim to represent. The facts remain unchanged, as follows:

- In California, property owners are allowed to pump groundwater from beneath their property for beneficial uses on their property without obtaining a formal water right. Shallow wells in close proximity (up to about one-half mile) to a surface water body and within a well defined subsurface bed and banks, have been found to be directly linked to surface water, requiring a surface water right. In no case in California is a deep well located miles from a stream channel considered to be directly linked to, or classified as surface water.

- The Blythe Solar Power Project proposes to utilize groundwater extracted from on-site wells approximately 550 to 600 feet deep, and more than ten miles west of the Colorado River. Under California water law, a landowner may pump groundwater from beneath their own lands for use on their property. No other LORS regarding use of this groundwater apply to this project.

- All aquifers – unconfined and confined – are recharged over time from a surface water source. Staff's assertion that *groundwater is surface water* simply because a cone of depression from a well can induce subsurface flow directions and the groundwater in this region was primarily recharged by the Colorado River, negates all of California water law (and that of most western states) which clearly distinguishes between groundwater and surface water. Staff's position could be applied anywhere in the State to claim that all wells ultimately are connected to surface water for groundwater recharge, and therefore all wells should be regulated as surface water. For example, according to staff's position, this fundamental geologic relationship would claim all wells in the Sacramento Valley, or San Joaquin Valley as surface water diversions from those rivers. This is in distinct contrast to more than a century of State water management, water rights law, and water use practice.

- There are some adjudicated groundwater basins in California subject to special rules, however, this exception does not apply to the Palo Verde region, and none of the dozens of operating wells - either on the valley floor or on the Mesa – are regulated by either the State or federal governments, or required to be accounted for as surface water.
- As determined by the Commission during the Blythe I and II deliberations, Mesa groundwater use does not constitute a LORS issue, and does not pose a significant environmental effect (page 208, BEP [I] Final Decision, and pages 250 and 254, BEP II Final Decision). After a second thorough vetting of these issues in the Blythe II deliberations, the Commission again made the same determination after developing and presenting a detailed and cogent understanding of the complexity of the groundwater and surface water relations in the Palo Verde Valley and Mesa regions; (see pp. 248-255, BEP II Final Decision).

  After careful analysis in the BEP II case, the Commission concluded:

  > *Commission Discussion*
  >
  > *The Commission finds that Palo Verde mesa groundwater and Colorado River water are legally distinct. The overland owner has rights under California law to use groundwater. Other than the few cases of underflow, the USBR has not asserted jurisdiction to directly regulate groundwater use from wells that are known to be in aquifers that are recharged by Colorado River water.*
  >
  > *Currently, however, the USBR indirectly regulates such groundwater through the allocation and accounting system for providers such as PVID. PVID's allocation of Colorado River water receives a "credit" for all return water returned to the River. However, that "credit" is reduced by irrigation water and canal water that percolates into and recharges the underlying aquifer. BEP II's use of groundwater from on-site wells is not an unauthorized use under state or Federal law.*
  >
  > *Additionally, the Commission finds that BEP II groundwater pumping does not cause a significant project or cumulative impact under the California Environmental Quality Act, in the context of the use of groundwater. (Below, we discuss the potential for groundwater degradation due to upwelling of salinity.) The mere change of the hydrologic setting, from Rannells Drain return water flowing to the River versus a portion of that return water recharging the groundwater, is not inherently a significant impact. In the context of PVID's volume of return water back to the Colorado River, the amount of recharge water (0.6%) is not significant. With the measurement methods employed on the River, the recharge water volume is not only insignificant, it is undetectable by measurement,*

even though it is actually happening according to physical laws of hydrologic recharge.

The Commission is extremely mindful of the potential impact of power plants on California's water resources. Our 2003 IEPR emphasizes the need for conservation and intelligent use of available water resources. Just as we laud combined cycle generating technology for its ability to recover and efficiently use waste heat, the Commission sees that in this case the groundwater has been recovered from water previously used for irrigation. With virtual certainty, the water that will recharge the aquifer in response to project pumping will be water dedicated initially to agricultural use. We are aware that some of the recharge water will be operational spillage; but this PVID water is effectively being used twice. Initially, it is dedicated to agricultural use, a significant segment of California's economy. Then it is recovered and stored in an aquifer as degraded groundwater to be used again for electricity production, also a significant and necessary segment of California's economy and welfare.

Therefore, the proposed use of groundwater for project cooling does not violate any applicable federal law or policy and conforms to applicable California laws and water policy.

2. Nothing has changed physically or legally since that time that could justify staff's continued assertions of a direct physical connection with potential impacts requiring mitigation.

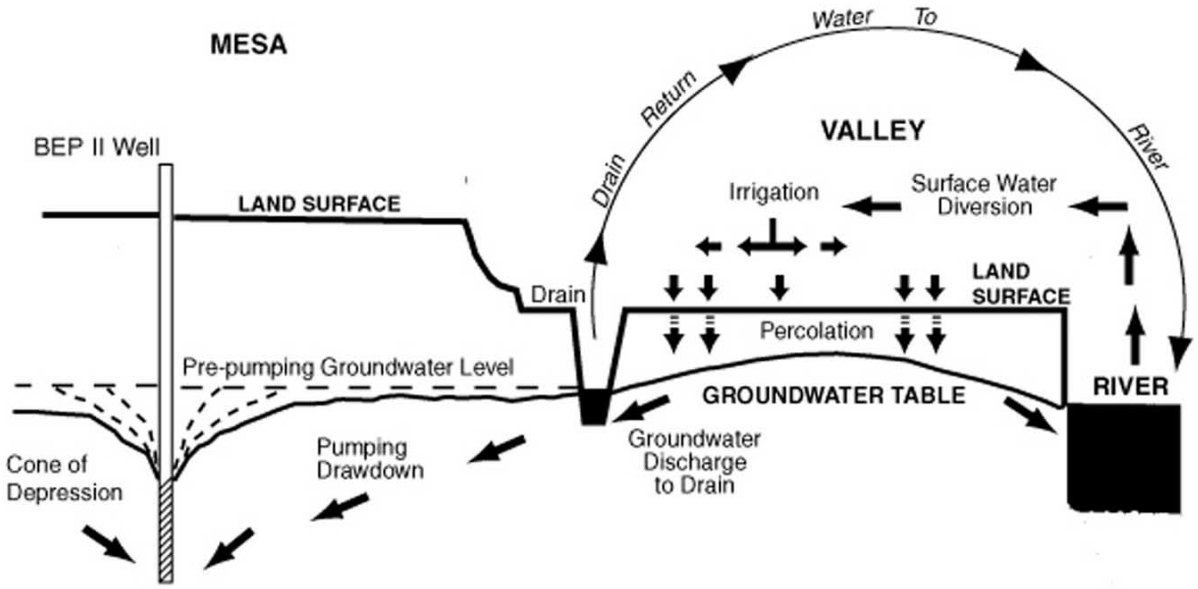
- No groundwater use in the Palo Verde Valley or Palo Verde Mesa is regulated by the Bureau of Reclamation or PVID, nor is any Mesa groundwater accounted for in PVID's Colorado River surface water entitlement accounting. If such policy is ever implemented, it must be equally applied to all well water users, and cannot be applied arbitrarily or capriciously to selected wells. It should particularly not be applied unilaterally – without consensus of the agencies that have water rights jurisdiction and without basis in LORS – by the California Energy Commission.

- There are dozens of active wells on the Palo Verde Mesa including agricultural wells, the well at the community of Mesa Verde, and the City of Blythe's municipal wells, none of which are "charged" against PVID's allocation or accounted for as Colorado River surface water. According to Staff's logic every one of these wells are impacting the Colorado River and downstream water rights holders.

3. The project's use of groundwater will have no measurable affect on surface waters of the Colorado River, and will not reduce supplies available to Colorado River surface water users.

Groundwater is distinct from surface water. Its movement is measured in feet per day, rather than feet per second as for surface water, and it is recharged by surface water sources over a period of weeks, months, years, and decades. As groundwater is pumped, it creates a cone of depression and flow pattern from surrounding waters into the well. Water in the surrounding aquifer – laterally, and vertically – is thus induced to flow following that pattern towards the well and from all directions around the well. Only a portion of the induced flow will come from east of the well in the direction of the Rannells Drain and irrigated lands of the Palo Verde Valley – and that portion will come as subsurface recharge water moving at rates of feet per day, not feet per second. The 1) rate of movement, 2) low volume of water (relative to the millions of acre-feet of the groundwater and surface water systems involved), and 3) dynamics of the surface water system above, make it impossible to detect the groundwater withdrawals in any measurable way. (*See schematic diagram below, extracted from the Commission's Final Decision in the BEP II case, December 2005; page 251.*)

In the BEP II case, PVID confirmed that there is no way that groundwater drawn from the proposed project well could have any measurable affect on the Rannells Drain (the closest surface water source) or any other part of its surface water system (Ed Smith, PVID General Manager, pers.comm. to Jeff Harvey, 07/14/05).



PVID also noted that the total of the proposed BEP II water use is not even within the range of measurement accuracy for their water system – for diversions, drain

discharges, or delivery of water at major headgates within the system. The BSPP proposed water use is substantially less (20 percent) than the proposed BEP II use that was determined to be undetectable.

In addition, staff's analysis in this BSPP case is based upon an erroneous assumption that water can move freely between the River and the Mesa aquifer or from the Mesa aquifer to the River. Staff recognizes irrigated agriculture as a source of recharge from a few hundred acres on the Mesa (*page C.9-23, section C.9.3.3.5.2.4 Irrigation Return Flow, and page C.9-24, section C.9.3.3.5.2.6. Groundwater Budget)*, but mysteriously ignores the recharge that occurs from the 104,500 acres of irrigated lands in the Palo Verde Valley between the Mesa and the River. Using staff's own assumption that 10% of applied water infiltrates and recharges the groundwater basin, and accounting for approximately 950,000 acre feet of applied water in the Valley, produces additional annual recharge of up to 95,000 acre-feet to the regional groundwater system.

In fact, over a period of many decades this source of recharge has produced saturated conditions in the Valley that has resulted in a need to install an elaborate drain system throughout PVID to maintain groundwater levels at about 9 to 10 feet below ground surface. This saturated condition also acts as a virtual barrier to free movement of water from the Mesa aquifer to the River, or from the River to the Valley aquifer. As illustrated in the schematic above, groundwater from the Valley forms a mound, with movement to recharge the Mesa aquifer, and with flow toward the River channel as well.

As the Commissioners accurately described this physical condition in the BEP II Decision (*BEP II Final Decision, December 2005, page 249*):

> *In fact, irrigation with Colorado River water has raised groundwater levels in the Palo Verde Valley above historical levels. The amount of groundwater recharge from irrigation has so soaked the soil and raised the water table that a network of drainage ditches has been constructed throughout the valley to remove percolating irrigation water that would otherwise "flood" the root zones of the crops. Irrigation with Palo Verde Irrigation District's (PVID) Colorado River diversions and its network of drainage ditches maintain constant groundwater water levels a few feet below land surface throughout the Palo Verde Valley. Under these conditions, the groundwater system is hydraulically connected to the irrigation drains and unlined canals.*
>
> *Given the constant supply of percolating irrigation water and the interconnectivity of the aquifer system, groundwater recharge increases whenever groundwater pumping increases in the Palo Verde Valley or the Palo Verde Mesa. Correspondingly, increases in groundwater recharge cause decreases in irrigation drain discharge and return flows to the Colorado River. (FSA, pp. 4.9-9-10)*

Groundwater pumping forms a cone of depression that radiates from each active well, creating groundwater gradients towards the well. Initially, the well produces water that is stored in the aquifer within the cone of depression. However, in the long-term, groundwater production is sustained by the lateral flow of water to the well. Drawdown of stored aquifer water stabilizes when the cone of depression intercepts a source of recharge water and induces flow toward the pumping well. Finally, recharge water continues to flow toward the well until the cone of depression is filled when pumping ceases.

Staff has completely ignored the Commission's analysis in the previous cases, and has made erroneous assumptions that – together with staff's fundamental misunderstanding of the distinction between groundwater and surface water – lead directly to staff's incorrect conclusions that:

1) *the BSPP groundwater extraction would cause overdraft on the Palo Verde Mesa aquifer* (page C.9-44);

2*) "that the project's pumping could have an effect on the Colorado River by inducing flow into the Palo Verde Mesa"* (page C.9-45); and most nonsensically

3) "*Correspondingly, all or a portion of the groundwater production at the site would be considered Colorado River water. Consequently the project has the potential to divert Colorado River water.*"

There is no science or analysis to support these conclusions, and they have been made only by neglecting facts, scrupulously avoiding the evidence and conclusions that the Commission developed with regard to these same questions in the BEP I and II cases, and ignoring all of California law with regard to groundwater use. For these reasons, staff's conclusions should be rejected.

D. Conclusions

The issue of water supply and use of groundwater relative to Colorado River surface water was thoroughly litigated for both the original Blythe Energy Project proposal and the Blythe Energy Phase II case. The CEC staff assessments in this Blythe Solar Power Project case again do not reflect the results of that litigation.

CONDITIONS OF CERTIFICATION

BSPP requests that the Committee reject Staff's proposed Conditions of Certification **Soil & Water-2 and Soil & Water-16**, which requires modeling of the groundwater use to quantify Colorado River effects, and implementation of a water offset program. BSPP requests the Committee to base its rejection on the same reasons the Commission rejected Staff's arguments in BEP and BEP II, specifically, that they are not necessary to mitigate any identifiable impact to Colorado River surface water, and are not required by any LORS.

SOIL&WATER-4 The proposed Project's use of groundwater during construction shall not exceed 4,100 af during the 69 months of construction and an annual average of 600 afy during operation or a total amount of 22,100 acre feet (over the Project life). Water quality used for project construction and operation will be reported in accordance with ***Condition of Certification Soil and Water-5 and Soil and Water-7, as applicable*** ~~SOIL&WATER-17~~ to ensure compliance with this condition.

Prior to the use of groundwater for construction, the project owner shall install and maintain metering devices as part of the water supply and distribution system to document Project water use and to monitor and record, in gallons per day, the total volume(s) of water supplied to the Project from this water source. The metering devices shall be operational for the life of the Project.

Verification: At least ~~sixty (60)~~ ***seven (7)*** days prior to the start of ***groundwater pumping for*** construction of the proposed Project, the Project owner shall submit to the CPM a copy of evidence that metering devices have been installed and are operational. Beginning six months after the start of construction, the project owner shall prepare a semi-annual summary of amount of water used for construction purposes. The summary shall include the monthly range and monthly average of daily water usage in gallons per day.

The project owner shall prepare an annual summary, which shall include daily usage, monthly range and monthly average of daily water usage in gallons per day, and total water used on a monthly and annual basis in acre-feet. For years subsequent to the initial year of operation, the annual summary shall also include the yearly range and yearly average water use by source. For calculating the total water use, the term "year" will correspond to the date established for the annual compliance report submittal.

GROUNDWATER LEVEL MONITORING, MITIGATION, AND REPORTING PLAN

SOIL&WATER-5 The project owner shall submit a Groundwater ~~Level~~ Monitoring~~, Mitigation,~~ and Reporting Plan to the CPM for review and approval ~~in advance of construction activities and~~ ~~prior to the~~

~~operation of onsite groundwater supply wells~~ ***in advance of using onsite wells to supply groundwater for mass grading activities for Unit 1.*** The Groundwater ~~Level~~ Monitoring~~, Mitigation,~~ and Reporting Plan shall provide the methodology for monitoring background and ***site groundwater levels and water quality as provided in the waste discharge requirements (SOIL&WATER-7).*** Monitoring shall include pre-construction, construction, and ~~Project~~ operational water use. The plan shall establish pre-construction ~~and Project related~~ groundwater level ***and water quality*** trends ***from available data*** that can be ~~quantitatively~~ ***used as a baseline to establish pre-Project water level and water quality trends, and to subsequently compare to post-Project pumping data*** ~~construction and operational against observed trends near the Project pumping wells and near potentially impacted existing wells~~.

RATIONALE: The modifications are made under the proposal to eliminate SOIL&WATER-17, which is redundant and unwarranted, as it is essentially in place to reflect the requirements provided under the Waste Discharge Requirements (SOIL&WATER-7,) for the evaporation ponds. Those requirements, including statistical methodology, analytical program, monitoring well location and reporting are well enumerated and clearly stated in Condition-7 and by reference Appendix B, C and D. The WDR requirements clearly state the water quality testing that is needed to monitor impacts to underlying groundwater during operation of the evaporation ponds. Further, there is NO evidence that the propose Project pumping would induce changes in groundwater geochemistry over time. The rationale for removing Condition-17 is further discussed in comments to that section below.

Additionally, the condition should be tied to the start of the first significant use of groundwater, which is for mass grading activities of Unit 1 as PVSI will need to conduct preliminary construction activities where minor pumping of groundwater will be necessary in order to facilitate the mass grading activities for Unit 1, which will be the first unit are to be constructed. Prior to that time, groundwater pumping will be minimal in support of equipment mobilization, desert tortoise fencing, road construction and minimal intermittent grading activities only. It is only when project mass grading activities of Unit commences that water use will be significant and at a rate so as to potentially affect offsite wells.

A. Prior to Project Construction

1. A well reconnaissance shall be conducted to investigate and document the condition of existing water supply wells ***as established by the groundwater model and Condition A.2 below*** ~~located within five miles of the project site~~, provided that access is granted by the well owners. The reconnaissance shall

include sending notices by registered mail to all property owners ***for wells identified under condition A.2***~~.within a five mile radius of the project area.~~

RATIONALE: The condition requirement of FIVE miles is redundant to Condition A.2. It provides a specific distance requirement that is in conflict with the results of the numerical modeling and prediction of Project induced drawdown impacts off the site. Under the most conservative numerical groundwater modeling scenario, the anticipated drawdown impacts to one foot or more were between one and five miles from the perimeter of the Project site. At the end of the 30-year operation period, in the direction where most of the water supply wells are located south and east of the Project site, the predicted drawdown contour to one foot was between one to two miles. At the end of the construction period (69 months), in the same direction, the model predicted that there would be no drawdown impact offsite of one-foot or more. The groundwater modeling condition as specified in Condition A.2 provides an adequate and conservative means to identify offsite wells that might be affected by Project pumping.

2. Monitor to establish preconstruction conditions. The ~~monitoring plan and~~ network of monitoring wells shall make use of existing wells in the basin that ***are accessible and*** would satisfy the requirements for the monitoring program. The monitoring network ***for offsite wells*** shall be defined by the groundwater model developed for the AFC, ***using the lower transmissivity value derived from aquifer testing on the site, so as to provide a conservative estimate of the potential impact, and to indentify the area*** predicted to show a water level change of one foot or more at the end of construction and at the end of operation. ***The monitoring network shall also include*** ~~and~~ any monitoring wells that are installed to comply with Waste Discharge Requirements ***(SOIL&WATER-7)*** ~~issued by the Energy Commission for the evaporation ponds and land treatment unit associated with the Project~~. ***Provided access is granted, up to eight wells located in the area defined by the model and up to three additional wells, in a direction north, east and south of the Project site will*** ~~Identified additional wells will be located outside of this area will to~~ serve as background monitoring wells. Abandoned wells, or wells no longer in use, will ~~should~~ be considered as part of the ~~that are accessible and provide reliable water level data within the potentially impacted area may also be included as part of the~~ monitoring network. A site reconnaissance will be performed to identify wells that could be accessible for monitoring. As access to these wells is available, historic water level, water quality, well construction and well performance information shall be obtained for both pumping and non-pumping conditions.

RATIONALE: Proposed change to be consistent with the change made under A.1 and to provide specificity in terms of the modeling scenario that should be used to identify the offsite monitoring well network. The modeling scenario proposed (i.e., lowest transmissivity) is the most conservative estimate of potential offsite impacts from proposed Project pumping based on site-specific data.

3. As access allows, ~~measure~~ ***in advance of using onsite wells to supply groundwater for mass grading activities for Unit 1*** groundwater levels ***will be measured*** from the off-site and on-site wells within the network and background wells to provide initial groundwater levels for pre-project trend analysis. ***The installation of pressure transducers shall be done in selected wells to provide an assessment in the seasonality of the water levels.***

4. Construct water level maps within the PVMGB ***within the area identified under Condition A.2 above*** ~~five miles of the site from the groundwater data collected~~ prior to construction. As data is available, ***prepare trend plots*** ~~Update trend~~ ***perform statistical analyses using the Mann –Kendall test for trend to assess pre-project water level trends.***

RATIONALE: Specification of the Mann-Kendall test is included as it is a standard and accepted approach, being included into other Conditions of Certification on other projects to estimating water level trend data.

B. During Construction:

1. Collect water levels on a ***quarterly basis throughout the construction period and at the end of the construction period within the monitoring period. Collect water quality data as per Condition-7 and enumerated in the WDRs in Appendix B, C and D.*** ~~under C within the monitoring network on a quarterly basis throughout the construction period and at the end of the construction period.~~ Perform statistical trend analysis for water levels ***using the Mann-Kendal test for trend.*** Assess the significance of an apparent trend and estimate the magnitude of that trend.

C. During Operation:

1. On a quarterly basis for the first year of operation and semi-annually thereafter for the following four years, collect water level measurements from any wells identified in the groundwater monitoring program to evaluate operational influence from the

Project. Quarterly operational parameters (i.e., pumping rate) of the water supply wells shall be monitored ***as access allows for those wells within the monitoring network. Wells outside the network and their influence pumping influence within the network shall also be evaluated on a quarterly basis initially, to understand well interference from sources of pumping outside the Project area.*** ~~Additionally, quarterly groundwater-use in the PVMGB shall be estimated based on available data.~~

2. On an annual basis, perform statistical trend analysis for water levels data and comparison to predicted water level declines due to Project pumping. Analysis of the significance of an apparent trend shall be determined and the magnitude of that trend estimated. ***Pressure transducer data will be used as appropriate to assess seasonality and diurnal trends in the water level date.*** Based on the results of the statistical trend analyses and comparison to predicted water level declines due to Project pumping, the project owner shall determine the area where the Project pumping has induced a drawdown in the water supply at a level of five feet or more below the baseline trend.

3. If water levels have been lowered more than five feet below pre-site operational trends, and monitoring data provided by the Project owner show these water level changes are different from background trends ***or other groundwater pumping*** and are caused by Project pumping, then the Project owner shall provide mitigation to the impacted well owner(s). Mitigation shall be provided to the impacted well owners that experience five feet or more of Project-induced drawdown if the CPM's inspection of the well monitoring data confirms changes to water levels and water level trends relative to measured pre-project water levels, and the well (private owners well in question) yield or performance has been significantly affected by Project pumping. The type and extent of mitigation shall be determined by the amount of water level decline induced by the Project, the type of impact, and site specific well construction and water use characteristics. If an impact is determined to be caused by drawdown from more than one source, the level of mitigation provided shall be proportional to the amount of drawdown induced by the Project relative to other sources. In order to be eligible, a well owner must provide documentation of the well location and construction, including pump intake depth, and that the well was constructed and usable before Project pumping was initiated. The mitigation of impacts shall be determined as follows:

a. If Project pumping has lowered water levels by five feet or more and increased pumping lifts, increased energy costs shall be calculated. Payment or reimbursement for the increased costs shall be provided ~~at the option of the affected well owner~~ on an annual basis. In the absence of specific electrical use data supplied by the well owner, the project owner shall use SOIL&WATER-6 to calculate increased energy costs.

b. If groundwater monitoring data indicate Project pumping has lowered water levels below the top of the well screen, and the well yield is shown to have decreased by 10% or more of the pre-Project average seasonal yield, compensation shall be provided for the diagnosis and maintenance to treat and remove encrustation from the well screen. Reimbursement shall be provided at an amount equal to the customary local cost of performing the necessary diagnosis and maintenance for well screen encrustation. Should the well yield reductions be recurring, the project owner shall provide payment or reimbursement for periodic maintenance throughout the life of the Project. If with treatment the well yield is incapable of meeting 110% of the well owner's maximum daily demand, dry season demand, or annual demand the well owner should be compensated by reimbursement or well replacement as described under Condition 3.c.

c. If Project pumping has lowered water levels to significantly impact well yield so that it can no longer meet its intended purpose, causes the well to go dry, or cause casing collapse, payment or reimbursement of an amount equal to the cost of deepening or replacing the well shall be provided to accommodate these effects. Payment or reimbursement shall be at an amount equal to the customary local cost of deepening the existing well or constructing a new well of comparable design and yield (only deeper). The demand for water, which determines the required well yield, shall be determined on a per well basis using well owner interviews and field verification of property conditions and water requirements compiled as part of the pre-project well reconnaissance. Well yield shall be considered significantly impacted if it is incapable of meeting 110% of the well owner's maximum daily demand, dry season demand, or annual demand – assuming the pre-project well yield documented by the initial well reconnaissance met or exceeded these yield levels. ~~For already low-yielding wells identified prior to Project construction, a reduction due solely to Project pumping of 10% or more below the pre-project yield shall be considered a significant impact. The contribution of Project pumping to observed decreases in observed well yield shall be determined using the groundwater monitoring data collected.~~

RATIONALE: There is no need for a low-yield condition. The requirement that the well be capable of meeting 110% of its dry season demand is inclusive of all performance conditions and regardless of consideration of past performance and yield. This text is redundant and unnecessary.

d. The project owner shall notify any owners of the impacted wells within one month of the CPM approval of the compensation analysis for increased energy costs.

e. Pump lowering – In the event that groundwater is lowered as a result of Project pumping to an extent where pumps are exposed but well screens remain submerged the pumps shall be lowered to maintain production in the well. ~~The Project shall reimburse the impacted well owner for the costs associated with lowering pumps.~~ ***The Project shall reimburse the impacted well owner for the costs associated with lowering pumping in proportion to the Project contribution to the impact.***

f. Deepening of wells – If the groundwater is lowered enough as a result of Project pumping that well screens and/or pump intakes are exposed, and pump lowering is not an option, such affected wells shall be deepened or new wells constructed. ~~The Project owner shall reimburse the impacted well owner for all costs associated with deepening existing wells or constructing new wells shall be borne by the Project owner.~~ ***The Project shall reimburse the impacted well owner for all costs associated with deepening existing wells or construction of a new well in proportion to the Project contribution to the impact.***

RATIONALE (3e, 3f): Changes made to provide specificity in terms of the Project responsibility in the costs of addressing the impact. The Project should not be responsible for regional changes in water levels that are not attributable to Project pumping.

3. After the first five-year operational and monitoring period the CPM shall evaluate the data and determine if the groundwater monitoring program ~~for water level measurements~~ should be revised or eliminated. Revision or elimination of any monitoring program elements shall be ***based on the statistically verifiable datasets and trend analysis*** ~~the consistency of the data collected~~. The determination of whether the monitoring program should be revised or eliminated shall be made by the CPM.

RATIONALE: The change is made to be consistent with the methodology that will be used to evaluate the Project impacts. The notion of "consistency of the data" is too vauge.

> 4. If mitigation includes monetary compensation, the project owner shall provide documentation to the CPM that compensation payments have been made by March 31 of each year of Project operation ~~or, if lumpsum payment are made, payment is made by March 31 following the first year of operation only~~. Within thirty (30) days after compensation is paid, the project owner shall submit to the CPM a compliance report describing compensation for increased energy costs necessary to comply with the provisions of this condition.

RATIONALE: The concept of a lump sum payment is specific to increases in utility costs and is overly broad, as payment should be for annual impacts to the current well owner, not for possible future impacts, as those, along with the ownership of the well could change over time.

> 6. At the end of every subsequent five-year monitoring period, the collected data shall be evaluated by the CPM and they shall determine if the sampling frequency should be revised or eliminated.
>
> 7. During the life of the Project, the Project owner shall provide to the CPM all monitoring reports, complaints, studies and other relevant data within ten (10) days of being received by the Project owner.

Verification: The project owner shall do all of the following:

a. At least thirty (30) days in advance of using onsite wells to supply groundwater for mass grading activities of Unit 1, a Groundwater Monitoring and Reporting Plan shall be submitted to the CPM for review and approval before completion of Condition of Certification SOIL&WATER-3 (Well Installation). The Groundwater Monitoring and Reporting Plan shall provide the methodology for monitoring background and site groundwater levels and water quality as provided in the waste discharge requirements (SOIL&WATER-7).

b. At least ***fifteen*** ~~thirty~~ (~~30~~) ***(15)*** days ~~prior to~~ ***in advance of using onsite wells to supply groundwater for mass grading activities***, the project owner shall submit to the CPM, a comprehensive report presenting all the data and information required in item A above. The CPM will provide comments to the plan following submittal. CPM approval of the plan is required prior to operation of the site groundwater supply wells. The project owner shall also submit to the CPM all

calculations and assumptions made in development of the report data and interpretations.

RATIONALE: The condition should be tied to the start of the first significant use of groundwater, which is for mass grading activities. Prior to that time, groundwater pumping will be minimal in support of equipment mobilization and road construction activities only. It is only when project grading commences that water use will be significant and at a rate so as to potentially affect offsite wells.

c. During Project construction, the project owner shall submit to the CPM quarterly reports presenting all the data and information required in item B above. The quarterly reports shall be provided thirty (30) days following the end of the quarter. The project owner shall also submit to the CPM all calculations and assumptions made in development of the report data and interpretations.

d. No later than March 31 of each year of construction or sixty (60) days prior to Project operation, the project owner shall provide to the CPM for review and approval, documentation showing that any mitigation to private well owners during Project construction was satisfied, based on the requirements of the property owner as determined by the CPM.

e. During Project operation, the project owner shall submit to the CPM, applicable quarterly, semi-annual and annual reports presenting all the data and information required in item C above. Quarterly reports shall be submitted to the CPM thirty (30) days following the end of the quarter. The fourth quarter report shall serve as the annual report and will be provided on January 31 in the following year.

f. The project owner shall submit to the CPM all calculations and assumptions made in development of report data and interpretations, calculations, and assumptions used in development of any reports.

g. After the first five year operational and monitoring period, the project owner shall submit a 5-year monitoring report to the CPM that includes all monitoring data collected and a summary of the findings. The CPM will determine if the water level measurements and water quality sampling frequencies should be revised or eliminated.

SOIL&WATER-6 Where it is determined that the project owner shall reimburse a private well owner for increased energy costs identified as a result of analysis performed in Condition of Certification SOIL&WATER-5, the project owner shall calculate the compensation owed to any owner of an impacted well as described below.

Increased cost for energy = change in lift/total system head x total energy consumption x costs/unit of energy

Where:

change in lift (ft) = calculated change in water level in the well resulting from project.

total system head (ft) = elevation head + discharge pressure head.

elevation head (ft) = difference in elevation between well head discharge pressure gauge and water level in well during pumping.

discharge pressure head (ft) = pressure at wellhead discharge gauge (psi) X 2.31.

The project owner shall submit to the CPM for review and approval the documentation showing which well owners must be compensated for increased energy costs and that the proposed amount is sufficient compensation to comply with the provisions of this condition.

- Any reimbursements ~~(either lump sum or annual)~~ to impacted well owners shall be only to those well owners whose wells were in service within six months of the CEC~~ommission~~ decision and ***within the monitoring area predicted by the groundwater modeling under condition A.2.*** ~~a 5-mile radius of the project site~~.
- The project owner shall notify all owners of the impacted wells within one month of the CPM approval of the compensation analysis for increase energy costs.
- Compensation shall be provided on ~~either a one-time lump-sum basis, or on a~~n annual basis, as described below.

RATIONALE: The changes were made to be consistent with prior changes to provide uniformity in the identification of the monitoring well field. The removal of the concept of lump sum payments is discussed below.

~~Annual Compensation:~~ Compensation provided on an annual basis shall be calculated prospectively for each year by estimating energy costs that will be incurred to provide the additional lift required as a result of the project. With the permission of the impacted well owner, the project owner shall provide energy meters for each well or well field affected by the project. The impacted well owner to receive compensation must provide documentation of energy consumption in the form of meter readings or other verification of fuel consumption. For each year after the first year of operation, the project owner shall include an adjustment for any

deviations between projected and actual energy costs for the previous calendar year.

~~**One-Time Lump-Sum Compensation:** Compensation provided on a onetime lump-sum basis shall be based on a well-interference analysis, assumingthe maximum project-pumping rate of 600 afy. Compensation associated with increased pumping lift for the life of the project shall be estimated as a lump sum payment as follows:~~

- ~~The current cost of energy to the affected party considering time of use or tiers of energy cost applicable to the party's billing of electricity from the utility providing electric service, or a reasonable equivalent if the party independently generates their electricity;~~
- ~~An annual inflation factor for energy cost of 3%; and • A net present value determination assuming a term of 30 years and a discount rate of 9%;~~

RATIONALE: The concept of lump sum payments is unwarranted and unfair to the Project owner. It is overly broad and does not consider variability in annual pumping impacts and electrical usage. Further, it does not consider changes in well ownership that could occur over the course of the Project, and as such the Project owner could be faced with the possibility of double payment. It is appropriate to tie the compensation to an annual payment based on the operational costs for each individual year and not push costs into the future.

Verification: The Project owner shall do all of the following:

a. No later than thirty (30) days after CPM approval of the well drawdown analysis, the project owner shall submit to the CPM for review and approval all documentation and calculations describing necessary compensation for energy costs associated with additional lift requirements.

b. The project owner shall submit to the CPM all calculations, along with any letters signed by the well owners indicating agreement with the calculations, and the name and phone numbers of those well owners that do not agree with the calculations. Compensation payments shall be made by March 31 of each year of project operation ~~or, if lump-sum payment is selected, payment shall be made by March 31 of the first year of operation only~~. Within thirty (30) days after compensation is paid, the project owner shall submit to the CPM a compliance report describing compensation for increased energy costs necessary to comply with the provisions of this condition.

ESTIMATION OF COLORADO RIVER IMPACTS

SOIL&WATER-16 The project owner may choose to further evaluate and estimate the ***increase in the*** amount of recharge ~~subsurface water flowing~~ from the Colorado River ***to the regional aquifer that is attributable to Project pumping*** ~~that is due to project pumping~~. This estimate may be used for determining ***the appropriate replacement volume of Colorado River water.*** The owner shall do the following to provide an estimate for review and approval by the CPM:

1. The project owner shall conduct a detailed analysis of the contribution of Colorado River water to the PVMGB from the Project's groundwater extraction activities ***at the end of the 30 year operational period.*** The detailed analysis shall include:

a. The conceptual model developed in the AFC and the Staff Assessment, ***and any changes resultant from further analysis in support of the numerical modeling;***

b. ***The use of an appropriately calibrated and constructed groundwater flow model of the Palo Verde Mesa Groundwater Basin, inclusive of the Mesa and Floodplain and the Colorado River that shall include:*** ~~. The model shall utilize the U.S. Geological Survey (USGS) numerical model developed by Leake et al. (2008). The model that shall include:~~

i. ~~Any additional~~ horizontal and vertical geometry information gained through on- and offsite investigations conducted as part of the hydrogeological field investigations for the AFC, ***and any subsequent investigation performed as part of the model development;***

ii. Aquifer properties developed as part of the AFC, ***and any subsequent investigations performed as part of the model development, and an assessment of aquifer properties available from other published sources***. The properties used shall be representative of the available data, and will be used in calibration of the flow model under ASTM standards and methods. ~~the most conservative numbers that would result in the largest impact or flux from the Colorado River;~~ and;

iii. ***The modeling effort shall include a sensitivity analysis where in the most sensitive variables will be identified and varied within a reasonable range outside of their calibration value to provide an assessment of the range of potential impacts to the Colorado River***. ~~an estimation of the relative error of the estimates derived.~~

c. Reporting of the results of the modeling effort

d. ***Estimation of the increased contribution of Colorado River water attributable to the Project groundwater pumping*** ~~and groundwater from the adjacent Palo Verde Valley Groundwater Basin to the PVMGB~~ as a result of Project groundwater extraction.

2. The analysis shall include the following elements:

a. The change in groundwater ***flux to the regional aquifer*** attributable to the inflow from the Colorado River as a result of Project pumping in afy for the life of the Project (30 years);

b. An sensitivity analysis that would provide a range in the potential changes flux from the River relative to variation in the key model variables ~~Relative error or confidence interval of the calculated change in groundwater flux attributable to the inflow from the Colorado River~~ as a result of Project pumping for the life of the Project;

3. The project owner shall present the results of the conceptual model, numerical model, transient runs and sensitivity analysis in a report for review and approval by CPM. The report shall include all pertinent information regarding the development of the numerical models. The report shall include:

a. Introduction

b. Previous Investigations

c. Conceptual Model

d. Numerical Model and Input Parameters

e. Sensitivity Analysis

f. Transient Modeling Runs

g. Conclusions

RATIONALE: For the reasons discussed in the first part of this testimony, PVSI does not agree that the BSPP will impact downstream Colorado River users. However, if the Committee believes the BSPP will have such impacts, we offer the modifications above to perform modeling. The proposal to specifically use the

USGS (Leake 2008) model to estimate depletion from the Colorado River from Project pumping is overly conservative and simplistic. The model does not consider other sources of water to the groundwater basin, including precipitation, mountain front recharge and underflow from up-gradient basins. There is ample evidence that these sources play a significant role as a source of water to the Palo Verde Mesa Groundwater Basin. The model as established by the USGS does not consider any of these sources in its evaluation of groundwater pumping on the flux from the Colorado River. The model is without any other recharge component other than the flux from the River. As such, changes in groundwater pumping are "forced" in a numerical way to only draw water from storage and from the recharge from the River.

A calibrated groundwater flow model provides a more accurate and representative model of the groundwater basin by comparison to the USGS model. As a calibrated model it would match the water levels in the basin which would require consideration of all sources of water and the aquifer characteristics. This approach is more robust by comparison to the USGS model, and with an appropriately conducted sensitivity analysis, wherein the key model variables are changed, this methodology provides an appropriate level uncertainty analysis from which a range of potential changes in flux from the River attributable to Project pumping can be evaluated.

The concept of error is inappropriately applied to groundwater modeling, as proposed in the Condition. The sensitivity analysis provides the level of uncertainty analysis in the data set from which to draw conclusions on the range of possible changes in flux from the River. A calibrated groundwater model, using appropriate statistically measured ranges in the variability of model variables provides the best measure of potential impacts from the Project pumping on the Colorado River.

Verification: Within thirty (30) days following certification of the proposed Project, the project owner shall submit to the CPM for their review and approval a report detailing the results of the modeling effort. The report shall include the estimated amount of subsurface water flowing from the Colorado River due to project pumping. This estimate shall be used for determining the appropriate volume of water for mitigation in accordance with SOIL&WATER-2.

~~**GROUNDWATER QUALITY MONITORING AND REPORTING PLAN SOIL&WATER-17** The project owner shall submit a Groundwater Quality Monitoring and Reporting Plan to the CPM for review and approval. The Groundwater Quality Monitoring and Reporting Plan shall provide a description of the methodology for monitoring background and site groundwater levels and quality. The sampling required for the water~~

~~quality monitoring program shall be implemented during groundwater level monitoring events in accordance with SOIL&WATER-5. Prior to project construction, monitoring shall commence to establish pre-construction groundwater quality conditions in the well proposed for the program and shall include pre-construction, construction, and project operation water use. The water quality monitoring program shall identify potential changes in the existing water quality of the proposed water supply resulting from project pumping, if any, in concert with Condition of Certification SOIL&WATER-5, establish pre-construction and project related groundwater quality that can be quantitatively compared against observed and simulated levels near the project pumping well and near potentially impacted existing wells, and to avoid, minimize, or mitigate significant impacts to sensitive receptors (springs and groundwater dependent vegetation, and groundwater supply users).~~

~~A. A Groundwater Quality Monitoring and Reporting Plan shall be submitted to the CPM for review and approval before completion of Condition of Certification SOIL&WATER-3. The Plan shall include a scaled map showing the site and vicinity, existing well locations, and proposed monitoring locations (both existing wells and new monitoring wells proposed for construction). Additional monitoring wells that shall be installed include wells required in accordance with Condition of Certification SOIL&WATER-7, for the evaporation ponds and land treatment unit proposed for the project. The map shall also include relevant natural and man-made features (existing and proposed as part of this project). The plan also shall provide: (1) well construction information and borehole lithology for each existing well proposed for use as a monitoring well; (2) description of proposed drilling and well installation methods; (3) proposed monitoring well design; and, (4) schedule for completion of the work.~~

~~B. A Well Monitoring Installation and Groundwater Level Network Report shall be submitted to the CPM for review and approval in conjunction with Condition of Certification SOIL&WATER-5. The report shall include a scaled map showing the final monitoring well network. It shall document the drilling methods employed, provide individual well construction asbuilds, borehole lithology recorded from the drill cuttings, well development, and well survey results. The well survey shall measure the location and elevation of the top of the well casing and reference point for all water level measurements, and shall include the coordinate system and datum for the survey measurements. Additionally, the report shall describe the water level monitoring equipment employed in the wells and document their deployment and use.~~

~~C. As part of the monitoring well network development, all newly constructed monitoring wells shall be constructed consistent with State and Riverside County specifications.~~

~~D. Prior to use of any groundwater for construction, all groundwater quality and groundwater level monitoring data shall be reported to the CPM. The report shall include the following:~~

~~1. An assessment of pre-project groundwater levels, a summary of available climatic information (monthly average temperature and rainfall records from the nearest weather station), and a comparison and assessment of water level data relative to the assumptions and spatial trends simulated by the applicant's groundwater model.~~

~~2. An assessment of pre-project groundwater quality with groundwater samples analyzed for total dissolved solids (TDS), chloride, nitrates, major cations and anions, oxygen-18 and deuterium isotopes, and any other constituents required by the CPM to protecting existing water supply quality.~~

~~3. The data shall be tabulated, summarized, and submitted to the CPM. The data summary shall include the estimated range (minimum and maximum values), average, and median for each constituent analyzed. If a sufficient number of data points are available, the data shall also be analyzed using the Mann-Kendall test for trend at 90% confidence to assess whether pre-project water quality trends, if any, are statistically significant.~~

~~E. During project construction and during the first five years of project operations, the project owner shall semi-annually monitor the quality of groundwater and changes in groundwater elevation and submit data semiannually to the CPM. After five years of project operations, the frequency and scope of the monitoring program shall be reassessed by the CPM. The summary report shall document water level monitoring methods, the water level data, water level plots, and a comparison between pre- and post-project start-up water level trends as itemized below. The report shall also include a summary of actual water use conditions, monthly climatic information (temperature and rainfall) from the nearest meteorological monitoring station, and a comparison and assessment of water level data relative to the assumptions and simulated spatial trends predicted by the applicant's groundwater model.~~

1. Groundwater samples from all wells in the monitoring well network shall be analyzed and reported semi-annually for TDS, chloride, nitrates, cations and anions, oxygen-18 and deuterium isotopes. These analyses, and particularly the stable isotope data, can be useful for identifying water sources and assessing their contributions to the quality of water produced by wells.

2. For analysis purposes, pre-project water quality shall be defined by samples collected prior to project construction as specified above, and compliance data shall be defined by samples collected after the construction start date. The compliance data shall be analyzed for both trends and for contrast with the pre-project data.

3. Trends shall be analyzed using the Mann-Kendall test for trend at the 90% confidence. Trends in the compliance data shall be compared and contrasted to pre-project trends, if any.

4. The contrast between pre-project and compliance mean or median concentrations shall be compared using an Analysis of Variance (ANOVA) or other appropriate statistical method approved by the CRBRWQCB for evaluation of water quality impacts. A parametric ANOVA (for example, an F-test) can be conducted on the two data sets if the residuals between observed and expected values are normally distributed and have equal variance, or the data can be transformed to an approximately normal distribution. If the data cannot be represented by a normal distribution, then a nonparametric ANOVA shall be conducted (for example, the Kruskal-Wallis test). If a statistically significant difference is identified at 90% confidence between the two data sets, the monitoring data are inconsistent with random differences between the pre-project and baseline data indicating a significant water quality impact from project pumping may be occurring.
5. If compliance data indicate that the water supply quality has deteriorated (exceeds pre-project constituent concentrations in TDS, sodium, chloride, or other constituents identified as part of the monitoring plan and applicable Water Quality Objectives are exceeded for the applicable beneficial uses of the water supply) for three consecutive years, the project owner shall provide treatment or a new water supply to either meet or exceed pre-project water quality conditions to any impacted water supply wells.

Verification: The project owner shall complete the following: At least forty-five (45) days prior to construction, a Groundwater Quality Monitoring and Reporting Plan shall be submitted to the CPM for review and approval before completion of Condition of Certification SOIL&WATER-3. At least thirty (30) days prior to construction, a Well Monitoring Installation and Groundwater Level Network

~~Report shall be submitted to the CPM for review and approval. At least thirty (30) days prior to use of any groundwater for construction, all groundwater quality and groundwater level monitoring data shall be reported to the CPM.~~

RATIONALE: The condition has apparently been provided to 1.) evaluate changes in groundwater geochemistry over time from the proposed Project pumping and 2.) to ensure that the monitoring conditions for monitoring of the evaporation ponds have been adhered too.

This condition should be removed as it is redundant to the requirements under SOIL&WATER-7 and the waste discharge requirements (WDRs) for water quality monitoring provided in Appendix B, C and D. There are enumerable requirements under these conditions to provide an assessment of background water quality, changes in water quality and thus, a detection of a release from the evaporation ponds. There does not need to be a separate condition to duplicate and complicate the compliance process.

Secondly, there is simply NO evidence that the propose project pumping would induce changes in groundwater geochemistry over time. In fact, Staff concludes that water below the site would meet SWRCB Policy 75-59, and that water is of poor quality being on the Mesa. Geochemical data shows that water becomes higher in TDS concentrations from the River toward the Mesa and is found at its highest concentrations below the Mesa and the Project site. The short-term pumping proposed for the construction supply and the low rate of pumping proposed for operational supply (i.e., 150 AFY per unit equates to an average rate of about 90 gallons per minute), would not induce changes in aquifer geochemistry over the proposed operational life of the Project of 30 years. Further, the water that will be provided to the project through pumping will be drawn from the high TDS water under the Mesa and up-gradient from the Project site under the McCoy Wash. Conservative numerical groundwater modeling showed that changes in drawdown of between 1 and 2 feet would be expected offsite to the east and south of the project. The model showed that water would generally be drawn from under the Mesa and in the up-gradient direction of McCoy Wash, where there is a source of poor water quality.
In summary, there is no credible data provided by Staff from which to suggest that the project pumping would provide significant changes in aquifer geochemistry in offsite water supply wells. As such, there is not a need to monitoring offsite groundwater wells and their changes in water chemistry over time. Water quality monitoring should be done as suggested and consistent with SOIL&WATER-7 and the associated WDRs in Appendix B, C and D, but not for Project-induced changes in aquifer water chemistry.

APPENDIX B, C AND D – WASTE DISCHARGE REQUIREMENTS

Appendix B, Page 20 - Waste Management

84. The LTU will be used to treat HTF-affected soil at various concentrations. Spills of HTF will be cleaned up within 48 hours and affected soil will be

moved to a temporary staging area in the LTU where it will be placed on 60-mil plastic and covered with plastic sheeting pending receipt of analytical results and characterization of the waste material. As possible, free liquids will be removed using a vacuum truck. The liquids will be filtered and reused to the extent possible and reintroduced into the process. Filtrate ***that cannot be reused*** will be characterized, ***as appropriate*** (though will likely be managed as hazardous waste, as the concentration in the filtrate will likely be more than 10,000 mg/kg HTF).

Soil & Water, Appendix B, Page 3

10. The Project proposes to use dry cooling condenser for power plant cooling. Water for cooling tower makeup, process water makeup, and other industrial uses such as mirror washing will be supplied by ~~two~~ ***up to ten*** onsite wells. This source will also be used to supply water for employee use (e.g., drinking, showers, sinks, and toilets). Water received from the on-site wells will be pumped directly to a reverse osmosis (RO) treatment unit to meet the requirements of the California Department of Health Services for potable water supplies. Power cycle makeup, mirror washing water, and cooling of ancillary equipment will require on-site treatment for reduction of dissolved solids, and this treatment varies according to the quality required for each of these uses.

Soil & Water, Appendix B, Page 6

28. According to the recent geotechnical investigation of the site (Kleinfelder 2009), several inferred faults have been mapped by several authors trending northwest-southeast through the area. These faults are speculative and based on geophysical data (Rostein et al., 1976). The Blythe Graben is mapped approximately six miles northeast of the site (Stone, 2006). The Blythe Graben offsets Quaternary alluvium dated between 6 to 31 thousand years old. The tectonic significance of the Blythe Graben is unknown. The location and elevation of alluvial deposits of the McCoy wash area that have been incised by the McCoy Wash and other drainages suggest that tectonic uplift may have affected this area since the Pliocene epoch (within the last 5 million years). This uplift could be related to faulting, or regional uplift associated with the basin and range extension. Because the speculated faults in the area are not considered active, and there is no direct evidence of active faulting on the site, the risk associated with surface rupture from active faults at the site is considered very low. Regardless of whether there are faults across the site, because the Project is located in a seismically active area, all Project structures must be designed to comply with the California Building Code (CBC) and Universal Building Code (UBC) Zone ~~4~~ ***3*** requirements. The CBC and UBC are considered to be standard safeguards against major structural failures and loss of life. The goals of the codes are to provide structures that will:

Soil & Water, Appendix B, Page16, Waste Classification

67. Wastewater from several processes within the Facility will be piped to two 4.0-acre evaporation ponds per Unit (total combined area of 8 acres per Unit) for disposal. The pond area provides sufficient evaporative capacity to dispose of the anticipated wastewater stream, and allows for one pond to be taken out of service for up to approximately three years for cleaning, potential future maintenance, and repair without impacting the operation of the plant. Raw water for the Facility is supplied from groundwater wells. Discharge into the evaporation ponds are from ~~three~~ ***two*** sources:

Soil & Water, Appendix C, Page 1

4. Waste material shall be confined or discharged to the evaporation ponds ***and LTU***.

Soil & Water, Appendix C, Page 2

14. Prior to removal of solid material that has accumulated in the concrete ~~cooling tower basins~~ ***evaporation ponds***, an analysis of the material must be conducted and the material must be disposed of in a manner consistent with that analysis and applicable laws and regulations.

Soil & Water, Appendix C, Page 2

15. Conveyance systems throughout the Facility area shall be cleaned out at least every 90 days to prevent the buildup of solids ~~or when activity at the site creates the potential for release of solid materials from the conveyance systems~~.

    The proposed BSPP will not have any conveyance systems that will have the potential to release solid materials.

Soil & Water, Appendix C, Page 3

22. Ninety days prior to the cessation of discharge operations at the Facility, the Discharger shall submit a workplan, subject to approval of the Regional Board's Executive Officer, for assessing the extent, if any, of contamination of natural geological materials and waters of the ~~Ford Hydrological Unit~~ ***Palo Verde Mesa Groundwater Basin*** by the waste. One hundred twenty days following workplan approval, the Discharger shall submit a technical report presenting results of the contamination assessment. A California Registered Civil Engineer or Certified Engineering Geologist must prepare the workplan, contamination assessment, and engineering report.

Soil & Water, Appendix C, Page 3

26. The Discharger shall implement the attached Monitoring and Reporting Program, ~~Appendix C~~ ***Appendix D,*** and revisions thereto, in order to detect, at the earliest opportunity, any unauthorized discharge of waste

constituents from the Facility, or any impairment of beneficial uses associated with (caused by) discharges of waste to the brine pond.

Soil & Water, Appendix C, Page 3

27. The Discharger shall use the constituents listed in the attached Monitoring and Reporting Program, ~~Appendix C~~ ***Appendix D***, and revisions thereto, as "Monitoring Parameters".

Soil & Water, Appendix C, Page 3

28. The Discharger shall follow the Water Quality Protection Standard (WQPS) for detection monitoring established by the Regional Board. The following are parts of WQPS as established by the Regional Board's Executive Officer:

    a. The Discharger shall test for the monitoring parameters and the Constituents of Concern (COCs) listed in the Monitoring and Reporting R7-2010-0xxx and revisions thereto.
    b. b. Concentration Limits – The concentration limit for each monitoring parameter and constituents of concern for each monitoring point (as stated in the Detection Monitoring Program), shall be its statistically determined background value or method detection limit, whichever is higher as obtained during that reporting period.

Soil & Water, Appendix C, Page 5

41. Groundwater monitoring wells must be constructed adjacent to and both up gradient and down gradient of the evaporation ponds to provide background and detection monitoring for any potential release from the evaporation ponds containment. The Point of Compliance to be used for the detection monitoring must be the uppermost ~~shallow~~ groundwater beneath the evaporation pond. The groundwater monitoring wells must be constructed in conformance with Title 27 CCR Section 20415 requirements. The monitoring wells must be designed to meet the background and detection monitoring requirements in conformance with Title 27 CCR Section 20415(b)(1)(B) as applicable, including:

    a. Providing a sufficient number of monitoring points to yield ground water samples from the uppermost aquifer that represent the quality of ground water passing the Point of Compliance and to allow for the detection of a release from the evaporation ponds;

    b. ~~Providing a sufficient number of monitoring points installed at locations and depths to yield ground water samples from the upper most aquifer to provide the best assurance of the earliest possible detection of a release from the evaporation ponds;~~

c. Providing a sufficient number of monitoring points and background monitoring points installed at appropriate locations and depths to yield groundwater samples from ~~zones of perched water~~ ***the uppermost aquifer*** to provide the best assurance of the earliest possible detection of a release from the evaporation ponds; and

Statement b. above listed the same requirement as c.

Soil & Water, Appendix C, Page 6

48. Baseline samples of the groundwater must be collected from each of the monitoring wells and analyzed prior to discharging wastewater to the evaporation ponds. The groundwater must be initially sampled for each of the proposed monitoring parameters listed in the attached Monitoring and Reporting Program, ~~Appendix C~~ ***Appendix D***, and any additional Constituents of Concern (COC) identified by the Regional Board.

Soil & Water, Appendix C, Page 7 B. Prohibitions

1. The discharge or deposit of solid waste to the evaporation ponds as a final form of disposal is prohibited, unless authorized by the Regional Board's Executive Officer.
2. The Discharger is prohibited from discharging, treating or composting at this site the following wastes:
   a. Municipal solid waste;
   b. Sludge (including sewage sludge, water treatment sludge, and industrial sludge);

   Statement 1 above states that discharge or deposit of solid waste into the evaporation ponds as a final form of disposal is prohibited. Although solid waste will not be placed into the evaporation ponds as a means of final disposal, sludge will be present in the evaporation ponds and will be disposed of when the ponds are cleaned out (periodically) and will be disposed of at an appropriate facility.

   2b stated that sludge is prohibited from being discharged, treated, or composted at the site. Discharge from the reverse osmosis system will contain suspended solid (salts) that will eventually settle and precipitate out of solution into a sludge in the evaporation ponds.

Soil & Water, Appendix C, Page 8 - C. Provisions

1. The Discharger shall comply with the attached Monitoring and Reporting Program, ~~Appendix C~~ ***Appendix D***, and future revisions thereto, as specified by the Regional Board's Executive Officer.

Soil & Water, Appendix C, Page 10 - C. Provisions

14d. Monitoring must be conducted according to test procedures described in the attached Monitoring and Reporting Program, ~~Appendix C~~ ***Appendix D***, unless other test procedures have been specified in these WDRs or approved by the Regional Board's Executive Officer.

Soil & Water, Appendix C, Page 10 - C. Provisions

18. The procedure for preparing samples for the analyses shall be consistent with the attached Monitoring and Reporting Program, ~~Appendix C~~ ***Appendix D***, and any future revisions thereto. The Monitoring Reports shall be certified to be true and correct, and signed, under penalty of perjury, by an authorized official of the company. All technical reports require the signature of a California Registered Professional Engineer or Professional Geologist.

Soil & Water, Appendix D, Page 4 – Sampling and Analytical Methods

Sample collection, storage, and analysis shall be performed according to the most recent version of Standard USEPA methods, and California ~~ELPA~~ ***ELAP*** rulings.

Soil & Water, Appendix D, Page 4 – Sampling and Analytical Methods

3. All Quality Assurance/Quality Control (QA/QC) data shall be reported, along with the sample results to which it applies, including the method, equipment, and analytical detection limits, the recovery rates, an explanation of any recovery rate that is less than ***method recovery standards*** ~~80%,~~ the results of equipment and method blanks, the results of spiked and surrogate samples, the frequency of quality control analysis, and the name and qualifications of the person(s) performing the analyses. Sample results shall be reported unadjusted for blank results or spike recovery.

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of: Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DOCKET NO. 09-AFC-06** **DECLARATION OF** Trevor Thor

I, Trevor Thor, declare as follows:

1. I am presently employed by Solar Millennium LLC, as the Vice President of EPC Management.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Traffic and Transportation for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 JUNE 9, 2010.

Trevor Thor

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Howard Balentine

I, Howard Balentine, declare as follows:

1. I am presently employed by AECOM as a Program Manager III.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Traffic and Transportation for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 4 June, 2010.

Howard Balentine

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Douglas Moss

I, Douglas Moss, declare as follows:

1. I am presently employed by AeroPacific Consulting as a Principal.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Traffic and Transportation for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 JUNE 7, 2010.

Douglas M. Moss

Douglas Moss

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of: Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DOCKET NO. 09-AFC-06** **DECLARATION OF** John Wilson

I, John Wilson, declare as follows:

1. I am presently employed by, Wilson Engineering & Transportation Consultants, Inc. as a Principal.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Traffic and Transportation for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 6, 2010.

John Wilson

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Shawn Kelly

I, Shawn Kelly, declare as follows:

1. I am presently employed by AECOM, as a Senior Manager.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Traffic and Transportation for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 9, 2010.

Original Signed
Shawn Kelly

BLYTHE SOLAR POWER PROJECT
TRAFFIC AND TRANSPORTATION
OPENING TESTIMONY

I. Name: Trevor Thor, Howard Balentine, Douglas Moss, John Wilson and Shawn Kelly

II. Purpose:

Our testimony addresses the subject of Traffic and Transportation associated with the construction and operation of the Blythe Solar Power Project (09-AFC-06).

III. Qualifications:

Trevor Thor: I am presently employed at Solar Millennium, and have been for the past year and am presently a Vice-President EPC Management with that organization. I have an Executive MBA Degree and I have over 20 years of experience in the field of Progressive Projects Engineering and Construction Management. I prepared or assisted in the preparation of the Traffic and Transportation section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

Howard Balentine: I am presently employed at AECOM, and have been for the past 13 years and am presently a Senior Program Manager with that organization. I have a B.S. Degree in Physics and a M.E. Degree in Environmental Engineering and I have over 30 years of experience in the fields of air quality analysis and permitting, atmospheric dispersion modeling, and risk analysis. I prepared or assisted in the preparation of the aviation portion of the Traffic and Transportation section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

Douglas E. Moss: I am presently employed at AeroPacific Consulting, and have been for the past 5 years and am the principal of that organization. I have a M.S. Degree in Mechanical Engineering and I have 36 years of experience and over 11,000 flight hours as a test pilot, test pilot instructor, airline pilot and general aviation pilot. I was the pilot for the June 2010 overflight of an operating power plant air cooled condenser (ACC) and of an operating solar thermal plant conducted to help resolve issues associated with the Traffic and Transportation resource area. A detailed description of my qualifications is contained in the attached resume.

John Wilson: I am presently employed at Wilson Engineering & Transportation Consultants, Inc. and have been for the past 25 years and am presently a Principal with that organization. I have a Masters Degree in Transportation Engineering and I have over 30 years of experience in the field of Traffic and Transportation. I prepared or assisted in the preparation of the Traffic and Transportation section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

Shawn Kelly: I am presently employed at AECOM, and have been for the past several years and am presently a Senior Manager with that organization. I have 29 years of experience in senior management. I prepared or assisted in the preparation of the Traffic and Transportation section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

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 1	**Application for Certification Volumes I & II**, dated August 24, 2009, and docketed on August 24, 2009, Section 5.13.
Exhibit 18	**Palo Verde Solar I, LLC's Response to January 14, 2010 Workshop Query and January 29, 2010 Email Query**, dated February 2010, and docketed on February 4, 2010.
Exhibit 25	**Riverside County Airport Land Use Commission (RCALUC) Application for Major Land Use Action Review**, dated February 2010, and docketed on March 3, 2010.

Exhibit 28	**Palo Verde Solar I's Issues Statement for April 15, 2010 Status Conference**, dated April 12, 2010, and docketed on April 12, 2010.
Exhibit 29	**Palo Verde Solar I, LLC's Initial Comments on the SA, DEIS**, dated April 19, 2010, and docketed on April 19, 2010.
Exhibit 32	**County of Riverside County Airport Land Use Commission May 2010 Staff Report**, dated May 2010, and docketed on May 10, 2010.

V. Opinion and Conclusions

TRAFFIC AND TRANSPORTATION

Page C.10-16, Second Paragraph

Staff asserts that the BSPP must be reviewed by the Riverside County Airport Land Use Commission (ALUC). While BSPP has filed an application for review to the ALUC, this has been done voluntarily as PVSI and the ALUC agree that it does not have jurisdiction over activities on federal land (see also discussion above under Land Use). PVSI agrees with Staff that the FAA review is required and has submitted all applicable forms for FAA review of the transmission poles and tall structures within the appropriate zones.

Pages C.10-16 and 17, Air Cooled Condensers

Staff has performed a thermal plume analysis and concludes the ACC is capable of causing upward plumes with velocities that exceed 4.3 m/s at considerable heights. PVSI's consultants have reviewed Staff's basis and analysis for this conclusion and disagree. Specific comments related to Staff's analysis contained in Appendix TT-1 of the RSA are provided below.

PVSI believes that the Staff analysis used to develop their estimate of vertical plume velocities above the ACC is faulty for three reasons:

- The model used by Staff is an inappropriate model because the release characteristics of the plume produced by an ACC do not fit the assumptions used to develop the plume rise model used in the Staff analysis. Consequently, the Staff estimate of the expected vertical velocity profile of the ACC plume is invalid.

- The Staff employed incompatible assumptions in their modeling analysis of plume rise above an ACCACC that make the analysis unrealistic rather than conservative.
- The significance criteria used in the RSA to define a hazard to general aircraft from plume turbulence is specified by the agency developing the criteria as valid at 360 feet above the ground. The RSA does not provide any justification for extending the applicability of this significance criteria up to nearly 2,000 feet above the ground.

These three issues are discussed further below:

Inappropriate Model

The basic model used by Staff to estimate plume rise above the ACC is based on the general equations documented by Gary Briggs[1] and implemented in one version or another in most current models that make estimates of plume rise. A key assumption in standard plume rise models for buoyant plumes is that plume rise is a function of downwind distance raised to the power of 2/3 (commonly called the "2/3 Law"). This assumption does not appear to hold for a plume from an ACC.

In 2008, the CEC contracted with the University of Stellenbosch, South Africa, to perform computational fluid dynamic (CFD) modeling of a typical air cooled steam condenser (same type of unit as the BSPP ACC) to determine the effectiveness of cooling as a function wind speed and wind direction[2]. The modeling was performed using the FLUENT model. Modeling using CFD methodology is the premier methodology available today to simulate problems in fluid mechanics such as airflow around obstacles and motion in a fluid. Based on preliminary review of figures of simulated plumes provided in this CEC report, it appears that the trajectory of the thermal plume from an ACC, as computed by FLUENT, rises with a plume rise to downwind distance ratio dependency ranging from an exponent of 0.4 for low wind speed perpendicular to the long axis of the ACC flow to nearly 0.8 for higher along axis wind speeds. The 2/3 Law assumes a constant exponent of 0.67.

The FLUENT generated plume appears to be a mixture of momentum and buoyancy forcing accounting for a mixture of momentum dominated jet flow that

[1] Gary A. Briggs, Chapter 3. Plume Rise Predictions, in "Lectures on Air Pollution and Environmental Impact Analysis", American Meteorological Society, Duane Haugen, Editor, Boston,1976.

[2] J. A. van Rooyen and D. G. Kröger, Performance Trends of an Air-Cooled Steam Consenser Under Windy Conditions, CEC-500-2007-124, University of Stellenbosch, South Africa, May 2008

typically obeys a 1/3 power law and the buoyancy dominated plume rise that obeys the 2/3 Law.

A basic assumption in the Briggs' formulation of plume rise is that the plume is axisymmetric, or symmetrical around the vertical axis of rise. However, the ACC is a structure that prevents symmetry about the vertical axis. Because the linear structure of the heat exchangers is a linear A-frame arrangement, there is direction-dependent entrainment of ambient air into the plumes that leads to direction-dependent rise and turbulence fields surrounding the plume. These non-symmetrical influences are not accounted for in the Briggs' formulation. In addition, the A-frame lattice and cooling tubes/fins of the heat transfer surface essentially creates a diffuser above the ACC that tends to distribute vertical flow evenly across the entire surface of the ACC, a surface of approximately 100m x 75m, compared to a typical power plant stack that may have a diameter of 10m.

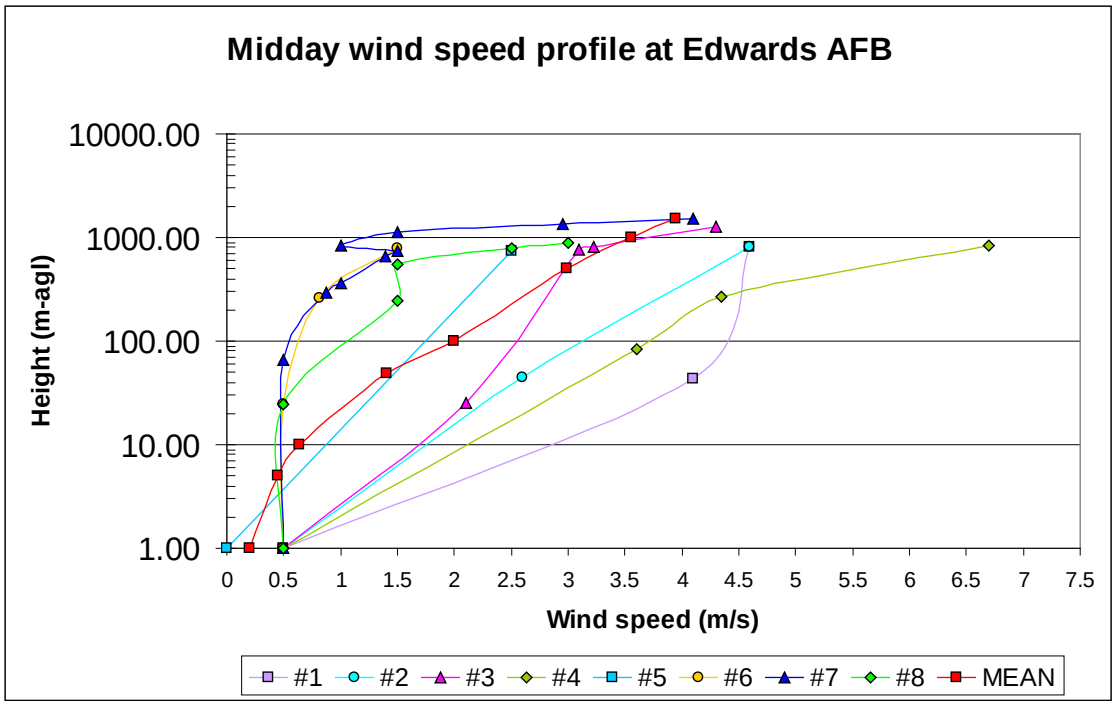
Based on the above preliminary analysis, it appears that the Briggs' formulation of plume rise is inadequate for simulating the rise, and vertical velocity profile, in a plume above an ACC because of violations of the basic assumptions inherent in the model. To simulate plume rise accurately above an ACC, a fully developed non-axisymmetric integral plume rise model would be needed to model the rate of vertical wind speed and turbulence decrease with height above the unit.

Incompatible Modeling Assumptions

The Staff modeling of plume rise from an ACC includes two incompatible assumptions. First, full load on the power block is assumed. Since the BSPP is a solar power plant, full load can only occur near midday with the sun is shining near its zenith. The Staff modeling also assumes that the wind speed is calm, and is calm through a 1,670-ft (approximate 500 m) depth of the surface boundary layer. During the day time when there is strong incoming sunlight that would allow a solar power plant to operate at full load, there would also be significant heating of the ground surface and strong to intense thermal convection from the desert floor. The wind flow under such conditions would be variable and light, but not calm. The strong convection after sunrise would quickly destroy any residual shallow surface layer with calm winds that formed during the preceding evening. At night with limited gradient winds, a layer of calm winds can form, and depending upon meteorological conditions, the calm layer could extend to a moderate height above the ground. However, there would be no sunlight at this time that would allow for operaton of the solar array.

Figure 1 presents an analysis of radiosonde sounding results for Edwards AFB (EAFB) for mid-day soundings where there were reported calm winds at the first reporting level of approximately 10 m. These soundings presented in Figure 1 represent all those soundings identified from EAFB since 1990 during the months of June-August that had less than 1 m/s wind speed at the first level and

occurred between 0800 – 1700. For the eight soundings identified, the mean wind speed at 100 m (328 feet) above the ground was 2.0 m/s (3.9 knots). It is obvious that with only eight soundings meeting the above criteria, true calm winds at the surface are a relatively rare (and shallow) occurrence in the Mojave Desert, as represented by EAFB. While Staff may claim that assuming a calm wind extending above 1,600 ft at a Mojave desert location such as Blythe is a conservative worst-case assumption, it is not a credible worst-case assumption given the low frequency of true calm winds through the surface boundary layer as documented by Figure 1. Therefore, the CEC assumption of a deep layer of calm winds is an unrealistic and unreasonable assumption. It should also be noted that the degree of conservatism required by the CEC for the thermal plume modeling for BSPP is greatly exceeds that required by the CEC for visible plume modeling in other licensing cases where the 20th percentile case is simulated (i.e., 20 percent of plumes are higher).



[b1]

Figure 1. Vertical profiles of wind speed observed from mid-day radiosondes released at Edwards AFB during June-August with a release surface wind speed of less than 1.0 m/s at first level during hours 0800 - 1700.

In the RSA, Staff provides a frequency of calm winds based on the meteorological data provided by the Applicant and used in the air quality modeling for the air quality analysis. In their analysis in the RSA, Staff claim a calm wind frequency of approximately 10 percent during daylight hours. What Staff does not provide is the reporting threshold of the anemometer on which their statement is based. That reporting threshold is 3 knots. At the Blythe

Airport, wind speeds are measured by an anemometer that is part of the National Weather Service Automated Surface Observing System (ASOS) monitoring system. The minimum reporting threshold of an ASOS anemometer is 3 knots (1.5 m/s). Consequently, the 10 percent figure used by the Staff actually represents the frequency of observed winds of less than 3 knots. The actual frequency of calm winds at the surface at the Blythe Airport is well less than 10 percent. It should also be noted that at 120 ft, the top of the ACC is 36 m above the ground, and has a non-calm wind speed for the most of the radiosonde observations plotted in Figure 1.

Lack of Justification of Modeling Criteria

The CEC vertical velocity significance criteria, 4.3 m/s average vertical wind speed, is based on a draft Australian Aviation Safety circular[3]. In this circular, they give the altitude below which there is a potential hazard for a vertical velocity of 4.3 m/s as 360 ft. The CEC uses the 4.3 m/s criteria but ignores the rest of the circular in its application as to the height at which the vertical velocity can be a hazard. In the circular, the hazard is defined as that which "may cause airframe damage to an aircraft at critical stages of flight, e.g., when approaching to land with flaps extended." The CEC needs to document the hazard presented by a plume at an altitude of 2,000 feet when the vertical plume velocity is 4.3 m/s, as an aircraft would not be in the landing pattern, which at Blythe Airport is 800 ft (see below).

Palo Verde Solar I suggest a more representative height for assessment of the potential hazard introduced by a thermal plume as 500 ft above the structure. A height of 500 ft represents the minimum separation distance from any structure established by the FAA under FAR Part 91.119 (Minimum Safe Altitudes). For a BSPP ACC with a height of 120 ft, the threshold height for the vertical velocity analysis would be a height of 620 ft above the ground.

Qualitative Assessment of Turbulence Potential from an ACC

From a simple review of the characteristics of an ACC plume, it is difficult to determine the mechanism that could produce turbulence above the light level in the plume above an ACC. The primary energy source in any cooling tower plume is the thermal energy associated with the dissipation of heat (approximately 400 MW for the BSPP) into the ambient air above the facility cooling structure. In the proposed BSPP ACC, this energy is dissipated across an area of approximately 6,700 m^2, compared to the same energy in a wet cooling tower of the same capacity that would be dissipated across an area of approximately 3,200 m^2. Thus, the thermal energy density in a wet cooling tower plume is more than twice as great as that in an ACC plume. As wet cooling

[3] Australian Government Civil Aviation Safety Authority Draft Advisory Circular AC 139-05(0), Guidelines for Plume Rise Assessment, October 2003.

cooling towers typically do not produce moderate turbulence in their plumes, it is not expected that an ACC plume with less than one-half of the thermal energy density will produce turbulence above a light level.

The actual air temperature change after passing through the ACC is only 11ºC (20 ºF), spread across 6,700 m^2. Based on the computational fluid dynamics (CFD) modeling discussed below performed for this project, the vertical velocity averaged across the top of the ACC is less than the CEC criteria of 4.3 m/s at the point of release. In general, the turbulence in the plume is driven by the temperature difference (less than 11ºC) and this temperature difference will decrease with height, thus dissipating the available energy for generating buoyant vertical motions in the plume. Consequently, only by postulating extreme natural occurring thermal convection conditions is possible to define meteorological conditions that could lead to a substantial increase in plume vertical velocity with increasing height above the ACC. In addition, even if there were greater than light turbulence in the plume above an ACC, the energy contained within the ACC plume would only be a small fraction of the overall energy available in the convective thermals in the surrounding desert. In other words, the turbulence of the ACC plume would be lost in the much greater turbulence of the naturally occurring convective thermals. This result is confirmed by the CFD modeling discussed below. .

The RSA for Traffic and Transportation, Appendix TT-1, Table 2, presents CEC staff modeling results showing a 4.3 m/s vertical velocity extending above 1,600 ft above the top of the ACC under calm wind conditions. As previously discussed in Applicant comments on the Staff Assessment, the CEC staff modeling documented in the RSA is based on an invalid model and therefore the results of that modeling are not credible. To provide a more scientific valid assessment of the potential vertical velocities above the ACC, Palo Verde Solar I performed computational fluid dynamics (CFD) modeling using the FLOW-3D model for a near calm scenario with full load on the ACC. This modeling has not been completed but preliminary modeling results are available. Full results will be supplied to the CEC when complete. For the preliminary scenario modeled, assuming low ambient wind speed (2 m/s at 100 m above the ground) and a convective unstable boundary layer representing strong mid-day insolation, an average thermal plume vertical velocity at 500 ft above the ACC is less than 2 m/s. A height of 500 ft is significant at it represents the minimum separation distance from any structure established by the FAA under FAR Part 91.119 (Minimum Safe Altitudes).

Figure 2 presents a plot of the FLOW-3D modeling results of the vertical velocity (m/s) versus height above the ground (m) for a horizontal slice north-south through the long axis of the ACC for the preliminary scenario discussed above. Nowhere in the modeling domain above the ACC does the vertical velocity exceed the significance threshold of 4.3 m/s for turbulence established by the CEC, even at the release point on top of the ACC. Figure 3 presents a view of

the vertical profile of temperature through the plume. On both figures, the flight altitude is annotated. Figure 4 presents block figures of the ACC model incorporated into the FLOW-3D simulation. The left diagram presents a view of a single fan cell of the ACC. The right diagram presents a view of the ACC from the top and from the bottom showing the 45 cells in a BSPP ACC.

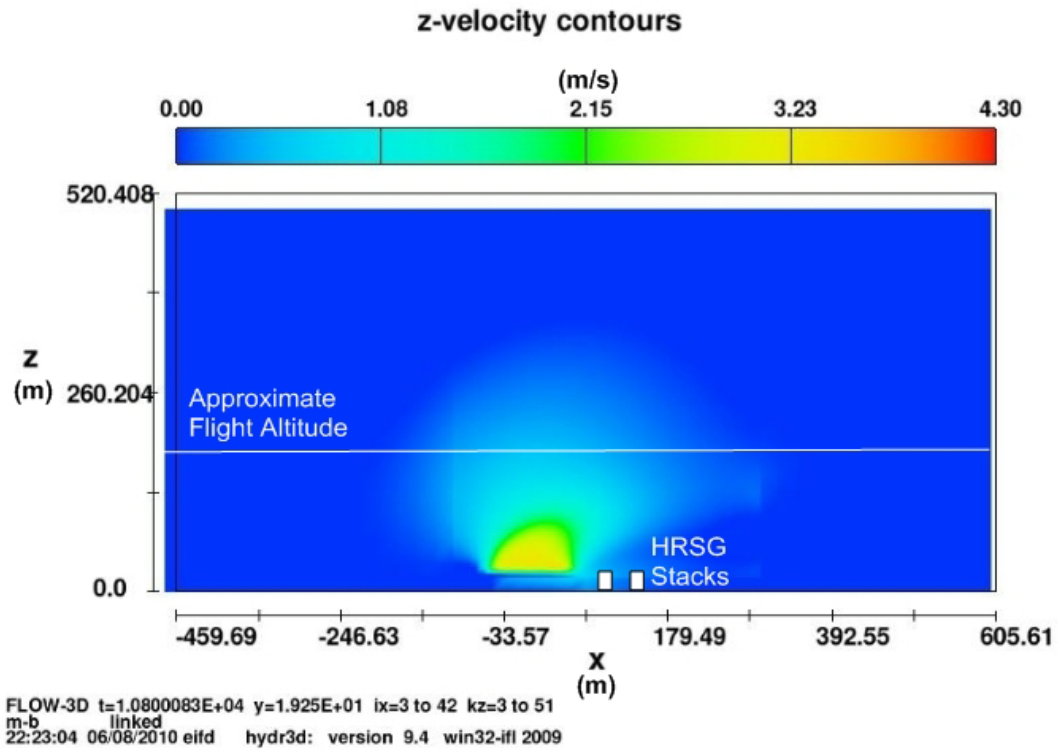


Figure 2. FLOW-3D Vertical Wind Speed Slice Above Ground Level Above the ACC for the Low Wind Speed (2.0 m/s at 100 m), Convectively Unstable Scenario. Distance Units are in Meters and Vertical Velocity is in m/s. A vertical level of 190 m corresponds to 500 ft above the top of the ACC. The thermal plume vertical velocity is below the CEC significance threshold of 4.3 m/s.

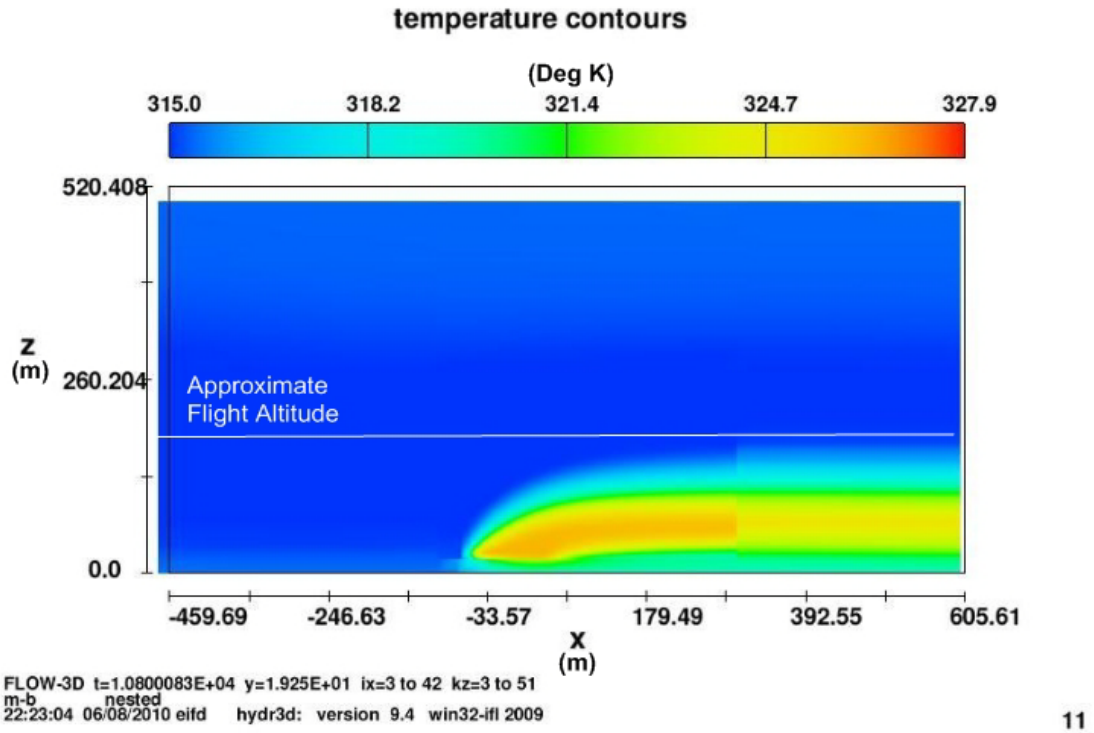


Figure 3. Vertical Cross Section of ACC Thermal Plume. Height and Distance units are meters and Temperature units are Degrees Kelvin. For this simulation, the top of the plume does not reach 500 ft above the top of the ACC. Due to convective instability, the plume will loop and could rise above that indicated in this snapshot of the plume.

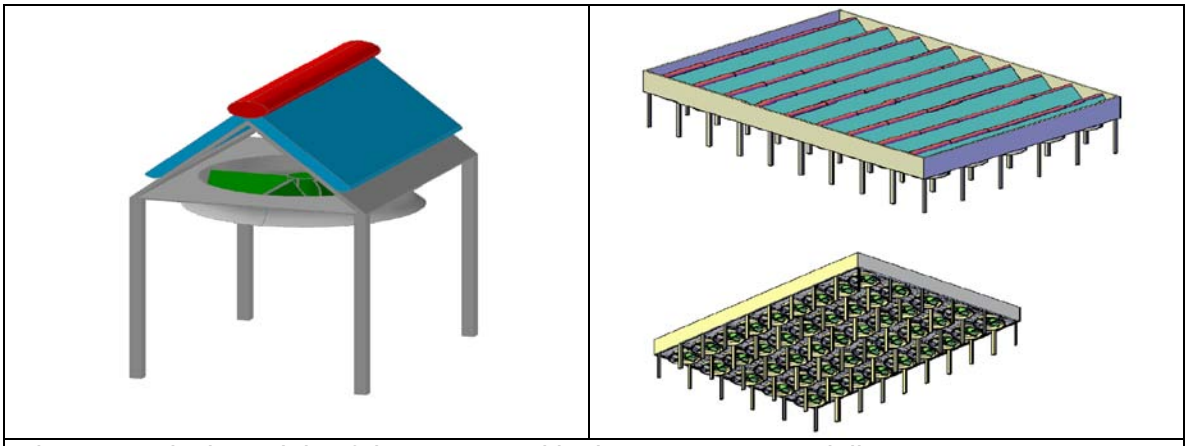


Figure 4. Block Models of the ACC used in the FLOW-3D modeling.

As part of the studies in support of the Traffic and Transportation analyses, the Applicant commissioned an aircraft overflight on June 2, 2010, at the Nevada Power Walter E. Higgins natural gas fired power plant in Primm, Nevada. The Higgins facility consists to two combined cycle gas turbine units with heat recovery steam generators and one steam turbine. Steam condensation is provided by one ACC composed of 40 cells in an array of 4x10 cells. During the

overflight, that occurred from approximately 7:15 AM - 8:30 AM PDT, and again from approximately 11:45 AM – 12:20 PM PDT, 34 passes over the ACC were performed at altitudes of 2,500 ft to 500 ft above the ACC. Most passes were at an altitude of 500 ft above the ACC. The objective of the flyovers was to assess the potential hazard posed by the ACC thermal plume to light aircraft that could overfly a similar ACC at the BSPP. The load on the ACC during the overflights was approximately 350 MW (70% load), with generally calm winds at the surface (limp wind sock at the airport and on top of the ACC) gradually becoming light and variable, with a westerly component. For the overflights, the aircraft was configured as during base leg approach (landing gear up, flaps retracted, cowl flaps closed, air speed 100 mph) and during final approach (landing gear down, flaps extended, cowl flaps closed, air speed 80 mph). The overflights approximated realistic aircraft operations while on approach to land during the early morning on Runway 26 at the Blythe Airport.

As documented by the pilot (Mr. Douglas Moss, a former consultant to the CEC) in his flight test report for the overflights (Attachment 1), previous thermal plume analyses have focused on turbulence as the metric for assessment of significance, and the significance threshold used as an average vertical velocity of 4.3 m/s. Turbulence, as defined by the Federal Aviation Administration, relates primarily to passenger comfort and ability to walk and serve food and beverages. In extreme cases this definition may also relate to potential for aircraft damage. The actual hazard that thermal (convective) plumes at a power plant pose to general aviation aircraft, however, is the pilot's temporary loss of aircraft control while close to the ground. A general aviation aircraft is more susceptible to convective plumes than a large airliner primarily due to its lower wing loading and mass moment of inertia about the longitudinal (roll) axis. The wing loading of a typical airliner is between 120 and 130 lbf/ft2. This is significantly higher than the wind loading of a Cessna C-152 (10.4 lbf/ft2) or a Beech Bonanza (16.9 lbf/ft2). The lower the wing-loading, the more an aircraft responds to a convective plume - both in normal acceleration and roll moment. Thus, a criteria other than turbulence (represented by average plume vertical velocity) is necessary to determine hazards that a convective plume poses to a light aircraft. Mr. Moss therefore selected metrics of changes in bank angle and pitch attitude after a 2-second delay as more meaningful criteria to use to assess potential hazard to general aviation posed by an ACC.

The CFD modeling results are consistent with the results of the June 2 overflight in which only light chop was observed at an altitude of 500 ft over the ACC. In addition, the CFD modeling demonstrates that under unstable convection conditions typical of a desert environment during a sunny day with strong solar insolation, ambient convective turbulence will dominate the turbulence over the desert and the turbulence generated by the ACC thermal plume will contribute only a small fraction of the ambient turbulent motion. The dominance of ambient convective turbulence on aircraft stability was demonstrated by the overflight and was documented in the Flight Test Report (Attachment 1).

In his conclusions regarding potential impacts on flight safety of the ACC thermal plume from the Flight Test Report, Mr. Moss states that:

> *"Based upon my education, training, and experience, it is my opinion, to a reasonable degree of engineering certainty that neither the glint/glitter characteristics of solar arrays nor the convective plume characteristics of an ACC array pose a significant threat to general aviation aircraft operating at traffic pattern altitudes.*
>
> *Specifically with respect to the solar array plan and ACC locations proposed for the Blythe Solar Power Plant (BSPP), it is my opinion that the currently proposed design and location of the ACCs and solar arrays will not present a significant hazard to aviation."*

Assessment of Flight Patterns with Respect to an ACC

The Blythe Airport is classified as a general aviation airport and operates a VOR approach system. The airport has two intersecting runways, Runway 08/26 and Runway 17/35. The runway designation is the azimuth of the runway in the direction of aircraft motion given in tens of degrees. For example, the most used runway at the Blythe Airport is Runway 26. This refers to an azimuth of 260 degrees or 10 degrees left of due west, and would be the runway in use for aircraft landing or departing to the west. If the motion on the runway were in the opposite direction, the runway would be designated Runway 08 and the azimuth would be 80 degrees, or 10 degrees left of due east. Likewise, Runway 17 is in use when aircraft are landing or departing to the south, and Runway 35 is used for landings or departures to the north.

The 2004 Riverside County Compatibility Plan contains projections of the number of flight operations at the Blythe Municipal Airport projected to 2020. One flight operation consists of either a landing or a takeoff. In 2020, there are projected to be 159 operations per day at the Blythe airport. For piston aircraft, the aircraft most susceptible to potential turbulence from an ACC (ACC), the distribution of operations by time of day is currently 88 percent daytime, 10 percent evening, and 2 percent nighttime. This distribution is not expected to change in the future. The expected operations in 2020 at the Blythe Airport by runway and aircraft type are given in Table TRANS-1.

Table TRANS-1. Projected Daily Operations in 2020 at Blythe Municipal Airport by Runway and Aircraft Type

	Piston Engine	**Turboprop**	**Business Jets**	**Totals**

Runway 8	7.4	0.2	0.2	8
Runway 26	73.9	3.6	4.1	82
Runway 17	44.4	0.5	0.2	45
Runway 35	22.2	0.5	0.2	23
Totals	148	5	5	157

Source: Riverside County Air Port Land Use Compatibility Plan, October 2004. Volume 3. Blythe Municipal Airport.

Values are computed based on expected daily traffic volume, and fraction of operation by aircraft type and runway, and excludes approximately 2 helicopter flights per day.

Based on information contained in Volume 3 of the Riverside County Airport Land Use Compatibility Plan (Volume 3 Blythe Airport), the pattern altitude for the airport is 800 feet and it is a left-turn pattern for all runways. . Figure TRANS-1 presents a diagram of the traffic patterns for the airport that is anticipated to encompass 80 percent of all flight operations, or approximately 157 operations per day in 2020. There are expected to be approximately 32 aircraft operations per day that will not be limited to the extent of the traffic patterns defined in Figure TRANS-1.

The most used runway at the Blythe Airport is Runway 26 with 50 percent of piston engine aircraft operations, followed by Runway 17, with an additional 30 percent of piston engine aircraft operations. The general approach procedure for Runway 26 is a straight in approach with a 25 degree right of centerline entry into the pattern. The straight-in approach has a descent height of 366 feet. If there is less than one mile visibility at this altitude, the standard procedure is to go around, which will involving climbing back to the pattern altitude of 800 feet and commencing the approach again. For a circling approach to the airport, and with VOR/GPS-A, the descent height is 433 feet, for a visibility of less than one mile.

The approach pattern distribution of flights presented in Figure TRANS-1 does not take aircraft over any part of the solar array field but has some aircraft operating above the right of way (facility boundary). However, in 2020, approximately 32 aircraft operations per day will occur outside the boundary given in Figure TRANS-1. One possible approach that could take aircraft over the solar field and one of the ACCs would be an approach to Runway 17 that would come in from the west over the McCoy Mountains, pass over the BSPP, and make a right turn for a direct landing on Runway 17. While plausible, such an approach and landing would be uncommon given the typical avoidance of pilots to overfly terrain obstacles (i.e., McCoy Mountains) at relatively low altitude, followed by the need for a more rapid descent over the BSPP to get to pattern altitude, and finally the need for a right turn onto final approach.

The ALUC is considering implementation of a right hand pattern for Runway 26. Figure 5 presents an approximate plot of the traffic pattern at Blythe Airport, with a new right hand pattern overlaid on the existing traffic pattern, as contained in the Riverside County Airport Land Use Compatibility Plan, Volume 3 Blythe Airport, Exhibit BL-7. This figure reflects the 80th percentile file profile in that 80 percent of all traffic is expected to occur within the delineated bounds for the pattern. To approximate the 80th percentile for a right hand traffic pattern, a mirror image of the left hand pattern was created and placed on top of the Compatibility Plan figure. It is clear from the plot that the ACC-4 is well outside the existing and future potential traffic pattern for the Blythe Airport. By scaling from the figure, the ACC-4 is approximately 10,400 feet from the outer edge of the right hand traffic pattern at its nearest point, and 24,400 feet from the inner edge of the left hand pattern. Therefore, a right hand turn pattern for Runway 26 will not cause pilots to overfly the ACC-4. Because the existing and proposed future traffic patterns for the Blythe Airport do not take pilots near any of the project's ACCs, the only way any pilot would fly over an ACC is if the pilot directed the aircraft to purposely fly over the ACC. For pilots following the normal patterns, BSPP does not have an impact on the airport operations.

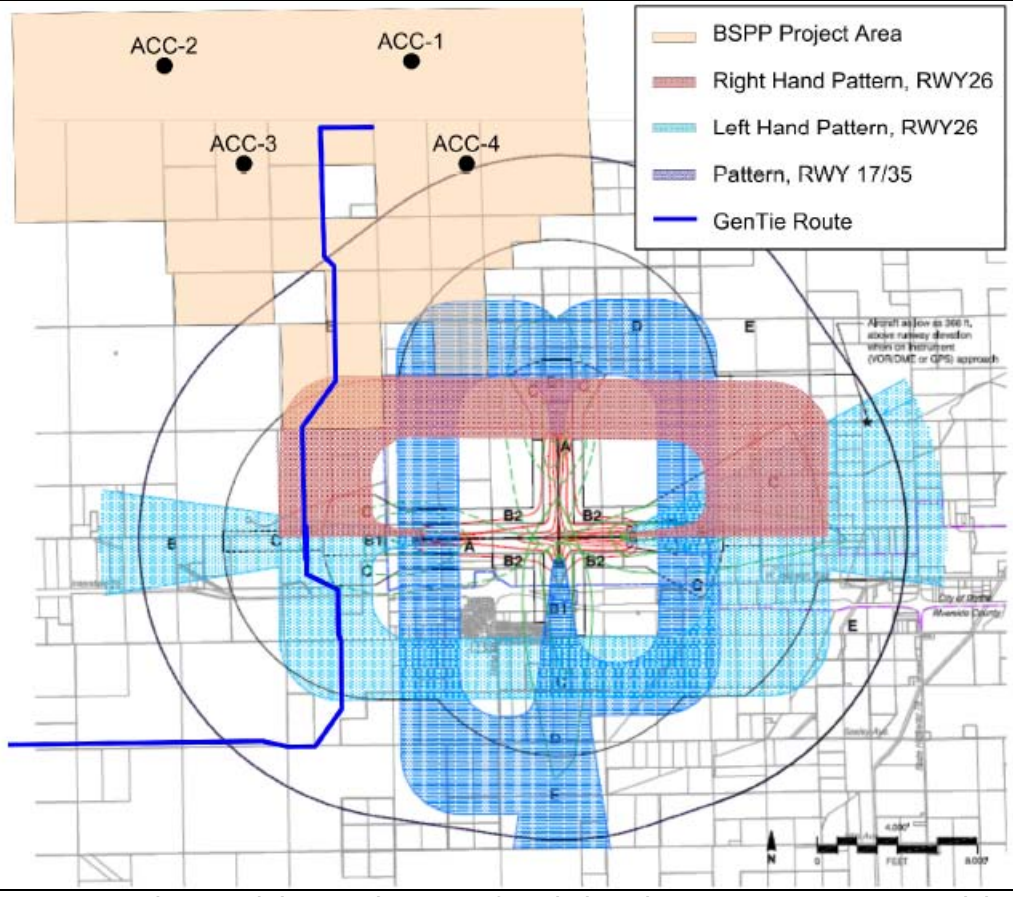


Figure 5. Approximate Right Hand Pattern for Blythe Airport Runway 26 Comprising Approximately 80 Percent of Aircraft Operations

Based on the projected flight operations for the Blythe airport, the airport traffic pattern defined in Figure 2, and the approach procedures for the airport, it is unlikely that any aircraft that would overfly the BSPP would be at an elevation of less than 800 feet. Given the small number of daily flight operations anticipated for 2020 that would be outside the general flight pattern (approximately 32 flight operations per day), the number of over flights of the BSPP by general aviation aircraft on a given day will be small to zero. Consequently, there is little probability that an ACC at the BSPP would constitute a hazard to general aviation aircraft at the BSPP.

Page C.10-17, Impact of Flash of Light on Pilots

As explained below in the comments on Condition of Certification **VIS-4**, the only geometry that allows for pilots to observe potential flashes of light from the BSPP solar array will be when the pilot is east or west of the solar array and in an approximate direct line from the sun and the solar array. In addition, the intensity of the glint/glare, or specular reflection, is subject to inverse square attenuation with distance from the source. The farther the pilot is from the solar array, the weaker the glint/glare becomes by the inverse square of the distance. Beyond a certain distance that will depend on a number of factors including time of day, pilot altitude, clarity of the air, and cloudiness, among other factors), the glare will be so dissipated as to blend into and contribute to the general glow from the linear Heat Conducting Elements (HCEs). As was documented in the AFC, including observations by a CEC Staff member (James Adams) in the Victorville 2 (07-AFC-1) AFC proceedings, from a distance, the solar array looks like a body of water and there is no indication of point sources of glare.

As part of the studies in support of the Traffic and Transportation analyses, the Applicant commissioned an aircraft flight on June 1, 2010, at the Kramer Junction SEGS facility to observe glint/glare from the facility at low sun angles near sunset. Mr. Howard Balentine was an observer on this flight. Fly-by passes of the SEGS facility were as low as 500 ft above ground level and were representative of the view an aircraft would have during take-off, and during approach and landing on Runway 26 in the early morning.

Based on personal observations, Mr. Balentine concluded that the intensity of the glint/glare from the SEGS mirrors was relatively low in intensity and much less bright than the setting sun in the opposite direction. Figure 6 presents a typical view of the glint/glare from an operating solar array with a low sun angle. During nearby low altitude passes such as represented in Figure 6, the solar array could be viewed continuously without need to look away due to brightness, even for the individual bright spots in the mirror array. Beyond approximately 3-5 miles from the solar array, the intensity of individual reflection sources tended to blur into a single image that approaches the look, commonly stated, of the shimmer off of a water body in the distance. On approach, both the Kramer Junction SEGS facility and the Harper Lake solar facility in the distance both displayed only a

diffuse brightness. (See Figure 7). Due to the low sun angle, and resultant near horizontal pointing of the mirrors, the general look of the solar array in the direction of the direct azimuth opposite the sun, was of desert tan as the mirrors reflected an inverted image with brown ground on the top of the mirror and blue sky on the bottom of the image. It is of note that the reflection of the sun could not be seen in the reflection of any mirror other than as a minor spot of glint/glare, generally on the bottom edge of a very few number of mirrors likely due to minor warping of individual mirrors from wind or other source (See Figure 8).

In his flight test report (Attachment 1), the pilot of the flyby, Mr. Douglas Moss, stated:

> *"Based upon my education, training, and experience, it is my opinion, to a reasonable degree of engineering certainty that neither the glint/glitter characteristics of solar arrays nor the convective plume characteristics of an ACC array pose a significant threat to general aviation aircraft operating at traffic pattern altitudes.*
>
> *Specifically with respect to the solar array plan and ACC locations proposed for the Blythe Solar Power Plant (BSPP), it is my opinion that the currently proposed design and location of the ACCs and solar arrays will not present a significant hazard to aviation."*

As discussed in the comments on Condition of Certification **VIS-4**, the glare will only occur when the observer is perpendicular to the linear HCE tubing. Consequently, a pilot on the ground at the Blythe Airport will not be able to observe any glare since no location on the airport will be perpendicular to the HCE tubing.

Pilots would potentially be able to observe glint/glare from the solar arrays when east or west of the BSPP, as discussed above. Since the McCoy Mountains are to the west of the BSPP, aircraft are likely to be several miles from the BSPP solar arrays if they are to the west of the airport. Because of this distance, the drop-off in intensity of any potential glint/glare will be significant due the inverse square attenuation and there is unlikely to be any significant glare that would potentially be hazardous. This leaves only aircraft operating from or near Runway 17/35 that would potentially be affected by glint/glare.

As discussed above, and can be calculated from the data in Table TRANS-1, there are an estimated average of 68 flight operations per day in year 2020, of which 88% would be daytime operations, and 43% would be for operations involving Runway 17/35. Assuming that the daytime flights are spread over a 10-

hour day, this results in less than three aircraft using Runway 17/35 in any given daytime hour.

For a given aircraft operation, the proper geometry will exist for only a moment during descent and landing. In addition, the proper geometry only occurs for low sun angle (for Runway 26, only in the early morning after sunrise). During this period, the sun will be low on the horizon and will pose a much more significant source of glare than weak glint/glare from a solar array. During the flyby, Mr. Moss commented that the glint/glare he observed from the SEGS facility was essentially identical to that he has observed when flying by built-up areas where reflection sources such as windows and buildings produce an equivalent glint/glare on an azimuth opposite the sun.

The glint/glare that a pilot would be subject to from the solar field is likely less than that which a pilot would experience from non-solar field reflective surfaces such as from a building window in the vicinity of the airport and from windshields, mirrors, and flat surfaces of vehicles traveling along Interstate 10.

[b2]

Figure 6. Typical View of the Glint/Glare from an Operating Solar Array with a Low Sun Angle on Close Approach

Figure 7. Typical View of the Glint/Glare from an Operating Solar Array with a Low Sun Angle from a Distance

Figure 8. Typical View of Localized Glint/Glare from an Operating Solar Array with a Low Sun Angle. See the local bright spots on Rows 3 and 5 in the left foreground. The larger apparent discontinuities in the solar array are from mirrors not aligned with the surrounding arrays.

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Memorandum

To	File: Solar Millennium 60139695 Task 6300	Page 1
CC	Carl Lindner, Mark Luttrell, Arrie Bachrach	
Subject	DRAFT: Overflight Report of SEGS Kramer Junction power plant and Walter E. Higgins Power Plant Air Cooled Condenser	

From	Howard Balentine
Date	June 4, 2010

I was an observer in a flyby of the Kramer Junction solar power plant on the evening of June 1, 2010, and two overflights of the air cooled condenser (ACC) at the Nevada Power Walter E. Higgins Power Plant in Primm, Nevada, on June 2, 2010. The Pilot was Mr. Douglas Moss of AeroPacific Consulting and the aircraft was a V-Tail Bonanza, Tail Number N9366Y.

Kramer Junction SEGS Flyby

The first flight began when I was picked up at the Oxnard Airport for a flight to Jean, Nevada. We departed Oxnard at approximately 6:00 PM EDT on June 1. We arrived in the vicinity of the Kramer Junction facility about 7:00 PM and proceeded to have an approximately 45 minute flyby of the SEGS plant. The solar elevation angle during the 45 minute flyby was 10° decreasing to 2° above the horizon. The objective of the flyby was to examine the potential for glint and reflection to be of such a magnitude so as to cause significant distraction of a pilot on a simulated final approach to a nearby runway. We terminated the flyby when the sun was reaching the horizon

Multiple passes were made at varying bearings and altitudes down to 500 feet above the ground on the west side if the solar field, including simulations of an aircraft on a glide slope to an airport. At no time did we overfly the SEGS facility. Passes were made at varying altitudes parallel to the west edge of the solar field and perpendicular to the solar field. The purpose of the various passes was to determine those azimuths, if any, which created the proper sun – observer – parabolic mirror geometry and produced glint or reflections that could be a hazard to flight.

At no time during the flight did I observe any glint or reflection from the solar array that I felt to be objectionable or would interfere with my ability to operate a machine such as an automobile. Midway through the flight, it became possible to look directly at the sun with more than a momentary glance. The intensity of the setting sun was much more significant than any glint or reflection observed from the parabolic mirrors. The brightest reflections occurred on the normal to the solar troughs with the sun – observer – mirror inline in the same plane. I specifically looked for reflections at large “off-normal” incidence angles, but did not observe any such reflections. If such reflections were to occur, our multiple flyby passes would have allowed us to observe such off-normal reflections.

I observed that the brightest reflections from the solar array occurred from two sources, in decreasing order of intensity:

1. Mirrors out of service such that the back sides of the mirrors were observable and produced reflections from the non-mirrored surface of the mirror back. These reflections were comparable to a row of overlapping lights along the length of a mirror segment and were not objectionable. It was easy to look directly at the lights for an extended period of time with no after image and no need to look away. The intensity of the light was less than that of the setting sun.
2. The bottom lip of the first row of mirrors. While the top of the mirrors were generally brown and were obviously presenting an image of the ground, the bottoms of the mirrors were presenting an image of the sky just above the horizon. The bright image along the bottom lip of the front row of mirrors was not continuous but rather consisted of individual spots, possibly due to minor local warping of the edge of the mirror. The bright spots were not objectionable and moved along the mirror array as the position of the aircraft moved. Again, it was easy to look directly at the local bright spots for an extended period of time with no after image and no need to look away. The intensity of the light was less than that of the setting sun and was no different than looking at a street light in the distance.

As the aircraft moved past the solar array on a parallel path, the image presented by the solar array was of a generally dark background that transitioned into a slight shimmering glow and culminated in a brighter area around the normal point to the sun. Within the bright area, there were individual brighter spots likely representing out of service mirrors, reflections from slightly warped mirror lips, and reflections from supports and other non-mirror surfaces. The shimmering glow and brighter center spot appeared to flow across the solar array as the aircraft passed by and was very entrancing to observe. At no time were any of these reflections objectionable or distracting.

Walter E. Higgins Power Plant Overflight

Two overflights of the Higgins plant occurred in the morning of June 2. The first overflight commenced at 7:18 AM PDT and ended at 8:28 AM. The second overflight commenced at 11:57 AM and ended at 11:23 PM. Forecast winds for the morning of the flight were 3 mph for 08:00 – 10:00 and 5 mph 11:00 – 13:00. (See Figure 1). At takeoff at 07:15, the Jean airport wind sock was limp and stayed that way through the takeoff for the second flight. Winds were forecast to be from the south-southwest veering to south by midday. A windsock was located on the ACC. Observation of the windsock, approximately 210 feet above the ground, indicated generally southwest to variable light winds.

The Higgins power plant is composed to two natural gas fired combustion turbines with heat recovery steam generations (HRSGs) and one steam turbine. The plant is cooled by two adjoining 5x4 cell air cooled condensers forming a continuous structure approximately 54 meters wide, 153 meters long and approximately 200 feet high. The long axis of the ACC is aligned north-south. East of the ACC are the two HRSG stacks, one approximately 64 meters from the east-center edge of the ACC and the second 45 meters farther east. The facility manager, Mr. Felix Fuentes, in a phone call after the first flight stated that both units of the Higgins plant were operating during the first flight at approximately 70 percent load (~350 MW). Figure 2 presents an aerial view of the plant.

The objective of the first flight was to determine the potential hazard posed to aircraft by overflight of the ACC during early morning conditions with low wind/calm conditions and full load on the ACC. The calm condition goal was met, and the load condition was approximately met, at 70 percent load.

The overflight began with a north to south run at an altitude of 5,300 feet mean sea level with an aircraft speed of 100 mph. The ground elevation is approximately 2,600 feet at the plant with approximately 200 feet to the top of the ACC, resulting in a clearance over the top of the ACC of approximately 2,500 feet. The initial aircraft bearing was 200° magnetic. No impact of the plume was felt on the first run, or the second run at 4,800 feet.

On the 5th run at 7:31 at an altitude of 700 feet near the ACC, a slight burble (high frequency oscillation) was felt, as was also a case the 6th pass at 600 feet. There were no visual cues to determine the ACC and HRSG plume locations except for the surface location of each structure. Starting with run 7, we passed through a plume at approximately 500 feet elevation, resulting in changes in aircraft altitude and easily corrected changes in aircraft pitch and bank. Starting with run 9, the aircraft flew directly along the long axis (north-south) of the ACC and directly over the ACC. Starting with Run 11 and for all subsequent passes, the pilot lowered the landing gear, extended the flaps, and reduced the air speed to 80 mph.

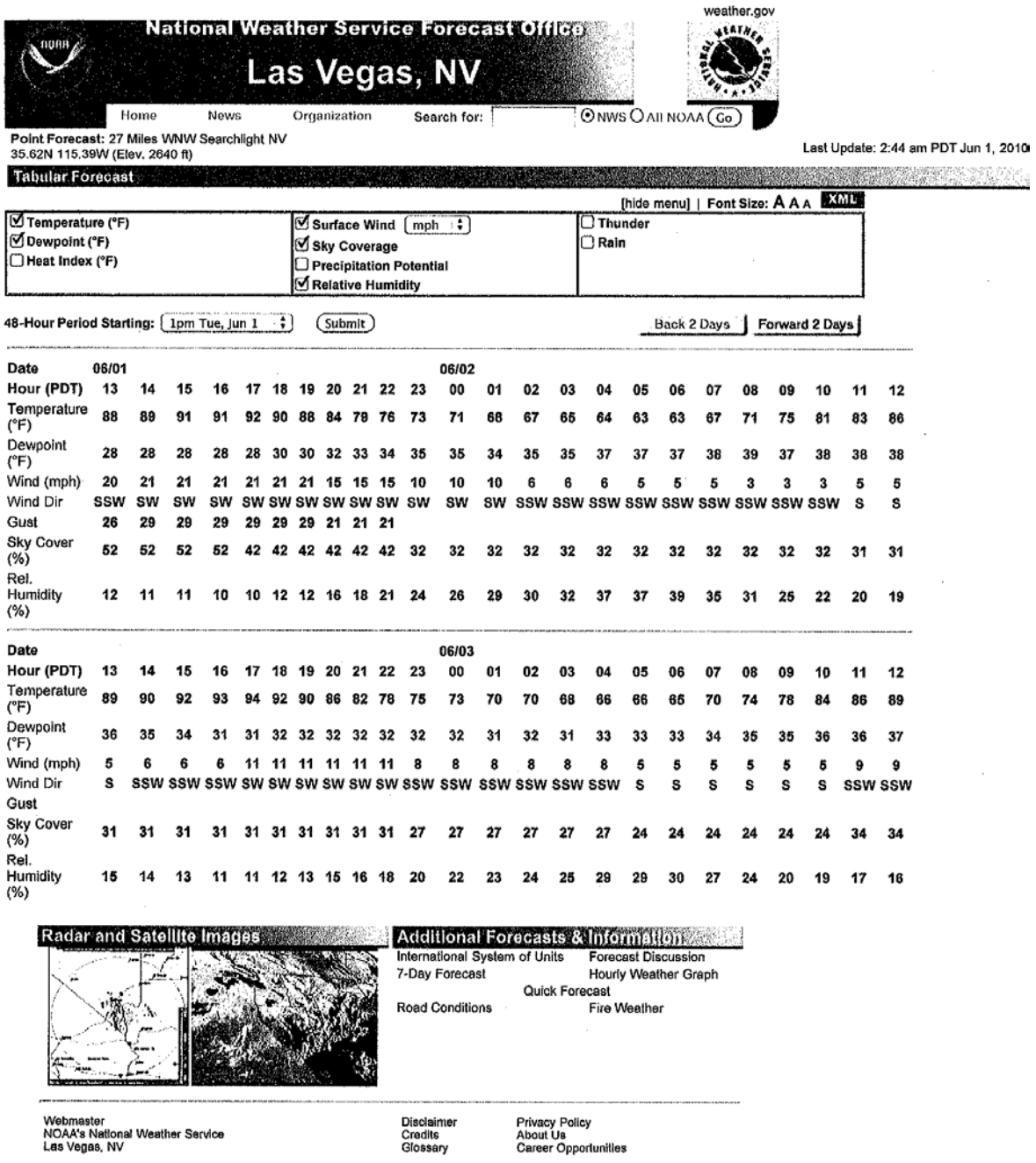
The runs following Run 7 (for a total of 24) were at a flight altitude of 500 feet above the ACC and alternated between a north to south run and a south to north run. The flight track deviated to the right and left of the centerline of the ACC to examine the potential instability introduced by the plume impacting a single wing. There were runs directly over the ACC at 500 feet where no turbulence was encountered. In general, any runs to the east side of the ACC (adjacent to the HRSG stack) experienced turbulence but not all runs directly over the ACC or to the west side of the ACC experience turbulence. On the final run of the Overflight 1, we passed directly over the centerline of the ACC at 500 feet and did not experience any turbulence. My impressions as an observer was that there was negligible impact on aircraft attitude produced by the thermal plume from the ACC. Rather, it was most likely that the bulk of the observed turbulence was due to flying near or through the plume from the nearby HRSG stack. During the runs, the windsock on the ACC was limp or indicating light winds from the southwest or variable.

The pilot commented during the flight that at all times, the changes to aircraft attitude and attitude were easily corrected, and by implication, did not affect flight safety.

While early in the day, we experienced some convective turbulence during the first overflight. The objective of the second overflight was to determine the potential impact on flight safety during a period where there was significant ambient turbulence due to natural convection. A total of 10 runs, number 31-40, were made during the second overflight. Five runs were made with a clean configuration and five with flaps and landing gear extended. All runs were at 500 feet above the ACC and were parallel to the ACC centerline. On all runs except Run 37 encountered turbulence. Run 37 was at 80 mph with flaps and landing gear extended and passed directly over the centerline of the ACC. No turbulence was experienced on Run 37. The turbulence experience on the other runs was indistinguishable from that produced by the natural convection occurring in the desert surrounding the plant, including a run that directly overflew the HRSG stack closest to the ACC. Run 39 stands out. During the run, there was an increase in aircraft performance when the turbulence was encountered consisting of an altitude gain of 150 feet and an increase in airspeed of 15 mph. This turbulence was encountered prior to passing over the ACC and the pilot and I collectively attributed the turbulence to that from a convective cell and not the ACC or HRSG plume. In Run 34, we experience a double hit likely due to striking a convective cell followed by a plume.

My conclusions, based on these two overflights of the Higgins plant are the following:

1. At conventional power plants, the closeness of the HGSG stacks to the ACC makes it very difficult or impossible to differentiate between the ACC plume and the HRSG plume unless some visual marker were added to the plumes.
2. Natural convective turbulence in the desert produces impacts on aircraft altitude and attitude that are equal to or greater than that produced by the HRSG plume at the Higgins plant.
3. My impression is that much of the turbulence experienced during the overflight of the ACC was due to either natural convection or comingling of the ACC plume with the adjoining HRSG plume.
4. The overall potential for an impact on flight safety of flying through an ACC plume is negligible.
5. The magnitude of the turbulence experienced in the second overflight was greater than that of the morning overfight due to the enhancement of plume turbulence by the boundary layer micrometeorological conditions leading to the natural convective turbulence. As a result, mid-day low wind speed conditions with strong insolation are more conducive to worst-case plume impacts on aircraft than calm wind conditions during the early morning when natural convection is dampened.



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Point Forecast: 27 Miles WNW Searchlight NV
35.62N 115.39W (Elev. 2640 ft)

Last Update: 2:44 am PDT Jun 1, 2010

Tabular Forecast

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- ☑ Temperature (°F)
- ☑ Dewpoint (°F)
- ☐ Heat Index (°F)
- ☑ Surface Wind (mph)
- ☑ Sky Coverage
- ☐ Precipitation Potential
- ☑ Relative Humidity
- ☐ Thunder
- ☐ Rain

48-Hour Period Starting: 1pm Tue, Jun 1 Submit Back 2 Days Forward 2 Days

Date	06/01											06/02											
Hour (PDT)	13	14	15	16	17	18	19	20	21	22	23	00	01	02	03	04	05	06	07	08	09	10	11	12
Temperature (°F)	88	89	91	91	92	90	88	84	79	76	73	71	68	67	65	64	63	63	67	71	75	81	83	86
Dewpoint (°F)	28	28	28	28	28	30	30	32	33	34	35	35	34	35	35	37	37	37	38	39	37	38	38	38
Wind (mph)	20	21	21	21	21	21	21	15	15	15	10	10	10	6	6	6	5	5	5	3	3	3	5	5
Wind Dir	SSW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	SSW	S	S
Gust	26	29	29	29	29	29	29	21	21	21														
Sky Cover (%)	52	52	52	52	42	42	42	42	42	42	32	32	32	32	32	32	32	32	32	32	32	31	31	
Rel. Humidity (%)	12	11	11	10	10	12	12	16	18	21	24	26	29	30	32	37	37	39	35	31	25	22	20	19

Date	06/03																							
Hour (PDT)	13	14	15	16	17	18	19	20	21	22	23	00	01	02	03	04	05	06	07	08	09	10	11	12
Temperature (°F)	89	90	92	93	94	92	90	86	82	78	75	73	70	70	68	66	66	65	70	74	78	84	86	89
Dewpoint (°F)	36	35	34	31	31	32	32	32	32	32	32	32	31	32	31	33	33	33	34	35	35	36	36	37
Wind (mph)	5	6	6	6	11	11	11	11	11	11	8	8	8	8	8	8	5	5	5	5	5	5	9	9
Wind Dir	S	SSW	SSW	SSW	SW	SW	SW	SW	SW	SW	SSW	SSW	SSW	SSW	SSW	SSW	S	S	S	S	S	S	SSW	SSW
Gust																								
Sky Cover (%)	31	31	31	31	31	31	31	31	31	31	27	27	27	27	27	27	24	24	24	24	24	24	34	34
Rel. Humidity (%)	15	14	13	11	11	12	13	15	16	18	20	22	23	24	25	29	29	30	27	24	20	19	17	16

Radar and Satellite Images

Additional Forecasts & Information

International System of Units
7-Day Forecast
Road Conditions
Forecast Discussion
Hourly Weather Graph
Quick Forecast
Fire Weather

Webmaster
NOAA's National Weather Service
Las Vegas, NV

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Figure 1. Forecast for Primm, Nevada, June 2, 2010.

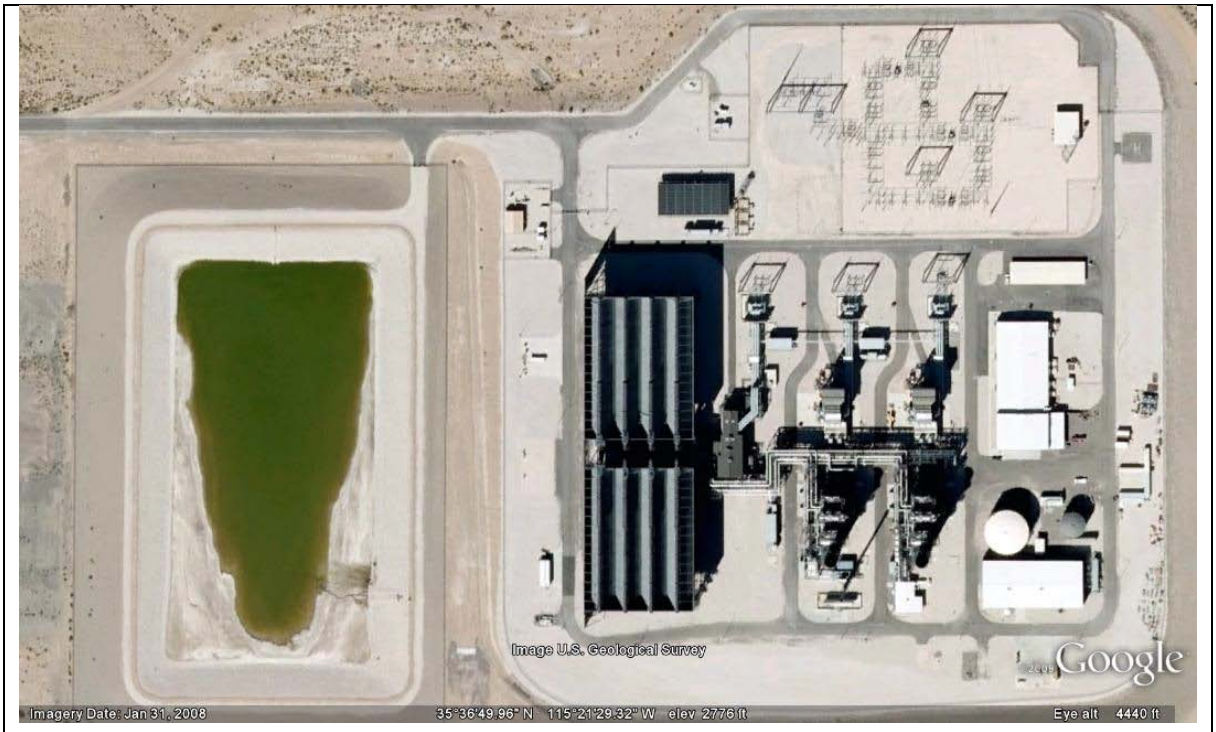

Figure 2. Nevada Power Walter E. Higgins Power Plant, Primm, Nevada

AeroPacific Consulting

Flight Test Report

Glint/Glitter Evaluation of SEGS, and Convective Plume Evaluation of Walter Higgins Power Plant

Douglas M. Moss
AeroPacific Consulting
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Torrance, CA 90503

Table of Contents

Executive Summary

The test objectives were to assess the impacts to flight safety of both the glint/glitter of a solar power plant and the convective plumes from a set of Air Cooled Condensers (ACC) from a power plant.

A total of three test flights were flown - one to assess the glint/glitter of the Solar Energy Generation System (SEGS) near Kramer Junction, California; and two flights to assess the convective plumes at the Walter E. Higgins power plant near Primm, Nevada.

During the photo flight, photographs were taken of the SEGS facility from a low sun angle, approaching from the west, near sunset. Both visual impressions and photographs indicated a collimated beam of specular reflection from the facility when the aircraft was appropriately located along the reflected beam. This reflected light was not objectionable to the observer and would not present a hazard to a pilot trying to land an aircraft at a nearby airport. Numerous photographs were taken to illustrate the characteristics of the reflections.

Thirty-four test points were flown at the Higgins Power Plant near Primm, Nevada. During these flights, quantitative data were taken of the aircraft's response to the convective plume and the workload required of the pilot to control the aircraft. Both cruise and landing configurations were flown, simulating an aircraft on a downwind leg in a landing pattern and one on final approach immediately prior to landing. Various altitudes were flown over the power plant, but most of the emphasis was placed at the 500 foot altitude above the ACC. The aircraft response to the plumes varied from high-frequency/low-amplitude aerodynamic chop to oscillatory bank angle changes of up to 25 degrees of bank. The variations generally were more prominent when the aircraft was closer (in altitude) to the source of plume. Since the ACC was adjacent to the Heat Recovery Steam Generators (HRSG), some of the aircraft responses were likely due to the HRSG plume as opposed to the ACC plume. For those points where the ACC was the contributor, the aircraft response was more benign. Even at 500 feet above the facility, the aircraft was fully controllable and recovery from any dynamic upset was fully within the capability of a student pilot with limited experience.

Based upon my education, training, and experience, it is my opinion, to a reasonable degree of engineering certainty that neither the glint/glitter characteristics of solar arrays nor the convective plume characteristics of an ACC array pose a significant threat to general aviation aircraft operating at traffic pattern altitudes.

Specifically with respect to the solar array plan and ACC locations proposed for the Blythe Solar Power Plant (BSPP), it is my opinion that the currently proposed design and location of the ACCs and solar arrays will not present significant glint/glitter or convective plume hazard to aviation.

Introduction

General

Background

Tests were conducted to determine the hazards to flight safety of the proposed Blythe Solar Power Plant (BSPP). The Solar Energy Generating System (SEGS), near Kramer Junction, California was used as a basis for evaluating the negative impact of flying a general aviation aircraft near a solar plant. The Walter E. Higgins Power Plant, near Primm, Nevada was used to evaluate the extent of any degradation to aircraft flying qualities or other negative impacts of a convective plume typical of Air Cooled Condensers (ACC).

Previous tests of thermal plume effects have been accomplished by others. Those tests, however, categorized the deleterious effects of a convective plume in terms of a turbulence level. This correlation was inappropriate for the relevant hazards of the convective plume of a power plant. Turbulence, as defined by the Federal Aviation Administration, relates primarily to passenger comfort and ability to walk and serve food and beverages. In extreme cases this definition may also relate to potential for aircraft damage. The actual hazard with convective plumes of a power plant to general aviation aircraft, however, is the pilot's temporary loss of aircraft control while close to the ground. A general aviation aircraft is more susceptible to convective plumes than a large airliner primarily due to its lower wing loading and mass moment of inertia about the longitudinal (roll) axis. The wing loading of a typical airliner is between 120 and 130 lb_f/ft^2. This is significantly higher than the wind loading of a Cessna C-152 (10.4 lb_f/ft^2) or a Beech Bonanza (16.9 lb_f/ft^2). The lower the wing-loading, the more an aircraft responds to a convective plume - both in normal acceleration and roll moment. Thus, choosing a criteria other than turbulence was necessary to determine hazards of a convective plume. For the tests conducted for this report, the changes in bank angle and pitch attitude after a 2-second delay was used as the criteria.

Test Objectives

The objectives of this tests were to:

1. Assess the flight hazards associated with the glint/glitter of a solar power plant as it affects general aviation aircraft in the approach and landing phases.
2. Assess the flight hazards associated with the convective plume of an Air Cooled Condenser (ACC) as it affects general aviation aircraft in the approach and landing phases.

Test Equipment

The test aircraft was a 1960 Beechcraft M35 Bonanza, registration N9366Y. The aircraft was equipped with an IO-470N, 6-cylinder, fuel-injected engine. The aircraft was also equipped with two Osborne fuel tanks on the wing tips. These tanks, however, were intentionally empty of fuel in order to minimize the

Figure 1. N9366Y

mass moment of inertia along the longitudinal (roll) axis. This allowed the maximum amount of roll angle response to a given amount of asymmetric convective plume.

The aircraft was also equipped with a Shadin fuel computer that measured fuel flow and computed fuel used and fuel remaining. The fuel remaining values were then added to the aircraft's Zero-Fuel-Weight (ZFW) to determine the aircraft's weight for each test point. The aircraft's empty weight was 2,135 lbs. The weight of the pilots and luggage was 435 lbs. This resulted in an aircraft ZFW of 2,570 lbs.

The aircraft was equipped with a ventral skeg to reduce directional (yaw-axis) dynamic oscillations. Additionally, the aircraft was equipped with a S-TEC electronic yaw damper and an S-TEC 50 autopilot. Neither of these two electronic devices were engaged during the execution of these tests.

The g-loadings (n_z) were measured with the accelerometer incorporated into an Apple iTouch device. The G-Meter application (app) was used to display the instantaneous and maximum normal g-levels for each test point.

A Sony V-O-R Micro Cassette model M-635VK audio recorder was used to record the pilot comments through the aircraft's intercom system.

Altitude values were measured using the aircraft's altimeter, with the local altimeter setting.

Pitch and bank angles were measured using the aircraft's attitude indicator.

A Nikon D60 Single Lens Reflex (SLR) camera was used to photograph the SEGS facility.

Test Limitations

These tests were conducted within the requirements of FAR Part 91 (General Operating and Flight Rules), FAR Part 61 (Certification of Pilots), and FAR Part 43 (Maintenance), among others.

Specifically, the tests adhered to the minimum altitude requirements of FAR Part 91.119 (Minimum Safe Altitudes), whereas the areas flown over during the photo flights and plume assessments were considered to be uncongested areas and a 500 ft minimum distance from any structure was maintained. Furthermore, sufficient altitude was always maintained in order to select and achieve a suitable landing surface in the event of engine failure.

SEGS Glint/Glitter Evaluation

Test Procedures

The aircraft was flown over the SEGS Solar Power Plant, near Kramer Junction, CA in the Mojave Desert. The photographic portion began around 7 PM on June 1, 2010. Sunset on that date was published as 7:59 PM. A series of patterns were flown, both parallel and perpendicular to the western edge of the solar power plant. The aircraft's elevation angle in relation to the power plant was controlled so that the aircraft was directly between the sun and the power plant - thus maximizing any specular reflection from the solar troughs. The minimum altitude flown was 500 ft above the ground and away from any objects.

Results and Analysis

The glint and glitter effects were evaluated from numerous angles and altitudes. The most significant visual aspect was what appeared to be specular reflection of the sun observed as a collimated brilliance that translated along the area of the reflectors consistent with the aircraft's movement along the reflector axes (see Fig 2). The intensity of the beam was not extreme and was of less intensity than the direct sun. This reflection would not be considered distracting to a pilot.

Figure 2. Collimated specular reflection

The second-most significant visual observation was the specular reflection of some of the leading-edge panels of the arrays. These appeared to be more prominent than panels in the rear or midsection as viewed by an observer. The reflections from these leading edge panels, however, would not considered to be distracting to a pilot. (see Fig 3).

Figure 3. Leading edge panel reflections

Occasionally, small spot reflections were observed from unique features within the solar array, most likely representing isolated panels that were misaligned with respect to its adjacent panels, or possibly irregular objects. (see Fig 4).

Figure 4. Spot reflections in 3rd and 5th rows

Pilots naturally adapt themselves to their environment. It is a necessary skill of their occupation. Visual distractions frequently occur in aviation. Examples include bright ramp lights shining in the pilot's eyes at night, a setting sun co-aligned with the runway during takeoff or landing, or off-angle reflections of the sun from highly-reflective objects. Pilots develop techniques for dealing with these distractions. Furthermore, most of the time they occur with adequate warning thus allowing the pilot adequate time to compensate. In summary, it is my opinion that the glint and glitter observed during the overflight of SEGS would not pose a hazard to aviation.

Walter E. Higgins Plume Evaluation

Test Procedures

The convective plume tests were conducted in the early morning in order to ensure calm winds and avoid solar heating and natural convective turbulence.

As a safety precaution, the tests were planned to go from high to low altitudes over the power plant. The land upon which the ACC is located was 2, 600 ft Mean Sea Level (MSL). The height of the ACC was 210 ft. Therefore, the top of the ACC was 2,810 ft MSL. The first fly-over altitude was flown at 4,310 ft (MSL). Consequently, the first flyover point was 2,500 feet above the top of the ACC. All subsequent altitudes in this report will correlate to altitudes above the top of the ACC. The lowest altitude flown during any test point was 500 ft above the top of the stack. Additionally, for safety considerations, adequate altitude was maintained at all times in order to select and glide to a suitable landing surface in the event an engine-failure occurred.

Subsequent over-flights were performed at successively lower altitudes after assessing that the aircraft response was easily controllable on the previous test point.

After entering the plume, the control column was held fixed by the pilot. Any bank angle or pitch attitude changes induced by the plume was not counter-acted by the pilot until after 2 seconds had elapsed. After such time, the pilot manipulated the controls in an operationally representative fashion to recover the aircraft to stabilized level flight. The 2-second delay was used to simulate the “startled” effect of pilots who were not mentally prepared to react to a convective plume.

The run-in heading used for most of the runs was approximately 170-350 degrees magnetic. This line was selected because, at the time of testing, the identity of the operating ACC was not known. Additionally, this run-in line gave the maximum separation from the two Heat Recovery Steam Generator (HRSG) stacks.

A figure-eight pattern was flown by making an approximately 30-degree heading change to the right, after flying over the ACC, followed by a left turn to the subsequent run-in heading. Comments were recorded during the turn.

The test was telephonically coordinated with the Las Vegas Flight Standards District Office (FSDO). Their suggestion was for us to coordinate further with Las Vegas Approach Control (ATC). Although we attempted to coordinate with ATC, our working altitudes were below their radar and radio coverages. Consequently, we coordinated directly with other local airborne traffic on the Jean Airport UNICOM (122.9 MHz). This was felt to be more effective than working with ATC radar.

The test points were flown in one of two configurations and speeds. The first set was flown in Cruise configuration - landing gear and flaps retracted, cowl flaps closed, and airspeed of 100 mph. This was used to simulate an aircraft in the downwind pattern, nominally at 800-1,000 ft AGL. The second set was flown in Landing configuration - gear and flaps fully extended, cowl flaps closed, and airspeed of 80 mph.

The test points were flown so as to fly through the ACC plume, either directly or offset slightly so that one wing would receive the direct force of the plume and the other wing would miss the plume. This was perceived to be the worst-case scenario.

Results and Analysis

Thirty-four test points were flown during the two flights. Both flights investigated the characteristics associated with Cruise and Landing Configurations.

Cruise Configuration

The first test point was flown at 2,500 ft above the ACC and no noticeable plume was observed. The next test point was flown at 2,000 ft above the ACC. At this height, the exhaust created a high-frequency, low-amplitude burble on the airframe. Most pilots would classify this as "light chop." No noticeable pitch and bank changes occurred.

Next, test points were flown at 1,000 and 1,500 ft above the ACC with no noticeable effects. It is likely that the aircraft flight-path passed to the side of the plume. There was a slight wind out of the west, as visualized by the orange wind sock on the top of the ACC. Thus, the lateral position of the exhaust plume at the aircraft's altitude had to be estimated. Flying a run-in heading directly into the wind was considered in order to minimize any drift error of the plume, but that westerly heading would have made the aircraft fly directly over the HRSG stack in addition to the ACC, which would have contaminated the data.

The first noticeable g-loading increase was felt at 700 ft above the ACC. It was associated with a light burble.

At 600 ft above the ACC, two runs were made where medium-amplitude burbles were felt on both runs, with a maximum n_z of 1.6 g. All day long, the maximum g readings, as a result of the exhaust plume, were not noticeably different from that experienced from the ambient convective turbulence created by solar heating of the terrain.

At 500 ft above the ACC, three runs were made in the Cruise configuration. Each time the aircraft entered the plume, the aircraft responded with a 5 to 10 degree oscillatory bank angle change (wing-rock), a 2 degree oscillation in pitch, and an n_z of 1.7 to 1.8 g. These deviations from stable flight were easily controlled by the pilot and would have been within the capability of a student pilot possessing limited experience.

Landing Configuration

The natural aircraft response to pilot inputs in the landing configuration was naturally slower than the cruise configuration because of the slower airspeed. This implies that any deviation from stable flight may be more hazardous because the pilot would have less time to respond since the aircraft response is slower.

During the tests in the Landing Configuration, the deviations in bank angle were slightly larger. During one test point, a 25-degree deviation in bank angle occurred, requiring a moderate correction by the pilot. If this had truly occurred on final approach and close to the ground,

then it would have been a challenge for the pilot to quickly recover. It, however, would have been little different from the destabilizing effects of ambient turbulence typically experienced in the summer. Furthermore, it appeared that this test point encountered the plume from the HGSR, instead of that of the ACC.

On several points while configured for landing, the plume resulted in a momentary stall warning by the aircraft's artificial stall-warning system. The inherent restorative dynamic stability of the aircraft, however, quickly and naturally recovered from this momentary increase in angle-of-attack.

Due to the aircraft's naturally slower response to control-wheel deflections, the workload and time required for the pilot to respond to the dynamics of the convective plume was more prominent at the slower speed in the Landing Configuration. At no time, however, did the workload exceed that of a student pilot possessing limited experience.

Additionally, it should be noted that the natural thermal convective conditions associated with surface heating was equivalent to that experienced while flying through the plume. In fact, the largest bank angle excursions occurred between test points while the aircraft was maneuvering to set up for the next run-in.

Applicability to the Blythe Solar Power Plant (BSPP)

The primary issue with BSPP is the location of ACC 4 - approximately 14,000 feet from the approach-end of runway 17. Aircraft operating in a conventional right-hand traffic pattern would not overfly this ACC. It is foreseeable, however, that some aircraft may overfly this ACC while entering the traffic pattern for runway 17 in an unconventional manner. Even if doing so, however, their altitude would either be 800 feet above the runway, level at pattern altitude, or on a curved glideslope to landing at approximately 700 feet above the runway. Therefore, the only ACC convective plume encounter that would be applicable to BSPP would be one in which the aircraft was at approximately pattern altitude and at a speed measureably above that of final approach speed.

During all the tests conducted, there was no indication of a hazard to aviation due to an ACC convective plume encounter - down to 500 feet above the ACC in the Cruise configuration.

Conclusions

Based upon my education, training, and experience, it is my opinion, to a reasonable degree of engineering certainty that neither the glint/glitter characteristics of solar arrays nor the convective plume characteristics of an ACC array pose a significant threat to general aviation aircraft operating at traffic pattern altitudes.

Specifically with respect to the solar array plan and ACC locations proposed for the Blythe Solar Power Plant (BSPP), it is my opinion that the currently proposed design and location of the ACCs and solar arrays will not present a significant hazard to aviation.

Appendices

Flight Test Data

Run	Alt (ft) Above ACC	time	Config	Speed (mph)	ΔH (ft) alt	ΔΘ (deg) pitch	ΔΦ (deg) bank	Δn_z (g)	Fuel (gal)	Comments
1	2,500	7:18	Cruise	100						No detectable plume.
2	2,000	7:22	Cruise	100						Light bit of high-freq burble
3	1,500	7:25	Cruise	100					60.7	No plume
4	1,000	7:28	Cruise	100					60.2	No plume
5	700	7:31	Cruise	100					59.7	Ambient turbulence felt from surrounding area. Light burble in plume, slight normal bump of approx ¾ sec duration.
6	600	7:33	Cruise	100					59.9	Light high-freq/low amplitude burble.
7	600	7:36	Cruise	100		0	9	1.6	58.8	Starting using N-S headings from here on. High-frequency/low amplitude burble, oscillatory in bank, light chop.
8	500	7:39	Cruise	100		0	10		58.3	Light chop, with off-center hit resulting in wing rise
9	500	7:42	Cruise	100	+80	2	5	1.8	57.8	Light chop, small increase in altitude
10	500	7:45	Cruise	100		2	9	1.7	57.1	Larger oscillations in bank angle. Slight off-center
11	700	7:49	Land	80	+130		25	1.6	56.2	Probable HRSG plume. Large increase is altitude and large bank angle change. Moderate workload to recover from 25 deg bank angle change. Tolerable and controllable.
12	700	7:53	Land	80	+100	2	15	1.6	55.3	Easy to control. Probable HRSG plume.
13	600	7:56	Land	80	+50	2	8	1.5	54.7	
14	500	8:00	Land	80					53.8	No plume
15	500	8:02	Land	80					53.2	No plume
16	500	8:05	Land	80		0	10	1.5	52.6	Encountered turb 4 secs past stack, probable natural convection
17	500	8:07	Land	80					51.9	No plume
18	500	8:11	Land	80		5			51.0	Very light chop
19	500	8:13	Land	80	0	0	10		50.4	Light chop, easy to control
20	500	8:16	Land	80					49.8	No plume
21	500	8:18	Land	80	+100			1.8	49.2	Momentary stall warning
22	500	8:21	Land	80	+50	2	15	1.6	48.6	
23	500	8:24	Land	80	+40	1	15	1.7	48.0	

24	500	8:27	Land	80					47.3	
Run	**Alt (ft Above ACC)**	**time**	**Config**	**Speed (mph)**	**ΔH (ft) alt**	**ΔΘ (deg) pitch**	**ΔΦ (deg) bank**	**Δn_z (g)**	**Fuel (gal)**	**Comments**
31	500	11:57	Cruise	100	+50	0	0	2.0	61.8	Ambient turbulence averages approx 1.5 g. Very noticeable and abrupt onset of plume. Not objectionable. Controllable. Could feel more energy in that one.
32	500	12:01			+70	1	10		61.2	Possible HRSG stack on right. Hard to differentiate between ACC and HRSG. Not objectionable. Blends in with ambient turbulence.
33	500	12:03			-	1	0	2.0	60.7	Symmetrical bump, less than ½ sec in duration. Not objectionable.
34	500	12:05				2	10	0.4 - 1.7	60.3	Double hit, secondary bump. Standard kick in vertical, followed by drop-down. Ambient turbulence seems to be increase as the flight continues.
35	500	12:08			+50	1	10	2.3	59.8	Momentary stall warning. Symmetrical bump. Ambient turbulence. Worst bank angle for this series so far. Not objectionable.
36	500	12:11	Land	80	+80	1	10	1.9	59.0	
37	500	12:14							58.3	No plume
38	500	12:16			+100	1	15	1.9	57.9	Easily controllable

39	500	12:20			0	0	12	1.8	57.0	Increase performance prior to plume, +150ft and +15 mph attributed to ambient convection. Not objectionable. Easily controllable with conventional pilot inputs and responses. Left wing over ACC but right wing went up b/c of plume from HRSG.
40	500	12:22			+40		20	2.2	56.4	Momentary stall warning consistent with ambient convective turbulence.

Curriculum Vitae

Douglas Moss

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Firm/Expert Profile:

Douglas Moss (BS Engr, MS Engr, MBA, JD) is a trained and experienced professional pilot and engineer. He provides research and investigations of aircraft accidents to determine the causal factors. His professional experience spans over 33 years in aviation as an engineer and professional pilot, including assignments as a USAF fighter pilot, USAF experimental test pilot, McDonnell Douglas engineering test pilot, airline pilot, and general aviation pilot. His academic education includes both bachelor and master degrees in engineering, with additional advanced degrees in business and law. He has also been a faculty instructor at the USAF Test Pilot School, teaching aircraft certification, flying qualities, performance, systems, and human factors. He currently instructs courses in Aviation Human Factors at USC's Viterbi School of Engineering.

His analysis of aviation accidents typically involve considerations of:

- Engineering and scientific bases
- Operational factors
- Human factors
- Aircraft certification compliance (14 CFR Parts 21 and 25)
- FAR statutory compliance (14 CFR Parts 91, 121 and 135)
- Strict products liability
- Aircrew standard of care

Professional Experience:

Over 11,400 flight hours
Faculty instructor of Human Factors at the USC's Viterbi School of Engineering
USAF experimental test pilot
McDonnell Douglas engineering test pilot
USAF Test Pilot School instructor
Airline pilot
ATP Typed DC-9, MD-80, MD-90, MD-11, A320 and Flight Engineer
Qualified in various models of Cessna, Piper, and Beechcraft

Education/ Training:

Concord Law School, Juris Doctor
University of Southern California - Aviation Safety & Security Course
University of Phoenix: Master of Business Administration
Georgia Institute of Technology: Master of Science – Mechanical Engineering
Georgia Institute of Technology: Bachelor of Engineering - Nuclear Engineering
US Air Force: USAF Test Pilot School, Air War College, Air Command & Staff College, Squadron Office School

Professional Qualifications:

Airline Transport Pilot
Type Certificates: A320, MD-11, DC-9 (MD-80, MD-90)
Type Qualifications: F-15, F-4, A-37, T-33, T-34, T-37, T-38, T-46
Single-Engine, Land & Sea; Multi-Engine; Instrument
Flight Engineer – Turbojet Powered

Professional Affiliations:

Society of Experimental Test Pilots
Air Line Pilots Association
Aircraft Owners and Pilots Association
American Institute of Aeronautics and Astronautics
Society of Automotive Engineers - SAE International
Association of Aviation Psychology

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Richard Ardolino

I, Richard Ardolino, declare as follows:

1. I am presently employed by AECOM, as a National Director of Transmission and Substations.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Transmission Line Safety and Nuisance for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 7, 2010.

_____
Richard Ardolino

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Ralph Hollenbacher

I, Ralph Hollenbacher, declare as follows:

1. I am presently employed by Solar Millennium LLC, as a Director, Project Development Engineering.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Transmission Line Safety and Nuisance for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 8, 2010.

Ralph Hollenbacher

BLYTHE SOLAR POWER PROJECT
TRANSMISSION LINE SAFETY AND NUISANCE
OPENING TESTIMONY

I. Name: Richard Ardolino and Ralph Hollenbacher

II. Purpose:

Our testimony addresses the subject of Transmission Line Safety and Nuisance associated with the construction and operation of the Blythe Solar Power Project (09-AFC-06).

III. Qualifications:

Richard Ardolino: I am presently employed at AECOM, and have been for the past 2 years and am presently a National Director of Transmission and Substations with that organization. I have a Masters Degree in Electrical Engineering and I have over 35 years of experience in the field of Power Engineering. I prepared or assisted in the preparation of the section of the AFC as well as the post-filing information, data responses, and supplemental filings for Transmission Line Safety and Nuisance section. A detailed description of my qualifications is contained in the attached resume.

Ralph Hollenbacher: I am presently employed at Solar Millennium, LLC, and have been for the past 4 months. I am presently Director of Project Development Engineering with that organization. I have a Bachelor's Degree in Mechanical Engineering and a Masters in Business Administration and I have over 25 years of experience in the field of energy development, engineering and consulting. I prepared or assisted in the preparation of the AFC as well as the post-filing information, data responses, and supplemental filings for Transmission Line Safety and Nuisance section. A detailed description of my qualifications is contained in the attached resume.

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 1	**Application for Certification Volumes I & II**, dated August 24, 2009, and docketed on August 24, 2009, Section 5.14.

V. Opinion and Conclusions

We have reviewed the Transmission Line Safety and Nuisance section of the Revised Staff Assessment and agree that with incorporation of the Conditions of Certification, the section of the Project will not result in significant Transmission Line Safety and Nuisance impacts and will comply with all Transmission Line Safety and Nuisance-related laws, ordinances, regulations and standards (LORS). However we recommend the following language be added to Condition of Certification TSLN-1 to clarify that certain mitigation measures such as transmission tower height will not be incorporated into the design if it conflicts with other laws restricting height of the towers near the Blythe Airport.

TLSN-1 The project owner shall construct the proposed transmission line according to the requirements of California Public Utility Commission's GO-95, GO-52, GO-131-D, Title 8, and Group 2. High Voltage Electrical Safety Orders, sections 2700 through 2974 of the California Code of Regulations, and Southern California Edison's Electric's EMF reduction guidelines. ***The Project will follow Southern California Edison's EMF resign guideline for the design and construction of the 230kV interconnection line except where it conflicts with Federal Aviation Agency (FAA) and/or the Riverside County Airport Land Use Commission (RCALUC) rules and regulations.***

Verification: At least 30 days before starting construction of the transmission line or related structures and facilities, the project owner shall submit to the Compliance Project Manager (CPM) a letter signed by a California registered electrical engineer affirming that the lines will be constructed according to the requirements stated in the condition.

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Merlyn Paulson

I, Merlyn Paulson, declare as follows:

1. I am presently employed by AECOM, as a Senior Analyst.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating Visual Resources for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 _____06/06_, 2010.

_____
Merlyn Paulson

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-6**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Howard Balentine

I, Howard Balentine, declare as follows:

1. I am presently employed by AECOM as a Senior Program Manager.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Visual Resources for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 _June 9_____, 2010.

Howard W Balentine

_____
Howard Balentine

BLYTHE SOLAR POWER PROJECT
VISUAL RESOURCES
OPENING TESTIMONY

I. Name: Merlyn Paulson and Howard Balentine

II. Purpose:

Our testimony addresses the subject of Visual Resources associated with the construction and operation of the Blythe Solar Power Project (09-AFC-06).

III. Qualifications:

Merlyn Paulson: I am presently employed at AECOM Environment, and have been for the past 11 years and am presently a senior analyst with that organization. I have a Master's degree in Landscape Architecture from Harvard University and I have over 37 years of experience in the fields of aesthetics and visual resources. Beside my current employment with AECOM, I also am a Professor of Landscape Architecture and Environmental Planning, which I founded in 1975, at Colorado State University, and am the lead of the visual resources research and teaching program. I prepared or assisted in the preparation of the Visual Resources section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

Howard Balentine: I am presently employed at AECOM, and have been for the past 13 years and am presently a Senior Program Manager with that organization. I have a B.S. Degree in Physics and a M.E. Degree in Environmental Engineering and I have over 30 years of experience in the fields of air quality analysis and permitting, atmospheric dispersion modeling, and risk analysis. I prepared or assisted in the preparation of the glint and glare portion of the Visual Resources section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

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 own 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, I am sponsoring the following exhibits in this proceeding.

Exhibit 1	**Application for Certification Volumes I & II**, dated August 24, 2009, and docketed on August 24, 2009, Section 5.15.
Exhibit 4	**Data Adequacy Supplement**, dated October 26, 2009, and docketed on October 26, 2009.
Exhibit 9	**Palo Verde Solar I, LLC's Responses to CEC Data Request, Set 1 (1 through 260)**, dated January 2010, and docketed on January 22, 2010, Section 232 through 252.
Exhibit 12	**Palo Verde Solar I, LLC's Supplemental Responses to CEC Data Request Set 1**, dated January 2010, and docketed on January 22, 2010, Responses 232 through 252.
Exhibit 28	**Palo Verde Solar I's Issues Statement for April 15, 2010 Status Conference**, dated April 12, 2010, and docketed on April 12, 2010.
Exhibit 29	**Palo Verde Solar I, LLC's Initial Comments on the SA, DEIS**, dated April 19, 2010, and docketed on April 19, 2010.

V. Opinion and Conclusions

VISUAL RESOURCES

Page C.12-1, Second Paragraph

"Staff concludes that these visual impacts would be significant in terms of three of the four criteria of California Environmental Quality Act (CEQA) Appendix G, and could not be mitigated to less than significant levels and would thus result in significant and unavoidable impacts under CEQA." However, the CEC visual analysis process is highly dependent on photographs of existing conditions and accompanying photographic simulations. The RSA analysis for KOP-2 and KOP-3 is based only on very crude Google Earth-based simulations (perspective views of the Project site without simulations of Project facilities), with the following statement in each KOP impact discussion. "This perspective was

prepared because an appropriate visual simulation was not available at the time this RSE was prepared." The RSA for KOP-2 and KOP-3 does not utilize or even acknowledge that additional simulations were requested of the applicant in Data Requests and were submitted to the CEC on January 13, 2010 while the SA/DEIS was in early stages of preparation.

The RSA analysis does not provide a sound technical basis for its conclusions for KOP-2, KOP-3 and the remaining KOP-1, KOP-4, KOP-5, KOP-6, and KOP-7. The Applicant went to considerable effort and expense to provide life-size simulations for all of the KOPs (1 through 7). The RSA did not present these simulations at life-size and in fact stated they were not available. It is even more problematic that the simulations shown were apparently not produced from the PDFs provided by the Applicant. The RSA simulations are pixilated, unclear and do not show the careful attention to color and detail needed to portray the project's blending with the surrounding environment. Without clear photographs and life-size photographic simulations from which to assess the several BLM and CEC impact criteria of Project facilities (which were provided to the CEC/BLM in January 2010 as noted above), there is no valid and reliable professional, technical analysis/data to serve as an objective basis for discussion and conclusion about Project visual resources impacts and appropriate Conditions of Certification.

Palo Verde Solar I disagrees with the CEC Staff conclusions that: 1) the BSPP has significant and unmitigable adverse impacts on visual resources, and 2) the BSPP, in combination with other projects, would have significant unavoidable adverse cumulative impacts both within the Project viewshed and within the California Desert Conservation Area overall.

The BSPP will change the visual appearance of the Project area, but the Applicant does not agree that these changes necessarily mean that the Project will have unmitigable, significant adverse impacts. Viewed from eye level during most hours of the day, the solar field would be relatively unobtrusive, with the power block visible above the solar field. Power block structures would have neutral color finishes and non-reflective surfaces to minimize their contrast with the natural environment. From elevated locations, because of the movement of the sun and the changing orientation of the mirrors to track the sun's movement, the view would change over time. In afternoon hours when viewed from elevated locations to the southwest, the reflective surface of the mirrors would be oriented toward the viewer. At these times, on a sunny day, the solar array would create a visual impression that more closely resembles a body of water than a power plant or other industrial facility because the array would be reflecting the blue sky. On a cloudier day, the visual impression of the facility would appear grayer (reflecting gray sky). In late afternoon when the sun angle is low, the orientation of the mirrors is such that the visual impression from elevated locations to the southwest is primarily brown because the mirrors are reflecting the brown desert ground surface. In the morning hours, viewers from the same elevated locations

from the southwest would have the non-reflective backs of the mirrors toward them, in which case the visual contrast with the surrounding environment would be considerably less. It also must be acknowledged that viewers may find the BSPP facility visually interesting because of its contribution to important societal goals (renewable energy, greenhouse gas reduction, energy independence).

It can be argued that Project impacts should be considered significant and adverse merely because the Project area is classified as VRM Class III by BLM, a classification whose objective is to partially retain the existing character of the landscape, with a moderate level of change from the existing landscape, and with changes that do not dominate the view. However, it also must be noted that the BLM has designated the I-10 corridor as a utility corridor, and there already are high voltage transmission lines in the area (DPV 1, Blythe Energy), as well as an existing combined-cycle power plant (Blythe Energy I) a few miles from the BSPP site. BLM's designation of the area as a utility corridor conflicts with BLM's designation as VRM Class III. It would appear that this conflict might preclude a literal interpretation and strict adherence to VRM Class III management objectives.

The RSA concludes that there is a significant adverse impact associated with impacts from viewing locations in the McCoy Mountains west of the site. PVSI notes that the view to the east from the McCoy Mountains also would include existing developed areas in the same viewshed, including the Blythe Airport, I-10, residential areas, and agricultural fields, as well as other developed areas north and south of I-10. Thus, the visual character of the area when looking toward the BSPP site from elevated locations to the west of the site already contains substantial manmade changes to the natural environment. While the Project would represent additional change, the change would occur in an already modified visual context.

With respect to the RSA's assertion that the Project contributes to a significant unavoidable adverse cumulative impact in combination with other existing and foreseeable projects, PVSI notes the overall thrust of both Federal and State of California policy to reduce the nations' dependence on foreign oil and reduce greenhouse gas emissions by greatly expanding utilization of the solar resource of the California desert. The BSPP is located within desert areas being considered as potentially suitable for solar facilities as part of specific policy initiatives by both the Federal and state governments: the BSPP site is within a California Renewable Energy Zone (CREZ) as currently designated by California's Renewable Energy Transmission Initiative (RETI), as well as within one of the defined Study Areas being evaluated under the BLM/Department of Energy's ongoing Solar Energy Development Programmatic EIS. Thus, while the Project may appear to be in conflict with visual resources management policy objectives, it is in harmony with other important societal goals related to environment (greenhouse gas reduction and other impacts associated with the

production, processing, and consumption of fossil fuels), as well as economic and national security (less dependence on imported oil).

PVSI also takes exception to the inclusion as part of the cumulative impact discussion the assertion that the Project contributes to significant adverse cumulative visual impacts for the entire California Desert Conservation Area. This is an inappropriate perspective for cumulative visual impacts. Historically, including as recently as September 2009 (the Beacon Solar Energy Project Final Staff Assessment), CEC visual resources cumulative analyses appropriately considered the project viewshed (defined as extending out 15 miles from the project site), as the geographic extent of the cumulative evaluation. The logical premise is that the cumulative effect encompasses what would be visible from a single location, i.e., a cumulative impact would involve the same viewer in a location where they could experience the visual effects of multiple projects). "Cumulative impact" starts to lose meaning when it encompasses multiple viewsheds that could require driving for hours to get from one viewing location within which a facility is visible to another viewing location from which a different facility (but not the first one) is visible.

Page C.12-26, CEQA Level of Significance ("Would the project create a new source of substantial light and glare…")

Condition of Certification **VIS-4** from the SA/DEIS has been removed for further study and replaced with VIS-5 (renumbered to VIS-4 for the RSA). The RSA indicates that the Project would "potentially" create a substantial source of daytime glare, but that a more definitive conclusion would be based on an independent study of glint and glare being prepared for the CEC. As written, the Condition requires slatted fencing along the north and south boundaries of Project site because of "glint and glare/"bright spots" concerns. Such fencing would serve no useful purpose and is inconsistent with the optics leading to the production of glint/glare from the mirror array, and the Applicant continues to hold the position that this requirement should be deleted from the Conditions of Certification.

As discussed in the following paragraphs, the production of glint/glare from the mirror array, or in more accurate terminology, specular reflection, is not due to direct reflection of the sun by the parabolic mirror but is due to three sources of light of much lower intensity:

1. The reflection of incoming sunlight from a small linear area along the front of the Heat Conducting Element (HCE) that is normal (perpendicular) to the sun and intercepts and reflects a small portion of the incoming sunlight.
2. Direct reflection of sunlight from metal components of the parabolic mirror array such as connectors along the HCE tube and structural elements.

3. Sunlight that is first refracted, reflected, and/or scattered by the glass tubes comprising the HCE that then strikes the mirror and is subsequently reflected outwards in a columnar beam, but at a greatly reduced intensity.

Specular reflection must obey the Law of Reflection, derived from Snell's Law of Refraction, in which the incoming and outgoing light rays form the same angle of incidence from the normal to the reflecting surface. The mirror arrays at all solar trough power plants are aligned north-south to allow east-west tracking of the sun. The normals for any given HCE tube are therefore east and west of the solar array, and therefore reflections can only occur to the east and west.

The only time specular reflection can occur from the BSPP mirror array and be visible by a ground level observer is when the observer is to the east or west of the mirror; the sun is low on the horizon, to the back of the observer and slightly over the observer's shoulder; and the observer is looking at the approximate point where a perpendicular line from the observer to the HCE intersects the HCE. This means that the glare will not be observable from I-10 to the south of the BSPP and will not be visible from the Blythe Airport to the southeast of the BSPP.

For a properly situated ground level observer, the only time glare would be visible is in the first few hours after sunrise, or before sunset, when the sun is low on the horizon and contributing its own glare. As the McCoy Mountains are immediately to the west of the proposed BSPP facility, the general public will only be exposed to the potential specular reflections when located to the east of the mirror arrays in the early morning hours if they could see over the 30 foot high wind fences. For hikers in the McCoy Mountains, the glint/glare would be visible only in the late afternoon/evening hours. As the sun rises in the sky during the morning and the mirrors begin tracking the sun, the Law of Reflection will not allow a ground level observer to observe the reflection. It is important to reiterate that the reflection (glare or glint) is specular reflection from the HCE tube with lesser amounts of scattered and refracted light, not direct reflection of the sun from the parabolic mirror.

As part of the studies in support of the Traffic and Transportation analyses, the Applicant commissioned an aircraft flight on June 1, 2010, at the Kramer Junction SEGS facility to observe glint/glare from the facility at low sun angles near sunset. Mr. Howard Balentine was an observer on this flight. Fly-by passes of the SEGS facility were as low as 500 ft above ground level and would be representative of the view from an observer on the McCoy Mountains in the late afternoon. Based on personal observations, Mr. Balentine concluded that the intensity of the glint/glare from the SEGS mirrors was relatively low in intensity and much less bright than the setting sun in the opposite direction. During the entire flight, the solar array could be viewed continuously without need to look away due to brightness.

Below a certain solar elevation angle in the late afternoon/early evening that will depend on season, the McCoy Mountains as well as fencing to some degree depending on the sun angle and time of day will block sunlight form reaching most/all of the solar array and will put the solar array into shadow. In addition, due to the geometrical constraints that allow observation of glint/glare form a solar trough mirror, only a small portion of the array will produce glint/glare from a given observation point at a given time that will be dependent on the sun elevation angle and azimuth.

The RSA (and the earlier SA/DEIS) includes a ground level photograph of the Kramer Junction SEGS facility that shows a considerable amount of glare; this photo (and an aerial photo of the SEGS plant also included in the SA/DEIS and RSA) were attributed in the SA/DEIS to Michael Clayton &Associates (the CEC consultant who prepared the Visual Resources portion of the SA/DEIS and of the RSA). In the RSA, Mr. Clayton denies that he is responsible for the photo(s) attributed to him and, instead incorrectly attributes both of them to the Applicant because they were provided as part of Palo Verde Solar I's response to a CEC Data Request. In fact, the photographs attributed by Mr. Clayton to the Applicant actually are from the Victorville 2 CEC Proceedings. They are part of a Hearing Exhibit submitted by the Applicant (the City of Victorville) in support of testimony by Mr. Scott Frier, COO of Abengoa Solar and former COO of the KJC Operating Company, which owned and operated the Kramer Junction SEGS plants.

Mr. Frier's testimony makes it clear that he was explaining that the apparent reflections in the photos are not reflections from the mirror surfaces of the array mirrors, but rather from the receiver tubes that contain the heat transfer fluid, and that the reflections from the tubes are much less intense than the sun's reflections in the mirror. Further, as discussed below, Palo Verde Solar I feels that the glare revealed in the ground level photo incorrectly attributed by Mr. Clayton is an artifact of an overexposed photograph, not of reality. For CEC Staff to attribute the photographs to the Applicant leaves the incorrect and unfair impression that the Applicant considers the photos representative and realistic, when in fact, the opposite is the case.

Palo Verde Solar I feels that the most plausible explanation for the non-representativeness of the ground level SEGS photo in the SA/DEIS and RSA (referred to herein as the "CEC photo"), is that the CEC photo is over-exposed. If an over-exposure did occur, the light sensor would have been saturated with the result that the apparent size of the glare spot is much larger than actually existed.

The CEC photo was taken from Highway 395 near sunrise looking west, as demonstrated by the horizontal pointing of the mirror and includes a broad expanse of dark pavement in the foreground. The early morning hour indicates relatively low light conditions, as does the relatively dark sky. Because the actual glare spot is small in the frame of the picture, it is unlikely to affect the area-weighted exposure algorithm in the camera and thus the exposure by the camera

will be overly influenced by the dark foreground. If the person taking the photograph in such a difficult exposure situation does not adjust the camera settings for the difficult exposure, the autoexposure mode of the camera will likely result in a wide aperture setting based on the general low light and dark foreground. This likely happened with the CEC photograph, resulting in a wider aperture than appropriate for the element in the photograph of interest – the glare spot - with a resulting overexposure of the glare. As a result, the glare is out of proportion from what actual occurred. In addition, the wider aperture will allow more flare in the lens and reflections from the mirror. The probable overexposure and flare in the CEC photo result in an intense spot of light not representative of actual viewing conditions.

Condition of Certification VIS-1

PVSI requests the following modification to ensure that it would not have to treat or paint the galvanized collector structural steel.

> **VIS-1** The project owner shall treat the surfaces of all project structures***, excluding galvanized collector structural steel,*** and buildings visible to the public such that a) their colors minimize visual intrusion and contrast by blending with (matching) the existing characteristic landscape colors; b) their colors and finishes do not create excessive glare; and c) their colors and finishes are consistent with local policies and ordinances. The transmission line conductors shall be non-specular and non-reflective, and the insulators shall be non-reflective and non-refractive.

Condition of Certification VIS-4

For the reasons discussed above in the PVSI comment concerning page C.12-1, this condition should be deleted.

Condition of Certification VIS-4 (was VIS-5 in SA/DEIS)

This condition requires various design components be incorporated but incorporation of these costly measures, according to Staff, will not reduce the visual impacts to less than significant levels. Since Staff believes a Finding of Override is required to License this project, there seems to be no impact or LORS-related reason to incur the costs to implement Condition of Certification VIS-4 and it should be deleted.

It should be noted that most of the design concepts mentioned in the Condition are embodied in other disciplines/Conditions (e.g., retain as much vegetation as possible, use vegetation for screening when possible, limit grading and unnecessary disturbance); some are obvious and already planned (minimize number of buildings and combine functions). The key elements of mitigation for

Visual Resources are presented in the other Visual Conditions ((surface treatment, lighting, and revegetation). There is no adequate justification for a possible additional elaborate design review and verification process, particularly one that is largely redundant with other disciplines and mitigation measures.

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of: Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DOCKET NO. 09-AFC-06** **DECLARATION OF** Mike Dudasko

I, Mike Dudasko, declare as follows:

1. I am presently employed by AECOM, as a Senior Program Manager for Air Quality and Compliance.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Waste Management for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 7, 2010.

Mike Dudasko

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of: Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DOCKET NO. 09-AFC-06** **DECLARATION OF** Mark Luttrell

I, Mark Luttrell, declare as follows:

1. I am presently employed by AECOM, as a Vice President.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Waste Management for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 9, 2010.

Mark Luttrell

Mark Luttrell

BLYTHE SOLAR POWER PROJECT
WASTE MANAGEMENT
OPENING TESTIMONY

I. Name: Mike Dudasko and Mark Luttrell

II. Purpose:

Our testimony addresses the subject of Waste Management associated with the construction and operation of the Blythe Solar Power Project (09-AFC-06).

III. Qualifications:

Mike Dudasko: I am presently employed at AECOM, and have been for the past 7 years and am presently a Senior Program Manager for Air Quality and Compliance with that organization. I have a Bachelor's Degree in Chemical Engineering and I have over 30 years of experience in the field of process and environmental engineering. I prepared or assisted in the preparation of the Waste Management section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

Mark Luttrell: I am presently employed at AECOM, and have been for the past 6 years and am presently a Vice President with that organization. I have a Masters of Science Degree in Civil Engineering and I have over 36 years of experience in the field of environmental consulting. I prepared or assisted in the preparation of the Waste Management section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

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 1	**Application for Certification Volumes I & II**, dated August 24, 2009, and docketed on August 24, 2009, Section 5.16.
Exhibit 4	**Data Adequacy Supplement**, dated October 26, 2009, and docketed on October 26, 2009.
Exhibit 9	**Palo Verde Solar I, LLC's Responses to CEC Data Request, Set 1 (1 through 260)**, dated January 2010, and docketed on January 22, 2010, Responses 253 through 258.
Exhibit 29	**Palo Verde Solar I, LLC's Initial Comments on the SA, DEIS**, dated April 19, 2010, and docketed on April 19, 2010.

V. Opinion and Conclusions

We have reviewed the Waste Management section of the Revised Staff Assessment and agree that with incorporation of the Conditions of Certification, the Project will not result in significant Waste Management impacts and will comply with all applicable Waste Management-related laws, ordinances, regulations and standards (LORS).

Staff has been very responsive to our comments on the SA/DEIS and we offer the following clarification to the Verification to **Condition of Certification WASTE-8** for the sole purpose of harmonizing the language in the verification to the language in the condition regarding the definition of "spill" in terms of quantity that shall be reported.

> **Verification:** Within 28 days of an HTF spill ***of 42 gallons or more*** the project owner shall provide the results of the analyses and their assessment of whether the HTF-contaminated soil is considered hazardous or non-hazardous to DTSC and the CPM for review and approval.

Condition of Certification WASTE-9

This condition requires documentation and reporting of all releases to the CPM within 30 days of discovery. PVSI would like to make clarifications on what is defined as a release. To this end, PVSI suggests that the

"release" be defined per Title 40 of the Code of Federal Regulations, Part 302.3. This definition is:

> *Release* means any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles containing any hazardous substance or pollutant or contaminant), but excludes:
>
> (1) Any release which results in exposure to persons solely within a workplace, with respect to a claim which such persons may assert against the employer of such persons;
>
> (2) Emissions from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel, or pipeline pumping station engine;
>
> (3) Release of source, byproduct, or special nuclear material from a nuclear incident, as those terms are defined in the Atomic Energy Act of 1954, if such release is subject to requirements with respect to financial protection established by the Nuclear Regulatory Commission under section 170 of such Act, or for the purposes of section 104 of the Comprehensive Environmental Response, Compensation, and Liability Act or any other response action, any release of source, byproduct, or special nuclear material from any processing site designated under section 102(a)(1) or 302(a) of the Uranium Mill Tailings Radiation Control Act of 1978; and
>
> (4) The normal application of fertilizer;

PVSI feels that this clarification will not result in unnecessary burden to report minor incidents such as small releases within the shop or other contained area form the documentation and reporting requirement. PVSI recommends that **WASTE-9** be revised as follows:

> **WASTE-9** The project owner shall ensure that all accidental spills or unauthorized releases of hazardous substances, hazardous materials, and hazardous waste are documented and remediated, and that wastes generated from accidental spills and unauthorized releases are properly managed and disposed of in accordance with all applicable federal, state, and local requirements. ***For the purpose of this Condition of Certification, "release" shall have the definition in Title 40 of the Code of Federal Regulations, Part 302.3.*** The project owner shall document management of all accidental spills and unauthorized releases of hazardous

substances, hazardous materials, and hazardous wastes that occur on the project property or related linear facilities. The documentation shall include, at a minimum, the following information: location of release; date and time of release; reason for release; volume released; how release was managed and material cleaned up; amount of contaminated soil and/or cleanup wastes generated; if the release was reported; to whom the release was reported; release corrective action and cleanup requirements placed by regulating agencies; level of cleanup achieved and actions taken to prevent a similar release or spill; and disposition of any hazardous wastes and/or contaminated soils and materials that may have been generated by the release.

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of: Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DOCKET NO. 09-AFC-06** **DECLARATION OF** Alice Harron

I, Alice Harron, declare as follows:

1. I am presently employed by Solar Millennium, LLC, as a Senior Director.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Worker Safety and Fire Protection for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 Jan 8, 2010.

Alice Harron

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Steve Petto

I, Steven R. Petto, declare as follows:

1. I am presently employed by AECOM, as an Engineering Department Manager.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Worker Safety and Fire Protection for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 5, 2010.

Steven R. Petto

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Mike Arvidson

I, Mike Arvidson, declare as follows:

1. I am presently employed by AECOM, as a Department Manager.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Worker Safety and Fire Protection for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 7, 2010.

Mike Arvidson

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Daniel Bak

I, Daniel Bak, declare as follows:

1. I am presently employed by AECOM, as a Senior Fire Engineering Consultant.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Worker Safety and Fire Protection for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 11, 2010.

Daniel Bak

BLYTHE SOLAR POWER PROJECT
WORKER SAFETY AND FIRE PROTECTION
OPENING TESTIMONY

I. Name: Alice Harron, Steve Petto, Mike Arvidson and Daniel Bak,

II. Purpose:

Our testimony addresses the subject of Worker Safety and Fire Protection associated with the construction and operation of the Blythe Solar Power Project (09-AFC-06).

III. Qualifications:

Alice Harron: I am presently employed at Solar MiIlennium, LLC, and have been for the past 8 months and am presently a Senior Director with that organization. I have a B.A. Degree in Economics and I have over 15 years of experience in the field of energy. I did not prepare or assist in the preparation of this section of the AFC but I did assist in preparing the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

Steve Petto: I am presently employed at AECOM, and have been for the past 5+ years and am presently an Engineering Department Manager with that organization. I have a Bachelor of Science Degree in Chemical Engineering and a Master in Business Administration and I have over 30 years of experience in the field of engineering of energy-related facilities. I prepared or assisted in the preparation of the Worker Safety section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

Mike Arvidson: I am presently employed at AECOM, and have been for the past 3 years and am presently a Department Manager with that organization. I have a B.S. Degree in Civil Engineering and I have over 10 years of experience in the field of Environmental Health & Safety Management. I prepared or assisted in the preparation of the Worker Safety and Fire Protection section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

Daniel Bak: I am presently employed at AECOM, and have been for almost 3 years and am presently a Senior Fire Protection Engineer with that organization. I have a B.S. Degree in Fire Protection and Safety Engineering, an M.S. Degree in Safety Engineering, a Ph.D. in Industrial

Engineering, and I have over 25 years of experience in the field of Fire and Life Safety Engineering. I am familiar with the Worker Safety and Fire Protection section of the AFC as well as the post-filing information, data responses, and supplemental filings and will be participating in assessments of risk and resource response needs. A detailed description of my qualifications is contained in the attached resume.

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 1	**Application for Certification Volumes I & II**, dated August 24, 2009, and docketed on August 24, 2009, Section 5.18.
Exhibit 9	**Palo Verde Solar I, LLC's Responses to CEC Data Request, Set 1 (1 through 260)**, dated January 2010, and docketed on January 22, 2010, Responses 259 through 260.
Exhibit 29	**Palo Verde Solar I, LLC's Initial Comments on the SA, DEIS**, dated April 19, 2010, and docketed on April 19, 2010.
Exhibit 34	**Responses to Questions from CEC April 28, 29 and May 7 Workshops Re: Worker Safety, Hazardous Materials, and Water Resources**, dated May 13, 2010, and docketed May 13, 2010.
Exhibit 35	**Responses to Questions from CEC April 28, 29 and May 7 Workshops Re: Worker Safety & Hazardous Materials**, dated May 14, 2010, and docketed on May 14, 2010.
Exhibit 36	**Responses to April 28, 29 & May 7 Workshops Re: Operation Phase Fire Protection**, dated May 14, 2010, and docketed on May 14, 2010.

Exhibit 37 **Responses to April 28, 29 & May 7 Workshops Re: HTF Fluid (Burn Rate Discussion)**, dated May 14, 2010, and docketed on May 14, 2010.

V. Opinion and Conclusions

We have reviewed the Worker Safety and Fire Protection section of the Staff Assessment and agree that with incorporation of the modifications set forth below to the Conditions of Certification, the Project will not result in significant Worker Safety and Fire Protection impacts and will comply with all applicable Worker Safety and Fire Protection-related laws, ordinances, regulations and standards (LORS).

Page C.14-36, 37 and 38, Conditions of Certification WORKER SAFETY - 6, - 7 and - 8

Staff has made quite a number of assertions in the RSA about the need and cost of facilities. The Applicant is still discussing these requests with the Riverside County Fire Department. To our knowledge, the Staff is assuming mitigation provisions that the RCFD has not yet decided to be needed from its standpoint. Applicant requests the ability to continue to coordinate with the RCFD to establish the level of fire-related risk associated with the BSPP and determine the appropriate level of response capability commensurate with that risk and consistent with applicable safety regulations.

WORKER SAFETY-6

After careful consideration, the Client is willing to provide the secondary fire department access to the site if required by RCFD. Details of the design of secondary fire department access will be further discussed and detailed with appropriate parties. The design of the secondary fire department access will be submitted for approval as the design of the facility evolves further.

Applicant requests the following modifications to Worker-Safety 6:

WORKER SAFETY-6 The project owner shall

a. Provide a second access gate for emergency personnel to enter the site. This secondary access gate shall be at least one-quarter mile from the main gate.

b. ***If required by the Riverside County Fire Department***, provide a second access road that comes to the site. ***This road shall meet standards set forth in by the RCFD.***

c. Maintain the main access road and, ***if required***, the second road and provide a plan for implementation.

Plans for the secondary access gate, the method of gate operation, ***and, if necessary, secondary access road*** and to maintain the roads shall be submitted to the Riverside County Fire Department for review and comment and to the CPM for review and approval.

Verification: At least sixty (60) days prior to the start of site mobilization, the project owner shall submit to the Riverside County Fire Department and the CPM preliminary plans showing the location of a second access gate to the site, a description of how the gate will be opened by the fire department, and a description and map showing the location, dimensions, and composition of the main road, and, ***if necessary,*** the secondary access road to the second gate. At least thirty (30) days prior to the start of site mobilization, the project owner shall submit final plans plus the road maintenance plan to the CPM review and approval. The final plan submittal shall also include a letter containing comments from the Riverside County Fire Department or a statement that no comments were received.

CONDITION OF CERTIFICATION WORKER SAFETY-7

Staff has had discussions with the RCFD. Applicant requests time for its EPC contractor to produce its Fire Risk Evaluation Plan that it must prepare for the insurance company and the Fire Marshall. This plan is expected prior to the CEC License.

Applicant requests that the condition be changed to allow more informed discussions with the RCFD. In the meantime, to mitigate for ongoing negotiations, the applicant proposes the condition below that requires funding of $350,000 at start of construction, a portion of the $825,000 that the Staff is proposing. Applicant also requests a condition that an agreement must be executed or an independent consultant study be conducted and implemented by six months prior to the time HTF is delivered to the site. Estimate of first delivery to the site is approximately August 2012.

Staff asserts that money is needed immediately to ramp up the Fire Department for start of construction. However, the potential fire hazards of the magnitude with which Staff states is needed is based on the presence of large amounts of HTF that will not be present at the beginning of construction. Staff states:

“These new solar power plants are much larger in scale than the existing solar power plants (for example, Blythe solar would be ~1000 MW and ~10 square miles in area) and all will have huge amounts of highly flammable heat transfer fluid used and stored on site, as much as 2,300,000 gallons. The Blythe solar power plant (and Palen) will also have large fuel depots storing in excess of 20,000 gallons of diesel and gasoline during construction and perhaps even

during operations. The Palen solar project would also store in excess of 75,000 lbs of Liquefied Petroleum Gas (LPG). The amount of highly flammable fuel stored and used on-site, combined with the rather remote locations of the Blythe and Palen projects (and Genesis) and the potential for escalation of a small fire into a large conflagration, presents an emergency response challenge never before experienced by the RCFD. (p.14-25)."

The HTF will not be delivered until August 2012.

There will be a fuel depot on site from the beginning of construction. However, the asserted fuel storage and fire risk for which Staff seeks response capability funds begins at a low level at start of construction and changes with time as the plant moves closer to becoming fully operational.

As noted in letter communications from the county fire department to Risk Services Associates that was docketed on January 7, 2010, the BSPP is served by RCO Station #45, Blythe Air Base and RCO Station #44, Ripley that allow for the first unit to arrive within 2-3 minutes after dispatch and a second unit to arrive within 11-12 minutes. These responses are well within the letter's stated 8 mile response objective.

Moreover, fire risk at the BSPP is considered to be low based on the inherent nature and design of the facility and the limited quantities of the flammable materials to be stored there. The buildings to be erected on the premises are all one story and equipped with full sprinkler systems supported by water pressures from hydrants designed to meet all applicable fire code, building code and NFPA standards, including NFPA 850, NFPA 30, etc., will be followed.

The Therminol VP-1 heat transfer fluid (HTF) has a moderate vapor pressure and when released to the air vapor rapidly cools to below the fire point. It cannot be released in large quantities due to protection provided by extensive valving and installed leak detection systems. Even if ignited, the material will not sustain a flame and will quickly self extinguish at atmospheric pressures.

For these reasons, the applicant is not yet convinced of the need to provide funding at the proposed magnitude for expanded RCFP coverage in the Blythe areas a direct result of its operations. As Staff has acknowledged, applicant has shown that risk of HTF leakage and igniting is low and the burn would be contained.

Starting and maintaining a fire requires three things: an ignition source, a fuel supply and sufficient oxygen to support combustion. For an ignition source, we would assume that therminol is sprayed on a hot surface of the collector tube assembly. If the leak merely drips, the Therminol VP-1 will not come into contact a surface hot enough for ignition. Assuming that a spraying leak is detected, the mirrors will be defocused and the loop will be isolated. Defocusing the mirror

assemblies will be done immediately to prevent warpage of the collector tubes, which would occur if there was not proper heat removal. With the mirrors defocused and the loop isolated, the fluid working pressure of the loop will immediately begin to decrease due to a combination of the removal of the heat source, isolation of the loop from pump pressurization and the depressurization of the loop due to the leak. This depressurization of the loop will likely cause the leak to diminish to the point that the flame is self extinguished. Under this leakage scenario, there is low likelihood that all of the 1,250 gallons of therminol contained within a valved segment would burn. Under the most severe leakage event involving a guillotine rupture of a collector tube, defocusing of the mirror assemblies and isolation of the header would quickly reduce loop pressure. However, due to the high working fluid temperature, the therminol would be very hot and have good flow ability. Depending upon the actual leak configuration, this would cause most but not all of the therminol to drain from the header in approximately 15 minutes. As the header drains, ambient air will be drawn into the header cooling the remaining therminol and significantly reducing its flow ability. The therminol would not burn unless it drains from the header and reaches an oxygen source. Once drained from the header with adequate oxygen, it would be expected to burn very quickly or in approximately the 15 minutes required for the header to be voided.

To reach agreement and achieve fire protection appropriate for the true level of operational risk, applicant is willing to place an incremental fire response funding amount at the start of construction. If an agreement with RCFD cannot be reached at time of start of construction, Applicant is willing to commission an independent evaluation of the maximum credible release and fire scenario to support a determination of the corresponding level of fire response capability.

The applicant is willing to fund and participate in this independent study to determine the appropriate level of additional off-site resources that should be provided in readiness and will await the outcome of this study before committing to monetary payments at the level of those proposed by Staff. The applicant is willing to accept the requirement for such an independent study should an agreement not be reached prior to construction as a condition of certification.

The applicant will reach out to other solar developers to determine their interest in participating in such a study to evaluate the regional needs.
The applicant will also consider the formation of a group or association of solar energy producers to learn and share information on the new technology as well as pooling efforts and funds to further study the solar industry advancements and lessons learned to continually improve the overall safety of this new industry. PVSI will require some time to approach various producers and discuss the formation of an association.

Applicant proposes to modify Worker-Safety 7 as follows:

WORKER SAFETY-7 The project owner shall either:

(1) Reach an agreement, either individually or in conjunction with a power generation industry association or group that negotiates on behalf of its members, with the Riverside County Fire Department (RCFD) regarding funding of its project-related share of capital and operating costs to build and operate new fire protection/response infrastructure and provide appropriate equipment as mitigation of project-related impacts on fire protection services within the jurisdiction; **or**

(2) ***if such agreement is not reached, fund***

- ***a. $350,000 prior to start of construction***
- ***b. provide Fire Risk Evaluation to RCFD***
- ***c. execute an agreement to fund an independent consultant that will evaluate:***
  - ***i. Potential for impacts on local fire protection and costs of new local fire protection services necessary to mitigate such impacts***
  - ***ii. Recommend amount of funding that should be provided to mitigate any identified significant impacts on local fire protection services.***

No delivery of HTF shall be delivered to site until funding of mitigation occurs either pursuant to an agreement reached between project owners and RCFD or pursuant to Staff-approved independent consultant study.

If Independent Study or Agreement reached by parties subsequent to deposit of $350,000 determines that initial capital requirement is less than the deposit, then RCFD shall, at applicant's option, either refund the difference or apply the difference to the future annual operating costs.

~~Shall fund its share of the capital costs in the amount of $825,000 and provide an annual payment of $375,000 to the RCFD for the support of new fire department staff and operations and maintenance commencing with the start of construction and continuing annually thereafter on the anniversary until the final date of power plant decommissioning.~~

Verification: At least thirty (30) days prior to the start of site mobilization, the project owner shall provide to the CPM:

(1) A copy of the individual agreement with the RCFD or, if the owner joins a power generation industry association, a copy of the bylaws and group's agreement/contract with the RCFD; **or**

~~(2) Documentation that the amount of $850,000 has been paid to the RCFD, documentation that the first annual payment of $375,000 has been made, and shall also provide evidence in each January Monthly Compliance Report during construction and the Annual Compliance Report during operation that subsequent annual payments have been made.~~

(2) Documentation that the $350,000 deposit has been paid to RCFD and that the Fire Risk Evaluation has been delivered to staff and RCFD and/or independent study protocols have been agreed upon. The project owner must provide the CEC CPM with a copy of independent study or executed agreement with RCFD prior to delivery of HTF to the project site.

CONDITION OF CERTIFICATION WORKER SAFETY-8

Applicant objects to the requirement for "enhanced dust control" based on the occurrence of visible emissions. As justification for this requirement, CEC staff stated the following: "[G]iven the available scientific and medical literature on Valley Fever, it is difficult for staff to assess the potential for Valley Fever to impact workers during construction and operation of the proposed BSPP with a reasonable degree of certainty. To minimize potential exposure of workers and also the public to Valley Fever during soil excavation and grading, extensive wetting of the soil prior to and during construction activities should be employed and dust masks should be worn at certain times during these activities. The dust (PM 10) control measures found in the Air Quality section of this Revised SA should be strictly adhered to in order to adequately reduce the risk of contracting Valley Fever to less than significant." (page C.14-18) As the condition is worded, "whenever visible dust comes from…the site", the requirement for enhanced dust control measures take effect. This is a standard that is not practical to comply with, as visible emissions could occur with virtually any activity on unpaved surfaces, including simply walking across the site. While PSVI understands Staff's desire to be protective given the uncertainty, Valley Fever is not known to exist at the BSPP site. Therefore, in recognition of both the uncertainty and the need to have condition that does not unnecessarily restrict normal construction or operations activities, PSVI would propose to provide dust masks to workers for their use whenever there are visible emissions and implement a dust control plan similar to KCAPCD Rule 402; however, we would ask that section iii of the condition be reworded as shown below to clarify when enhanced dust control measures would be required.

In addition, the applicant recommends minor changes to Worker Safety-8 to clarify the intent of the underlying rules cited in the condition. Specifically, Worker Safety-8 references KCAPCD Rule 402. Rule 402, section C states: "For any large operation, except those satisfying Subsection V.D.3 (implementation of RACM's), a person shall not cause or allow downwind PM10 ambient concentrations to increase more than 50 ug/m^3 above upwind concentrations as

determined by simultaneous upwind and downwind sampling." The language in section iii of the condition should be changed to reflect the fact that 50 ug/m^3 is the contribution to PM10 concentrations due to project activities, not a cumulative total concentration.

Applicant proposes to modify Worker-Safety -8 as follows:

WORKER SAFETY-8 The project owner shall develop and implement an enhanced Dust Control Plan that includes the requirements described in AQ-SC3 and additionally requires:

i. Site worker use of dust masks (NIOSH N-95 or better) whenever visible dust is present;
ii. Implementation of methods equivalent to Rule 402 of the Kern County Air Pollution Control District (as amended Nov. 3, 2004); and
iii. Implementation of enhanced dust control methods (increased frequency of watering, use of dust suppression chemicals, etc. consistent with AQSC4) immediately whenever visible dust ~~comes from or onto the site~~ ***persists in the breathing zone of the workers,*** or when PM10 measurements obtained when implementing ii (above) ~~exceed~~ ***indicate an increase in PM10 concentrations due to Project activities of*** 50 µg/m3 ***or more***.

Verification: At least 60 days prior to the commencement of site mobilization, the enhanced Dust Control Plan shall be provided to the CPM for review and approval.

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of: Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DOCKET NO. 09-AFC-06** **DECLARATION OF** Ray Dracker

I, Ray Dracker, declare as follows:

1. I am presently employed by Solar Millennium LLC, as Vice President of Project Development.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Facility Design for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 9, 2010.

Ray Dracker

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of: Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DOCKET NO. 09-AFC-06** **DECLARATION OF** Steve Petto

I, Steven R. Petto, declare as follows:

1. I am presently employed by AECOM as an Engineering Department Manager.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Facility Design for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 5, 2010.

Steven R. Petto

Steven R. Petto

BLYTHE SOLAR POWER PROJECT
FACILITY DESIGN
OPENING TESTIMONY

I. Name: Ray Dracker and Steve Petto

II. Purpose:

Our testimony addresses the subject of Facility Design associated with the construction and operation of the Blythe Solar Power Project (09-AFC-06).

III. Qualifications:

Ray Dracker: I am presently employed at Solar Millennium LLC, and have been for the past 5 years and am presently a Senior Vice President with that organization. I have a Masters Degree in Nuclear Engineering and I have over 30 years of experience in the field of Renewable Energy. I prepared or assisted in the preparation of the Facility Design section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

Steve Petto: I am presently employed at AECOM, and have been for the past 5+ years and am presently an Engineering Department Manager with that organization. I have a Bachelor of Science Degree in Chemical Engineering and a Master in Business Administration and I have over 30 years of experience in the field of engineering of energy-related facilities. I prepared or assisted in the preparation of the Facility Design section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

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 1	**Application for Certification Volumes I & II**, dated August 24, 2009, and docketed on August 24, 2009, Section 2.5 and Appendix C.

V. Opinion and Conclusions

We have reviewed the Facility Design section of the Revised Staff Assessment and agree that with incorporation of the standard Conditions of Certification set forth therein, the Project will not result in significant impacts and will comply with all applicable Facility Design-related laws, ordinances, regulations and standards (LORS).

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Mike Flack

I, Mike Flack, declare as follows:

1. I am presently employed by AECOM, as a Senior Program Manager.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Geology, Paleontology and Minerals for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 7, 2010.

Mike Flack

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of: Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DOCKET NO. 09-AFC-06** **DECLARATION OF** Cara Corsetti

I, Cara Corsetti, declare as follows:

1. I am presently employed by SWCA Environmental Consultants, as an Office Principal.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Geology, Paleontology and Minerals for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 7th, 2010.

Cara Corsetti

BLYTHE SOLAR POWER PROJECT
GEOLOGY, PALEONTOLOGY AND MINERALS
OPENING TESTIMONY

I. Name: Mike Flack and Cara Corsetti

II. Purpose:

Our testimony addresses the subjects of Geology and Paleontology and associated with the construction and operation of the Blythe Solar Power Project (09-AFC-06).

III. Qualifications:

Mike Flack: Geologic Hazards Lead, I am presently employed at AECOM, Camarillo, California, and have been for the past 15 years and am presently a Senior Program Manager with that organization. I have a Masters of Science Degree in Geology and I have over 27 years experience principally in the area of groundwater and water resource investigation and remediation. I prepared or assisted in the preparation of the Geologic Hazards section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

Cara Corsetti: Paleontological Resources Lead, I am presently employed at SWCA Environmental Consultants, and have been for the past 9 years and am presently an Office Principal with that organization. I have a Masters of Science Degree in Geological Sciences, emphasis Paleobiology, and I have over 14 years of experience in the field of Paleontology. I prepared or assisted in the preparation of the Paleontological Resources section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

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 1	**Application for Certification Volumes I & II**, dated August 24, 2009, and docketed on August 24, 2009, Sections 5.5, 5.9 and Appendix H.
Exhibit 4	**Data Adequacy Supplement**, dated October 26, 2009, and docketed on October 26, 2009.
Exhibit 9	**Palo Verde Solar I, LLC's Responses to CEC Data Request, Set 1 (1 through 260)**, dated January 2010, and docketed on January 22, 2010, Responses 154 through 156.

V. Opinion and Conclusions

We have reviewed the Geology and Paleontology section of the Revised Staff Assessment and agree that with incorporation of the Conditions of Certification, the Project will not result in significant impacts to Geological or Paleontological Resources and will comply with all applicable laws, ordinances, regulations and standards (LORS).

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Ray Dracker

I, Ray Dracker, declare as follows:

1. I am presently employed by Solar Millennium LLC, as Vice President of Project Development.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Power Plant Efficiency for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 9, 2010.

R J Dracker

Ray Dracker

BLYTHE SOLAR POWER PROJECT
POWER PLANT EFFICIENCY
OPENING TESTIMONY

I. Name: Ray Dracker

II. Purpose:

My testimony addresses the subject of Power Plant Efficiency associated with the construction and operation of the Blythe Solar Power Project (09-AFC-06).

III. Qualifications:

Ray Dracker: I am presently employed at Solar Millennium LLC, and have been for the past 5 years and am presently a Senior Vice President with that organization. I have a Masters Degree in Nuclear Engineering and I have over 30 years of experience in the field of Renewable Energy. I prepared or assisted in the preparation of the Efficiency section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

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 1	**Application for Certification Volumes I & II**, dated August 24 2009, and docketed on August 24, 2009, Section 2.0.
Exhibit 4	**Data Adequacy Supplement**, dated October 26, 2009, and docketed on October 26, 2009.

Exhibit 9	**Palo Verde Solar I, LLC's Responses to CEC Data Request, Set 1 (1 through 260)**, dated January 2010, and docketed on January 22, 2010, Response 153.

V. Opinion and Conclusions

I have reviewed the Power Plant Efficiency section of the Revised Staff Assessment and agree with the analysis contained therein.

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Ray Dracker

I, Ray Dracker, declare as follows:

1. I am presently employed by Solar Millennium LLC, as Vice President of Project Development.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Power Plant Reliability for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 9, 2010.

R J Dracker

Ray Dracker

BLYTHE SOLAR POWER PROJECT
POWER PLANT RELIABILITY
OPENING TESTIMONY

I. Name: Ray Dracker

II. Purpose:

My testimony addresses the subject of Power Plant Reliability associated with the construction and operation of the Blythe Solar Power Project (09-AFC-06).

III. Qualifications:

Ray Dracker: I am presently employed at Solar Millennium LLC, and have been for the past 5 years and am presently a Senior Vice President with that organization. I have a Masters Degree in Nuclear Engineering and I have over 30 years of experience in the field of Renewable Energy. I prepared or assisted in the preparation of the Power Plant Reliability section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

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 1	**Application for Certification Volumes I & II**, dated August 24 2009, and docketed on August 24, 2009, Section 2.0.
Exhibit 4	**Data Adequacy Supplement**, dated October 26, 2009, and docketed on October 26, 2009.

Exhibit 9	**Palo Verde Solar I, LLC's Responses to CEC Data Request, Set 1 (1 through 260)**, dated January 2010, and docketed on January 22, 2010, Response 165.
Exhibit 29	**Palo Verde Solar I, LLC's Initial Comments on the SA, DEIS**, dated April 19, 2010, and docketed on April 19, 2010.
Exhibit 38	**Response to CEC April 28, 29 and May 7 Workshop Queries Re: Southern CA Edison Colorado River Substation Project Description**, dated April 15, 2010, and docketed on May 17, 2010.

V. Opinion and Conclusions

I have reviewed the Power Plant Reliability section of the Revised Staff Assessment and agree with the conclusions that the BSPP will be a reliable source of renewable energy.

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Ralph Hollenbacher

I, Ralph Hollenbacher, declare as follows:

1. I am presently employed by Solar Millennium LLC, as a Director, Project Development Engineering.

2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Transmission System Engineering for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 8, 2010.

Ralph Hollenbacher

STATE OF CALIFORNIA

Energy Resources
Conservation and Development Commission

In the Matter of:	**DOCKET NO. 09-AFC-06**
Application For Certification for the BLYTHE SOLAR POWER PROJECT	**DECLARATION OF** Richard Ardolino

I, Richard Ardolino, declare as follows:

1. I am presently employed by AECOM, as a National Director of Transmission and Substations.

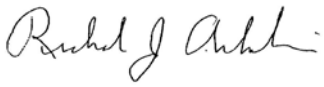
2. A copy of my professional qualifications and experience is included herewith (Attachment A to Testimony) and is incorporated by reference in this Declaration.

3. I prepared the attached testimony relating to Transmission Systems Engineering for the Blythe Solar Power Project (California Energy Commission Docket Number 09-AFC-06).

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 June 10, 2010.



_____
Richard Ardolino

BLYTHE SOLAR POWER PROJECT
TRANSMISSION SYSTEM ENGINEERING
OPENING TESTIMONY

I. Name: Ralph Hollenbacher and Rich Ardolino

II. Purpose:

Our testimony addresses the subject of Transmission System Engineering associated with the construction and operation of the Blythe Solar Power Project (09-AFC-06).

III. Qualifications:

Ralph Hollenbacher: I am presently employed at Solar Millennium, LLC, and have been for the past 4 months. I am presently Director of Project Development Engineering with that organization. I have a Bachelor's Degree in Mechanical Engineering and a Masters in Business Administration and I have over 25 years of experience in the field of energy development, engineering and consulting. I prepared or assisted in the preparation of the AFC as well as the post-filing information, data responses, and supplemental filings for Transmission System Engineering. A detailed description of my qualifications is contained in the attached resume.

Richard Ardolino: I am presently employed at AECOM, and have been for the past 2 years and am presently a National Director of Transmission and Substations with that organization. I have a Masters Degree in Electrical Engineering and I have over 35 years of experience in the field of Power Engineering. I prepared or assisted in the preparation of the Transmission System Engineering section of the AFC as well as the post-filing information, data responses, and supplemental filings. A detailed description of my qualifications is contained in the attached resume.

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 1	**Application for Certification Volumes I & II**, dated August 24 2009, and docketed on August 24, 2009, Section 2.7.
Exhibit 4	**Data Adequacy Supplement**, dated October 26, 2009, and docketed on October 26, 2009.
Exhibit 9	**Palo Verde Solar I, LLC's Responses to CEC Data Request, Set 1 (1 through 260)**, dated January 2010, and docketed on January 22, 2010, Responses 230 through 231.
Exhibit 17	**Palo Verde Solar I, LLC's Responses to CEC January 15, 2010 and January 20, 2010 E-mail Queries from CEC Staff, Additional Info Regarding Transmission System Engineering**, dated February 2010, and docketed on February 3, 2010.
Exhibit 38	**Response to CEC April 28, 29 and May 7 Workshop Queries Re: Southern CA Edison Colorado River Substation Project Description**, dated April 15, 2010, and docketed on May 17, 2010.
Exhibit 42	**Notification of Revision Memorandum—Blythe Solar Power Project Gen-Tie**, dated May 28, 2010 and docketed on May 28, 2010.

V. Opinion and Conclusions

We have reviewed the Transmission System Engineering section of the Staff Assessment and believe that with incorporation of the Conditions of Certification the Project will not result in significant impacts to the Transmission System and will comply with all Transmission System-related laws, ordinances, regulations and standards (LORS).

We do however disagree with the Staff's conclusion that they cannot conclude that the BSPP will comply with Transmission System-related LORS. The sole reason that Staff bases its opinion is that the Phase II Study is not yet complete. However, Staff has included Condition of Certification TSE-5 which requires the BSPP to provide an executed copy of the Large Generator Interconnection Agreement (LGIA). This cannot be executed until ***after*** the Phase II Study is complete. Executing and implementation of the LGIA will be the proof necessary to ensure the project will comply with all applicable Transmission System-related LORS. The LORS are within the jurisdiction of the CalSO and the appropriate tariffs. While Staff has enjoyed the use of more complete studies in the past, the fact that the Phase II Study is not complete does not prevent the Commission from relying on TSE-5 to ensure the project will comply with LORS prior to interconnection of the BSPP.

We also request the following modification to Condition of Certification TSE-1 to clarify the timing of the various submittals.

> **TSE-1** The project owner shall provide the Compliance Project Manager (CPM) and the Chief Building Official (CBO) with a schedule of transmission facility design submittals, a master drawing list, a master specifications list, and a major equipment and structure list. The schedule shall contain both a description and a list of proposed submittal packages for design, calculations, and specifications for major structures and equipment. To facilitate audits by Energy Commission staff, the project owner shall provide designated packages to the CPM when requested.
>
> **Verification:** Prior to the start of construction ***of transmission facilities***, the project owner shall submit the schedule, a master drawing list, and a master specifications list to both the CBO and the CPM. The schedule shall contain a description and list of proposed submittal packages for design, calculations, and specifications for major structures and equipment (see a list of major equipment in **Table 1: Major Equipment List** below). Additions and deletions shall be made to the table only with both CPM and CBO approval. The project owner shall provide schedule updates in the monthly compliance report.

Attachment A

Resumes

Michael Anguiano
Wildlife Biologist

Education
MS, Ecology, San Diego State University, 2008
BA, Wildlife Biology, Minor in Spanish, Kansas State University, 2001

Certification
State Scientific Collecting Permit SC-007314
Research permit on State-listed Barefoot banded gecko

Training
Flat-tailed Horned Lizard Survey and Monitoring Techniques, 2009, Bureau of Land Management
San Diego Tracking Team Tracker/Naturalist series, 2009

Michael Anguiano has 3 years of environmental consulting experience and 4 years of academic research experience in the field of wildlife biology. This experience has included serving as an environmental specialist for a municipality, as well as academic coursework and research completed at Kansas State University and San Diego State University. While at San Diego State, his research involved investigating the impact of urbanization on California kingsnake spatial ecology and on snake communities in the coastal sage scrub ecosystem. He used radiotelemetry methods to track California kingsnakes and drift fences with funnel traps to collect demographic, abundance, and population data on southern California snakes. His expertise and experience also includes conservation planning, sensitive habitat assessments, wildlife species surveys, wildlife tracking, data management/analysis, and technical writing.

Project Experience

Solar Millenium Energy Project – Ridgecrest, Kern County, CA
Project Biologist aiding in preparation of the Biological Technical Report and associated technical reports in preparation of an Application for Certification (AFC) for the California Energy Commission. The project proposes to develop a 250 MW commercial solar thermal electric power generating project located in the high northern Mojave Desert in northeastern Kern County, California, approximately seven miles southwest of the

city of Ridgecrest, California. The Project would utilize solar parabolic trough technology to generate electricity. Major project species concerns include the desert tortoise (Mojave population), Mohave ground squirrel, and western burrowing owl.

Solar Millenium Energy Project – Blythe, Riverside County, CA
Project Biologist aiding in preparation of the Biological Technical Report and associated technical reports in preparation of an Application for Certification (AFC) for the California Energy Commission. The project proposes to develop a 1000 MW commercial solar thermal electric power generating project located in the southern California inland desert, near Blythe in Riverside County, California. The Project would utilize solar parabolic trough technology to generate electricity. Major project species concerns include the desert tortoise (Mojave population) and western burrowing owl.

Solar Millenium Energy Project – Palen, Riverside County, CA
Project Biologist aiding in preparation of the Biological Technical Report and associated technical reports in preparation of an Application for Certification (AFC) for the California Energy Commission. The project proposes to develop a 500 MW commercial solar thermal electric power generating project located in the southern California inland desert, near Desert Center in Riverside County, California. The Project would utilize solar parabolic trough technology to generate electricity. Major project species concerns include the desert tortoise (Mojave population), Mojave fringe-toed lizard, and western burrowing owl.

State Route 125 South Vernal Pool and Quino Checkerspot Butterfly Habitat Restoration, San Diego County, CA
As part of mitigation for the State Route 125 South project, we have been retained by South Bay Expressway in coordination with California Department of Transportation (Caltrans) to design, implement, and manage a 52-acre site for vernal pool and watershed restoration as well as QCB habitat restoration. As Project Biologist, responsible for scheduling and conducting pitfall trap monitoring for small mammals, reptiles, and amphibians.

Caltrans State Route 76 East Expansion Project, San Diego County, CA
As Project Biologist, pariticipated in writing of the Natural Environment Study document.

NAVFAC Southwest Grow the Force Environmental Studies, MCB Camp Pendleton, CA
As Project Biologist, participated in writing biological and environmental assessment documents. This project includes a basewide expansion of military housing and training facilities.

San Diego Gas & Electric (SDG&E) RGP and Programmatic Permits for Operation and Maintenance and Minor New Construction Activities, San Diego, CA
As Project Biologist, prepared programmatic biological assessment that is needed to assist SDG&E in obtaining programmatic permits from the U.S. Army Corps of Engineers, State Water Resources Control Board, and California Department of Fish and Game. These programmatic permits are intended to complement SDG&E’s approved NCCP and provide a streamlined permit process for minor routine activities.

San Diego Gas & Electric (SDG&E), Natural Communities Conservation Plan On-Call Services, San Diego County, CA
As Project Biologist, provides on-call support to SDG&E Land Planning and Natural Resources Department for planned and emergency operations and maintenance activities associated with their electricity transmission and distribution lines within San Diego and Orange counties. This project involves evaluating potential biological impacts from operations and maintenance activities being conducted under SDG&E's Subregional Natural Communities Conservation Plan (NCCP). A

thorough understanding of SDG&E operations and maintenance activities and operational protocols of the NCCP is required. The project consists of ongoing multiple task orders. Mr. Anguiano performs fieldwork, including species monitoring, and document preparation.

City of Escondido Citracado Parkway – Andreasen Drive to West Valley Parkway, San Diego County, CA
As Project Biologist, helped manage field efforts for protocol listed wildlife species surveys, vegetation mapping, and rare plant survey. Completed protocol surveys and associated reports for least Bell’s vireo. Aditionally, was the lead biologist cooridinating production of the biological technical report. This project spans a multijurisdictional area, including the City of Escondido and the County of San Diego, thus requiring consideration of draft subarea Natural Communities Conservation Plans.

Yolo County Joint Power Authority Natural Heritage Program (NCCP/HCP), Yolo County, CA
As Project Biologist, assisted in the development of the NCCP/HCP for Yolo County. Responsibilities include working with species experts to develop species accounts and detailed habitat models for each of 69 species. Assisted in the development of conservation strategies including preserve design for upland and wetland habitats, and innovative new approaches to conservation of species on actively cultivated croplands, including rice, grain, and hay, and field crops. Work was performed prior to joining this firm.

Joint Water Agencies (JWA) Natural Community Conservation Plan/Habitat Conservation Plan, San Diego County, CA
As Project Biologist, assisted in the preparation of the JWA NCCP/HCP for approximately 6,910 acres of land owned by the three JWA Partners in San Diego County. Responsibilities included preparation and editing the sub-regional plan, subarea plans, conservation analysis, and biological section of EIR/EIS. Work was performed prior to joining this firm.

County of San Diego East County Multiple Species Conservation Program (MSCP), San Diego County, CA
As Project Biologist, assisted in the preparation of East County MSCP Plan for the 1.6 million acres of land in East San Diego County. Responsibilities included developing baseline GIS data inventory, preserve design and planning, and conservation analysis. Work was performed prior to joining this firm.

County of San Diego Wildcat Canyon Before-After-Control-Impact (BACI) Postconstruction Study, San Diego County, CA
As Project Biologist, assisted in the collection of roadkill and tracking data. Developed data forms for data collection using PDAs. Work was performed prior to joining this firm.

City of Santee Multiple Species Conservation Program (MSCP) Subarea Plan, Santee, CA
As Project Biologist, assisted in the preparation of MSCP Plan for the City of Santee. Responsibilities included review and editing the Subarea Plan and Conservation Analysis in coordination with wildlife agency and City staff. Work was performed prior to joining this firm.

Yolo County Joint Power Authority Hellhole Canyon and Del Dios Highlands Preserves Biodiversity Study, San Diego County, CA
Lead biologist for the design of herpetological sampling methods, location of herpetological trap arrays, and implementation of herpetological surveys. Trap arrays used drift fences with pitfall and funnel traps. Work was performed prior to joining this firm.

County of San Diego Willows Road Bridge Project,
San Diego County, CA
As Project Biologist, conducted arroyo toad focused surveys according to USFWS protocol. Surveys included day and night surveys along

with habitat assessment. Work was performed prior to joining this firm.

San Diego Gas & Electric Coast Region Habitat Conservation Plan, San Diego, CA
As Staff Biologist, assisted in the preparation of a habitat conservation plan (HCP) to address incidental endangered species take issues associated with the operations and maintenance (O&M) activities of SCG in the five counties of San Luis Obispo, Santa Barbara, Ventura, Orange, Riverside, Los Angeles, and San Bernardino. Responsibilities included preparation of species accounts, aiding in vegetation mapping, and identifying and modeling factors for species distributions. Work was performed prior to joining this firm.

County of San Diego Valley Center Bridge Replacement Arroyo Toad Relocation, Valley Center, CA
Staff biologist for the preparation of a USFWS-approved arroyo toad relocation program. Developed monitoring protocol. Conducted arroyo toad habitat assessments with San Diego Natural History Museum biologists. Work was performed prior to joining this firm.

Richard J. Ardolino, P.E.

Professional History

Education

Polytechnic University, Master of Science, Electrical Engineering (Power)

CW Post College, Graduate Studies, Finance

Manhattan College, Bachelor of Science

Years of Experience

With AECOM 2

With other firms 35

Registrations

Professional Engineer, New York

Professional Affliations

Institute of Electrical and Electronics Engineers (IEEE), Senior Member

Project Management Institute

IEEE Transformer Committee – Loading Guide

Special Accomplishments

Published in IEEE Transformer Loading Guide

Major Achievements

Prepare and submit Electrical Interconnection Applications to the Applicable Electrical System Operator for the interconnection of new generation to the electric grid

Responsible for the development of the New York Power Authority's document titled " Requirements for the Electrical Interconnection to the NYPA Transmission System"

Experience

AECOM, New York, NY. National Director Transmission and Substations.

- Prepare and submit Electrical Interconnection Applications to the Applicable Electrical System Operator for the interconnection of new generation to the electric grid
- Project Manager for the development of a wind farm outside Denver, CO. Reviewed the electric transmission system and conducted load flows to determine the electrical interconnection of the wind project to the grid. Filed an electrical Interconnection Request with Xcel energy.
- Project Manager on a fast paced wind farm project in Western New York. Responsible for scheduling, budgeting, construction management and start up and testing for the (230kv) substations and substation interconnections. This wind farm used 84 turbines to produce up to 126 MW
- Prepare electrical substation station one line diagrams, including protective relaying and preliminary substation and transmission line designs for new project development

Tech Serv – a Division of Welsbach Electric Corp an EMCOR Company, New York, NY. Vice President, Electrical Testing.

- Supervised Local #3 electricians in the testing of Relay Protection systems at NYC DEP Facilities
- Prepared estimates for the testing of switchgear, cable, relaying systems and controls to obtain new business
- Supervised emergency repair of cable and switchgear at various facilities throughout New York City
- Improved cash flow on outstanding account receivables
- Inspected building electrical systems and prepared estimates for maintenance and repair in accordance with the NEC

New York Power Authority, New York, NY. Vice President, Engineering – Power Generation.

- Managed eight direct reports with a team of 80 engineers *(Mechanical, Electrical, Fire protection, Civil, Relay Protection & Control, Supervisory Control and Data Acquisition, Design & Drafting and Security)* and a $12 million engineering budget. Responsible for the design of the annual capital improvement plan of $250 million
- Managed the Federal Regulatory Energy Commission (FERC) compliance
- Managed the North American Electric Reliability Corporation (NERC) compliance

Managed eight direct reports with a team of 80 engineers (mechanical, electrical, fire protection, civil, relay protection & control, Supervisory Control and Data Acquisition, design & drafting and security) and a $12 million engineering budget. Responsible for the design of the annual capital improvement plan ($250 million). Responsible for Operations & Maintenance support of hydroelectric and fossil generation facilities, including all building campuses, as well as support to the transmission system.

Managed the Federal Regulatory Energy Commission (FERC) compliance for the six FERC-licensed New York Power Authority (NYPA) facilities.

Managed the North American Electric Reliability Corporation (NERC) compliance for the NYPA.

Program Manager for NYPA's Robert Moses Niagara Power Project Generating Plant Upgrade project. Responsible for all electrical, relay protection, mechanical, piping, fire protection, and civil systems required to upgrade thirteen hydroelectric generators from 165 MW to 225 MW. This included all procurement, scheduling, start-up and testing and budgeting.

Program Manager for NYPA's In-City Generation Project Electrical Interconnection (installation of eleven GE LM6000s). Responsible for the conceptual design, physical design, equipment procurement, scheduling, budgeting, start-up and testing, and construction management of the eleven 138 kV substations and the required interconnecting high-voltage cable and relay protection-. This required interface with Con Edison, and was completed on schedule within seven months.

Directed the engineering review, equipment selection and commissioning for NYPA's 345 kV

- Subject Matter Expert to determine NYPA's NERC Cyber-Security assets
- Performed pre-feasibility and feasibility studies, analysis, and evaluations for proposed modifications and new facilities, including cost benefit analysis of the proposed modifications and new facilities
- Performed engineering support by providing technical specifications, qualified bidders lists, bid evaluations, and recommendations for awards to project management
- Provided engineering support during construction and start-up and testing procedures
- Coordinated and reviewed outside engineering and design services performed by architects / engineers / construction firms. Insured all designs were in compliance with the National Electrical Code, ANSI/IEEE standards, UL and NEMA standards
- Development of the New York Power Authority's document titled " *Requirements for the Electrical Interconnection to the NYPA Transmission System"*

Project Manager – Power Generation

- Program Manager of the Authority's Robert Moses Niagara Power Project main generating plant upgrade
- Program Manager of the Authority's Robert Moses Lewiston Pumped Generating Project major overhaul
- Program Manager of the Authority's Robert Moses Niagara Power Project Capital Improvement Initiative

Principal Engineer – Power Generation Engineering

- Project Manager of In-City Combined Cycle Project. Designed the interconnecting 138kv substations. This included the design of 7 substations at the Gas turbine sites. Modification of 4 Con Edison substations and 1 LIPA substation. The 138 kV xlpe cable and all associated substation and feeder relay protection.
- Project Manager of Y2K Initiative for Power Generation and Transmission Business Units
- Designed emergency power supplies for NYPA's critical assets
- Negotiated and wrote Interconnection and Operating agreements for existing and new NYPA facilities
- Member of NYPA Chief Operators Committee. Worked on the update of NYPA' switching and tagging procedure
- Operating and maintenance knowledge of 345Kv, 230Kv, 115Kv and 13.8Kv electrical substation equipment

Managing Electrical Engineer – Power Generation Engineering

- Provided administration and technical management of the Electrical Engineering section, which was comprised of four major sections: Power System Equipment; System Studies; Protection and Control; and Metering
- Coordinated the work of the electrical section directors, reviewed and approved technical accuracy all work products
- Reviewed and checked electrical power system calculations, including short circuit, load flow, relay coordination and equipment sizing calculations.

pipe type and self-contained cable system interconnection between Con Edison and Long Island Lighting. This included the gas-insulated bus, circuit breakers, phase angle regulators, 345/115 kV autotransformers, shunt reactors, emergency generators and control buildings.

Project Manager for the interconnection of NYPA's Small Hydroelectric facilities with Con Edison, Central Hudson and Niagara Mohawk.

Coordinated the interfaces for NYPA's 345 kV Marcy South Transmission line with the respective utilities. Chaired the Operations and Maintenance team that provided design review and start-up and testing for the Marcy South Transmission Line Project.

- Prepared specifications for equipment procurement and installation and start up testing
- Reviewed technical documents for technical adequacy and accuracy
- Approved diagrams, drawings, calculations, studies and specifications
- Performed Tap Root Analysis on NYPA's equipment failures

Director Power Systems Equipment – Power Generation Engineering

- Directed engineers, whose responsibilities were to develop, implement and assess operations, maintenance and in-service inspection policies and standards for the power plants and transmission system. Directed the engineering, design, procurement, installation and testing for substations and power plant modifications or new construction
- Electrical engineering, design, specification procurement, installation and start-up of two 7,000 Horsepower Variable Speed-Induced Draft Fan motor drives
- Electrical engineering, design, specification and procurement for the expansion of the Adirondack substation. Included 115 Kv circuit breakers, one 230/115 Kv transformer, current limiting reactors and all associated equipment
- Engineering review, equipment selection and commissioning for the start-up and testing for a 345 Kv pipe type and self-contained cable system interconnection between Con Edison and Long Island Lighting (Y49)
- Wrote the Y49 operating, switching and tagging procedure between Con Edison Long Island Lighting and NYPA
- Developed and maintained generic equipment specifications and design standards for transformers, circuit breakers, switchgear, etc. in accordance with the National Electrical Code, ANSI/IEEE standards, UL and NEMA standards

Director Operations and Maintenance – System Operations

- Directed a group of Mechanical, Electrical and Civil engineers, whose overall responsibility was to optimize and coordinate the operations and maintenance of NYPA's Hydro, Fossil, Transmission and substation facilities.
- Developed, implemented, and ensured adherence to policies and standards for the operation and maintenance of non-nuclear power plants
- Provided plants with guidance and support in the inspection and evaluation of major components
- Project Manager for the interconnection of the Small Hydroelectric facilities with Con Edison, Central Hudson and Niagara Mohawk
- Specified and purchased new 230/115Kv transformers for the Willis Substation
- Coordinated the interfaces for the 345 Kv Marcy South Transmission line with the respective utilities
- Chaired the Operations and Maintenance team that provided design review and start up and testing for the Marcy South project
- Chairman of the Electrical Power Apparatus Committee
- Coordinated the Westinghouse generator rewind for Poletti
- Coordinated NYPA 's Transmission Line crews on Long Island in response to Hurricane Gloria

Senior Operations Engineer – System Operations

- Directed a group of Mechanical, Electrical and Communications engineers, whose overall responsibility was to optimize and coordinate the operations and maintenance of NYPA's Hydro, Fossil, Transmission and substation facilities
- Maintained performance data on pertinent power systems equipment and made recommendation for equipment replacements
- Provided specialized technical support, undertaking design, procurement and installation of specialized projects.
- Reviewed design of new facilities and changes to existing facilities
- Reviewed major system disturbances and recommended necessary corrective action
- Chairman of the Electrical Power Apparatus Committee

Operations Engineer – System Operations

- Oversaw, reviewed and coordinated the operations and maintenance activities within NYPA's electric generating and transmission system
- Wrote the electrical switching coordination document between IP3 and Con Edison
- Supervised the start-up testing of the EHV equipment at NYPA's Marcy 765 Kv transmission line. Lived in Utica for 6 months
- Prepared functional or purchase specifications for the implementation or modification of power plant and substation monitoring, control, operation, maintenance and instrumentation systems
- Represented the NYPA at various utility meetings. Doble, IEEE and P.E.A.
- Prepared responses to regulatory agencies. FERC, NPCC and P.E.A.
- Reviewed procurement specifications and drawings developed by others to insure that the design was satisfactory from an operations and maintenance viewpoint and met all NPCC and NYPA design criteria
- Issued NYPA's Single Line Diagram book
- Chairman of the Power Apparatus Committee

Long Island Lighting Company, New York, NY. Electrical Engineer – Substation Maintenance

- Provided job assignments, guidance, instruction and evaluation of job performance and progress
- Represented Long Island Lighting at IEEE, Doble and P.E.A. meetings
- Prepared estimates, engineering specifications and instructions for the installation of equipment in the area of new construction
- problems with the installation and operation of new or existing equipment
- Scheduled the electrical substation equipment for periodic maintenance; interfaced with the System Operations Coordinator to remove equipment from service; wrote switching orders; and scheduled the crew, material, necessary equipment and number of days required for each job

International Brotherhood of Electrical Workers/Local #3, New York, NY. Electrical Apprentice

Michael J. Arvidson
Worker Safety Discipline Lead/Department Manager

Professional History

AECOM, Department Manager, present

HR Textron, Inc.

Lindmark Engineering

Education

M.B.A., Management, Graziadio School of Business and Management, Pepperdine University

B.S., Civil Engineering, University of California, Los Angeles

Years of Experience

11

Technical Specialties

Environmental, Health and Safety (EHS) Compliance and Management Systems

EHS Auditing

Environmental Site Assessments

Professional Registrations and Affiliations

Engineer-in-Training, California

40 hour HAZWOPER, including 8-hour Supervisor Level certification

Mr. Arvidson is a program manager with 11 years of project management experience. He has experience leading, evaluating, and preparing waste management, hazardous materials, and worker safety impact analyses for CEC licensing of the BSEP, VV2, PHPP in the California Mojave Desert, as well as the proposed solar power projects involving three separate sites. Mr. Arvidson has experience in post-AFC permitting of waste discharge systems, such as land treatment units and surface impoundments.

Representative Project Experience

Hazards and Hazardous Materials Analysis, Kern County, California. Preparation of a technical report for a gasification project with energy recovery located in northwestern Kern County. Tasking included identifying Federal, State and local permitting entities, determining project impacts, and assessing significant impacts to demonstrate permitting processes for future project development.

Worker Safety Analysis, Blythe, Palen, and Ridgecrest, California. Conducted the analysis and prepared the Application for Certification (AFC) worker safety section for three solar thermal facilities.

Worker Safety and Waste Management Analysis, California City, California. Preparation of the worker safety and waste management sections of an AFC for the permitting and construction of the Project Beacon solar thermal power plant. Prepared the responses to the California Energy Commission (CEC) regarding Preliminary Staff Assessment (PSA) comments on worker safety and waste management.

Worker Safety Analysis, Palmdale, California. Preparation of the worker safety section of an AFC for the permitting and construction of the Palmdale hybrid gas-solar thermal power plant. The project was deemed data adequate by the CEC.

Health and Safety Compliance Audit, Buena Park, California. A four-day compliance audit to determine compliance with regulatory requirements and internal corporate requirements. Operations at the facility consisted of material handling within the building and delivery by rail and truck, assembly of cardboard boxes, and administrative functions. The health and safety audit scope included confined space entry, hot work, machine guarding, personal protective equipment (PPE), emergency response, mobile equipment, fall protection, dock safety, and training. The deliverable consisted of a verbal and written

compliance matrix outlining the findings, regulatory citations, and observations.

Health and Safety Compliance Audit, Canoga Park, California. The five-day environmental, health, and safety audit evaluated regulatory compliance for two facilities with approximately two million square feet of manufacturing space.
The on-site operations consisted of the design, fabrication, assembly, and test of complex rocket engines for NASA. Mr. Arvidson was one of two health and safety auditors responsible for the following topical areas: welding and cutting; confined space operations; emergency action plans; flammable and combustible liquids, gases, and vapors; cranes, hoists, and slings; PPE; walking and working surfaces; injury and illness prevention program; and hazard communication. The deliverable consisted of completed audit protocol sheets for each topical area, a matrix identifying the program, regulatory citation, and a description of all observations and findings.

Environmental, Health and Safety Manager, Valencia and Pacoima, California. Operations at two aerospace manufacturing facilities consisted of research and development; machining of steel, aluminum, and titanium; metal finishing; assembly and test of assemblies; quality test and engineering; administrative functions; engineering; material handling; painting of assemblies; and maintenance activities. Developed various health and safety programs, including Federal Aviation Administration's (FAA) drug and alcohol program, Job Safety Analyses, LOTO machine-specific procedures, behavior based training programs, ergonomics program, safety committee process, fall protection program, contractor safety program, and modified work program. Audited all elements of health and safety applicable to the facilities, including Hot Work, hazard assessments, hazardous materials, OSHA recordkeeping, confined space, powered industrial trucks, fall protection, FAA drug and alcohol, machine guarding, hearing conservation, PPE, and HAZCOM (including Proposition 65). Additional responsibilities included environmental engineer and ISO 14001 management representative responsible for all aspects of environmental compliance and conformance to ISO 14001. Developed the ISO 14001 program and upgraded the program to conform to ISO 14001:2004. Developed and implemented hazardous waste management program, including waste source reduction, universal waste, and non-hazardous waste management. Audited all applicable environmental programs, including air quality, waste water, stormwater, National Pollutant Discharge Elimination System, and waste management.

Daniel N. Bak, Ph.D., P.E.
Senior Fire Engineering Consultant

Years Experience
With AECOM since: September 10, 2007
With this firm: 2.5
With other firms: 25

Education
Ph.D. in Industrial Engineering, 1987, Texas A&M University
M.S. in Safety Engineering, 1982, Texas A&M University
B.S. in Fire Protection and Safety Engineering, 1980, Illinois Institute of Technology

Registration
Registered Professional Engineer, CA #FP1495; Expires: 06/30/11

Professional Affiliations
National Fire Protection Association
Society of Fire Protection Engineers
California Fire Prevention Officers Association
American Institute of Architects

Profile
Dr. Bak is responsible for the design, management, review, testing, and negotiations of all aspects of fire, life safety, and fire engineering activities and projects. His activities extend from directing design efforts at the commencement of a project to the coordination and management of all technical activities required for the preparation of construction documents through contract administration and commissioning of fire safety systems.

Dr. Bak's experience includes the management and design of commercial buildings, mission critical, entertainment, education, mercantile, storage, hazardous, institutional, multi-use, and industrial facilities. His experience includes fire safety audits and risk assessment, as well as analysis and assessment of hazardous materials and mitigation measures. Dr. Bak is an expert in the application of fire safety performance approach and alternative solutions to design challenges, nationally and internationally. His experience includes acting and performing in the role of the Authority Having Jurisdiction.

Dr. Bak's has maintained in-depth professional involvement through academic teaching and professional training throughout the country. He has presented numerous fire safety topics to various audiences nationally and internationally.

Project Experience

COMMERCIAL

100 Arthur Street, North Sydney, Australia
Fire Engineering Manager/Principal Engineer - Tenant improvement of three levels of office space. Work included justifying the interconnection of three levels via an open stair arrangement using fire modeling and timed egress analysis. Included in the scope of work were appropriate mitigation measures and negotiation with the Authority Having Jurisdiction. Professional Services: 2007; Construction: 2008

Council Chambers, 174 Phillip Street, Sydney, Australia
Fire Engineering Manager - The complex consists of approximately 540,000 square feet office space and corresponding support facility. Work including a fire safety audit with the main purpose of designing and implementing smoke hazard management for a dated building constructed in the mid fifties. Part of the mitigation factors were fire suppression (fast-response system), smoke detection (Class A and

throughout), voice annunciation system, and management procedures. Professional Services: 2007; Construction 2009

New South Wales Archive Repository, Kingwoods, Australia
Fire Engineering Manager - To meet the State mission of safeguarding critical historical documents, investigation of existing conditions provide design criteria for a smoke exhaust system based upon the Client primary objective. The current use for the building is primarily for archive purposes with hardcopy documents stored within compactuses. The intent of this Fire Engineering Assessment is to provide a reasonable solution for the adoption of a suitable smoke exhaust system. The aim is not to justify compliance with the Building Code of Australia in terms of satisfying the Performance Requirements. The analysis documented in this report shows that by implementing a smoke exhaust system as per the recommendations of this report, some smoke relief will be provided with the intent of minimizing smoke damage to the Archives. The acceptance criteria used, from the State of New South Wales Archive Repository, is to maintain the upper smoke layer higher than the top compactuses within each respective compartment. It was recommended to provide make-up air via the perimeter louvers. These louvers are required to be operated automatically to open in the event of a fire alarm for each respective area. The mechanically operated louvers are required to be interfaced with the fire detection system and therefore, forming part of the smoke exhaust system. Professional Services: 2007; Construction: Not funded yet.

Allianz Training Center, 12th Level of 2 Market Street, Sydney, Australia
Fire Engineering Manager - A change of use on the 12th Floor of a high-rise office building, demanded the investigation of the feasibility of a 50% increase of occupant load. The work consisted of simulating a worst credible fire and conducting a timed egress for the maximum occupant load. With appropriate mitigation measure, the occupant load was justified to increase from 200 to 300 persons without increasing the total exiting capacity. Professional Services: 2007; Construction: 2008

Arboretum Gateway Building, Santa Monica, California
Senior Project Manager - Work consisted of general coordination and quality assurance as well as special inspection duties for the smoke management system. The new high-rise structure was behind schedule. As the owner representative, I was charged to direct various contractors and assist them with the understanding of the smoke control requirements. Duties included pre-testing and commissioning process of all fire and life safety systems. The project was completed within the targeted date. Professional Services: 2002; Construction: 2001

Messeturn Tower, Frankfurt, Germany
Project Manager - The project consisted of the design and construction of the tallest high-rise building in Western Europe as of 1987. Work included of both a code analysis based of BOCA Building Code and supporting justification via fire safety performance criteria of tenability on a typical office floor. Develop the sequence of events and operations that follows an accidental fire in one of the upper stories. Simulate the accidental fire while assuming other important input information such as which doors were open and by how much, as well as the degree of functionality of assumed fire and life safety systems and devices. It was demonstrated that the mitigation features of the design of the building would be successful at meeting fire and life safety goals.

135 Oliver Street, Boston, Massachusetts
Project Manager - In addition to the preparation of a fire protection outline defining major building code requirements, variances were also prepared. The size of the project (4 city blocks) triggered approaches such as an easement agreement which solved security and fire and life safety needs. Many of the philosophies of early 1980's were proposed, approved and implemented.

The Merchandise Mart, Chicago, Illinois
Project Manager - When opened in 1930, the Merchandise Mart or the Mart, located in Chicago, Illinois, was the largest building in the world with 4,000,000 square feet of floor space. The Mart centralized Chicago's wholesale goods business by consolidating vendors and trade under a single roof. Massive in its construction, and serving as a monument to early 20th century merchandising and architecture, the art deco landmark anchors the daytime skyline at the junction of the Chicago River branches. The building continues to be a leading retailing and wholesale destination, hosting 20,000 visitors and

tenants per day. This project consisted of a systematic fire and life safety survey, detailed egress analysis as one of the major goals was the removal of fire escapes without adding fire stairs. The building has the largest public corridor in the world. Its length is over 7 miles.

Sears Tower, Chicago ,Illinois
Project Manager - The Sears Tower is a supertall skyscraper in Chicago, Illinois. It has been the tallest building in the United States since 1973, surpassing the World Trade Center, which itself had surpassed the Empire State Building only a year earlier. Commissioned by Sears, Roebuck and Company, it was designed by chief architect Bruce Graham and structural engineers Srinivasa and Fazlur Khan of Skidmore, Owings and Merrill. Construction commenced in August 1970 and the building reached its originally anticipated maximum height on May 3, 1973. When completed, the Sears Tower had overtaken the roof of the World Trade Center in New York City as the world's tallest building. The tower has 108 stories as counted by standard methods, though the building owners count the main roof as 109 and the mechanical penthouse roof as 110. The distance to the roof is 1,450 ft 7 in, measured from the east entrance. The project consisted of conducting a systematic and comprehensive inspection and testing of fire and life safety systems.

Chicago Board of Trade, Chicago, Illinois
Project Manager - The Chicago Board of Trade Building is a skyscraper located in Chicago, Illinois, USA. It stands at 141 West Jackson Boulevard at the foot of the LaSalle Street canyon, in the Loop community area. First designated a Chicago Landmark on May 4, 1977, the building was listed as a National Historic Landmark on June 2, 1978. It was added to the National Register of Historic Places on June 16, 1978. The current structure is known for its art deco architecture, sculptures and large-scale stone carving, as well as large trading floors. A three-story art deco statue of Ceres, goddess of grain, caps the building. The project consisted of assessing the occupant load on the main trading floor due to an expansion of the floor. Due to the unique nature of the trading floor negotiation with the City of Chicago were successfully undertaken to justify the increase while maintaining a fire safe environment.

Chicago Mercantile Exchange, Chicago, Illinois
Project Manager - The Chicago Mercantile Exchange (CME or, simply, "The Merc") is an American financial exchange based in Chicago. The CME was founded in 1898 as the Chicago Butter and Egg Board. CME trades several types of financial instruments: interest rates, equities, currencies, and commodities. It also offers trading in exotic instruments such as weather and real estate derivatives. The scope of work consisted of a detailed exiting analysis in light of a major expansion of the main trading floor. A horizontal exiting arrangement was proposed along with consideration of the unique nature of the trading floor as it is not recognized as a use in any building code.

Skolnick Toys Company, Des Plaines, Illinois
Project Manager - The project consisted of the analysis of a post-mortem condition after a total loss due to a fire in the toy making facility. The effort consisted of conducting a fire modeling exercise with guiding parameters of fire investigation findings. The fire modeling results were in harmony with discoveries made by other parties. The litigation case was successfully settled to the owners' favor.

Culver City Ice Arena, Culver City, California
Senior Fire Safety Consultant - The project consisted of negotiating with Culver City Fire Department after researching best mitigating measures to maintain regular ice skating activities while decommissioning the old ammonia system. Ammonia, in large quantities, is recognized in California, as a hazardous material.

Sony Pictures Entertainment, Inc. (previously know as Columbia Pictures Entertainment), Culver City, California
Senior Fire Safety Consultant - The project consisted of the review, analysis of movie sets prop preparation and hazardous chemicals. Work included the preparation of a systematic building classification, appropriate fire detection and suppression, and management procedures necessary to maintain an acceptable fire safe environment.

Mission Viejo Shopping Mall Renovation, Mission Viejo, California

The project consisted of expansion and renovation of the shopping mall which originally was constructed in the early sixties. As part of the renovation was the implementation of a new smoke management system. Work included special inspection and commissioning of the fire and life safety systems.

South Coast Plaza Shopping Mall, Costa Mesa, California
The project consisted of remodel of Crystal Cove portion of the shopping mall. Work included special inspection and commissioning of the fire and life safety systems, as well as the new smoke management system.

Westminster Shopping Mall, Westminster, California
The project consisted of undertaking a detailed exiting analysis for the purpose of determining the feasibility of removing one fire stair. Based upon the analysis, the removal of the fire stair was performed.

Santa Anita Shopping Mall, Santa Anita, California
The project consisted of a major expansion of the existing shopping mall. Issues such as cumulated egress and exiting via parking garage were considered. Through efforts of negotiating alternative solutions to explicit code requirements, the City of Santa Anita reviewed and approved the expansion to take place.

Chatswood Shopping Center Expansion, Chatswood, Australia
The project consisted of over 1.5 million square feet expansion. The scope of work consisted of investigating and analysis code deficiency using fire engineering alternative acceptable solutions. A fire engineering brief was generated and presented to the Authority Having Jurisdiction for approval.

Westminster Police Department, Westminster, California
This project consists of the design and construction of a new City Police Headquarter which includes a detention Center. The fire engineering scope of work consisted of prescriptive and performance design. Specifically, performance formulation of the design criteria were produced for fire sprinklers, fire standpipes, FM-200 agent, and fire detection, alarm, and notification systems. Included in the work was the work control rational analysis for the detention center and the alternative means and method used to justify not providing fire sprinklers in the majority of the parking structure.

RESEARCH

National Science Foundation, Washington DC
Fire Safety Principal - The project consisted of investigating fires in residential structures which started following the Loma Prieta Earthquake in Northern California. The specific interest was about avoiding the typical fires in residential occupancies. The field research and statistical data indicated that gas-fired water heaters were the primary cause of fires starting in residential uses. It was demonstrated that the strapping of water heaters would prevent heaters from toppling and hence gas line from rupturing. The key recommendation from the research was subsequently adopted and made a law in the State of California.

National Institute of Standards and Technology, Gaithersburg, Maryland
Principal Investigator - The project consisted of conducting a statistical analysis of the then state-of-the-art fire model to investigate the sensitivity of its input parameters. A non-parametric statistical methodology was applied to consider 16 input parameters to the fire model known as "FAST". It was demonstrated via a computerized randomized sequencing of 256 permutations (256 fire simulations) that some input parameters were highly sensitive while other inputs were not. This was the first known sensitivity analysis performed on a deterministic fire model.

Texas A&M University, College Station, Texas
Investigator - The project consisted of analyzing, using a stochastic approach, the sequential progression of a fire event in a typical student dormitory on the Texas A&M University campus. It was assumed that an accidental fire start in a typical dormitory room. The fire spread was computerized

using two criteria of physical proximity of fuels and their relative ease of ignition. Then, a binary sequential event mode was used to consider fire progression within the room of origin followed by fire spread to the floor of origin. The same approach was used to consider the spread to the entire building. Every event had a rationalized probability value associated with its occurrence. Simultaneously, automatic detection, passive protection, and manual suppression were also considered. The overall likelihood and the ultimate catastrophic event of building full involvement were determined.

Arlington Park Racetrack, Arlington Heights, Illinois
Fire Safety Principal - The project consisted of investigating the most likely causes and progress of a catastrophic fire in the racetrack complex This fire became the largest structural fire in the history of the State of Illinois. The fire occurred in a racetrack complex (Paddoc and grandstand buildings) causing over 150 million in damages on July 31, 1985. The grandstand structure and the Paddoc building caught on fire. It must be noted that both structured were originally erected in the 1930's. Eyewitnesses reported that a fire started within the ballast of a neon light fixture in the main lounge of the VIP 2-level structure. That VIP structure was not provided with smoke detectors or with sprinklers. Fifty minutes passed before the first responders arrived at the site. Soon, it was realized that the fire spread to concealed areas which were located between the grandstand and the lounge under the bleachers. A decision to cut through the concealed spaces provided access to fires but it also vented the smoldering fires. The fire became overwhelming even though there were over 250 firefighters on the scene. It was demonstrated why a fully sprinklered building burned to the ground in spite of 250 firemen trying to extinguish it. The challenge was to rationalize the most likely fire scenario and to explain why the fire eluded over 250 firefighters to cause a total loss. To answer that challenge, the following major tasks were undertaken. These were fire modeling simulations and the illustration of the sequential progression of the fire from ignition to full involvement via computer animation. Therefore, the Client's goal was met as his insurance carrier recovered the maximum of liability coverage from of the sprinkler contractor's liability insurance

Brea Oil Company, Brea, California
Senior Fire Safety Consultant - The project consisted of investigating the fire and explosion hazards from an active oil and gas collection facility. The key concern was fire and explosion exposure to the newly residential development nearby. Computer fire simulations were undertaken as well as the assessment of the likelihood of accidental discharge of either oil or gas due to excessive high pressure. Among the mitigation measures were explosion "proof" walls to protect the residential development.

Long Beach Oil Wells Study, Long Beach, California
Senior Fire Safety Consultant - The project consisted of investigating the fire and explosion hazards in a public land where active and abandoned oil wells are located. The land was planned to be used as a public sports and entertainment park. Computer fire simulations were undertaken as well as radiation calculations to determine fire hazards to the planned public facility in the new park.

Nazareth College, Kalamazoo, Michigan
Project Manager - The project consisted of a full code analysis and the exiting requirements of a gymnasium that has a suspended jogging track. The nature of a jogging track is unique and building codes were silent as to exiting calculations and requirements. Negotiations with Authorities Having Jurisdictions were pursued and a rational for the unique use was presented and approved.

Quiet Wings, Pacific Northwest National Laboratories, Richmond, Washington

TRANSPORTATION

Air Traffic Control Towers, Base Buildings, and TRACONs, Western Pacific Region
Project Manager for various FAA locations (John Wayne Air Traffic Control Tower, Santa Ana, CA; Bakersfield Air Traffic Control Tower and TRACON, Bakersfield, CA; Long Beach Air Traffic Control Tower and Base Building, Long Beach, CA; Livermore Air Traffic Control Tower and Base Building, Livermore, CA; Monterey Air Traffic Control Tower and Base Building, Monterey, CA; Van Nuys Air

Traffic Control Tower, Van Nuys, CA; Santa Monica Air Traffic Control Tower, Santa Monica, CA; Reid Hillview Air Traffic Control Tower, Reid Hillview, CA; North Las Vegas Air Traffic Control Tower, North Las Vegas, NV; Las Vegas Air Traffic Control Tower and Base Building, Las Vegas, NV; Grand Canyon Air Traffic Control Tower and Base Building, Grand Canyon, AZ; Oakland South Air Traffic Control Tower, Oakland, CA; Oakland North Air Traffic Control Tower and Base Building, Oakland, CA; San Jose Air Traffic Control Tower, San Jose, CA; Burbank Air Traffic Control Tower and Base Building, Burbank, CA; Fresno Air Traffic Control Tower, Fresno, CA; Salinas Air Traffic Control Tower, Salinas, CA; Lancaster Air Traffic Control Tower and Base Building, Lancaster, CA; Napa Air Traffic Control Tower, Napa, CA; Carlsbad Air Traffic Control Tower and Base Building, Carlsbad, CA; Santa Barbara Air Traffic Control Tower and Base Building, Santa Barbara, CA; Los Angeles Air Traffic Control Tower, Los Angeles, CA). Typical work included surveying including testing of all fire and life safety systems, complete design, including design development, construction documents and contract administration. Some work consisted of performing the commissioning of the fire and life safety systems of a few Air Traffic Control Towers and associated uses.

San Ysidro Land Port of Entry, San Ysidro, California
This project consisted of the design of a four level parking garage for the General Service Administration agency. Included in the scope of work was an overall analysis of fire and life safety requirement for a replacement of all border-crossing infrastructures. The work for the parking structure included performance specifications and designs of fire sprinklers, fire standpipes, fire alarm, fire pump, and mass notification systems.

EDUCATION

University of California - Irvine, Department of Health and Safety, Irvine, California
Project Manager - Provided on-going fire and life safety advice and consultation.

Division of State Architect, Los Angeles, California
Project Manager - Undertook extensive study on appropriateness of the fire and life safety of California Schools per Governor Gray Davis directives. Designed and administered a survey to include all stakeholders' opinions and recommendations on the issues of fire and life safety in schools. Researched and gathered relevant California and national fire and life safety statistics to ascertain unbiased yardsticks for the identified fire safety issues. Presented preliminary findings to identified stakeholders in public forums in both Northern and Southern California. Prepared findings and presented them to the Division of State Architect and to the State Fire Marshal staff. After the consideration of State staff remarks, a comprehensive report was prepared and submitted to the State for its use.

Marlboro State University, Marlboro, New Jersey
Project Manager - Provided systematic and comprehensive fire and life safety consultation of 10 different buildings. The buildings surveyed included dormitories, office use, laboratories, and food court/cafeteria uses. Work included documentation of deficiencies, recommendations, and cost estimates to mitigate deficiencies.

Woolongong University, Woolongong University, Australia
Fire Engineering Manager - Provided comprehensive survey of known deficiency of fire separation issue (fire doors) for a student residential complex. A fire simulation was undertook, as an alternative fire engineering solution, justifying the lack of fire rating requirement of door assemblies, while providing safe egress out of individual rooms.

Rosary College, River Forest, Illinois
Project Manager - Performed an assessment of the existing 8,000 square feet gymnasium pool complex for the purpose of considering a horizontal exiting arrangement. Negotiation with the Authorities having Jurisdiction followed and approval was obtained shortly after.

INDUSTRIAL

Zinifex, Zinc Smelting Facility, Hobart, Australia
Fire Engineering Manager - The project consisted of a comprehensive audit of the existing fire and life safety systems of one of the largest in the world zinc processing facility. Included in the scope of work were recommendations to improve fire safety in particular for the water supply and active fire protection as well as fire water storage and fire pumps arrangement to comply with NFPA standards. Professional Services: 2006; Construction: 2006

Pasadena Power Plant, Pasadena, California
Fire Safety Principal - Demonstrated that the likelihood for a natural gas explosion in the compressor building is remote. It consisted of the preparation of a report, intended for the fire department, focusing on compliance of the explosion control requirements. Specifically, a "crude" but not only credible but it, also, represents the worst case: the worst-credible natural gas release scenario ion the compressor building. The timing of the completion of the project was critical due to the 2003 Rose Ball Parade. Modeling of the release was not attempted. However, key assumptions, such as "ideal gases" achieve perfect mixing instantaneously, were made. Risk assessment approach was applied to this investigation. Hence, it was demonstrated that, with a reasonable degree of scientific certainty, given various fire and life safety features already in place and as recommended, the chance for a gas explosion in the compressor building is remote. In fact, we were able to not only support Client's goal, but also meet the AHJ requirements. Professional Services: 2004; Construction: 2005

Blythe Power Plant, Blythe, California
Fire Safety Principal - This project was a 520 MW natural gas-fired cogeneration power plant consisting of three General Electric combustion turbine generators and one steam turbine generator. Power was generated for supply to the local utility and surrounding businesses. The main effort was to assist all subcontractors to obtain the final Certificate of Occupancy (CO) for the new power plant with a strong emphasis on expediting due to heavy penalties. Specifically, the effort consisted of acting as a fire protection and life safety clearinghouse for the owner of the new power plant. The project site is a 520-MW natural gas-fired, combined-cycle, and power generating facility. Amongst, the various part of the facility such heat-recovery- steam generators, a steam turbine, generator-step-up transformers, the chiller building. The building contained anhydrous ammonia which cools each combustion-turbine-inlet filter. The chiller building was designed to contain 16,000 gallons of anhydrous ammonia. Ammonia is known to be a health, fire and explosion hazards. As such, it dictated that the chiller building is to be Class I, Division 1 location. Most of the equipment, already installed, was not meeting that requirement. We were engaged into an intense research about specific flammability and explosiveness of ammonia. Codes have classified the hazards of ammonia gas to be the same as methane gas. Even though, both gases, at the proper proportion with air, will ignite and potentially explode. It was assessed that it takes much more energy to ignite ammonia than to ignite methane. Owner obtained his Certificate of Occupancy in a timely manner. The owner also saved a substantial amount of money when the AHJ agreed to "de-classify" the chiller building as a Class I, Division 1 location. Professional Services: 2003; Construction: 2005

Chicago Tribune Company, Chicago, Illinois
Fire Safety Specialist - The project consisted of assessing safety conditions of over 500,000 square feet of useable space. It encompassed multiple uses such as office, cafeteria, press room, paper warehouse, machine shops, ink storage and miscellaneous uses. Survey and assessment included all fire/smoke detection, monitoring, notification systems, and suppression systems. The client's goal was to evaluate the emergency evacuation, preparedness, and response of the various departments. Consequently, develop, and implement emergency response plans. It followed that we made a number of recommendations, following exhaustive survey and analysis. All recommendations were categorized to prioritize expenditures according to the Client's perceived risk and means of mitigating that risk. Emergency evacuation plans and emergency response plans were prepared for each department. Training was developed for each shift. Guidance was provided as to "When to fight a fire...When to evacuate the building or area". Emergency evacuation drills were conducted for all departments, while stressing effective, efficient, and safe options for evacuation. Hence, we successfully designed, improved and implemented an evacuation system for the 5,000 occupants. We also educated all

departments as to their respective hazards, mitigation features provided, and appropriate emergency responses. Professional Services: 1997; Construction: 1997

Vopak New Ethanol Loading/Unloading Facility, Long Beach, California
Fire Safety Principal - With the advent of the use of cleaner automotive fuel in California, a number of port loading and unloading facility were converted to accommodate ethanol fuel. As it is an alcohol, its protection against fire is required to custom to its intrinsic hazard. Specifically, the type of foam appropriate for ethanol is alcohol foam. Professional Services: 2005; Construction: 2006.

INSTITUTIONAL

City of Anchorage New Jail, Anchorage, Alaska
Special Inspector - The project consisted of representing the City of Anchorage Building Department for the fire and life safety requirements of the new jail facility. Extensive inspection and testing took place as this was the second smoke management project in the State of Alaska.

Leisure World, Laguna Hills, California
Fire Safety Principal - The project consisted of the general assessment of the fire and life safety conditions and potential for fire alarm replacement at 81 three to four stories housing units. The scope of work included the testing and documentation of all 81 fire alarm systems. The documentation consisted of separate fire safety assessment report with respective video of fire and life safety issues.

Trenton Psychiatric Facility, Trenton, New Jersey
Project Manager - The project consisted of a comprehensive fire and life safety survey of the facility. Appropriate recommendations based on the Life Safety Code ware made and put through a report for the State consideration.

JUSTICE

Women's Jail Expansion, San Luis Obispo, California
Fire Safety Engineer - The project consisted of both new housing unit and an expansion of the medical unit of the existing jail. Work included the design of the detection, suppression, and smoke management systems. To prevent known vandalism, a state-of-the-art smoke detection system was utilized (VESDA).

ANTI-TERRORISM RELATED PROJECTS

New Fire Station, Finegayan, Guam
Project constructs one single-level fire station in the Finegayan area of Naval Station in Guam. The facility will be constructed of reinforced concrete, and with all components such as exterior walls, windows, roofing, mechanical and electrical systems appropriate to Guam earthquake and weather standards, designed to withstand 170 miles per hour winds. The design of the project includes Anti-terrorism/Force Protection measures in compliance with United Facilities Criteria (UFC) 4-010-01. Facilities include training facilities, living quarters, recreational/dining facilities, administrative support areas, EMS support, HAZMAT support, fire prevention offices, maintenance/repair/support, storage and bays for the engines and apparatus. Facilities will be protected by fire sprinklers, fire alarm, mass notification, and carbon monoxide detection, and they are provided with air conditioned. Parking for POV vehicles and emergency vehicles are included. Areas including vestibules, corridors, and public toilet facilities are to be barrier free, and all facilities will be designed in accordance with the requirements with ABA Chapters 1 and 2 (scoping requirements), and Chapters 3 through 10 of the Americans with Disabilities Act and Architectural Barriers Act Accessibility Guidelines, dated 23 July 2004. All design and construction will comply with the Energy Policy Act 2005 (EPAct 2005) requirements. Operations and maintenance manuals are included in project costs as are Post Construction Award Servces. Sustainable features will be incorporated to the extent possible and the facility will be commissioned. Leadership in Energy and Environmental Design (LEED) will be

integrated into the design to achieve at least a Silver-level certification by the United States Green Building Counsel (USGBC).

This project consisted of active participation and design via an on-site functional analysis concept development (FACD) study for a new state-of-the-art fire station in July 2009 in Guam. This process was designed to assure the timely delivery of the project within budget and optimize user requirements. The process also involved the entire architecture/engineering design team working with designated representatives from the Government of Japan, Department of Defense Fire and Emergency Services, Naval Facilities Engineering Command Marianas, to analyze and validate the project scope and cost, and to develop an approved concept-level design. The construction cost of the new fire station is 23.4 Million dollars.

The design approach was based upon functional analysis and it included three main objectives such as the support of emergency response operations, support of administration operations, and support training.

Specifically, the analysis led to the design of a sprinklers system protecting the entire fire station. Addressable fire sensors were required in all sleeping rooms and associated corridors. In addition to smoke detection, each sleeping room was also provided with carbon monoxide detectors. A mass notification system was also specified for local notification.

The uncertain reliability of the water supply necessitated that an autonomous temporary water supply with a fire pump be provided. In conjunction with an electric fire pump driver, an emergency generator was also specified.

New Marine Expeditionary Force Headquarters, Finegayan, Guam

Validate preliminary programming of a new 150,000 square feet headquarters for the US Navy, Finegayan, Guam.

Marines Armory Building, Finegayan, Guam

Marine Logistics Group CLR-37 Operations Facility, Finegayan, Guam

Automotive Organizational Shop Building, Finegayan, Guam

Electronics/Communication Maintenance Shop Building, Finegayan, Guam

Controlled Humidity Warehouse, Finegayan. Guam

Company/Battery Headquarters, Finegayan. Guam

ENTERTAINMENT

Discovery Zone, Chicago, Illinois

Fire Safety Principal - The project consisted of conducting a comprehensive research and analysis to devise comprehensive fire safety solutions applicable in all 50 states. A typical Discovery Zone FunCenter (DZFC) facility consists of indoor playground stations for children. Most stations are elaborate mazes of tubing and netting. The landing surface in, most play stations, is an enclosure partially filled with small rubberized balls. The fuel consisted of substantial amounts of plastic materials in different forms and shapes. Many materials were treated with chemicals rendering them "ignition resistant". However, no specific guarantees were offered by suppliers. The inherent fire risk had to be investigated. Evaluate fire and life safety design, its associated hazards, and mitigation features of a typical DZFC. Authorities Having Jurisdiction (AHJ) had concerns over fire and life safety risk of concentrated assembly use involving principally young children. The study focused on compliance with different codes and corporate goals. Specifically, the following was performed: Model Codes compliance analysis; Failure Modes and Effects Analysis (Client's risk tolerance defined); Fault Tree Analysis (qualitative, considers worst case scenario). Simulated Fire Analysis (three fire scenarios were used for application of computer fire modeling). The review and analysis, of fire and life safety of typical DZFC facility, led to conclude that the facility complied with intents of model building codes, and with Client's safety corporate goals.

Universal Studios, Los Angeles, California
This project consists of a core and shell building for the eventual use of entertainment show for the general public. The public will view the show in mobile tram. As part of the infrastructure of the show setup, are catwalks and control platforms which have been created and are located above the ground level at elevations of 32 feet to 35 feet.

The design criteria for fire suppression, fire detection, alarm, and notification is based upon the occupancy groups identified by the Code Analysis (by Architecture). The main use group was determined to be an Assembly Group 3. It follows that fire sprinklers, fire standpipe, and manual fire alarm systems are required in this project.

Based upon the limited scope of work (core & shell) which include catwalks and tunnel, the design criteria recommended is an Ordinary Hazard, Group 1, per FM directions (FM memorandum dated May 20, 2009). NFPA 13 (2002 edition) requires a water discharge density of 0.15 gallons per minute per square foot of area and over 1,500 square feet of design area. FM representative mandated increasing the design area to 3,000 square feet over the same density.

Given that the show components are still being developed, any special requirements will be addressed at a later time. Note that the FM representative also concluded in a same manner. It is anticipated that additional piping and sprinkler coverage will be needed to address physical arrangement constraints or additional fuel loads from show components.

There are three distinct different locations which require the need to the following specification. These are overhead general suppression, projection booths protection, and basement protection. It was acknowledged that projection booths are a source of intense heat from projection equipment (68,260 BTU per hour per projector). It is understood that all projection booths will be provided with conditioned air. It is also understood that the building will not be provided with emergency power supply. As such, intermediate temperature rating fire sprinklers will be specified for projection booths. It is assumed that the maximum ambient temperature, without intervention of cooled air, to reach 150^0F.

The maximum ambient temperature at the ceiling level of the building is expected to reach 100^0F without mechanical cooling in summer days. Unless we obtain clarification of expected thermal conditions and policies to manage abnormal thermal conditions, we will specify the fire sprinkler design for the projection booths to be of intermediate temperature rating.

Per the 2007 California Building Code and California Fire Code, a fire standpipe is required for this building if the distance between the lowest fire department access and the highest level used for human occupancy is 30 feet or higher Section 905.3.1). It is assumed that the lowest fire department access is located more than 30 feet from the lowest human occupancy. It appears that projection booths are located 32 feet above the finished floor. Given that the structure is required to be sprinklered, the Code allows the use of a Class I standpipe system.

The detailed design is to be implemented using NFPA 14 unless Factory Mutual Corporation requires more stringent performance requirements. The standpipe system is anticipated to be a combined system (sprinkler and standpipe). Locations of Class I standpipe hose connections are to comply with Section 905.4. Specifically, Class I standpipe hose connections are required to be located in every required fire stair. Hose connections are to be located at the intermediate stair landing.

Per the Building and Fire Codes, a fire alarm system is also required. The presence of both fire sprinkler and standpipe systems require monitoring the status of these two systems.

A Class B fire alarm system is recommended while it is recognized that a Class A fire alarm system is more reliable. Per the exception of Section 907.2.1, only one manual fire alarm box is required when the building is provided with fire sprinklers. The location of the fire alarm box is per the Los Angeles County Fire Department. The fire alarm system would include one (1) smoke detector in the space housing the fire alarm control panel, one (1) manual fire alarm box, and audio and visual notification devices throughout the building (general, catwalk, projection booths, control room, and catwalks) and tunnel.

Howard W. Balentine, CCM, P.E.

Senior Program Manager

Years Experience: 30+

Technical Specialties

- Climate Change Policy Assessment
- Greenhouse Gas Emissions Inventory Development and Verification
- Emission Inventory Development and Analysis
- Atmospheric Dispersion Modeling / Air Quality Analysis
- Air Quality Permitting
- Human Health Risk Assessment
- Off-Site Consequence Analysis

Professional History

- ENSR
- Radian Corporation
- Espey Huston & Associates
- U.S. Air Force Officer/Weather Forecaster

Education

- ME (Environmental Engineering) University of Florida
- MS (Business Administration) Boston University
- BS (Physics) United States Air Force Academy

Professional Registrations and Affiliations

- Lead Certifier, California Climate Action Registry
- Certified Consulting Meteorologist, American Meteorological Society
- Registered Professional Engineer, Texas, No. 67215
- Air & Waste Management Association
- American Meteorological Society

Representative Project Experience

Mr. Balentine's areas of expertise include air quality permitting and modeling; regional and facility emission inventory development for criteria, greenhouse gas, and toxic air pollutants; off-site consequence analysis of chemical spills, boundary layer and air pollution meteorology, and health risk assessment, greenhouse gas emission inventory development and verification, climate change issues, Life Cycle Assessment,. He has over 25 years of experience in emission inventory development and air quality modeling and has participated in a number of regional emission inventory and modeling projects in the U.S., Hong Kong, and Southern China. He has performed numerous assessments of hazardous materials spills and off-site consequence analyses. His experience includes a number of solar and hybrid solar/combined-cycle permitting and licensing projects where his responsibilities included aviation related analyses. He is expert at the performance of health risk assessments to examine to health effects of the emissions of toxic air contaminants

from industrial facilities. He directs ENSR's greenhouse gas emission verification program.

Solar Millennium, LLC, Blythe Solar Power Project, California. Prepared aviation analyses portion of the Traffic and Transportation section of the Blythe Solar Power Project AFC, located approximately 1.5 miles from the Blythe Municipal Airport. This included both the standard analysis with respect to Federal Aviation Administration (FAA) requirements for evaluating whether project structures would exceed height limitations, as well as an analysis of potential turbulence impacts on aircraft of the thermal plume from one the project's dry cooling towers. He also prepared the application to the Riverside County Airport Land Use Commission (ALUC) to obtain ALUC concurrence that the project is a compatible land use with the airport.

Inland Energy, Environmental Permitting, California. Prepared aviation analyses portions of the AFCs for two hybrid solar thermal/combined-cycle projects proposed in southern California. Mr. Balentine prepared the analyses demonstrating compliance with FAA requirements for structures in the aircraft approaches and departure routes for both the Victorville 2 Hybrid Power Project and the Palmdale Hybrid Power Project. In the Victorville 2 project, the proposed power plant site is nearly adjacent to the Southern California Logistics Airport (former George Air Force base). For the Palmdale project, the site is adjacent to Air Force Plant 42. In both cases, the FAA provided its approval and the aviation facilities themselves also were comfortable with the projects.

Various Clients, Cooling Tower Fogging and Icing Modeling using SACTI; California, Nevada, Iowa, Delaware. Performed cooling tower plume fogging and icing analyses for a number power plant and other cooling towers. The EPRI SACTI model was used to perform the modeling. Issues investigated included the frequency of fogging and icing on nearby roadways, salt deposition on nearby agricultural fields, and the rate of deposition of rime icing on nearby power lines. For certain projects, post-processing software was developed to address site-specific modeling issues. For power plants in California, the SACTI modeling was supplemented with other models used to assess the potential for visual plume formation from heat recovery steam generators at combined cycle natural gas power plants.

Sempra Energy Resources, Palomar Energy Project, Escondido, California. Task manager for air quality modeling, human health risk assessment, and offsite consequence analysis for a successful permitting project for a new merchant power plant in Escondido, California. The air quality analysis included modeling using ISCST3 and AERMOD models, VISCREEN Level-2 analysis plume blight visibility screening analyses, CALPUFF regional haze and Class I area other air quality related values analysis, health risk assessment modeling, and visible plume analyses. Performed an off-site consequence analyses for the release of aqueous ammonia.

Southern California Edison, Class I Area Modeling Using CALPUFF, Nevada. Performed regional air quality impact assessment modeling for the Mohave Power Plant near Laughlin, Nevada using the CALPUFF model. The objective of the modeling was to assess changes in visibility, acid deposition, and other air quality related values in Grand Canyon and Joshua Tree National Parks due to major modifications at the facility. The meteorological modeling domain included both Class I areas with air quality modeling domains focused on the two Class I areas.

Confidential Client, Petroleum Refinery, Analysis of Metals Deposition from Petroleum Refinery Emissions, Los Angeles area. Project manager of an air quality

modeling analysis assessing average heavy metals deposition to a watershed surrounding a petroleum refinery. The modeling was prepared using the CALPUFF model and was in response to agency concern on toxic impacts to wildlife in the designated watershed.

Confidential Client, Aerospace Industry, Modeling Analysis of the Potential Hazards from the Venting of Rocket Propellant during Fuel Tank Loading Operations, Southeast U.S. Project manager of an air quality modeling analysis examine the potential ambient concentrations of rocket propellants released during fuel tank loading operations. The objective was to determine the safe amount of hypergolic oxidizer and propellant that could be released simultaneously during accidental spills and not lead to toxic or explosive conditions. The modeling was performed using the CALPUFF model.

Various Clients, Visibility Modeling using CALPUFF; California, Arizona, Nevada. Performed visibility and acid deposition modeling using the CALPUFF model to assess acid deposition impacts and the contribution to regional haze of emissions from a number of power plants and other large stationary sources. The modeling followed the Federal Land Managers Air Quality Group (FLAG) guidance for visibility modeling using CALPUFF. The screening mode of CALPUFF was used to estimate the visibility and acid deposition impacts in nearby PSD Class I areas.

TranSystems, Transportation Facility Air Quality Analysis, Southern California. Prepared an air quality analysis of emissions from two warehouse distribution facilities in Southern California. The URBEMIS model was used to estimate emissions of criteria pollutants from traffic and area sources associated with the projects. The emission computations were prepared for three future years and the resultant emissions totals were compared to threshold emission values to determine the magnitude of air quality fees to be paid to the local air district as a mitigation measure under the California Environmental Quality Act (CEQA).

Confidential Petroleum Refinery, Health Risk Assessment. Principal Investigator for a project to develop criteria and an air toxic emission inventory for a confidential petroleum production and refining company. The emission inventory was used to perform a health risk assessment for population exposure to the toxic emissions from facility operations. Task performed included conducting a site visit to gather the data to be used to compute the emission inventory, performing air quality modeling using the AERMOD model, and performance of the health risk assessment.

Riverside Cement Company, Facility Emission Inventory Reports, Oro Grande and Riverside, California. Project manager for two projects to develop comprehensive emission inventory plan and reports (CEIP/CEIR) for criteria pollutants for the Oro Grande and Crestmore cement plants. The inventories were based on an emission inventory plan that was approved by the local air district that included all sources of criteria pollutant emissions for the cement plants and associated quarry. The completed CEIRs were submitted to the districts in electronic format.

Western States Governor's Association, Micro Inventory, Grand Canyon National Park. Task leader of a project to develop a local (micro) inventory for Grand Canyon NP. The objective was to develop emission estimates to support evaluation of emission-visibility relationships in the Grand Canyon. The project included assessment of all emissions sources in the Park, consisting of stationary and mobile sources, including vehicle, rail and aircraft. The inventory was developed to support regional emission inventory development and as input to a visibility modeling analysis.

Woodside Natural Gas, Life Cycle Assessment and Emissions Inventory Development for the Proposed OceanWay LNG Deepwater Port, Southern California. Mr. Balentine is technical project manager for an ongoing Lifecycle Assessment (LCA) commissioned by Woodside Natural Gas (WNG) for the OceanWay Project, a proposed liquefied natural gas (LNG) deepwater port off Southern California. . He is responsible for ensuring that the technical aspect of the LCA meets ISO 14040/14044 requirements for the conduct of an LCA, reviewing the LCA modeling, and managing the preparation of the energy use and GHG emission metrics for the lifecycle of the entire LNG train from gas exploration end user combustion of the regasified LNG. He is also responsible for coordinating the input for the final report from the various authors and the preparation and editing of the final report. He was Project Manager of the development of the criteria and toxic air pollutants and GHG emission inventories for construction and operation of the OceanWay project, including quantifying operational emissions associated with LNG regasification aboard the regasification LNG carrier (RLNGC), vessel transit, lightering with the LNG carrier, and support activities including support vessels and helicopters.

Covanta Energy, Greenhouse Gas Emission Inventory Development for California Operations. Project Manager for development of a greenhouse gas (GHG) emission inventory for Covanta Energy's 12 California facilities for 2005 and 2006. The facilities included landfill gas-fired power plants, wood-fired power plants, and a waste to energy (WTE) facility. Emissions were estimated for the six Kyoto GHGs. Emission computations were performed following the California Climate Action Registry (CCAR) General Reporting and Power and Utility Protocols with development of source-specific GHG emission factors based on source tests for each facility. The inventories were entered into the CCAR's Online Reporting System CARROT. After submission of the inventory, coordinated the certification of the inventories between the Certifier and Covanta Energy.

Pacific Ultrapower Chinese Station (PUCS), Greenhouse Gas Emission Inventory Development. Project Manager for development of a greenhouse gas (GHG) emission inventory for PUCS for 2005 and 2006. PUCS is a wood burning power plant in northern California. Emissions were estimated for the six Kyoto GHGs following the CCAR Power and Utility Protocol and entered using the CARROT reporting system. Source-specific GHG emission factors were computed based on CEMS monitoring data. After submission of the inventory, coordinated the certification of the inventories between the Certifier and PUCS.

Selected Publications and Presentations

Mr. Balentine has over 20 publications and technical presentations at conferences to his credit. Details are available upon request.

SWCA ENVIRONMENTAL CONSULTANTS

CARA CORSETTI, M.S.
Office Principal

Education / Training

- M.S., Geological Sciences, emphasis in Paleobiology, University of California, Santa Barbara, 2007
- B.A., Creative Studies, interdisaplinary degree with an emphasis in Biology, Geology, and Paleontology, University of California, Santa Barbara, 1999
- NHPA Section 106 Training, University of Nevada, Reno, 2002
- CEQA Regulatory Compliance, Association of Environmental Professionals, 2002, 2003

Experience Summary

Cara Corsetti, Office Principal of SWCA Environmental Consultants' Pasadena and Half Moon Bay offices, specializes in the direction and management of multi-disciplinary technical studies and environmental assessments conducted in support of environmental documents, particularly in the disciplines of cultural resources, natural resources, historic preservation, geoarchaeology and paleontology. Her current responsibilities include agency and client coordination and facilitation, program development, proposal writing and project management, budget preparation and oversight, managing and coordinating the tasks of technical and administrative staff, conducting environmental assessments, and the production and editing of technical reports.

With over 18 years of management experience, Ms. Corsetti has been involved in more than 350 projects throughout California, Nevada, Colorado, Wyoming, and Utah and has experience working on a multitude of project types, including oil and gas pipelines, transmission lines, seismic projects, as well as geothermal, natural gas, wind and photovoltaic projects. She has successfully worked with various lead agencies such as the Federal Energy Regulatory Commission (FERC), the Bureau of Land Management (BLM), Caltrans, and the California Energy Commission (CEC).

Ms. Corsetti has been certified through the California Energy Commission (CEC) as a Paleontological Resource Specialist (PRS) on a project-specific basis for multiple projects throughout California during pre-construction and construction phases of various small and large power plants and associated linear facilities. She has worked on over 20 power projects under CEC jurisdiction in either the permitting or construction phase. She is a member of the following professional organizations: Society of Vertebrate Paleontology, Society for Sedimentary Geology (SEPM), Geological Society of America, Paleontological Society, and Association for Environmental Professionals.

SWCA Relative Project Experience

Stockton Generation Project; San Joaquin, Stanislaus, and Merced counties, California (2009): Senior Paleontologist for paleontological resources studies in support of the Application for Certification (AFC) for a 530 MW natural gas power plant and associated linear facilities. Served as coauthor and quality control officer for draft paleontological survey report, as well as the AFC section. *Role: Principal Investigator. Client: Power Engineers, Inc.*

Victorville 2 Hybrid Power Project; San Bernardino County, California (2006- 2009): SWCA is currently providing paleontological resources management services for this project; the scope of work includes (1) performing background research and museum records searches of the project area and vicinity, (2) conducting paleontogical field survey, and (3) preparating a technical report that includes project-specific mitigation measures to be implemented during the ground disturbing associated with the 250-acre plant site, associated utility lines, and approximately 20 miles of transmission line right-of-way. *Role: Project Manager. Client: AECOM.*

Kings River Conservation District Peaking Plant; Fresno County, California (2004-2005): As the project manager and one of the CEC-approved Paleontological Resource Specialists for this project, Ms. Corsetti was responsible for overseeing all paleontological tasks associated with the construction of a small peaking plant located in Fresno County, California. Prior to the commencement of project construction, a paleontological resources survey and assessment was performed of the approximately 18-acre project plant site and associated utility lines. A paleontological monitoring and mitigation program (PRMMP) was designed to identify and salvage scientifically significant paleontological resources and associated data as rapidly as possible in order to prevent construction delays. Additionally, SWCA prepared and implemented the worker environmental awareness training program for paleontological resources as per the project Conditions of Certification. Paleontological monitoring by SWCA's CEC-certified paleontological monitors was performed during the construction of the plant site. A final monitoring report documenting the results of the monitoring program was prepared and submitted to the client. *Role: Paleontological Resource Specialist / Project Manager. Client: Navigant Consulting for the Kings River Conservation District and the California Energy Commission.*

Cosumnes Power Project; Sacramento County, California (2003 – 2005): SWCA assisted Sacramento Municipal Utilities District (SMUD) officials with the implementation of the project's Conditions of Certification, as required by the California Energy Commission (CEC) during a major construction effort for a power plant site, a new gas pipeline, and other facilities. SWCA's team of paleontologists designed and implemented a worker environmental awareness training program for paleontological resources per the project's Conditions of Certification, performed a field survey and conducted soils testing and paleontological sensitivity analysis, and prepared and implemented a Paleontological Resources Monitoring and Mitigation Program for the project. Ms. Corsetti was approved by the CEC as one of the Paleontological Resource Specialists for the project and was responsible for overseeing all paleontological tasks. *Role: Paleontological Resource Specialist. Client: Sacramento Municipal Utilities District.*

Riverside Energy Resource Center; Riverside County, California (2004 - 2005): SWCA was retained by Power Engineers, Inc., to provide support of an application by the Riverside Public Utilities to the California Energy Commission (CEC) for a Small Power Plant Exemption (SPPE) for the Riverside Energy Resource Center (RERC) in the city of Riverside and subsequent paleontological services during the construction of the RERC and associated transmission line. As Paleontology Task Manager, Ms. Corsetti was responsible for overseeing paleontological work, including (1) museum records searches and literature reviews, (2) reconnaissance field surveys, (3) design and preparation of a Paleontological

Monitoring and Mitigation Plan (PRMMP), (4) design and implementation of a worker environmental awareness program, and (5) implementation of monitoring and mitigation services. *Role: Paleontological Resource Specialist/ Paleontology Task Manager. Client: Power Engineers, Inc.*

Raymond J. Dracker
Senior Vice President – Project Development

Overview:

Ray Dracker presently serves as the Senior Vice President of Project Development at Solar Millennium LLC in Berkeley, California. He is responsible for all project development activities for the company's US solar power development business. Solar Millennium is a solar power project developer, owner, operator, with a project portfolio covering the southwest US, Spain, Africa and China.

Prior to joining Solar Millennium, Ray served as Technical Director at the Center for Resource Solutions in San Francisco, with lead responsibility for implementing a series of projects and programs to assess near term renewable energy power options for western states. He previously served as the Director of Technology Transfer at the National Renewable Energy Laboratory in Colorado, with responsibility for managing the Laboratory's intellectual property assets, supporting technology commercialization initiatives throughout the Lab, and providing business support to NREL's industrial stakeholders throughout the country.

Ray also has worked in renewable energy roles at Bechtel and Pacific Gas and Electric in San Francisco. At Bechtel Corporation, Ray was responsible renewable energy R&D as well as technology development, market and economic assessment, strategic planning, and policy and regulatory analysis for Bechtel Power. As an R&D Program Manager at Pacific Gas and Electric in the 1980s, he participated in the planning, design and development of leading renewable energy and advanced fossil technologies.

Employment History:

2006 to Present – Solar Millennium LLC – Senior Vice President

Responsible for all project development activities, including site screening and analysis, permitting, licensing, interconnection, development engineering and oversight of the EPC contractors.

2001 to 2006 – Center for Resource Solutions – Technical Director

1998 to 2001 – Bechtel National - National Renewable Energy Laboratory Management and Operation
Director: Technology Transfer Office

1993 to 1998 - Bechtel Corporation
Manager: Renewable Energy Development and Advanced Industrial Technologies

1980 to 1993 - Pacific Gas and Electric Corporation
Program Manager: Renewable Energy; Program Manager: Advanced Fossil Energy; Project Engineer: Advanced Power Systems

1979 to 1980: Argonne National Laboratory
Research Intern - Advanced Physics Division

Education
B.A., Physics, State University of New York at Oneonta, 1977
B.S., Engineering Science, University of Buffalo, 1978
M.S., Nuclear Engineering, University of Arizona, 1980
Post Graduate Studies in:
Finance, Sloan Business School, Massachusetts Institute of Technology, 1987
Advanced Management College, Stanford University, 1992
Economics, University of California at Berkeley, 1982

Registered Professional Engineer - State of California
.

Michael Dudasko, CPEA
Senior Program Manager

Education

BS, Chemical Engineering, Pennsylvania State University, 1978

Registrations

Certified Professional Environmental Auditor, Registration No: 399878

Years of Experience

With AECOM: 8
With other firms: 24

Mr. Dudasko is a Certified Professional Environmental Auditor and has provided audit services and proactive compliance support to facilities of all sizes in a wide spectrum of industries including: satellite and aerospace, pharmaceutical/ biotechnology, and semi-conductor/high tech. Mr. Dudasko has also provided permitting and compliance support to petroleum refineries, power plants, and other industries. He has also prepared hazardous waste permit applications under RCRA Part B for six facilities and assisted a number of other facilities with California Tiered Permitting compliance. Mr. Dudasko also has expertise in hazardous waste classifications, regulatory exemptions, disposal and handling requirements.

Experience

Environmental Compliance Experience

BP Cherry Point Refinery, Washington Compliance Audit. Audited the hazardous and dangerous waste operations at the refinery focusing on hazardous secondary materials exclusions for recovered oil, and other exemptions. Provided findings report as well as technical memo on application of recovered oil exemption to hazardous secondary materials to refinery auxiliary maintenance operations.

Confidential Power Generation, Compliance Audit, Northern California. Served as lead auditor for environmental compliance audits of two different 25 MW biomass-powered steam electric generating facilities. Audited program areas for wastewater, stormwater, hazardous materials, oil spill prevention, and hazardous waste. Prepared consolidated report from other auditors including the Title V air permit and CEM system.

Community Power Corp., Waste to Energy Regulatory Evaluation, Northern California. Evaluated the hazardous waste and air permitting requirements for a biowaste to energy unit located on a farm that processed walnut shell waste and converted it to a low BTU gas. The gas could be direct-fired in a generator to produce electricity or could be processed to produce liquid fuels. The report summarized the process and described the applicable regulatory requirements including what equipment required air permits or did not, best available control technology (BACT) requirements, and the applicable waste regulations

and testing requirements.

Brewery, Environmental Compliance Audit, California. Assisted internal corporate auditors to perform annual environmental compliance audits yearly for five years. The facility included a wastewater treatment plant, ammonia refrigeration system, two gas-fired cogeneration turbines, gas-fired boilers, and two biogas-fired internal combustion engines for power. Audits were performed against federal and California laws and regulations and focused on storm water, hazardous waste, hazardous materials and air compliance issues. Recommendations were also made to reduce risk exposure.

Confidential Power Generation, Compliance Audit, Utah. Served as lead auditor for environmental compliance audit of a 59 MW steam electric generating facility fueled by coal waste refuse. Audited program areas for biological resources, solid and hazardous waste management, water use, wastewater management, pollution prevention and release response, radiological licensing, storm water management, tank management, and ash management. Prepared consolidated report from other auditors including the Title V air permit and CEM system.

Confidential Power Client, Ash Disposal Assessments, California and Utah. Managed a project to review ash management practices used by a power generating company for facilities fueled by coal, petroleum coke, and biomass. Visited four ash management locations to assess actual practices. Managed data received from site visits conducted by other personnel. The report summarized ash management practices at whether their handling of the ash would create any liabilities for the parent company of the power generating facilities.

Hazardous Waste Permitting

Romic, Part B Permit Application, East Palo Alto, California. Performed as project manager for preparation of a Part B hazardous waste permit application for a California and RCRA hazardous waste storage and treatment facility. This facility is one of the most complex of its kind with processes including: liquefaction, fuels blending, solvent distillation, ethylene glycol purification, waste consolidation, inorganic waste processing/neutralization, and waste water treatment. Activities included preparing Part B Application narrative sections, technical support to tank certifications, and developing the facility closure plan and the facility closure cost estimate.

Shell Oil Products, U.S., Part B Permit Application and RCRA Trial Burn, Martinez, California. Managed a project for the successful preparation of a Part B Permit Renewal Application to the California Department of Toxic Substances Control (DTSC) for a boiler/industrial furnace (BIF) unit. This included preparation of all hazardous waste permit application materials, including a new closure plan and closure cost estimate using CostPro for a tank, a surface impoundment, and three BIF Units. A Health Risk Assessment (HRA) protocol document and a Trial Burn Plan were prepared and submitted for DTSC approval. The Trial Burn Plan described the test procedures for stack chemical analyses to be used in the HRA, selection of the spiking compound and procedures used to determine the destruction and removal efficiency (DRE). After anomalous factors caused the DRE of 99.99% to be met on only one of

three runs, an addendum to the Trial Burn Plan was prepared. In addition, assisted the client to complete real-time engineering tests to assess key operating parameters affecting DRE. After a suite of engineering tests were performed, the second Trial Burn was scheduled and successfully completed. Managed preparation of Trial Burn Reports for both series of tests. Maintained significant involvement with the permit writer and other staff from DTSC. Assisted DTSC by in preparing the California Environmental Quality Act (CEQA) Environmental Information Form and the draft of the public meeting presentation.

Phibro-Tech, Part B Permit Application, Santa Fe Springs, California. Managed the Part B permit renewal application for a facility that recycles spent inorganic etchants and other inorganic chemicals to make a variety of new chemical products. The process included adding a new organic treatment process for managing oily water. Worked with client to establish process schematic and major treatment components. Had working meetings with DTSC staff to outline the permit application approach. Also wrote the Part B sections on waste management equipment, operations, closure plan and closure cost estimate (using DTSC approved CostPro) and defining engineering certification requirements.

Hazardous Waste Compliance

Indalex Inc., Hazardous Waste Compliance Support, Central Valley, California. Evaluated compliance alternatives for onsite hazardous waste treatment for an aluminum anodizing facility that received a notice of violation from the Department of Toxic Substances Control (DTSC). Developed alternative compliance scenarios and identified one that could be completed to meet the compliance deadlines at less than 20% of the anticipated costs. Assisted the client with subsequent meetings or calls with DTSC and in filing notices under the permit-by-rule tier.

Confidential Retail Store Chain, Hazardous Waste Characterizations, California. Worked for outside legal counsel on behalf of a retail store chain that had been charged by two different district attorneys with improper disposal of hazardous waste. Performed store shelf assessments to validate the accuracy of the database of items classified as hazardous and whether it was up to date with products observed in retail stores. Reviewed over 55,000 entries in a database for those items initially classified as non-hazardous which should be considered as hazardous either pursuant to federal or California criteria. Participated in a visit to corporate headquarters to review status of the work and to help direct handling of newly introduced products. Assisted attorneys in store visits to verify products already characterized were done so properly and to identify the proper characterization of other products.

Shell Chemicals, Hazardous Waste Regulatory Analyses, Martinez, California. Performed regulatory analyses to demonstrate how two routinely generated hazardous waste streams can be properly recycled under California hazardous waste regulations and Section 25143.2 of the California Health and Safety Code.

Signode Western Operations, Waste Minimization, Pittsburg, California. Wrote the initial waste minimization plan and performance report for a steel products company in accordance with California SB 14 guidelines. Worked with the facility to identify potential waste minimization

projects and their benefits to determine those to be implemented or those that required further evaluation before a decision could be made. After the company implemented the recommended measures, they reduced their hazardous waste generation by 84%.

Exxon, Waste Minimization, Benicia, California. Wrote a waste minimization plan for a petroleum refinery under California SB 14 guidelines. Compiled and described the progress of previous waste minimization steps that were implemented and then worked with the facility to define additional waste minimization measures that could be implemented or that required more detailed review.

Satellite Manufacturer, Waste Minimization, Silicon Valley, California. Developed a California SB 14 waste minimization plan for a satellite manufacturing company that uses a variety of high technology processes on a multi-building campus. This facility already had a mature waste minimization program in place. With the measures identified, helped support a 20% reduction in hazardous waste generation.

CEQA Support

Valero, Capital Permitting, Benicia, California. Managed project to support a petroleum refinery obtain a Use Permit for a large refinery project. Participated in engineering discussions, crafted the Project Description, and managed the effort to prepare an Environmental Assessment document that mimicked an EIR. This document allowed the local agency to expedite their reviews. Performed technical review of the BAAQMD Authority to Construct air permit application. Throughout both processes, assisted client in responding to questions from the agencies.

Petroleum Refinery, Support for Large Project Permitting, Contra Costa County, California. Provided support to a petroleum refinery related to a proposed major refinery project. Project activities included performing hazard scoring analyses in accordance with the Contra Costa County Land Use Ordinance to determine if a land use permit and subsequent EIR was required. Also prepared an analysis of applicability of Chapter 84-63 under Title 8 of the Contra Costa County Industrial Safety Ordinance. Prepared the section for the applicant draft of the EIR related to the hazards section discussing setting and proposed impacts from the project related to hazardous materials and hazardous waste. Provided support to the project team on issues potentially affecting key design parameters for product storage.

California Lead Agency, Hazards Section of Topock EIR, California. Served as member of a multi-disciplinary team working for the California Department of Toxic Substances Control as the lead agency in writing the Environmental Impact Report (EIR) to support the selection of a remedial alternative(s) for cleanup of hexavalent chromium contaminated groundwater at the PG&E Topock compressor station near Needles, California. Had primary responsibility for the EIR Section on Hazards, established environmental settings, evaluated impacts and mitigation measures of various project alternatives.

Solar Millennium, AFC Waste Sections, California. Responsible for writing the Waste Section for three Application for Certification (AFC) documents for three thermal solar power plants in the California desert designed to provide a total electrical output of 1,750 MW and comprising

about 15,000 acres. The sections considered the laws, regulations, and other standards applicable to waste activities at these three locations; defined the baseline settings, waste impacts and mitigation measures. The evaluation considered waste management methods, disposal locations, re-use and recycling opportunities, and waste treatment methods. Additionally provided post submittal support and response to data adequacy questions related to hazardous material issues.

Michael E. Flack
Senior Program Manager

Professional History

Education

BS, Geology, California State University of Northridge
MS, Geology, California State University of Northridge

Registrations

Professional Geologist, CA
Certified Engineering Geologist, CA

Years of Experience

With AECOM 14
With other firms 13

Technical Specialties

Brownfield Development
Contaminated Sediment Investigation
Groundwater & Soil Subsurface Investigation
Groundwater Recovery & Treatment Systems
In Situ and Ex Situ Soil Remediation & Treatment
Landfill and Waste Capping & Containment
Operation & Maintenance of Remediation Systems
Remedial Fate & Transport Modeling
Remedial Process Optimization & Performance-based Remediation
Remediation Feasibility Studies
Remediation Technology Testing/Evaluation/Pilot Studies

Mr. Michael Flack has over 25 years of experience in managing investigation and remediation programs that employ both in-situ and ex-situ technologies at oil field and refining facilities throughout the western United States. Further, he has assisted responsible parties, regulatory agencies, and water purveyors in identifying and implementing water supply alternatives to replace groundwater resources impacted by industrial facilities. In this capacity he evaluated surface and groundwater resources to identify feasible short-term and long-term water supply alternatives. Water quality studies were performed to determine water chemistry and acceptability of potential sources, and groundwater modeling and basin yield evaluations were performed to assess a wide range of alternatives including potable and non-potable reuse. As one outgrowth of these projects, he has designed water supply wells and overseen well-head treatment programs. He is a Professional Geologist and Certified Engineering Geologist in California with experience in managing projects under CERCLA and RCRA regulation. He is also experienced with CEQA, having prepared numerous Initial Studies, developed mitigation measures and directed groundwater surveys needed to support implementation of remedial actions.

Experience

Confidential Client, Western Mojave Desert, California. Project hydrogeologist assigned to evaluate groundwater resources as part of an application for certification (AFC) to the California Energy Commission (CEC) in support of a proposed 250-megawatt solar power plant planned for commercial operation in 2011. Project tasks included development of a groundwater basin conceptual model and subsequently a numerical groundwater model (MODFLOW) to determine availability of groundwater to meet project water requirements and evaluate the impacts to groundwater basin storage and water quality for the AFC. Tasks in support of the basin conceptual modeling included conducting several step and constant-discharge a pumping tests, down-hole geophysical and conductivity logging, developing a database of recent and historic hydrologic and well data, and evaluating groundwater geochemistry. Critical elements for the modeling included development of the basin water balance and recharge. Several analyses of recharge were performed that

Tank Removal
Vapor Intrusion
Waste Facility Site Selection, Permitting, Design/Build & Operation
Water Resources Investigations
Water Supply Permitting & Development

Professional Affiliations

National Groundwater Association
Association of Engineering Geologists
Groundwater Resources Association of California

showed the groundwater basin is in recovery from prior period of overdraft. These analyses provided foundation for the proposed groundwater use, and supported that the project would have less than significant impact to the groundwater basin storage. Additionally, supported the project through all data response and communications to the CEC and provided leadership in the preparation of all water-related permitting such as the report of waste discharge for proposed evaporation ponds and dredge and fill-permit to the Regional Water Quality Control Board and Conditional Letter of Map Revision to Federal Emergency Management Agency.

Confidential Client, Western Mojave Desert, California. Assigned as project hydrogeologist to evaluate soil, geologic hazards and water resources impacts as part of three applications for certification to the California Energy Commission. Multiple projects are proposing parabolic mirror technology with dry cooling at 250-megawatt increments at three sites within the Mojave Desert. Project responsibilities include negotiation and development of scoping and approach consistent with current CEC and Federal Bureau of Land Management requirements for assessment of impacts.

San Luis Rey Municipal Water District, Pala, California. As project hydrogeologist, provided an evaluation of groundwater resources within a small water district in Southern California. In support of the planned development of formerly agricultural properties, the project objectives were to determine storage and sustainable yield for an alluvial groundwater basin. Project tasks included literature review, analytical modeling of storage, and sustainable yield and water balance. In addition, the project included evaluation of alternative management schemes to return treated wastewater to the aquifer system.

The Boeing Company, Inactive Rancho Cordova Test Site, CERCLA RI/FS and Remediation, Sacramento, California. Senior hydrogeologist, and geologist of record under the Order, for the investigation and remediation of a former 4,000-acre rocket-test facility under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) guidance. Responsible for all technical deliverables and a field program that has included soil vapor sampling, rock coring programs, and the installation of over 150 multi-completion monitoring wells. Provided comprehensive interpretation of a multi-layered aquifer system through the interpretation of lithologic and geophysical logging (short and long-normal resistivity, Spontaneous Potential, and natural gamma logs) of the well and soil borings. Identified and implemented water supply alternatives to replace groundwater resources impacted by contamination. Water quality studies were performed to determine water chemistry and acceptability of potential sources, and groundwater modeling and basin yield evaluations were performed to assess a wide range of alternatives including potable and non-potable reuse. Coordinated development of a probabilistic groundwater model (MODFLOW) to evaluate impacts from proposed pumping and determine if the viability of developing alternative groundwater resources down-gradient from the remedial system pumping centers. Prepared an engineering evaluation and cost analysis (EE/CA) of remedial alternatives to contain and remediate groundwater impacted by perchlorate and VOCs. Designed extraction well network and supervised and directed probabilistic modeling program for the hydraulic containment system. Designed soil vapor system network as part of several ongoing source removal programs for sources of VOCs on former rocket-test facilities. Provided senior review of proposed in-situ biological degradation pilot

testing program for soil and groundwater involving both perchlorate and VOC-impacted media. Prepared water supply alternative reports that identify reuse alternatives for treated groundwater. Prepared and peer-reviewed remedial investigation/feasibility study (RI/FS) reports and remedial action plans for multiple operable units. Provided oversight for human-health and ecological risk assessments and negotiated risk-based cleanup objectives for various soil and interim groundwater source removal programs.

Tronox LLC, Henderson, Nevada. Acted as both the program manager and senior hydrogeologist for the investigation and remediation of a 450-acre active chemical plant south of Las Vegas, in the City of Henderson, Nevada. The project is under two consent agreements with the Nevada Department of Environmental Protection, one for containment of perchlorate and hexavalent chromium-affected groundwater and a second for assessment and remediation of the sources of chemical impacts in soil that would threaten human health and groundwater. Responsibilities include development and refinement of the site conceptual model for a complex multi-layer aquifer system, including chemical fate and transport modeling, design and evaluation of three groundwater containment systems for groundwater discharging to Las Vegas Wash, and evaluation of soil remedial alternatives and the site human-health risk assessment. The site soils and groundwater have been impacted by perchlorate, hexavalent chromium, volatile organic compounds (VOCs), pesticides, metals and radionuclides. Responsibilities in role as program manager include senior technical review of all technical deliverables, including Standard Operating Procedures, Quality Assurance Project Plan, soil and groundwater sampling and analysis plans, and remedial investigation and remedial system operation reports.

Aircraft Manufacturing Facility Closure, El Segundo, California. Supervised environmental investigation and closure of a large government defense contractor's 55-acre facility. Coordinated hydrogeologic investigations that included an extensive exploratory boring and monitoring well program, and soil gas cone penetrometer and pore-water surveys. Coordinated closure programs for numerous WMUs and completed a remedial excavation effort, which accounted for removal of 100,000 cubic yards of “high-boiling” point petroleum hydrocarbons and chlorinated volatile organic compounds. Soils were sent for thermal incineration and reuse as backfill. Secured closure of further soil investigation and remedial action, and negotiated a limited ground water monitoring effort with the LEA using a risk-based approach. Established monitoring program to evaluate intrinsic bioattenuation of the chlorinated volatile organic compounds in the shallow groundwater by methanotrophic bacteria in an anaerobic environment. Groundwater closure received. Site is currently under redevelopment.

Aerospace Contractors Test Facility Remedial Design, Washoe County, Nevada. Supervised design of a ground water pump and treat program for remediation of a TCE plume using MODFLOW/MODPATH. Evaluated basin and canyon hydrogeology and a contaminant plume over 1-mile in length. Designed, directed and provided peer review of the groundwater modeling effort to design the remedial system layout. Provided technical and cost-benefit analysis for the use of horizontal extraction wells. Designed infiltration galleries and pumping wells, and prepared portions of the design specification package related to well installation, performance monitoring, and future modeling. Assembled and

reviewed bid package including engineering design specifications for the ground water pump and treat program.

United Technologies Corporation/Pratt & Whitney Space Propulsion, San Jose, California. Served as senior hydrogeologist for the investigation and remediation of a former 5,300-acre rocket and propellant test facility under California Regional Water Quality Control Board and Department of Toxic Substances Control Orders. As the senior project hydrogeolgist, developed the site conceptual model and interpretation of a complex alluvial and bedrock aquifer system impacted by perchlorate, VOCs, and 1, 4 dioxane. Responsible for review and technical content for investigation reports describing the extent of perchlorate in surface and un-saturated zone soils and groundwater. Also served as senior author for the preparation of a remedial action plan for perchlorate-affected groundwater at the site. Reviewed historic pump-and-treat-program for perchlorate migrating in a narrow alluvial aquifer and evaluated alternative remedial technologies to improve containment and capture. Developed EE/CA for containment enhancements to prevent perchlorate and VOC migration in groundwater off site to a down-gradient water supply reservoir belonging to the Santa Clara Water District. Directed a groundwater modeling program (MODFLOW) for the evaluation of various containment enhancements.

ARCO Environmental Remediation, Oil Field Closure, Santa Barbara, California. Acted as project manager for abandonment of a 102-acre oil field facility along California's central coast. Responsible for design and implementation of an investigation program to delineate former sumps and petroleum hydrocarbons in the soil and groundwater. Used a conductivity survey as a reconnaissance tool to identify former sumps. Developed risk-based assessment and closure program that was accepted by the LEA.

Former Aircraft Manufacturing Facility Closure, El Segundo, California. Provided innovative sampling program using immunoassay technology for assessment of building materials and former waste management units. Designed program for a wide variety of chemicals of concern that had impacted soils, concrete, and building walls. Supervised Phase I ESA of transonic wind tunnel facility impacted by PCBs. Provided recommendations for assessment of soils and concrete materials.

Various Petroleum Companies Investigation and Remediation, Arizona, California, Oregon, and Washington. Managed two large petroleum companies in Southern California. Responsible for administrative, peer review and technical oversight of $3 M of assessment and remedial programs for petroleum-impacted properties. Supervised a team of six project managers handling more than 70 assessment and remediation projects in Arizona, California, Oregon and Washington.

Brown and Bryant, CERCLA RI/FS, Bakersfield, California. Developed and implemented an RCRA remedial investigation (RI) at a 15-acre former pesticide formulating and distribution facility. Coordinated field program that included installation of a 300-foot monitoring well and 22 exploratory borings in Level B protection and served as site supervisor and site safety officer. Prepared RI work plan including field sampling and analysis, quality assurance project plan (FSAP/QAPP), health and safety plan, RI report and Feasibility Study work plan.

Western Farm Service, BTEX and Pesticide Remediation, Watsonville, California. Supervised design and operation of a groundwater pump and treat program to mitigate and contain volatile petroleum hydrocarbon, pesticide and volatile fumigant-impacted groundwater. Supervised operation of a soil vapor extraction program to mitigate volatile petroleum- hydrocarbon-impacted soils and three source area son the former pesticide formulation and distribution facility. Prepared a partitioning factor analysis (risk) to develop site-specific target levels in soil protective of shallow groundwater. The partitioning factor analysis was done under the oversight and concurrence of the RWQCB-Central Coast Region. Provide senior oversight of the remedial excavation program to remove pesticide-impacted soils and secure soil closure status from the LEA.

Fletcher Refinery, Petroleum Hydrocarbon Investigation, Carson, California. Managed a hydrogeologic investigation at a large refinery in Southern California. Project tasks included assessment of several acres of impacted soil and groundwater, design of a groundwater monitoring well network, aquifer evaluation and testing, and groundwater pump and treat system design and implementation. Evaluated and supervised excavation of 4,000 cubic yards of petroleum hydrocarbon-impacted soils from a former oil field production sump as part of site restoration operations and property transfer.

The Dial Corporation, Brownfield Closure, South Gate, California. Managed assessment and remediation of a former bleach and soap manufacturing facility. Designed and implemented a soil vapor extraction system to mitigate petroleum and chlorinated volatile organic compounds as part of a “brownfield” redevelopment of the 15-acre site. Prepared facility closure plan and negotiated risk-based closure of several areas containing residual hydrocarbon compounds. Provided senior technical review of all submittals and prepared facility demolition specifications as part of site closure.

Former Golden Eagle Refinery, Due Diligence Assessment, Torrance, California. Served as manager and third-party reviewer of evaluation of an SVE and air sparging program implemented as part of a brownfield redevelopment of a former refinery. Remedial system consisted of 123 dual air sparging and vapor extraction wells installed over an approximate 50-acre area. Provided opinions on system design during development and prepared a predictive analysis on system performance and failure scenarios. Assessed long-term system performance and prepared cost analysis for potential failure scenarios for inclusion in the indemnification agreement. Assisted in negotiations during final design phase, which resulted in an expansion from the initial remedial design of 63 wells to the final design of 123 wells. Provided recommendations for a sub-foundation vapor recovery network and design of a passive methane recovery system.

Salt Lake Valley Landfill, Landfill Assessment, Salt Lake City, Utah. Supervised geotechnical and hydrogeologic field investigation for expansion of the largest landfill in Utah, consistent with State regulation and Federal Subtitle D requirements. The program involved installation of 10 monitoring wells and 25 borings to assess hydrogeologic and geotechnical conditions in the area proposed for cell expansion. Designed ground water monitoring network for new expansion cells and prepared FSAP/QAPP.

County of Ventura Regional Sanitation District, Landfill Siting: California,

Ventura County, California. Conducted and coordinated the evaluation of several potential landfill sites in Ventura County, California in preparation for expansion of landfill operations by the County sanitation district. The geotechnical investigations of candidate sites included detailed surface mapping of several quadrangles in the County and supervision of exploratory trenching and boring and well-installation programs. The investigation and siting programs were performed consistent with California Title 23, Chapter 15 criteria.

Puente Hills Landfill, Slope Stability Analysis, Los Angeles, California. Designed and implemented the geotechnical field investigation for a cut slope stability analysis at the largest landfill in Southern California. Provided recommendations to the engineering staff regarding geologic conditions and hazards that would affect the cut slope stability and placement of a composite liner.

Double-Butte Landfill, Landfill Hydrogeologic Analyses, San Bernardino County, California. As part of a design basis for a remedial system, provided an analysis of the site hydrogeology and impacts from chlorinated volatile organic compounds, soluble metals and dissolved solids to a shallow perched and bedrock aquifer below the landfill footprint. Reviewed site hydrogeologic information and pumping test data to establish the pumping scheme and well placement for the groundwater extraction network. Provided a scope for additional investigation to close data gaps in the occurrence and extent of the contaminant plume and the hydrogeology. Further, established the ground water modeling program to evaluate the additional information and proposed well field as part of the design basis.

Texaco of California, Closure of Land Treatment Units and Landfills, Ventura County, California. Served as senior reviewer and technical resource for the preparation of closure plans for three land treatment units and landfills operated within the Ventura Avenue Oilfield. Provided closure strategy and technical approach for closure and post-closure monitoring programs.

Jeff Goodson
Environmental Engineer, Acoustics and Air Quality Specialist

Education
BS, Civil Engineering, Clemson University, 1987
BS, Geology, College of Charleston, 1981

Professional Registration
Engineer-in-Training, South Carolina,1987

Professional Affiliation
Member, Association of Environmental Professionals

Jeff Goodson is a senior environmental engineer with 20 years of experience in multidiscipline environmental impact analysis, facilities planning, and project management for the construction and operation of facilities at the federal, state, city, and county levels. He specializes in outdoor acoustics, air quality, and lighting analysis, and the management of NEPA projects. His work experience is primarily in the Southern California and metropolitian Washington, D.C. areas. Mr. Goodson specializes in performing air quality, lighting, and noise impact analysis to include field monitoring, modeling, analysis, and technical report preparation. Current emphasis is with powerplant projects, specifically various solar and geothermal technologies.

Mr. Goodson has managed and prepared environmental planning and analysis documents under the NEPA for the U.S. Air Force, Navy, Marine Corps, Customs and Border Protection, Secret Service, and Department of Agriculture; National Park Service; Smithsonian Institution; Architect of the Capitol; General Services Administration; and Native American tribes; as well as under the CEQA for California city and county governments.

Projectexperience includes solar and geothermal powerplants; military base and residential site development; highway expansion, widening, and bridge replacement; federal headquarters building renovation/expansion and post 9-11 perimeter security; national monuments and memorials

planning; stadium, zoo, casino, and campus land planning; water pollution control facilities planning; utility pipeline installations; and underground storage tank and soil and groundwater investigations.

Project Experience

Powerplant and Energy Transmission Projects

Abengoa Solar Mojave Powerplant CEC AFC Addendum, Substation and Fiber Optic Lines, Air Quality/Noise Analysis, San Bernardino County, CA.
As Air Quality/Noise Specialist, prepared air quality and noise programmatic impact analysis for the proposed additions to the Mojave facility in a rural, agricultural area. Key issues were the regional and local construction emissions including criteria pollutants and greenhouse gas emissions, proximity of sensitive receptors (residences), regulatory requirements, potential air and noise impacts and reduction measures.

El Segundo Power Redevelopment Project Facility Petition to Amend, El Segundo, CA
As Noise Specialist, performed noise observations and analysis for the anticipated modifications to the powerplant located in a coastal, urban developed area. Key issues were changes in existing noise sources, the proximity of sensitive noise receptors (residences), ocean and airport noise, Californian Energy Commission (CEC) regulatory requirements, potential noise impacts and attenuation, and CEC Conditions of Certifications.

Renewable Resources Group, Weldon Photo-Voltaic Powerplant Air Quality Impact Analysis, Kern County, CA
As Air Quality Specialist, prepared air quality impact analysis for the proposed facility in a rural, agricultural area within the Mojave Desert Air Basin. Key issues were the regional and local construction emissions including criteria pollutants and greenhouse gas emissions, proximity of sensitive air quality receptors (residences), Kern County Air Pollution Control District requirements, and potential air impacts and significant impact thresholds, and mitigation measures.

Renewable Resources Group, Antelope Valley Photo-Voltaic Powerplant Air Quality Impact Analysis, Kern and Los Angeles Counties, CA
As Air Quality Specialist, prepared air quality impact analysis for the proposed facility in a rural, agricultural area within the Mojave Desert Air Basin. Key issues were the regional and local construction emissions including criteria pollutants and greenhouse gas emissions, proximity of sensitive air quality receptors (residences), Kern County Air Pollution Control District and Antelope Valley Air Quality Management District requirements, and potential air impacts and significant impact thresholds, and mitigation measures.

Solar Millennium Solar-Thermal Powerplants (3) CEC AFC, Palen and Blythe, Riverside County, CA; Ridgecrest, Kern County, CA.
As Acoustical Specialist, prepared noise impact analysis for CEC Application for Certification (AFC) with Cal-Energy for a solar-thermal powerplants in rural desert areas. Key issues were 24-hour noise monitoring, plant noise modeling, the proximity of sensitive noise receptors (residences),and the establishment of noise Conditions of Certification.

Los Angeles Department of Public Works Black Rock Geothermal Powerplant CEC AFC, Imperial County, CA
As Acoustical Specialist, prepared noise impact analysis for the Californian Energy Commission Application for Certification with Cal-Energy for a geothermal powerplant converting the energy of naturally superheated groundwater into electricity in a rural, agricultural area east of the Salton Sea near the Town of Calipatria, CA. Key issues were 24-hour plant noise and the proximity of sensitive noise receptors (residences).

Los Angeles Department of Public Works Niland Solar Energy Project IS/MND, Imperial County, CA
As Air Quality and Acoustical Specialist, prepared air quality and noise impact analysis for the Initial Study/Mitigated Negative Declaration for a solar photo-voltaic facility located in a rural, agricultural area near the Town of Niland, CA. Key issues were the proximity of sensitive noise receptors (residences),

Florida Power and Light Energy Imperial Irrigation District, Powerplant Feasibility Study, Imperial County, CA
As Air Quality and Acoustical Specialist, prepared air quality and noise existing conditions for the study and anticipated issues of proposed facility located in a rural, agricultural area. Key issues were the proximity of sensitive noise receptors (residences), land use planning, regulatory requirements, and potential noise impacts and attenuation.

P.F. NET AT&T Fiber Optic Facility, Noise Impact Analysis, Pine Valley, CA
As Acoustical Engineer, performed day/night ambient noise monitoring and prepared a noise analysis of proposed facility located in a residential and commercial area. Key issues were the proximity of sensitive noise receptors (residences), land use planning, mitigation measures required for noise attenuation, and obtaining a San Diego County noise variance for night operation.

U.S. Air Force and Southern California Edison Kramer Junction Electric Transmission Line Project,
Edwards AFB, CA
As Project Manager, performed preliminary environmental review (feasibility study) of proposed backup transmission line between Edwards AFB and Southern California Edison Substation at Kramer Junction. Key issues were endangered species and habitat, electromagnetic radiation, visual resources, cultural resources, air traffic, and land use. Work was done prior to joining this firm.

W.R. Grace & Company Kapirowitz Plateau Coal Conversion Project, Sundance, UT
As Staff Geologist, performed cost assessment of coal extraction and transportation alternatives to operating an on-site coal/electricity conversion facility. Key issues were land use, water supply, and air quality. Work was done prior to joining this firm.

Land Development Projects

County of Sumner, Kansas Harrah’s Casino Feasibility Study, Sumner County, KS
As Environmental Engineer, prepared air quality and noise impact analyses for farmland to casino development including housing, recreational, and commercial facilities. Key issues were impacts to nearby residences and regional air quality from facility operation and casino patron traffic.

City of San Diego Carmel Valley Skate Park Noise and Lighting Analyses, San Diego, CA
Managed, performed, and prepared air quality and noise impact analyses for the land development of an abandoned parcel in a public service district as a public skateboard park. Key issues were the noise and lighting impacts to nearby residents from the project’s construction and evening operation.

City of Chula Vista Tamarindo Villas Air Quality and Noise Analyses, Chula Vista, CA
As Environmental Engineer, performed and prepared air quality and noise impact analyses for the redevelopment of an underdeveloped parcel with fill material surrounded by an established residential area. Key issues included the impacts to nearby residences from the project demolition and construction and hauling of fill soil.

D.C. Sports and Entertainment Commission Baseball Stadium Environmental Mitigation Study, Washington, D.C.
Managed the preparation of the study for the development of a baseball stadium for the

Washington Nationals Major League Baseball team in southeast DC. Key issues included socioeconomic displacement and land use, hazardous waste remediation, event trip generation , parking, noise, lighting, crowd behavior, visual and transportation corridors, closure of on-site segment of Maryland Avenue, lighting, parking, and visitor experience, and visitation.

Military Projects

U.S. Marine Corps Base Camp Pendleton Infrastructure EIS, Oceanside, CA
As Air Quality and Noise Engineer, managed and performed the air quality and noise impact analysis of base-wide facilities improvements including water, wastewater, electricity, communications, natural gas, proposed for the Grow the Force (GTF) EA. Key issues included noise impacts to sensitive receptors, and regional and localized air quality impacts.

U.S. Marine Corps Base Camp Pendleton, GTF EA, Oceanside, CA
As Air Quality and Noise Engineer, managed and performed the air quality and noise impact analysis of 62 facilities proposed for the Grow the Force (GTF) EA. Key issues included noise impacts to sensitive receptors and regional and localized air quality impacts.

U.S. Marine Corps Base 29 Palms PPV Housing EA,
29 Palms, CA
As Air Quality and Noise Engineer, managed and performed the air quality and noise impact analysis of the development of public-private venture housing at the Base. Key issues included noise impacts to noise sensitive receptors of residents, and regional and localized air quality impacts.

Naval Weapons Station Seal Beach - Detachment Concord EA, CA
As Environmental Engineer, performed noise impact analyses and prepared EA sections for the relocation of the fire station and railroad maintenance shop on base. Key issues included noise impacts to adjacent residences due to siren operation and testing.

U.S. Air Force Rocket Engine/ Motor Testing Programmatic EA, Edwards AFB, CA
Managed the preparation of the EA for programmatic operations at Phillips Laboratory. Key issues addressed were noise, air quality, soil erosion, storm water runoff, cultural resources, and endangered species and habitat. Work was done prior to joining this firm.

U.S. Navy F/A -18 E/F Aircraft Acquisition, Lemoore Naval Air Station, CA
Served as environmental liaison between the U.S. Navy and aircraft manufacturer McDonnell Douglas for the Navy’s acquisition and placement of the F/A-18 E/F aircraft at Naval Air Stations in the southwestern U.S. Key issues were aircraft’s hazardous waste management program, the replacement of halon as the aircraft’s fire suppressant, hazardous materials, noise, and air quality. Work was done prior to joining this firm.

Transportation Projects

City of Temecula Western Bypass Bridge Air Quality/Noise Technical Memorandums, Murrieta, CA
As Environmental Engineer, performed and prepared air quality and noise impact analyses for bridge construction crossing Murrieta Creek and street extension and traffic connection as part of the City’s Western Bypass. Key issues included construction and operation emissions, noise, and traffic to nearby residents.

Caltrans South Santa Fe Avenue Widening Air Quality and Noise Analysis, Vista, CA
As Environmental Engineer, performed noise monitoring and prepared noise impact analysis for the realignment of Robelini Drive and the widening of South Santa Fe Avenue. Key issues included construction and operational traffic noise to nearby residents.

Caltrans Torrey Pines Bridge Retrofit, Noise Impact Analysis, Del Mar, CA
As Environmental Engineer, performed and prepared air quality and noise impact analyses for the bridge retrofit construction. Key issues included day and night construction noise to nearby residents and protected noise sensitive bird species (California gnatcatcher).

U.S. Customs and Border Protection Imperial County Airport CBP Hangar EA, Imperial, CA
Managed and prepared the EA for the expansion and upgrade of the CBP facilities at the Imperial County Airport. Key issues included the construction and operational impacts to the airport and its clients and to surrounding residents.

City of Murrieta Guava Street Extension/Bridge Air Quality and Noise Analysis, Murrieta, CA
As Environmental Engineer, performed and prepared air quality and noise impact analyses for the street extension and bridge construction and replacement . Key issues included construction and operation emissions, noise, and traffic to nearby residents.

City of San Diego, Department of Land Use Planning Fallbrook Airpark EIR, Air Quality and Noise Impact Analysis, San Diego, CA
As Environmental Engineer, performed noise and air quality impact analysis for the 20-year Airpark master plan. Key issues included the noise impacts of future aircraft operations and facilities, and the realignment of the runway away from nearby residents and the resulting effect on the location of threshold noise contour lines.

County of San Diego, Department of Public Works Miramar Road Widening, Construction Noise Monitoring and Analysis, San Diego, CA
As Environmental Engineer, performed noise compliance monitoring and impact analysis for the widening of a 2-mile section of Miramar Road near MCAS Miramar from two to four lanes. Key issues included noise impacts of pavement breaking with noise barriers not to exceed threshold levels to adjacent noise sensitive species (California gnatcatcher) habitat.

City of Murrieta Los Alamos Road Bridge Widening, Air Quality Analysis, Murrieta, CA
As Environmental Engineer, performed air quality impact analyses for the bridge widening. Key issues include construction and operation emissions, regulatory standards, future impacts, and emission reduction measures.

City of San Diego Pacific Street Bridge, Water Quality Impact Technical Report, Oceanside, CA
As Water Quality Specialist, prepared water quality technical report for construction of a bridge across the San Luis Rey River and the removal of the existing Pacific Street crossing at the river/ocean interface. Key issues were salinity, turbidity, sedimentation, and stormwater flows.

City of San Diego West Mission Bay Drive Bridge, Water Quality Impact Technical Report, San Diego, CA
As Water Quality Specialist, prepared water quality impact technical report for expansion of the existing bridge across the San Diego River floodway. Key issues were turbidity, sedimentation, stormwater, and hazardous waste.

U.S. Air Force Routine Flightline Activities Programmatic EA, Edwards AFB, CA
Managed the preparation of the EA. Key issues were air quality, noise, hazardous materials and waste, health and safety, and biological and cultural resources. Work was done prior to joining this firm.

Water and Wastewater Projects

Los Angeles Department of Public Works Santa Anita Dam/Reservoir Sediment Removal and Placement EIR,
Arcadia, CA
As Environmental Engineer, managed and prepared air quality and noise impact sections of the EIR to excavate reservoir sediments to

increase reservoir capacity. Key issues were the air quality and noise impacts from the excavation, truck transport, and placement of reservoir sediment to nearby residences.

County of San Diego, Department of Land Use Planning El Monte Valley Nature Park Air Quality/Noise Analyses, Lakeside, CA
As Environmental Engineer, performed and prepared air quality and noise impact analyses for the land restoration of an undeveloped alluvial floodplain to a nature park. Key issues included the air quality and noise impacts to nearby residents from the excavation of alluvial sediments for sorting and resale of aggregate.

San Diego County Water Authority (SDCWA) Emergency Storage Project, Olivenhain Dam/Reservoir, Air Quality and Noise Monitoring and Reporting, San Diego, CA
Performed air quality and noise monitoring of the construction of the Olivenhain Dam/Reservoir and water supply pipeline. Constructed a semi-permanent air quality/meteorological station with remote (office) data downloading via a relay station. Conducting mobile and stationary air quality and noise monitoring, analyses and monthly reporting. Key issues were noise/dust generation and attenuation, proximity of residents, wind speed and direction, community response, and regulatory compliance.

City of Ningbo Dong Xian Lake Redevelopment Plan,
Ningbo, China
As Environmental Specialist, prepared a preliminary study for water quality improvements associated with redevelopment of land surrounding the impaired Dong Xian Lake. Key issues included water quality, water supply, sedimentation, irrigation, aquaculture, and urban runoff.

City of Shanghai Suzhou River Redevelopment Plan, Shanghai, China
As Environmental Specialist, prepared a preliminary study for water quality improvements associated with redevelopment along the impaired Suzhou River in Shanghai. Key issues included shoreline restoration, water quality, water supply, and urban runoff.

City of San Diego Pump Station 30A Alternative, Erosion Control Plan, San Diego, CA
Managed the preparation of an erosion control plan, revegetation plan and biological monitoring for the abandonment of a sewer pump station and installation of 5,470 feet of gravity sewer pipe by open trenching and tunneling at the intersection of Interstate 5 and La Jolla Village Drive. Key issues were preparation of Caltrans Water Pollution Control Plan, selection of erosion control measures and revegetation, and preparation of plans and specifications with a landscape architect.

City of San Diego Rancho Bernardo Water Supply Pipelines, Noise Impact Analysis, San Diego, CA
As Acoustical Engineer, performed ambient noise monitoring along pipeline route and prepared the noise impact analysis. Key issues were proximity of residents, California gnatcatcher habitat, and mitigation measures required (e.g., noise attenuation barriers, construction scheduling, variance to county noise ordinance for night work).
City of Escondido Creek Stormwater/Nutrient Diversion System MND, San Diego, CA
As Water Quality Specialist, prepared a CEQA mitigated negative declaration (MND) for diversion of nutrient-rich stormwater flow in Escondido Creek to the Hale Avenue Resource Recovery Facility. Response to emergency discharge of tertiary-treated wastewater to the creek due to effluent ocean outfall exceeding capacity. Key issues addressed were water quality, stormwater, land use, and noise.

Stevens Planning Group Onyx Ridge Housing Development Sewer Pump Station Operation, Noise Impact Analysis, Olivenhain, CA

As Acoustical Engineer, performed ambient noise monitoring and analysis of construction grading and future pump station operation. Key issues were proximity of noise sensitive receptors (species and habitat and future residences) and mitigation measures required.

U.S. Air Force and Antelope Valley/East Kern Water Authority Antelope Valley/East Kern Water Supply Pipeline EA, Edwards AFB, CA
Managed the preparation of the EA for installation of a pipeline to transport water from California Aqueduct to Edwards Air Force Base, replacing groundwater as the source of potable water. Key issues were soil erosion, land subsidence, groundwater recharge, dry lake use as emergency runways, cultural resources, Bureau of Land Management and Kern County lands, and endangered species and associated habitat. . Work was done prior to joining this firm.

U.S. Air Force Wastewater Treatment Plant Upgrade EA, Edwards AFB, CA
Managed the preparation of the EA for the upgrade of the Phillips Laboratory wastewater treatment plant. Key issues were soil erosion, storm water runoff, wetlands, cultural resources, and endangered species and habitat. Work was done prior to joining this firm.

U.S. Air Force Wastewater Treatment Plant Storm Water Bypass Channel EA, Edwards AFB, CA
Managed the preparation of the EA for the construction of a channel for stormwater flows to bypass the plant. Key issues addressed were soil erosion, storm water runoff, cultural resources, and endangered species and habitat. Work was done prior to joining this firm.

Mount Pleasant Water and Sewer Commission Wastewater Treatment Facilities EA, Charleston, SC
Prepared the EA, managed preparation of a facilities plan, supervised public participation program, and performed pre-design review under the Clean Water Act, Section 201, construction grants program. Key issues were water quality, point source discharge (waste load allocation and NPDES permit), groundwater quality, biological resources, wetlands, and floodplains. Work was done prior to joining this firm.

Buildings, Facilities, and Monument Projects

National Archives and Records Administration Building Perimeter Security EA, Washington, D.C.
Managed the preparation of the EA for the installation of vehicle barriers along the perimeter of the Archives Building. Key issues included visual and historic resources, explosive blast perimeter, trees, visual impacts, and parking.

Eisenhower Memorial Commission and the National Park Service EA, Washington, D.C.
Managed the preparation of the EA for the development of a national memorial to President Dwight D. Eisenhower in the Monumental Core of Washington, D.C. Key issues included visual and transportation corridors, closure of the on-site segment of Maryland Avenue, lighting, parking, visitor experience, and visitation.

National Park Service and Georgetown University Boathouse EA, Washington, D.C.
Served as environmental scientist for the biological and water quality impact analysis of the proposed boathouse construction and operation on the Potomac River. Key issues included water quality, shoreline vegetation, visual resources, wetland delineation and jurisdictional determination, noise, vehicle and pedestrian access, and parking.

Friends of St. Patrick’s School Environmental Study, Washington, D.C.
Managed the preparation of the environmental study for the redevelopment of a private mansion estate into a junior/senior high school and residential development. Key issues included archaeological and historical resources, wetlands, Waters of the U.S., traffic and roadway alignment, visual

resources, protected trees, sports field, and parking.

Department of Defense Pentagon Reservation Master Plan EA, Arlington, VA
Served as environmental analyst for the redevelopment of the Pentagon Reservation based on a post 9-11 security perimeter around the Pentagon. Key issues included relocation of roadways, conversion of surface parking to underground garages, stormwater and water quality impacts to the Potomac River, visual resources, vehicle and pedestrian access, and parking.

Department of Defense Federal Building #2 Demolition/Arlington Cemetery Expansion EA, Arlington, VA
Served as environmental analyst for the proposed demolition of FB #2 to facilitate the expansion of Arlington Cemetery. Key issues included demolition, solid and hazardous waste, stormwater and water quality impacts to the Potomac River, visual resources, vehicle and pedestrian access, and parking.

Smithsonian Institution, The National Zoological Park,
Asia Trail EA, Washington, D.C.
Managed the preparation of the EA for the redevelopment, consolidation, and upgrade of Asian-themed exhibits at the National Zoo. Key issues included visual resources, lighting, roadway closure, traffic, tree cover, stormwater, visitation and visitor experience, and utilities.

Architect of the Capitol, Remote Delivery Facility EA, Washington, D.C.
Managed the preparation of the EA for the relocation and development of a permanent truck and package security screening facility for the U.S. Capitol Complex. Key issues included explosive blast perimeter, traffic, parking, noise, land use, and visual impacts.

U.S. Department of Agriculture Headquarters Perimeter Security EA, Washington, D.C.
Managed the preparation of the EA for the installation of perimeter building security improvements for the complex of USDA Headquarters buildings. Key issues included visual and historic resources, trees, pedestrian access, stormwater, and solid waste.

Smithsonian Institution Patent Office Building Renovation and Courtyard Roof Enclosure EA, Washington, D.C.
Managed the preparation of the EA for the renovation of the Patent Office Building to improve public interior space for the National Portrait Gallery Key issues included visual and historic resources, lighting, courtyard trees, groundwater, stormwater, and solid and hazardous waste.

Security and Exchange Commission Headquarters Building EA, Washington, D.C.
Managed the preparation of the EA for the installation of an explosive vehicle barrier at the perimeter of the Archives Building. Key issues included visual and historic resources, public safety, perimeter trees, and parking.

U.S. Census Bureau Headquarters EA, Suitland, MD
Served as environmental engineer for preparation of the EA for redevelopment and upgrade of the Census Bureau Headquarters Buildings. Key issues included visual and historic resources, water quality, stormwater, public transportation, traffic, and parking.

National Park Service, National Capital Region Washington Monument Security EA, Washington, D.C.
Managed the preparation of the EA for replacement of temporary security measures with landscaped earthen walls, and the replacement of the temporary visitor screening facility with a remote underground facility. Key issues included visual and historic resources, soil contamination and stability, groundwater, and visitation and visitor experience.

William Graham, MCP
Principal

Education
MCP, Urban and Regional Planning, San Diego State University, 1992
BA, Phi Beta Kappa, Cultural Anthropology, San Diego State University, 1980

Professional Affiliations
Member, American Planning Association (APA)
Member, Association of Environmental Professionals (AEP)

Mr. Graham has more than 25 years of experience in the environmental and urban planning field. His professional experience ranges from municipal planning and permit review, to management of large-scale environmental studies, to expert witness testimony concerning the application of federal environmental regulations. He has a broad geographic base of experience. This has led to a thorough understanding of the application of National Environmental Policy Act (NEPA) in a wide variety of contexts. He has also gained a familiarity with the environmental regulations of various states.

Mr. Graham has extensive experience in the conduct of environmental documentation processes for large-scale developments. These have included public infrastructure facilities ranging from large above-ground reservoirs to highway projects, and private developments ranging from major casinos to planned residential communities. Gained in this experience is a profound understanding of the applicability of the entire gamut of state and federal environmental regulation, and insight into strategies to assure regulatory compliance while achieving project objectives.

Mr. Graham's extensive record of managing NEPA documentation projects has allowed him to gain a detailed knowledge of the other, resource-specific aspects of federal environmental regulation. He is knowledgeable in the consultations with the SHPO under the provisions of Section 106 of the NHPA. He is experienced in the application of the provisions of the Endangered Species Act, and was the manager for a project which was one of the first to be permitted under Section 10 of the Act. Many of his projects have required permitting under the Clean Water Act, and he is experienced in evaluating projects for Clean Air Act compliance.

Mr. Graham has prepared environmental documentation for review by a wide variety of federal lead agencies. These include the FERC, FAA, FCC, ACOE, USFS, USFWS, U.S. Navy, Federal Transit Authority, BLM, the Bureau of Indian Affairs, and the National Indian Gaming Commission. He is familiar with the NEPA implementation procedures of each of these entities. He has also submitted environmental documentation to many state regulatory agencies. As most of his career has been spent in California, he is very familiar with the preparation of environmental documentation under the provisions of the California Environmental Quality Act (CEQA).

Mr. Graham has always played an active role in professional organizations. He has served on the Chapter Board of Directors of both APA and AEP and is a former President of AEP. He has delivered papers at several state AEP conferences and national APA conventions.

Project Experience

Energy Projects

FPL Energy, LLC, Beacon Solar Energy Development, California City, CA
Provided oversight for all biological permitting efforts (including, wildlife biology and botany) and oversight of archaeological and architectural surveys and technical reports. We worked with FPL Energy to develop an Application for Certification (AFC) for the California Energy Commission to permit the development of a 250 MW solar thermal power plant in the Mojave Desert of California. This project proposes to use a well-established parabolic trough solar thermal technology to produce electrical power using a steam turbine generator. The generator receives heated transfer fluid from solar thermal equipment composed of arrays of parabolic mirrors. Because of the large acreage required for this project (over 2,000 acres), potential impacts and mitigation for biological resources are major issues. AECOM has provided overall biological services, cultural resources, land use planning, and socioeconomics analysis to develop the environmental sections of the AFC for the client.

Mojave Solar Project, San Bernardino County, CA
Oversaw the environmental studies supporting preparation of an Application for Certification (AFC) for the California Energy Commission. The project proposed to develop a 500 MW solar thermal power plant on over 4,000 acres in the Mojave Desert located in the vicinity of Harper Lake, San Bernardino County, California. The solar project is proposed to comprise 2,200 acres of parabolic trough arrays, with the rest of the site reserved for future plant expansion upon finalization of power purchase agreements. Environmental technical studies include biological services (permitting, habitat conservation plan, wildlife biology and botany surveys, and multiple mitigation monitoring plans), cultural resources (archaeological and architectural surveys and associated technical reports), land use, and socioeconomic analysis. Major project species concerns include the desert tortoise (Mojave population), Mohave ground squirrel, and western burrowing owl. The corresponding sections of the Application for Certification (AFC) for the California Energy Commission will also be prepared.

Solar Millennium Energy Projects – California Desert
Overseeing the environmental studies supporting preparation of Applications for Certification (AFC) for the California Energy Commission. Solar Millennium proposes to develop three commercial solar thermal electric power generating projects located in the desert areas of California. Totaling 2,000 MW, the projects would utilize solar parabolic trough technology to generate electricity. Environmental technical studies include biological services (permitting, habitat conservation plan, wildlife biology and botany surveys, and multiple mitigation monitoring plans), cultural resources (archaeological and architectural surveys and associated technical reports), land use, and socioeconomic analysis. Major project species concerns include the desert tortoise (Mojave population), Mohave ground squirrel, and western burrowing owl. The corresponding sections of the Application for Certifications (AFC) for the California Energy Commission have been prepared.

San Diego Gas & Electric (SDG&E) Facilities - Cleveland National Forest EA, San Diego County, CA
Cleveland National Forest (CNF) desires to consolidate the different easements and access roads used by SDG&E into a single use permit application. Under direction of Project Manager Mr. Graham, we are preparing an Environmental Assessment, as well as supporting technical documentation, to support this application. As the quality of existing locational data is variable, our staff are performing GPS surveys of SDG&E facilities within the CNF for transfer to GIS-generated maps. Cultural resource and biological surveys are being performed. We are also managing a consultation with the US Fish and Wildlife Service under Section 7 of the Endangered Species Act concerning the

potential effects of SDG&E's operational and maintenance activities within the CNF upon federal listed species.

Intergen 230kV Transmission Line EA, California to Mexico
Currently serving as Project Manager for the preparation of an EA for a 230kV overhead electrical power transmission line and will compose the U.S.-routed portion of an electrical transmission line interconnecting the proposed Energia De Baja California Power Project in Mexico with an existing 230kV Substation in Imperial Valley, California, owned by the SDG&E. The transmission line will be routed east of, and parallel to, the existing 230kV transmission line that connects the La Rosita Substation to the aforementioned Imperial Valley substation. The EA will be submitted jointly to the BLM and the Department of Energy. A Presidential Permit will be required from the Department of Energy in order to cross the border.

Intergen DeAnza Pipeline EIR, Ehrenberg, AZ to Calexico, CA
Managed preparation of environmental studies prepared in support of a licensing application submitted to the FERC. The license would apply to the construction and operation of a 20-inch natural gas pipeline. The pipeline route crosses the Colorado River, open desert areas under the jurisdiction of the BLM, irrigation facilities, and agricultural areas in the Imperial Valley. Our staff conducted all necessary biological and archaeological technical surveys. An analysis of pipeline routing relative to the BLM's land management objectives under the California Desert Conservation Area Plan was conducted.

Moapa Power Plant EIS, Clark and Lincoln Counties, NV
Managed preparation of environmental technical studies in support of an EIS for a proposed new 760 mw, natural gas-fired electrical generation plant on the Moapa Indian Reservation in southern Nevada. The EIS also addresses power transmission lines on the Reservation and on adjacent land under the jurisdiction of the BLM. The Lead Agency for the EIS is the BIA, with the BLM serving as a Cooperating Agency. Our staff performed cultural resource and biological surveys, the latter including directed surveys for desert tortoise. Limited testing of cultural resources in order to determine site significance was performed. Technical reports were prepared for both issues. A visual impact analysis of the proposed plant and transmission lines was prepared in conformance with BLM Visual Resource Management methodologies.

SDG&E Valley-Rainbow 500 kV Transmission Line Proponent's PEA, CA
Managed preparation of technical studies prepared in support of a PEA for a proposal by SDG&E to construct a 500 kV transmission line connecting Southern California Edison's Valley substation with a proposed new SDG&E substation in Rainbow, California. A total of 67 miles of potential transmission route linkages were analyzed. Links were eliminated or modified based on an analysis. These linkages were reduced to seven primary routing alternatives, ranging between 28 and 37 miles each, that were carried forward into the PEA. Our staff was responsible for the biological, cultural resource, and socioeconomic components of the analysis. Extensive use of GIS-based mapping layers derived from the Western Riverside County Multiple Species Habitat Conservation Plan were utilized in the biological analysis of routing alternatives. Our staff was also responsible for consultation with Native American tribes.

Park Projects

County of Riverside Laborde Canyon State Vehicle Recreation Area, Riverside County, CA
As Project Principal, currently overseeing the work of staff and various subconsultants in the planning and preparation of a General Plan and EIR for a new State Vehicle Recreation Area (SVRA) in the Badlands area of Riverside County, California. When approved by the state Off-Highway Vehicle Commission, the project will be the first SVRA to be developed in California in more than 20 years. The project encompasses a site measuring 1,360 acres in size, and will feature a variety of facilities for off-highway vehicle use, including motocross tracks, single-track trails, and hill-climbs. The use of the site is assumed in the Western Riverside County Multi-Species Habitat Conservation Plan. More than 6,000 acres of mitigation land will be purchased and protected as conserved habitat as part of project implementation.

California Department of Parks and Recreation Doheny State Beach, Dana Point, CA
As Project Principal, Mr. Graham is directing staff in the preparation of the Doheny State Beach General Plan and EIR. The scope of services for the General Plan is to update the park's Purpose, Vision, and Goals based on an evaluation of user needs, physical and environmental constraints, and community compatibility. Major issues that have been identified for evaluation are the need for improvement to park facilities, expanded interpretive program, protection of

the marine environment, external open space linkages, and traffic circulation to, and within, the park. Public meetings have been held to solicit input and to select a Preferred Alternative and other alternatives for concurrent evaluation in the EIR. The joint document will include all mandatory requirements of CEQA will detail actions to be taken to respond to major issues identified for park operations and resource protection.

Land Development Projects

Bureau of Land Management (BLM) East San Diego County Resource Management Plan and Environmental Impact Statement, San Diego, CA
Currently managing preparation of a Resource Management Plan (RMP) and EIS for 98,902 acres of BLM land in the southern California desert. The RMP must provide for a variety of recreational uses within the planning area. It must protect designated Critical Habitat for the endangered peninsular bighorn sheep, while at the same time allowing continued use of long-standing grazing allotments where feasible. An extensive public outreach and scoping process is underway. The draft RMP will require consultation with the USFWS under Section 7 of the Endangered Species Act.

City of Maryland Heights Creve Coeur Area Land Use Plan, Maryland Heights, MO
Managed preparation of a 6,000-acre Specific Plan. The plan will guide future land and infrastructure development within the portion of the city that is within the 100-year floodplain of the Missouri River currently devoted almost exclusively to agriculture. Phased infrastructure improvements include seven miles of 500-year levee, an internal drainage system designed to detain the runoff from the 75-square mile area of the St. Louis suburbs which empties into the project area, and two expressways. Some 2,000 acres within the project will be retained in agricultural use or will consist of conserved or restored wetlands as mitigation for future development. This would allow 4.8 million square feet of additional office space over a 25-year period. An additional 7.5 million square feet of various industrial, commercial, and entertainment uses would also be called for in the plan.

Imperial County General Plan EIR, Imperial County, CA
As part of the EIR for the Imperial County General Plan, prepared the land use impact analysis. The principal issue in this analysis was the potential land use effects of the plan's designation of several new commercial and industrial development areas outside of the county's already developed urban areas. Concerns were raised regarding the potential decline of these older cores if new development was channeled to newly designated sites.

County of Riverside Stephens Kangaroo Rat Habitat Conservation Plan EIS, Riverside County, CA
As Project Manager, supervised preparation of a Habitat Conservation Plan and EIS submitted by the County of Riverside, California, under Section 10(a) of the Endangered Species Act. Approval of the plan allowed land development to proceed outside habitat reserves essential for the species' survival. The Plan resulted in the creation of ten habitat reserves, based initially upon roughly twelve-thousand acres of public land owned or managed by the BLM, the Metropolitan Water District, the County, and the University of California.

County of San Diego Upper San Diego River Improvement Project EIR, Lakeside, CA
As Project Manager, supervised the environmental review, and permitting for this 596-acre river reclamation project. The project area is host to sensitive riparian resources, including several endangered songbird species. The plan established a total of 362 acres of future light industrial and commercial development; water quality objectives and wetlands permit conditions were satisfied via the use of restored riparian habitat.

Native American Projects

Agua Caliente Band of Cahuilla Indians New Casino, Palm Desert, CA
Served as project manager for an EA of the proposed new casino on the Agua Caliente Band of Cahuilla Indians Reservation. The proposed new casino will be located on a 36-acre parcel. An environmental impact analysis was conducted to address land use, traffic circulation, noise, air quality, drainage/water quality, visual aesthetics, public services/utilities, public safety, cultural resources, biological resources, geology/soils, and socioeconomics. Based on the analysis, an EA has been prepared and conforms to the specifications of the Tribal Environmental Policy Act.

Eastern Band of Cherokee Indians Harrah's Casino Expansion, Cherokee, NC
Served as project manager to provide environmental services for the construction of the Harrah's Cherokee Hotel and Conference Center. The hotel is adjacent to the existing

Harrah's casino on the Eastern Band of Cherokee Reservation. Environmental issues addressed include land use, traffic circulation, noise, air quality, hydrology, water quality, visual aesthetics, public services, public safety, cultural resources, biological resources, geology/soils, socioeconomics, and hazardous materials. For each issue, relevant baseline data is being collected. The collection and analysis of data related to each of the identified environmental issues is being documented into technical studies in preparation for the EA.

Rincon San Luiseno Band of Mission Indians Casino EA, Valley Center, CA
Managed environmental consulting services for the proposed Harrah's casino on the Rincon Indian Reservation. An EA was conducted to address land use, traffic circulation, noise, air quality, hydrology, water quality, visual aesthetics, public services, public safety, cultural resources, biological resources, geology/soils, and socioeconomics. Directed surveys were conducted for listed species. Upon completion of the analysis, an EA was prepared to cover the proposed gaming facility development. The EA conformed with the specifications of NEPA 40 CFR 1508.9 and the Tribal Environmental Policy Act.

Barona Band of Mission Indians Casino Off-Reservation Environmental Impact Analysis, San Diego County, CA
Managed environmental impact documentation for the proposed expansion of the casino resort on the Barona Indian Reservation. The documentation of this analysis will fulfill the requirements of Sec. 10.8.1 of the Tribal-State Gaming Compact and the Barona Band of Mission Indians environmental protection ordinance. Staff prepared an environmental checklist form, conducted environmental impact analysis of water, traffic circulation, noise and air quality issues. Mitigation measures were formulated and an environmental document prepared summarizing the analysis.

Lakes Kean-Argovitz Resorts Jamul Fee-to-Trust Acquisition Constraints Report, Jamul, CA
Managed consulting services in support of the Jamul Band of Mission Indian's efforts to acquire additional 85-acres of land. Assisted the Band and Lakes Kean-Argovitz Resorts in future decisions pertaining to the properties and concerning interactions with local, state, and federal regulatory agencies. These interactions will be triggered by efforts to have the subject acreage taken into trust status by the U.S. for the Jamul Band.

Eastern Band of Cherokee Indians Casino EA, Cherokee, NC
Managed all environmental analysis and permitting for the 175,000-square foot gaming facility on the Cherokee Reservation in western North Carolina. Phase II archaeological testing determined that the proposed building location was underlain by a prehistoric habitation site eligible for listing on the NRHP. Consultation with the Tribe and the North Carolina State Historic Preservation Officer led to development of a memorandum regarding the protection of the site and the relocation of the gaming facility on the site. The project's effects upon regional traffic circulation was an important issue. Level-of-Service analyses were conducted at roadway segments and intersections in the project vicinity. Intersection and lane improvements were incorporated into the project. A Nationwide 26 Permit from the ACOE to allow fill of jurisdictional wetlands. Hydrological analysis was submitted to FEMA to demonstrate no rise in the floodwaters of Soco Creek, a perennial stream bordering the site.

Capital Gaming International Cow Creek Gaming Facility Expansion EA, Canyonville, OR
Managed preparation of an EA for the Cow Creek Band of Umpqua Tribe of Indians examining a 23,722-square foot expansion to the existing Cow Creek Gaming Facility. Project consisted of expanded gaming floor space, a new restaurant, a 156-room hotel, a convention facility, and a new wastewater treatment plant. Facility parking was expanded to 1,377 spaces. Principal environmental issues were the potential effects upon freeway ramps connecting the facility with Interstate 5, and the potential new demands placed upon community services and infrastructure.

Harrah's Entertainment Prairie Band of Potawatomi Indians Gaming Facility EA, Marietta, KS
As Project Manager, supervised preparation of an EA for the Prairie Band of Potawatomi Indians, in association with Harrah's Entertainment, Inc., for a 63,000 square foot casino located 17 miles north of Topeka, Kansas. The project involved construction of a 1.5-mile roadway connecting the project site with US 75. Technical studies prepared included a cultural resource survey, a wetlands delineation, and a biological survey. Mr. Graham supervised preparation and submittal of a 404 Permit application required by the ACOE for the relocation of approximately 900 feet of intermittent stream channel and associated wetland impacts.

Capital Gaming International Narragansett Indian Gaming Facility EA, Charlestown, RI
The Narragansett Indian Gaming Facility is a proposal by the Narragansett Tribe, in association with Capital Gaming International, to develop a gaming facility on Tract 6 of Tribal lands. The initial development project would consist of a 112,440 square-foot structure, including a 66,500 square-foot gaming floor. The development would feature a terraced parking lot with spaces for 1,500 cars. As Project Manager, Mr. Graham oversaw preparation of a series of technical studies for the project, and managed a large team of local subconsultants. A salient issue was the project's potential effects on the roadway network in southern Rhode Island. Additional important issues were the need to treat wastewater on-site and to discharge the treated effluent into an aquifer feeding Indian Cedar Swamp, a Wildlife Management Area.

Squaxin Island Tribe Gaming Facility EA, Kamilche, WA
Environmental staff managed by Mr. Graham, as well as several locally based subconsultants under his direction, conducted the environmental analysis required to prepare an EA for the Squaxin Island Tribe's 35,000 square foot gaming facility. The gaming operation and related facilities are located on a 20-acre tribal trust site south of Shelton, Washington. Potential land use conflicts with Mason County land use designations for the site were studied. As the site is located at an interchange of Highway 101 and SR-108, the project's traffic circulation impacts were assessed. Of particular concern was the potential conflict between casino patrons accessing the facility and heavy use of the state route by logging trucks. Skookum and Little Creeks, which cross the site, are very productive salmon streams; potential project effects to water quality were a prime tribal and regulatory concern. Several options for wastewater treatment and disposal were examined.

Agua Caliente Band of Cahuilla Indians Gaming Facility EA/ND, Palm Springs, CA
Mr. Graham was the Project Manager for the EA/EIR prepared for a proposal by the Agua Caliente Band of Cahuilla Indians, in association with Caesars World Resorts, Inc., to build a gaming facility on tribal trust land of the Agua Caliente Indian Reservation. The 8-acre gaming facility site is located in the central district of the City of Palm Springs. The ultimate 80,000 square-foot gaming facility will feature approximately 40,000 square-feet of gaming area and retail, dining, entertainment, and casino support uses. A series of phased improvements, several involving the active participation of the City are proposed as part of the eventual gaming facility development. These consist of the abandonment of street segments for pedestrian and vehicular access, parking, and other uses; demolition of outdated buildings and parking lots. Phased development of these outlying properties with accessory uses would then occur on a site encompassing approximately 20 acres. The environmental impact analysis conducted under Mr. Graham's direction covered the full range of potential issues. The analysis was incorporated into the EA reviewed and processed by the National Indian Gaming Commission. Prominent issues included traffic circulation, air quality, noise, cultural resources, and visual assessment.

Tonto Apache Tribe Mazatzal Casino EA, Payson, AZ
The Tonto Apache Tribe, in conjunction with Capital Gaming International, is currently operating a 35,000 square foot casino outside of Payson, Arizona adjacent to SR-87. Mr. Graham managed preparation of an EA that examined the project's potential effects on municipal functions such as fire and medical responses and the provision of water. A key issue was the identification of required traffic improvements at the intersection of the Reservation's access road with SR-87. As the Reservation is surrounded by Tonto National Forest, the relationship of the project the USDA Forest Service management objectives and identified visual resources required assessment.

Muckleshoot Tribe Casino and Off-Track Betting Complex, Auburn, WA
Environmental staff and locally based subconsultants, under the direction of Mr. Graham, prepared an EA for the Muckleshoot Casino and Off-Track Betting Complex. The 63,900 square foot project is located on a 25-acre parcel on the Muckleshoot Reservation within the corporate boundaries of the City of Auburn, Washington. Extensive traffic analyses were prepared concerning intersections and roadway segments in the project vicinity. A Municipal Services Agreement was negotiated between the City of Auburn and the Tribe. It arranged for the payment of certain service and hookup fees by the Tribe and the Tribe's participation in a City-wide Traffic Signal Interconnect Project.

Water and Wastewater Projects

San Diego County Water Authority (SDCWA) Regional Colorado River Conveyance Feasibility Study, San Diego, CA
Served as Project Manager for this binational study evaluated the feasibility of conveying Colorado River water directly to the Tijuana-San Diego region. Alternative aqueduct alignments, segments of which were on either side and crossed the border, were evaluated for feasibility of construction and supply reliability. An environmental screening analysis was conducted for the various alignments and associated facility improvements. The environmental analysis included evaluation under both the National Environmental Policy Act (NEPA) and Mexico's *Ley General del Equilibrium Ecológico y la Protección al Ambiente* (LGEEPA). This included binational coordination with the Mexican environmental consultant. Additional areas of review included the North American Free Trade Agreement, International Boundary and Water Commission regulations, and BECC certification requirements.

City of Virginia Beach Southern Canals EA and Permitting, Virginia Beach, VA
Managed preparation of an EA and permit applications for this project involving maintenance of several drainage canals located in the southeastern portion of the City which is typically flat and at low elevation. The USDA originally constructed the canals in the 1950s. The growth of vegetation, collection of debris, and accumulation of sediment through lack of maintenance has decreased the capacity of these drainageways to accommodate storm events and resulted in flooding of upland properties. Desired maintenance activities included dredging to establish original dimensions and removal of vegetation and debris. The Norfolk District of the ACOE required submittal of an individual permit and was the Lead Agency for the accompanying EA.

San Diego County Water Reclamation Master Plan, San Diego County, CA
Managed preparation of an EIR concerning the environmental effects of the upgrade of all County-operated wastewater facilities to a treatment standard allowing human contact with effluent. The project results in a supply of reclaimed water for use at twenty-eight designated water reuse areas in the unincorporated portion of the County. The public health effects of the reclaimed water use were assessed. Biological and cultural resource surveys of all facilities were performed.

Sweetwater Authority Reservoir Urban Runoff Diversion System EIR, San Diego County, CA
Managed preparation of an EIR for a system of structures installed to divert urban runoff, particularly the "first-flush" following periods of extended drought, thereby protecting this 12,650 acre-foot reservoir. The effects upon endangered species and wetlands were analyzed, and necessary permits obtained from regulatory agencies.

SDCWA Pipeline 4B, San Diego and Riverside Counties, CA
Managed the preparation of an EA, associated environmental technical studies and surveys, and permitting for the San Diego County Water Authority's Pipeline 4B, a 96-inch diameter pipeline extending approximately 90 miles. Pipeline 4B is the largest of three parallel raw water pipelines together comprising the Second San Diego Aqueduct, which transports a blend of Colorado River and California Aqueduct water to the storage and distribution facilities of the San Diego County Water Authority.

Olivenhain Municipal Water District Water Storage Project EA, San Diego County, CA
Managed preparation of EA for construction of a 310-foot high, 2,400-foot long dam, creating a 24,000 acre-foot reservoir. Technical studies performed for biological resources, cultural resources, visual quality and air quality. Consultation with the USFWS required under Section 7 of the Endangered Species Act to identify mitigation for project impacts to the California gnatcatcher and to coastal sage scrub habitat.

Ramona Municipal Water District Sewer Master Plan EIR, Ramona, CA
Managed preparation of an EIR for the plan. The Master Plan identified treatment facilities, pipelines, and disposal areas that will be needed to serve build-out conditions within the water district. Growth inducement, land use, and hydrology/water quality were the key issues reviewed.

Transportation Projects

San Joaquin Council of Governments State Route 4 Cross-town Extension, Stockton, CA
As Project Principal, oversaw preparation of the Preliminary Environmental Assessment Report (PEAR) for this $250-million freeway extension. The project involved development of two alternatives for a 4-mile extension of SR-4 to Charter Way. The project will also improve the access to the Port of Stockton and in turn remove trucks from crossing through an

adjacent neighborhood. A Draft Relocation Impact Study was prepared to evaluate the impact for the removal of 35 homes. The PEAR identified Environmental Justice as a key issue in the future environmental documentation as a result of the project's potential division of a Traditionally Disadvantaged Population.

San Diego Association of Governments (SANDAG) Mid-City Rapid Bus Project, San Diego, CA
SANDAG proposed implementation of the Mid-City Rapid Bus Project to replace an existing bus route and add a new 10-mile limited-stop route between downtown and San Diego State University (SDSU). Improvements to support the rapid bus route are focused within segments of the Park Boulevard and El Cajon Boulevard corridors and include transit priority measures and new enhanced rapid bus stations at 10 major intersections. Project Principal for the project which includes deployment of visually distinctive buses, improvements for pedestrian safety, and several street system modifications to improve local traffic flow. We will prepare a Mitigated Negative Declaration for the project.

County of Los Angeles, Department of Public Works Old Road – Lake Hughes Road to Hillcrest Parkway EA/EIR Los Angeles County
Principal-in-charge of our preparation of an EA/EIR in support of the widening and realignment of Old Road in northern Los Angeles County. Interstate 5 (I-5) is adjacent and parallel to the project limits and is the major transportation corridor link between northern and southern California. Old Road serves as an alternate route for local commuters and provides a viable option for travelers and regional commerce during closures/emergencies on I-5.

County of San Francisco Transportation Authority Yerba Buena Island Ramps EIR/EIS, San Francisco, CA
Principal-in-charge of a proposed project that would replace the existing westbound on-ramp and the westbound off-ramp located on the eastern side of Yerba Buena Island with a new westbound on-ramp and a new westbound off-ramp connecting to the new San Francisco Bay Bridge, which is currently under construction. We are preparing an EIR/EIS along with the entire suite of supporting technical studies. Due to National Register-listed historic resources on the island, the Section 106 and Section 4(f) issues associated with the project are critical. The project is being reviewed by District 4 of the Department as a Local Assistance project sponsored by the San Francisco County Transportation Commission (SFCTC).

LA County Department of Public Works SR 90 Extension/Admiralty Way EIR/EIS, Marina del Rey, CA
Managed preparation of a an EIR/EIS for a one-mile extension of SR 90 and the widening of a 4-mile segment of Admiralty Way under contract to the LA County Department of Public Works. Project is a Local Assistance project with Caltrans District 7. Major issues include right-of-way acquisition, resulting in a need for Relocation Study and a Section 4(f) Evaluation, noise impacts on sensitive receptors, building evaluations, and community opposition to increased traffic on connecting surface streets.

City of Santa Clarita Cross Valley Connector EA/EIR, Santa Clarita, CA
Managing staff and subconsultant services to the City of Santa Clarita for the Cross Valley Connector project, a 2.1-mile new arterial roadway that includes a bridge across the Santa Clara River. The project is a Local Assistance project in Caltrans District 7. We have prepared a series of Caltrans-format technical studies, including an HPSR for cultural resources and an NESR for biological resources. The latter reported on surveys for the listed California gnatcatcher and arroyo toad. An EA/EIR is being prepared for the project.

Dokken Engineering for the City of Solana Beach I-5/Lomas Santa Fe Interchange BA and MND, Solana Beach, CA
Managed preparation of a BA necessitated by a determination that project grading would disturb approximately 0.4 acre of disturbed coastal sage scrub habitat within Unit 3 of the designated Critical Habitat for the California gnatcatcher. Our staff prepared the BA in accordance with the Caltrans format. The mitigation measures outlined include the off-site replacement of the disturbed habitat at a 2:1 ratio and the revegetation of all disturbed areas within the project area with DCSS vegetation. During preparation of the BA, it became apparent that the previously circulated MND for the project, prepared by a different consultant, was obsolete. Our staff revised the MND and coordinated its noticing and circulation in cooperation with Caltrans and City of Solana Beach staff. We drafted a new Finding of No Significant Impact (FONSI), and participated in the hearing process.

Dokken Engineering for the City of Encinitas I-5 Manchester Avenue Interchange, San Diego County, CA
Managing environmental consulting services for the Interstate 5/Manchester Avenue interchange. The project is being funded through SANDAG as a Caltrans Local Assistance Program project. Initial tasks consist of

preparation of a Project Study Report and a determination regarding eventual documentation requirements pursuant to the NEPA/CEQA. It is anticipated that the potential environmental effects are such that an EIS/EIR will be required.

City of Palm Springs Indian Canyon Drive and Bridge Widening, Palm Springs, CA
Managing the preparation of natural resource, cultural resource, air quality, and noise technical reports. Directed surveys for sensitive species, including Coachella Valley milk vetch, desert tortoise, and Coachella Valley ground squirrel. Includes preparation of Initial Site Assessment and Preliminary Environmental Assessment for Caltrans Local Assistance project. Preparation of Initial Study/Environmental Assessment followed by anticipated preparation of Negative Declaration/Finding of No Significant Impact.

County of Riverside Laborde Canyon State Vehicle Recreation Area, Riverside County, CA
As Project Principal, currently overseeing the work of staff and various subconsultants in the planning and preparation of a General Plan and EIR for a new State Vehicle Recreation Area (SVRA) in the Badlands area of Riverside County, California. When approved by the state Off-Highway Vehicle Commission, the project will be the first SVRA to be developed in California in more than 20 years. The project encompasses a site measuring 1,360 acres in size, and will feature a variety of facilities for off-highway vehicle use, including motocross tracks, single-track trails, and hill-climbs. The use of the site is assumed in the Western Riverside County Multi-Species Habitat Conservation Plan. More than 6,000 acres of mitigation land will be purchased and protected as conserved habitat as part of project implementation.

City of Del Mar North Torrey Pines Bridge EA/ND, Del Mar, CA
Mr. Graham is currently managing our provision of environmental consulting services for the seismic retrofit of the North Torrey Pines Bridge. The project involves coordinating with Caltrans District 11 offices, and reviewing existing environmental and historic resource reports prepared by the City of San Diego and Caltrans. The NCTD right-of-way crossing beneath the bridge is a major issue in project development. We are preparing a Historic Property Survey Report (HPSR) for submittal to Caltrans, the Federal Highway Administration (FHWA), and the State Historic Preservation Officer (SHPO). Other tasks included advising the City of Del Mar on their compliance with the CEQA and the NEPA, and attending Del Mar City Council and Historic Site Board meetings.

Clark County Regional Transportation Commission South Resort Corridor Intermodal Transit Station, Las Vegas, NV
As Project Manager, prepared an EA, in accordance with Federal Transit Administration NEPA regulations for a proposed intermodal transit station at the southern end of the South Resort Corridor in Las Vegas, Nevada. The facility will initially serve as a bus transfer facility, but will also serve as a major transfer station along the Fixed Guideway planned for development along “the Strip” in downtown Las Vegas. In the long term, the facility is also positioned to serve as a station for the High Speed Rail line planned to serve the Los Angeles-Las Vegas corridor.

City of San Diego Calle Cristobal Assessment District EIR, San Diego, CA
Served as the City of San Diego Planning Department Project Manager for the EIR prepared concerning the assessment district formed to finance and construct the four-mile segment of Calle Cristobal. The roadway linked the Planned Urbanizing community of Mira Mesa with Sorrento Valley and Interstate 5. The EIR involved the compilation of the many roadway-related mitigation measures previously mandated in EIRs prepared for the various single- and multi-family residential developments fronting the planned corridor.

County of San Diego Highway 395 Bridge Replacement EA, San Diego County, CA
As Project Manager, prepared an EA for the replacement of the Highway 395 bridge across the San Luis Rey River. The old bridge was undermined by winter storm floodwaters. The project required an individual permit under section 404 of the Clean Water Act. Revegetation and intrusive plant species eradication was required. Mitigation for bat populations roosting on the underside of the bridge was also required.

City of Escondido Bear Valley Parkway EIR, Escondido, CA
As Project Manager, prepared EIR for the widening of a four-mile segment of a north-south arterial road. Principal issues were the noise, air quality, and visual impacts on adjacent residential areas resulting from increased traffic volumes and speeds. A bridge replacement on Del Dios Creek required an Individual Permit from the ACOE and a Section 7

Consultation with the USFWS as a result of the presence of a breeding pair of endangered least Bell's vireo.

City of San Diego Fairmount Avenue/Montezuma Avenue Interchange EA, San Diego, CA
As Project Manager, prepared FHWA-format EA for this interchange on a federal highway corridor. Environmental issues analyzed included impacts to wetlands and other biological resources, noise, air quality, and visual aesthetics. Surveys for endangered California gnatcatcher breeding territories were conducted. A Section 4(f) analysis was prepared as a result of the acquisition of City-owned open space for needed right-of-way.

North County Transit Development District Oceanside-San Diego Commuter Rail EIR Technical Studies, San Diego County, CA
As Project Manager, coordinated the preparation of technical studies examining the environmental impacts associated with the construction and operation of the various stations along "The Coaster" commuter rail route. Studies were prepared for each impact category identified through the Initial Study. These individual studies were then formatted into an EIR prepared by North County Transit Development Board staff. Prepared the responses to all agency and public comments received during the review period. The project required an extensive scoping and hearing process. Issues of most concern to community groups included traffic circulation, parking, noise, and visual aesthetics.

Metropolitan Transit Development Board Washington Street Light Rail Transit Station Negative Declaration, San Diego, CA
As Project Manager, prepared a Negative Declaration concerning the redevelopment of the Mission Brewery. Included in the environmental analysis was development of an LRT station platform on the west side of the building as part of the Old Town LRT line development.

Metropolitan Transit Development Board Bayside Light Rail Transit Line, San Diego, CA
Served as Project Manager for environmental review and Coastal Development Permit processing for the Metropolitan Transit Development Board's Bayside Light Rail Transit alignment, stations and corridor landscaping. The project required environmental review by the City of San Diego and permit approval by the CCC. Consultation with the State Historic Preservation Officer under Section 106 of the Historic Preservation Act was required due to the displacement of the historic Frost Hardwood Lumber complex.

County of Pima River Road Realignment EA, Tucson, AZ
Managed the preparation of an FHWA-format EA the widening and realignment of a 12-mile segment River Road for the Pima County Department of Public Works. Key issues were roadway noise, air quality, visual impacts on sensitive hillsides, and the socioeconomic effects of business relocations.

County of James City Alternate SR-5 EA, James City County, VA
Managed preparation of an EA for a 3.5-mile, two-lane roadway linking residential areas west of Williamsburg, Virginia, within the planned SR-199 corridor. Wetland mapping within the corridor was confirmed. Extensive visual impact analyses were required as a result of the route's designation as a Virginia Scenic Byway. Drainage crossings and bridges were permitted under the provisions of Nationwide Permits 14 and 26. Staff performed a survey for the small-whorled pogonia, a federally listed threatened species. The project will result in permanent impacts to 2.18 acres of forested wetlands. Mitigation was accomplished via the transfer of 92 acres of open space to the Williamsburg Land Conservancy.

Puerto Rico Ports Authority Luiz Muñoz Marin International Airport Runway 26 Extension EA, San Juan, Puerto Rico
Managed preparation of an EA for the construction of a 1,000 foot extension to the main runway at the Luiz Muñoz Marin International Airport. The extension will occur largely on fill placed in the La Torrecilla Lagoon east of the airport. The lagoon is bordered by mangrove swamps. The project will require an individual permit issued by the ACOE under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. The lagoon is also within the boundaries of the Los Piñones Forest Preserve; the project required a determination under Section 4(f) of the U.S. Department of Transportation Act of 1966. One alternative considered shifted aircraft operations to the west; the FAA's Integrated Noise Model was utilized to determine this alternative's effect upon sensitive noise receptors in the Isla Verde resort area. In addition to coordination with federal agencies, the project required consultation with several agencies of the Commonwealth of Puerto Rico.

Virginia Department of Transportation Rugby Road Categorical Exclusion, Charlottesville, VA
Managed the preparation of a Categorical Exclusion for the Virginia Department of Transportation concerning the widening of a .8-mile segment of Rugby Road. The subject road segment extends westward from the University of Virginia campus and passes through the Rugby Road Historic District, which is listed on the NRHP. A consultation with the Virginia Department of Historic Places was necessary under Section 106 of the NHPA. Of concern was the project's potential effects upon the historic streetscape.

Capital Area Airport Authority Richmond International Airport Extension of Runway 16/34 EA, Richmond, VA
As Land Use Planner, prepared Land Use Impacts and Land Use/Noise Compatibility Analysis for this EA dealing with a runway extension and other improvements at Richmond International. Principal environmental issues addressed in the document included noise from increased air operations, land use, impacts to wetlands, and potential effects upon cultural resources. Managed consultation with SHPO, mandated by Section 106 of the NHPA. This consultation was necessary due to Confederate entrenchments dating to the 1862 Peninsular campaign being present within the project area.

Pactel Cellular Communications Sites EA, NV and CA
Contracted by Pactel Cellular to obtain the necessary approvals from the BLM and the County of San Bernardino, for the construction of thirteen wireless communication antenna sites along the Interstate 15 corridor between Los Angeles and Las Vegas. The sites, all consisting of monopole- or lattice tower-mounted dish antenna and accessory structures, were situated on private land under County jurisdiction or federal land under BLM jurisdiction. As Project Manager, an EA was prepared that analyzed potential impacts upon the endangered desert tortoise, visual impact analyses conducted in conformance with Department of Interior Visual Resource Inventory and Evaluation procedures, and analysis of consistency with County land use plans and the BLM Land Management Use Categories contained in the California Desert Plan.

Confidential Project
Managed preparation of EIR for a new 102,000 square-foot student center and a 43,000 square-foot bookstore in the central portion of the campus. Major issues analyzed consisted of seismic risk factors, architectural compatibility, traffic and parking, and solar access.

JENNIFER GUIGLIANO, CPESC, CPSWQ, CESSWI, EIT, REA

Project Director

Senior Environmental Scientist

EDUCATION

ME, Environmental Engineering, Pennsylvania State University, University Park, 1996

BS, Combined Science, Santa Clara University, Santa Clara, California 1994, Minor Biology; Minor Environmental Studies

Post-Graduate Researcher, Environmental Microbiology, University of California at Santa Barbara, 1998

REGISTRATIONS

2008, Certified Erosion, Sediment, and Storm Water Inspector (CESSWI) (Certification No. 0018)

2006, Certified Professional in Erosion and Sediment Control (CPESC) (Certification No. 3613)

2005, Registered Environmental Assessor (REA I No. 08037)

2004, Certified Professional in Storm Water Quality (CPSWQ) (Certification No. 0085)

1997, Engineer-in-training (EIT), California (License No. XE103188)

PROFESSIONAL AFFILIATIONS

Associate Member of Sigma XI, Scientific Research Society

Urban Land Institute

International Erosion Control Association

Women's Environmental Council

HONORS

Marketing Incentive Award (Tetra Tech 2003)

"SMILER-Spirit, Motivate, Inspire, Lead, Encourage, Results" Awards (Tetra Tech 2002, 2003)

CERTIFICATIONS

1997, EPA's Water Treatment Operator Course Certificate

2002, Wetland Delineation Training Certificate, Wetland Training Institute

2003, Storm Water Pollution Prevention Plan (SWPPP) Certificate, SWPPP Training Seminar by the Building Industry Association and San Diego County Copermittees

2003, California Storm Water Quality Association (CASWQA) Best Management Practices Handbook Training Seminar

Hazardous Waste Operations and Emergency Response, 29 CFR 1910.290, 40-hour Certification

Hazardous Waste Operations, Manager/Supervisor Training, 29 CFR 1910.120, 8-hour Certification

U.S. Fish and Wildlife Service Endangered Species Recovery Permit

Coastal California Gnatcatcher, In Progress

Least Bell's Vireo, In Progress

Southwestern Willow Flycatcher, In Progress

American Red Cross Adult CPR Certification and First Aid Certification, 2006

DOT Training for Offerors of Bulk and Non-bulk Hazmat Packages - 2003 Security Updates

Ms. Guigliano is an engineer and project manager with over 12 years of experience working in environmental engineering and resource management, including storm water, wastewater, and natural resources management, and site assessment projects. She is an expert in managing large integrated projects and has prepared many plans and reports, including integrated natural resources management plans, integrated pest management plans, CEQA/NEPA documents, water quality technical reports, agency permit applications and processing, biological resources reports, and storm water management and pollution prevention plans. Ms. Guigliano has extensive experience in the fields of water quality and natural resources management. She has experience working with a diversity of clients including private, tribal, municipal, state, and federal entities. Her responsibilities and experience have included project and field management; Phase I site assessments; environmental monitoring; biological site assessments; watershed assessments; ecological risk assessment sampling; wastewater treatment plant sampling and evaluations; storm water compliance and management, storm water treatment design, NPDES program implementation, erosion control projects; water management issues; groundwater monitoring; and spill prevention, contingency, and countermeasure plans.

Ms. Guigliano is the Technical Vice Chair for the CPESC, Inc. CPSWQ Executive Committee (Board), on the Technical Advisory Committee for the CPESC, Inc. Certified Erosion, Sediment, and Storm Water Inspector (CESSWI) program, and is on the Executive Committee for the Urban Land Institute (ULI) San Diego/Tijuana and is the Sustainability Committee Chair for ULI San Diego/Tijuana.

Ms. Guigliano is also the EDAW Corporate Director of Health and Safety and has developed the Health and Safety Program for the firm including policies and procedures. She is responsible for implementation of the program and representation of EDAW at the AECOM corporate level.

EROSION AND SEDIMENT CONTROL AND STORM WATER MANAGEMENT

Westside Parkway Storm Water Design, Bakersfield, CA

Project Manager/Engineer

CLIENT: DMJM Harris/City of Bakersfield

EDAW is responsible for the design of effective temporary and permanent erosion control and sediment control measures and storm water management Best Management Practices (BMPs) for the Westside Parkway. Ms. Guigliano is responsible for managing the storm water and erosion/sediment control aspects of the design including preparation of Water Pollution Control Plans, Erosion and Sediment Control Plans, and multiple Storm Water Data Reports (SWDRs) for the proposed alignments.

Storm Water Management and Erosion Control, Honolulu, HI

Project Scientist/Engineer

CLIENT: Caltrans

Ms. Guigliano is providing technical guidance regarding storm water management and erosion control for the City and County of Honolulu in coordination with AECOM Water. Ms. Guigliano's responsibilities include the preparation of two white papers on the technical issues of erosion and sediment control modeling and numeric standards for municipalities, review and comment on Revised Universal Soil Loss Equation (RUSLE) as applicable to Hawaii, attendance at a focus group meeting regarding the municipal standards, and preparing and delivering a training to municipal staff on the

erosion control and the use of RUSLE2. Ms. Guigliano is also preparing an Erosion Prediction Guidelines (EPG) Manual and a revised RUSLE2 program for the City/County for use in project analysis during the project development phase. The EPG and revised RUSLE2 program will be incorporated into the development guidelines an include input and review by the Natural Resources Conservation Service (NRCS).

Erosion Prediction Procedure and Caltrans RUSLE2 Development, CA
Project Manager, Project Manager
CLIENT: Caltrans
Ms. Guigliano is the project manager in charge of preparing an Erosion Prediction Procedure (EPP) and a modified RUSLE2 program for the California Department of Transportation. The project includes research and recommendations in to maximum allowable erosion rates (MAER), modification of databases to accommodate appropriate Best Management Practices for construction sites, revising the management practices database structure in the Caltrans RUSLE2 program, and redefining default values and options for preconstruction conditions. Ms. Guigliano also developed the training materials for the EPP for Caltrans. Ms. Guigliano conducted 2 BETA training classes for Caltrans to introduce the training program and address comments or concerns for program improvement. The initial project included preparation of the EPP Manual, modification of the Revised Universal Soil Loss Equation (RUSLE2) program, development of the training program, and 2 training sessions. Subsequent tasks involved more in-depth refinement of the program and the EPP manual.

Bioswale Design and Water Quality Technical Report, San Diego, CA
Project Manager
CLIENT: Sudberry Properties
Ms. Guigliano prepared a water quality technical report and designed a large bioswale system for a large-scale development known as Quarry Falls in San Diego, California. The project includes mixed-use development of over 230 acres that are currently mined for aggregate. The project required innovative approaches to storm water management to integrate storm water principles with multi-use open space and park designs. The bioswale concept includes the coupling of storm water treatment with active and passive recreational areas and incorporates links to the native habitat in the area including the San Diego River. The project included preparation of a Water Quality Technical Report as required by the San Diego Municipal Permit.

ENVIRONMENTAL COMPLIANCE

Beacon Solar Energy Project, Kern County, CA
Project Director
CLIENT: NextEra Energy Resources
Ms. Guigliano is the Project Director for environmental compliance components of a proposed 250-megaWatt solar project located in Kern County, California. The project has submitted an Application for Certification (AFC) with the California Energy Commission (CEC) and is processing associated technical studies to support the data requests. Responsibilities include strategic coordination of biological compliance, land use, socioeconomics, cultural resources, and storm water/flood plain management requirements including preparation and review of technical documents (technical studies, permit applications, and management and mitigation plans), coordination and negotiation with agencies including the USFWS, CDFG, RWQCB, Federal Emergency Management Agency (FEMA), CEC, and coordination and oversight of the project team including biological resources, land use, socioeconomics, cultural resources, and engineering and design. Biological areas of concern include general biological resources (wildlife and vegetation), special status species (Mojave ground squirrel, desert tortoise, and burrowing owl), jurisdictional waters, raven management, and water

quality and ecological risk assessment for migratory birds. Other key responsibilities include strategic coordination of storm water and flood plain management components of the project including hydrology and hydraulics modeling and analyses, sediment transport studies and modeling, storm water management approach development, FEMA processing of the Conditional Letter of Map Revision (CLOMR) and Letter of Map Revision (LOMR), and coordination with relevant agencies including FEMA, the RWQCB, CDFG, and the CEC.

Construction Site Environmental Compliance, MCB Camp Pendleton, CA
Environmental Manager
CLIENT: Pacific General/TC Construction
Ms. Guigliano provided construction site environmental compliance oversight for Pacific General, Inc. followed by TC Construction, the prime contractors, who installed a raw water pipeline at MCB Camp Pendleton and MCAS Camp Pendleton. The project involved providing training and oversight for environmental concerns on the project including hazardous waste and hazardous materials management, storm water management, spill prevention, and biological and cultural resources. This was a high-profile project due to its location along the main road on-base.

BIOLOGICAL ASSESSMENT/NATURAL RESOURCES MANAGEMENT

Caltrans District 7 On-Call US-101 Wildlife Connectivity Analysis (07A2329), Ventura and Los Angeles, CA
Project Manager
CLIENT: California Department of Transportation, District 7
Ms. Guigliano is the Project Manager for this on-call contract with District 7. The purpose of this project is to evaluate the potential effects of current and future capital transportation projects on wildlife, particularly medium and large mammal, movement across U.S. Route 101 (US-101) within Caltrans District 7 (D7). The goal of this task order is to support D7 with the analysis of the US-101 for wildlife crossing opportunities through the implementation of a wildlife corridor analysis and engineering Feasibility Study (FS) of appropriate crossing locations and designs to accommodate wildlife movement across the highway. This work may involve wildlife movement studies including road kill and tracking surveys, habitat and wildlife linkages/corridor studies, economic cost/benefit analyses, and alternatives analyses to properly assess potential impacts and mitigation of current and proposed projects.

The project area of interest is located on the US-101 between State Route (SR) 23 and SR 27, generally from Post Mile (PM) 00.0 to PM 38.2. This area is located between the Simi Hills to the north and the Santa Monica Mountains to the south, where wildlife connectivity issues between the two linkages are known to persist.

To successfully complete this project, several activities are necessary to evaluate the current and potential future status of wildlife movement across the US-101 and determine the steps Caltrans should consider to improve wildlife connectivity to the extent feasible. These activities are:

Activity 1 Literature and Data Review
Activity 2 Data Gap Analysis
Activity 3 Study Design Preparation
Activity 4 Study Design Implementation
Activity 5 Constraints Analysis
Activity 6 Engineering Feasibility Study and Cost Estimate

JENNIFER GUIGLIANO

Mesquite Regional Landfill Biological Compliance, Imperial County, CA
Project Manager
CLIENT: Sanitation Districts of Los Angeles County
Ms. Guigliano is the Project Manager for a large biological compliance project for the Mesquite Regional Landfill project with the Los Angeles County Sanitation Districts. This project involves the construction of a new landfill in Imperial Valley and compliance with environmental regulations and mitigation requirements defined in a Biological Opinion, Conditional Use Permit, and other environmental compliance documents. The services include general regulatory assistance and agency coordination, burrowing owl impact assessment and avoidance, habitat monitoring (breeding birds, small mammal trapping, and vegetation transects), desert tortoise population monitoring, raven monitoring, development of contractor specifications for biological conditions, providing design considerations to minimize impacts to resources, spill contingency planning for rail spur and rail transport activities, and other as-needed services to facilitate compliance with biological requirements. Ms. Guigliano also provides Project Environmental Awareness Training for LACSD and their contractors on the project.

Biological Resources Surveys, Burrowing Owl Surveys, and Wetland Delineations, Imperial County, CA
Task Manager
CLIENT: Westshore Development
Ms. Guigliano conducted biological resource surveys, including habitat classification and species surveys, on two large (greater than 1,500 acre) agricultural sites in Imperial County, California. The properties are part of two separate large scale development master plan areas. The sites are proposed as mixed use land plans consisting of commercial/retail, varying density residential uses and passive/active recreation uses. Surveys included burrowing owl surveys in accordance with the California Burrowing Owl Consortium guidelines and wetland delineations in accordance with the USACE 1987 Wetland Delineation Manual.

Borax Mining, Boron, CA
Biologist
CLIENT: NA
Ms. Guigliano monitored the area behind the mining location for desert tortoise habitat and population. The protected tortoise habitat is threatened by the moving earth masses that result from the mining activities. Work involved marking grids for future monitoring checks, identifying burrows, and relocating tortoises.

ENVIRONMENTAL PLANNING AND PERMITTING

Agua Hedionda and Calavera Creeks Dredging and Improvements Project, Carlsbad, CA
Project Manager
CLIENT: City of Carlsbad
Ms. Guigliano is directing the environmental and engineering team in the preparation of the EIR including environmental studies and technical documents for the proposed dredging and design improvements for Agua Hedionda and Calavera creeks. The project includes channel dredging, the removal and modification of an existing weir wall structure, outlet modifications, hydraulic improvements, and bank stabilization. Ms. Guigliano is responsible for the day-to-day coordination with the team, reviews technical content, provides guidance to staff, and maintains control of the project schedule and budget. Ms. Guigliano is also responsible for the acquisition of necessary environmental permits for the project including the preparation of permit applications, preparation of mitigation recommendations, and leading negotiation efforts to obtain various permits from the regulatory agencies

including a Coastal Development Permit, and the USACE 404, RWQCB 401, and CDFG 1600 permits.

El Monte Restoration Environmental Impact Report, Lakeside, CA
Project Manager
CLIENT: El Capitan Golf Club
Ms. Guigliano is the project manager for a Subsequent EIR and associated technical studies and acquisition of a Major Use Permit, for approximately 460 acres in the upper San Diego River that are currently approved as a golf course. The project includes preparation of the Reclamation Plan and a Subsequent EIR to address potential impacts associated with changing the plan of development from a golf course to a restoration site. Restoration would include the removal of approximately 10 percent of the aggregate material in the river channel to return the channel bottom closer to the groundwater level. The removal of aggregate would be sold to help pay for the restoration effort. Restoration would include creation of new habitats including cottonwood/willow riparian, oak woodland, and an upland/alluvial scrub community. This project also includes the acquisition of appropriate permits from the regulatory agencies including the USACE 404, RWQCB 401, CDFG 1600, and storm water permits with the SWRCB

Bill Hagmaier, PE

Associate Vice President
Civil Senior Project Manager

Education
BS/1979/Civil Engineering, University of Oklahoma

Registrations
PE/1989/California, Registration No: 44325 (Civil)

Professional Associations
American Society of Civil Engineers (ASCE)

Experience

Years with AECOM: 15

Years with other firms: 16

Mr. Hagmaier's expertise includes site development, planning and land use analysis, transportation and traffic engineering, rail design, hydrological investigations and hydraulic studies, infrastructure design, construction, operations, financial administration and budgeting, quality control, scheduling, and professional staff management. His experience includes site development work associated with Corp of Engineer contracts; Los Angeles, Orange, & Riverside County contracts, and private developer contracts. He has also been involved with substantial transportation and infrastructure design in the City of Los Angeles, primarily in design engineering of rail projects for Los Angeles County Metropolitan Transportation Authority, Rail Construction Corporation, and class I railroads. He is very knowledgeable of AREMA and ACTA standards, City of Los Angeles design manuals, and permitting requirements and the L.A. County Department of Public Works permitting process. He has been instrumental in obtaining approvals from a variety of agencies, including the Los Angeles Cultural Affairs Commission, the County of Los Angeles, Caltrans, and the City of Los Angeles on numerous projects.

San Ysidro Border Crossing, San Diego, California: Project Manager for civil engineering and site electrical elements associated with the re-construction/modification of the San ysidro Port of Entry border crossing with Mexico at the south end of the I-5 Freeway. This project will be engineered to provide for the 2020 Masterplan which anticipates an increase from the current 40 million border crossings/year to 80 million crossings/year. The project is being designed in 3 major phases in order to maintain the existing facilities in full operation while removing and replacing all facilities, roadways, and infrastructure. Approximately 50 existing buildings and inspection booths are scheduled to be removed and replaced with new advanced border protection facilities. The north and south bound lanes of the I-5 freeway will be fully removed and reconfigured to accommodate the expanded port facilities and a new point of embarcation to Mexico. New pedestrian bridges (approximately 2300 feet in length) linking various transportation modalities will also be incorporated into the new border crossing to facilitate movement throughout the port area. Public and private utility infrastructure will be removed, modified, or replaced to maintain service to all facilities throughout the 5 year construction period while also providing new service mainlines and laterals to the new buildings and booths. An extensive staging plan is being developed to interface with the 3 independent

phases of the project, with the staging plans addressing the items of building demolition, temporary traffic control, temporary and permanent utility construction and other aspects of this complex project.

James A Musick Detention Facility, Orange, California: Project manager responsible for civil engineering and site electrical engineering associated with a new 120 acre county detention facility in Orange, California. This new facility converts an existing under-utilized parcel of land and antiquated small jail facility into a state of the art detention facility with provisions for adding a future 3-building judicial complex. The new facility will be designed and constructed in 2 phases to allow for the current small jail facility on site to be maintained in Phase 1 and then subsequently demolished as part of Phase 2. The site Master Plan calls for ultimate build-out of 7000 beds in a fully stand-alone functional facility. The design incorporates 32 new buildings and associated infrastructure including 2.5 miles of roadway, 12,000 feet of water lines, 8000 feet of sewer lines, 7500 feet of storm drain lines, design of an electrical substation for the facility, emergency and redundant power provisions, 8500 LF of electrical lines, grading of the 120 acres to achieve a mass balance of soil material, and design of 2 on-site storm water detention facilities.

Westminster Police Department, Westminster, California: Project manager for civil engineering and site development engineering for a new city police department building and city parking garage complex. The project is designed as a 2 phase development so that existing operations are not disturbed during the construction process. The project includes a new 2 story, 87,000 SF police department headquarters building with isolation sallyport, and an adjacent 600 car, 3 level parking garage. Site development includes providing new utilities to the buildings, site grading, drainage improvements, and provisions for water quality control.

Americana at Brand, Glendale, California: Project Manager for civil engineering elements associated with this mixed-use development of retail, restaurant, and residential uses. Project includes reconstruction of all perimeter roadways adjacent to this project in a heavily urbanized downtown setting adjacent to an existing large shopping mall. The offsite improvements incorporated reconstruction and/or widening of 6 arterial streets and signal modifications for 10 intersections. The on site civil elements included roadways, drainage, utilities, water quality management requirements, and design and coordination for the backbone infrastructure for the site. The site civil design required coordination with 4 separate and distinct architectural firms designing various elements of the 8 multi-story buildings, 3 underground parking structures, and a six story above ground parking structure. The on site infrastructure was developed around a 1.6 acre urban park while at the same time fitting within a pedestrian roadway that included a 2900 foot long rail trolley system. Construction of this aggressively scheduled project is accomplished with an intensive design and communication approach to address all the unique features for this site.

Legends Resort, Dubai, United Arab Emirates: Project manager for civil engineering, site development, and site electrical engineering for a 260 acre entertainment based resort in Dubai, UAE. Resort included a water based theme park, a 200,000 SF shopping corridor/mall covering 32 acres, 5 themed hotels and convention center (2100 rooms), and 1425 residential units. Responsibilities included providing Schematic Design services for the site, coordination with the master plan architect, and incorporating the engineering parameters into the Master Plan. The master plan developed by the architect for the complex was refined during the schematic design phase to incorporate the required engineering elements associated with roadway networks, site access, fire and life safety provisions, utility corridors, utility demands, and pedestrian circulation. The schematic design was developed in Los Angeles in conjunction with the Master Plan architect so that the design direction and integrity was consistent with the Owners intent. Provisions were made for subsequent design development and construction documents to be

prepared by our company at our Dubai office. Engineers from the local office were incorporated into the schematic design process for their knowledge of local code issues and any local requirements that could affect the general engineering elements for the site. The combination of Master Plan and Schematic Design being performed in concert as a team activity was very successful in identifying issues associated with the development.

Ammunition Supply Point (ASP), Bagram Air Field, Afghanistan: Project manager and for a design-build contract to create a new ASP (weapons storage facility) for the American military at the Bagram Air Field on a 62-hectare site. Civil work included siting five buildings, clearing the site of land mines, demolition of damaged buildings, clearing, grading, earthwork, drainage, providing 56 earthen bermed concrete/gravel pads, and 24 gravel pads protected by steel panels in-filled with dirt for the storage of various types of weapons, 3 kilometers of perimeter fencing, 13,500 square meters of parking areas, 8 kilometers of base roadways, and providing various force protection measures at the site. The ASP was designed in accordance with Army Pamphlet 385-64, “Ammunition and Explosives Safety Standards.”

ANA Regional Brigade, Qalat, Afghanistan: Project manager for a design-build contract to create new military base for the Afghanistan National Army at the City of Qalat. The ANA base is on a 120-hectare site with a planned population of 4,000 soldiers. Civil work included siting over 130 buildings/structures, clearing the site of land mines, clearing, grading, earthwork, drainage, providing fuel containment basins, 5 kilometers of perimeter and site fencing, a new sports field, 36,000 square meters of parking areas, 4 kilometers of base roadways, 3.7 kilometers of water distribution piping, and 5.6 kilometers of sanitary sewer collection piping.

ANA Regional Brigade, Kandahar, Afghanistan: Project manager for a design-build contract to create new military base for the Afghanistan National Army at the City of Kandahar. The ANA base is on a 120-hectare site with a current population of 4,000 soldiers and a master-planned population of 6,000 soldiers. Civil work included siting over 140 buildings/structures, clearing the site of land mines, demolition of damaged buildings, clearing, grading, earthwork, drainage, providing fuel containment basins, a two-lane box culvert bridge over an existing natural drainage channel (wahdi) at two locations, 5.4 kilometers of perimeter and site fencing, a new sports field, 40,000 square meters of parking areas, 5.5 kilometers of base roadways, 4.8 kilometers of water distribution piping, and 3.6 kilometers of sanitary sewer collection piping.

ANA Regional Brigade, Herat, Afghanistan: Project manager for a design-build contract to create a new military base for the Afghanistan National Army at the City of Herat. The civil work included siting over 140 buildings/structures; clearing the site of land mines; and demolition of damaged buildings. The work included clearing, grading, earthwork, and drainage; and providing fuel containment basins. Also included were two-lane box culvert bridges over a pre-existing natural drainage channel (*wahdi*) at two locations; 5.4 kilometers of perimeter and site fencing; a new sports field; 40,000 square meters of parking area; 5.5 kilometers of base roadways; 4.8 kilometers of water distribution piping; and 3.8 kilometers of sanitary sewer collection piping.

East Apron Phase II, Oakland International Airport, Oakland California: Quality Control manager for this $26 million project to reconstruct, under operations, approximately 20 acres of concrete apron and 1,000 feet of asphalt taxiway. Work was phased to minimize disruption to airline operations. Primary responsibilities included project reviews and quality control of apron layout, pavement and jointing plan, apron and taxiway grading plans, apron and taxiway drainage and utility plans, construction phasing program, and striping and marking plans.

Buffington Harbor Convention Center, Lake Michigan, IL : Project Manager for civil design elements associated with a multi-use, commercial, retail, residential, harbor development on Lake Michigan. Provided design team management for evaluation of civil infrastructure

requirements associated with this project as part of the master planning and schematic design stage. Design elements included investigation and preliminary sizing of utility lines, evaluation of NPDES impacts, evaluation of traffic circulation and roadway networks, and preparation of preliminary cost estimates for the numerous civil infrastructure demands of this project.

Traffic Control Plan, Pacific Coast Highway at Sunset Blvd., City of Los Angeles, Los Angeles, California: Project manager for the traffic control plans and stage construction plan associated with a major sewer trunk line relocation. Design features included provisions for traffic controls such as lane closures and transitions, signalization modifications, and work barrier screens for a highly congested four-lane highway. Stage construction plans were created to minimize rush hour impacts and mitigate the access constraints to intersecting roadways and private properties.

Traffic Control Plans, Southern California Gas Company, Los Angeles County, California: Utility relocations project manager for numerous traffic control plans with utility line relocations for The Gas Company. Projects consisted of short service extensions to as much as 3/4-mile mainline relocations for 12 projects throughout Los Angeles County as well as five projects in downtown Los Angeles.

Anaheim Street Viaduct Widening, Port of Los Angeles/Caltrans District 7, Los Angeles, California: Senior engineer responsible for providing quality control and construction support for this $25 million bridge replacement/roadway project. Design and constructibility review included geometrics, grading, drainage, and traffic engineering.

Henry Ford Avenue Grade Separation, Alameda Corridor Transportation Authority, Los Angeles, California: Senior engineer responsible for construction staging, traffic control, project phasing, and constructibility review for a 5,500-foot-long multi-segment grade separation structure. This project provided a 67-segment dual-track railroad bridge over a 300-foot-wide drainage channel in the Port of Los Angeles, continued with a 250-foot crossing of State Route 47, and included long multi-span approaches at each end of the project. The project also incorporated a separate three-span seven-lane highway bridge over the 300-foot-wide drainage channel. The phasing plans for the project incorporated scheduling construction aspects for railroad shooflies, bridge construction, and roadway detours. The stage construction plans were developed to coordinate the partial demolition and ultimate removal of an existing four-lane highway bridge while constructing the new seven-lane highway bridge over the channel and the railroad truss bridges over the highway intersection. The traffic control plans were designed to maintain the existing railroad traffic across the intersection while maintaining full capacity of the existing roadway system during construction.

Redondo Junction Grade Separation, Alameda Corridor Transportation Authority, Los Angeles, California: Senior engineer responsible for providing constructibility review, utility coordination, and permit coordination for a 1,300-meter multi-segment grade separation structure. The constructibility review included alignment, right-of-way, grading, and utility relocations. Additional responsibilities included preparation of right-of-way mapping and stage construction plans. The stage construction plans were developed to coordinate the construction of right-of-way retaining walls, 10-meter high MSE approach walls, a steel deck flyover bridge, and two steel through girder bridges over public streets and railroad right-of-ways. These construction requirements were staged in four phases around two active freight railroad lines. Permit coordination included activities with Los Angeles Cultural Affairs Commission, the Burlington Northern Santa Fe Railroad, Amtrak, and the City of Los Angeles Bureau of Engineering (Structures). (2000/2001/DMJM Harris)

Oceanside-Escondido Rail Project, North County Transit District, San Diego County, California: Project manager to provide preliminary analysis, design and quantities of

superstructure and substructure for 21 miles of track and related structures along a branch line. The project includes two concrete cast-in-place, post tensioned box girder bridges (312-foot long, 3 span bridge and a 312-foot long, 4 span bridge), 15 new stations and numerous pedestrian bridges and overpasses.

Metro Rail Blue Line Segment 3, Pasadena, California: Project manager responsible for the preparation of all utility relocations and the design of all new utilities associated with the 4,500-linear-foot depressed light rail transit system through Old Town Pasadena. The project included the preparation of a transit impact report analyzing the changes required for the four at-grade crossing, a utility relocation report and drainage report describing the impacts of the light rail system on the existing infrastructure. Also responsible for civil engineering plans including right-of-way plans, surface demolition plans, and grading plans. In addition, the project required preparation of all traffic engineering plans in the highly congested area of Old Town Pasadena, including traffic control plans, signing and striping plans, lighting plans, and signalization plans.

Metro Rail Blue Line, Chinatown Aerial Structure, Los Angeles, California: Project manager responsible for providing track alignment calculations, plan and profile calculations, and right-of-way calculations. The project also included the preparation of an alignment analysis defining the impacts of the elevated structure above an existing 4-lane arterial street in downtown Los Angeles. The project also included preparation of a drainage report and evaluation of hydrology and hydraulic modifications in a dense urban area. The project involved approximately 5,000 linear feet of street improvements and 4,050 linear feet of elevated light rail track. In addition, the project included the Chinatown Station platform. This project required design coordination with existing adjacent property owners to assure that existing vehicle and pedestrian access will be maintained.

Metro Rail Green Line Extension, I-105 Freeway to LAX, Los Angeles County, California: Project manager for all civil and utility engineering associated with the design of approximately 2.5 miles of an at-grade and elevated light rail transit system. The project included extensive coordination with various agencies including the Department of Airports and the FAA. Design work included grading, storm drainage, roadway modifications, traffic control plans, right-of-way plans, and alignment calculations. The project also involved coordination with two station designers for all utility and civil interfaces.

Metro Rail Red Line, Hollywood Boulevard and Vine Street Metro Station, Hollywood, California: Project manager for the preparation of street improvement plans, grading, and site improvement plans, conceptual utility relocation plans, storm drain plans, sewer plans, and incorporation of detour, street lighting, water, and signal plans provided by the City of Los Angeles for this station. Also responsible for cross sections of the proposed subway station and track grade plans and alignment.

Pasadena Blue Line, Storm Water Pumping Station, Pasadena, California: Project manager for design of civil and utility improvements associated with construction of a depressed section of commuter rail for the Los Angeles Metropolitan Transit Authority within the boundaries of historic Old Town Pasadena. Included in this work is the design for a storm water pumping station and a storage box for draining the depressed track-way.

Union Pacific Railroad, Yuma Subdivision, Track Alignment Analysis and Permitting, Colton to Indio, California: Project manager responsible for review of the existing conditions and permitting for track modifications, over a 90-mile section of mainline track. Modifications included installation of new double track facilities, at-grade crossing revisions, and incorporation of hydrology and hydraulic constraints. Permit analysis and coordination included obtaining local agency permits for at-grade crossing modifications, county and state permits for track grading

and surface modifications, CPUC permits for G.088A modifications, Corps of Engineers' permits for hydrology impacts, and preparation of traffic control plans for the construction impacts.

Anaheim Street Rail Access Project, Port of Los Angeles, San Pedro, California: Senior engineer responsible for providing independent quality control review and constructibility review for 2 miles of railroad with five road grade crossings, two bridge structures, and eight industry sidings. The design and constructibility reviews included alignment, right-of-way, geometrics, grading, drainage, utility relocations, staged construction, and traffic control. Construction engineering included evaluation of the right-of-way and utility conflicts and associated infrastructure interfacing with City of Los Angeles, Caltrans, and the Class I railroads. Mr. Hagmaier was also responsible for preparation of bidding specifications for roadway, pump station, and utility infrastructure.

On-Dock Rail Interchange Station (ORIS), Port of Los Angeles, San Pedro, California: Senior engineer responsible for providing quality control review and constructibility review for the design of 13 miles of railroad tracks and associated infrastructure for an intermodal container loading yard and an eight-track storage yard. The design and constructibility review included geometrics, grading and drainage, a fire protection system, compressed air system, and track drainage system. Also included were reviews on the electrical and signalization systems and a fuel loading facility. Specification review consisted of evaluating the interrelationship between owner supplied material specifications and the individual project specification. Specification review included running rail, special trackwork, ties, utilities, earthwork, and miscellaneous infrastructure improvements.

Pier S Railyard, Port of Long Beach, Long Beach, California: Project manager responsible for all design activities and planning documents for the engineering design of an intermodal railyard facility. Responsible for managing the design team on all elements of work, including rail, utilities, roadway design, traffic engineering, signals, and lighting. Mr. Hagmaier was also the point of contact with the Port of Long Beach coordinating with all utility companies and adjacent projects at the site.

South Terminal-East Expansion Project, Port Hueneme, California: Project manager for this $5 million expansion of the site from 65 to 110 acres. Site improvements included environmental permitting, terminal planning and design, and design of adjacent roadways, pedestrian walkways, and landscaping.

California State Prison, Ironwood State Prison, Blythe, California: Project manager responsible for providing management services and complete site civil engineering design for a self-contained correctional facility housing 5,400 inmates. Provided all coordination between the client and the design team subconsultants. Engineering for this 1,700-acre site involved preparation of full infrastructure plans including sewer, water, power, gas, storm drainage, fencing, signing, striping, security system, and roadway designs. The project design and management also included a reverse-osmosis water treatment plant, a new wastewater secondary treatment distribution pumping station for reclaimed water from three storage ponds to 12 agricultural fields. Reclaimed water pumping station components consist of four 125-horsepower turbine pumps discharging from a “dual direction pass through” wet well which received wastewater from the storage ponds and the wastewater treatment plant. Construction support responsibilities included management of all civil, mechanical, electrical, and architecture design issues and resolution of all site construction constraints as a result of design related problems for construction contracts in excess of $50 million. Project responsibilities included negotiation of contract amendments and final authority for review of all RFIs, shop drawing/submittal reviews, and substitution requests.

Callmark Development Corporation, Senior Housing and HUD Sponsored Projects, Various Locations, California: Project manager for mixed-use and multi-family residential projects throughout California focused on senior housing developments with units totaling approximately 2,000. Project responsibilities included tract map, variance, waiver applications, general plan amendments, and presentations to planning commissions, building commissions, and homeowner groups. Project size varied from 24 units to 215 units. The design engineering responsibilities included hillside grading, utility extensions, roadways, storm drains, retention basins, hydrology and mass grading studies, stream rechannelizations and realignments, and pump stations for storm drains, sewers, and water systems. Construction support included grading, utility, and roadway site inspections, and construction management assistance to the Developer.

Channel Gateway Mixed Use Complex, Los Angeles, California: Project manager for all civil design and traffic control work associated with this 17-acre, 1200-resident mixed use high-rise project. Roadway design and traffic engineering included 1/2 mile of roadway widening, resurfacing, signalization, signing and striping to Lincoln Boulevard, a four- to six-lane major arterial. Design work also included new intersection design with transition resurfacing and full traffic control and state construction plans for the termination of the Marina Expressway (I-90) into Lincoln Boulevard.

Claremont Downtown/Rail Corridor Redevelopment Project, Senior Housing Development, Claremont, California: Project manager responsible for providing conceptual design for a 3-acre vacant parcel of property adjacent to the rail corridor through downtown portions of Claremont. The land use analysis was focused on compatibility and buffering of the adjacent single family housing at one end of the project and the rail corridor and downtown commercial boundary at the other end.

Columbia Park Subdivision 1-4, Anchorage, Alaska: Project manager for four subdivisions varying in size from 5 acres to 40 acres. Planning and engineering design services included plot map approval, planning commission presentations, variance applications, and design of all infrastructure and utilities, roadways, and grading. Grading work included resolution of a 20-foot depth of unsuitable foundation material in the roadways and below housing units. This muskeg condition required close construction supervision to insure adequate removal, replacement, surcharge of the peat as needed, and coordination of structural piles for the housing units.

Eagle Glen Subdivisions 1, 2, and 3, Anchorage, Alaska: Project manager for three single-family residential subdivisions covering 120 acres. Management services included coordination with multiple city review groups, the Alaska Department of Transportation, and various homeowner groups to complete the plat map approvals for these projects. Engineering design services included utilities, grading, roadways, and storm drainage. Also included were three new waterwell houses, well structures, and two new sewage lift stations. Construction management services included site inspections for all utilities, storm drainage, pump stations, and associated roadways.

Eagle Point Water District, Pump Station #1, Eagle River, Alaska: Project engineer for design of a 250,000-gpd water pumping plant. System components included three submersible well pumps discharging to a 200,000-gallon storage reservoir.

El Monte Downtown Rail Corridor Redevelopment Project, K-Mart Commercial Center, El Monte, California: As the project manager, provided land use analysis and conceptual design for a 22-acre multi-tenant commercial project that involved relocation of various commercial and residential property owners through the El Monte Redevelopment Agency. The conceptual design required balancing the infrastructure demands of the area including the high traffic volume adjacent to the site, the Southern Pacific Railroad Company tracks on the south

property line of the site, and the associated demands on the site and downtown commercial core to interface with a transit station location.

Huntington Memorial Hospital, Pasadena, California: Project engineer for site planning and engineering for a major expansion to an existing hospital within the confines of a dense urban setting.

County of Los Angeles, Inmate Services Warehouse, Saugus, California: Project manager responsible for civil engineering and surveying for a two-phase, two-building, 15-acre warehouse facility and included preparation of a needs assessment study and program schematics. Civil engineering included all grading, utility extensions, drainage, and storm water management, hydrology and hydraulics, fencing, signing, and pavement designs for the site. Site survey work was also included in this assignment, as well as construction support services.

Racquet Club of Corona, Corona, California: Project manager for two condominium developments totaling 778 units. Site planning work included preparation and processing of general plan amendments, street vacations, and tract map approvals. Design engineering included site grading in hillside conditions moving 2.5 million cubic feet of earth. Engineering requirements included all utility improvements, site drainage, hydrology studies, oil pipeline relocations, access road improvements, and site paving. Construction inspection and management included review of blasting plan for bedrock conditions, mass grading plan management, and coordination of contractor's work requirements.

Rose Court Subdivision, Pasadena, California: Project manager for 187-unit lot mixed use residential development incorporating single-family residential and zero lot line residential housing. Provided the engineering design for all utilities, roadways, drainage systems, grading, and retaining walls. Construction support and contract management services were also provided to coordinate between the developer, the city, and the homeowners association.

Sand Lake Area Master Plan, Anchorage, Alaska: Provided project management and site development of the Sand Lake Area Master Plan. This 640-acre development incorporated land use analysis of wetlands, natural resource extraction sites, permafrost areas, geotechnically active soils, and unstable slopes. The existing roadway system was modified for greater traffic loads and the land form was proposed for modification to incorporate partially revetted structures to assist in stabilizing the active soils. The area was master planned and designed with all new utilities, wastewater and storm water pump stations, emergency power substations, and an isolated road network as required for heavy industry. The wetland areas were partially reclaimed and the isolated permafrost soils were thawed and recompacted in compliance with geotechnical conditions.

Service High School, Anchorage, Alaska: Principal engineer for site planning and civil engineering design for a new 2,500-student high school. Project included emphasis on building solar orientation, mitigation of wetlands and deep frost zones, as well as incorporating value engineering to optimize a fast-track construction schedule. This 40-acre site was located in an isolated undeveloped hillside district subject to permafrost, ice lenses, and deep frost zones. New access roads, internal circulation roads, and new utility corridors were designed for the school and associated school facilities.

Valley View Subdivision, Storm Water Pumping Station, Chatsworth, California: Project manager and lead engineer for the design of all utility and drainage improvements associated with the construction of a 450-unit residential subdivision beyond the Los Angeles County Flood Control District collection boundary. Work included design to the standards of the Los Angeles County Flood Control District of a storm water pumping station capable of pumping 75-cfs from a storm water collection basin in series with a debris basin.

Eagle River Correctional Facility, Wastewater Pump Station and Treatment Plant, Eagle River, Alaska: Project engineer responsible for design of a wastewater pumping station and wastewater treatment plant to discharge untreated wastewater from the correctional facility wastewater wet well to a 0.5-mgd wastewater treatment plant. Pump station design incorporated explosion-proof design, three 20-HP submersible pumps, and a standby power system design for discharge to the treatment plant. The treatment plant consisted of primary and secondary treatment incorporating sediment tanks, clarifiers, and anaerobic digestors, in an active soil region beyond the secured site perimeter. The treatment plant required permitting from the Alaska Department of Fish and Game, Alaska Department of Wildlife, and the Corps of Engineers prior to discharge.

Water Garden Commercial Development, Los Angeles, California: Project manager for civil design and traffic control work associated with this 15-acre development bounded by three major arterial streets. Extensive roadway modifications with traffic control and stage construction were required to provide access to this site without disturbing the access points to adjacent properties. Approximately 0.5-mile of Colorado Boulevard, Olympic Avenue and 26th Street were evaluated for rehabilitation and restructuring to accommodate this project. Modifications included pavement grinding with associated asphalt overlay, roadway crown modifications, and structural section replacement.

Water Pumping Plant, Wasilla, Alaska: Project manager and principal engineer for design of a 200,000-gpd water pumping plant located on an isolated land-locked parcel. Project required coordination with the Alaska Department of Health and Alaska Department of Transportation. Project design included 12 miles of new roads, land use planing for surrounding properties, and evaluation of wetland mitigation zones and permafrost zones. The water system design incorporated drilling of three new water wells, hydrostatic well testing and development, and design of the water well house. The well house system consisted of four pressure vessels, bypass lines and valves, sediment tank and three-phase motor control center for pump and well controls. The system also included four submersible well pumps with discharge to a 100,000-gallon storage reservoir.

Omalley Bike Trail: Responsible for project management and construction management for an 8-mile class I bike trail and equestrian trail adjacent to Omalley Road, a class II arterial highway. Unique features included a freeway underpass using an arch culvert and an elevation rise of 1,500 vertical feet over the 8-mile trail segment. The bike and equestrian trails were designed for occasion cross-overs and also interfaced at roadway crossings. Right-of-way constraints for transit bus stops and highway access points were resolved through coordinated efforts with city agencies and private property owners.

Tudor Road Bike Trail: Responsible for project management of 6 miles of new bikeway construction, modification, and rehabilitation of existing trails along a major 6-lane expressway. Design features included conversion of the class II trails into class I trails and designing trail connections to other bikeways which helped complete numerous bikeway loops along this roadway. Connections were also provided to a streamway greenbelt and state park located in the vicinity of this bikeway. This bikeway was designed adjacent to primarily commercial business zones with landscaped features and rest stop areas added to enhance the trail. Design work included a stream crossing, retaining walls, and surcharge for a wetlands area.

Richard P Hamel

Air Quality Meteorologist / Technology Specialist

Years Experience: AECOM 4, professional 18

Technical Specialties

- Air Dispersion Modeling
  - AERMOD (including AERMET, AERMAP, and AERSURFACE)
  - Characterization of material handling, storage pile, and road emission sources common.
  - Litigation support modeling.

- Deposition Modeling
  - AERMOD
  - ISCST3

- Cooling Tower Modeling (SACTI)
- Meteorological Data Analysis
- Boundary later and convective meteorology

- Software Development
  - Proficient in several programming languages including FORTRAN, C++, HTML, jscript, ASP, and SQL
  - Database design and application architecture
  - Website design and development

Education

- B.S. (Computer Science) University of Lowell, Lowell, MA (1991)
- MS (Environmental Science - Atmospheric Science) University of Massachusetts at Lowell, Lowell, MA (2004)

Solar Power Projects

NextEra: Beacon Solar Energy Project, California City, California

Managed and performed air dispersion modeling with AERMOD in support of permitting effort for a 250 MW solar project near California City, CA. Tasks included:

- Managed modeling staff and aided in class-II modeling effort to demonstrate compliance with all applicable NAAQS and CAAQS, using the ozone limiting method (OLM) for determining NO2 impacts.
- Performed CEC required construction-phase modeling to demonstrate compliance with CAAQS.

- Developed responses to CEC Comments after performing additional modeling and research on issues raised by the agency. Aided in completed the formal written responses to these comments.

Inland Energy: Victorville and Palmdale Hybrid Power Projects, California.
Performed air dispersion modeling with AERMOD in support of permitting effort for two new hybrid solar/natural gas power plants. Tasks included:

- Development of on-site and airport meteorological data for used in the Class-II dispersion modeling and health risk assessment.
- Performed NAAQS, CAAQS, and PSD modeling to demonstrate compliance, using the ozone limiting method (OLM) for determining NO2 impacts.
- Determined PM10, PM2.5, and NO2 total impacts by developing database of hourly and daily backgrounds and matching modeled impacts with concurrent background values.
- Interacted with MDAQMD and AVAQMD staff to develop inventory cumulative modeling inventory and executed cumulative modeling for all criteria pollutants consistent with CARB policy.
- Created sources and performed AERMOD modeling for project construction per CARB rules.
- Developed AFC and PSD Permit Application for both projects.

Solar Millennium: Solar Energy Projects, Mojave Desert, California
Managing the class-II modeling effort for three separate solar projects located in the Mojave Desert. Tasks include:

- Selection of representative meteorological data for each of the three sites based on availability of data, proximity to project location, and similarity in surface characteristics to the project location.
- Development of modeling strategy to meet CEC's requirement to model construction emissions.
- Development of modeling protocol for all Class-II modeling requirements.
- Modeling visual effects of cooling tower plumes using the SACTI model.
- Delivery of final modeling report for inclusion in the Air Quality section of the Application for Construction (AFC).

Capital Permitting Power Projects

IPA: Coleto Creek, Fannin, Texas
Performed air dispersion modeling with AERMOD dispersion model in support of permitting effort for expansion of existing facility to add an additional coal fired boiler. Tasks included:

- Definition of source characteristics and emissions for combustion sources and fugitive sources including material handling, haul roads, and coal pile erosion.

- Facility-wide dispersion modeling using AERMOD to demonstrate compliance with the NAAQS and PSD increment.
- Texas ESL (Effects Screening Levels) modeling for non-criteria pollutants.
- Cumulative SO2 modeling using AERMOD including off-site major emissions sources within 50 kilometers of project site. Included permit review of existing and permitted but not yet constructed sources in TCEQ's permit database.
- Supported litigation team during contested hearing regarding the draft permit issued by TCEQ.

Entergy: White Bluff Pollution Control Project, Redfield, Arkansas

Performed air dispersion modeling with AERMOD dispersion model in support of permitting effort for FGD scrubber retrofit for two coal fired boilers. Tasks included:

- Definition of source characteristics and emissions for combustion sources and fugitive sources including material handling, haul roads, coal pile erosion, and land fill traffic.
- Development of meteorological data set using AERMET and AERSURFACE pre-processors for AERMOD.
- Facility-wide dispersion modeling using AERMOD to demonstrate compliance with the NAAQS.
- Currently involved in post-application support and response to agency comments.

Ethanol Projects

Hawkeye Renewables" Menlo, Iowa and Shell Rock, Iowa

Performed air dispersion modeling with USEPA's AERMOD dispersion model in support of permitting effort for two new 115 million gallon per year ethanol producing facilities. Worked with Iowa Department of Natural Resources to develop air modeling report for permitting process.

Other

Valero Refining Company: Benicia Refinery, Benicia, California

Developed two sets of on-site meteorological data for use in air dispersion modeling to support site expansion. Assisted in visibile plume modeling and analysis for the site.

Southern California Edison: Five Locations in Los Angeles Area.

Set up and performed air dispersion modeling at five candidate peaker-station locations in the greater Los Angeles area using ISCST3 for general operation and construction periods. Created modeling reports for each site.

International Paper: Boiler MACT, six lumber mills in Southeastern United States.

Performed air dispersion modeling using ISCST3 and developed Health-Based Compliance Alternative documentation for six lumber mills in the Southeastern United States. Corresponded extensively with NC and SC Departments of Environmental and Natural Resources. Developed extranet website to centralize all documentation and modeling information for client.

Angie Harbin-Ireland
Senior Biologist + Project Manager

Education
M.S., Conservation Ecology, University of California, Davis, 2004
Habitat Evaluation Procedures Certification, Virginia Polytechnic Institute and State University, Blacksburg, 2002
B.S., Wildlife, Fish, and Conservation Biology, University of California, Davis, 1998

Accreditation
Recovery Permit # TE-094845-0 for California Tiger Salamander
PADI Divemaster #240135
American Association of Underwater Scientists

Affiliations
Member, The Wildlife Society, Western Section
Member, Raptor Research Foundation
Member, Estuarine Research Federation
Member, Association of Environmental Professionals

Specialized Training
2002 CEQA Basics, Grassetti Environmental Consulting
2002 Legal and Regulatory Foundation for Managing Aquatic Ecosystems, UC Berkeley Extension
2003 California Tiger Salamander Workshop, Western Section of the Wildlife Society
2003 California Burrowing Owl Symposium, Western Section of the Wildlife Society
2003 Endangered Species Act and Habitat Conservation Planning, CLE International
2005 Spring CEQA Update, Association of Environmental Professionals
2006 Endangered Species Act, CLE International
2007 Alameda Whipsnake Workshop, Alameda County Conservation Partnership

Publications + Technical Papers
Diablo Firesafe Council Best Management Practices Development. Contra Costa County, California. October 2008.
Federal Biological Assessment For The Creekside Memorial Park. Corrie Development Corporation. Contra Costa County, California. June 2008.
CCWD Canal Replacement Project ASIP. Contra Costa County. March 2007.
East Cypress Corridor Property Owners Project Description and Application for USACE Individual Permit. Oakley, California. May, 2006.
East Cypress Corridor Specific Plan Draft EIR. Chapter 3.5 - Biological Resources. Oakley, California. August, 2005.
Biological Assessment and Preliminary Jurisdictional Determination for the Proposed Yountville Inn Expansion Project, Yountville, Napa County, California. July, 2005.
Effects of Oyster Mariculture on the Benthic Invertebrate Community in Drakes Estero, Point Reyes National Seashore, California, Master's Thesis, University of California, Davis. 2004.
Cypress Grove Project - Swainson's Hawk Foraging Habitat Analysis. March 2003.
Potential Changes in Avian Community Composition with Conversion of Oak Woodlands to a Residential Development at the Proposed Franklin Canyon Project Site, Hercules, Contra Costa County, California. October 2002.
Rejmankova, Eliska, Angelique Harbin-Ireland, and Michele Lege. “Bacterial abundance in larval habitats of four species of Anopheles (Diptera: Culicidae) in Belize, Central America.” Journal of Vector Ecology, December 2000

Angie Harbin-Ireland is a senior biologist with AECOM. She has worked on multiple biological resource projects of various scale within in California as a technical specialist and project manager for natural resource studies, CEQA and NEPA review, regulatory permitting, and mitigation planning. She draws upon her broad experience in regulatory permitting, wetlands, wildlife, and conservation ecology to develop feasible and collaborative solutions to complex land use planning issues. She has extensive knowledge of the listed species and protected habitat types in the state of California as well as local natural resource protection policies.

Angie has over ten years of experience in conducting habitat assessments and surveys for special-status species such as the California red-legged frog, western burrowing owl, Swainson's hawk, California tiger salamander (for which she holds a U.S. Fish and Wildlife Service recovery permit), peregrine falcon,

spotted owl, giant garter snake, Alameda whipsnake, and San Joaquin kit fox. She has extensive experience in sampling of wetland, marine, and intertidal and sub tidal invertebrate communities. She has 12 years of experience with raptor field study and identification, having conducted long-term raptor population and behavioral studies, including extensive field work.

Angie has overseen the development of several resource management and mitigation and monitoring plans, managed western burrowing owl passive relocation efforts, and California tiger salamander salvage, including installation of pitfall traps and relocation of the salamanders to mitigation sites. She integrates her biological understanding with regulatory compliance, submittals, and agency negotiations for species including California tiger salamander, California red-legged frog, San Joaquin kit fox, western burrowing owl, Alameda whipsnake, vernal pool fairy shrimp, giant garter snake, fisheries, salt marsh harvest mouse, California clapper rail, California freshwater shrimp, California least tern, brown pelican, desert tortoise, Mojave fringe toed lizard, and rare plants. In preparing the biological resources sections of program and project-level CEQA and NEPA documents, she is involved in local, state, and federal agency biological resource impact evaluations, coordination, planning, and presentations at public meetings. She coordinates with contractors, engineers, and agencies on construction projects regarding natural resources and permit compliance.

Project Experience

Solar Millennium, Blythe/Palen/Ridgecrest Application for Certification and Engineering Support, California

AECOM has been retained by Solar Millennium, LLC to provide permitting and engineering support services for three proposed solar thermal power projects in Southern California. Each project ranges from approximately 250 to 1,000 MW. AECOM assisted Solar Millennium in submitting AFCs to the CEC for each of the three projects, including responding to data requests. The projects will be developed on federal land managed by the U.S. Bureau of Land Management (BLM), which is the lead federal agency for permitting purposes. The three projects have been identified as “fast track” projects by the BLM, and are being permitted on an expedited timeline in order to be eligible for stimulus funding.

In support of the projects, AECOM has performed required field surveys including natural resource surveys and is supporting Solar Millennium in providing related documentation and regulatory agency submittals, as well as resolving technical and regulatory agency issues pertaining to endangered species and cultural resources. AECOM is also supporting environmental analyses in the other resource areas, such as air quality and public health modeling of construction and operation emissions and permitting, visual simulations, groundwater modeling, socioeconomic IMPLAN modeling, waste management, worker safety, etc.

As elements of the licensing and engineering scope, AECOM is also managing geotechnical and groundwater development investigations, developing the projects' civil design basis, and providing engineering support for substation and transmission line design. The projects will be instrumental in fulfilling Governor Schwarzenegger’s executive order to California utilities to obtain 33 percent of electrical energy from renewable resources by 2020. Angie has been assisting with project mitigation planning for sensitive resources, leading authoriship of the Habitat Mitigation and Monitoritng Plans. She has also assisted with CEC data responses and coordinating field survey efforts.

PV Solar Project, Weldon, Kern County, CA
AECOM conducted site reconnaissance surveys and habitat mapping for three parcels in eastern Kern County to assess constraints and opportunities for proposed photovoltaic solar developments by Renewable Resources Group.

Vegetation communities, potential federal and state jurisdictional wetlands, and potential habitats for sensitive species occurring in the region were evaluated. Habitats evaluated include rabbit brush scrub, irrigated pasture, non-native annual grassland, and wetland areas. AECOM is working with the client to develop a constraints based site plan based on regulated biological and cultural resources. Technical reports are being provided to support the County's CEQA evaluation for the proposed project. Angie is the lead biologist.

PV Solar Project, Rosamond, Kern County, CA
AECOM conducted site reconnaissance surveys and habitat mapping for approximately 5,000 acres in the Antelope Valley to assess constraints and opportunities for proposed photovoltaic solar developments by Renewable Resources Group. Vegetation communities, potential federal and state jurisdictional wetlands, and potential habitats for sensitive species occurring in the region were evaluated. Habitats evaluated include various scrub habitats and agricultural uses. AECOM is working with the client to develop a constraints based site plan based on regulated biological and cultural resources and has conducted focused surveys for rare plants and desert tortoise. Technical reports are being provided to support the County's CEQA evaluation for the proposed project. Angie is the lead biologist.

Yerba Buena Island Ramps Improvement Project, CA
For the proposed freeway ramp improvement project on Yerba Buena Island, Angie and her colleagues are assisting the City of San Francisco and Transportation Authority with the environmental review process to secure NEPA compliance. As lead biologist, Angie led the biological surveys, impact analysis, reporting, and mitigation planning effort for the various ramp design alternatives. The project site is located on an island in San Francisco Bay therefore sensitive biological resources that are being evaluated include marine mammals, waterbirds such as brown pelican and double-crested cormorant, fisheries, and peregrine falcon. She and her team are completing a comprehensive Natural Environment Study for approval by CalTrans.

Robert Louis Stevenson and Surrounding Lands Interim Management Plan, Napa/Sonoma County, CA
AECOM is preparing an Interim Management Plan for the Land Trust of Napa County consisting of baseline conditions of 12,000 acres of diverse terrain at the north end of the Napa Valley form a continuous open space assemblage, setting forth an array of management and operations options for the assemblage to be implemented over time. The interim plan will allow for transfer of the lands from the Trust to a permanent ownership and management entity that will serve to implement long term planning and design initiatives. Angie is serving as lead biologist.

County of Marin Bridge Maintenance Program, Marin County, CA
The County of Marin has 64 bridges throughout the County which are inspected every year by CalTrans. Upon inspection in 2005, CalTrans concluded that severe weather over the past twenty years had caused substructure and superstructure damage to a total of 38 bridges. Ms. Harbin-Ireland and the project team worked with the County of Marin and Harris Associates to identify those bridges which needed immediate repair, and to prepare a Biological Assessment, a wetland delineation and jurisdictional determination, permit applications, a detailed project description, and a Mitigated Negative Declaration under the California Environmental Quality Act. In an extremely short period of time, the project team was able to coordinate a site visit and receive all the necessary permitting documentation from four separate agencies, including a Biological Opinion from the NOAA Fisheries, for the emergency repair of one of the bridges. As lead biologist, Angie oversaw the biological and wetlands assessment work

and development of special-status species avoidance measures.

Santa Clara Valley Water District Habitat Assessment for California Red-Legged Frog, CA
AECOM conducted a protocol-level Site Assessment for the California red-legged frog *(Rana aurora draytonii)*, federally listed threatened, and a California Species of Special Concern, along five creeks managed by the Santa Clara Valley Water District in Santa Clara County. U.S. Fish and Wildlife Service protocols were implemented to evaluate potential aquatic, breeding, and dispersal habitats on site and within five miles of the study areas. The habitat assessment was conducted using aerial photos and field surveys. Data from the habitat assessment was analyzed using a GIS platform, and stream reaches and pond features were evaluated for suitability and quality by modeling various criteria, consistent with the California red-legged frog Primary Constituent Elements as described by the USFWS in the critical habitat designation. The quality of aquatic breeding and non-breeding habitat was evaluated and found to vary due to the presence of predatory species, physical limitations of the habitat, and connectivity to known occurrences or other potentially suitable habitat locations. An evaluation of surrounding aquatic features, dispersal habitats, documented populations, and upland habitat suitability was completed for the regional vicinity of each study area. Additional survey recommendations were made for project activities in the five study areas based on the habitat suitability and regional habitat and population analysis. In her role as project manager and lead biologist, Angie oversaw development of the field methodology and implementation and provided guidance on the habitat analysis and production of the draft report.

East Cypress Corridor Property Owner and Contra Costa Water District Permitting and Mitigation Planning, Holland Tract, CA
As part of the regulatory permitting and agency approval process for the Contra Costa Canal Replacement project and the East Cypress Corridor Specific Plan development a comprehensive wetland and species mitigation solution was necessary to satisfy mitigation requirements for wetland and habitat impacts. AECOM worked collaboratively with the project proponents, local landowners, and Wildlands, Inc. to identify suitable off site properties which were evaluated for their preservation, habitat enhancement, and wetland creation potential. We coordinated the completion of multi-disciplinary constraints studies for biological and cultural resources, hydrology, geology, and hazardous materials for properties located on Holland Tract and west of Clifton Court Forebay.

Negotiations with the local Reclamation District, regulatory agencies, land owners, and various mineral rights and other easement holders were facilitated by AECOM. All constraints and opportunities were accounted for to achieve a feasible and acceptable wetland and species habitat creation plan and long-term management plan at Holland Tract, satisfying the mitigation needs for both project proponents. An operations and management plan was prepared for the potential preservation site near Byron which is a representation of rare alkali and vernal pool habitats in the region. Angie served as the project manager and lead biologist for these efforts for the Contra Costa Water District and East Cypress Corridor Developers.

Diablo Firesafe Council Best Management Practices Development, Contra Costa County, CA
AECOM worked with the Diablo Firesafe Council and U.S. Fish and Wildlife Service to develop a guidebook designed to familiarize land managers, homeowners, and communities in Contra Costa County with the most effective hazardous fuel treatment types suited for their landscapes. The guidebook also provides guidelines for protecting sensitive species and their habitats during implementation. Our guidelines take the form of best management practices, designed to streamline compliance with federal natural resource laws for small-

scale hazardous fuel treatment projects, and are intended as a useful resource for a variety of audiences implementing hazardous fuel treatment projects in the County. Angie served as the Project Manager and technical expert in developing BMP's for federally protected species.

Concord Naval Weapons Station Biological Surveys, Concord, CA
For the United States Navy, AECOM conducted surveys for federally listed vernal pool branchiopods, along with habitat mapping and nocturnal surveys for California tiger salamander prior to the reuse of the base. Approximately 2,500 acres of the reuse area was thoroughly surveyed for upland habitat elements including small mammal burrows which could be used by aestivating California tiger salamanders. Survey results were compiled into an extensive GIS database identifying concentrations of upland habitat, with special emphasis on habitat relative to potential breeding ponds. In addition, aquatic features with potential to support vernal pool branchiopods were identified and surveyed according to US Fish and Wildlife Service protocol. This information will be used for constraints-based planning of base reuse. Angie conducted nocturnal salamander surveys and provided guidance on habitat survey methodology, design, and constraints analysis strategy.

East Dublin Specific Plan and Supplemental EIR, City of Dublin, CA
AECOM conducted comprehensive biological resource studies and analyses for approximately 1,100 acre project site for the City of Dublin. The project involved several landowners and a host of resource, engineering, CEQA, and permitting issues. We created GIS biological resource constraints layers, coordinated with city and stakeholders to achieve constraints-based planning, prepared Mitigation and Monitoring Plans, and designed mitigation features. The team conducted focused surveys for rare species including California tiger salamander, California red-legged frog, western burrowing owl, and vernal pool and special-status wildlife and rare plant species. We consulted with the USACE, USFWS, NOAA Fisheries, RWQCB, and the CDFG. Angie conducted habitat assessments and focused surveys for rare species including California tiger salamander, California red-legged frog, western burrowing owl, San Joaquin kit fox, and rare plant species. Surveys determined that California tiger salamander, California red-legged frog, and western burrowing owl inhabited the site. She observed all California tiger salamander life history stages and observed adult California red-legged frog on site.

Contra Costa Water District Canal Replacement Project, Oakley, CA
For the approximate 4-mile long Contra Costa Canal Replacement project, Angie coordinated the assessment of potentially occurring special-status plant and wildlife species and all necessary focused follow-up surveys for the Contra Costa Water District. She has conducted an evaluation of the suitability and quality of existing on-site habitats and is one of the lead authors for the project Action Specific Implementation Plan (ASIP) being completed in compliance with the CalFed Multi Species Conservation Strategy. As part of the ASIP process she has identified potential project effects on listed species and NCCP habitats and negotiated appropriate avoidance and mitigation measures with the USACE, Bureau of Reclamation, CDFG, and USFWS. She assisted in coordinating the wetland and species mitigation planning efforts with the agencies and other stakeholders.

CCWD On-Call Biological Services, Contra Costa County
AECOM conducted biological surveys and habitat assessments for sensitive resources within Contra Costa Water District (CCWD) lands as needed. Typical tasks included pre-construction surveys prior to standard operations and maintenance activities, agency coordination, and burrowing owl relocation.

Angie served as the main point of contact and project manager for this work.

On-Call Biological Services, Contra Costa County, CA
AECOM conducted third party peer reviews of various biological resource evaluations and surveys on behalf of Contra Costa County. Site visits to review conditions were conducted and reports and memos provided of results and additional recommendations for CEQA and regulatory compliance as needed. Angie served as the main point of contact and project manager for this work.

Marin County Department of Public Works Drainage Culverts Clearing, Marin County, CA
AECOM assisted the Marin County Department of Public Works with biological resource evaluations for the maintenance and upgrading of forty-nine drainage culverts and portions of associated drainages along a linear corridor in western Marin County. A biological resources assessment of the study corridor was conducted to assess the potential for the occurrence of special-status plant or animal species, and sensitive vegetation communities within the areas to be affected by the project. In addition to the biological resources assessment, biologists conducted a formal wetland delineation and jurisdictional determination to identify the extent of waters of the U.S. falling under the jurisdiction of the U.S. Army Corps of Engineers within each of the project work areas. Also identified were potential waters of the State of California, which fell under the jurisdiction of the California Department of Fish and Game and/or the Regional Water Quality Control Board. As a biologist, Angie provided an analysis of impacts to regulated resources, recommendations for avoidance and minimization of impacts to sensitive biological resources, and pre-permit application agency coordination.

Vaquero Farms Mitigation Planning, Brentwood, CA
The project team led the mitigation planning effort for the Vineyards at Marsh Creek Development Project at the 936-acre Vaquero Farms mitigation site for Blackhawk Services & Nunn. Mitigation implementation included creation of five wetlands totaling 1.6 acres created for the benefit of California tiger salamander and California red-legged frog and occurred in occupied California red-legged frog and western burrowing owl habitat. The construction work required careful consideration for protection of these sensitive species including full-time construction monitoring and multiple protective measures to prevent take from occurring. As project manager, Angie oversaw and conducted protocol-level surveys and impact analyses for special-status species including California tiger salamander (adults and larvae observed), vernal pool crustaceans, western burrowing owl, California red-legged frog, rare plants, and San Joaquin kit fox. In addition, she performed pre-construction surveys for Swainson’s hawk, California red-legged frog, western pond turtle, special-status bats, San Joaquin kit fox, and western burrowing owl. Further, Angie conducted burrowing owl passive relocation and created a Salvage Plan for California tiger salamander eggs and larvae. In addition, she provided on-site environmental compliance monitoring inspections of erosion, undesired water-ponding, exclusion fencing, construction fencing, contractor education, and construction activities. This project is on-going with respect to monitoring of California red-legged frog and California tiger salamander populations at the Vaquero Farms mitigation site. Observed all California red-legged frog life stages at the mitigation site. No California red-legged frogs have been observed at the project site during focused surveys. California tiger salamander larvae have been observed at the mitigation site.

Adobe Creek Upper Reach Restoration, Los Altos Hills, CA
Angie and the project team conducted tree surveys, biological and botanical assessments,

as well as prepared a biological resources report, impact analysis, and preliminary wetland jurisdictional determination for the approximate 1,100-linear foot Upper Reach of Adobe Creek in Los Altos and the Los Altos Hills, Santa Clara County, for the Santa Clara Valley Water District. The project team developed a Preservation Plan intended to improve the Adobe Creek ecosystem via the replacement of the concrete channel protection using minimal hardscape, sediment removal, and bank stabilization. The Adobe Creek Upper Reach 5 Restoration Project will address the severe erosion problems and narrow channel cross sections of this portion of the creek incorporating stakeholder selected preferred alternatives. As project manager and lead biologist, Angie oversaw the completion of biological studies, coordinated with District planners and biologists, analyzed potential impacts to biological resources for each alternative, and provided review and oversight of completion of the wetland delineation, tree report, and Biological Resources Report. Key issues include flood protection, creek channel improvement, channel bottom and bank erosion repair, and tree protection.

Santa Clara Valley Water District Stream Maintenance Program Biological Monitoring
As part of the permit conditions for routine stream maintenance, Angie conducted pre-construction surveys and monitoring during vegetation clearing, sediment removal, and tide gate replacement activities. Specific duties included contractor education, surveying for California clapper rail and salt marsh harvest mouse prior to and during clearing work , ensuring permit compliance, coordination with permitted District biologists, and stopping work as needed for protection of the species.

Burrowing Owl Habitat Assessment and Mapping, Santa Clara County, CA
AECOMconducted a habitat assessment, burrow mapping study, and standardized protocol surveys in multiple seasons for western burrowing owl (*Athene cunicularia hypugaea*), a California Species of Special Concern, along sections of approximately 45 miles of waterways in 18 watersheds managed by the Santa Clara Valley Water District (District). This study was designed to comply with the District’s Biodiversity Monitoring Plan, which is a Best Management Practice incorporated into the District’s Stream Maintenance Program (SMP). In the first phase of the project, we conducted a habitat assessment using GIS and field surveys. In the second phase, we documented and mapped burrow concentrations suitable for western burrowing owl occupation. The final phase included focused burring owl surveys conducted according to California Department of Fish and Game approved protocols. In her role as project manager, Angie participated in the development of the survey and mapping protocol in coordination with the District and our biology and GIS team. In addition, Angie participated in protocol surveys for phases two and three of the project.

Downtown Roseville Specific Plan and EIR, Roseville, CA
For the Downtown Roseville Specific Plan and Environmental Impact Report (EIR) in Roseville, Placer County, Angie and the team provided a host of biological consulting services focusing on the Dry Creek riparian corridor, including a review of environmental documentation, aerial photographs, and natural resource databases, a preliminary assessment of potential occurrence of special-status plant and wildlife species, an evaluation of the constraints and opportunities posed by existing on-site habitats, the preparation of a CEQA-ready technical report describing the biological resources found in the area, and an evaluation of the permitting implications. Angie led the project’s team analysis of biological constraints and restoration opportunities for Dry Creek which is being incorporated into the Specific Plan design. She has also drafted program-level mitigation and avoidance measures which address the goals of the Roseville General Plan, the Dry Creek Watershed Coordinated Resource Management

Plan, regulatory agencies, and local conservancy groups for incorporation into the EIR. She is continuing to participate in public outreach as part of the Specific Plan process.

Dutch Slough Community Park and Master Plan, Oakley, CA
Angie and her colleagues provided ecological planning services for the development of a Conceptual Master Plan for the Dutch Slough Community Park as well as public access to Dutch Slough in Oakley. They assisted 2M Associates with the conceptual design of formal educational and interpretive signage that enriches the public's experience and understanding of their environment, builds community, and enhances civic involvement. Angie and the planning team conducted an extensive opportunities and constraints analysis for selecting environmentally appropriate locations for future recreational uses, facilities, parking, boat access, and signage sites. Ms. Harbin-Ireland coordinated with the relevant agencies including the City of Oakley, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, Regional Water Quality Control Board, NOAA Fisheries, and the California Department of Fish and Game, regarding the project design, anticipated impacts, CEQA and permitting requirements.

The Conceptual Master Plan balances public use and accessibility without negatively affecting the conservation of the diverse plant and wildlife communities that contribute to the long-term functioning of the San Francisco Bay Delta. Community workshops were facilitated to build consensus among the different stakeholders.

Lafayette Community Center Spanning Pedestrian Bridge and Bioengineering Project, Lafayette, CA
Angie worked with the City of Lafayette to obtain regulatory agency approval for the installation of a clear spanning pedestrian bridge across Las Trampas Creek to connect the Lafayette Community Center with a stretch of open space trail running along the Lafayette Community Park. With the assistance of the project team, Angie conducted a biological assessment and jurisdictional determination for the less than 0.1-acre project area, and prepared permit applications and revegetation plans for the bank stabilization of bridge installation sites. She successfully negotiated mitigation measures in coordination with the California Department of Fish and Game, Regional Water Quality Control Board, U.S. Army Corps of Engineers, and the U.S. Fish and Wildlife Service to avoid impacts to special-status species and compensate for habitat disturbance. Ms. Harbin-Ireland also conducted pre-construction surveys and contractor education for special-status species likely to occur on site, including California red-legged frog, western pond turtle, and foothill yellow-legged frog, to avoid potential impacts to these species during construction.

Aetna Springs Historical Resort, Napa County, CA
As project manager and lead biologist, Angie led the evaluation of potential biological constraints to development of the approximate 675-acre Aetna Springs property for Build, Inc. The project team's areas of focus included the historic resort core area and associated infrastructure, potential home sites, an existing golf course, Swartz Creek and Aetna Creek, as well as four on-line (i.e. built on a jurisdictional drainage) man-made lakes and drainages. Ms. Harbin-Ireland presented the project team's findings to the potential buyer/developer of the property. Angie prepared the constraints analysis that included an assessment of potential California red-legged frog habitat, which are known to occur upstream in Swartz Creek.

Golftec Development Group Project, Dublin Canyon, CA
Angie led the project team in the botanical survey for special-status plant species on a 325-acre Dublin Canyon study in Alameda County for T.W. Starkweather. Although 64 special-

status plant species were thought to occur on the site, the project team conducted a reconnaissance-level survey and focused rare plant surveys to determine that no federally or state-listed endangered or threatened species actually occurred on the site. They also conducted a wetland delineation and preliminary jurisdictional determination, completed a CEQA ready biological resources assessment report, and is currently conducting focused protocol-level surveys for California red-legged frog.

Front Street Repair and San Ramon Creek Bank Stabilization, Danville, CA
The Town of Danville received funding from the Federal Emergency Management Agency to repair two creek bank failures along San Ramon Creek in downtown Danville. AECOM biologists conducted USFWS-protocol level surveys for California red-legged frog, a wetland delineation, and biological resources assessment. Our restorationists also prepared a Revegetation and Monitoring Plan. A detailed permit application package was created and coordinated efforts to garner approvals from USACE, RWQCB, CDFG, FEMA, and USFWS. In addition to permit approvals an Initial Study/Mitigated Negative Declaration in compliance with CEQA was prepared and certified for the project. Angie participated in focused surveys for California red-legged frog and Western pond turtle. AECOM was a member of the ENGEO, Inc. team.

Kawar Biological Surveys, Contra Costa County, CA
Angie led the biological surveys for the 785-acre Kawar Project in Tassajara Valley for Andersen & Bonnifield. The project team completed a jurisdictional wetland delineation with mapping, biological assessment, and late spring season botanical survey. A protocol-level site assessment and focused surveys for California red-legged frog was completed. Protocol-level burrowing owl surveys, a San Joaquin kit fox Early Evaluation, and a tree survey is in progress. The project team participated in constraints based site planning and is also completing the biological resources portion of the project CEQA document. Angie conducted Early Evaluation and tracking study for San Joaquin kit fox. Further, she observed California red-legged frog adults and California tiger salamander larvae in aquatic features on site.

Prewett Ranch Habitat Evaluation, Brentwood, CA
Angie oversaw and coordinated the completion of on-site habitat evaluations of special-status plant and animal species, as well as determining the presence/absence of sensitive natural communities for a CEQA-ready technical report on Suncrest Homes’ 112-acre Prewett Ranch located southeast of the Lone Tree Way and O’Hara Drive intersection. She is supervising the on-going monitoring of a successful burrowing owl relocation effort and completion of pre-construction surveys for nesting birds, roosting bats, and western pond turtle. A certified arborist report and burrowing owl focused surveys were completed as part of the biological resources survey work. The reports have been utilized by CEQA planners to support the biological resources section of a Mitigated Negative Declaration.

Creekside Memorial Park Project, Contra Costa County, CA
For the Creekside Memorial Park Project, AECOM conducted all sensitvie biological resource studies according to accepted agency protocols including a wetland delineation, rare plant surveys, burrowing owl and nesting raptor surveys, focused amphibian surveys, and a San Joaquin kit fox Early Evaluation. Biologists also completed a habitat assessment for vernal pool fairy shrimp. Based on the findings of habitat assessments and surveys, we assisted the land planners and engineers with developing a constraints based site plan for Corrie Development Corporation that avoids and preserves the most sensitive resources on site.

As part of the CEQA review process, AECOM evaluated mitigation options for rare plant

populations present on site, providing input on the riparian planting and landscaping plans, and preparing the Biological Resources section of the draft EIR for the County’s use. We drafted a Biological Assessment in accordance with requirements of the U.S. Fish and Wildlife Service (USFWS) and has engaged the Service in informal consultation regarding project affects on listed species and acceptable mitigations through site tours and correspondence. As project manager and lead biologist, Angie conducted a U.S. Fish and Wildlife Service protocol-level site assessment and focused surveys for the California red-legged frog and an Early Evaluation for San Joaquin kit fox. Further, Angie observed California red-legged frog adults and California tiger salamander larvae in aquatic features on site.

Juliana Vineyards, Napa County, CA
In her role as project manager and lead biologist, Angie conducted a U.S. Fish and Wildlife Service protocol-level site assessment and focused surveys for the California red-legged frog for the 66.31-acre portion of the Juliana Vineyards property in Napa County. As part of the County's environmental review process, Angie assisted owners Riechers Spence with the evaluation of potential effects of a road and housing development on California red-legged frog habitat. She conducted a U.S. Fish and Wildlife Service protocol-level site assessment and focused surveys for the California red-legged frog. Reservoirs on site were heavily populated by bull frogs. She assisted owners with the evaluation of potential effects of a road and housing development on potential California red-legged frog habitat. Reservoirs on site were heavily populated by bull frogs that were observed during focused surveys.

Silverado Trail Biological and Permitting Services, Calistoga, CA
Angie, who served as project manager, and her colleagues provided biological, permitting, and mitigation monitoring services for the Curtis Helmer property on Silverado Trail. The project team conducted a formal wetland delineation and preliminary jurisdictional determination, reconnaissance-level site visit, focused botanical surveys, and pre-construction surveys for nesting birds and special-status bat species, and developed avoidance measures for western pond turtle. Upon completion of the surveys, the project team prepared California Environmental Quality Act (CEQA) ready technical reports summarizing the results and methods employed, as well as assisted with the City of Calistoga's preparation of the CEQA document. The Helmer property holds an abandoned wetland that was originally created by the City for treatment of re-used water. The pond subsequently became habitat for the western pond turtle. The project team analyzed the hydrologic regime of the on-site watershed in order to prepare the Mitigation and Monitoring Plan for the on-site drainage and to protect the created pond's hydrology.

Fisher Property Biological Assessment, Napa County, CA
As wildlife biologist, Angie conducted a biological assessment for the 1,200-acre Fisher Property in accordance with the requirements outlined in the Napa County Biology/Botany Resource Surveys and Reports for Riechers Spence. The Area of Potential Effect (APE) was delineated to determine the potential for the occurrence of special-status species. The assessment included the analysis of the Napa County Biological Sensitivity Maps maintained by the Napa County Conservation, Development, and Planning Department.

Metcalf Road Residential Development Permitting and Mitigation Planning, San Jose, CA
Angie led permitting and mitigation planning on a large San Jose residential development project for KB Home that included 213 residential units, open space, wetland enhancement, and habitat conservation areas. The Bay checkerspot butterfly, California tiger salamander, California red-legged frog,

western burrowing owl, and other special-status species inhabit this 260-acre site. The project team conducted focused surveys, mapped plant and animal populations, prepared a Mitigation and Monitoring Plan, designed mitigation features including wetland habitat and other wildlife enhancement features, and oversaw the construction of mitigation areas and the translocation of California tiger salamanders, western burrowing owls, and California red-legged frogs to the mitigation area as needed. The project team negotiated with U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, Regional Water Quality Control Board, California Department of Fish and Game, and the City of San Jose to ensure in-perpetuity conservation of 200 acres of open space, including habitat for several special-status species. Angie and her colleagues worked with the City and the Regional Water Quality Control Board to plan Best Management Practices to fully address water quality concerns. Other issues included serpentine soils preservation, wetland mitigation, habitat interfaces, and wildlife corridor movement. Angie conducted and lead habitat assessments and pre-construction surveys for the California tiger salamander, California red-legged frog, western burrowing owl, and other special-status species.

Cypress Grove Biological Resource Assessment and Permitting, Oakley, CA
For D.R. Horton's Cypress Grove Residential Development, Angie and her colleagues conducted a formal wetland delineation, impact analysis, mitigation scoping, biological assessment, Essential Fish Habitat assessment, special-status plant surveys, and focused wildlife surveys for special-status species such as the western burrowing owl, silvery legless lizard, giant garter snake, Swainson's hawk, and Valley elderberry longhorn beetle. Angie completed an analysis of foraging habitats available to nesting Swainson's hawk in the region which has been utilized by the City to determine the significance level of development project impacts to Swainson's hawk foraging habitat in the Oakley area. The project team secured permits from the U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, California Department of Fish and Game, NOAA Fisheries, and the Contra Costa Water Department to reduce and/or mitigate impacts to special-status species. The AECOM team prepared the draft California Environmental Quality Act text, which was directly incorporated into the City's Environmental Impact Report. Ms. Harbin-Ireland and her colleagues conducted all pre-construction surveys for sensitive species and environmental compliance monitoring during construction in accordance with project permits. Prior to construction passive relocation of burrowing owls was completed and on-going monitoring required. A white-tailed kite nest and swallow nests were found on site which required protection and monitoring during construction. Ms. Harbin-Ireland was responsible for oversight of avian protection measures.

California Tiger Salamander Surveys, Gilroy, CA
For the 23-acre study area located in an orchard and open grassland habitats, AECOM biologists conducted extensive surveys for California tiger salamander. Several hundred burrows were viewed using a fiber optic scope to assess the presence or absence of adults and/or juveniles. The biology team determined through an exhaustive scoping and excavation effort that juveniles were utilizing the site as upland aestivation habitat. The presence of an AECOM biologist with a USFWS recovery permit was required for the surveys. Angie filled this role and provided technical oversight to the project for Llagas Creek Investors.

Sunnyvale East and West Channels Baseline Biological Report, Sunnyvale, CA
AECOM conducted a reconnaissance-level evaluation of the proposed Sunnyvale East and West channel flood protection project for the Santa Clara Valley Water District. The study area included the channelized waterways as well as Pond A4 in the South San Francisco

Bay. The AECOM biology team mapped vegetation communities including salt marsh and brackish marsh and delineated aquatic and terrestrial habitats. An evaluation of the suitability of the study area to support special-status species such as California clapper rail, salt marsh harvest mouse, western snowy plover, and burrowing owl, among others, was completed. Recommendations for further biological studies to identify site constraints and inform project plans were provided to the District. Angie provided technical oversight and senior review to the biology team.

Lower Guadalupe Pre-Construction Surveys and Monitoring, San Jose, CA
Prior to construction of capital improvements on the Guadalupe River between the San Jose International airport and downtown San Jose, Angie coordinated with the Santa Clara Valley Water District, engineers, and contractors regarding permit conditions and protection requirements for biological resources. She led the pre-construction surveys completed by the biology team and follow-up monitoring of active bird nests. Angie provided guidance to the project construction team regarding adequate protections, agency coordination, and creative solutions to allow construction to move forward where feasible.

Westshore Marina, Point Richmond, CA
At the request of Toll Brothers, Angie conducted a reconnaissance-level biological assessment and jurisdictional delineation for the approximate 6-acre Westshore Marina property. The project site is located at the terminus of Marina Way on the Richmond Inner Harbor Channel. An evaluation of potential project impacts was included in the report as well as suggested minimization measures. The biological report was utilized in support of the City’s environmental review process. Angie served as project manager.

General Mills Due Diligence, Vallejo, CA
Angie was the project manager for the evaluation of the potential biological constraints to development of the 38-acre General Mills property located on Mare Island Strait for Brooks Street. The subject property is the former site of the General Mills Plant. She evaluated the potential for occurrence of special-status species and identified sensitive habitats on site. An outline of the necessary biological studies needed for the CEQA and regulatory agency permitting process was developed as well as a preliminary analysis of site constraints, potential impacts associated with various site plan alternatives, and a possible permitting strategy. Biological site constraints included wetlands and potential monarch and Callipe Silverspot butterfly habitat.

Aptos Transmission Line Relocation, Santa Cruz County, CA
The Santa Cruz Sanitation District proposes to install an approximate 3-mile sewer transmission line and facilities to replace failing facilities in the County of Santa Cruz. The project, represented by Harris & Associates, is located within the Coastal Zone and is within the jurisdiction of California State Parks, the City of Capitola, the unincorporated Town of Aptos, and Santa Cruz County. AECOM prepared a wetland delineation, biological resources assessment, and frac-out contingency plan for approval by regulatory agencies to allow jack-and-boring underneath Aptos Creek. As lead biologist, Angie oversaw the biological studies, impact analyses, and development of adequate mitigation measures to protect sensitive biological resources near the project area including steelhead and tidewater goby. We also prepared an IS/MND pursuant to CEQA and a comprehensive permit application package to USACE, RWQCB, CDFG, USFWS, and NMFS.

Soquel Creek Lagoon Biofiltration Wetland Project, Capitola, CA
Working with Harris & Associates, AECOM provided biological and permitting consultation for the City of Capitola's proposed biofiltration project on Soquel Creek. The City of Capitola provides a swimming lagoon in Soquel Creek by berming the mouth of Soquel Creek for residents and

visitors every year beginning Memorial Day to be maintained for the rest of the summer. However, the manmade lagoon has been riddled with a host of water quality concerns mostly as a result of gulls and has experienced regular beach closures. We worked with the project engineers, the City of Capitola, and the regulatory agencies to develop and construct a biofiltration wetland to improve water quality. Soquel Creek and the lagoon provide habitat for steelhead and historically for tidewater goby. While improved water quality will benefit listed species as well as people using the lagoon for swimming, species' concerns were addressed through careful design and planning considerations to allow this biofiltration unit to be permitted and constructed by the regulatory agencies. As lead biologist, Angie coordinated the biological team and provided senior review and oversight of all technical reporting and construction monitoring.

Proposed Department of Veterans Affairs Facilities at Alameda Point, Alameda, CA
AECOM was contracted by the U.S. Department of Veterans Affairs to conduct a Biological Resources Report, formal wetland delineation, botanical surveys, and Biological Assessment for the approximate 579-acre parcel, located at the former Naval Air Station (NAS), Alameda Point, Alameda, California. The site is situated on a peninsula within San Francisco Bay. Ms. Harbin-Ireland and her team conducted back ground literature reviews and field surveys to delineate the extent of sensitive resources to inform the proposed project design and prepare environmental review documentation. EDAW is working with the client and the USFWS to ensure protection of a federally listed bird that nests on site, the California least tern. Other sensitive resources being evaluated include aquatic habitats, rare plants, waterbirds, shorebirds, marine mammals, and fisheries. Angie, in her role as lead biologist, oversaw the field surveys, reporting of results, and development of conservation measures for federally listed species.

White Property Residential Development, Fort Bragg, CA
As lead wildlife biologist, Angie conducted a biological resources assessment and assisted with the routine wetland delineation for the 69-acre White Property for Sean Hogan, Esq. The complex delineation and habitat assessment included the identification of waters of the U.S. and state, as well as a determination of mean high tide for an off-site outfall feature which connect to the Pacific Ocean. Angie was able to evaluate the entire site and determine habitat areas of high value. This information was then used to alter the site plan and reduce impacts to areas determined to be sensitive. Angie’s experience with the fauna of the region was essential to the habitat assessment, and supported the project team’s efforts to reduce the overall impact to sensitive biological resources.

Benicia Waterfront Village, Benicia, CA
Benicia Waterfront Village, proposed by Focus Realty Services, required extensive shoreline revetment along the Carquinez Strait. The existing shoreline was in disrepair and was considered unsafe for public access. Angie, who served as lead biologist, and her team secured regulatory permit approvals for the development project and 435 linear feet of shoreline revetment from the U.S. Army Corps of Engineers, Regional Water Quality Control Board, NOAA Fisheries and San Francisco Bay Area Development Commission in less than one year. We worked closely with the project engineers in developing a project approach to avoid impacts to ESA-listed fisheries and Essential Fish Habitat. Our team also conducted habitat and fishery assessments, focused surveys for western burrowing owl, pre-construction surveys, and botanical surveys.

Marina Vista Streetscape Project, Martinez, CA
For the proposed Marina Vista Streetscape Project in Martinez, Contra Costa County, Ms. Harbin-Ireland and her colleagues assisted the City with the environmental review process to

secure NEPA compliance through CalTrans. The environmental review and project approval was completed under a very short timeline with all studies including a Natural Environment Study, Archeological Survey Report, and a Historic Property Survey Report completed, reviewed by the agencies, and approved within three months. The successful completion of the NEPA documentation and approval within this timeframe greatly contributed to securing federal funding for the roadway improvement project. Ms. Harbin-Ireland and her team members worked with the engineering and design team throughout the project planning phase to streamline compliance through avoidance of sensitive biological and cultural resources in the vicinity. Ms. Harbin-Ireland served as the Project Manager for the biological and cultural resources evaluations and took the lead in coordinating with other project team members, the City, and CalTrans staff to meet the critical path schedule.

Oak Park Residential Development Due Diligence, Pleasant Hill, CA
Summerhill Homes contemplated reuse of an abandoned elementary school site to construct a 76-unit in-fill residential development in Pleasant Hill, Contra Costa County, California. Ms. Harbin-Ireland conducted an initial site visit and performed a due diligence level constraints analyses to evaluate feasibility of development of the property. During additional phases of site review and preparation of development applications, EDAW conducted a wetland delineation, biological resources assessment, and commenced applications for 401 Water Quality Control Board Certification and a California Department of Fish and Game Section 1600 Streambed Alteration Agreement for the approximate 10-acre project site.

Westshore Marina, Point Richmond
At the request of Toll Brothers, Ms. Harbin-Ireland conducted a reconnaissance-level biological assessment and jurisdictional delineation for the approximate 6-acre Westshore Marina property located within the City of Richmond, in western Contra Costa County, California. The project site is located at the terminus of Marina Way on the Richmond Inner Harbor Channel. An evaluation of potential project impacts was included in the report as well as suggested minimization measures. The biological report was utilized in support of the City’s environmental review process.

East Cypress Corridor Specific Plan and EIR, Oakley
For the 2,500-acre City of Oakley Specific Plan and Environmental Impact Report (EIR) in Oakley, Contra Costa County, Ms. Harbin-Ireland oversaw the completion of a host of biological consulting services, including a review of environmental documentation, aerial photographs, and natural resource databases, a preliminary assessment of potential occurrence of special-status plant and wildlife species, all necessary focused follow-up surveys, an evaluation of the constraints and opportunities posed by existing on-site habitats, the preparation of CEQA-ready technical reports describing the biological resources found in the area, and an evaluation of the permitting implications.

Ms. Harbin-Ireland participated in the constraints-based planning process and provided the biological resources section of the Specific Plan and the EIR. She worked collaboratively with the City and plan participants, including the developer group, to identify constraints, address them in Specific Plan and EIR, and present findings and preservation strategies at public meetings. Mitigation measures to reduce potential impacts to biological resources were drafted for both project and program-level components of the Specific Plan EIR. Multi-disciplinary issues in the Specific Plan EIR process included transportation, infrastructure, utility lines, cultural resources, levees, and the Delta habitats. Because the project team is working for both the City and the landowners, we have coordinated much of the land use planning

solutions to ensure CEQA compliance at a project level for those properties with sufficient information. This project includes extensive work within the San Joaquin Delta and requires counsel and coordination with NOAA Fisheries and the U.S. Fish and Wildlife Service.

City of Martinez, East Bay Regional Park District, and Caltrans Marsh Enhancement and Flood Management, Martinez
Working over a seven year period, EDAW assisted the project design team, including Korve Engineering and Phillip Williams and Associates, to support the City of Martinez, the East Bay Regional Park District, and the California Department of Transportation (Caltrans) from design to inception of a joint venture to complete an 11-acre marsh enhancement and flood management project at the Martinez Regional Shoreline Park in the City of Martinez, Contra Costa County. The project provided mitigation credit for impacts related to a number of Caltrans projects. We assisted in defining goals for the mitigation site and the development of three design alternatives that integrated flood control, trails, delta smelt habitat creation, and marsh enhancement goals with the opportunities and constraints of the site. After selection of the preferred alternative, we developed a conceptual design of the selected alternative that included a preliminary grading approach, sensitive construction practices, revegetation plant palettes, exotics eradication, protection of special-status species, and measures to minimize impacts to adjacent habitats. The project team worked with Phillip Williams and Associates to develop a Mitigation Monitoring Plan for the entire site. Ms. Harbin-Ireland has assisted in carrying out the monitoring program for the successful mitigation site.

Orwood Marina and Residential Development, Contra Costa County
A private developer proposed to construct residential units and a marina on an approximate 40-acre site located on the southwest corner of Orwood Tract in the Delta region of eastern Contra Costa County, California. The project is immediately adjacent to a delta slough and would involve breaching an agricultural levee and would involve potential impacts to Section 10 waters, wetlands, and special-status species. Ms. Harbin-Ireland conducted a due diligence and biological constraints analysis of the below sea level site to determine potentially sensitive resources to avoid and to identify regulatory permitting requirements for unavoidable impacts.

Golden Gate Bridge Suicide Barrier Project, San Francisco. California
For the proposed suicide barrier on the Golden Gate Bridge, Ms. Harbin-Ireland and her colleagues are assisting the District with evaluating potential impacts to avian species. Systematic observations of avian behavior around the bridge structure were conducted to evaluate the potential risks posed by adding a suicide barrier below the roadway. The primary species evaluated include gulls, cormorants, pelicans, peregrine falcon, and red-tailed hawks. A report of survey results and recommendations to reduce potential hazards to migrating birds was produced.

Lavenida Biological Resources Assessment, Orinda, California
For the Lavenida residential development proposed in Orinda Contra Costa County, EDAW Inc. conducted a biological resource study including a wetland delineation. EDAW is assisting the land planners and engineers with developing a constraints based site plan that avoids and preserves the most sensitive resources on site. As part of the CEQA review process, EDAW is providing input on the riparian planting and landscaping plans, and preparing the Biological Resources section of the Initial Study for the City’s use.

Alternative Intake Project, San Joaquin County, CA

EDAW conducted extensive biological surveys and provided permitting compliance services for the Alternative Intake Project on Victoria Island in San Joaquin County, California. The project required surveys and an ongoing passive relocation effort for burrowing owl, as well as protocol-level focused surveys for Swainson's hawk. In addition, EDAW conducted pre-construction surveys for nesting birds, giant garter snake, and western pond turtle, as well as construction monitoring during project implementation. Ms. Harbin-Ireland has served as the senior biologist and permitting specialist for environmental compliance services for the Alternative Intake Project on Victoria Island in San Joaquin County, California. In several cases she has been able to negotiate with agency staff and construction has been able to continue within standard non-disturbance buffer zones due to short duration and low impact work. She has also negotiated extended construction windows from the U.S. Fish and Wildlife Service with implementation of additional avoidance measures.

Ygnacio Valley Road Permanent Restoration, Concord, CA
The City of Concord received federal disaster relief funding to repair a landslide located within the Lime Ridge Open Space and designated Alameda whipsnake Critical Habitat. EDAW biologists conducted a biological resources assessment, wetland assessment, and focused botanical surveys. EDAW oversaw the obligations to comply with NEPA, the federal Department of Transportation Act, CEQA, and the Endangered Species Act. A Section 4(f) Programmatic Report and Natural Environment Study (NES) were also prepared to Caltrans requirements. The EDAW team served as environmental monitors for Phase 1 of the project in 2008 and is currently providing environmental compliance oversight for Phase 2 in 2009. Our biologists were approved by the U.S. Fish and Wildlife Service to conduct pre-construction surveys and contractor education sessions for Alameda whipsnake, California tiger salamander, and California red-legged frog as outlined in the Biological Opinion. Pre-construction surveys for burrowing owl and other nesting birds were also completed prior to groundbreaking. We are carrying out on-going construction monitoring, coordination, and reporting as required by conservation measures for these species. EDAW has successfully coordinated with City planners, engineers, and inspectors as well as construction contractors to convey and interpret environmental avoidance and minimization measures required for the project and are actively involved in their review and implementation in the field. Ms. Harbin-Ireland is overseeing pre-construction surveys, construction monitoring, overall environmental compliance, and contractor education during the Phase 2 of the project.

Grizzly Island Road Bridge Project, Solano County, California
Solano County is replacing a vehicular bridge on Grizzly Island Road over Hill Slough in Suisun Bay, with potential impacts to ecologically sensitive tidal marsh habitat. AECOM performed biological services associated with permit compliance, including rare plant surveys, surveys for California clapper rail, California black rail, salt marsh harvest mouse, and western pond turtle, and construction monitoring for Delta smelt during in-water pile-driving. AECOM made recommendations to the County to comply with resource agency permits for these species and provided technical reports of survey findings. Angie provided senior oversight during biological compliance monitoring.

Rock Slough Intake Fish Screen Project, Contra Costa County
AECOM conducted extensive biological surveys and provided permitting compliance services for the Rock Slough Intake Fish Screen project near Oakley, CA. Angie worked with the District to obtain the required project permits from USACE, NMFS, USFWS, RWQCB and CDFG in a four month time period. The project required a wetlands jurisdictional determination, protocol-level focused surveys

for rare plants, burrowing owl, California red-legged frog, western pond turtle, and giant garter snake prior to construction.

Angie led pre-construction surveys for rare plants, burrowing owl, giant garter snake, San Joaquin kit fox, California red-legged frog, and western pond turtle. She managed implementation of avoidance measures for species found on site including rare plants, burrowing owl, and western pond tutle. She is the main point of contact for construction managers and is overseeing implementation of all other biological mitigation measures including construction monitoring and development and implementation of the Suisun Marsh aster mitigation and monitoring plan.

Alice L. Harron

SUMMARY OF QUALIFICATIONS

Experienced leader of complex power generation project acquisitions, commercial power purchase agreements and other contract negotiations. Over 15 years of experience in the power generation and project finance industry from both the independent power producer and utility perspectives.

PROFESSIONAL EXPERIENCE

Senior Director, Development, Solar Millennium, LLC, Berkeley, CA 2009

- Oversee development of Solar Millennium's three solar thermal projects in California
  - Lead and oversee all aspects of project development including permitting and regulatory approval, land acquisition, and community outreach.
  - Coordinate and oversee project managers, outside consultants, and internal support staff as part of the development process.

***Principal*, Renewable Development, Pacific Gas and Electric, San Francisco, CA 2003-2009**

- Led negotiations to acquire a partially, constructed gas-fired combined cycle 600 MW power plant (Gateway) from Mirant during and after its bankruptcy.
  Result: *Acquired plant assets as part of bankruptcy settlement resulting in first, utility-built, power plant in decades.*
- Led team to accelerate acquisition of 650 MW gas-fired combined cycle power plant (Colusa) after counterparty notified PG&E that it planned to terminate its agreement.
  Result: *Executed amended agreement and acquired development assets quickly to minimize delay in forecasted on-line date of power plant.*
- Negotiated bilateral power purchase agreement for 150 MW of wind generation including price, credit, and other provisions particular to a renewable resource such as scheduling, delivery, CEC certification process, and green attributes.
  Result: *Achieved near-term renewable generation in CA.*
- Leading development of utility wind and solar thermal generation projects.
  Result: *Screening wind development opportunities and developing a solar thermal project.*
- Led cross-functional team investigating commercial and political viability of obtaining renewable generation sources in British Columbia.
  Result: *Pursued discussions about potential commercial arrangements.*

***Director, Strategic Assessment,* Calpine Corporation, San Jose, CA 2001-2003**

- Analyzed credit agreements ($3.5 billion of credit facilities (Calpine Construction Finance Company (CCFC) I and CCFC II)) to optimize cash management of portfolio.
- Developed detailed financial spreadsheet models to support refinancing.

***Manager, Marketing and Financial Analysis,* PG&E National Energy Group, 1993-2001**

- Provided a comprehensive market assessment of current assets, power plant development, acquisitions and marketing opportunities and presented to senior management.
- Developed sophisticated financial spreadsheet models to support financing of independent power projects, including refinancing, project work-outs, securing letters of credit, acquiring additional debt, acquisitions and converting projects from construction to term loans.
- Reviewed key project contracts and annual power plant budgets to assess economic, financial, and technical risks.
- Communicated with senior managers, partners, and lenders about project economics.

EDUCATION

MBA, Finance, University of Maryland
BA, Economics, University of Maryland

HMCG
Harvey Meyerhoff Consulting Group

Jeffrey G. Harvey, Ph.D.
Principal & Senior Scientist

Dr. Jeff Harvey has more than 25 years experience as a consultant in environmental planning and reporting pursuant to requirements of the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA), specializing in water resources, power generation, and mining. Reports have been prepared for local, state, and federal government agencies, and private developers. For the past decade he has been deeply involved in complex water, power, and environmental restoration projects in the southern California desert region, with a focus on the Colorado River, regional groundwater, the All American and Coachella canals, and the Salton Sea.

Education

- Ph.D. Geography – Emphasis in *Hydrology and Water Resources, Environmental Law and Policy, Natural Resources Management, and Impact Assessment.* UCLA, 1994
- Master of Arts, Geography – Emphasis in *Environmental Planning, Water Resources Development, and Impact Analysis.* CSU, Chico, 1983
- Bachelor of Arts, Geography – Emphasis in *Physical Geography.* CSU, Chico, 1981

Professional Experience

- Harvey Meyerhoff Consulting Group, Principal and Senior Scientist, 2005-present
- Greystone Environmental Consultants, California General Manager, 1994-2005
- Research Associates, Principal and Project Manager, 1986-1994
- Eco-Analysts, Project Manager, 1981-1986

Relevant Experience

- Eagle Mountain Pumped Storage Hydroelectric Project, *Project Director*
- Coachella Canal Lining Project, *Environmental Coordinator*
- IID / SDCWA Water Transfer; Quantification Settlement Agreement (QSA); Lower Colorado River Multi-Species Conservation Program; and Salton Sea Ecosystem Restoration Program; *Transfer Program Consultant (to SDCWA)*
- Blythe Energy Project, Phase 1 and 2, *Project Manager for Environmental Permitting*
- Regional Water Facilities Master Plan Program EIR, San Diego County Water Authority, *Project Manager*
- San Joaquin Valley Drainage Program, *Principal Investigator, Natural Heritage Institute (under contract to Bureau of Reclamation)*

Sara J. Head, QEP

Years Experience: 35

Technical Specialties

- Regulatory Permitting and Compliance Support
- Environmental Impact Assessment
- Air Quality Modeling and Attainment Planning
- Project Management

Professional History

- AECOM Environment (formerly known as ENSR)
- AeroVironment, Inc.

Education

- BS (Atmospheric Sciences) University of California at Davis

Professional Registrations and Affiliations

- Qualified Environmental Professional, IPEP
- Air and Waste Management Association, Fellow Member
- Ventura Co. Air Pollution Control District Advisory Committee, Vice Chair

Representative Project Experience

Solar Millennium, LLC, Environmental Permitting, *California.* Providing senior technical support and review for three projects to obtain environmental permits for solar thermal electric generating plant located on federal land in the desert regions of Southern California. The projects will range in size from 250 to 1,000 megawatts (MW), and will use parabolic trough mirrors. Projects involves preparation of three Applications for Certification (AFCs) to the California Energy Commission (CEC), as well as supporting Environmental Impact Statement (EIS) preparation through the U.S. Bureau of Land Managerment (BLM). Air Permits are being obtained from three air districts (SCAQMD, MDAQMD, and KCAPCD). These Projects involve biological permitting including a Section 7 consultation with the U.S. Fish and Wildlife Service under the Endangered Species Act and California Department of Fish and Game (CDFG) 2081 Incidental Take Permit and Streambed Alteration Agreement programs, as well as all other state, regional, and local permits and approvals.

NextEra Energy Resources, Environmental Permitting, *California.* Managing a project to obtain environmental permits for the Beacon Solar Energy Project, a 250-MW solar thermal electric generating plant near California City, that will use parabolic trough mirrors. Project involves preparation of an AFC to the CEC, biological

permitting under the Endangered Species Act (ESA) and CDFG 2081 Incidental Take Permit and Streambed Alteration Agreement programs, as well as all other local, air district and regional permits. The BSEP is in the final stages of the CEC licensing process.

Inland Energy, Environmental Permitting, *California*. Managing two projects to develop hybrid combined-cycle and solar electric generating plants in Victorville and Palmdale. Projects involve preparation of an AFC to the CEC and Prevention of Significant Deterioration (PSD) permit applications to the U.S. Environmental Protection Agency (EPA), as well as all other local, air district and regional permits. Biological impacts are major issues due to the large area needed for solar arrays. The power plants will be wet cooled and use reclaimed water from local wastewater treatment plants. Victorville 2 was licensed by the CEC in July 2008 and Palmdale is currently in the licensing process. Assisted with the development of initial compliance plans, compliance matrix tracking, and pre-construction monitoring until the project was put on-hold to secure financing.

Sempra Generation, Environmental Permitting, *California*. Managed a project to prepare an AFC and obtain a license from the CEC for a proposed new combined cycle power plant (the Palomar Energy Project in Escondido). Major issue areas addressed in the AFC included air quality and biological resources, as well as all environmental impacts. Air Quality modeling was performed with AERMOD, visibility modeling was done with CALPUFF and PLUVUE II and all PSD permitting requirements were addressed. Water requirements are met with the use of reclaimed water from the local waste water treatment plant. Subsequent to licensing, assistance has been provided with permit modifications and other support.

Mountainview Power Company, Environmental Permitting, *California*. Managed a project to prepare an AFC and related CEC process for a 1,056-MW expansion of an existing power plant in San Bernardino County. The project included a new 17-mile natural gas pipeline and wastewater connector line. The project completed the CEC 12-month process in less than a year from being deemed data adequate.

Sempra Generation, Compliance Assistance, *California*. Managed a project to assist with post-certification amendments and environmental permitting requirements for the Elk Hills Power plant. Tasks have included multiple permit modifications with the CEC, EPA and SJVAPCD; Title V permitting and acid rain notifications; review of commissioning plans; offset analysis; obtaining variances from the air district; and other consultation.

FPL Energy, Air Permitting, *California*. Assisted the Blythe Energy Project (BEP) to obtain various permits from the Mojave Desert Air Quality Management District (MDAQMD). For example, assisted with modifications of BEP's PSD permits from MDAQMD, EPA and CEC to increase the emissions allowed during startup; prepared the initial Title V permit application; and prepared an acid rain permit application. Also assisted with noise monitoring.

High Desert Power Project, Air Permitting and Other CEC Support, *California*. Managed a project to satisfy all the air quality requirements for a new merchant power

plant to be sited in Victorville, California. The permitting requirements included a PSD permit from EPA Region IX, a local air permit from the MDAQMD, and a Final Decision from the CEC. The project involved development of a strategy to obtain offsets for the project, including obtaining approvals of an interpollutant, interbasin trade of volatile organic compound offsets for oxides of Nitrogen emissions. Assistance with hazardous materials (ammonia) handling, Federal Aviation Administration stack height and visible plume analysis, biological impacts, and other topics was also provided on this project. Subsequent to licensing, on-going assistance has been provided for permit modifications, protocol review, water permitting, reporting and other compliance services.

Sempra Energy, Environmental Permitting, *Arizona, Nevada and California.* Managing and assisting with projects to develop solar thermal or photovoltaic power plants in three western states. In Arizona, assisted with amendments to the Maricopa County Comprehensive Plan to allow for development of two solar projects and then preparation of applications for Special Use Permits. An application for new transmission lines was also provided to the Arizona Corporation Commission. In Nevada, assisted with permitting reviews and feasibility assessment for potential solar thermal and photovoltaic power plants. For the El Dorado Solar facility, assisted with various permits and approvals including biological mitigation plans, stormwater, dust control, and CEC Renewable Portfolio Standard (RPS) certification requirements.

Confidential Clients, Critical Issue Analysis and Permitting Plans, *California, Arizona and Nevada*. Assisting several clients to determine the feasibility and permitting requirements to develop solar energy projects in the desert regions. These projects involve both solar thermal and photovoltaic technology. Biological resources, water resources, and land uses are some of the major issues being addressed. Some projects involve development on BLM lands. Several projects involve assisting with due diligence for the purchase of developing solar projects in the Southwest. Some projects involve developing proposals for projects seeking power puchase agreements.

Sempra Generation, Environmental Permitting, *Nevada*. Managed a project to obtain all environmental permits needed for a new combined-cycle power plant in Southern Nevada. Primary permits included a PSD air permit, water (NPDES) permits and review of potentially impacted biological resources. Subsequently, the permit was modified to add additional equipment, including a solar thermal cooling system and auxiliary boiler. A new permit was obtained when the original permit expired.

Sempra Generation, Ozone Modeling, *Arizona and Mexico*. Provided oversight and coordination of AECOM assistance with ozone modeling requirements and evaluations. For the Mesquite project in Arizona, AECOM provided Urban Airshed Modeling (UAM) to support project permitting. For the Termoeléctrica de Mexicali project in Mexico, provided consulting and assistance with ozone box modeling to support project impact assessment, as well as expert testimony and review of the EIS.

Sempra Generation, Feasibility Studies, *California*. Provided oversight for AECOM studies to determine the feasibility of potential project sites. Studies included Phase I due diligence site assessments; surveys to determine the availability of emission reduction credits to use for offsets; water studies to evaluate different options for water

supply and discharge including use of contaminated agricultural run-off water, groundwater, underground injection, dry cooling and water swaps with water agencies; and conduct of biological surveys.

Tuscon Electric Power, Air Permitting, *Arizona*. Managed a project to obtain air permits for the expansion of the Springerville Generating Station, a coal-fired power plant. The permitting of two new units was accomplished by netting out of PSD through emissions control of the existing two units. A permitting feasibility assessment related to new operations nearby was also done.

Duke Energy North America, Environmental Permitting, *Arizona*. Managed a project to obtain environmental permits and approvals needed for a new combined-cycle power plant near Phoenix, Arizona. Primary permits included a PSD/Title V air permit and an environmental review under the Arizona Corporation Commission. Air Quality models used included ISCST3, CTSCREEN, CALPUFF, VISCREEN, PLUVUE II, and UAM. After permitting was accomplished, permits for an expansion to add two more units were obtained. Tasks also consisted of assisting with compliance assurance during the construction phase. For example, assisted with development of a compliance tracking matrix, review of required plans and protocols, permit modifications, and development of semi-annual compliance reports.

Newport Generation, Focused Fatal Flaw Analyses, *California*. For two sites, one within the South Coast Air Quality Management District (SCAQMD) and one within Ventura County, managed a project to review potential fatal flaws for expansion of two existing power plant operations. The analyses focused on air quality issues, including the availability of offsets, land use (including California Coastal Commission requirements), and biological resources.

Major Power Producers, Offset Availability Analysis, *California*. Managed several projects to investigate the feasibility of generating PM10 emission reduction credits (ERC) from road paving or other means for potential new power plants in the SCAQMD, Bay Area Air Quality Management District, San Joaquin Valley Air Pollution Control District, and San Diego Air Pollution Control District. Potential PM10 ERC sufficient for the projects' needs were identified, however, other ERC options were utilized.

ThermoEcotek, Repowering Project, Fatal Flaw Analysis, *California*. Managed a project to identify environmental permitting "fatal flaws" for a company that acquired two power plants and planned to repower them. The analysis reviewed potential turbine configurations, probable permitting requirements, including the CEC and/or CEQA requirements, as well as potential local requirements with respect to air, water, noise, building permits, etc. Potential permitting timelines and community issues, such as environmental justice, were also addressed.

El Dorado Energy, Title V and Acid Rain Permit Applications, *Nevada*. Managed a project to prepare a Title V permit application and analysis of Acid Rain program requirements for an existing power plant in Southern Nevada. Project was completed on a fast track basis in order to meet the program requirements. Also assisted with permit modifications to add new equipment including a wet surface air cooler.

Sempra Generation, Environmental Permitting, *Nevada and Idaho*. Managed two projects to obtain environmental permits, including PSD, National Pollutant Discharge Elimination System (NPDES), and landfill permits; obtain County Special Use Permits; and comply with National Environmental Policy Act (NEPA) for a 1,200-MW and a 600-MW coal-fired power plant. Since project linear facilities (transmission lines, rail road, water lines, etc.) crossed BLM land, the BLM was the NEPA lead agency for these projects, which included extensive biological and cultural baseline studies, as well as ambient air quality and meteorological monitoring program. The projects were cancelled prior to completion of the environmental studies.

Confidential Power Developer, Feasibility and Critical Issues Assessments, *Arizona*. Managed projects to review the impact of potential schedule delays and to investigate new equipment at two different coal-fired power projects. Modeling and regulatory assessment was performed to determine the feasibility of the potential changes. Also managed two projects to look at potential sites for coal-fired power plants in two western states. Issues investigated included air permitting, water supply, NEPA compliance and potential for ash disposal issues. The air quality analyses included conceptual modeling using AERMOD and CALPUFF to determine the feasibility of the projects.

Sithe Global, Air Permitting, *New Mexico*. Air task manager for a project to obtain a PSD permit from EPA for a mine-mouth, 1,500-MW coal-fired power plant in New Mexico on the Navajo Nation. Emissions levels and regional haze impacts on the nearby Class I areas, e.g., Mesa Verde and Bandelier, were the major issues for this project. Negotiations with the EPA, four state agencies, and Federal Land Managers from both the National Park Service and Forest Service were extensive in order to resolve the scope of the modeling assessment and obtain the cumulative source inventory.

RALPH HOLLENBACHER

Employment History

Solar Millennium **February 2010 – Present**
Berkeley, California
Solar Power **Director, Project Development Engineering**

Provide development engineering support for four ARRA "fast track" solar thermal power plants in California and Nevada including work on transmission related issues.

Chevron Energy Solutions **October 2007 – January 2010**
San Francisco, California
Renewable Energy **Sr. Manager, Technical Services**

- For the large scale renewable energy group, I prepared and implemented development strategy for developing 1,500 MW of solar thermal power plants. Filed transmission interconnection requests and initiated permitting.
- Determined site location, filed SGIA and prepared EIS for a 45 MW, ground mount, thin film solar PV plant in Southern California. Project was awarded "fast track" environmental permitting status and will complete permitting by the end of 2010.
- Advised wind projects in Hawaii and Texas on transmission related issues.

Genentech **February 2006 – August 2007**
South San Francisco, California
Biotechnology **Consultant**

- Identified $30 million in energy savings projects with favorable investment returns.

San Francisco Public Utility Commission **January 2003 – November 2005**
San Francisco, California
Public Utility Commission **Development Manager**

- Managed initial development activities for a 192 MW gas turbine project within the City of San Francisco.

Calpine Corporation, San Jose, California **July 1998 – August 2002**
Independent Power Producer Project Development Manager

- Managed development of a 600 MW, gas turbine, combined-cycle plant near Thermal, CA.
- Identified site for the 900 MW Inland Empire Energy Center.
- Completed development and procured engineering-procurement-construction services for the 546 MW, South Point power plant in Arizona.

Energy Options, Greenbrae, California **1987 – 1998**
Engineering and Management Consultant *Senior Consultant*

- Appraised independent power generating plants for Southern California Edison. This effort included estimating plant performance and operating and maintenance costs for gas turbine combined cycle power plants.

- Ran $6 million gas turbine R&D program assessing the adaptability of advanced aircraft engine technology to electric power generation applications. Used strategic marketing analysis to persuade 2 of the 3 major aircraft engine manufacturers to evaluate and further develop new commercial products based on this research.
- Identified major operating problems at biomass fueled power plants in California.

Energy Factors, Concord, CA. **1986 – 1987**

Independent Power Development Company *Contracts Manager*

- Completed project development and managed $94 million in design-build contracts completing the project on schedule and within budget.

Kaiser Engineers Corp., Oakland, CA. **1981 – 1986**

Engineering, Procurement and Construction Company *Project Engineer*

- Saved $500,000+ in services & materials on a $6 million design, procurement and construction contract for a Westinghouse W251-B10.

EDUCATION:

MBA, Finance (Honors), St. Mary's College, Moraga, CA

BSME, Ohio State University, Columbus, Ohio

PROFESSIONAL MEMBERSHIPS:

ASME - American Society of Mechanical Engineers

LICENSES:

PE - California, #M-19174

PE - Illinois, #62-35155

PUBLICATIONS:

Competitive Repowering Strategies For Deregulated Electric Power Markets, R. Hollenbacher, POWER-GEN '95, Anaheim, California, December 1995.

The intercooled Aeroderivative Gas Turbine, New Technology for a Rapidly Changing Electric Market, B. Davidson, R. Hollenbacher, C. Dohner, and G. Hay, POWER-GEN EUROPE '95, Amsterdam, The Netherlands, May 1995.

Developing Advanced Intercooled Aeroderivative Gas Turbines For Electric Utility Applications, Art Cohn and Ralph Hollenbacher, presented at ASME TURBO EXPO '94, The Hague, The Netherlands, June 1994.

Elizabeth C. Ingram

EXPERIENCE

2010-present ***Solar Millennium, LLC*** Berkeley, CA
Solar Developer
Project Manager, Development
- Project Manager for the Blythe Solar Power Project (BSPP), a nominal 1, 000 MW solar thermal project proposed in eastern Riverside County
- Oversee permitting process with regulatory agencies including the lead agency under CEQA: the California Energy Commission and the lead agency under NEPA: the Bureau of Land Management as well as FESA/CESA review with US Fish & Wildlife Service and California Department of Fish & Game
- Coordinate additional permitting reviews and communication with local air districts and county agencies
- Manage community outreach activities in Riverside County

2008-2009 ***Spinnaker Energy, Inc.*** San Diego, CA
Renewable Energy Developer
Project Development & Finance
- Assistant Project Manager for San Joaquin Solar (SJS) Project, a 106.8 MW solar thermal/biomass hybrid project under development in California, including oversight of permitting, interconnection, site layout, capital cost studies, equipment supply, and power purchase agreements
- Coordinated permitting process for SJS including preparation of Application for Certification (AFC) filed in November 2008 to the California Energy Commission
- Assisted the project financing team for 174 MW wind project in Texas
- Prepared numerous RFP responses to utilities or other stakeholders for new utility-scale renewable developments

2007 ***Recurrent Energy*** San Francisco, CA
Solar Developer
Summer Associate, Energy Services
- Monitored competitive landscape to provide differentiation strategies for company's product offers
- Assessed new markets for solar power purchase agreements nationwide based on regulatory environments and utility tariff schedules
- Created forecast to track the relationship between California Solar Initiative incentive levels & solar prices

2007 ***Haas International Business Development Program*** Finland
- Consulting project for Nokia Corporation

2003-2006 ***The Intagio Group, Inc.*** San Francisco, CA
Media Planning Agency and Corporate Trading Company
Manager, Trade Administration (2004-2006)
Financial Analyst (2003-2004)

2002 ***Milestone Group*** Arlington, Virginia
Boutique consulting firm now owned by General Dynamics Information Technology
Accountant

EDUCATION **University of California at Berkeley**
Walter A. Haas School of Business
Masters of Business Administration, May 2008
- Steering Committee member/Co-founder, UC Berkeley Center for Energy & Environmental Innovation
- Berkeley Energy & Resources Collaborative (BERC), Vice President for Curriculum Development

The College of William & Mary, Williamsburg, Virginia
B.A. in Economics and Government, May 2001
- Golden Key, Omicron Delta Epsilon (Economics Honor Society), Monroe Scholar
- Completed honors program in economics with Highest Honors

Stacey Jordan, PhD, RPA
Senior Archaeologist

Education
PhD, Anthropology, Rutgers University, New Brunswick, NJ,2000
MPhil, Anthropology, Rutgers University, New Brunswick, NJ, 1995
MA, Anthropology, Rutgers University, New Brunswick, NJ, 1994
BA with High Distinction, Anthropology, University of California, Berkeley, 1991

Professional Affiliations
Member, Society for American Archaeology
Member, Register of Professional Archaeologists

Certifications + Approvals
County of San Diego Approved Consultant List for Archaeological Resources
County of San Diego Approved Consultant List for Historic Resources
County of Riverside Approved Cultural Resources Consultant (No. 222)

Awards
2009 - San Diego Archaeological Center Excellence in Archaeology Award, Excellence in Cultural Heritage, Archaeological Data Recovery at CA-SDI-10,920 and Site Stabilization at Sites CA-SDI-586 and CA-SDI-10,920 Along the Southern Shore of Lake Hodges
2008 - San Diego AEP Outstanding Environmental Resource Document Finalist, Boulder Oaks Open Space Preserve (winner Honorable Mention at September 25 AEP Awards)
2008 - Riverside County Planning Department, Certificate of Appreciation for the Cultural Resources Working Group
2006 - City of San Diego Historical Resources Board Award of Excellence, CCDC Downtown San Diego African-American Heritage Study
2005 - California Preservation Foundation Preservation Design Award, CCDC Downtown San Diego African-American Heritage Study
2005 - AEP Outstanding Public Involvement/Education Program, CCDC Downtown San Diego African-American Heritage Study
2005 - APA, San Diego Section Focused Issue Planning Award Honorable Mention, CCDC Downtown San Diego African-American Heritage Study

Grants + Fellowships
2003, Wenner-Gren Foundation for Anthropological Research Individual Research Grant Team Member: "Analysis and Interpretation of Archaeological Residues from Excavations at the Castle of Good Hope, Cape, South Africa'"
1996-1997, Wenner-Gren Foundation for Anthropological Research, Predoctoral Research Grant #6021
1994-1995, Wenner-Gren Foundation for Anthropological Research, Predoctoral Research Grant #5739
1992-1996, Rutgers University Excellence Fellowship

Publications
Jordan, Stacey. 2002. Classification and Typologies. In: *Encyclopedia of Historical Archaeology*, Charles E. Orser, Jr. (ed.). Routledge. London.
Jordan, Stacey and Carmel Schrire. 2002. Material Culture and the Roots of Colonial Society at the South African Cape of Good Hope. In: *The Archaeology of Colonialism*, Claire Lyons and John Papadopoulos (eds.). Getty Research Institute. Los Angeles. Jordan, Stacey C. 2000. Coarse Earthenware at the Dutch Colonial Cape of Good Hope, South Africa: A history of local production and typology of products. *International Journal of Historical Archaeology*, Vol. 4, No. 2.
Jordan, Stacey, Duncan Miller and Carmel Schrire. 1999. Petrographic Characterization of Locally Produced Pottery from the Dutch Colonial Cape of Good Hope, South Africa. *Journal of Archaeological Science*, Vol. 26.
Jordan, Stacey. 1994. Colonial Coarse Earthenware at the South African Cape of Good Hope, 1669-c.1900. *Crosscurrents*, Vol. VI.

Dr. Stacey Jordan has been professionally involved in the fields of archaeology and history for over a decade. Her specialty in historical archaeology combines the use of material culture and the archival record in anthropologically driven analyses of cultural resources. Dr. Jordan was the recipient of the Excellence Fellowship at Rutgers University, as well as multiple research grants from the Wenner-Gren Foundation for Anthropological Research. She is the author of various publications as well as numerous papers that have been presented at national and international conferences. Dr. Jordan is particularly well versed in the analysis of historical ceramics and has taught courses in the method and theory of historical archaeology as well as in the identification and analysis of historical ceramics and glass. She has extensive experience in archival research and historical writing, and has worked on projects spanning from early colonial contact to the recent past. In addition, Dr. Jordan has served on a variety of prehistoric and historic excavations both in the United States and abroad. Supplementing her work in cultural resources management, she conducts research on ceramics, community development, and identity construction in colonial South Africa.

Project Experience

County of San Diego Department of Parks and Recreation Sage Hill Preserve Cultural Surveys, San Diego County, CA
Cultural resources task manager for Phase I pedestrian survey and cultural resource inventories of the Sage Hill Preserve in unincorporated northern San Diego County. This project involved the identification and documentation of prehistoric and historic resources, built environment features, and existing infrastructure to assist the Department of Parks and Recreation in resource management through development of a Resource Management Plan including Area Specific Management Directives. Extensive archival and background research, including a contact program with local historic societies, was conducted to develop a historical context for the property. Methods and results of the intensive pedestrian survey were reported in a County of San Diego format technical report which included extensive cultural histories, a descriptive inventory of identified sites, and management guidelines for potentially significant cultural resources. All resources were documented on DPR 523 forms, and field work was conducted in coordination with a Native American monitor.

Solar Millennium Ridgecrest Solar Power Project, Ridgecrest, CA
Project Manager of ongoing BLM Class III intensive pedestrian survey, resource documentation, and site evaluation efforts for an approximately 2000-acre solar power project on BLM land in the western Mojave Desert under a Fast-Track ARRA funding schedule. This project includes extensive records searches and data management, multi-agency coordination and consultation involving BLM and the California Energy Commission, an ongoing Native American contact and outreach program.

San Diego Gas & Electric On-Call Cultural Services, San Diego and Imperial Counties, CA
Director of on-call inventory, survey, monitoring and reporting work as part of SDGEs infrastructure operations and maintenance activities on both private and public lands. Tasks include records searches, construction monitoring, archaeological survey and documentation, completion of State of California DPR forms, and management recommendations.

Southern California Edison As-Needed Archaeological Services, CA
Director of on-call survey, resource identification, documentation, testing, and evaluation efforts related to Southern California Edison infrastructure replacements and development throughout the state on both private and public lands, including BLM, USACE, and USFS. Product involves completion of State of California DPR forms, assessment of resource significance according to NRHP eligibility and CEQA significance criteria, and management recommendations. Work done before joining this firm.

San Nicolas Island Archaeological Evaluations, Ventura County, CA
Project Manager for ongoing archaeological evaluation of prehistoric sites CA-SNI-316, 361 and 550 on San Nicolas Island in the Channel Islands of the Calfornia Bight. This project involves the significance testing and analysis of Middle and Late Holocene sites and synthesis of results with existing island-wide archaeological data.

Emergency Storage Project Cultural Resources, Lake Hodges, San Diego County, CA
Senior Archaeologist and report co-author for data recovery project at site CA-SDI-10,920 along Lake Hodges. The project involves integration of regional data to provide context for the analysis of CA-SDI-10,920 and examination of the Late Prehistoric occupation of the San Dieguito River Valley around present-day Lake Hodges.

Jefferson National Expansion Memorial Environmental Impact Study, St. Louis, MO
Co-author for prehistoric and historical archaeology background and impact analysis sections related to the proposed expansion of the Jefferson National Expansion Memorial (Gateway Arch) in St. Louis, Missouri and East St. Louis, Illinois.

Old Town State Historic Park Jolly Boy Project, San Diego, CA
Contributor to the archaeological data recovery report for the Jolly Boy Saloon site in Old Town San Diego State Historic Park. Contributions to this project involve the synthesis of existing data on Old Town San Diego and development of an archaeological and historic context for the analysis and interpretation of recovered material.

Ocotillo Wells SVRA General Plan & Environmental Impact Report Cultural Resources, Imperial County, CA
Ongoing Cultural Resources analyses of Ocotillo Wells State Vehicular Recreation Area. This project involves the analysis of existing cultural resources conditions, and recommendations for the treatment of cultural resources.

Banning State Water Transmission Line, Riverside County, CA
Task Manager for cultural resources sensitivity analysis for the construction of an approximately 2.4-mile long pipeline within the rights-of-way of paved streets within the unincorporated area of the county. As part of this analysis a records search of the Eastern Information Center was conducted to identify cultural resources studies and identified resources within a one-mile radius of the Banning State Water Transmission Line's proposed alignment. A sacred lands file search was also requested from the Native American Heritage Commission.

Heber Dunes SVRA General Plan & Environmental Impact Report Cultural Resources, Imperial County, CA
Ongoing Cultural Resources Phase I Survey and Inventory of Heber Dunes State Vehicular Recreation Area. This project involves the analysis of existing cultural resources conditions, assessment of proposed facilities maintenance and development impacts, and recommendations for the treatment of cultural resources.

SWPL 500kV Line Wetland Delineation , San Diego County, CA
Project Director for Phase I pedestrian surveys, resource documentation, Section 106 resource evaluation, findings of effect and management recommendations in support of USACE wetland permitting associated with proposed jurisdictional water crossing improvement projects in southern San Diego County. Work done before joining this firm.

Boulder Oaks, Sycamore/Goodan, El Capitan/Oakoasis/ El Monte/Steltzer Open Space Preserve and Regional Park Cultural Resources Inventories, San Diego County, CA
Project director for Phase I pedestrian survey and cultural resource inventories of Open Space Preserves and Regional Parks in unincorporated central San Diego County. The projects involved the identification and documentation of prehistoric and historic resources, built environment features, and existing infrastructure to assist the Department of Parks and Recreation in resource management. Inventory reports included extensive archival research and historical narrative, an inventory of identified sites, and management guidelines for potentially significant cultural resources developed in consultation with Native Americans where appropriate. Work done before joining this firm.

State Route 94 Operational Improvements Inventory and Evaluation, San Diego County, CA
Director of cultural resources efforts and Caltrans coordination for survey, documentation, and evaluation related to proposed operational improvements along an 18-mile stretch of State Route 94 in San Diego County. Development of Caltrans-format documentation for archaeological and built environment resources. Work done before joining this firm.

BLM Santa Rosa San Jacinto Mountains National Monument Trails Inventory, Riverside County, CA
As Project Director, directed cultural resources inventory of trail systems within the Santa Rosa San Jacinto Mountains National Monument, including documentation of prehistoric and historic routes and associated resources within trail corridors. Completed cultural resources inventory report for BLM, including BLM-format GIS database. Work was performed before joining this firm.

High Winds Wind Farm Project, Solano County, CA
Conducted archival and historical research on the settlement and development of southern Solano County. Evaluated nine historic resources and surrounding landscape significance according to CEQA criteria. Completed historical background and assessment report, photographically documented resources and landscape, and updated State DPR forms for previously identified resources. Work done before joining this firm.

U.S. Fish & Wildlife Service Hercules Gunpowder Point Historical Resources Evaluation, Chula Vista, CA
Project director for the historical evaluation of the Hercules Powder Company Gunpowder Point facility in Chula Vista. Supervised archival and historical research, directed field survey and documentation efforts, and provided National Register eligibility evaluation for the site. Work was performed before joining this firm.

CCDC Downtown San Diego African-American Heritage Study, San Diego, CA
As Senior Historian, documented the development and growth of the African-American community in downtown San

Diego through the 19th and 20th centuries. Archival information, oral histories, architectural evaluations, and recognition of potential archaeological sites were used to document the African-American community's economic, social, and political history in the downtown area, and to identify an African-American Thematic Historic District. Work was performed before joining this firm.

Mannasse's Corral/Presidio Hills Golf Course, San Diego, CA
Directed and managed archaeological excavation and interpretation of historic refuse and features related to Old Town San Diego located within the city-owned Presidio Hills Golf Course property. Conducted analysis of excavated material, researched and interpreted site history and use, and assessed resource significance, broadening the understanding of Old Town's archaeological signature and historic lifeways. Work was performed before joining this firm.

California State Parks Old Town San Diego State Historic Park Archaeological Excavations, San Diego, CA
Managed excavation and analysis of 19th-century deposits recovered from two locations within Old Town State Historic Park, representing roadbed flood wash and tavern refuse, respectively. Oversaw ceramic and glass cataloguing, and conducted historical research and interpretation on specific site uses and depositional processes. Prepared State of California DPR forms, and assessed resource significance according to NRHP eligibility criteria. Work was performed before joining this firm.

City of El Centro Cole Road and Dogwood Road Widening Projects, Imperial County, CA
Project management of field survey and documentation efforts related to the widening of Dogwood Road and Cole Road in unincorporated Imperial County. Produced CEQA and Caltrans-format documentation related to identified resources and proposed project impacts. Work was performed before joining this firm.

Blackwater West Cultural Resources Phase I and Phase II Studies, Potrero, CA
Project director overseeing the survey of an approximately 850-acre area in eastern San Diego County and test excavation of identified prehistoric sites. Directed archaeological and built environment documentation, Extended Phase I testing, and Phase II testing efforts under the new County of San Diego Guidelines implemented September 2006. Work was performed before joining this firm.

Vine/Carter Hotel Historical Assessment, San Diego, CA
As Project Manager, conducted extensive archival research and historical assessment of the African-American-owned Vine/Carter Hotel building in San Diego's East Village. Conducted historical research on the building's ownership history and development; its historical uses, managers, and residents; and its place in San Diego's historical African-American community. Photographed and documented the building according to Office of Historic Preservation guidelines, prepared State of California DPR forms, and assessed the building's significance according to local, state, and federal significance criteria. As a result of the project, the Vine/Carter Hotel was nominated as a significant historical resource by the City of San Diego Historical Resources Board. Work was performed before joining this firm.

Mission San Gabriel Gardens Excavation, Jump Start Project, San Gabriel, CA
As Project Manager, conducted monitoring and excavation of Spanish colonial and American-era deposits associated with the construction of the original Mission San Gabriel and later 19th-century occupations. Documented the sites according to State Office of Historic Preservation guidelines, and assessed the resources according to NRHP and CEQA significance criteria. Work was performed before joining this firm.

Lillian Grant Property Public Art Project, San Diego, CA
As Project Manager, provided historical research services and written text incorporated into the public art commissioned for the redevelopment of the historical Lillian Grant Property in the East Village of San Diego. The public art, located at 14th and J streets at the Lillian Place affordable housing complex, commemorates the histories, experiences, and contributions of African-Americans to the development of San Diego and the East Village area in particular. Work was performed before joining this firm.

Lillian Grant Property Historic American Building Survey (HABS), San Diego, CA
As Project Manager, supervised HABS of the Lillian Grant properties in the East Village community of San Diego, submitted to the City of San Diego. Oversaw archival quality photographic documentation, and architectural line and plan drawings, as well as completed required HABS historical

narrative on the subject buildings. Work was performed before joining this firm.

San Gabriel Mission Trench Excavation, San Gabriel, CA
As Senior Archaeologist, conducted historical and archival research on the prehistory and history of the San Gabriel Mission and surrounding areas to assess potential impacts of proposed below-grade railway trench. Compiled historical narrative, identified potential subsurface features, and recommended appropriate mitigation strategies. Work was performed before joining this firm.

LA Department of Parks and Recreation Camp Seely National Register Evaluation, San Bernardino National Forest, San Bernardino County, CA
As Senior Historian, conducted NRHP evaluation of the early-20th-century Camp Seely recreational camp facility leased by the City of Los Angeles in the San Bernardino National Forest. Conducted historical and archival research on the Camp's history and development; its individual buildings; and its architects, including Sumner P. Hunt and Silas R. Burns. Photographed and documented the building according to Office of Historic Preservation guidelines, prepared State DPR forms, and assessed resource significance according to NRHP eligibility criteria. Work was performed before joining this firm.

Camp Radford National Register Evaluation, San Bernardino National Forest, San Bernardino County, CA
As Senior Historian, conducted NRHP evaluation of the early-20th-century Camp Radford recreational camp facility leased by the City of Los Angeles in the San Bernardino National Forest. Conducted historical and archival research on the Camp's history and development; its individual buildings; and its architects, Sumner P. Hunt and Silas R. Burns. Photographed and documented the building according to Office of Historic Preservation guidelines, prepared State DPR forms, and assessed resource significance according to NRHP eligibility criteria. Work was performed before joining this firm.

Papers and Presentations

The Development of Colonial Culture at the South African Cape of Good Hope: Examining the many "functions" of utilitarian ceramics. Paper presented at the Archaeology of Colonialism Symposium, Archaeological Institute of America Annual Meetings, January 2001.

Urban Archaeology and the Focus of Memory: a study in the history and narrative of South Central Los Angeles. Paper Presented at the Society for American Archaeology Annual Meeting, March 2002.

Historical Archaeology as Anthropology: Artifacts, Identities, and Interpretations in the Study of the Recent Past. Presented at World Archaeological Congress, January 2003.

Old Town Made New Again: The Archaeology of San Diego's First Settlement. Paper presented at the Society for California Archaeology Annual Meeting, April 2005.

Past as Present: Tourism and Archaeology in Old Town San Diego. Presented at the Society for Applied Anthropology Annual Meeting, April 2005.

The Face of Mercantilism at the South African Cape of Good Hope: Ceramics and the Hesitant Empire. Presented at the Society for Historical Archaeology Annual Meeting, January 2006.

A Patchwork History: Interweaving Archaeology, Narrative and Tourism in Old Town San Diego. Paper presented at the Society for American Archaeology Annual Meeting, March 2007.

Mannasse's Corral: The Life History of a Piece of Old Town. Presented to the Presidio Council, January 2008.

Making the Past Present: Archaeology, Heritage and Tourism in Old Town San Diego. Paper presented at the Society for California Archaeology Annual Meeting, April 2008.

CEQA and Historical Resources. Guest Lecturer, California Environmental Quality Act, UCSD Extension Course, August 2008.

ALICE E. KARL, Ph.D.

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Alice has been an environmental consultant since 1978 and is the principal for the firm Alice E. Karl & Associates, a certified 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 over 30 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 PROJECT CATEGORIES

- Solar energy development, hybrid and gas-fired power plants, hydropower projects
- Transmission lines and pipelines
- Wind projects
- Waste facilities
- Military
- Mining

MAJOR TASK CATEGORIES

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

SPECIAL-STATUS PLANTS and REVEGETATION

- Principal botanist for numerous surveys of special-status plants in the Mojave and Colorado deserts (California and Nevada), the Tehachapi Mountains and the Central and San Joaquin valleys
- Extensive knowledge of Mojave and Colorado Desert flora and habitats
- Revegetation

- Wetlands delineation

DESERT TORTOISE

- Recognized desert tortoise authority, with over 32 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
- Designed and implemented 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
- 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

Fort Irwin Expansion Project, Barstow, California. 2002-2003. Authored all desert tortoise sections for the Fort Irwin Expansion Biological Assessment. 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

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)

Southern California Edison Palo Verde-Devers II Transmission Line, Colorado River to Devers, California. 2002 - 2004. Surveys of proposed transmission line, in this segment, for special-status plants and animals; technical reports. Consultant to EPG Inc., Tucson, Arizona.

Blythe Energy Project, Blythe, California. 2000 - continuing. Designated biologist for proposed power plant and pipeline, 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.

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

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.

Southern California Edison Palo Verde - Devers II HVDC Transmission Line, Colorado Desert, California. Spring, l985, Spring, 1987, Spring, 1988. Field surveys and literature determination of impacts to special-status plants and wildlife and development of mitigation procedures along new transmission line route. Consultant to E. Linwood Smith and Associates, Tucson, Arizona.

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

Mesquite Regional Landfill, El Centro, 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 associated with most 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. In prep. Drought effects on the desert tortoise and population recovery.

Freilich, J., R. Camp, J. Duda and A. Karl. 2004. Problems with sampling desert tortoises:: a simulation analysis based on field data. In press.

MEMBERSHIPS

California Native Grass Association
California Native Plant Society
Desert Tortoise Council
Herpetologists' League, Inc.
Ecological Society of America
Society for the Study of Amphibians and Reptiles
Society for Ecological Restoration

Professional History
29 Years Senior Management Experience

Title
Transmission and Distrinution Market Segment Leader – West Region

Certifications & Registrations
Certified Professional Constructor #592, National

American Institute of Constructors #4543, National

Associations
Constructor Level Member, American Institute of Constructors

Chairman, Professional Standards Committee AIC (Past)

Member, Certified Professional Constructors' Certification Exam Committee (Past)

Board Member, Cleveland State College, Technical Advisory Committee (Past)

Shawn Kelly, a Senior Manager with AECOM, has over 37 years of experience. He is instrumental in building strong, thriving relationships with Owners and has served as the lead on a variety of successful projects in the power industries.

Shawn is a hands-on manager, with the ability to infuse teamwork and confidence in his staff – and with Owners. His attitude to every aspect of a project is teamwork, because a team approach results in a quality job and a safe working environment, so that a project completes on time and within budget.

Project Experience

President, Fru-Con Technical Services, Inc., St. Louis, MO - Responsibilities included the initial Performa to hiring, procedural systems and controls, financial forecasting, profit and loss, strategic planning, business development and contract/risk assessment. Executed successful start-up worldwide in multiple locations.

President, Fru-Con Engineering, Inc., St. Louis, MO - Responsible for the profit and loss, vision, leadership and turnaround of a 60-year-old engineering company. Completely reorganized overhead structure refocused business development efforts and changed the culture to accept more responsibility for work execution. Added project controls, purchasing, and reduced overall spending.

Sr. Vice President, Fru-Con Construction Corp., St. Louis, MO - Consolidated and created a regional division in the Southeast US while overseeing complete financial and technical performance responsibilities of both the Engineering and Technical Services Companies.

Director, Field Start-up Operations, Fru-Con Construction, St. Louis, MO - Responsible for the start-up of a waste-coal power facility in Pennsylvania and the completion of a very complex project in West Virginia.

Project Manager, Blount International Ltd., Portland, OR - Responsible for the successful execution of turnarounds and maintenance in the chemical industry; contract negotiations, budgets, recruiting, scheduling, safety, and profit and loss on projects to $30M.

Manager of Start-up, Blount International Ltd., Montgomery, AL - Responsible for successful turnover of all waste coal and refuse power facilities built or owned by Blount. Established start-up and testing procedures, documentation turnover packages operator training, and engineer/construction oversight. Daily customer interface on multiple projects and direction of multiple start-ups all. Started as a Project Controls specialist in home office for LUZ and Blount Energy Projects.

Director Pipeline/Transmission, GHR Transmission Corp., Houston, TX - Responsibility for managing staff on moving natural gas transmission from wellhead to customer.

Refinery Manager, GHR Energy Corp., Houston, TX - Responsibility for the management of a 300kbbl full-service refinery.

Manager of Construction, TCP Constructors (GHR), Houston, TX - Responsible for construction of $1.2B refinery expansion.

Vice President/General Manager, Dynalectric Corp. (ANECO Division) - Responsible for the profit and loss T&D, Industrial and Heavy Commercial Electrical Division Offices (6).

Russell Kingsley, CPP
Air Quality Discipline Lead

Professional History

AECOM, Project Manager, present

PGP Industries, Inc.

Kwikset Corporation

Education

B.S., Chemical Engineering, University of California, San Diego

Years of Experience

25

Technical Specialties

Air Permitting

Process Engineer

Environmental Auditing

Environmental Compliance

Professional Registrations and Affiliations

Certified Permitting Professional, South Coast Air Quality Management District

Mr. Kingsley has over 20 years of experience in managing and preparing air quality anal impacts analyses and permitting projects, comprehensive and complex environmental assessments of energy, industrial, and other projects, as well as preparing water resources, and hazardous materials assessments, and facilitating key stakeholder and regulatory agency coordination. Mr. Kingsley has a unique skill set that includes both an air quality and engineering background. He has been the air quality lead for AECOM's AFCs for Solar Millennium's proposed solar thermal projects at Blythe, Palen, and Ridgecrest, and participated in the lomar Energy Project, VV2, PHPP, the CalEnergy Black Rock 1, 2, 3 Geothermal Power Project Major Amendment, and the BSEP. He served as AECOM's project manager for the preparation a PTA application for the El Segundo Power Redevelopment Project. He also managed CEQA documents for four peaker plants proposed in southern California by SCE. He has evaluated the air impacts from installation of six combustion turbines and SCR on existing boilers at LADWP power plants.

Representative Project Experience

Solar Millennium, AFC and Air Permit Applications for Solar Thermal Energy Projects, California. Discipline lead for air quality portions of AFCs for three proposed solar thermal projects ranging in size from 250 MW to 1000 MW, two in Riverside County (Blythe and Palen) and one in Kern County (Ridgecrest). Has played a lead role in responding to information requests from the regulatory agencies throughout the licensing process. Also has prepared the air permit applications for all three projects, responded to information requests from the respective air agencies (South Coast AQMD, Mojave Desert AQMD, and Kern County APCD), and interacted with air agency staffs. Finally, he provided review and oversight of the public health portion of the AFC.

Confidential Client, AFC and Air Permit Application for Solar Energy Power Plant, California. Prepared the air quality and hazardous material sections of a CEC AFC and the air permit application for a 250 MW solar power plant in California. Work involved evaluation of the engineering design of the solar collector/concentrator plant design to determine hazardous material usage, air emission points and air emission estimates, in addition to document preparation.

Inland Energy, Application for Certification for Victorville 2 Power Project, California. Prepared the hazardous materials section of the California Energy Commission (CEC) Application for Certification (AFC) for the Victorville 2 hybrid power project which includes a conventional gas turbine-based combined cycle power plant with a 50 megawatt (MWe) solar collector/concentrator power plant. Continuing to support the project by evaluating the proposed mitigation measures, and preparing responses to public comments on behalf of the Mojave Desert Air Quality Management District (MDAQMD) for the Determination of Compliance for the project air permit**.**

Confidential Client, Air Permit Application for Solar Energy Power Plant, Nevada. Prepared the air permit application for a 180 MWe solar energy plant in Clark County, Nevada. Work involved evaluation of the engineering design to determine emission points, preparation of the process description, preparation of air emission estimates and regulatory compliance evaluation.

CalEnergy, Black Rock Geothermal Project, California. Discipline lead for air quality for the 159-MW Black Rock Geothermal Project proposed near Calipatria in Imperial County. As proposed, the project was a major modification (different geothermal technology, different facility configuration) to a previously licensed geothermal project proposed by the same applicant at the same site. Because of the extent of the modifications to the previously licensed project, a completely revised air quality analysis was required.

Southern California Edison, CEQA IS/MND for Four Peaker Power Plants, California. Project Team Leader for the preparation of four California Environmental Quality Act (CEQA) Initial Study / Mitigated Negative Declarations (IS/MND) for four peaker power plants in Southern California. The peaker plants employed 45 MWe combustion turbines. In addition to project management, prepared the project descriptions, air quality, hazardous materials, and energy sections of the ISs, coordinated the use of five subcontractors, and provided overall quality control for the project. The four IS/MNDs were prepared in under three months from project kick-off, and certified by the SCAQMD, the lead agency, six weeks following submittal.

Woodside, Land Use Permit Application for LNG Terminal, California. Prepared the hazardous materials section of the Land Use Permit application for the proposed Woodside Liquified Natural Gas (LNG) Deepwater Port terminal. The LUP is the application that initiates the CEQA review; ENSR's approach was to supply a CEQA-equivalent application to the State Lands Commission. Work included evaluation of hazardous material impacts from construction and operation of both on-shore and offshore facilities. Also supported the Project by contributing to the Best Available Control Technology analysis for the shipboard equipment, and quality control review of the air permit applications.

Constellation Power, Audit, California. Conducted a

comprehensive review of current air permit requirements in support of certification of the initial Title V application for the High Desert Power Project (HDPP). The review included the risk management plan as well as CEMS data, source tests, and other requirements of the MDAQMD and EPA PSD permits. Other assistance at this facility has included preparation of MDAQMD air permit applications for the fire water pump and an emergency generator.

FPL Energy, Audit, California. Conducted a comprehensive audit of current air permit requirements in support of certification of the initial Title V application for the Blythe Energy Project (BEP). The audit included a review the risk management plan as well as CEMS data, source tests, and other requirements of the MDAQMD and EPA PSD permits.

Covanta Stanislaus, Inc., Audit, California. Conducted a comprehensive audit of air programs and permits at Covanta's waste-to-energy facility in the San Joaquin Valley in California.

Honolulu Resource Recovery Venture, Oahu, Hawaii. Conducted a comprehensive audit of air programs and permits at Covanta's waste-to-energy facility in Hawaii.

Cargill, California. Assisted in the preparation of Risk Management Plans meeting the California Accidental Release Prevention (CalARP) program requirements for two ammonia refrigeration systems operated by Cargill Foods.

The Wood Group, Kings River Conservation District Peaker Plant, Fresno, California. Assisted in the preparation of the initial California Accidential Release Prevention Program Risk Management Plan (RMP) for a Selective Catalytic Reduction system at a new peaker power plant near Fresno.

United Airlines, Oakland, California. Performed air compliance audits of United's maintenance facility adjacent to the Oakland airport and the terminal operations at the airport.

The Valspar Corporation, Los Angeles, California. Prepared annual air emissions reports for two facilities in the Los Angeles area. Project involved implementing innovative emission estimation techniques.

California Portland Cement, Riverside, California. Assisted in evaluation of NSR and PSD requirements for the restart of a coal-fired fluidized bed boiler used for electrical generation at the facility in the SCAQMD. Investigation included BACT analysis, emission calculations and compliance determinations.

United Airlines, San Francisco, California. Prepared air permit application for jet engine test stand modification at United's maintenance facility in San Francisco.

Romic Environmental Services, Inc., East Palo Alto, California. Applied for and received numerous permits to construct at a solvent recycling facility in the Bay Area. Permit applications for tanks,

solvent transfer operations, and a truck wash-out station were included in the submittals.

DENNIS LARSON
Economist, Sustainable Economics Practice

SUMMARY
Manages large-scale, high-profile, and controversial projects

Coordinates preparation of environmental review documents

Provides technical expertise to socio-economic, planning, and environmental endeavors

EDUCATION
MA, Economics, San Diego State University 2003

BA, Geography, San Diego State University 2001

AFFILIATIONS
American Planning Association

Urban Land Institute

An economist for over 6 years, Dennis is responsible for managing socio-economic and economic projects, performing community impact analysis, and developing economic policy. His areas of expertise include economic and social impact assessments, project and program management, and analytical support for local government general and community plans. Dennis has extensive experience preparing proposals, developing scopes of work, budgets and schedules, and managing client relationships.

Dennis' experience managing and performing complex economic, demographic, and land use studies lends a unique and creative approach to our projects. His experience in the private and public sectors gives him a valuable dual perspective, resulting in project contributions of great depth and breadth. Through strong analytical, creative and management skills, he anticipates opportunities and issues, and develops comprehensive solutions that help advance projects toward implementation.

PROJECT EXPERIENCE

Solar Millennium Blythe and Palen Application for Certification,
San Bernardino and Riverside counties, CA
Economist
CLIENT: Solar Millennium
For the Application for Certification, prepared the economic and socioeconomic analysis related to two proposed solar electric power plants in southern California. Analysis included impacts to local public services as well as application of an IMPLAN model to anticipate economic- and employment-related impacts.

Mojave Solar Project Application for Certification,
San Bernardino, CA
Economist
CLIENT: Abengoa, Inc.
For the Application for Certification, prepared the economic and socioeconomic analysis related to a proposed solar electric power plant in southern California. Analysis included impacts to local public services as well as application of an IMPLAN model to anticipate economic- and employment-related impacts.

Beacon Solar Project Application for Certification,
San Bernardino, CA
Economist, Assistant Project Manager
CLIENT: Florida Power and Light
For the Application for Certification, prepared the socioeconomic analysis related to a proposed solar electric power plant in southern California. Analysis included impacts to local public services as well as application of an IMPLAN model to anticipate economic- and employment-related impacts.

Invenergy Borrego Valley PV Solar Application for Certification,
San Diego, CA
Economist, Assistant Project Manager
CLIENT: Invenergy, LLC
Provided project and financial management support related to the Application for Certification. Developed IMPLAN methodology to model anticipated impacts of the project on economics and socio-economics of the region.

DENNIS LARSON

Bay Delta Conservation Plan EIR/EIS, Central Valley, CA
Economist and Project Manager
CLIENT: HDR (California DWR)
The BDCP is being developed to provide for the conservation of identified sensitive species and their habitats while improving water supply reliability. The Socioeconomic Existing Conditions Report will analyze the impacts of alternative conservation actions including improved water conveyance infrastructure in the Delta. Dennis is responsible for describing employment characteristics, workforce characteristics, agricultural uses, and recreational uses. He will also provide a description of the demographic, socioeconomic, housing, and social characteristics present within the study area and, for comparison purposes, within the larger region surrounding the study area. Additionally, Dennis will perform economic impact analyses for the alternative actions.

I-5/SR 56 Realignment Community Impact Assessment; Technical Appendix to I-5/SR 56 Realignment EIR/EIS, San Diego, CA
Economist
CLIENT: San Diego Association of Governments (Caltrans)
The Community Impact Assessment supports the environmental review of the proposed I-5/SR-56 Interchange project. The proposed project would provide improvements to the existing interchange between I-5 and SR-56, and would include alternatives ranging from construction of direct connectors to surface street improvements. Dennis is responsible for preparation and management of the socio-economic and economic studies assessing impacts to adjacent communities as a result of the proposed development.

SR 76 East, EIS/EIR - San Diego County, CA
Economic Planner
CLIENT: Caltrans
Economic planner for wide-ranging environmental studies for this 4.5 mile highway widening project, located within the San Luis Rey River Valley, in northern San Diego County.

San Joaquin River Restoration Project Socioeconomic Technical Memorandum; Technical Appendix to San Joaquin River Restoration Project EIR/EIS, Central Valley, CA
Economist
CLIENT: MWH (U.S. Bureau of Reclamation)
Economic planner for the development of a socioeconomics affected environment technical report to be used as part of an EIS for the Bureau of Reclamation. The technical report described the population, demographics, industry sectors, employment, and taxation within 11 counties of central California. The usage of water for crop production by Friant Division Water Contractors was described, along with a description of crops grown within 6 counties and the economic value of such crops within the area.

Spokane Tribe Casino Project EIS and Two-Part Determination – Airway Heights, Spokane County, WA
Economist, Assistant Project Manager
CLIENT: Spokane Tribe of Indians
Economist for development of an EIS and a Two-Part Determination for a proposed casino project within the City of Airway Heights, near Spokane, Washington. Currently coordinating with Tribal contacts regarding an update to a master plan, a market research study, and a traffic study for the proposed project. The Two-Part Determination will make an assessment of whether the proposed project would be beneficial to the Tribe and whether the proposed project would be detrimental to surrounding communities.

DENNIS LARSON

Grow the Force Programmatic EA, Camp Pendleton, CA
Economist
CLIENT: NAVFAC Southwest
Project involves extensive multidisciplinary environmental work related to the expansion of the number of Marines assigned to Camp Pendleton.

Topock Compressor Station EIR, Needles, CA
Economic Planner
CLIENT: California Department of Toxic Substances Control
Analyzed the potential project impacts on the surrounding socioeconomics of the region for all project components. The socioeconomic impact analysis involved a discussion of tribal socioeconomic concerns and the creation of an IMPLAN impact analysis.

Agua Caliente New Casino EA, Palm Desert, CA
Economist
CLIENT: Agua Caliente Band of Cahuilla Indians
Served as the economist for an EA of the proposed new casino on the Agua Caliente Band of Cahuilla Indians Reservation. The proposed new casino will be located on a 36-acre parcel. An environmental impact analysis was conducted to address land use, traffic circulation, noise, air quality, drainage/water quality, visual aesthetics, public services/utilities, public safety, cultural resources, biological resources, geology/soils, and socioeconomics. Based on the analysis, an EA has been prepared and conforms to the specifications of the Tribal Environmental Policy Act.

Navy Broadway Complex Redevelopment EA, San Diego CA
Economist
CLIENT: Naval Facilities Engineering Command Southwest
Served as the lead economist in the preparation of an EA for the redevelopment of the Navy Broadway Complex in downtown San Diego. Prepared socioeconomics section of the document and coordination with Navy staff to tackle issues related to economic and fiscal impacts.

Guava Street Bridge Replacement EA, Murrieta, CA
Assistant Project Manager
CLIENT: City of Murrieta and Caltrans District 8
Assisted in managing the completion of various technical studies, including biological, cultural (ASR and HPSR), air quality, noise, traffic, and hazards reports, and an IS/EA to meet Caltrans' requirements. The project aims to remove an existing bridge over Murrieta Creek at Washington Street and install a bridge and construct a roadway extension at Guava Street.

Northeast Fairfield Station Market Strategy, Industry Cluster Analysis, Fiscal Impact Analysis, and Financing Plan, CA
Economist
CLIENT: City of Fairfield
Market strategy and financing plan for a large scale master-planned community directly adjacent to a new Amtrak Station as part of the Capitol Corridor line. The market study evaluates viable rail logistics uses that could locate in the planned research and development park as well as new nascent green industries, which could locate near a major transit hub in Fairfield, California. The market analysis also evaluates the timing and placement of higher density residential uses not currently present in Fairfield's residential market, analyzing household formation trends and corresponding shifts in housing demand. In addition, the financing plan analyzes the long-term fiscal impacts of the project, both from first-time capital improvements and the long-term service provision offered to the residents and employees. Where short-falls are identified, the plan recommends district-level financing mechanisms to ensure a long-term fiscal surplus to the City.

Mark Luttrell
Program Manager

Education

B.S and M.S., Civil Engineering, University of Virginia, University of Missouri

Years of Experience

With AECOM: 6
With other firms: 30

Mr. Luttrell has more than 30 years of experience in managing large, complex environmental planning, assessment, and permitting programs in the energy sector. He has extensive experience leading multi-disciplinary teams of scientists and engineers and multiple offices performing integrated tasks, often driven by fast track schedules. He is expert in developing regulatory strategies and environmental design basis documents for capital improvement and greenfields projects and has managed numerous environmental impact assessments and applicant's filings for pipelines, refinery modernization, energy facilities, and infrastructure projects in the Western US and internationally. Mr. Luttrell's program management skills have been brought to bear on a number of complex environmental projects, including lead responsibility for licensing and environmental management during construction of a large diameter gas pipeline from Canada to Southern California under certificates issued by the FERC and CPUC. He has also been responsible for environmental permitting and compliance for a number of energy developments and construction projects throughout the Western U.S., including major project developments on BLM lands. He is an expert in site selection methodologies and has lead site selection studies for several large energy development facilities in California.

Representative Project Experience

Solar Millennium Solar Thermal Power Plants, California.
Currently serving as AECOM's Program Manager for development of three concurrent Authorization for Certification (AFC) applications to the California Energy Commission and ROW applications to the Bureau of Land Management for 1,750 MW of power generation in the Mojave and Colorado Basin Desert areas of Southern California. Responsible for managing 80 person AECOM Team working jointly on environmental baseline inventories, resource impact assessments, preliminary engineering design, including site development, surface drainage systems and controls, and infrastructure, and federal and state permitting. Two of the 15 square mile sites involve areas formerly used for military training and operations, requiring attention to UXO/MEC issues. Developed and implemented the program's Health and Safety Program covering risks of working in extreme temperatures and remote areas. Responsible for integrating parallel engineering and environmental efforts to achieve aggressive schedule milestones driven by federal ARRA funding windows.

PG&E-PGT Pipeline Expansion Project, Canada and U.S.
Responsible for final design and construction of an 845-mile, 42-inch

natural gas transmission pipeline constructed from the Canadian Border to Southern California. Directly responsible for performance of environmental mitigation, compliance inspection, surveys, monitoring, and reporting for this $1.3 billion fixed price contract involving simultaneous construction in four Western states. Directed a staff of 65 engineers, scientists, and environmental compliance inspectors in implementation of $60 million in environmental mitigation requirements.

Alaska Natural Gas Transportation System (ANGTS), Alaska. Managed the environmental engineering design effort for the 743-mile Alaska segment of the Alaska Natural Gas transportation System (ANGTS), a 48-inch gas pipeline from Prudhoe Bay to the Canadian border. Responsible for design of water and wastewater utilities for construction camps and compressor stations, fuel storage facilities, hazardous material management, oily and hazardous waste disposal systems, emissions equipment, borrow sites, and solid waste disposal sites. Presented the project's position in public hearings on air and wastewater discharge permits. Authored mitigation plans required by federal and state right of way permits, including air quality, water quality, pesticides, and hazardous waste management. Managed environmental compliance against conditions of BLM and State DNR land use permits during 3-year pre-construction period, including development of frost heave test sites, field camps, and 2,200 borehole geotechnical program.

Bay Area Refinery, California. Performed as Project Manager for confidential project to increase refinery throughput through increased deliveries of crude oil across existing wharf. Responsible for permitting strategy, implementation plan, and development of applications to lead agencies and Bay Area AQMD; a strategy laid out that will minimize overall permitting timelines, multiple documents are being produced to cover the range of potential outcomes from initial agency determinations.

Woodside Oceanway Project. Responsible for regional multi-attribute site selection study to identify, assess, and rank candidate development sites for LNG terminals along coastal segments from Monterey to San Diego. The study considered both engineering and environmental constraints offshore and onshore, and resulted in selection of a terminal site off the LA Basin and pipelines to a landfall west of LAX.

British Gas/Williams Pipeline Corporation, Interstate Pipeline Filing, Alaska. Responsible for filings to the State of Alaska for certification to build an interstate pipeline to ship natural gas from the North Slope to Lower 48 markets, in response to the Alaska Gasoline Inducement Act (AGIA) of 2007. Managed engineering and environmental task force responsible for sections of the filing**.**

US Army Corps of Engineers, Total Environmental Remediation (TERC) Contract, Sacramento, California. Responsible for $260 million TERC II contract with Sacramento District US Army Corps of Engineers (USACE). Managed $27 million contract for environmental remediation of Oakland Army Base, anchor base for TERC program. Responsibilities included contract, cost and schedule, regulatory

interface, and technical management of planning and execution of clean up actions for contaminated sites onshore and within adjoining wetlands and tidal areas of San Francisco Bay.

Chevron Waste Discharge Order Project, Richmond, California. Between 1991 and 1994, managed the partnership responsible for $55 million site investigation and design phase, and engineering support to construction pond and landfill closure program at Chevron USA's Richmond, California refinery. The program involved designing and installing a 35,000-foot slurry wall and extraction trench system around the perimeter of the refinery as well as closure of four major landfills.

Major Refinery, Crude Flexibility Project, Bay Area, California. Conducted permitting program in support of a crude flexibility project for a Bay Area refinery. Scope involved development of the Project's permitting strategy and plan, preparation of Land Use Permit applications, ATC application to Bay Area AQMD, and associated CEQA documentation filed with Contra Costa County as lead CEQA agency.

Tesoro Golden Eagle Refinery Coker Modification Project, Bay Area, California. Responsible for permitting effort associated with replacement of GER's fluidized bed coker with a delayed coker unit. Managed baseline surveys and development of Applicant's filings to Contra Costa County's Community Development Department and Bay Area AQMD, in response to abatement order. Led the development and implementation of the Project's permitting strategy, including preparation of draft and final permit application packages.

Shell/Bechtel Mare Island LNG Complex, Vallejo, California. Served as Environmental and Regulatory Manager for proposed LNG terminal, regasification facility, and power plant located on former naval shipyard at Vallejo, CA. Responsible for site screening studies, site confirmation studies, risk screening, regulatory schedule, and project HAZID**.**

PTT Thailand Offshore Developments, Thailand. Acted as HSE Manager for Front-end Engineering (FEED) and detailed design phases of various major pipeline developments, include PTT Thailand's Trans Thai Malaysia offshore to onshore gas field development in the JDA block and PTT's Third Transmission Pipeline Project (TTPP) offshore to onshore development.

Trans Caspian Gas Pipeline. As HSE Manager for Shell International E&Ps $2.6 billion Trans Caspian Gas Pipeline (TCGP) Project, prepared environmental design basis and EIA documents for delivery of natural gas from eastern Turkmenistan across the Caspian Sea through Azerbaijan and Georgia to markets in Turkey.

Natural Gas Company, NGC Cross Island Pipeline, Trinidad. Served as HSE Manager for Natural Gas Company of Trinidad's Cross Island Pipeline (CIP) Project for BP in Trinidad. Responsible for development of the HSE Management Plans, Regulatory Approval Plans, Baseline Studies Programs, Health and Safety Plans, Stakeholder Involvement Plans, and Security Plans as well as

ongoing oversight.

Saudi Arabian Bechtel Company (SABCO), EIA Program Development, Kingdom of Saudi Arabia. Served as Manager of Environmental Technology for Saudi Arabian Bechtel Company (SABCO), responsible for three year, $14 million technology transfer program providing 40 environmental engineers and scientists to the Meteorology and Environmental Protection Administration of the Kingdom of Saudi Arabia. Responsible for development of the Kingdom's wastewater and hazardous waste regulatory program, including licensing procedures for the first Class I disposal facility. Also responsible for development of the Kingdom's environmental impact assessment and coastal zone management programs and procedures.

ARCO Kangean Block Offshore Development, Indonesia. Conducted the preparation of EIA for ARCO's Kangean Block gas development, including four offshore gas production platforms adjacent to remote coral atolls in the Java Sea north of Bali, onshore gas conditioning facilities, a gas liquids marine terminal, and a 300 mile marine pipeline to Java. Prepared first EIA under new Indonesian environmental regulations patterned after World Bank requirements. The project became operational in 1992.

OXYPetroleum/Shell Western E&P San Miguel Project. Served as Environmental Project Manager for the largest offshore oil production platform in North America and the first in the Santa Maria Basin off San Luis Obispo County. Developed the regulatory strategy environmental permitting plan for this controversial project and managed offshore routing and onshore facility siting studies in two central California counties. Conceived and managed overall federal, state, and local permitting program, including preparation of all submittals and agency interactions and support to EIS/EIR and public hearings. The project was approved in January 1988.

ARCO Alaska Asian Gas System, Alaska. Responsible for development of environmental design basis for an 809-mile natural gas pipeline, gas conditioning plant, and coastal LNG complex in Alaska proposed by ARCO, and developed environmental engineering design criteria for construction and operations. This environmental design basis document was integrated into the project's feasibility-level cost estimate provided to lenders.

Central California Coastal Oil Field Expansions, California. Conducted environmental feasibility studies for two other major coastal projects in California: an oil field expansion for Shell California Production, Inc.; and a grass-roots refinery proposed for Chevron USA, Inc. Developed conceptual design basis for emission controls, wastewater treatment, and hazardous waste management, developed siting approach, and managed county-wide siting study in Santa Barbara County.

FERC Filings, ANGTS, Alaska. Managed environmental exhibits of Northwest Pipeline Company's application to construct the Alaska segment of the Alaska Natural Gas Transportation System (ANGTS) that was submitted to the Federal Energy Regulatory Commission.

Organized and supervised the cost and technical performance of approximately 25 geotechnical engineering and environmental contractors contributing to the application. Managed preparation of all environmental documents for the ANGTS Alaska segment and environmental-related licensing testimony to FERC.

DOE Strategic Petroleum Reserve, Texas and Louisiana. Conducted an environmental siting and design review of DOE's Strategic Petroleum Reserve oil storage and transportation facilities in Texas and Louisiana

Socal Gas and Northwest Pipeline Company Interstate Transmission Associates Pipelines, Idaho and Washington. Served as PM and Deputy PM for FERC filings for two proposed natural gas pipeline systems in the northwest U.S.: the Interstate Transmission Associates (ITA) pipeline from northern Idaho to Southern California and the Northwest Energy Company system expansion project in Northern Idaho and Washington**.**

Trans Alaska Oil Pipeline, Routing and Siting Studies, Alaksa. Participated in routing and siting studies for the Trans Alaska Pipeline System (TAPS) oil pipeline design and in development of construction procedures. Member of select four-person team seconded to prepare documentation demonstrating the extent to which the TAPS design compiled with Department of Interior stipulations to mitigate environmental damage. Prepared surface water quality and waste management portions of the analysis and corresponding mitigation plans. The Team's Stipulation Compliance Document was a central element of the final petitions for grant of right-of-way for TAPS and the Congressional authorization.

Scott McMillan
Biologist

Education
BS, Biology, San Diego State University, 1991

Professional Affiliations
Member, California Native Plant Society
Research Associate, San Diego Natural History Museum

Publications + Technical Papers
Bauder, E. T. and S. McMillan. 1996. Current distribution and historical extent of vernal pools in southern California and northern Baja California, Mexico. Proceedings from the 1996 conference: Ecology, Conservation, and Management of Vernal Pool Ecosystems. Sacramento. Published by the California Native Plant Society.

Bauder, E. T.; A. D. Kreager; and S. McMillan. 1998. Recovery Plan for the Vernal Pools of Southern California. Written for the U.S. Fish and Wildlife Service, Portland.

McMillan, S. 1995. A morphometric and systematic study of the southern California species in the genus Pogogyne (Lamiaceae). Presented at the 1996 Conference for the American Institute of Biological Sciences. San Diego.
McMillan, S. 1995. The vernal pools of southern California and northern Baja California, Mexico. Presented at the 1996 Conference for the American Institute of Biological Sciences. San Diego.

McMillan, S. 1995. Vernal pools and the coastal sage scrub community. Presented at the 1995 seminar: Coastal Sage Scrub; A Vanishing Habitat. Quail Botanical Gardens, Encinitas.

McMillan, S. 1996. The systematics, biogeography, and ecology of the genus Pogogyne (Lamiaceae). Proceedings from the 1996 conference: Ecology, Conservation, and Management of Vernal Pool Ecosystems. Sacramento. Published by the California Native Plant Society.

McMillan, S. 1996. The vernal pools of southern California and northern Baja California, Mexico. Presented at the Symposium for Botanical Research in Baja California and Adjacent Areas. Universidad Autonoma de Baja California, Ensenada, Mexico.

Scott McMillan has conducted botanical consulting in the southern California floristic province for over 17 years. He has conducted work in Orange, Los Angeles, and Riverside counties, but the majority of his work has been in San Diego County. Mr. McMillan has conducted hundreds of vegetation and general botany surveys as well as hundreds of rare plant surveys. Mr. McMillan has conducted surveys for almost all of the habitat types found in southern California, including coastal sage scrub, chaparral, vernal pools, riparian, dune and saltmarsh, and oak woodland.

Mr. McMillan has not only worked in botany as a consultant but has also conducted botanical research as part of his unfinished thesis, as well as with Dr. Ellen Bauder, Dr. Michael Simpson, and Dr. John O'Leary at San Diego State University (SDSU). Mr. McMillan was an instructor at SDSU (general biology and botany) as well as the University of San Diego (botany). He has given many scientific presentations on the species and habitats in southern California, especially on vernal pools and the species found in them. Mr. McMillan is coauthor on the Fish and Wildlife's Vernal Pool Recovery Plan, as well as the Checklist of the Vascular Flora of San Diego County. His list of scientific publications includes the Current Distribution and Historical Extent of Vernal Pools in Southern California and Northern Baja California, Mexico (coauthored with Dr. Ellen Bauder and published in the California Native Plant Society's Proceeding from the 1996

conference: Ecology, Conservation, and Management of Vernal Pool Ecosystems). Mr. McMillan has extensive experience with almost all of the sensitive plant species and habitats in San Diego County. This experience includes knowledge of species identification and distribution, as well as the affinities that these species have toward habitat type, soil type, hydrological regime, and other ecological factors.

In addition to conducting rare plant surveys, Mr. McMillan has also conducted Quino checkerspot butterfly, fairy shrimp, California gnatcatcher surveys. He is also responsible for authoring many biological technical reports, work plans, and restoration and management plans for projects in San Diego County. As part of these projects, Mr. McMillan has coordinated and scheduled other biologists, equipment operators, surveyors, and landscape maintenance crews.

Restoration Ecologist Introduction

Mr. McMillan has 10 years of experience conducting numerous restoration projects on a wide range of habitats. He has conducted restoration of mountain meadow, riparian woodland, coastal sage scrub, chaparral, and vernal pool habitats throughout the southern California region. In addition, Mr. McMillan has also conducted desert habitat restoration projects on creosote scrub in Imperial County, ironwood woodland in San Diego County, and cottonwood/willow riparian habitat in Anza Borrego State Park. As with the surveys experience, Mr. McMillan's experience in native habitat restoration has often been associated with vernal pools and other sensitive species habitats. These efforts have often been associated with mitigation for impacts to sensitive species such as San Diego fairy shrimp, Riverside fairy shrimp, Otay Mesa mint, San Diego mesa mint, San Diego button-celery, spreading navarretia, California gnatcatcher, cactus wren, and Quino checkerspot butterfly.

Desert Survey Introduction

Mr. McMillan has mapped vegetation and conducted rare plant and general botanical surveys throughout the Colorado and Mojave deserts of California. The areas surveyed include most of Anza Borrego State Park and the Providence Mountains State Recreation Area, where both upland and riparian areas were surveyed. He is familiar with most of the sensitive plant species and vegetation types that occur in the deserts of San Diego and Imperial counties. Mr. McMillan has also conducted vegetation assessment and rare plant surveys in numerous areas of the Mojave Desert, in both the western and eastern portions.

Project Experience

Sweetwater Authority Sweetwater Reservoir Botanical Surveys, Rare Plant Surveys, and Vegetation Mapping
Conducted general botanical surveys, rare plant surveys, and vegetation mapping on multiple project areas around Sweetwater Lake. Also conducted fairy shrimp surveys and wrote a management and restoration plan.

South Bay Expressway State Route 125 South Vernal Pool and Quino Checkerspot Butterfly Habitat Restoration,
San Diego County, CA
Directing restoration implementation, maintenance, and monitoring of the first habitat restoration designed specifically for the federally endangered Quino, as well as the restoration of over 100 vernal pools on Otay Mesa.

Mass 3 Preserve Vernal Pool Enhancement and Habitat Management Plan, Marine Corps Base Camp Pendleton, CA
Authored the Enhancement and Management Plan for coastal sage scrub, native grassland, and vernal pool habitats on the Mass 3 Preserve area.

City of San Diego Vernal Pool and Quino Checkerspot Restoration and Management Program, CA
Conducted the fieldwork and data collection. Authored portions of the report to the City, County of San Diego, regulatory agencies, and SANDAG. Report analyzed numerous vernal pool locations within San Diego for restoration and management needs. Report included recommendations for implementation at six sites, where habitat was restored for vernal pools and Quino checkerspot butterfly. Directed the implementation of weed control, seed collection, plant propagation, and monitoring.

Dennery West Vernal Pool and Quino Checkspot Butterfly Restoration and Management Program, CA
Conducted the fieldwork and data collection. Authored the Restoration, Management, and Monitoring Plan for vernal pools, Quino checkerspot butterfly, burrowing owls, and California gnatcatcher. Plan was approved by the regulatory agencies as mitigation for impact on State Route 905.

Surveys and Assessment of Selected *Acanthomintha ilicifolia* Populations in San Diego County, CA
Conducted the fieldwork and data collection. Authored portions of the report to CDFG. Work was performed prior to joining this firm.

Meadow Restoration at Cuyamaca Lake, Cuyamaca Rancho State Park, CA
Helped to develop the restoration plan and conduct a watershed analysis. Directed implementation and data collection. Work was performed prior to joining this firm.

Post Fire Vegetation Analysis of Coastal Sage Scrub Sites in San Diego, Orange, and Riverside Counties
Vegetation sampling, species identification, and data analysis. Data was published by in a scientific journal. Work was performed prior to joining this firm.

California State Parks, Vegetation and Rare Plant Survey of the Anza Borrego State Park, CA
Vegetation sampling and surveys for rare plants and wildlife. Data analysis and report preparation. Work was performed prior to joining this firm.

California State Parks, Vegetation Survey of Providence Mountains State Recreation Area, CA
Vegetation sampling and rare plant surveys at the 5,900-acre State Recreation Area. General wildlife surveys. Authored report to California State Parks. Work was performed prior to joining this firm.

NAVFAC Southwest, Rare Plant and Wildlife Surveys at the Naval Radio Receiving Facility in Imperial Beach and Naval Amphibious Base in Coronado
Rare plant surveys and vegetation analysis. Conducted wildlife surveys on the dune habitat. Authored portions of the report to NAVFAC Southwest. Work was performed prior to joining this firm.

Marine Corps Base, Camp Pendleton, Biological Survey for Rare Plants at Marine Corps Base, Camp Pendleton, CA
Rare plant surveys with GIS mapping. Authored report to Southwest Division. Work was performed prior to joining this firm.

Marine Corps Base, Camp Pendleton, Biological Survey for Vernal Pools at Marine Corps Base, Camp Pendleton, CA
Vernal pool surveys with GIS mapping. Authored report with management recommendations to NAVFAC Southwest.

California Transportation Venture, Inc., State Route 125 Quino Checkerspot Butterfly Surveys and Habitat Assessment
Conducted habitat assessment and butterfly surveys. Updated vernal pool and rare plant surveys for SR-125. Authored a report with management and restoration recommendations.

Revegetation Monitoring on Pipeline Segments for the San Diego County Water Authority (SDCWA)
Helped to develop and implement restoration of coastal sage scrub, chaparral, and riparian habitats. Conducted monitoring and authored reports to SDCWA. Work was performed prior to joining this firm.

San Diego City Schools, Scripps Ranch High School Riparian Revegetation Plan and Monitoring Project
Developed restoration plan and directed implementation and monitoring. Authored reports to San Diego City Schools. Work was performed prior to joining this firm.

Marine Corps Air Station Miramar, Restoration of Vernal Pools at the Miramar Mounds National Natural Landmark (Group U), Marine Corps Air Station Miramar
Conducted vernal pool surveys of the entire base. Authored a restoration plan for the Group U vernal pools. Directed implementation, maintenance, and monitoring of over 100 vernal pools. Authored reports to Marine Corps Air Station Miramar.

City of San Diego Vernal Pool and Coastal Sage Scrub Restoration and Preservation Plan on Otay Mesa
Authored Restoration Plan for vernal pool habitat. Directed implementation, maintenance, and monitoring. Authored report to the City of San Diego. Work was performed prior to joining this firm.

Dennery Canyon Vernal Pool, Coastal Sage Scrub, and Mule Fat Scrub Restoration and Preservation Plan
Directed restoration implementation, maintenance, and monitoring of over 300 vernal pools on Otay Mesa for Pardee Construction. Work was performed prior to joining this firm.

Sweetwater Authority, Sweetwater Reservoir Botanical Surveys, Rare Plant Surveys, and Vegetation Mapping
Conducted general botanical surveys, rare plant surveys, and vegetation mapping on multiple project areas around Sweetwater Lake. Also conducted fairy shrimp surveys and wrote a management and restoration plan.

Caltrans, Bonita Meadows General Botanical Surveys, Rare Plant Surveys, Vegetation Mapping and Restoration Recommendations
Conducted general botanical surveys, rare plant surveys, and vegetation mapping on a 200-acre parcel for a habitat preservation bank associated with I-15 and SR-125. Also wrote management and restoration recommendations. Work was performed prior to joining this firm.

U.S. Department of General Services, Jamul Ranch General Botanical Surveys and Rare Plant Surveys, Jamul, CA
Conducted general botanical surveys and rare plant surveys on the 2,000 + acre Jamul Ranch Preserve (California Department of Fish and Game). Also wrote management and restoration recommendations.

City of San Diego, City of San Diego MSCP Rare Plant Surveys, Mapping, and Monitoring Program
Conducted general botanical surveys and rare plant surveys on the City of San Diego’s MSCP lands (over 5,000 acres and 150 parcels). Also established permanent monitoring sites and conducted baseline sampling. Management and restoration recommendations were also provided.

CalEnergy Operating Company, Black Rock Geothermal Energy Project. Imperial County, California
Managed the biological surveys and reporting for wildlife, botany, and wetland delineations on the proposed Black Rock Geothermal facility. The Black Rock Geothermal facility would extract geothermal brine from production wells to operate a Power Generation Facility (PGF) consisting of a condensing turbine/generator, gas removal and abatement systems, and the heat rejection system. It also includes a solids handling facility for brine solids processing, brine ponds, and steam polishing equipment designed to provide turbine-quality steam to the PGF. Authored the biological sections (existing, impacts, and mitigation) for the Application for Certification (AFC) to the California Energy Commission (CEC).

Douglas M. Moss

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Firm/Expert Profile:

Douglas Moss (BS Engr, MS Engr, MBA, JD) is a trained and experienced professional pilot and engineer. He provides research and investigations of aircraft accidents to determine the causal factors. His professional experience spans over 30 years in aviation as an engineer and professional pilot, including assignments as a USAF fighter pilot, USAF experimental test pilot, McDonnell Douglas engineering test pilot, airline pilot, and general aviation pilot. His academic education includes both bachelor and master degrees in engineering, with additional advanced degrees in business and law. He has also been a faculty instructor at the USAF Test Pilot School, teaching aircraft certification, flying qualities, performance, systems, and human factors.

His analysis of aviation accidents typically involve the following considerations:

- Engineering and scientific bases
- Operational factors
- Human factors
- Aircraft certification compliance (14 CFR Parts 21 and 25)
- FAR statutory compliance (14 CFR Parts 91, 121 and 135)
- Strict products liability
- Aircrew standard of care

Professional Experience:

Over 10,000 flight hours
USAF experimental test pilot
McDonnell Douglas engineering test pilot
USAF Test Pilot School instructor
Airline pilot
ATP Typed DC-9, MD-80, MD-90, MD-11, A320 and Flight Engineer
Qualified in various models of Cessna, Piper, and Beechcraft

Education/ Training:

Concord Law School, Juris Doctor
University of Phoenix: Master of Business Administration
Georgia Institute of Technology: Master of Science – Mechanical Engineering
Georgia Institute of Technology: Bachelor of Engineering - Nuclear Engineering
US Air Force: USAF Test Pilot School, Air War College, Air Command & Staff College, Squadron Office School

Professional Qualifications:

Airline Transport Pilot
Type Certificates: A320, MD-11, DC-9 (MD-80, MD-90)
Type Qualifications: F-15, F-4, A-37, T-33, T-34, T-37, T-38, T-46
Single-Engine, Land & Sea; Multi-Engine; Instrument
Flight Engineer – Turbojet Powered

Professional Affiliations:

Society of Experimental Test Pilots
Air Line Pilots Association
Aircraft Owners and Pilots Association
American Institute of Aeronautics and Astronautics
Society of Automotive Engineers - SAE International
Association of Aviation Psychology

Julie Ogilvie, Esq.
Regulatory Project Manager

Education
JD, Environmental Law Certificate, University of California, Davis, 2006
MS, Ecology, Environmental Policy Analysis, University of California, Davis, 2006
BA, Economics, Cum Laude, Claremont McKenna College, Claremont, California, 1999

Professional Registrations
State Bar of California License #251775

Professional Affiliations
Member, California Bar Association
Member, Environmental Law Section, State Bar of California

Publications + Technical Papers
An Analysis of Factors Influencing Adoption of Environmental Management Practices in Viticulture: A Comparison of Napa, Sonoma and Mendocino Counties. Master's Thesis, University of California, Davis. September 2006.
Regional Development, Population Trend, and Technology Change Impacts on Future Air Pollution Emissions in the San Joaquin Valley. Michael Kleeman, Deb Niemeier, Susan Handy, Jay Lund, Song Bai, Sangho Choo, Julie Ogilvie, and Shengyi Gao. University of California, Davis. 2005.
Co-Author of Index of Leading Environmental Indicators 2001 and 2002. Pacific Research Institute. 2001 and 2002.
The Politics of Biodiversity. The World and I Magazine. December 2002.

Training
California Wetlands, CLE International, 2008
Legal and Regulatory Foundations for Managing Aquatic Ecosystems, UC Berkeley Extension, 2007
Habitat Conservation Planning from Tahoe to the Bay, Northern California Conservation Planning Partners, 2007
Making Effective Use of Mitigated Negative Declarations, UC Davis Extension, 2007
Endangered Species Act, CLE International, 2006

Ms. Ogilvie brings thorough knowledge of environmental law and policy to AECOM. Ms. Ogilvie helps oversee all permitting interactions in the Walnut Creek Natural Resources Studio. She has extensive experience assisting clients in successfully completing the CEQA/NEPA process and obtaining approvals from the U.S. Army Corps of Engineers (USACE), U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), California Department of Fish and Game (CDFG), Regional Water Quality Control Board (RWQCB), State Lands Commission, California Department of Transportation, and the California Coastal Commission (CCC). Ms. Ogilvie specializes in waters and wetlands permitting under the Clean Water Act, California Porter-Cologne Act, and California Fish and Game Code; endangered species consultations under the Federal Endangered Species Act and California Endangered Species Act; coastal zone permitting under the California Coastal Act; and cultural and historical resources compliance under the National Historic Preservation Act. Ms. Ogilvie has authored numerous technical documents, including comprehensive Project Descriptions, NEPA documents such as Environmental Assessments and Natural Environment Studies, and CEQA documents such as Initial Studies and Mitigated Negative Declarations.

Prior to joining this firm, Ms. Ogilvie worked on land use and environmental issues associated with vineyard and winery development projects. She assisted clients in successfully obtaining necessary approvals as

well as ensuring compliance with the Clean Water Act, the Endangered Species Act, the California Environmental Quality Act, and the California Forest Practice Act. Before obtaining her combined law degree and Master's in Ecology, Ms. Ogilvie was an environmental public policy analyst at a think tank where she authored several large data and policy analysis studies. Her work included writing studies, public policy briefs, and opinion editorials on various topics, including land use issues, endangered species policy, air quality, water quality, and energy policy.

Ms. Ogilvie obtained her law degree and Master's in Ecology from University of California, Davis where she graduated in the top 25 percent of her class. She received the Witkin Book Award in Public Land Law and received the distinction of the Environmental Law Certificate.

Project Experience

Diablo Firesafe Council Best Management Practices Development, Contra Costa County, CA
As Regulatory Lead, worked with the Diablo Firesafe Council and U.S. Fish and Wildlife Service to develop a guidebook designed to familiarize land managers, homeowners, and communities in Contra Costa County with the most effective hazardous fuel treatment types suited for their landscapes. The guidebook also provides guidelines for protecting sensitive species and their habitats during implementation. Our guidelines take the form of best management practices, designed to streamline compliance with federal natural resource laws for small-scale hazardous fuel treatment projects, and are intended as a useful resource for a variety of audiences implementing hazardous fuel treatment projects in the County. Ms. Ogilvie prepared simplified flowcharts, easy to understand summaries, and user-friendly tables to convey the complex regulatory process in terms that the reader could understand and follow.

Sacramento Area Flood Control Agency (SAFCA)Natomas Levee Improvement Program, Sacramento, CA
We are leading the environmental compliance effort for SAFCA's program of flood control improvements to provide the Sacramento metropolitan area with a "200-year" level of protection. We prepared a program EIR and various CEQA (SAFCA lead agency) and NEPA (USACE lead agency) environmental documents for this four-phase critical, multi-year project. We are also assisting in the planning of implementation strategies, coordinating with regulatory agencies, preparing permit applications and related documentation, and providing extensive cultural resource and habitat surveys and monitoring support during geotechnical investigations and construction. As Regulatory Permitting Specialist, Ms. Ogilvie assisted with preparing an Individual Permit application to USACE, a Notice of Intent for a NPDES Stormwater permit from RWQCB, and a 1602 Streambed Alteration Agreement from CDFG for the project.

Three Rivers Levee Improvement Authority (TRLIA)Feather River Levee Repair Project EIR and Permitting, Yuba County,
We prepared the draft and final EIRs to address identified deficiencies in the Feather River levee and make related improvements to the Yuba River levee near its confluence with the Feather River. The EIR addressed three project alternatives at an equal level of detail involving various combinations of strengthening existing levees and constructing setback levees. Key issues include flood control, impacts to upstream and downstream flood stage elevations, endangered species, wetlands, fisheries, conversion of agricultural land, and potential impacts to known cultural resources sites. The EIR was certified and the project was approved in 2007. We are currently providing environmental monitoring during construction of Segments 1 and 3. For Segment 2, we prepared permit applications, including a CWA Section 404 individual permit (USACE), CWA Section 401 (RWQCB), FGC Section 1602 Streambed Alteration

Agreement, and a Biological Opinion from USFWS. Ms. Ogilvie prepared the permit applications for the Section 401 Certification and 1602 Streambed Alteration Agreement. Authorizations were obtained from these agencies in less than 3 weeks to be able to start construction on schedule. Approvals Obtained: 404 NW 3 Permit, 401 Water Quality Certification, Streambed Alteration Agreement.

ENGEO, Inc. for the Town of Danville San Ramon Creek Realignment Project, Danville, CA
The Town of Danville proposed to realign San Ramon Creek at the El Capitan Drive Bridge in Contra Costa County, California. The proposed project, funded in part by Caltrans, was complicated due to several seemingly contradictory objectives: increasing sediment transport in the channel; returning the channel to historic flows and alignment; maintaining flood control requirements; improving habitat values within the riparian corridor; and providing permanent scour protection at the bridge alignment. Due to the multi-faceted nature of these objectives, we were required to coordinate with multiple stakeholders, including Caltrans, the Contra Costa County Flood Control District, project engineers, cultural resource consultants, and state and federal agencies, to achieve regulatory approvals. We effectively waded through the layers of regulation from the local level to state and federal levels to attain regulatory approvals while at the same time achieving all project objectives and obtaining endorsement of all stakeholders. Ms. Ogilvie managed the project and prepared a comprehensive permit application package for submittal to USACE, RWQCB, CDFG, and USFWS. Ms. Ogilvie also prepared an IS/MND in compliance with CEQA for the project. Approvals Obtained: 404 NW 13 and 33 Permit, 401 Water Quality Certification, Operation of Law for Lake of Streambed Alteration, Section 7 Letter of Concurrence from USFWS, CEQA MND, and NEPA Categorical Exclusion.

Harris & Associates for the City of Capitola Soquel Creek Lagoon Biofiltration Wetland Project, City of Capitola, CA
The City of Capitola proposed to repair an existing bulkhead and to install a biofiltration wetland system to improve water quality in Soquel Creek Lagoon in downtown Capitola. As Project Manager, Ms. Ogilvie prepared the necessary federal and state permit applications. Because the project location contains federally listed endangered species, Ms. Ogilvie coordinated with the National Marine Fisheries Service and project engineers to determine a well-engineered solution that also avoids take of listed species. Approvals Obtained: 404 NW 18 Permit, 401 Water Quality Certification, Operation of Law for Lake of Streambed Alteration, Section 7 Letter of Concurrence from USFWS and NMFS, Waiver of Coastal Development Permit, State Lands Commission approval, MND pursuant to CEQA.

City of Concord Ygnacio Valley Road Landslide Repair,
City of Concord, CA
The City of Concord received federal disaster relief funding to repair areas after a landslide located within the Lime Ridge Open Space and designated Alameda whipsnake Critical Habitat. Our biologists conducted a biological resources assessment, wetland assessment, and focused botanical surveys. As Project Manager, Ms. Ogilvie oversaw the obligations to comply with NEPA, the federal Department of Transportation Act, CEQA, and the Endangered Species Act. Ms. Ogilvie prepared a Section 4(f) Programmatic Report and Natural Environment Study (NES). Our biologists prepared a Federal Biological Assessment to support Section 7 Consultation. Ms. Ogilvie coordinated with the City, Caltrans, and USFWS to obtain project approvals. Approvals Obtained: Approval of Natural Environment Study, Section 4(f) Report, Federal Biological Assessment from Caltrans, CEQA Statutory Exemption, NEPA Categorical Exclusion, Biological Opinion from USFWS.

KB Home, D.R. Horton, Bethel Island LLC East Cypress Corridor Property Owners Development, City of Oakley, CA
For the 2,500-acre City of Oakley Specific Plan and Environmental Impact Report (EIR) in Oakley, Contra Costa County, we provided a host of biological consulting services, including delineations, protocol surveys, constraints and opportunities analyses, mitigation planning, CEQA documentation, participation in the East County HCP, consultations with state and federal agencies, and preparation of a 404(b)(1) Alternative Analysis and Biological Assessments for Section 7 consultations with NOAA Fisheries and the U.S. Fish and Wildlife Service. Ms. Ogilvie, as Regulatory Permitting Specialist, coordinated with project engineers, archaeological consultants, project attorneys, landscape architects, and GIS specialists to complete reports and applications to comply with Section 106 of the National Historic Preservation Act. Approvals Obtained: Biological Opinion from NMFS, 401 Water Quality Certification and Waiver of Waste Discharge Requirement, Streambed Alteration Agreement, CEQA EIR. Pending Approvals: NEPA EIS, 404 Individual Permit, Biological Opinion from USFWS.

East Bay Municipal Utility District Upper San Leandro Dam Spillway, East Bay Municipal Utility District, CA
EBMUD proposed to day-light an existing culvert and conduct ongoing maintenance of a dam spillway to alleviate sedimentation issues in Miller and San Leandro Creeks in Alameda County. As Regulatory Permitting Specialist, Ms. Ogilvie assisted in preparing a Biological Opinion for the U.S. Fish and Wildlife Service due to existence of California red-legged frog and Alameda whipsnake at the project site. Ms. Ogilvie also prepared an Environmental Assessment to support a Finding of No Significant Impact pursuant to NEPA. Approvals Obtained: 404 NW 7 Permit, 401 Water Quality Certification and General Waste Discharge Requirement, Streambed Alteration Agreement, Biological Opinion from USFWS, CEQA MND, and NEPA FONSI.

Suncrest Homes Sierra Vista Residential Development, City of Antioch, CA
For the 166-acre Suncrest Homes Sierra Vista project in Antioch, Contra Costa County, we completed impact analyses for special-status species including Alameda whipsnake, California tiger salamander, California red-legged frog, San Joaquin kit fox, and rare plants. The project team prepared the permit applications and secured regulatory permits in coordination with USACE, CDFG, USFWS, and RWQCB. As Regulatory Permitting Specialist, Ms. Ogilvie drafted the Conservation Easement for a 134-acre site used for mitigation of project impacts. Ms. Ogilvie coordinated with USFWS, CDFG, and East Bay Regional Park District to garner approvals for the mitigation property, including the Conservation Easement, monitoring and management endowment, and transfer of fee title to the East Bay Regional Park District. Approvals Obtained: 404 NW 29 Permit, 401 Water Quality Certification and Waiver of Waste Discharge Requirement, Streambed Alteration Agreement, Biological Opinion from USFWS, CEQA EIR.

ENGEO, Inc. for the Town of Danville Front Street Repair and San Ramon Creek Bank Stabilization, Town of Danville, CA
The Town of Danville received funding from the Federal Emergency Management Agency (FEMA) to repair two creek bank failures along San Ramon Creek in downtown Danville, Contra Costa County, California. Our biologists conducted USFWS protocol-level surveys for California red-legged frog, a wetland delineation, and biological resources assessment. Our restorationists also prepared a Revegetation and Monitoring Plan. As Project Manager, Ms. Ogilvie prepared a comprehensive permit application package and coordinated efforts to garner approvals from USACE, RWQCB, CDFG, FEMA, and USFWS. Ms. Ogilvie also prepared an IS/MND in compliance with CEQA for the project. Approvals Obtained: 404 NW 13 and 33

Permit, 401 Water Quality Certification, Streambed Alteration Agreement, Biological Opinion from USFWS, CEQA MND, NEPA Categorical Exclusion.

Reclamation District 800Kellogg Creek Bio-Filter/Retention Basin Project, Brentwood, CA
As a result of agricultural tailwater and stormwater runoff, excess sediment with trace levels of toxins has been flowing from Kellogg Creek into the San Joaquin/Sacramento Delta via Discovery Bay. The Kellogg Creek Bio-Filter/Retention Basin project proposes to construct a 4-acre bio-filtration/retention basin to intercept water from Kellogg Creek, reduce the sediment load by 50 percent, and reduce the level of contaminants found in the water. The project will improve water quality and reduce the need for periodic dredging of Discovery Bay. We prepared a detailed Project Description, along with applications to the Regional Water Quality Control Board, the California Department of Fish and Game, and the U.S. Army Corps of Engineers. We are coordinating with the U.S. Fish and Wildlife Service and NMFS to obtain Section 7 approvals for the project. We also prepared a Mitigated Negative Declaration pursuant to the California Environmental Quality Act (CEQA), which was adopted by the Reclamation District in fall 2007. We are currently coordinating with the U.S. Fish and Wildlife Service regarding the protection of endangered species potentially present at the project site. As Regulatory Permitting Specialist, Ms. Ogilvie assisted with preparing a Draft Biological Opinion to be used by USFWS and drafting a USACE Decision Document for the Individual Permit. Approvals Obtained: 401 Water Quality Certification, Streambed Alteration Agreement, Letter of Concurrence from NMFS, CEQA MND. Pending Approvals: 404 Individual Permit, Biological Opinion from USFWS.

San Ramon Valley YMCA , CA
The San Ramon Valley YMCA tasked us with preparing the necessary state and federal regulatory permit applications, as well as performing all the necessary biological assessments and compensatory mitigation planning, for the 13-acre project located in Danville, California. The project site posed unique permitting and planning challenges with surrounding public park lands, residential communities, and open space and nesting bird habitat for several species. We were able to work closely with the project engineer, client, Town of Danville, and various regulatory agencies to develop a site plan that satisfied the recreation and facilities goals of the YMCA, while protecting and enhancing sensitive habitats. Prior to construction, we conducted all the permit required pre-construction surveys and provided on-site contractor education and construction monitoring during construction phases. As Regulatory Lead, Ms. Ogilvie oversaw preparation of a revised permit application to CDFG and negotiated terms and conditions for the Section 401 Water Quality Certification from RWQCB. Approvals Obtained: 401 Water Quality Certification, 404 NW 39 Permit, Streambed Alteration Agreement, Letter of Concurrence from USFWS.

County of Sacramento, Department of Transportation Elverta Road Widening and Bridge Extension,
Sacramento County, CA
The Sacramento County Department of Transportation proposes to widen the existing two-lane Elverta Road in northern Sacramento County to accommodate transit facilities, 6-foot-wide bicycle lanes, pedestrian facilities, and two additional automobile lanes. The project includes replacing an existing two-lane bridge, over Dry Creek with a six-lane reinforced concrete bridge, and expanding an existing culvert carrying seasonal Goat Creek. As Regulatory Permitting Specialist, Ms. Ogilvie prepared a comprehensive permit application package to USACE, RWQCB, and CDFG. Approvals Obtained: 404 NW 14 Permit, 401 Water Quality Certification, Streambed Alteration Agreement.

City of Walnut Creek Ygnacio Valley Road Sidewalk Expansion Project, City of Walnut Creek, CA
The City of Walnut Creek proposes expanding the sidewalk and adding a bike lane adjacent to Ygnacio Valley Road along Ygnacio Heights Park. Ms. Ogilvie assisted in preparing a Natural Environment Study – Minimal Impact in compliance with NEPA and prepared a Section 4(f) Programmatic Report in compliance with the federal Department of Transportation Act. As Project Manager, Ms. Ogilvie coordinated with Caltrans and USFWS to garner project approvals and ensure compliance with NEPA. Approvals Obtained: Natural Environment Study – Minimal Impact and Section 4(f) Report from Caltrans.

Solar Millennium Energy Development Project, Mojave Desert, CA
We are working with a client to develop an Application for Certification (AFC) for the California Energy Commission to permit the development of a 250-megawatt (MW) solar thermal power plant in the Mojave Desert of California. Because of the large scale of this project (over 2,000 acres), potential impacts and mitigation for biological resources are significant issues for which we are identifying appropriate avoidance, minimization and mitigation measures. We have provided overall biological services, including permitting, wildlife and plant surveys, cultural resource services, land use planning, and socioeconomics analysis as part of a larger team to develop the environmental sections of the AFC for the client. As Regulatory Permitting Specialist, Ms. Ogilvie is providing assistance with permitting efforts and technical review for environmental documents prepared for the project.

Confidential Solar Energy Project, CA
The project will involve development of a solar power facility on approximately 4,000 acres south of Harper Lake in San Bernardino County, CA. Biological surveys and a jurisdictional delineation were conducted for the environmental permitting of the project through submittal of the Application for Certification under the California Energy Commission power plant licensing process, and preparation and submittal of permit applications as part of federal and state biological resources-related permitting (incidental take permits/authorizations under the Federal Endangered Species Act and California Endangered Species Act, and Streambed Alteration Agreements with the California Department of Fish and Game). Ms. Ogilvie provided technical review for environmental documents prepared for the project.

Harris & Associates for Santa Cruz Sanitation District Aptos Transmission Line Relocation, Santa Cruz County, CA
The Santa Cruz Sanitation District proposes to install an approximate 3-mile sewer transmission line and facilities to replace failing facilities in the County of Santa Cruz. The project is located within the Coastal Zone and is within the jurisdiction of California State Parks, the City of Capitola, the unincorporated Town of Aptos, and Santa Cruz County. We are preparing a wetland delineation and biological resources assessment. A fisheries biologist is preparing a frac-out contingency plan to be approved by regulatory agencies to allow jack-and-boring underneath Aptos Creek. As Project Manager, Ms. Ogilvie prepared an IS/MND pursuant to CEQA. In addition, Ms. Ogilvie oversaw the preparation of a comprehensive permit application package to USACE, RWQCB, CDFG, USFWS, and NMFS. Ms. Ogilvie is coordinating with the County, engineers, and cultural resources consultants to obtain approvals pursuant to Section 106 of the NHPA. Approvals Obtained: 404 NW 12 Permit, 401 Water Quality Certification, Streambed Alteration Agreement, Letter of Concurrence from USFWS and NMFS, CEQA-Plus MND.

Dahlin Group Rossmoor Community Center Development Project, City of Walnut Creek, CA
The Rossmoor retirement community proposes to construct new community facilities and replace an existing private clubhouse in the City of

Walnut Creek, Contra Costa County, California. We conducted a wetland delineation and biological resources assessment of the approximate 12-acre project site. As Project Manager, Ms. Ogilvie is overseeing the development of an IS/MND pursuant to CEQA. Approvals Obtained: CEQA MND.

Bellecci & Associates Orwood Acres Marina and Residential Development, Contra Costa County, CA
A private developer proposes to construct residential units and a marina on an approximate 40-acre site located on the southwest corner of Orwood Tract in eastern Contra Costa County, California. The project would involve breaching an agricultural levee and have potential impacts to Section 10 waters, wetlands, and special-status species. As Regulatory Lead, Ms. Ogilvie and biologist Angie Harbin-Ireland conducted a due diligence and biological constraints analysis of the site to determine potentially sensitive resources to avoid and to identify regulatory permitting requirements for unavoidable impacts.

Riverwest Inc. Rancho Laguna Residential Development Project, Moraga, CA
We provided biological and permitting consulting services for the approximately 330-acre Rancho Laguna residential development in Contra Costa County. To complete the development project, the Town of Moraga required the client to make improvements to a nearby road in which a jurisdictional drainage had to be filled. The client hired the project team to help meet regulatory compliance, and to coordinate with the U.S. Army Corps of Engineers, Regional Water Quality Control Board, California Department of Fish and Game, and U.S. Fish and Wildlife Service. The project team organized and led an interagency meeting with these regulatory groups to streamline the permitting process for the client. In addition to obtaining the necessary permits, the project team also prepared a Mitigation and Monitoring Plan for the client. As Regulatory Permitting Specialist, Ms. Ogilvie assisted with mitigation planning and obtained local entitlements from the City of Moraga.

Barra, LP Castro Ranch Residential Development,
City of Richmond, CA
The applicant proposes to develop approximately 14 acres of a 35-acre site into single-family units in the City of Richmond, Contra Costa County, California. Due to impacts to waters of the U.S. and State, and potential impacts to California red-legged frog and Alameda whipsnake, We identified off-site mitigation on a 45-acre parcel. We conducted an interagency meeting with USACE, EPA, and RWQCB to present the project and facilitate the permit application process. As Project Manager, Ms. Ogilvie is currently overseeing permitting efforts with USACE, CDFG, RWQCB, and USFWS. Pending Approvals: 404 NW 29 Permit, 401 Water Quality Certification, Streambed Alteration Agreement, Biological Opinion from USFWS.

Brosamer & Wall, LLC County Crossings Commercial Development, City of Antioch, CA
The applicant proposes to construct a Transit-Oriented Development around a proposed future Bay Area Rapid Transit (BART) station on an approximate 200-acre site in the City of Antioch along State Highway 4. Due to anticipated potential impacts to wetlands and special-status species, we conducted research to find suitable off-site mitigation parcels. As Project Manager, Ms. Ogilvie developed a matrix to prioritize properties based on opportunities for wetland preservation, wetland creation, and special-status species potential. Ms. Ogilvie assisted with presenting mitigation options to the client.
Contra Costa Water District Canal Replacement Project, Oakley, CA
For the approximate 4-mile long Contra Costa Canal Replacement project, we conducted a formal wetland delineation, assessment of potentially occurring special-status plant and wildlife species, and all necessary focused follow-up surveys. We are one of the lead

authors for the project Action Specific Implementation Plan (ASIP) completed in compliance with the CalFed Multi Species Conservation Strategy. As part of the ASIP process, the project team identified potential project effects on listed species and NCCP habitats, and negotiated appropriate avoidance and mitigation measures with USACE, the Bureau of Reclamation, CDFG, and USFWS. The team coordinated the wetland and species mitigation planning efforts with the agencies and other stakeholders. As Permitting Specialist, Ms. Ogilvie assisted with preparation of a Section 106 evaluation of off-site mitigation properties and coordinated with USACE and SHPO to obtain concurrence with eligibility and effect findings for historic and cultural resources. Approvals Obtained: 404 Individual Permit, 401 Water Quality Certification, Streambed Alteration Agreement, Biological Opinion from USFWS, CEQA MND, ASIP, and NEPA FONSI.

Dickenson, Peatman & Fogarty Abreu Timberland Conversion, Napa County, CA
The client requested that we conduct a peer review of the IS/Proposed MND and supporting technical environmental documentation for the proposed conversion of 17 acres of timberland to vineyard within a 75.5-acre parcel east of the Town of Angwin in Napa County. As Project Manager, Ms. Ogilvie and biologist Angie Harbin-Ireland conducted a site reconnaissance of the proposed conversion site, peer reviewed all existing information, and conducted independent research. Based on a review of the CEQA regulations, Oak Woodland regulations, the existing Napa County General Plan, and Napa County General Plan Update, Ms. Ogilvie analyzed the thresholds of significance for direct and cumulative impacts to oak woodland habitat, traffic, and air quality. Ms. Ogilvie and Ms. Harbin-Ireland identified data gaps and need for additional mitigation to be proposed pursuant to CEQA.

County of Marin Bridge Maintenance Program, Marin County, CA

Due to severe weather over the past 20 years, 38 bridges in the County of Marin suffered substructure and superstructure damage that required repair. We worked with the County of Marin and Harris & Associates to identify five bridges that required immediate repair. In addition, we conducted wetland delineations and biological assessment in all five locations. The regulatory and permitting team prepared a comprehensive permit application package for submittal to USACE, RWQCB, CDFG, USFWS, and NMFS. We also prepared the IS/MND pursuant to CEQA. In an extremely short period of time, the regulatory and permitting team was able to coordinate site visits with regulatory agencies and obtain approvals from four separate regulatory agencies, including a Biological Opinion from NMFS for the emergency repair of one of the bridges. As Permitting Specialist, Ms. Ogilvie prepared a detailed project description and application to the California Coastal Commission for one bridge located in the Coastal Zone. Ms. Ogilvie also coordinated efforts to obtain a Biological Opinion from USFWS to cover repairs at all five bridges. Approvals Obtained: 404 NW 39 Permit, 401 Water Quality Certification, Streambed Alteration Agreement, Biological Opinion from USFWS and NMFS, CEQA MND, Coastal Development Permit.

Santa Clara Valley Water District Burrowing Owl Habitat Assessment and Mapping, Santa Clara County, CA
Our biologists are conducting a nesting season habitat assessment for burrowing owl on all linear features that lie within the District’s purview, such as levees, roads, and natural habitats adjacent to aquatic features within the watershed. Our work will allow the District to make informed decisions regarding future monitoring and maintenance for burrowing owl. As Burrowing Owl Surveyor, Ms. Ogilvie assisted the biology team in locating and mapping the extent of potential burrowing owl habitat and documenting any sign of burrowing owl presence.

Mondavi Timberland Conversion, Napa County, CA

The client proposed converting timberlands to vineyards near Angwin in Napa County. As Law Clerk, Ms. Ogilvie assisted with local county permitting for the project including use and grading permits. In addition, Ms. Ogilvie prepared legal documents and briefs to support the application for a Timberland Conversion Permit to the California Department of Forestry in compliance with the Forest Practice Act. Work was performed prior to joining this firm.

One True Vine Winery Cave, Napa County, CA
The client proposed developing a winery cave that had potential stream impact issues near Angwin in Napa County. As Law Clerk, Ms. Ogilvie coordinated with hydrologists to determine the top of bank and establish stream setbacks to ensure avoidance of impacts and compliance with CDFG and RWQCB regulations. Work was performed prior to joining this firm.

AECOM

Merlyn J. Paulson

FASLA

Years Experience: 38

Professional History

- AECOM, 2000 – present
- Colorado State University, 1975 - present
- MPI, 1978 - 2000
- EDAW, 1975 - 1978
- Steinitz-Roger, 1973 – 1975
- U.S.D.A. Forest Service, 1972

Education

- MLA II, Harvard University
- BLA, Utah State University

Professional Registrations and Affiliations

- Fellow, American Society of Landscape Architects

Technical Specialties

- Aesthetics and Visual Resources
- Visual Simulations
- Geographic Information Systems
- Land Architecture
- Photography

Representative Project Experience

Beacon Solar Energy Project, FPL Energy, California. ENSR technical expert for visual resources field investigation, visual/aesthetics inventory and analysis, computer - aided photographic visual simulations, and GIS visibility analyses of alternatives connected with the generating station, solar array and transmission line options. 2008-2010.

Blackrock Geothermal Energy Project, CAL Energy, California. AECOM technical expert for visual resources field investigation, visual/aesthetics inventory and analysis, computer - aided photographic visual simulations, and GIS visibility analyses of alternatives connected with the generating station, cooling towers and transmission line options. Salton Sea, 2008.

Blythe Solar Energy Project, Solar Millennium, California. AECOM technical expert for visual resources field investigation, visual/aesthetics inventory and analysis, computer - aided

photographic visual simulations, and GIS visibility analyses of alternatives connected with the generating stations, solar arrays and transmission line. Blythe, 2009-2010.

Colstrip Power Plant and Ancillary Facilities, Colstrip, Montana. Graduate degree thesis at Harvard University. This project served as basis for research and development of methods for computer - aided photographic visual simulations and GIS visibility analyses of the generating station and transmission lines. 1975.

Missouri River Energy Services / Ottertail Power Company, Big Stone II Generating Station Expansion and 230kV Corridor Selection Project, Minnesota – South Dakota. Technical expert at ENSR for GIS for all disciplines, field investigation, visual/aesthetics inventory, computer - aided photographic visual simulations, and visibility analyses for the Big Stone II Generating Station and 230kV transmission line corridors to several substations near Morris, Spicer, and Granite Falls, Minnesota. 2006.

Oceanway Secure Energy Project, Los Angeles Basin, California. Technical expert for visual resources field investigation, visual/aesthetics inventory and analysis, computer - aided photographic visual simulations, and GIS visibility analyses of alternatives connected with the LNG ships and pipelines. 2006-2008.

Palen Solar Energy Project, Solar Millennium, California. AECOM technical expert for visual resources field investigation, visual/aesthetics inventory and analysis, computer - aided photographic visual simulations, and GIS visibility analyses of alternatives connected with the generating stations, solar arrays and transmission line. Desert Center, 2009-2010.

Palmdale Solar Energy Project, Inland Energy Corp., Palmdale, California. AECOM technical expert for visual resources field investigation, visual/aesthetics inventory and analysis, computer - aided photographic visual simulations, GIS visibility analyses of alternatives connected with the generating station, solar array, and transmission line and landscape plan for transplanting of Joshua trees. Palmdale, 2008-2010.

Rawhide Generating Station, Platte River Power Authority, Colorado. EDAW technical staff for visual resources field investigation, visual/aesthetics inventory and analysis, connected with the generating station and transmission lines. 1978.

Reliant Energy Services, Bighorn to Eldorado 230-kV Corridor Selection Project, Nevada. ENSR technical expert for GIS for all disciplines, computer - aided photographic visual simulations, and visibility analyses for 230-kV transmission line corridors. 2007.

Ridgecrest Solar Energy Project, Solar Millennium, California. AECOM technical expert for visual resources field investigation, visual/aesthetics inventory and analysis, computer - aided photographic visual simulations, and GIS visibility analyses of alternatives connected with the generating station, solar arrays and transmission line. Ridgecrest, 2009-2010.

Santan Generating Station, Arizona Public Service Co., Phoenix, Arizona. ENSR technical expert for GIS and visual resources field investigation, visual/aesthetics inventory and analysis, computer - aided photographic visual simulations, and GIS visibility analyses for the generating station, transmission lines and pipeline. 2004.

Sierra Pacific Power Company, 1000 Springs 2000-MW Generating Station Simulation Project, 1000 Springs, Nevada. Performed environmental simulations of the proposed generating station in north central Nevada. 1993.

TransWest Express and Western Area Power Admininstration, 600-kV DC Transmission Line Project, Colorado, Nevada, Utah, and Wyoming. AECOM technical expert for visual resources. Current.

Tri-State Generation and Transmission Association, Pyramid Generating Station, New Mexico. ENSR technical expert for GIS and visual resources for aerial photographic interpretation, digitizing, detailed mapping, and spatial analyses of alternatives connected with the generating station, transmission line and pipeline. 2002.

Victorville 2 Generating Station and Solar Facility, Inland Energy Corp., Victorville, California. ENSR technical expert for visual resources field investigation, visual/aesthetics inventory and analysis, computer - aided photographic visual simulations, GIS visibility analyses of alternatives connected with the generating station, solar array, and transmission line and landscape plan for transplanting of Joshua trees. 2007.

Western Area Power Administration, Lawrence Livermore Laboratory Direct Service 230-KV Transmission Line Project, Livermore, CA. Woodward - Clyde Consultants technical expert for visual resource simulations for critical vantage points between Bethany Reservoir and Patterson Pass Road near Livermore. 1993.

Steven Petto

Engineering Dept. Manager

Education
MBA, Golden Gate University
BS, Chemical Engineering, Rensselaer Polytechnic Institute

Registrations
PE (Mechanical), CA

Mr. Petto has over 30 years of professional experience, most of which has been spent participating in natural gas and other energy-related permitting, engineering, and construction assignments in the U.S. and abroad. Since joining AECOM in 2004, his work has focused on engineering design and construction aspects of regulatory submittals for capital permitting of major energy infrastructure projects, including solar thermal power plants, an offshore LNG import terminal, and petroleum refinery expansions. In addition to his project assignments since joining AECOM, Mr. Petto has served as Department Manager to the engineering staff of the environmental remediation consultancy group in the Oakland office. He was on loan to Woodside Natural Gas, a subsidiary of Woodside Energy Ltd of Australia, from 1Q2006 to 1Q2009, where he participated on the owner's project team as the Pipeline Engineering Manager during the regulatory permitting phase of a $2 billion LNG import terminal project. Prior to joining AECOM, Mr. Petto spent 15 years in Bechtel's Pipeline Engineering group, working on a variety of domestic and international pipeline engineering and construction projects, as well as feasibility studies, master plans, and proposal teams. Prior to working for Bechtel, Mr. Petto was Western Region Manager for the technical services division of an east coast manufacturer of steam traps and boiler trim, providing energy conservation advice and services to the power, petroleum and chemical industries. Mr. Petto started his professional career as a chemical engineer with Procter & Gamble in their central engineering division.

Experience

Capital Permitting

Solar Millennium, Solar Thermal Power Plant Licensing, Mojave Desert, California. Comprised of developing license applications to the California Energy Commission for solar thermal power plants proposed for three locations in the Mojave Desert of California. Responsible for the Project Descriptions sections of the applications as well as functioning as the liaison between the various engineering and environmental impact analysis teams.

Woodside Natural Gas, Pipeline Engineering for Offshore LNG Terminal and Gas Pipelines, Los Angeles, California. In 4Q2005 to 1Q2006, participated in the siting study for a proposed LNG terminal off the coast of southern California. Then from 1Q2006 thru 1Q2009, seconded full-time to Woodside on the OceanWay Secure Energy Project, which consisted of the deep water port, offshore and onshore pipelines, and related onshore facilities. Wrote the project description covering design and construction of the proposed fixed facilities for the Deep Water Port license application to the United States Coast Guard / MARAD as lead NEPA agency and the Pipeline Franchise application to City of Los Angeles as the lead CEQA agency. As Pipeline Engineering Manager, was responsible for the oversight of the engineering design consultants charged with developing the conceptual design and preliminary construction plan for the offshore pipelines; siting and design of the HDD shore approach; land purchase and design for the onshore metering & regulating station; liaison with the local gas utility, and right-of-way acquisition and design of the onshore pipeline and tie-in to the existing natural gas infrastructure.

Tesoro, Permitting Support, Martinez, California. Submittal of Land Use Permit to Contra Costa County (CA) for Tesoro's Golden Eagle Refinery Crude Flexibility Project, and later their Coker Modification Project. Provided support in the development of applicant's CEQA documentation, principally on the topics of the Project Description and liaison with the FAA.

Avoca Natural Gas, FERC Permitting, New York. For the Steuben Pipeline Project for Avoca Natural Gas Storage, Avoca, NY, responsible for the FERC permitting and EPC package for a 45 mile, 10" brine disposal pipeline associated with a proposed salt dome natural gas storage facility.

Thai Industrial Gas, Pipeline Permitting, Thailand. For the Thai Industrial Gases (TIG) Gas Distribution Project, Laem Chabang, Thailand, responsible for permitting and preliminary design of oxygen and nitrogen pipelines.

Natural Gas Pipeline Engineering & Construction

USAID, Iraq Infrastructure Reconstruction Program. Responsible for the design and subcontract formation of the gas gathering system and gas processing plant for a new 300 MW electric power plant.

National Gas Company of Trinidad and Tobago Ltd. As interim project engineering manager for the Cross Island Pipeline Project, onsite in Trinidad, responsible for pipeline and facilities engineering management and technical support to construction.

Pacific Gas & Electric Company, Natural Gas Pipeline, California. Served as project manager for the Redwood Path Pipeline Expansion Project during the design and permitting phase of this pipeline project.

Pacific LNG, Pipeline, Bolivia & Chile. For the Pacific LNG Project, provided pipeline engineering and general management support for the Concept Selection and Definition study for a "wellhead to loading arm" project proposed for Bolivia and Chile, including natural gas and condensate pipelines across the Andes mountains. Deliverables included two project reports, a cost estimate report, and Front End Engineering Design bid packages.

Portland Natural Gas Transmission System, Pipeline Engineering & Construction, Maine, New Hampshire, and Vermont. Responsible for the Portland Natural Gas Transmission System Project, a LSTK EPC pipeline project from the international border with Canada across 3 New England states comprised of 185 miles of 24" and 12" pipelines, 3 meter and regulating stations, and 15 automated mainline valve facilities.

Petroleum Authority of Thailand, Pipeline Engineering, Multiple Projects, Thailand. Responsible for four projects: 1. Natural Gas Parallel Pipeline Project, responsible for a technical evaluation of bids received for three new onshore gas processing, compression, and metering facilities; 2. Erawan-Bongkot-Khanom Pipeline Project, Commissioning Engineer responsible for representing PTT during start-up of a natural gas receiving terminal in Khanom, Thailand; 3. Tantawan Gas Pipeline Project, responsible for writing the Design Basis Manual and executing the Detailed Design for the 53 km subsea pipeline in the Gulf of Thailand; 4. Nong Chok to Wang Noi Pipeline, Field Piping Engineer for the 50 km onshore pipeline project.

Pacific Gas & Electric Company, Pipeline Engineering & Construction, California, Oregon, Washington, and Idaho. For the PGT-PG&E Pipeline Expansion Project (PEP), first served as Project Engineer, including Front-End Engineering (San Francisco), Detailed Engineering management (Houston), and home office support to initial construction activities. Then, as Assistant Resident Representative and Field Piping Engineer assigned to the construction site of a greenfield compressor station near Brentwood, CA.

Pemex, Pemex Cantarell Field Expansion Project - Offshore Pipeline Design, Mexico. Responsible for preliminary design of the gas lift system.

Oil & Gas Studies

Port Authority of Alaska, Pipeline Feasibility Study, Alaska. For the Alaska Gas Development Project, responsible for the following major portions of the Bechtel-funded study: Operations & Maintenance Philosophy; Reliability and Availability Analyses; Loss Prevention; Regulations, Codes and Standards; Engineering Execution Plan; and Value Engineering.

TransCaspian Gas Pipeline, Pipeline Engineering, Turkmenistan, Azerbaijan, and Georgia. Served as Engineering Manager for Phase 1 Front-End Design of the Trans Caspian Gas Pipeline, a proposed 1,650 km onshore/offshore pipeline system for transportation of natural gas from eastern Turkmenistan across the Caspian Sea, through the republics of Azerbaijan and Georgia for consumption in Turkey and Europe, responsible for field reconnaissance of technical data and project status presentations to the client in Turkmenistan, and the engineering portion of the EPC Implementation Manual.

Kuwait Petroleum Corporation, Natural Gas Master Plan, Kuwait. As Project Manager for the Kuwait Onshore Gas Distribution Project, providing consultancy services to Kuwait Petroleum Corporation regarding their plan to convert all electricity-generating power plants from liquid fuels to natural gas.

CV3 Consortium, Pipeline Feasibility Study, Saudi Arabia. For Core Venture 3, Pipeline Hydraulics Analyses for 620 kilometer and 760 kilometer natural gas and NGL pipelines, respectively, from Shaybah, Saudi Arabia, conducted for joint venture partners Shell, Conoco, TotalFinaElf, and Aramco.

Repsol, Pipeline Feasibility Study, Spain. For the Novoalga Project, provided general management assistance for a feasibility study for the capacity expansion of an offshore gas storage facility in northern Spain, for Repsol.

Petrox, S.A., Petroleum Feasibility Study, Chile. Served as the Project Manager for the Feasibility Study for the Andalien Terminal for Petrox, S.A., Concepcion, Chile, an offshore marine terminal for various crude oils and no. 6 fuel oil.

Koch Industries, Petroleum Feasibility Study, Estonia. Project Engineer for the Baltic Sea (Estonia) Fuel Oil Terminal, Feasibility Study responsible for scope definition and report writing for a high-level feasibility study for Koch Industries, Inc.

LNG Studies

Kuwait Petroleum Corporation, LNG Study, Kuwait. Conducted feasibility study for LNG import vs. new gas pipeline from Qatar necessitated by Saudi Arabia's rejection of natural gas pipeline through their waters.

Thai LNG Power Corporation, LNG Proposal & Feasibility Study, Thailand. Responsible for evaluation of design issues and environmental impact assessment; accompanied PTT to meetings with the OEPP, Thailand's governmental environmental authority.

Chevron, LNG Feasibility Study, Taiwan. For Taiwan LNG, responsible for modifications to the original feasibility study for an LNG receiving terminal for Chevron, involving reevaluation of the LNG source, carrier fleet, and facilities design.

Oil & Gas Business Development

Petronas Dagangan Berhad, Fuel Depot Proposal, Malaysia. For the new Kuala Lumpur International Airport for Petronas Dagangan Berhad, responsible for the engineering portion of the successful joint venture EPC proposal with Technip Geoproduction (M) Sdn. Bhd., for the aircraft fueling system.

PetroVietnam, Petroleum Terminal Design, Vietnam. For the PetroVietnam Gas Utilization Project, responsible for the liquid storage and marine terminal portion of the winning proposal.

Petroleum Consortium, Pipeline Study Proposal, Alaska. For the Alaska Gas Pipeline Project, member of the proposal team for the Pipeline Engineering Services subcontracts requested by a consortium of ExxonMobil, BP Amoco, and Phillips to study route alternatives for bringing North Slope gas to market in the lower 48 states.

Thai LNG Power Corporation, LNG Receiving Terminal, Thailand. For a division of PTT, responsible for writing scope of work and execution plan portions of the proposal for engineering of an LNG receiving terminal.

Petroleum Authority of Thailand, Yadana Pipeline Project, Thailand. Responsible for writing scope of work and execution plans for the pipeline survey and soils investigation portions of the EPC proposal.

Environmental Remediation Project Management

United Technologies Corporation, Remediation O&M, San Jose, California. Served as Project Manager for O&M of remedial systems for soils, groundwater and surface water contaminated with ammonium perchlorate, 1,4 dioxane, and chlorinated solvents. Systems included GAC and ion exchange resin media in pump and treat and SVE systems. Project included new construction of HiPOx (hydrogen peroxide / ozone treatment) systems.

Professional associations
American Society of Mechanical Engineers (ASME)

Training and certifications
OSHA 40-hr HAZWOPER training
OSHA 8-hr Health & Safety Training for Management and Supervisors
Environmental Law & Regulations - UC Berkeley

Publications and presentations
1987 Industrial Energy Technology Conference, September 16-18, Houston, Texas, "Reliability Improvement Programs in Steam Distribution and Power Generation Systems"

Years with AECOM
5

Years with other firms
26

TREVOR CONRAD THOR

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SENIOR-LEVEL CONSTRUCTION MANAGEMENT

Quality-focused visionary and detail-oriented professional equipped with more than 20 years of progressive project, engineering, and construction management success within power generation, renewable energy, and conventional combined cycle industries. Award-winning leader with record of achievement managing billion-dollar projects from concept through completion within strict time and budget constraints, including several initiatives acknowledged as 1st and largest of their kind; installed nearly 3,000 MW of new generation with assets of nearly $3B. Proven team player and resourceful manager recognized by colleagues and superiors for excellent business sense and vision. Expertly negotiate complex contracts for EPC services, power purchase agreements, and power plant sales. Demonstrate valuable combination of technical and business savvy.

SCOPE OF EXCELLENCE

Project Management • Strategic Planning • Quality Assurance • Process Improvement • Business Plans
Business Development • Cost Control • Budget Administration • Operations Management • Engineering
Proposal Development • Relationship Development • Estimating • Client/Employee Relations • P&L
Team Leadership • Customer Service • Needs Assessment • Procurement • Facilities Management
Performance Management • Contract Negotiations • Safety/Regulatory/Environmental Compliance
Project Development • Commissioning • Operations • EPC (Engineering/Procurement/Construction)

PROFESSIONAL TRACK

Solar Millennium [Berkeley, California] 2010-Present
Start-up company providing utility scale concentrating solar power throughout the Southwest United States. Currently developing nine plants with total capacity of 2,250 MW and capitalization of $10B.

Vice President, EPC Management
Drive all company engineering, procurement, and construction related activities. Implement and control budget and cost systems, ensure regulator permitting and compliance for state and federal agencies, negotiate contracts for EPC Contractor, major equipment, project labor, and power purchase agreements. Participate in funding and financing endeavors and provide operations and asset management support.

- Instrumental in developing a strong partnership with the EPC Contractor and Solar Millennium affiliate companies. Established initial project schedule and project control systems. Negotiated two project EPC Contracts and Steam Turbine Purchase Orders.
- Actively negotiating the Project Labor Agreement (PLA) with state labor organizations.
- Actively engaged in negotiations with the local utility for the Power Purchase Agreement (PPA).
- Participated in the DOE loan guarantee process and due diligence investigations.
- Provided expert testimony for regulatory permitting process.

Advanced Power Projects [*Fremont & Roseville, California*] 2008-2010
Start-up company providing US power industry wide range of products and services designed to make existing power plants more efficient and cleaner.

Vice President, Construction
Prepare power plant construction scope proposals, totaling $10M to $40M. Oversee estimating, proposal development, turbine component design and manufacturing, construction, and project management functions. Conduct technology tests; implement site testing of technology. Propelled successful product implementation at demonstration site and led advancement of simplified combined cycle (SCC) technology and testing activities by providing valuable expertise, guidance, and support; tested Cheng system on LM2500 gas turbine and results were published in multiple trade journals, including *Engineering News Report*.

Calpine Corporation [*Folsom, Romoland, Pittsburg, Turlock, & King City, California*] 1999-2008
Independent Power Producer (IPP) and builder, owner, and operator of natural gas-fired power plants, with $19B in capital and 3,500 employees during peak.

Director, Construction—Western Region
Headed regional-based team accountable for several projects; contributed to new project development, providing direct oversight, guidance, and support for project execution. Monitored safety, quality, and regulatory compliance as well as scope, schedule, and financial performance. Participated in project-related development, permitting, engineering, procurement, and construction-related proposals and contracts. Developed strategic plans and supported VPs in all regional construction activities. Negotiated several EPC contracts.

Senior Project Manager—Inland Empire Energy Center
Spearheaded construction management efforts for 3rd-party, 800MW combined cycle power plant, including safety, environmental/regulatory compliance, quality assurance, contracts, cost control, scheduling, production, material and document control, and off-site linears. Led 50 construction staff and 1,200 craft labor workers at peak production.

- Played instrumental role in new product introduction for 7H gas turbine, which is largest of its kind in North America and had overall project budget of approximately $1B.
  - Led team to receive CAL OSHA Golden Gate and SHARP Safety recognition awards.

Project Manager—Los Medanos & Delta Energy Centers
Orchestrated all aspects of 2 EPC contracts and associated linears, executing all activities associated with project safety, budget, schedule, compliance, financial, and commercial issues. Controlled $1B budget and combined electrical output of 2 power plants of 1,430MW.

- Directed $350M EPC contract for combined cycle 2x1 F-class project, which earned recognition as *Power Magazine's* Best Project of the Year.
- Spearheaded $450M EPC joint venture for combined cycle 3x1 F-class initiative.
- Championed $200M+ DEC LMEC linears project.

Project Manager—Walnut Energy Center
Directed all functions of 250MW combined cycle power plant with $165M construction budget. Led team charged with all aspects of engineering, procurement, construction management, and commissioning for 3rd-party owner.

- Earned 2005 Corporate Safety & Quality awards for best project, which was turnkey initiative involving over 100 construction and procurement contracts.
- Acquired 750,000 safe working hours without lost-time accident (LTA).

Plant Manager—King City Power Plant & King City Energy Center
Championed all activities associated 2 power plant facilities, including 1 combined cycle and 1 peaking. Controlled $100M+ in annual revenues. Contributed to monetization effort of Cogen facility as well as commercial negotiations of natural gas contracts contributing to enhanced equity position.

- Directed $50M+ energy center initiative, including Peaker LM6000PD.

Elliott Company [*Benicia, California*] 1998-1999
$15M OEM for turbines, pumps, and compressors for power producers and refineries.

Western Region Manager—Engineering Support Services & On-Site Services
Led operations for San Francisco repair facility and off-site overall and field machining activities across western US. Oversaw safety, environmental, budget, sales, financial, contract, training, and staffing efforts.

- Increased revenues and exceed objectives; reduced expenses and boosted margins.
- Negotiated company's 1st off-site contract in region and 1st utility power plant overhaul contract.

Also served as **Project Manager & Maintenance Specialist** for **GWF Power Systems Company, Inc.** and **Rotating Equipment Specialist** for **Pacific Gas & Electric Company**.

ACADEMIC & PROFESSIONAL CREDENTIALS

Executive M.B.A. (magna cum laude): Golden Gate University
B.S., Marine Engineering Technology: California Maritime Academy

USCG 3rd Engineer's License for unlimited horsepower steam turbines and diesel motors
Class A General Engineering Contractors License • Professional Engineer's License, Mechanical Engineer

Curriculum Vitae
BENJAMIN RAUL VARGAS, M.A. RPA

Education

Bachelor of Arts in Anthropology, California State University, Fullerton, 1993

Master of Arts in Anthropology, California State University, Long Beach, 2003

Thesis: *Contact Period Archaeology in Southern California: A View from La Ballona*
4.0 GPA; Awarded Outstanding Graduate Student in Archaeology; Thesis nominated for Thesis of the Year

Professional Memberships

Register of Professional Archaeologists (No. 15733)
Society for California Archaeology
Society for American Archaeology

Statement of Qualifications

Mr. Vargas has over 20 years of experience conducting all types of archaeological fieldwork on prehistoric and historical-period sites throughout the southwestern United States including all phases of survey, excavation and lab work, forensic recovery, and Native American consultation. Mr. Vargas specializes in the operation of large-scale projects and has run some of the largest data recovery excavations ever undertaken in southern California. In his capacity as Director of Field Operations, Benjamin worked directly with all levels of management and field personnel to ensure that fieldwork was conducted in an efficient manner while maintaining high standards of care and research. In this capacity he has helped to develop more efficient and accurate means of data collection in the field and management of this data post field. He has extensive experience working with Native American groups through excavations and repatriation projects. He meets the Secretary of Interior's qualifications standards in prehistoric and historical archaeology and is a Registered Professional Archaeologist (No. 15733). Mr. Vargas's interests include Prehistoric, historical/protohistoric-period southern California coastal archaeology, Spanish Colonial archaeology, and the Missionization process throughout the Southwest; geophysical applications, invertebrate faunal analysis, general field logistics and methods, and operation of large scale projects. Mr. Vargas was awarded Outstanding Graduate Student in Archaeology from California State University, Long Beach in 2003 and his Thesis was nominated for Thesis of the Year.

PROFESSIONAL EXPERIENCE

2010 Senior Archaeologist/Principal Investigator – AECOM Environment

Duties include oversight of survey and monitoring projects, data management and report preparation. Interaction with clients, agency representatives, Native Americans, public officials, press, and subcontractors is also a major function of this position.

SELECTED PROJECTS

Solar Millenium Blythe Power Project (Riverside County, California). Oversight and management of cultural resource survey teams.

Dos Pueblos/Paradiso del Mare Ocean and Inland Estates Project (Santa Barbara County, California). Cultural Resource monitoring of soils test locations, Native American consultation.

1999-2010 Director of Field Operations/Principal Investigator—Statistical Research, Inc.

As Director of Field Operations I worked directly with the Chief Operations Officer, and closely with research directors, office directors, principal investigators, and project directors to ensure that fieldwork was conducted in an efficient manner while maintaining high standards of care and research. The DFO, relied on extensive experience, the ability to work in complex and difficult situations, and a thorough understanding of the corporate vision. The DFO's primary goals were to ensure that quality fieldwork was conducted in all areas and to provide leadership and guidance to new and existing field supervisory staff.

As a Principal investigator my responsibilities included the management and direction of multiple field and laboratory projects in a wide variety of cultural contexts and environmental settings. In this capacity I oversaw and managed all aspects of archaeological fieldwork, including pre-field logistics, survey, all levels of archaeological excavation and monitoring of prehistoric and historical-period archaeological sites, and forensic archaeological recovery. Management duties included development and management of budgets, proposal writing, oversight and training of lower level staff, and management of all phases of field and laboratory work, analysis, and report preparation. Interaction with clients, agency representatives, Native Americans, public officials, press, and subcontractors was also a major function of this position. I specialized in budgeting, planning, and running large scale projects including several with budgets of over 1 million dollars. I conducted archaeological, archival, and historical research independently and as part of a large team of researchers.

SELECTED PROJECTS

The Playa Vista Archaeological and Historical Project (Los Angeles, Co., CA), Principal Investigator/Project Director. Duties included oversight and management of all phases of testing, data Recovery, monitoring, laboratory analysis, curation, repatriation, data management, report preparation, archival research, client relations, and Native American consultation. Direction of large and small excavations including supervision of field staff of over 100 people. Oversight and management of data recovery excavations at five large multicomponent archaeological sites including recovery of large burial site (over 300 human burials). Oversight of large laboratory staff for the processes of laboratory analysis, curation, and repatriation of human remains. Interaction with subcontracted analysts and researchers, presentation of data and research at professional meetings.

Burlington Northern Santa Fe (BNSF) (San Bernardino County, CA); Principal Investigator/Field Director. Railway Cajon Subdivision: Main Third Track: Summit to Keenbrook; Oversight and consultation for archaeological inventory, geoarchaeological investigation, archaeological testing and data recovery)

Barry M. Goldwater Range (Luke Air Force Base, Gila Bend, AZ) Project Director. Duties included direction and coordination of thousands of acres of survey and site recording at various manned ranges. Recording and evaluation of prehistoric and historical-period resources, recording of various types of rock art, damage assessment and test level excavations at several rock shelter sites, and report preparation. Required the ability to work and supervise field crews in remote locations and sometimes under extreme weather conditions. This project also required consultation with Air Force personnel regarding cultural resources as well interaction with Native American groups.

Port Hueneme Project:CA-VEN-662, (John Laing Homes; Ventura, CA); Principal Investigator for test-level and data recovery excavations. Duties included the oversight and coordination of excavations at VEN-662. Upon the discovery of several sets of human remains, duties included interaction with the Most Likely Descendant, Client representatives, and other Native American monitors. Developed a plan for data recovery and coordinated amicable negotiations between the MLD, the client, and other Native American monitors for excavation strategies and repatriation agreement.

U.S. Army Yuma Proving Ground, (Yuma, Arizona); Project Director; Class III cultural resources survey of the proposed Hot Weather Test Complex. The survey of 2,644 acres resulted in the discovery of several prehistoric archaeological sites, trail segments, features, and other isolated finds. Historical period components included a large

Military Maneuver and Training Area, as well as other isolated refuse dumps and road segments.

Prado Dam Archaeological Project: historical archaeological evaluation of CA-SBR-8091/H, (Riverside County, CA); Project Director. (Joint effort between the Counties of Riverside and Orange, and The U. S. Army Corps of Engineers. Duties included the development of a testing and evaluation program for a previously recorded historical-period ranching site. During testing, a prehistoric component to the site was discovered that required a subsequent testing plan. Upon determination of national register eligibility, a data recovery plan was developed and complex excavations were undertaken to expose and record both prehistoric and historical period resources at the site. Duties included direction and coordination of field and laboratory work and report writing and coordination.

Woodlawn Cemetery Forensic Archaeological Recovery (Compton, California) Department of Consumer Affairs, Cemetery and Funeral Bureau. Project Director; Duties included direction and management of emergency forensic recovery of a large area of re-deposited soils containing human remains; coordination with Consumer affairs personnel and security personnel, mapping, and report production.

Other Key Projects

Wellton-Mohawk Generating Facility, Project Director; for Greystone Environmental Constultants, Inc. Yuma, Arizona, 2005
Yuma Energy Plant, Class III Cultural Resources Inventory, Project Director; Yuma, Arizona; for Greystone Environmental Consultants; 2003
Tycom Transpacific Fiber Optic Cable and Hermosa Beach Landing Project, Project Director; cultural Resources Assessment, archival research, report writing; for Ecology and Environment, Inc.; Los Angeles County, California; 2001
Inventory of 10 Southern Trails Pipeline Components, Project Director; Flagstaff, Arizona; for Questar Corporation, survey, site recording; 2001
The Griffith Energy Project: Inventory of 80 miles of Transmissions Lines, Kingman, Arizona; Project Director; for Greystone Environmental Consultants; 1999
The Northridge Group for the City of Big Bear, San Bernardino County, CA; Project Director; Phase I, II, - archival research, survey, testing and monitoring of historical period camp
Archaeological Investigations of an historic water control feature (CA-SBR-9861H), Department of Public Services, City of Loma Linda, California; Project Director; documentation, monitoring; for the 1999
Point Mugu Naval Air Station, Ventura, CA; Project Director; Phase II test level and Phase III data recovery excavations at prehistoric site, report preparation.

1998 **Student/Researcher - California State University, Long Beach.** Member of four-person team selected to travel to Armagh, Northern Ireland to conduct geophysical surveys of several Neolithic sites. Joint effort of Queens University in Belfast, and California State University, Long Beach. Assisted in geophysical surveys, and supervised and conducted all mapping activities.

1995-1998 **Field Director/Project Director—Macko, Inc.**, Huntington Beach, California. Duties included Supervision and direction of all field activities including excavation, survey, and monitoring. Field Director at CA-ORA-64 (Orange County), in which duties included the supervision of all field personnel (approximately 25 people). On site supervision and coordination of heavy equipment, waterscreening operations, and mapping activity. Management of all data from fieldwork, including: excavation information, feature information, maintenance of daily notes, photographic information, personnel data, and billing information for all subcontracted work. Senior/Contributing author of archaeological site reports. Development of proposals for prospective contracts. Management of all phases of various archaeological contracts.

1992 **Field Technician—Archaeological Resource Management Corporation**.
Duties included archaeological excavation, and subsequent sorting of archaeological materials in field.

1991 **Monitoring Supervisor/Field Technician/Surveyor—Macko Archaeological Consulting**, Michael Macko M.A., Huntington Beach, California. Duties included archaeological excavation, survey, feature recording, recovery, and removal. Supervisor of archaeological monitoring projects.

1991 **Field Technician—John Minch and Associates, Inc**.,
Gary Hurd Ph.D., San Juan Capistrano, California. Duties included archaeological excavation, and subsequent sorting of archaeological materials in lab.

1990 **Field Technician—Arizona Archaeological Society Field School**.
Learned techniques including: excavation, recording of data, ceramic identification, feature recovery, map interpretation, site survey, and local Arizona Archaeology.

1989-1990 **Field Technician—Keith Engineering Company**, Michael Macko M.A., Irvine, California. Duties: excavation of several sites including rock shelters and open sites, excavation and recording of features, and led field crew to conduct brush clearing and site preparation.

1988 **Field Technician—Chambers Group,** Gary Hurd Ph.D., Santa Ana, California. Duties: excavation of historic adobe, feature recording and recovery, identification of artifacts, and maintenance of field notes.

1988 **Field Technician—Adella Schroth Ph.D.**, University of California, Riverside California, Volunteer. Duties included archaeological excavation, and subsequent sorting of archaeological materials in field.

1988 **Field Technician—Cypress College Archaeological Field Class**, Henry Koerper Ph.D. Director. Cypress, California. Learned basic excavation techniques, unit set up, mapping, soil profiles, taking of field notes, local archaeology lecture

LABORATORY/ANALYSIS EXPERIENCE

1999–2010 **Laboratory Supervisor, Laboratory Technician, CAD Technician, Assistant Faunal Analyst—Statistical Research, Inc.**, Redlands, California. Duties included: processing of excavated materials, photography, cartography, graphic illustration, CAD illustration, database manipulation, invertebrate analysis. Writing of technical reports, and specialized invertebrate analysis. As one of the Principal Investigators for the Playa Vista project, I oversaw the extremely complicated curation and repatriation work that included the curation of hundreds of thousands of artifacts, and repatriation of over 300 sets of human remains and associated artifacts. Important to this work was coordination with the Native American Most Likely Descendant, legal representatives of Playa Vista, and SRI management personnel. This project involved numerous negotiations and development of working plans for repatriation that were agreeable to all parties involved.

1995–1998 **Laboratory Technician—Macko, Inc**., Santa Ana Heights, California. Duties include: Sorting, Photography, Cartography, Data Entry,Report Writing and editing, Research , Proposal writing, Computer Graphics, Processing archaeological materials, and management and curation of archaeological materials.

1991–1992 **Laboratory Technician—Macko Archaeological Consulting**. Huntington Beach, California.

1991 **Laboratory Technician—John Minch and Associates**, Gary Hurd Ph.D. Director, San Juan

Capistrano, California. Duties included sorting, and identification of artifacts, and shell species.

1989–1990 **Laboratory Technician—Keith Engineering Company**, Michael Macko M.A. Director, Irvine, California. Duties included sorting, and identification of artifacts, and shell species.

1988 **Laboratory Technician**—Henry C. Koerper Ph.D. Director, Cypress College, Cypress, California. Duties included: Sorting, and identification of artifacts, and shell species.

CULTURAL RESOURCE MANAGEMENT REPORTS—PRINCIPAL AUTHOR

2008 *Preliminary Report on Data Recovery at CA-LAN-62 Locus G, within the Proposed School Site Parcel, Phase 1, Playa Vista, California*. Benjamin R. Vargas and John G. Douglass. Playa Vista Archaeological and Historical Project, Technical Report 15. Statistical Research, Inc. Tucson.

2005 *Preliminary "Report on Data Recovery within the Phase 1 Project Area at CA-LAN-62, Playa Vista, California.* Benjamin R. Vargas, Jeffrey H. Altschul, John G. Douglass, Richard Ciolek-Torrello, Donn R. Grenda, Robert M. Wegener, and William L. Deaver. Playa Vista Archaeological and Historical Project, Technical Report 12. Statistical Research, Inc., Tucson.

2003 *End of Fieldwork Report for the Rockshelter Damage Assessment.* Benjamin Vargas and Christopher J. Doolittle. Prepared for the 56th RMO/ESM, Luke AFB. Technical Report 03-58., Statistical Research, Inc., Tucson.

2003 *Leo Carrillo State Park Archaeological Investigations. Phase Ii Investigation: Archaeological Survey and Testing Program within the Proposed Concession Store and Visitors Center Areas of Potential Effects,* (with Richard Ciolek-Torrello). Technical Report 03-42. Statistical Research, Inc., Tucson.

2002 *Field Summary Report for the NTAC 2002 Survey, Barry M. Goldwater Range, Arizona* (with Christopher J. Doolittle. Prepared for the 56th RMO/ESM Luke AFB, Arizona. Technical Report 02-31. Statistical Research, Inc., Tucson.

2001 *On Ballona Creek. Archaeological Treatment Plan for CA-LAN-54, Marina del Rey, California* (with Jeffrey H. Altschul). Submitted to the U.S. Army Corps of Engineers. Los Angeles District. Los Angeles, California.

2001 *Cultural Resources Assessment of the Terrestrial Portion of the Tycom Transpacific Fiber Optic Cable and Hermosa Beach Landing Project, Los Angeles County, California.* Benjamin R. Vargas, Michael K. Lerch, and Donn R. Grenda Prepared for Ecology and Environment, Inc., San Francisco. Technical Report 01-62.

2000 *Forensic Archaeological Recovery at Woodlawn Cemetery, Compton, California* (with Donn R. Grenda). Technical Report 00-26. Statistical Research, Redlands. Submitted to Department of Consumer Affairs, Cemetery and Funeral Bureau, Sacramento, California.

1999 *Archaeological Testing for Phase One, Stage A Improvements at Soka University of America, Calabasas, California* (with Donn R. Grenda). Technical Report 99-39. Statistical Research, Tucson.

1999 *Archaeological Assessment of 1.66 Acres for the Mountain Meadows Senior Housing Complex, Big Bear Lake, California* (with Donn R. Grenda). Technical Report 99-35. Statistical Research, Tucson.

1999 *An Evaluation of Archaeological Resources at the Mountain Meadows Senior Housing Complex, Big Bear Lake, California* (with Anne Stoll and Matthew Bischoff). Technical Report 99-55. Statistical Research, Tucson.

1999 *An Historic Water Control Feature near Bryn Mawr, California: Archaeological Investigations at CA-SBR-9861H* (with Matthew Bischoff and Donn R. Grenda). Technical Report 99-43. Statistical Research, Tucson.

1998 *Historic Town Center Park Archaeology—Identification and Preservation of Mission Period Structural Remains: Avoidance Planning for the City Christmas Tree San Juan Capistrano, California* (with Michael E. Macko). Macko, Huntington Beach, California.

1997 *Final Report: Archaeological Monitoring of the Blas Aguilar Adobe, City of San Juan Capistrano, Orange County, California* (with Michael E. Macko). Prepared for The City of San Juan

Capistrano, Planning Department.

1996 *Archaeological Monitoring for CA-ORA-600H Within the Mission Promenade Development, City of San Juan Capistrano, Orange County, California* (with William Hayden, Jeff Couch, Kevin Buffington, and Michael E. Macko). Macko, Santa Ana Heights, California.

1996 *Letter Report: The Result of Monitoring for The Colony at Fashion Island (Block 800) Apartment Project.* Fashion Island, City of Newport Beach.

CULTURAL RESOURCE MANAGEMENT REPORTS—CONTRIBUTING AUTHOR

2008 *Assessment of Preservation in Place of Archaeological Resources (CA-LAN-62 Locus D and CA-LAN-211) in Proposed Village at Playa Vista Project*, by John G. Douglass, Donn R. Grenda, and Benjamin R. Vargas. Playa Vista Archaeological and Historical Project, Technical Report 14. Statistical Research, Inc. Tucson.

2007 *Preliminary Report on Data Recovery at CA-LAN-2768 Locus B within the Los Angeles Clippers Training Center Parcel, Lot 33, Playa Vista, California* (DRAFT), by Amanda Cannon and Benjamin R. Vargas

2006 *Preliminary Report on Data Recovery within the Phase 2 Project Area at CA-LAN-62 Locus D and CA-LAN-211/H, Playa Vista, California*, by Sarah J. Van Galder, Benjamin R. Vargas, Jeffrey H. Altschul, John G. Douglass, Richard Ciolek-Torrello, and Donn R. Grenda. Playa Vista Archaeological and Historical Project, Technical Report 13. Statistical Research, Inc. Tucson.

2006 *Archaeological Data Recovery at CA-SBR-8091/H. Foraging to Farming at a Multicomponent Site in the Prado Basin Region* DRAFT, compiled by David T. Palmer and Marlesa A. Gray. Technical Report 06-74.

2004 *Life in the Margins. Archaeological Excavations at Point Mugu (CA-VEN-187/256), Naval Base Ventura County, California,* edited by Felicia R. Beardsley and John G. Douglass. Technical Report 02-43.

2003 *At the Base of the Bluff: Archaeological Inventory and Evaluation along Lower Centinela Creek, Marina del Rey, California*, edited by Jeffrey H. Altschul Anne Q. Stoll, Donn R. Grenda, and Richard Ciolek-Torrello. Test Excavation Report 4. July 2003.

2002 *National Register of Historic Places Eligibility Testing at CA-SBR-8091/H, Prado Flood Control Basin, San Bernardino County, California* (with Matthew A. Sterner and Scott Thompson). Technical Report 02-50. Statistical Research, Inc., Tucson.

2002 *A Class III Cultural Resources Inventory and Evaluation of the Proposed Hot Weather Test Complex (HWTC), Yuma Proving Ground, Arizona* (with John G. Douglass and Edgar K. Huber). Technical Report 01-53. Statistical Research, Inc., Tucson.

2001 *A Cultural Resources Inventory of 10 Southern Trails Pipeline Components West of Flagstaff, Arizona.* Edgar K. Huber, Kenneth Becker, and Benjamin Vargas. Prepared for the Questar Corporation. Technical Report 01-36. Statistical Research, Inc., Tucson.

2001 *A Class III Cultural Resources Inventory and Evaluation of the Proposed Wellton Mohawk Generating Facility, East of Yuma Arizona.* Edgar K. Huber, Matthew Hill, Benjamin R. Vargas, and Kenneth M. Becker. Prepared for Greystone Environmental Consultants, Inc. Technical Report 01-63. Statistical Research, Inc., Tucson..

2000 *The Griffith Energy Project: A Cultural Resources Inventory of Four Miles of a Natural Gas Pipeline Connection to the EPNG Line South of Kingman, Arizona* (with Kenneth M. Becker, Edgar K. Huber, and Anne Q. Stoll). Technical Report 00-07. Statistical Research, Tucson.

1999 *Cultural Resources Inventory of 80 Miles of 230kV Transmission Lines for the Griffith Energy Project near Kingman, Arizona* (with Christopher J. Doolittle, Edgar K. Huber, Jane Rosenthal, and Stephanie M. Whittlesey). Technical Report 99-62. Statistical Research, Tucson.

1997 *Final Report: Harriett M. Wieder Regional Park Archaeological Project: Phase I Planning for Sites CA-ORA-292/293, and 294, Huntington Beach, California* (with Michael E. Macko, Jeffrey S. Couch, Kevin S. Buffington, and William Hayden). Macko Consulting, Inc.

1997 *Final Report: Historical, Archaeological, and Paleontological Assessment of the Mid-Valley Sanitary Landfill Expansion, San Bernardino County, California* (with Michael E. Macko). Macko Consulting, Inc.

1997 *Upper Newport Bay Regional Park Archaeological Project, Data Recovery at CA-ORA-170* (with

Michael E. Macko, Jeffrey S. Couch, and William Hayden). Macko, Orange County, CA. Macko, *Draft Final: Upper Newport Bay Regional Park Archaeological Project, Data Recovery at CA-Ora-170*, Orange County, California. (1997)

PAPERS PRESENTED

2008 Expedientes, Parones, Flaked Stone and Cattle Bones. Ethnohistoric Research, Archaeological Data, and Future Directions for Mission-period Archaeology Near the Ballona Lagoon. Paper presented at the 42nd Annual Meeting of the Society for California Archaeology, Burbank, California.

2008 Gradalls, Powerscreens, 3D Scanners, and Laser Sorters: Recent Advances in Archaeological Method for Large Scale Data Recovery Projects (with Donn R. Grenda). Paper presented at the Annual Meeting of the Society for Historical Archaeology, Albuquerque, New Mexico.

2008 No Smoking Gun: Ethnohistory and Contact Period Archaeology, a View from the Ballona Lagoon. Paper presented at the Annual Meeting for the Society for Historical Archaeology, Albuquerque, New Mexico

2008 Domination, Acculturation, and Resistance: Modeling Native American Responses to the Mision System in Southern California (with John G. Douglass and Seetha Reddy). Presented at the 73rd Annual Meeting of the Society for American Archaeology, in Vancouver, Canada.

2007 Life on the Edge: Persistence of Native American Identity on the Periphery of Hispanic Influence. Paper presented at the 72nd Annual Meeting of the Society for American Archaeology, Austin, Texas.

2007 Constructing Identity in Colonial Southern California. Co-author with John Douglass, Richard Ciolek-Torrello, Angela Keller, and Donn Grenda. Paper presented at the 72nd Annual Meeting of the Society for American Archaeology. In the symposium, "Identity and Colonialism in California, 1769–1848," organized by Angela Keller, John Douglass, and Benjamin Vargas, April, 2007.

2002 Contact Period Occupation and Acculturation in a Non-Mission Context along the Southern California Coast (with Anne Q. Stoll and Richard Ciolek-Torrello). Paper presented at the 36th Annual Meeting of the Society for California Archaeology, in San Diego, California.

2001 Contact Period Occupation and Acculturation in a Non-Mission Context along the Southern California Coast (with Anne Q. Stoll and Richard Ciolek-Torrello). Paper presented at the 66th Annual Meeting of the Society for American Archaeology in New Orleans, Louisiana.

1998 The Excavation of ORA-64: The Design and Management of a Large Excavation. Paper presented at the 63rd Annual Meeting of the Society for American Archaeology as part of a Symposium entitled "The Irvine Site (CA-ORA-64): Life in Early and Middle Holocene Southern California.

SESSIONS ORGANIZED

Identity and Colonialism in California, 1769–1848. Co-organizer with John Douglass and Angela Keller. Symposium organized for the 72nd Annual Meeting of the Society for American Archaeology, Austin, April 2007.

AWARDS AND RECOGNITION

Gilbert Altschul Scholarship for anthropological research 2001

Outstanding Graduate Student in Archaeology, California State University, Long Beach; 2003

JOHN D. WILSON, PRINCIPAL

REGISTRATION:

Civil Engineer, State of California, License No. C 33695
Traffic Engineer, State of California, License No. TR 1192

CAPABILITIES:

Mr. Wilson is a civil and traffic engineer with over 30 years of experience in the areas of civil, traffic and transportation engineering. He has served in the capacity of principal in charge or project manager for a variety of traffic, and transportation related projects for both public and private clients. He has been responsible for all aspects of traffic studies including circulation analyses/ plans, impact analyses, the development and design of mitigation measures, and the generation of project reports. He has extensive experience preparing and presenting plans to neighborhood groups/ associations, public agencies, and elected bodies.

EXPERIENCE RECORD:

At Wilson Engineering, Mr. Wilson is responsible for all traffic and transportation related projects. Mr. Wilson has been responsible for the preparation of traffic and transportation analyses for a number of Applications for Certification of power plants throughout the State of California. He has provided both written and oral testimony to the CEC as part of the certification process. Analyses have been prepared for generation facilities proposed in the Southern California Desert, Central Valley, and Sacramento areas. He has also completed numerous access and circulation studies for a variety of projects throughout the State of California allowing him to develop ongoing working relationships with a variety of agencies, local municipalities, and private developers. As a consultant to the San Francisco Transportation Authority, he has prepared traffic analyses for Strategic Analysis Reports (Technical Informational Reports to the Board of Supervisors) for the evaluation of Central Freeway Replacement Alternatives, demolition of a second portion of the Central Freeway, and for the evaluation of a one-couplet in the South of Market Area. He has been responsible for the design and preparation of PS&E for a variety of infrastructure (roadway and intersection) projects in Mission Bay. He was recently responsible for a major series of traffic signal improvements for the Mission Bay Development in San Francisco which included interfacing with the Municipal Light Rail System, interconnection, and variable message signing in the vicinity of Pac Bell Park. He has completed traffic impact studies for U.S. Postal facilities throughout California and Washington which typically included presentations to local governing agencies and neighborhood groups. He has completed traffic impact studies for industrial or office developments in the Cities of Oakland, Vacaville, Stockton, Hayward, Santa Clara, and Palo Alto; commercial developments in the Cities of Oakland, Milpitas, San Jose, Morgan Hill, and Vacaville; and residential developments in the Cities of Novato, Pinole, Hayward, San Ramon, and Redwood City. Mr. Wilson has extensive experience working with Caltrans Staff having completed projects in almost all Districts. Projects involving Caltrans have ranged from traffic impact studies to the design of highway widening to design of access improvements and the installation of traffic signals.

EDUCATION:

M.S. Transportation Engineering, Cal Poly, San Luis Obispo, CA, 1974
B.S.C.E., University of Santa Clara, Santa Clara, CA, 1971

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT
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APPLICATION FOR CERTIFICATION
FOR THE *BLYTHE SOLAR*
POWER PLANT PROJECT

Docket No. 09-AFC-6

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(Revised 5/3/10)

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DECLARATION OF SERVICE

I, Marie Mills, declare that on June 11, 2010, I served and filed copies of the attached **PALO VERDE SOLAR I, LLC'S OPENING TESTIMONY**, dated **June 11, 2010**. The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at:
[http://www.energy.ca.gov/sitingcases/solar_millennium_blythe]

The document has been sent to both the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit, in the following manner:

(***Check all that Apply***)

FOR SERVICE TO ALL OTHER PARTIES:

__X__ sent electronically to all email addresses on the Proof of Service list;

__X__ by personal delivery or by depositing in the United States mail at with first-class postage thereon fully prepaid and addressed as provided on the Proof of Service list above to those addresses **NOT** marked "email preferred."

AND

FOR FILING WITH THE ENERGY COMMISSION:

__X__ sending an original paper copy and one electronic copy, mailed and emailed respectively, to the address below (***preferred method***);

OR

____ depositing in the mail an original and 12 paper copies, as follows:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 09-AFC-6
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512
docket@energy.state.ca.us

I declare under penalty of perjury that the foregoing is true and correct.

Marie Mills