

STATE OF CALIFORNIA
ENERGY RESOURCES CONSERVATION
AND DEVELOPMENT COMMISSION

In the Matter of:)
) Docket No. 09-AFC-5
)
Application For Certification for the)
Abengoa Mojave Solar Project)
)
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)
)
)

SUPPLEMENTAL TESTIMONY AND HEARING STATEMENT OF STAFF

Commissioner Anthony Eggert, the Presiding Member of the Application for Certification (“AFC”) Committee (“Committee”) in the above-referenced proceeding, issued a *Revised Notice of Evidentiary Hearing* on June 23, 2010. In accordance with the supplementary schedule contained in the *Revised Notice of Evidentiary Hearing*, Staff hereby files its supplemental opening testimony on the topics of (1) Worker Safety and Fire Protection; (2) Air Quality; and (3) Transmission System Engineering (“TSE”), including TSE-Appendix A. As discussed at the June 28, 2010 evidentiary hearing, Staff also hereby files the Executive Summary of staff’s environmental and engineering analyses as opening testimony, the Declarations and Statements of Qualifications for Staff’s rebuttal testimony, and an email message from Ashleigh Blackford of the United States Fish and Wildlife Service (“USFWS”) to Heather Blair, as a supplement to Ms. Blair’s testimony on Biological Resources.

As directed by the *Revised Notice of Evidentiary Hearing*, Staff also submits the following as its supplemental hearing statement:

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I. TOPIC AREAS THAT ARE COMPLETE AND READY TO PROCEED TO EVIDENTIARY HEARING

The topic areas reserved for the July 15, 2010, evidentiary hearing are complete and ready to proceed to evidentiary hearing. Those topic areas are Executive Summary, Air Quality, TSE, and Worker Safety and Fire Protection.

II. TOPIC AREAS THAT ARE NOT COMPLETE AND NOT READY TO PROCEED TO EVIDENTIARY HEARING

Staff submits that all topic areas are complete and ready to proceed to evidentiary hearing.

III. TOPIC AREAS THAT ARE DISPUTED AND REQUIRE ADJUDICATION

Based on its review of the written filings and oral statements of applicant and the County of San Bernardino made to date, Staff believes that the topic area of Worker Safety and Fire Protection likely remains disputed and will thus require adjudication. Staff reserves the right to revise this list pending review of parties' supplemental opening and rebuttal testimony, hearing statements, statements made at the July 15, 2010, hearing, or otherwise.

IV. IDENTITY OF WITNESSES, TOPIC AREAS EACH WITNESS WILL PRESENT, BRIEF SUMMARY OF WITNESSES' TESTIMONY, AND TIME REQUIRED TO PRESENT DIRECT TESTIMONY

Staff will sponsor the following witness and anticipates calling him to testify at the July 15, 2010, evidentiary hearing.

Witness: Alvin Greenberg, Ph.D.

Summary of Testimony: Worker Safety and Fire Protection

Qualifications: Declaration and resume contained in the Preparation Team Section of the SSA – Part A (Exhibit 301) and attached to Staff's Rebuttal Testimony (Exhibit 306) and the Supplemental Opening Testimony of Alvin Greenberg, Ph.D. on Worker Safety and Fire Protection (Exhibit 313)

Time required to present direct testimony: 10 minutes

Staff does not believe that any issue in the topic areas of **Executive Summary, Air Quality, Biological Resources, or Transmission System Engineering** is in

dispute, and thus no adjudication is required. Staff witnesses for these topic areas, however, can be made available for cross-examination if any party indicates by its Hearing Statement that it would like to cross-examine any of them. For those topic areas with issues not subject to dispute by the Applicant or other parties, Staff proposes to enter testimony and exhibits into the record by written declaration. The testimony and exhibits and sponsoring witnesses are identified below and declarations have been included.

- Executive Summary (included in Exhibit 303) – Craig Hoffman
- Air Quality (included in Exhibits 302 and 305) – Tao Jiang and William Walters, P.E.
- Biological Resources (included in Exhibits 302 and 304) – Heather Blair
- Transmission System Engineering (included in Exhibit 303) – Ajoy Guha, P.E., Mark Hesters, and Heather Blair

V. TOPICS, SUMMARY OF SCOPE, AND TIME ESTIMATES FOR CROSS-EXAMINATION

Because parties have yet to file supplemental opening or rebuttal testimony on Worker Safety and Fire Protection, Staff reserves the right to cross-examine applicant's, the County's, and any other parties' witnesses on the topic area of Worker Safety and Fire Protection. At present, Staff can not estimate the amount of time it would request for cross-examining witnesses.

VI. EXHIBIT LIST

Staff hereby attaches its updated Tentative Exhibit List of Staff's exhibits. As indicated on the attached, Staff will request that its assessment of the proposed project's Transmission System Engineering contained in the Supplemental Staff Assessment – Part C (Exhibit 303) supersede the TSE section contained in SSA – Part B (Exhibit 302) in its entirety. At the July 15, 2010, evidentiary hearing, Staff will move that Exhibits 303, 305, 306, 312, and 313 be entered into the record and received as

evidence. Staff will also move that its Supplemental Rebuttal Testimony on Air Quality, TSE, and Worker Safety and Fire Protection, if prepared, also be entered into the record and received as evidence.

VII. SCHEDULE PROPOSALS

Staff reiterates its prior request that Opening Briefs, if necessary, be due ten business days after transcripts become available, and that Reply Briefs be due five business days after the due date for Opening Briefs.

VIII. PROPOSED MODIFICATIONS TO PROPOSED CONDITIONS OF CERTIFICATION

As indicated in Exhibit 305, CEC Staff's Errata to Supplemental Staff Assessment – Part B on Air Quality, the format for Conditions of Certification **AQ-SC-3**, **-4**, and **-5** have been corrected so that the substantive requirements are in the conditions rather than the verifications of the conditions. Other changes are made to achieve consistency with other solar thermal projects with AFCs before the Energy Commission and to reflect revised conditions from the Mojave Desert Air Quality Management District's revised Final Determination of Compliance.

Staff also proposes modifications to Condition of Certification **WORKER SAFETY-6** as set forth in Exhibit 312, the Supplemental Opening Testimony of Alvin Greenberg, Ph.D. on Worker Safety and Fire Protection.

Staff believes that the other Conditions of Certification contained in Staff's filed testimony, and Condition of Certification **TRANS-4** as read into the record at the June 28, 2010, evidentiary hearing, are complete, enforceable, and consistent with the evidence that will be presented at hearings.

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IX. COPIES OF WRITTEN TESTIMONIAL AND DOCUMENTARY EVIDENCE

Altogether, the documents marked as exhibits and hereby submitted for filing are:

- Exhibit 303: Supplemental Staff Assessment – Part C (Executive Summary and Transmission System Engineering (“TSE”), including TSE – Appendix A);
- Exhibit 305: CEC Staff’s Errata to Supplemental Staff Assessment – Part B on Air Quality
- Exhibit 306: Declarations and Statements of Qualifications for Staff’s Rebuttal Testimony
- Exhibit 312: Supplemental Opening Testimony of Alvin Greenberg, Ph.D. on Worker Safety and Fire Protection
- Exhibit 313: Email dated June 28, 2010 from Ashleigh Blackford of United States Fish and Wildlife Service to Heather Blair of CEC Staff

DATED: July 6, 2010

Respectfully submitted,

_____/S/_____
CHRISTINE JUN HAMMOND
Senior Staff Counsel
California Energy Commission
1516 9th St., MS-14
Sacramento, CA
Ph: (916) 651-2924
E-mail: chammond@energy.state.ca.us

**UPDATED IDENTIFICATION OF
STAFF'S OPENING TESTIMONY**

REVISED IDENTIFICATION OF STAFF'S OPENING TESTIMONY (JULY 6, 2010)

TECHNICAL SECTION	STAFF DOCUMENT						
	STAFF ASSESSMENT March 15, 2010	SUPPLEMENTAL STAFF ASSESSMENT PART A May 12, 2010	SUPPLEMENTAL STAFF ASSESSMENT PART B May 25, 2010	SUPPLEMENTAL STAFF ASSESSMENT PART C July 2, 2010	ERRATA TO SSA PART B – BIOLOGICAL RESOURCES SECTION June 9, 2010	ERRATA TO SSA PART B – AIR QUALITY SECTION July 2, 2010	SUPPLEMENTAL OPENING TESTIMONY – WORKER SAFETY & FIRE PROTECTION July 2, 2010
EXHIBIT NO.	300	301	302	303	304	305	313
AIR QUALITY / GHG ALTERNATIVES	X		X			Errata	
BIOLOGICAL RESOURCES			X		Errata - Figures 1 and 2		
CULTURAL RESOURCES			X				
CUMULATIVE EFFICIENCY	X X						
EXECUTIVE SUMMARY				X			
FACILITY DESIGN	X						
GENERAL CONDITIONS	X						
GEOLOGY / PALEONTOLOGY	X						
HAZARDOUS MATERIALS		X					
INTRODUCTION	X						
LAND USE			X				
NOISE & VIBRATION		X					
PROJECT DESCRIPTION			X				
PUBLIC HEALTH		X					
RELIABILITY	X						
SOCIOECONOMICS	X						
SOILS & WATER RESOURCES			X				
TRAFFIC & TRANSPORTATION		X					
TRANSMISSION LINE SAFETY & NUISANCE	X						
TRANSMISSION SYSTEM ENGINEERING (TSE)				X			
TSE APPENDIX A				X			
VISUAL RESOURCES		X					
WASTE MANAGEMENT		X					
WORKER SAFETY & FIRE PROTECTION		X					X

**UPDATED TENTATIVE EXHIBIT LIST
OF STAFF**



Docket Number: 09-AFC-5

Date: July 6, 2010

Project Name: Abengoa Mojave Solar Project (AMS)

STAFF'S TENTATIVE EXHIBIT LIST

YELLOW HIGHLIGHT represents additions to Staff's Tentative Exhibit List, submitted on June 17, 2010.

Exhibit	Brief Description	Stipulation	Offered	Admitted	Refused	CEC Use Only
300	<p>Staff Assessment for the Abengoa Mojave Solar Project, dated March 15, 2010 and docketed March 15, 2010.</p> <ul style="list-style-type: none"> (a) Executive Summary (to be superseded by Supplemental Staff Assessment – Part C) (b) Introduction (c) Project Description (superseded by Supplemental Staff Assessment – Part B) (d) Cumulative Analysis (e) Air Quality (superseded by Supplemental Staff Assessment – Part B) (f) Biological Resources (superseded by Supplemental Staff Assessment – Part B) (g) Cultural Resources (superseded by Supplemental Staff Assessment – Part B) (h) Hazardous Materials (superseded by Supplemental Staff Assessment – Part A) (i) Land Use (superseded by Supplemental Staff Assessment – Part B) (j) Noise and Vibration (superseded by Supplemental Staff Assessment – Part A) (k) Public Health (superseded by Supplemental Staff Assessment – Part A) (l) Socioeconomic Resources (m) Soil and Water Resources (superseded by Supplemental Staff Assessment – Part B) (n) Traffic and Transportation (superseded by Supplemental 					

	<p>Staff Assessment – Part A)</p> <p>(o) Transmission Line Safety and Nuisance</p> <p>(p) Visual Resources (superseded by Supplemental Staff Assessment – Part A)</p> <p>(q) Waste Management (superseded by Supplemental Staff Assessment – Part A)</p> <p>(r) Worker Safety and Fire Protection (superseded by Supplemental Staff Assessment – Part A and Supplemental Opening Testimony of Alvin Greenberg, Ph.D. on Worker Safety and Fire Protection)</p> <p>(s) Facility Design</p> <p>(t) Geology and Paleontology</p> <p>(u) Power Plant Efficiency</p> <p>(v) Power Plant Reliability</p> <p>(w) Transmission System Engineering (superseded by Supplemental Staff Assessment – Part C)</p> <p>(x) Alternatives</p> <p>(y) General Conditions</p> <p>(z) Declarations and Witness Qualifications of:</p> <ul style="list-style-type: none"> • Suzanne Phinney • Tao Jiang • William Walters, PE • Heather Blair • Kathleen Forrest • Alvin Greenberg, Ph.D. • Negar Vahidi • Susanne Huerta • Shahab Khoshmashrab • Christopher Dennis • John Fie • Eugene Yates • Mike Conway • Steven Brown • Obed Odoemelam, Ph.D. • Thomas Packard • William Kanemoto • James Jewell • Ellen Townsend Hough • Erin Bright • Chris Davis • Michael Lindholm • Ajoy Guha, PE • Mark Hesters • Craig Hoffman 					
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	<ul style="list-style-type: none"> • Scott Debauche 					
301	<p>Supplemental Staff Assessment – Part A for the Abengoa Mojave Solar Project, dated May 12, 2010 and docketed May 12, 2010.</p> <ul style="list-style-type: none"> (a) Executive Summary (b) Hazardous Materials (c) Noise and Vibration (d) Public Health (e) Traffic and Transportation (f) Visual Resources (g) Waste Management (h) Worker Safety and Fire Protection (i) Declarations and Witness Qualifications of: <ul style="list-style-type: none"> • Craig Hoffman • Alvin Greenberg, Ph. D. • Shahab Khoshmashrab • Steven J. Brown, PE • William D. Kanemoto • James E. Jewell • Thomas Packard • Ellen Townsend-Hough 					
302	<p>Supplemental Staff Assessment – Part B for the Abengoa Mojave Solar Project, dated May 25, 2010 and docketed May 25, 2010.</p> <ul style="list-style-type: none"> (a) Executive Summary (b) Project Description (c) Air Quality/GHG (d) Biological Resources (e) Cultural Resources (f) Land Use (g) Soil and Water Resources (h) Transmission System Engineering (i) Declarations and Witness Qualifications of: <ul style="list-style-type: none"> • Craig Hoffman • Tao Jiang • William Walters, PE • Heather Blair • Kathleen Forrest • Negar Vahidi • Susanne Huerta • Christopher Dennis • John Fio • Eugene Yates • Mike Conway 					

	<ul style="list-style-type: none"> • Ajoy Guha, PE • Mark Hesters 					
303	<p>Supplemental Staff Assessment – Part C for the Abengoa Mojave Solar Project</p> <ul style="list-style-type: none"> (a) Executive Summary (b) Transmission System Engineering, including Appendix A (c) Declarations and Witness Qualifications of: <ul style="list-style-type: none"> • Craig Hoffman • Heather Blair • Ajoy Guha, PE • Mark Hesters 					
304	<p>CEC Staff's Errata to SSA Part B – Biological Resources, dated June 9, 2010 and docketed on June 9, 2010</p>					
305	<p>CEC Staff's Errata to SSA Part B – Air Quality</p> <p>Declarations and Witness Qualifications of:</p> <ul style="list-style-type: none"> • Tao Jiang • William Walters 					
306	<p>CEC Staff's Rebuttal Testimony to the Applicant's Opening Testimony, dated June 17, 2010 and docketed on June 17, 2010</p> <ul style="list-style-type: none"> (a) Biological Resources (b) Hazardous Materials (c) Noise and Vibration (d) Soil and Water Resources (e) Traffic and Transportation (f) Visual Resources (g) Waste Management (h) Worker Safety and Fire Protection (i) Declarations and Witness Qualifications in support of Staff's Rebuttal Testimony dated June 17, 2010, of: <ul style="list-style-type: none"> • Heather Blair • Alvin Greenberg, Ph.D. • Shahab Khoshmashrab • Christopher Dennis • John Fio • Eugene Yates • Mike Conway • Steven Brown, PE • Thomas Packard • William Kanemoto • James Jewell • Ellen Townsend-Hough 					



BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT
COMMISSION OF THE STATE OF CALIFORNIA
1516 NINTH STREET, SACRAMENTO, CA 95814
1-800-822-6228 – WWW.ENERGY.CA.GOV

APPLICATION FOR CERTIFICATION
FOR THE **ABENGOA MOJAVE**
SOLAR POWER PLANT

Docket No. 09-AFC-5
PROOF OF SERVICE
(Revised 6/23/2010)

APPLICANT

Emiliano Garcia Sanz
General Manager
Abengoa Solar Inc.
11500 West 13th Avenue
Lakewood, CO 80215
emiliano.garcia@solar.abengoa.com

Scott D. Frier
Chief Operating Officer
Abengoa Solar Inc.
13911 Park Ave., Ste. 206
Victorville, CA 92392
scott.frier@solar.abengoa.com

Tandy McMannes
2030 Addison Street, Suite 420
Berkeley, CA 94704
tandy.mcmannes@solar.abengoa.com

APPLICANT'S CONSULTANTS

Frederick H. Redell, PE
Engineering Manager
Abengoa Solar, Inc.
11500 West 13th Avenue
Lakewood, CO 80215
frederick.redell@solar.abengoa.com

COUNSEL FOR APPLICANT

*Christopher T. Ellison
Ellison, Schneider & Harris
2600 Capitol Ave., Suite 400
Sacramento, CA 95816
cte@eslawfirm.com

INTERESTED AGENCIES

California ISO
E-mail Preferred
e-recipient@caiso.com

INTERVENORS

County of San Bernardino
Ruth E. Stringer, County Counsel
Bart W. Brizzee, Deputy County Counsel
385 N. Arrowhead Avenue, 4th Floor
San Bernardino, CA 92415-0140
bbrizzee@cc.sbcounty.gov

California Unions for Reliable Energy ("CURE")
Tanya A. Gulesserian
Marc D. Joseph
Elizabeth Klebaner
Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080
E-mail Preferred
tgulesserian@adamsbroadwell.com
eklebaner@adamsbroadwell.com

Luz Solar Partners Ltd., VIII
Luz Solar Partners Ltd., IX
Jennifer Schwartz
700 Universe Blvd
Juno Beach, FL 33408
jennifer.schwartz@nexteraenergy.com

ENERGY COMMISSION

ANTHONY EGGERT
Commissioner and Presiding Member
aeggert@energy.state.ca.us

JAMES D. BOYD
Vice Chairman and Associate Member
jboyd@energy.state.ca.us

Kourtney Vaccaro
Hearing Officer
kvaccaro@energy.state.ca.us

Lorraine White
Adviser to Commissioner Eggert
lwhite@energy.state.ca.us

Craig Hoffman
Project Manager
choffman@energy.state.ca.us

Christine Hammond
Staff Counsel
chammond@energy.state.ca.us

Jennifer Jennings
Public Adviser's Office
publicadviser@energy.state.ca.us

DECLARATION OF SERVICE

I, Debra Dabney, declare that on July 6, 2010, I served and filed copies of the attached Supplemental Testimony and Hearing Statement of Staff, dated July 6, 2010. The original documents, filed with the Docket Unit, are accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at: [\[http://www.energy.ca.gov/sitingcases/abengoal/index.html\]](http://www.energy.ca.gov/sitingcases/abengoal/index.html). 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:

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:

- sent electronically to all email addresses on the Proof of Service list;
- by personal delivery;
- by delivering on this date, for mailing with the United States Postal Service with first-class postage thereon fully prepaid, to the name and address of the person served, for mailing that same day in the ordinary course of business; that the envelope was sealed and placed for collection and mailing on that date to those addresses **NOT** marked "email preferred."

AND

For filing with the Energy Commission:

- 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-5
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, that I am employed in the county where this mailing occurred, and that I am over the age of 18 years and not a party to the proceeding.

/s/ _____
Debra Dabney

ABENGOA MOJAVE SOLAR

DOCKET 09-AFC-5
DATE _____
REC'D <u>JUN 30 2010</u>

Supplemental Staff Assessment - Part C



CALIFORNIA
ENERGY COMMISSION
Arnold Schwarzenegger, Governor

JUNE 2010
CEC-700-2010-003 - SUPC

DOCKET NUMBER 09-AFC-5

PROOF OF SERVICE (REVISED 06/08/10) FILED WITH
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**CALIFORNIA
ENERGY COMMISSION**

1516 Ninth Street
Sacramento, CA 95814

<http://www.energy.ca.gov/sitingcases/abengoa/index.html>

Craig Hoffman
Project Manager

Roger Johnson
Siting Office Manager

TERRENCE O'BRIEN
***Deputy Director
Siting, Transmission and
Environmental Protection Division***

MELISSA JONES
Executive Director

DISCLAIMER

Staff members of the California Energy Commission prepared this report. As such, it does not necessarily represent the views of the Energy Commission, its employees, or the State of California. The Energy Commission, the State of California, its employees, contractors and subcontractors make no warrant, express or implied, and assume no legal liability for the information in this report; nor does any part represent that the uses of this information will not in fringe upon privately owned rights. This report has not been approved or disapproved by the Energy Commission nor has the Commission passed upon the accuracy or adequacy of the information in this report.

**ABENGOA MOJAVE SOLAR (AMS)
(09-AFC-5)
SUPPLEMENTAL STAFF ASSESSMENT PART C**

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EXECUTIVE SUMMARY

Testimony of Craig Hoffman

INTRODUCTION

The California Energy Commission staff has the responsibility to complete an independent assessment of the Abengoa Mojave Solar project (AMS) Application for Certification (09-AFC-5). This analysis includes a review of the engineering design and any potential impacts to the environment, the public's health and safety, and a determination of whether the project conforms to all applicable laws, ordinances, regulations and standards (LORS). Energy Commission staff prepares a Staff Assessment (SA) that identifies any potentially significant environmental impacts and includes recommended mitigation measures in the form of conditions of certification for construction, operation and eventual closure of the project.

The SA contains analyses similar to those normally contained in an Environmental Impact Report (EIR) required by the California Environmental Quality Act (CEQA). The Energy Commission review and licensing process is a functional equivalent of an EIR. When issuing a license, the Energy Commission is the lead state agency under CEQA, and its process is functionally equivalent to the preparation of an EIR.

The President and Congress have underscored the need for accelerated development of renewable energy projects in California with the passing of the American Recovery and Reinvestment Act (ARRA) of 2009. The Act specifically directs economic stimulus funding to qualified projects that begin construction by December 1, 2010. The AMS project is requesting ARRA funding which has required an accelerated project schedule and the preparation of a single Staff Assessment (SA) as opposed to a Preliminary Staff Assessment and Final Staff Assessment. The SA presents for the applicant, interveners, agencies, other interested parties, and members of the public, the staff's final analysis, conclusions, and recommendations.

When necessary, staff provides a comment period to resolve issues between the parties and to narrow the scope of disputed issues presented at evidentiary hearings. During the comment period that normally follows the publication of the SA, staff will conduct one or more workshops to discuss its findings, proposed mitigation, and proposed compliance-monitoring requirements. Based on the workshops and written comments, staff may refine its analysis, correct errors, and finalize conditions of certification to reflect areas where agreements have been reached with the parties and will then publish a Supplemental Staff Assessment (SSA). The SSA will be a limited document representing revisions and additions rather than a document including each technical section.

BACKGROUND

Energy Commission staff published a SA for the AMS project on March 15, 2010. That document included staff's independent analysis, conclusions, and recommendations for the proposed project. Staff publically noticed the SA for a 30-day comment period that lasted from Tuesday March 16, 2010 to Thursday, April 15, 2010.

During this comment period, public workshops were held on Tuesday, April 6, 2010 in Sacramento at the Energy Commission and on Wednesday, April 7, 2010 at the Barstow City Hall to discuss staff's findings, proposed mitigation, and proposed conditions of certification and compliance-monitoring requirements.

The Supplemental Staff Assessment (SSA) has been prepared based upon discussions at the SA workshops, written comments and new information provided by the applicant, agencies and public. This SSA is a limited document representing revisions and additions to various technical sections that were commented upon. Technical sections included with the SSA supersede the section in the SA. This document does not include each technical section. Executive Summary Table 1 identifies where the final sections are located for each technical section. For a complete project description please see SSA Part B. Final technical sections are located in the SA, SSA Part A, SSA Part B and SSA Part C. The SSA only includes sections that were revised or had public comments.

The AMS SSA was published in three parts. SSA Part A was published on May 12, 2010 and contained the Energy Commission staff's final environmental and engineering evaluation of the project in the following technical sections: Hazardous Materials, Noise and Vibration, Public Health, Traffic and Transportation, Visual Resources, Waste Management and Worker Safety and Fire Protection and will serve as staff's testimony during evidentiary hearings.

SSA Part B was published on May 25, 2010 and contained the Energy Commission staff's final environmental and engineering evaluation of the project in the following technical sections: Air Quality, Biological Resources, Cultural Resources, Land Use, Soils and Water Resources and Transmission System Engineering and will serve as staff's testimony during evidentiary hearings.

SSA Part C contains Transmission System Engineering and Transmission System Engineering - Appendix A that is an environmental review of downstream transmission and telecommunication facilities. These are facilities that are past the first point of interconnection, the Lockhart substation, and are required for the AMS project to connect to Southern California Edison Company's (SCE) Kramer-Cool Water 230-kV transmission line.

Staff's testimony that will be provided at the Energy Commission's Evidentiary Hearings on the AMS project will encompass the technical sections not modified in the SA and revisions to sections included in SSA Part A, SSA Part B and SSA Part C.

ENERGY COMMISSION'S "IN LIEU" PERMITTING PROCESS

Staff has implemented an objective of the Renewable Energy Action Team (REAT), as identified in the Governor's Executive Order S-14-08, to create a consolidated process for permitting renewable energy generation facilities under California law. This permit streamlining process is being implemented according to the Energy Commission's "in lieu permit" authority established under the Warren-Alquist Act. Accordingly, staff coordinated its environmental review with other agencies such as the U.S. Fish and Wildlife Service, California Department of Fish and Game, Lahontan Regional Water

Quality Control Board, Mojave Desert Air Quality Management District and San Bernardino County to ensure that substantive requirements of these agencies were incorporated into the process and document.

The requirements of state and local permits that would ordinarily be issued but for the Energy Commission's exclusive jurisdiction, will be incorporated into the Commission's certificate if the project is approved. By implementing this cooperative approach, staff was able to reduce the overall permit processing time otherwise necessary to issue an Incidental Take Permit, Streambed Alteration Agreement and Waste Discharge Requirements.

CEQA PROCESS

The Energy Commission's siting regulations require Energy Commission staff to independently review the AFC and assess whether the list of environmental impacts contained is complete and whether additional or more effective mitigation measures are necessary, feasible, and available (Cal. Code Regs., tit. 20, §§ 1742 and 1742.5(a)).

In addition, Energy Commission staff must assess the completeness and adequacy of the measures proposed by the applicant to ensure compliance with health and safety standards and the reliability of power plant operations (Cal. Code Regs., tit. 20, § 1743(b)). Energy Commission staff is required to develop a compliance plan (coordinated with other agencies) to ensure that applicable laws, ordinances, regulations, and standards are met (Cal. Code Regs., title 20, § 1744(b)).

Energy Commission staff conducts its environmental analysis in accordance with the requirements of the California Environmental Quality Act (CEQA). No additional Environmental Impact Report (EIR) is required because the Energy Commission's site certification program has been certified by the California Natural Resources Agency as meeting all requirements of a certified regulatory program (Pub. Resources Code, § 21080.5 and Cal. Code Regs., title 14, § 15251 (j)).

Energy Commission staff's impact assessment, including the recommended conditions of certification, is only one piece of evidence that the Committee assigned to oversee the AMS AFC will consider in reaching a decision on the proposed project and making its recommendation to the full Energy Commission. At the public evidentiary hearings, all parties will be afforded an opportunity to present evidence and to rebut the testimony of other parties, thereby creating a hearing record on which a decision on the project can be based. The hearings before the assigned Committee also allows all parties to argue their positions on disputed matters, if any, and it provides a forum for the Committee to receive comments from the public and other governmental agencies.

Following the hearings, the Committee's recommendation to the full Energy Commission on whether or not to approve the proposed project will be contained in a document entitled the Presiding Member's Proposed Decision (PMPD). Following its publication, the PMPD is circulated in order to receive written public comments. At the conclusion of the comment period, the Committee may prepare a revised PMPD. At the close of the comment period for the revised PMPD, the PMPD is submitted to the full Energy Commission for a decision.

PROJECT LOCATION AND DESCRIPTION

The proposed AMS project is a solar electric generating facility to be located on approximately 1,765 acres. The proposed project site is located approximately nine miles northwest of the Town of Hinkley in unincorporated San Bernardino County, approximately halfway between the City of Barstow and Kramer Junction (Highway 395 / Highway 58 junction). Project access is provided by Harper Lake Road, which is located approximately twenty miles west of Barstow along the Highway 58 corridor. The project site is approximately six miles north of where Harper Lake Road intersects with Highway 58. The existing Solar Electric Generating Stations VIII and IX facilities, owned by NextEra™ Energy Resources, are located immediately northwest of the project site.

The project site is comprised of private property that was historically used as the Lockhart Ranch complex. The property has served as an agricultural and cattle center for over sixty years and, in that capacity, has utilized water from ground wells; farming activities have included flood irrigation and ultimately the pivot system of irrigation of quarter section areas. Currently there are no ranching or residential activities on the property, and there is only one active pivot irrigation field in production on the site.

The project would utilize solar parabolic trough technology to activate a heat transfer fluid. The proposed collector fields of parabolic trough solar collectors are modular in nature and comprise many parallel rows of solar collectors, aligned on a north-south axis. Each solar collector has a linear, parabolic-shaped reflector that focuses the sun's radiation on a linear receiver known as a heat collection element located at the focus of the parabola.

As heat transfer fluid is circulated through the solar field, light from the sun reflects off the solar collector's parabolic troughs and is concentrated on the heat collection elements located at the focal point of the parabola. This heat transfer fluid provides a high-temperature energy source which is used to generate steam in steam generators. As this steam expands through the steam turbine generators, electrical power is generated.

The project will have a combined nominal electrical output of 250 megawatts (MW) from twin, independently-operable solar fields, each feeding a 125-MW power island. The plant sites, identified as Alpha (the northwest portion of the Project area) and Beta (the southeast portion of the project area), will be 884 acres and 800 acres respectively and joined at an on-site transmission line interconnection substation to form one full-output transmission interconnection. This proposed substation, located at the southwest corner of the Beta solar field, is referred to as the "Lockhart" substation. An additional 81 acres shared between the plant sites will be utilized for receiving and discharging offsite stormwater drainage.

The applicant has a power purchase agreement with Pacific Gas and Electric Company.

PUBLIC AND AGENCY COORDINATION

Mojave Solar LLC (Applicant), a wholly owned subsidiary of Abengoa Solar Inc., filed an Application for Certification with the California Energy Commission (Energy Commission) on August 10, 2008.

On August 27, 2008, the Energy Commission staff issued a notification of receipt of the Application for Certification (AFC), together with a project description, to property owners within 1,000 feet of the proposed project and those located within 500 feet of the linear facilities. Staff sent a similar notification and a copy of the AFC to a comprehensive list of agencies and libraries. Staff's notification letters requested public and agency review and comment on the AFC, and invited continued participation in the Energy Commission's review and permitting process. Staff followed up this notification on October 21, 2009 with a notice of receipt of a Supplement to the AFC to those interested parties listed above.

The Energy Commission's Public Advisor's Office (PAO) reviewed public outreach information available from the applicant and others and then conducted its own extensive efforts to identify certain local officials, as well as interested entities within a six-mile radius around the proposed site for the AMS project.

The PAO sent a cover letter and a two-sided bilingual notice in English and Spanish announcing the Informational Hearing, Environmental Scoping Meeting and Site Visit for the project, held on December 9, 2009, in the City of Barstow. This notice was sent to local Barstow and San Bernardino County elected officials; commissions and boards; eighteen local Native American Tribes and registered members (provided by the Native American Heritage Commission); public and private schools; places of worship; local non-profit groups (community, environmental, ethnic organizations), mobile home parks; emergency services; museums and libraries. There were no identified Native American tribal lands within a six-mile radius of the project.

In addition, the PAO arranged for advertisements in English in the December 5, 2009 issue of the *Victorville Daily Press* and Spanish in *Rumores News* and also requested public service announcements in English and Spanish at television and radio stations broadcasting in the project area.

In addition to the outreach efforts of the PAO, staff has continued to solicit comments on the AFC from local, state and federal agencies that have an interest in the project including San Bernardino County Planning Department and Public Works Department, Mojave Desert Air Quality Management District, Cal-Trans, Lahontan Regional Water Quality Control Board, U.S. Fish and Wildlife Service, and California Department of Fish and Game. Staff has also considered the comments of interveners, community groups, and individual members of the public.

PUBLIC WORKSHOPS

On December 8, 2009, staff conducted a publicly noticed Data Response and Issue Resolution workshop at the Energy Commission in Sacramento and discussed the applicant's data responses on the topics of Air Quality, Alternatives, Biology, Land Use, Soils and Water Resources and Waste Management. The purpose of the

workshop was to provide members of the community and governmental agencies opportunity to obtain project information, and to offer comments they may have had regarding any aspect of the proposed project.

On December 9, 2009, the Energy Commission Committee assigned to oversee the proceeding conducted a publicly noticed Site Visit, Informational Hearing and Environmental Scoping Meeting at the City of Barstow council chambers. This Scoping Meeting and Informational Hearing provided an opportunity for members of the community in the project vicinity to obtain information and offer comments and concerns about the proposed project as well as identify potential environmental impacts for consideration during the Energy Commission's review of the proposal. The applicant explained plans for developing the project and the related facilities and Energy Commission staff explained the administrative licensing process and Staff's role in reviewing the AFC.

On January 15, 2010, staff conducted a second publicly noticed Data Response and Issue Resolution workshop at the Energy Commission and discussed the topics of Air Quality, Biology, Cultural Resources, Land Use, Soils and Water Resources and Waste Management. This meeting was continued to January 20, 2010 to extend discussions on Air Quality, Soils and Water Resources and Waste Management. The purpose of these workshops was to provide members of the community and governmental agencies the opportunity to obtain project information, and to offer comments they may have had regarding any aspect of the proposed project.

On March 15, 2010 the Energy Commission published the AMS Staff Assessment SA. This document was publically noticed for comments from March 16, 2010 to April 15, 2010. The Energy Commission held public workshops on the SA on April 6th in the City of Sacramento and April 7th in the City of Barstow. At these workshops, discussions on the project were held, and written comments were provided by the applicant, agencies and the public. The SSA has been prepared to respond to those comments and information and analysis not provided in the SA.

LIBRARIES

On August 27, 2008, the Energy Commission staff sent the AMS Application for Certification, and on October 21, 2009 followed up with the AMS Supplement to the Application for Certification, to various libraries located in Kern County and San Bernardino County (Barstow Branch Library, Victorville City Library, Apple Valley Newton T. Bass Branch Library, Adelanto Branch Library, Kern County Library - Mojave Branch, Barstow Community College Library and Victor Valley College) and to libraries in Eureka, Fresno, Los Angeles, Sacramento, San Diego, and San Francisco.

A Notice of Availability was sent to these libraries for the Staff Assessment on March 16, 2010. A Notice of Availability for the Supplemental Staff Assessment Part A was sent on May 19, 2010. A Notice of Availability for the Supplemental Staff Assessment Part B was sent on May 27, 2010. A Notice of Availability for the Supplemental Staff Assessment Part C will be sent out when the document is published.

ENVIRONMENTAL JUSTICE

California law defines environmental justice as “the fair treatment of people of all races, cultures and income with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies” (Government Code Section 65040.12 and Public Resources Code Section 72000).

All Departments, Boards, Commissions, Conservancies and Special Programs of the Resources Agency must consider environmental justice in their decision-making process if their actions have an impact on the environment, environmental laws, or policies. Such actions that require environmental justice consideration may include:

- Adopting regulations;
- Enforcing environmental laws or regulations;
- Making discretionary decisions or taking actions that affect the environment;
- Providing funding for activities affecting the environment; and
- Interacting with the public on environmental issues.

In considering environmental justice in energy facility siting cases, staff uses a demographic screening analysis to determine whether a low-income and/or minority population exists within the potentially affected area of the proposed site. The demographic screening is based on information contained in two documents: *Environmental Justice: Guidance Under the National Environmental Policy Act* (Council on Environmental Quality, December, 1997) and *Guidance for Incorporating Environmental Justice Concerns in EPA’s Compliance Analyses* (U.S. Environmental Protection Agency, April, 1998). The screening process relies on Year 2000 U.S. Census data to determine the presence of minority and below-poverty-level populations.

Environmental Justice: Guidance Under the National Environmental Policy Act, defines minority individuals as members of the following groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic. A minority population is identified when the minority population of the potentially affected area is (1) greater than 50%; or (2) or when one or more U.S. Census blocks in the potentially affected area have a minority population of greater than 50%.

In addition to the demographic screening analysis, staff follows the steps recommended by the U.S. EPA’s guidance documents which are: outreach and involvement; and if warranted, a detailed examination of the distribution of impacts on segments of the population.

Staff has followed each of the above steps for the following 11 sections in the SA: Air Quality, Hazardous Materials, Land Use, Noise, Public Health, Socioeconomics, Soils and Water, Traffic and Transportation, Transmission Line Safety/Nuisance, Visual Resources, and Waste Management. Over the course of the analysis for each of the 11 areas, staff considered potential impacts and mitigation measures and whether there would be a significant impact on an environmental justice population.

As a result of staff's analysis, staff determined there are no environmental justice issues for the proposed AMS project. Staff identified the following economic benefits from the project: capital costs; construction and operation payroll; sales taxes; and school impact fees.

PROJECT'S COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

Staff believes that with the Commission's adoption of staff's proposed mitigation measures and the proposed conditions of certification, the AMS project would comply with all applicable laws, ordinances, regulations, and standards (LORS).

PROJECT'S ENVIRONMENTAL IMPACTS

Based upon the information provided to date and the analysis completed to date for each technical section, staff has concluded that with implementation of staff's recommended mitigation measures described in the conditions of certification, all potential environmental impacts will be mitigated to a less than significant level and the AMS project would not cause significant adverse impacts.

The project analysis complies with the requirements of the California Environmental Quality Act (CEQA). The conclusions of each technical area are summarized in the table on the following page. For a detailed review of potentially significant impacts and the related mitigation measures, please refer to the various chapters of the SA, SSA Part A, SSA Part B and SSA Part C.

**Executive Summary Table 1
Summary of Impacts to Each Technical Area**

Technical Area	Document Location	Complies with LORS	Impacts Mitigated
Air Quality	SSA Part B	Yes	Yes
Alternatives	SA	Not Applicable	Not Applicable
Biological Resources	SSA Part B	Yes	Yes
Cultural Resources	SSA Part B	Yes	Yes
Cumulative	SA	Yes	Yes
Efficiency	SA	Not Applicable	Not Applicable
Facility Design	SA	Yes	Yes
Geology and Paleontology	SA	Yes	Yes
Hazardous Materials		Yes	Yes
Land Use	SSA Part B	Yes	Yes
Noise and Vibration	SSA Part A	Yes	Yes
Public Health	SSA Part A	Yes	Yes
Reliability	SA	Not Applicable	Not Applicable
Socioeconomic Resources	SA	Yes	Yes
Soil and Water Resources	SSA Part B	Yes	Yes
Traffic and Transportation	SSA Part A	Yes	Yes
Transmission Line Safety/Nuisance	SA	Yes	Yes
Transmission System Engineering	SSA Part C	Yes	Yes
Transmission System Engineering – Appendix A	SSA Part C	Yes	Yes
Visual Resources	SSA Part A	Yes	Yes
Waste Management	SSA Part A	Yes	Yes
Worker Safety and Fire Protection	SSA Part A	Yes	Yes

NOTEWORTHY PUBLIC BENEFITS

AMS offers the benefit of providing 100% of its power generation from the sun. The daylight operating hours generally coincide with the hours when peaking capacity and

energy is needed to support the California ISO electric power transmission grid. In addition, staff has identified the following significant and environmentally important public benefits:

- AMS would contribute to meeting goals under California's Renewable Portfolio Standard Program (Senate Bill (SB) 1078; as amended by SB 107), which establishes that 20% of the total electricity sold to retail customers in California by December 31, 2010 must consist of renewable energy;
- AMS would contribute to meeting the Governor's Executive Order #S-14-08 which establishes that renewable energy must contribute 33% of the supply for meeting total state energy demands by 2020;
- AMS would contribute to the state accomplishing its goals for reducing global carbon emissions in accordance with the California Global Warming Solutions Act of 2006 (Assembly Bill 32); and
- AMS would generate both short term construction-related and long term operational-related increases in local expenditures and payrolls, as well as sales tax revenues.

SUPPORT FOR PROPOSED PROJECT

The Federal government and the State of California have established the need for the nation and State to increase the development and use of renewable energy in order to enhance the nation's energy independence, meet environmental goals, and create new economic and employment growth opportunities. AMS would help meet these needs by:

- Assisting California in meeting its Renewable Portfolio Standard goals of 20 percent of retail electric power sales by 2010 under existing law (Senate Bill 1078 – Chapter 516, Statutes of 2002)..
- Supporting U.S. Secretary of the Interior Salazar's Orders 3283 and 3285 making the production, development and delivery of renewable energy top priorities for the United States;
- Supporting Governor Schwarzenegger's Executive Order S-14-08 to streamline California's renewable energy project approval process and to increase the State's Renewable Energy Standard to 33 percent renewable power by 2020;
- Supporting the greenhouse gas reduction goals of Assembly Bill 832 (California Global Warming Solutions Act of 2006); and
- Sustaining and stimulating the economy of Southern California by helping to ensure an adequate supply of renewable electrical energy, while creating additional construction and operations employment and increased expenditures in many local businesses.

STAFF ASSESSMENT COMMENTS

The following persons and agencies commented on the Staff Assessment. Responses to comments are provided in the technical sections.

County of San Bernardino / C Hyke (TN 56176), Comments on agriculture mitigation consistency with San Bernardino County.

County of San Bernardino / C Hyke (TN 56264), Comments on biological mitigation, impacts to county services and agricultural mitigation.

Defenders of Wildlife / J Aardahl (TN 56245), Commented on water conservation opportunities and impacts on surrounding protected biological resources.

Department of Conservation / D. Otis (TN 56177), Comments on agriculture mitigation.

Department of Conservation / M. Meraz (TN 56512), Comments on agriculture mitigation and LESA model.

Ellison, Schneider and Harris / C. Ellison (TN 56350). Applicant's Comments on Staff Assessment.

Glenn Maclean (TN 56215), Commented on the historical and cultural value of the Lockhart General Store.

Joe Ramirez (TN 56231), Commented on existing road and traffic conditions, change in view and quality of life, illumination of the night sky, the evaporation ponds as a draw for insects and emergency services.

Southern California Edison / H. Arshadi (TN 56289), Commented on the project description and need for environmental review on interconnection facilities.

Transition Habitat Conservancy / J. Bays (TN 56241), Commented on the agricultural mitigation requirement.

ENGINEERING ASSESSMENT

TRANSMISSION SYSTEM ENGINEERING

Testimony of Ajoy Guha, P. E. and Mark Hesters

SUMMARY OF CONCLUSIONS

The proposed interconnection facilities for the Abengoa Mojave Solar project (AMS) including the proposed new Alpha and Beta 230 kV switchyards, the generator 230 kV tie lines to the proposed new Southern California Edison (SCE) Lockhart 230 kV substation and their terminations would be adequate in accordance with industry standards and good utility practices, and are acceptable to staff according to engineering Laws, Ordinances, Regulations and Standards (LORS).

The Interconnection Facilities Study/Technical Assessment Study demonstrate that the addition of the AMS would cause new normal (N-0) and single contingency (N-1) overloads on the Kramer-Lugo No. 1 & No. 2 230 kV lines during 2013 summer peak and light spring system conditions. The study also identified transient stability violation for loss of the Lugo-Cool Water 230 kV line. The current mitigation plan responsibility for the AMS includes two alternatives. The alternative 1 mitigation plan involves building a new 59-mile Cool Water-Lugo 230 kV line, and installation of a new Special Protection System (SPS) for curtailment of the AMS generation under certain outage and other conditions. The alternative 2 mitigation plan includes congestion management, installation of a new SPS for curtailment of the AMS generation output and participation in the existing Kramer Remedial Acton Scheme (RAS) for associated curtailments in lieu of installation of the proposed Cool Water-Lugo 230 kV line.

The applicant has chosen the alternative 2 mitigation plan as above which staff finds acceptable. The plan involves installation of a telecommunication system using multi-stranded fiber optic cables and other communication equipment, which would be installed in the following routes:

- Lockhart substation to Alpha & Beta switchyards-about 3 miles.
- Lockhart substation to Kramer substation-about 18 miles.
- Lockhart substation to Tortilla substation-about 31 miles.
- Tortilla substation to Cool Water substation-about 12 miles.

(This telecommunications line is needed for the overall Southern California Edison power grid and responsibility for the improvement and environmental impacts have been assigned to the Daggett Ridge Wind Energy Project. The Daggett Ridge Wind Energy Project and associated linear downstream facilities is being fully analyzed and permitted in a separate environmental review process by the County of San Bernardino and Bureau of Land Management. This line segment is listed within the Transmission System Engineering (TSE) section, however it is not analyzed within the TSE Appendix A. Responsibility for the Tortilla substation to Cool Water substation fiber optic line improvement and environmental impacts have not been assigned to the AMS project and staff concurs.)

- Kramer substation to Victor substation-about 36 miles.

The new fiber optic cables for a total length of approximately 100 miles of the combined routes would be installed partly on the existing overhead transmission (115 kV) and distribution (33 kV) wood and steel poles, partly on new wood poles, and partly through new and existing underground conduits. The installation of the proposed fiber optic cables is considered a downstream project impact. A general environmental analysis of the telecommunication system upgrades with the fiber optic cables will be provided as Appendix A to this Transmission System Engineering (TSE) section on or before June 30, 2010 in the Supplemental Staff Assessment Part C.

The AMS would meet the requirements and standards of all applicable LORS upon compliance with the recommended Conditions of Certification.

The applicant has signed a power purchase agreement with Pacific Gas and Electric for renewable power supply. The AMS as a solar generation would provide clean renewable energy towards meeting state mandate and goals.

INTRODUCTION

The Transmission System Engineering (TSE) analysis examines whether or not the facilities associated with the proposed interconnection conforms to all applicable LORS required for safe and reliable electric power transmission. Staff's analysis evaluates the power plant switchyard, outlet line, termination and downstream facilities identified by the applicant. Additionally, under the CEQA, the Energy Commission must conduct an environmental review of the "whole of the action," which may include facilities not licensed by the Energy Commission (California Code of Regulations, title 14, §15378). Therefore, the Energy Commission must identify the system impacts and necessary new or modified transmission facilities downstream of the proposed interconnection that are required for interconnection and represent the "whole of the action." The downstream network upgrade mitigation measures that will be required to maintain system reliability for the addition of the power plant, are used to identify the requirement for any additional CEQA analysis.

Energy Commission staff relies on the interconnecting authority for the analysis of impacts on the transmission grid as well as the identification and approval of required new or modified facilities downstream from the proposed interconnection that would be required as mitigation measures. The proposed AMS would interconnect to the SCE transmission network and requires analysis by SCE and approval of the California ISO.

SCE'S ROLE

SCE is responsible for ensuring electric system reliability in the SCE system for addition of the proposed generating plant. SCE will provide the analysis and reports in their System Impact and Facilities studies, and their approval for the facilities and changes required in the SCE system for addition of the proposed transmission modifications.

CALIFORNIA ISO'S ROLE

The California ISO is responsible for ensuring electric system reliability for all participating transmission owners and is also responsible for developing the standards necessary to achieve system reliability. The California ISO is responsible for completing

the studies of the SCE system to ensure adequacy of the proposed transmission interconnection. The California ISO will determine the reliability impacts of the proposed transmission modifications on the SCE transmission system in accordance with all applicable reliability criteria. According to the California ISO Tariffs, the California ISO will determine the “Need” for transmission additions or upgrades downstream from the interconnection point to insure reliability of the transmission grid. The California ISO will, therefore, review the System Impact Study (SIS) performed by SCE and/or any third party, provide their analysis, conclusions and recommendations. On satisfactory completion of the SCE Interconnection Facility Study (IFS)/Technical Assessment Study (TAS) and in accordance with the LGIP as in the California ISO Tariff, the California ISO instead of issuing a final approval letter, would proceed to execute the LGIA between the California ISO and the project owner and subsequently perform an Operational study examining the impacts of the project on the grid based on the expected June, 2012 COD or current COD. The California ISO may also provide written and verbal testimony on their findings at the Energy Commission hearings, if necessary.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

- California Public Utilities Commission (CPUC) General Order 95 (GO-95), “Rules for Overhead Electric Line Construction,” formulates uniform requirements for construction of overhead lines. Compliance with this order ensures adequate service and safety to persons engaged in the construction, maintenance and operation or use of overhead electric lines and to the public in general.
- California Public Utilities Commission (CPUC) General Order 128 (GO-128), “Rules for Construction of Underground Electric Supply and Communications Systems,” formulates uniform requirements and minimum standards to be used for underground supply systems to ensure adequate service and safety to persons engaged in the construction, maintenance and operation or use of underground electric lines and to the public in general.
- The National Electric Safety Code, 1999 provides electrical, mechanical, civil and structural requirements for overhead electric line construction and operation.
- NERC/WECC Planning Standards: The Western Electricity Coordinating Council (WECC) Planning Standards are merged with the North American Electric Reliability Council (NERC) Planning Standards and provide the system performance standards used in assessing the reliability of the interconnected system. These standards require the continuity of service to loads as the first priority and preservation of interconnected operation as a secondary priority. Certain aspects of the NERC/WECC standards are either more stringent or more specific than the NERC standards alone. These standards provide planning for electric systems so as to withstand the more probable forced and maintenance outage system contingencies at projected customer demand and anticipated electricity transfer levels, while continuing to operate reliably within equipment and electric system thermal, voltage and stability limits. These standards include the reliability criteria for system adequacy and security, system modeling data requirements, system protection and control, and system restoration. Analysis of the WECC system is based to a large degree on Section I.A of the standards, “NERC and WECC Planning Standards with Table I and WECC Disturbance-Performance Table” and on Section I.D, “NERC and

WECC Standards for Voltage Support and Reactive Power”. These standards require that the results of power flow and stability simulations verify defined performance levels. Performance levels are defined by specifying the allowable variations in thermal loading, voltage and frequency, and loss of load that may occur on systems during various disturbances. Performance levels range from no significant adverse effects inside and outside a system area during a minor disturbance (loss of load or a single transmission element out of service) to a level that seeks to prevent system cascading and the subsequent blackout of islanded areas during a major disturbance (such as loss of multiple 500 kV lines along a common right of way, and/or multiple generators). While controlled loss of generation or load or system separation is permitted in certain circumstances, their uncontrolled loss is not permitted (WECC 2006).

- North American Reliability Council (NERC) Reliability Standards for the Bulk Electric Systems of North America provide national policies, standards, principles and guidelines to assure the adequacy and security of the electric transmission system. The NERC Reliability Standards provide for system performance levels under normal and contingency conditions. With regard to power flow and stability simulations, while these Reliability Standards are similar to NERC/WECC Standards, certain aspects of the NERC/WECC Standards are either more stringent or more specific than the NERC Standards for Transmission System Contingency Performance. The NERC Reliability Standards apply not only to interconnected system operation but also to individual service areas (NERC 2006).
- California ISO Planning Standards also provide standards, and guidelines to assure the adequacy, security and reliability in the planning of the California ISO transmission grid facilities. The California ISO Grid Planning Standards incorporate the NERC/WECC and NERC Reliability Planning Standards. With regard to power flow and stability simulations, these Planning Standards are similar to the NERC/WECC or NERC Reliability Planning Standards for Transmission System Contingency Performance. However, the California ISO Standards also provide some additional requirements that are not found in the WECC/NERC or NERC Standards. The California ISO Standards apply to all participating transmission owners interconnecting to the California ISO controlled grid. They also apply when there are any impacts to the California ISO grid due to facilities interconnecting to adjacent controlled grids not operated by the California ISO (California ISO 2002a).
- California ISO/FERC Electric Tariff provides guidelines for construction of all transmission additions/upgrades (projects) within the California ISO controlled grid. The California ISO determines the “Need” for the proposed project where it will promote economic efficiency or maintain system reliability. The California ISO also determines the Cost Responsibility of the proposed project and provides an Operational Review of all facilities that are to be connected to the California ISO grid (California ISO 2007a).

PROJECT DESCRIPTION

The AMS, a solar thermal generating plant, would be located in a 1,765-acre site in the Mojave Desert in San Bernardino County immediate southwest of Harper Dry Lake and about 9 miles northwest of Lockhart. The project would have two independent solar

fields, Alpha and Beta, each feeding a 125 MW power island with a solar steam generator to operate a steam turbine generator (STG). The AMS would have a total 250 MW nominal output with two 125 MW STG units. Each STG unit rated 165 MVA, 13.8 kV would be connected through an 8,000-ampere segregated bus duct to the low voltage terminal of a dedicated 148/175 MVA, 13.8/230 kV generator step-up (GSU) transformer with an impedance of 9 percent @ 148 MVA (AS 2009a, AFC, sections 1 & 2; AS 2009b, DA supplemental AFC).

SWITCHYARDS AND INTERCONNECTION FACILITIES

The new Alpha and Beta 230 kV switchyards would have a 1,200-ampere single bus arrangement. The 230 kV high voltage terminals of each GSU transformer at the Alpha and Beta solar fields would be connected to its switchyard 230 kV bus by short 700-ampere overhead conductors through a 1,200-ampere, 230 kV circuit breaker and two disconnect switches.

The Alpha and Beta switchyards would be interconnected to the SCE Kramer-Cool Water No. 1 230 kV line by building a new SCE Lockhart 230 kV substation located at the southern fence line of Beta solar field and looping the existing Kramer-Cool Water No. 1 230 kV line into the new substation (ESH 2010b, Page 3). The Alpha switchyard would be interconnected to Lockhart substation by building a new 2.17-mile long single circuit 230 kV overhead line with 477 kcmil steel-reinforced aluminum conductors (ACSR) on 80 to 110-foot steel poles within the plant boundary. The Beta switchyard would be interconnected to Lockhart substation by building a new 0.84-mile long single circuit 230 kV overhead line with 477 kcmil ACSR conductors on 80 to 110-foot steel poles within the plant property. The generator tie lines would be connected to their respective Alpha and Beta 230 kV switchyard bus through a 1,200-ampere disconnect switch. The applicant would build, own and operate the AMS Alpha and Beta switchyards and the generator tie lines.

The new SCE Lockhart 230 kV substation is proposed as a 2,000-ampere double bus arrangement. For two switch bays there would be a double breaker configuration at this time for connecting generator tie lines from Alpha and Beta switchyards and also another switch bay would be built with a breaker and a half configuration for connecting two circuits for looping the SCE Kramer-Cool Water #1 230 kV line. Each of the generator tie lines from Alpha and Beta switchyard would be connected to a Lockhart substation switch bay through a 1,200-ampere disconnect switch. The switch bays would be built with seven 2,000-ampere circuit breakers and fourteen associated 2,000-ampere disconnect switches. SCE would build, own and operate the new Lockhart substation, the interconnection facilities within the substation fence line, and all transmission outlets (AS 2009a, AFC, sections 1 & 2; AS 2009b, DA supplemental AFC).

The configuration of the AMS Alpha and Beta 230 kV switchyards, the generator 230 kV overhead tie lines and their terminations at the proposed new Lockhart 230 kV substation would be adequate in accordance with industry standards and good utility practices, and is acceptable to staff. Proposed Conditions of Certification TSE 1 to TSE 8 insure that the proposed facilities are designed, built and operated in accordance with good utility practices and applicable LORS.

TRANSMISSION SYSTEM IMPACT ANALYSIS

For the interconnection of a proposed generating unit or transmission facility to the grid, the interconnecting utility and the control area operator are responsible for ensuring grid reliability. For the AMS, SCE and California ISO are responsible for ensuring grid reliability. In accordance with the FERC/California ISO/Utility Tariffs, System Impact and Interconnection Facilities Studies are conducted to determine the preferred and alternate interconnection methods to the grid, the downstream transmission system impacts and the mitigation measures needed to ensure system conformance with performance levels required by the utility reliability criteria, NERC planning standards, WECC reliability criteria, and California ISO reliability criteria. Staff relies on the studies and any review conducted by the responsible agencies to determine the effect of the project on the transmission grid and to identify any necessary downstream facilities or project impacts required to bring the transmission network into compliance with applicable reliability standards (NERC2006, WECC 2006, California ISO 2002a and 2007a).

The System Impact and Interconnection Facilities Studies/Technical Assessment Study analyze the grid with and without the proposed project under conditions specified in the planning standards and reliability criteria. The standards and criteria define the assumptions used in the study and establish the thresholds by which grid reliability is determined. The studies must analyze the impact of the project for the proposed first year of operation and thus are based on a forecast of loads, generation and transmission. Load forecasts are developed by the interconnected utility, which would be SCE in this case. Generation and transmission forecasts are established by an interconnection queue. The studies are focused on thermal overloads, voltage deviations, system stability (excessive oscillations in generators and transmission system, voltage collapse, loss of loads or cascading outages), and short circuit duties. SCE completed the System Impact Study in June 2008 and the Interconnection Facilities Study in October 2009.

The applicant has also provided the Harper Lake Solar Power Plant Interconnection Optional Study Report which forecasts the curtailment of the AMS if congestion management is chosen as a means to mitigate overloads identified in the Interconnection Facilities Study.

If the studies show that the interconnection of the project causes the grid to be out of compliance with reliability standards, the study will then identify mitigation alternatives or ways in which the grid could be brought into compliance with reliability standards. If the interconnecting utility determines that the only feasible mitigation includes transmission modifications or additions which require CEQA review as part of the “whole of the action,” the Energy Commission must analyze those modifications or additions according to CEQA requirements.

SCOPE OF SYSTEM IMPACT STUDY (SIS)/ INTERCONNECTION FACILITIES STUDY

The June 27, 2008 SIS was prepared by the California ISO in coordination with SCE to evaluate the impact of the proposed AMS on the SCE transmission system and was supplanted by the IFS which included the TAS completed on December 12, 2008 (ESH 2010b, page 3). The TAS updated the generation interconnection queue, removing

many generators that dropped out or moved to lower queue positions. The updated generation interconnection queue used in the TAS provides a more accurate forecast of the impacts of the AMS interconnection. The SIS and IFS/TAS were prepared with and without the AMS 250 MW generation output with the following base cases based on the most expected critical loading condition for the transmission system in SCE's service area:

- A 2013 summer peak base case derived from the current SCE's California ISO annual transmission expansion study base cases and has 1-in -10 year extreme weather load level for SCE's service area.
- A 2013 light spring peak base case at 65 percent of the summer peak load level.

In each of the studies southern California generation and critical seasonal power flows in WECC Paths were maintained within limits. The base cases included planned California ISO approved transmission upgrades that would be operational by 2013. The pre-project base cases also included all queue generation projects with higher positions than the AMS, for the SIS this was 5,846 MW, in the IFS/TAS only 1,460 MW were left in the interconnection queue ahead of AMS (ESH 2010b, TAS page 9).

In addition, the study evaluated conditions with dispatch of generation inside and outside SCE territory that maximized loadings in the north of Lugo area. This included adjusting the West-of-River (Path 46) flow and modeling all pertinent queue generation in the vicinity of the AMS.

The study included analyses for power flow, short circuit, substation evaluation, transient stability, and post-transient voltage. The study also provided preliminary scope of work and cost estimates for the upgrades in the proposed Lockhart substation including downstream network reliability upgrades in the SCE system, assuming SCE would engineer, construct, own and maintain the new Lockhart substation and downstream network upgrades (AS 2009a, AFC, Appendix N: SIS report).

Power Flow Study Results and Mitigation

The IFS/TAS found that the addition of the AMS would cause new normal (N-0) and single contingency (N-1) overloads on the Kramer-Lugo No. 1 & No. 2 230 kV lines during 2013 summer peak and light spring system conditions. The Power Flow study results are shown in Tables 2.1 & 2.4, and section IV.A of the SIS (AS 2009a, AFC; Appendix N, SIS, pages 23-38).

Below is a summary of the results of the California ISO's power flow analysis for the AMS with the base cases (ESH 2010b).

- Under 2013 summer peak and light spring system conditions the study identified new normal (N-0) overloads on the Kramer-Lugo No. 1 & No. 2 230 kV lines (119% of their normal ratings) due to the addition of the AMS:

Mitigation

Staff considers mitigation alternative 1 or alternative 2 acceptable.

Alternative 1

- a. Construction of a new Cool Water-Lugo 230 kV line and installation of a new SPS designed to curtail AMS generation under certain system conditions. This line would be designed, built and operated by SCE and the CPUC would be the lead agency for permitting. The new about 59-mile long 230 kV line would be built using 500 kV structures for 16 miles with bundled 2156 Kcmil ACSR conductors and 230 kV structures for 43 miles with 2-1590 Kcmil ACSR conductors. Additional facilities to provide fiber optic channels may be required to remedy situations for withdrawal of application by higher queue interconnections projects.

Alternative 2

- a. Use congestion management and install a new SPS to mitigate overloads through curtailment of the AMS generation, and participation in the existing Kramer RAS. A telecommunication system using multi-stranded fiber optic cables and other communication equipment would be required in order to implement the SPS, as well as providing monitoring and remote operation capabilities at the Lockhart substation. The All Dielectric Self Supporting Fiber (ADSS) Optic cables would be installed in the following routes:

- i. Lockhart to Alpha and Beta Switchyards, approximately 3 miles.
- ii. Lockhart substation-Kramer substation, approximately 18 miles in an existing transmission corridor.
- iii. Lockhart Substation-Cool Water Substation via Tortilla substation, approximately 43 miles in an existing corridor.

(This telecommunications line is needed for the overall Southern California Edison power grid and responsibility for the improvement and environmental impacts have been assigned to the Daggett Ridge Wind Energy Project. The Daggett Ridge Wind Energy Project and associated linear downstream facilities is being fully analyzed and permitted in a separate environmental review process by the County of San Bernardino and Bureau of Land Management. This line segment is listed within the Transmission System Engineering (TSE) section, however it is not analyzed within the TSE Appendix A. Responsibility for the Tortilla substation to Cool Water substation fiber optic line improvement and environmental impacts have not been assigned to the AMS project and staff concurs.)

- iv. Kramer Substation-Victor Substation, approximately 36 miles in an existing corridor.
- Under 2013 summer peak and light spring system conditions the study identified the that the AMS aggravated pro-project overloads of the Kramer-Lugo No. 1 & No. 2 230 kV lines under single (N-1) contingency conditions:

Mitigation

With the additional upgrades in place for the new normal (N-0) overloads as stated above, the study determined that installation of a special protection system (SPS) for both the above lines under the single contingency conditions would be required to mitigate thermal and transient stability problems by tripping off the AMS. Staff considers the mitigation measure acceptable under the study assumptions.

- With the additional upgrades identified to mitigate new overloads caused by the addition of AMS, the study does not identify any double (N-2) contingency overloads in the local area.

The applicant has chosen alternative 2, congestion management and SPS, as the mitigation for overloads identified in the power flow studies. Based on the current studies, congestion management and SPS are acceptable mitigation for the identified overloads.

Short Circuit Study Results A and Substation Evaluation

Three line-to-ground (3 LG) and single line-to-ground (SLG) faults were simulated with and without the AMS to determine if there are any overstressed circuit breakers in SCE substations in the project vicinity caused by the addition of the project. The short circuit duty analysis included all queue projects and the related transmission upgrades.

The short circuit results shown in Tables 2-5 and 2-6 in section D of the SIS present the impact for the addition of the AMS only, while the results shown in the Tables 2-7 and 2-8 present the incremental impacts for the addition of upgrades required for the AMS (AS 2009a, Appendix N, SIS, Section IV. D, Pages 39-42). The Interconnection Facilities Study found that the AMS does not trigger the need for circuit breaker replacement but does aggravate pre-project conditions that could require the upgrade/replacement of fifty-two circuit breakers at eight different locations in case of withdrawal of application by higher queue interconnection projects (EHS 2010b, page 4).

The replacement of circuit breakers usually occurs within the fence line of existing facilities and does not require further CEQA review. If CEQA review is required the CPUC would be the lead agency for required permits.

Transient Stability Study Results and Mitigation

Transient stability analysis is performed to determine whether the transmission system would remain stable with the addition of the AMS. The analysis was performed with the 2013 summer peak and light spring base cases with simulated faults under selected critical single and double contingencies. Transient stability plots for summer and spring load conditions are provided in Appendices A and B of the SIS report (AS 2009a, Appendix N, SIS, section IV.B, pages 38-39).

The IFS/TAS found one transient stability violation caused by the AMS. The SPS identified for the mitigation of the N-1 overload above would also mitigate the transient stability violation (EHS 2010b, page 5).

Post-transient Voltage Analysis Results

The power flow study revealed that without facility upgrades identified under the pre-project base case conditions, the AMS aggravates previous low voltage conditions, including case non-convergence, which are indicative of voltage collapse conditions. These voltage problems would be mitigated with implementation of pre-project transmission upgrades for higher queue projects (AS 2009a, Appendix N, SIS, section IV.C, page 39).

Interconnection Option Study Results

The Interconnection Optional Study analyzed the potential curtailment for the AMS if congestion management and the SPS (Alternative 2, above) were used to mitigate transmission overloads identified in the TAS. The study looked at the historical loading of the transmission lines affected by the AMS and found that the likely maximum annual curtailment for the AMS would be 5% under the congestion management and SPS mitigation alternative (AS 2010d).

CALIFORNIA ISO REVIEW

In accordance with the provisions of LGIP, the June 27, 2008 SIS was prepared by the California ISO in coordination with SCE and evaluated the impact of the proposed 250 MW generation output from the AMS to a new Lockhart 230 kV substation with the loop-in of the existing Kramer-Cool Water 230 kV line. The IFS/TAS identified mitigation plan to eliminate the adverse impacts of the AMS would be adequate. The California ISO may also provide written and verbal testimony on their findings at the Energy Commission hearings, if necessary.

Execution of the LGIA would ensure system reliability in the California ISO grid and compliance with WECC/NERC and California ISO Planning standards (WECC 2006, NERC 2006, California ISO 2002a and 2007a). Condition of Certification TSE-5 requires the submittal of the LGIA to the Energy Commission at least 30-days prior to the construction of transmission interconnection facilities.

DOWNSTREAM FACILITIES

Besides the proposed interconnection facilities for the proposed AMS including Alpha & Beta switchyards, generator tie lines and construction of a new SCE Lockhart substation, accommodating the interconnection of the AMS new generation output to the SCE system would involve the installation of several optic communications cables on new wood poles in existing transmission corridors. The installation of the new cables is considered a reasonably foreseeable consequence of the proposed AMS project and requires CEQA analysis.

CUMULATIVE IMPACTS

Since the AMS is being connected to the north of Lugo SCE area which requires several major transmission upgrades for the reliable interconnection of both the AMS and generators with higher queue positions, staff believes that the AMS would create some cumulative effects in the SCE local network under certain conditions until all the identified transmission facilities are in place.

However, the cumulative impacts due to the AMS, as identified in the SIS or IFS which includes higher queue projects, would be mitigated. Staff also believes that there would be some positive impacts because the project, as local solar generation, would provide clean renewable energy, meet the increasing load demand in the SCE network, provide additional reactive power and voltage support, and enhance reliability in the SCE local network.

ALTERNATIVE TRANSMISSION ROUTES

The AMS site has access to two major transmission lines abutting its southern boundary, the Mead-Adelanto 500 kV line in the Los Angeles Department of Water and Power (LADWP) system and the SCE Kramer-Cool Water No. 1 230 kV line. The applicant did not choose to interconnect to the LADWP line with multiple owners, as the interconnection would increase costs, uncertainty, complexity and would be harder to ensure delivery of the project to the California ISO grid. The interconnection to the SCE system would ensure earlier interconnection and power delivery to the California ISO grid.

The generator overhead tie lines from the proposed AMS Alpha and Beta switchyards to the SCE Kramer-Cool Water 230 kV line through the proposed SCE Lockhart substation would also follow the shortest, least expensive routes within the AMS site with least environmental impacts (GWF2008a, AFC, section 4.5).

CONFORMANCE WITH LORS AND CEQA REVIEW

The configuration of the AMS Alpha and Beta switchyards, the generator interconnection overhead tie lines and their terminations at the proposed new Lockhart 230 kV substation would be adequate in accordance with industry standards and good utility practices, and is acceptable to staff.

The IFS/TAS demonstrate that there would be some adverse impacts on the SCE system for the addition of the AMS. The mitigation plan would be adequate and would eliminate the adverse impacts of the AMS.

SCE would be responsible for designing, building and operating the new 230 kV Cool Water – Lugo line. Sixteen miles of the new line would replace the existing Lugo – Pisgay 230 kV line as it heads east from the Lugo substation. SCE has not identified a route for the new 37-miles of the line as it heads north to the Cool Water substation.. The final routing and permitting of the 230 kV line would not occur until the LGIA is signed and CPUC permitting for the line could take twelve-months or more. Until a route for the line is chosen by SCE or through the permitting process any environmental analysis would require speculation on that final route. Without a specific route staff and the applicant are unable to provide an environmental analysis of these project impacts.

The AMS would meet the requirements and standards of all applicable LORS with the applicant's submission of all required information as stated above and upon satisfactory compliance of the Conditions of Certifications.

RESPONSE TO AGENCY AND PUBLIC COMMENTS

Staff received comments from SCE in a letter dated April 15, 2010 indicating that the Staff Assessment did not include a complete environmental analysis of the interconnection facilities at the Lockhart substation and that staff's description of the Lockhart substation facilities was not accurate. Staff has reviewed SCE's general environmental analysis report in the Draft, "Lockhart Substation Project Description for Abengoa Solar Inc." of March 15, 2010. The SCE report includes environmental impacts and mitigation measures for design and construction of the proposed Lockhart 230 kV substation, Kramer-Cool Water #1 230 kV transmission line loops into the new Lockhart substation, generator tie line connections, 12 kV distribution lines for station power and light and fiber optic telecommunication cables. The report does not discuss the relocation of 50 kV lines in or around the Lockhart Substation. Staff at this stage has no further information about any other new or existing facilities near the project site which would need to meet CEQA requirements (SCE 201b). The project description has been updated in this Staff Assessment and now indicates that the proposed Lockhart 230 kV substation would have 3 switch bays and seven circuit breakers along with associated disconnect switches.

CONCLUSIONS AND RECOMMENDATIONS

1. The configuration of the AMS Alpha and Beta switchyards, the generator interconnection overhead tie lines and their terminations at the proposed new Lockhart 230 kV substation would be adequate in accordance with industry standards and good utility practices, and is acceptable to staff according to engineering LORS.
2. The IFS/TAS demonstrates that the addition of the AMS would cause new normal (N-0) and single contingency (N-1) overloads on the Kramer-Lugo No. 1 & No. 2 230 kV lines during 2013 summer peak and light spring system conditions. The study also identified transient stability violation for loss of the Lugo-Cool Water 230 kV line. The current mitigation plan responsibility for the AMS includes building a new 59-mile Cool Water-Lugo 230 kV line, and installation of a new SPS to curtail the AMS generation under certain contingency and other conditions OR congestion management and installation of a new SPS and participation in the existing Kramer RAS.
3. The applicant has chosen the congestion management and the SPS mitigation alternative which staff finds acceptable. A telecommunication system using multi-stranded fiber optic cables and other communication equipment would be required in order to provide transmission line protection, SPS, monitoring and remote operation capabilities at the Lockhart substation. The fiber optic cables would be installed in the following routes:
 - Lockhart substation to Alpha & Beta switchyards-about 3 miles.
 - Lockhart substation to Kramer substation-about 18 miles.
 - Lockhart substation to Tortilla substation-about 31 miles.
 - Tortilla substation to Cool Water substation-about 12 miles.

(This telecommunications line is needed for the overall Southern California Edison power grid and responsibility for the improvement and environmental impacts have been assigned to the Daggett Ridge Wind Energy Project. The Daggett Ridge Wind Energy Project and associated linear downstream facilities is being fully analyzed and permitted in a separate environmental review process by the County of San Bernardino and Bureau of Land Management. This line segment is listed within the Transmission System Engineering (TSE) section, however it is not analyzed within the TSE Appendix A. Responsibility for the Tortilla substation to Cool Water substation fiber optic line improvement and environmental impacts have not been assigned to the AMS project and staff concurs.)

- Kramer substation to Victor substation-about 36 miles.

The new fiber optic cables for a total length of approximately 100 miles of the combined routes would be installed partly on the existing overhead transmission (115 kV) and distribution (33 kV) wood and steel poles, partly on new wood poles, and partly through new and existing underground conduits. The installation of the proposed fiber optic cables is a reasonably foreseeable consequence of the MEP.

4. A general environmental analysis of the telecommunication system upgrades with the fiber optic cables will included in the Appendix A to this Transmission System Engineering (TSE) section by June 30, 2010 as in the Supplemental Staff Assessment Part C.
5. The AMS would meet the requirements and standards of all applicable LORS upon compliance with the recommended Conditions of Certification.
6. The applicant has signed a power purchase agreement with Pacific Gas and Electric for renewable power supply. The AMS as a solar generation would provide clean renewable energy towards meeting state mandate and goals.

RECOMMENDATIONS

If the Energy Commission approves the project, staff recommends the following Conditions of Certification to ensure system reliability and conformance with LORS.

CONDITIONS OF CERTIFICATIONS FOR TSE

TSE-1 The project owner shall furnish to the CPM and to the CBO 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 a description and 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: At least 60 days (or a lesser number of days mutually agreed to by the project owner and the CBO) prior to the start of construction, the project owner shall submit the schedule, a Master Drawing List, and a Master Specifications List to the CBO and to 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 CPM and CBO approval. The project owner shall provide schedule updates in the Monthly Compliance Report.

Table 1: Major Equipment List
Breakers
Step-up Transformer
Switchyard
Busses
Surge Arrestors
Disconnects and Wave-traps
Take off facilities
Electrical Control Building
Switchyard Control Building
Transmission Pole/Tower
Insulators and Conductors
Grounding System

TSE-2 Prior to the start of construction the project owner shall assign an electrical engineer and at least one of each of the following to the project:

- A. A civil engineer;
- B. A geotechnical engineer or a civil engineer experienced and knowledgeable in the practice of soils engineering;
- C. A design engineer, who is either a structural engineer or a civil engineer fully competent and proficient in the design of power plant structures and equipment supports; or
- D. A mechanical engineer.

(Business and Professions Code Sections 6704 et seq., require state registration to practice as a civil engineer or structural engineer in California.)

The tasks performed by the civil, mechanical, electrical or design engineers may be divided between two or more engineers, as long as each engineer is responsible for a particular segment of the project (e.g., proposed earthwork, civil structures, power plant structures, equipment support). No segment of the project shall have more than one responsible engineer. The transmission line may be the responsibility of a separate California registered electrical engineer. The civil, geotechnical or civil and design engineer assigned in conformance with Facility Design condition **GEN-5**, may be responsible for design and review of the TSE facilities.

The project owner shall submit to the CBO for review and approval, the names, qualifications and registration numbers of all engineers assigned to the project. If any one of the designated engineers is subsequently reassigned or replaced, the project owner shall submit the name, qualifications and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer. This engineer shall be authorized to halt earthwork and to require changes if site conditions are unsafe or do not conform with predicted conditions used as a basis for design of earthwork or foundations.

The electrical engineer shall:

1. Be responsible for the electrical design of the power plant switchyard, outlet and termination facilities; and
2. Sign and stamp electrical design drawings, plans, specifications, and calculations.

Verification: At least 30 days (or a lesser number of days mutually agreed to by the project owner and the CBO) prior to the start of rough grading, the project owner shall submit to the CBO for review and approval, the names, qualifications and registration numbers of all the responsible engineers assigned to the project. The project owner shall notify the CPM of the CBO's approvals of the engineers within five days of the approval.

If the designated responsible engineer is subsequently reassigned or replaced, the project owner has five days in which to submit the name, qualifications, and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer within five days of the approval.

TSE-3 If any discrepancy in design and/or construction is discovered in any engineering work that has undergone CBO design review and approval, the project owner shall document the discrepancy and recommend corrective action (1998 CBC, Chapter 1, Section 108.4, Approval Required; Chapter 17, Section 1701.3, Duties and Responsibilities of the Special Inspector; Appendix Chapter 33, Section 3317.7, Notification of Noncompliance). The discrepancy documentation shall become a controlled document and shall be submitted to the CBO for review and approval and shall reference this condition of certification.

Verification: The project owner shall submit a copy of the CBO's approval or disapproval of any corrective action taken to resolve a discrepancy to the CPM within 15 days of receipt. If disapproved, the project owner shall advise the CPM, within five days, the reason for disapproval, and the revised corrective action required to obtain the CBO's approval.

TSE-4 For the power plant switchyard, outlet line and termination, the project owner shall not begin any increment of construction until plans for that increment have been approved by the CBO. These plans, together with design changes

and design change notices, shall remain on the site for one year after completion of construction. The project owner shall request that the CBO inspect the installation to ensure compliance with the requirements of applicable LORS. The following activities shall be reported in the Monthly Compliance Report:

- A. Receipt or delay of major electrical equipment;
- B. Testing or energization of major electrical equipment; and
- C. The number of electrical drawings approved, submitted for approval, and still to be submitted.

Verification: At least 30 days (or a lesser number of days mutually agreed to by the project owner and the CBO) prior to the start of each increment of construction, the project owner shall submit to the CBO for review and approval the final design plans, specifications and calculations for equipment and systems of the power plant switchyard, outlet line and termination, including a copy of the signed and stamped statement from the responsible electrical engineer attesting to compliance with the applicable LORS, and send the CPM a copy of the transmittal letter in the next Monthly Compliance Report.

- TSE-5** The project owner shall ensure that the design, construction and operation of the proposed transmission facilities will conform to all applicable LORS, including the requirements listed below. The project owner shall submit the required number of copies of the design drawings and calculations to the CBO as determined by the CBO.
- A. The power plant switchyard and outlet line shall meet or exceed the electrical, mechanical, civil and structural requirements of CPUC General Order 95 or National Electric Safety Code (NESC), Title 8 of the California Code and Regulations (Title 8), Articles 35, 36 and 37 of the “High Voltage Electric Safety Orders”, California ISO standards, National Electric Code (NEC) and related industry standards.
 - B. Breakers and busses in the power plant switchyard and other switchyards, where applicable, shall be sized to accommodate full output from the project and to comply with a short-circuit analysis.
 - C. Outlet line crossings and line parallels with transmission and distribution facilities shall be coordinated with the transmission line owner and comply with the owner’s standards.
 - D. The project conductors shall be sized to accommodate the full output from the project.
 - E. Termination facilities shall comply with applicable SCE interconnection standards.

- F. The project owner shall provide to the CPM:
- i. The Special Protection System (SPS) sequencing and timing if applicable,
 - ii. A letter stating the mitigation measures or projects selected by the transmission owners for each reliability criteria violation are acceptable,
 - iii. An Operational study report based on the expected or current COD from the California ISO and/or SCE, and
 - iv. A copy of the executed LGIA signed by the California ISO and the project owner.

Verification: At least 60 days prior to the start of construction of transmission facilities (or a lesser number of days mutually agree to by the project owner and CBO), the project owner shall submit to the CBO for approval:

- A. Design drawings, specifications and calculations conforming with CPUC General Order 95 or NESC, Title 8, Articles 35, 36 and 37 of the “High Voltage Electric Safety Orders”, NEC, applicable interconnection standards and related industry standards, for the poles/towers, foundations, anchor bolts, conductors, grounding systems and major switchyard equipment.
- B. For each element of the transmission facilities identified above, the submittal package to the CBO shall contain the design criteria, a discussion of the calculation method(s), a sample calculation based on “worst case conditions”¹ and a statement signed and sealed by the registered engineer in responsible charge, or other acceptable alternative verification, that the transmission element(s) will conform with CPUC General Order 95 or NESC, Title 8, California Code of Regulations, Articles 35, 36 and 37 of the, “High Voltage Electric Safety Orders”, NEC, applicable interconnection standards, and related industry standards.
- C. Electrical one-line diagrams signed and sealed by the registered professional electrical engineer in responsible charge, a route map, and an engineering description of equipment and the configurations covered by requirements **TSE-5 a)** through f) above.
- D. The Special Protection System (SPS) sequencing and timing if applicable shall be provided concurrently to the CPM.
- E. A letter stating the mitigation measures or projects selected by the transmission owners for each reliability criteria violation are acceptable,
- F. An Operational study report based on the expected or current COD from the California ISO and/or SCE, and
- G. A copy of the executed LGIA signed by the California ISO and the project owner.

¹ Worst case conditions for the foundations would include for instance, a dead-end or angle pole.

TSE-6 The project owner shall inform the CPM and CBO of any impending changes that may not conform to requirements **TSE-5** a) through f), and have not received CPM and CBO approval, and request approval to implement such changes. A detailed description of the proposed change and complete engineering, environmental, and economic rationale for the change shall accompany the request. Construction involving changed equipment or substation configurations shall not begin without prior written approval of the changes by the CBO and the CPM.

Verification: At least 60 days prior to the construction of transmission facilities, the project owner shall inform the CBO and the CPM of any impending changes that may not conform to requirements of **TSE-5** and request approval to implement such changes.

TSE-7 The project owner shall provide the following Notice to the California Independent System Operator (California ISO) prior to synchronizing the facility with the California Transmission system:

1. At least one week prior to synchronizing the facility with the grid for testing, provide the California ISO a letter stating the proposed date of synchronization; and
2. At least one business day prior to synchronizing the facility with the grid for testing, provide telephone notification to the California ISO Outage Coordination Department.

Verification: The project owner shall provide copies of the California ISO letter to the CPM when it is sent to the California ISO one week prior to initial synchronization with the grid. The project owner shall contact the California ISO Outage Coordination Department, Monday through Friday, between the hours of 0700 and 1530 at (916) 351-2300 at least one business day prior to synchronizing the facility with the grid for testing. A report of conversation with the California ISO shall be provided electronically to the CPM one day before synchronizing the facility with the California transmission system for the first time.

TSE-8 The project owner shall be responsible for the inspection of the transmission facilities during and after project construction, and any subsequent CPM and CBO approved changes thereto, to ensure conformance with CPUC GO-95 or NESC, Title 8, CCR, Articles 35, 36 and 37 of the, "High Voltage Electric Safety Orders", applicable interconnection standards, NEC and related industry standards. In case of non-conformance, the project owner shall inform the CPM and CBO in writing, within 10 days of discovering such non-conformance and describe the corrective actions to be taken.

Verification: Within 60 days after first synchronization of the project, the project owner shall transmit to the CPM and CBO:

- A. "As built" engineering description(s) and one-line drawings of the electrical portion of the facilities signed and sealed by the registered electrical engineer in responsible charge. A statement attesting to conformance with CPUC GO-95 or NESC, Title 8, California Code of Regulations, Articles 35, 36 and 37 of the, "High Voltage Electric

Safety Orders”, and applicable interconnection standards, NEC, related industry standards, and these conditions shall be provided concurrently.

- B. An “as built” engineering description of the mechanical, structural, and civil portion of the transmission facilities signed and sealed by the registered engineer in responsible charge or acceptable alternative verification. “As built” drawings of the electrical, mechanical, structural, and civil portion of the transmission facilities shall be maintained at the power plant and made available, if requested, for CPM audit as set forth in the “Compliance Monitoring Plan”.
- C. A summary of inspections of the completed transmission facilities, and identification of any nonconforming work and corrective actions taken, signed and sealed by the registered engineer in charge.

REFERENCES

California ISO (California Independent System Operator) 1998a. California ISO Tariff Scheduling Protocol posted April 1998, Amendments 1,4,5,6, and 7 incorporated.

California ISO (California Independent System Operator) 1998b. California ISO Dispatch Protocol posted April 1998.

California ISO (California Independent System Operator) 2002a. California ISO Planning Standards, February 7, 2002.

California ISO (California Independent System Operator) 2007a. California ISO, FERC Electric Tariff, First Replacement Vol. No. 1, March, 2007.

California ISO (California Independent System Operator) 2009a, Large Generator Interconnection Procedures, dated.

AS 2009a: Abengoa Solar Inc. Application for Certification (AFC) for the AMS, dated 7-2-09. Appendix N: Interconnection System Impact Study report. Submitted on 8-10-2009.

AS 2009b: Abengoa Solar Inc. Data Adequacy Supplement dated 9-4-09. Submitted on 9-24-2009.

AS 2009c: Abengoa Solar Inc. Power Purchase Agreement dated 10-8-2009. Submitted on 9-24-2009.

AS 2010b: Abengoa Solar Inc. / E. Garcia (TN 55215). Abengoa Mojave - Facility Transmission System Upgrade, dated 2/5/2010. Submitted to CEC on 2/8/2010.

ESH 2009c. Ellison. C. Response to Data Request set no 1. Submitted on 11-24-09.

ESH 2010b: Ellison, Schneider and Harris / C. Ellison (TN 54796). Application for Confidential Designation: System Impact Study dated 1/4/10. Submitted to CEC on 1/4/2010.

AS 2010d-Abengoa Solar Inc. / K. Sullivan (TN 55679). Interconnection Optional Study by California ISO, January 2010, dated 2/24/2010. Submitted to CEC on 2/25/2010.

CEC 2009m: CEC Data Request set 1A (1-93) dated 10-22-09. Submitted on 10-22-09.

NERC (North American Electric Reliability Council) 2006. Reliability Standards for the Bulk Electric Systems of North America, May 2 2006.

SCE 2010b: SCE letter of April 15, 2010, comments on staff assessments. Submitted to CEC on 4-19-10.

WECC (Western Electricity Coordinating Council) 2006. NERC/WECC Planning Standards, August 2006.

DEFINITION OF TERMS

ACSR	Aluminum cable steel reinforced.
AAC	All Aluminum conductor.
ACSS	Aluminum conductor steel-supported.
Ampacity	Current-carrying capacity, expressed in amperes, of a conductor at specified ambient conditions, at which damage to the conductor is nonexistent or deemed acceptable based on economic, safety, and reliability considerations.
Ampere	The unit of current flowing in a conductor.
Kiloampere (kA)	1,000 Amperes
Bundled	Two wires, 18 inches apart.
Bus	Conductors that serve as a common connection for two or more circuits.
Conductor	The part of the transmission line (the wire) that carries the current.
Congestion Management	Congestion management is a scheduling protocol, which provides that dispatched generation and transmission loading (imports) would not violate criteria.
Emergency Overload	See Single Contingency. This is also called an L-1.
Hertz	The unit for System Frequency.

Kcmil or KCM	Thousand circular mil. A unit of the conductor's cross sectional area, when divided by 1,273, the area in square inches is obtained.
Kilovolt (kV)	A unit of potential difference, or voltage, between two conductors of a circuit, or between a conductor and the ground. 1,000 Volts.
Loop	An electrical cul de sac. A transmission configuration that interrupts an existing circuit, diverts it to another connection and returns it back to the interrupted circuit, thus forming a loop or cul de sac.
MVAR or Megavars	Megavolt Ampere-Reactive. One million Volt-Ampere-Reactive. Reactive power is generally associated with the reactive nature of motor loads that must be fed by generation units in the system.
Megavolt Ampere (MVA)	A unit of apparent power, equals the product of the line voltage in kilovolts, current in amperes, the square root of 3, and divided by 1000.
Megawatt (MW)	A unit of power equivalent to 1,341 horsepower.
Normal Operation/ Normal Overload	When all customers receive the power they are entitled to without interruption and at steady voltage, and no element of the transmission system is loaded beyond its continuous rating.
N-1 Condition	See Single Contingency.
Outlet	Transmission facilities (circuit, transformer, circuit breaker, etc.) linking generation facilities to the main grid.
Power Flow Analysis	A power flow analysis is a forward looking computer simulation of essentially all generation and transmission system facilities that identifies overloaded circuits, transformers and other equipment and system voltage levels.
Reactive Power	Reactive power is generally associated with the reactive nature of inductive loads like motor loads that must be fed by generation units in the system. An adequate supply of reactive power is required to maintain voltage levels in the system.
Remedial Action Scheme (RAS)	A remedial action scheme is an automatic control provision, which, for instance, would trip a selected generating unit upon a circuit overload.
SSAC	Steel Supported Aluminum Conductor.
SF6	Sulfur hexafluoride is an insulating medium.

Single Contingency	Also known as emergency or N-1 condition, occurs when one major transmission element (circuit, transformer, circuit breaker, etc.) or one generator is out of service.
Solid Dielectric Cable	Copper or aluminum conductors that are insulated by solid polyethylene type insulation and covered by a metallic shield and outer polyethylene jacket.
SVC	Static VAR Compensator: An equipment made of Capacitors and Reactors with electronic controls for producing and controlling Reactive Power in the Power System.
Switchyard	A power plant switchyard (switchyard) is an integral part of a power plant and is used as an outlet for one or more electric generators.
Thermal rating	See ampacity.
TSE	Transmission System Engineering.
TRV	Transient Recovery Voltage
Tap	A transmission configuration creating an interconnection through a sort single circuit to a small or medium sized load or a generator. The new single circuit line is inserted into an existing circuit by utilizing breakers at existing terminals of the circuit, rather than installing breakers at the interconnection in a new switchyard.
Undercrossing	A transmission configuration where a transmission line crosses below the conductors of another transmission line, generally at 90 degrees.
Underbuild	A transmission or distribution configuration where a transmission or distribution circuit is attached to a transmission tower or pole below (under) the principle transmission line conductors.
VAR	Voltage Ampere Reactive, a measure for Reactive power in the power system.

APPENDIX A

**TRANSMISSION SYSTEM ENGINEERING
DOWNSTREAM UPGRADES
CONGESTION MANAGEMENT/TELECOMMUNICATION
SYSTEM IMPACT ANALYSIS**

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APPENDIX TO TRANSMISSION SYSTEM ENGINEERING CONGESTION MANAGEMENT/TELECOMMUNICATION SYSTEM IMPACT ANALYSIS

Testimony of Heather Blair

1.0 INTRODUCTION AND PURPOSE

This Transmission System Engineering Appendix to the Supplemental Staff Assessment (SSA) for the Abengoa Mojave Solar (AMS) project has been prepared by Energy Commission staff to examine the potential downstream impacts of future congestion management / telecommunication system upgrades that may be required as a result of interconnecting the 250 megawatt (MW) AMS project to Southern California Edison's (SCE) existing Coolwater–Kramer No.1 220-kilovolt (kV) transmission line. The upgrades are considered “downstream” because they occur after the first point of interconnection. The objective of this analysis is to assess whether construction and/or operation of the downstream upgrades would result in significant environmental impacts and recommend mitigation measures that would reduce potential impacts to less than significant levels. The downstream upgrade elements are collectively referred to as the anticipated downstream upgrades.

The Energy Commission has the exclusive authority to certify the construction and operation of thermal electric power plants 50 MW or larger and associated facilities. The Energy Commission also has the licensing authority up to the first point of interconnection for transmission facilities. Under the California Environmental Quality Act (CEQA), the Energy Commission must conduct an environmental review of the “whole of the action,” which may include facilities not licensed by the Energy Commission. Therefore, the Energy Commission must identify the system impacts and necessary new or modified transmission facilities downstream of the proposed interconnection that are required for interconnection and represent the “whole of the action.”

The off-site downstream facilities would be designed, built, and operated by SCE. The California Public Utilities Commission (CPUC) would be the CEQA lead agency and either the Bureau of Land Management (BLM) or U.S. Department of Energy (DOE) would be National Environmental Policy Act (NEPA) lead agencies, for permitting and licensing of these facilities. SCE's project description for the Lockhart Substation and associated facilities is a planning-level description only (SCE 2010c); site-specific engineering and design documents will be prepared at a later date. Therefore, this appendix is intended as a screening-level analysis that may support further environmental review, which will be conducted by the CPUC and/or BLM or DOE as the appropriate permitting agencies. The analysis of downstream impacts and identification of impact avoidance, minimization, and mitigation measures presented in this appendix are intended to inform the Energy Commission and the general public of the potential environmental and public health effects caused by interconnection of the AMS project to the SCE transmission system.

Abengoa Solar Inc. (Abengoa) applied to the California Independent System Operator (CAISO) for interconnection of the 250 MW AMS project. Abengoa requested and paid

for Interconnection Studies in accordance with the CAISO Large Generation Interconnect Procedures Tariff and was assigned Queue Position 125. All applicable interconnection studies have been completed for the AMS, and Abengoa is currently negotiating the execution of the Large Generator Interconnection Agreement under an “Energy Only” service arrangement with the implementation of special protection system (SPS). Such service arrangement could result in the need to implement congestion management protocols which could result in the curtailment of generation resources in the area during times when total generation production in the area exceeds the total area transmission capability.

Telecommunication / congestion management system upgrades beyond the first point of AMS interconnection would be required in order to provide transmission line protection, special protection systems, monitoring, and remote operation capabilities of the electrical equipment at Lockhart Substation. To this end, fiber optic communication cables, associated poles, conduits, and other telecommunication facilities would be installed to provide diverse path routing of communications required for the AMS interconnection, and to provide communications redundancy at the two AMS power blocks. This work would include installing communication paths between the Tortilla, Lockhart, Kramer, and Victor substations, as described in Section 2.0, below.

2.0 DESCRIPTION OF THE PROPOSED DOWNSTREAM UPGRADES PROJECT

This section describes the anticipated downstream upgrades required to accommodate interconnection of the 250 MW AMS project to SCE’s existing Coolwater–Kramer No.1 220-kV transmission line. In addition, this section includes a general description of the construction processes for the anticipated downstream upgrades.

2.1 PROJECT OVERVIEW

The anticipated downstream upgrades are summarized below and described in detail in Section 2.3 based on information provided by SCE (SCE 2010c) and Abengoa (AS 2010k):

Lockhart Substation: A new 220-kV substation would be constructed to loop-in the existing Coolwater–Kramer No. 1 220-kV transmission line and provide two 220-kV line positions to terminate two new 220-kV generation tie lines (gen-ties) owned by AMS.

Transmission Lines: The existing Coolwater–Kramer No. 1 220-kV transmission line would be looped into the new Lockhart Substation. The transmission loop would require construction of approximately 3,000 feet of new transmission line (composed of two segments of approximately 1,500 feet each) creating the new Lockhart–Kramer and Coolwater–Lockhart 220-kV transmission lines. This may require removal, modification, or replacement of at least one existing transmission support structure.

Generation Tie Line (gen-tie) Connections: The two AMS-built gen-ties would be connected into the SCE-owned Lockhart Substation. This work involves construction of two single spans of conductors between the Lockhart switchrack and the last

AMS-owned tower(s). The AMS gen-ties, which are under the licensing jurisdiction of the Energy Commission, are analyzed in the SSA, whereas the loop-in connections are analyzed in this appendix.

Distribution Line for Station Light and Power. The existing Hutt 12-kV distribution circuit out of the Hutt Poletop Substation would be connected to the Lockhart Substation. This would involve removing two existing poles and constructing a new pole approximately 40 feet north of the Lockhart Substation. A range of approximately 200-400 feet of underground conduit would be installed from the replaced pole to the substation to provide a path for one of the two required sources of station light and power.

Telecommunications Facilities: Fiber optic communication cables, associated poles, conduits, and other telecommunication facilities would be installed to provide diverse path routing of communications required for the AMS interconnection, and to provide communications redundancy at the AMS alpha and beta power blocks. This work would include installing communication paths between the Tortilla, Lockhart, Kramer, and Victor substations.

2.2 PROJECT LOCATION

The proposed Lockhart Substation, transmission lines to loop the Coolwater–Kramer 220-kV transmission line into the Lockhart Substation, gen-tie connections, and distribution interconnection, would be located within or adjacent to the limits of the AMS project, which is on private land located approximately 5.5 miles northeast of the intersection of State Route (SR) 58 and Harper Lake Road in the county of San Bernardino. Figures 1 and 2 depict the location of the Lockhart Substation and appurtenant facilities in relation to the proposed AMS project. Figure 3 identifies the location of electrical lines associated with the Lockhart Substation.

As illustrated in Figure 4, the proposed telecommunication lines would extend south of the proposed Lockhart Substation to the existing Tortilla substation to the southeast and the existing Kramer and Victor substations to the west and south, respectively, within San Bernardino County. Additional detail regarding the location of the proposed fiber optic lines is provided below and illustrated in Figures 5 through 7.

- The proposed **Lockhart to Tortilla Substation fiber optic line** extends west, then south of the Lockhart Substation before turning due east immediately south of SR 58. The route roughly parallels SR 58 for approximately 10 miles, turns southeast to the city of Barstow, and terminates at the Tortilla Substation. Refer to Figure 5.
- The proposed **Lockhart to Kramer Substation fiber optic line** extends from the Lockhart Substation within the AMS project site to the Kramer Substation, which is approximately 13 miles due west, immediately south of SR 58. This segment would be located within existing utility easements. Refer to Figure 6.
- The proposed **Kramer to Victor Substation fiber optic line** extends directly south-southeast parallel to the west side of Highway 395 between its intersection with SR 58 and Palmdale Road. This route is primarily within unincorporated San Bernardino County and partially within the city limits of Adelanto at the southern portion of the route. Refer to Figure 7.

2.3 PROJECT CHARACTERISTICS

Lockhart Substation and Interconnection

The proposed Lockhart Substation would be a 220-kV switching station measuring approximately 450 feet by 550 feet and considered to be an “unattended” collector station (i.e., no power transformation). The substation would be located within the boundary of the AMS project and would be surrounded by a wall or chain-link fence with two gates. The substation would be constructed with a six-bay 220-kV switchrack; one bay would be used to loop in the SCE Coolwater–Kramer No. 1 220-kV transmission line, two bays would be used to terminate the two AMS gen-ties, and the three remaining bays would be available for future use. The Lockhart Substation would be initially equipped with two overhead 220-kV buses, seven 220-kV circuit breakers, 220-kV disconnect switches, one mechanical electrical equipment room (MEER), light and power transformers, station lighting, and a back-up generator. To accommodate the proposed Lockhart Substation within the AMS property and to allow for future access to the substation, a SCE transmission right-of-way corridor would be established between the southern boundary of the AMS and the existing SCE Coolwater–Kramer 220-kV corridor.

The proposed Lockhart Substation would be connected to the Coolwater–Kramer No. 1 220-kV transmission line via loop-in transmission segments. The two loop-in line segments would create two new transmission lines: the Coolwater–Lockhart 220-kV transmission line and the Kramer–Lockhart 220-kV transmission line. Each transmission line segment into the Lockhart Substation would be approximately 1,500 feet long. The proposed loop-in of the existing Coolwater–Kramer No. 1 220-kV transmission line to the Lockhart Substation would require approximately four double-circuit transmission support structures (refer to Figure 3). These transmission support structures would be tubular steel poles and/or lattice steel towers. Two of the structures would be placed just outside of the substation fence or wall but within the AMS boundary. The other two structures would be used to re-route the Coolwater–Kramer No. 1, 220-kV transmission line into Lockhart Substation and would be located adjacent to the southern boundary of the AMS project within the existing SCE right-of-way. The section of line connecting the existing Coolwater–Kramer No. 1 220-kV transmission line to the first structure outside of Lockhart Substation may require a new right-of-way between SCE’s existing right-of-way and the new Lockhart Substation facilities. Since preliminary design information is unavailable at this time, including engineered maps with right-of-way limits, it is assumed that existing utility rights-of-way would be used. To support the loop-in, one existing double-circuit transmission structure may need to be removed. The exact location of new and replaced towers will be determined during detailed engineering.

The proposed Lockhart Substation design would also require a connection between the gen-ties from the AMS dead-end structures to the appropriate 220-kV position inside the Lockhart Substation. The span needed for this connection is estimated to be up to 300 feet, depending on the location of the transmission line tower relative to the Lockhart Substation.

To provide light and ancillary power to the substation, a distribution circuit out of the existing Hutt Poletop Substation located to the northwest would be routed to the Lockhart Substation. Two existing poles in the approximate location of the proposed substation would be removed and a new distribution riser pole would be installed approximately 40 feet north of the proposed substation's northern fence. From this pole, a 12-kV distribution riser would be installed and approximately 200 feet of two 5-inch conduits would be installed and connected to a new 12-kV station light and power rack location within the Lockhart Substation adjacent to the MEER. Portions of these facilities are also proposed to be used for installation of the required fiber optic cables into Lockhart Substation. These new overhead poles for light and power would be located within the limits of the AMS project.

The disturbance area for the Lockhart Substation and other facilities within the AMS Project boundary have been analyzed in the AMS Staff Assessment and Supplemental Staff Assessment because they are within the footprint of the AMS Project.

Telecommunication System

A telecommunication system would be required in order to provide transmission line protection, SPS, monitoring, and remote operation capabilities of the electrical equipment at Lockhart Substation.

To provide transmission line protection, the telecommunications system would extend diverse communication paths utilizing fiber-optic cables to connect Lockhart Substation to the SCE telecommunication network via the existing SCE Kramer Substation, the existing SCE Tortilla Substation, and also to the AMS alpha and beta power blocks (refer to Figures 2, 5, and 6).

To provide for the required SPS, a fiber optic cable would be installed between SCE's existing Kramer Substation and SCE's existing Victor Substation (refer to Figure 7). In addition, new fiber optic multiplex equipment and channel equipment would be installed at SCE's Kramer, Tortilla, Coolwater, Roadway, Lugo substations to support the communication requirements for the Lockhart Substation.

It is anticipated that the total distance of the combined telecommunication routes would be approximately 85 miles. As described in the following subsections, certain portions of the fiber optic cable would be constructed on existing overhead distribution and transmission wood and light duty steel poles, while other portions of the cable would be constructed on new overhead structures and within newly constructed underground conduit systems. The characteristics of the proposed telecommunications system are summarized in Table 1 and the ground disturbance that would result from construction of the Victor Substation to Kramer Substation fiber optic line is detailed in Table 2.

Table 1 - Summary of Proposed Fiber Optic Lines

	Kramer to Lockhart	Lockhart to Tortilla	Victor to Kramer
Total fiber optic cable length	92,000 ft (18 miles)	164,000 ft (31 miles)	189,000 ft (36 miles)
Total underground (UG) length	3,100 ft	1,900 ft	2,300 ft
- Existing UG conduits	2,000 ft	500 ft	700 ft
- New UG conduits	1,100 ft	1,400 ft	1,600 ft
Total overhead (OH) length	88,000 ft	162,000 ft	182,700 ft
- OH length (existing poles)	82,000 ft	150,000 ft	182,700 ft
- OH length (new poles)	6,000 ft	12,000 ft	0 ft
- Existing poles	250	600	226
- New poles	30	55	30
Ground disturbance	7,500 sq ft	13,700 sq ft	226,500 sq ft
Time to construct (4 men per crew)	38 crew days	64 crew days	154 crew days
Total man days	152 man days	256 man days	755 man days

Note: These figures are desktop estimates and may change based upon final engineering.

Table 2 - Estimated Ground Disturbance Victor-Kramer Fiber Optic Cable

Project Feature	Site Quantity	Disturbed Acreage Calculation (L X W)	Acres Disturbed During Construction	Acres to be Restored	Acres of Permanent Disturbance
Construct New Steel Pole	30	75' X 75'	3.9	2.4	1.5
Fiber Optic Setup Area - Tensioner ¹	18	40' X 60'	1.0	1.0	0.0
Fiber Optic Splicing Setup Areas ¹	18	20' X 30'	0.2	0.2	0.0
New Access Roads ²	0.1	Linear miles X 14' wide	0.1	0.0	0.1
Total³			5.2⁴	3.6	1.6

1 Includes structure assembly and erection, conductor and fiber optic cable installation. Area to be restored after construction. Portion of right of way within 25 feet of the tubular steel pole (TSP) and within 10 feet of light-weight steel pole (LWS) and H-frame to remain cleared of vegetation. Permanently disturbed areas for TSP=0.06 acre, LWS=0.05 acre, and H-Frame=0.06 acre.

2 Based on 9,000 feet conductor reel lengths, number of circuits, and route design.

3 The disturbed acreage calculations are estimates based upon SCE's preferred area of use for the described project feature, the width of the existing right-of-way, or the width of the proposed right-of-way and, they do not include any new access/spur road information; they are subject to revision based upon final engineering and review of the project by SCE's Construction Manager and/or Contractor awarded project.

4 5.2 acres equals 226,500 sq ft.

The environmental analysis presented in Section 3.0 assumes the following characteristics for the fiber optic lines:

- New poles would be located within existing utility rights-of-way
- New poles would be between 18 and 24 feet in height and would consist of either wood or light-duty steel
- Footprints for new pole construction would affect approximately 2 square feet for permanent impacts and 34 square feet for temporary construction impacts
- New underground trenching would necessitate a maximum construction footprint of 20 feet in width
- Stringing activities and construction equipment would be located within existing utility rights-of-way

Lockhart Substation to Tortilla Substation Fiber Optic Line

The DU project includes approximately 31 miles of new fiber optic cable to be installed between the proposed Lockhart Substation and the existing Tortilla Substation (see Figure 5). Approximately 1,000 feet of cable would be installed in an underground conduit within the limits of the Lockhart Substation/AMS project site, transitioning to new overhead poles near the edge of the SCE transmission corridor to the south. The cable would require the construction of approximately 55 new poles between the Lockhart Substation and Harper Lake Road to the east. These poles would be constructed within the existing SCE transmission corridor. At the intersection with Harper Lake Road, the overhead fiber optic line would transition underground for approximately 400 feet and head south on the west side of Harper Lake Road. The new underground trench would be located within a disturbed road right-of-way.

From this point, the underground cable would transition back to the overhead line via a riser and would be strung on existing overhead transmission line poles that parallel Harper Lake Road for approximately 5 miles, continuing south. The cable would be strung on existing transmission line structures beginning at the intersection of Harper Lake Road and SR 58, east along SR 58, south on Summerset Road, east on Community Boulevard, and south on Lenwood Road and Sun Valley Drive until intersecting with the existing Poco 33-kV transmission line located approximately one-third mile south of Main Street in Barstow.

The cable then would be strung on the existing 33-kV transmission line structures for approximately 4.7 miles and would continue to be strung on existing transmission line structures south along I Street and east for 740 feet along Bonanza Road until intersecting with the existing SCE Kramer–Tortilla 115-kV transmission line. The fiber optic cable would be strung on those existing structures until about 500 feet west of the existing Tortilla Substation, at which point it would transition to an existing underground conduit via a riser and terminate at the existing Tortilla Substation.

Lockhart Substation to Kramer Substation Fiber Optic Line

The DU project includes approximately 18 miles of new fiber optic cable to be installed between the proposed Lockhart Substation and the existing Kramer Substation (see

Figure 6). Approximately 1,000 feet of new underground conduit would extend north from the Lockhart Substation to the poles for the proposed distribution line for Lockhart Substation light and power. The fiber optic line would be co-located with the proposed distribution line on approximately 30 poles within the AMS property between the Lockhart Substation and Lockhart Road to the north. From Lockhart Road, the fiber optic cable would be strung on existing overhead transmission line structures for approximately 1.5 miles to the west until the intersection with Harper Lake Road. Here, the fiber optic cable would turn due south and would be strung on existing overhead transmission line structures along the west side of Harper Lake Road until it intersects with the existing SCE transmission line corridor for the Lockhart 33-kV and Coolwater-Kramer 220-kV transmission lines. From this point, the cable would be strung on existing transmission support structures within the utility corridor until just east of Highway 395. The cable would continue to be strung on existing overhead structures for another one-third mile south until the line intersects with the existing Kramer Substation. The overhead cable would transition to an existing underground conduit via a riser for approximately 2,000 feet until the conduit reaches the MEER within the substation.

Kramer Substation to Victor Substation Fiber Optic Line

The DU project includes approximately 36 miles of new fiber optic cable to be installed between the existing Kramer Substation and the existing Victor Substation (see Figure 7). Fiber optic cable connecting these existing substations would commence at the MEER within the Victor Substation by installing cable in a new underground conduit until it reaches the southern border of the substation where it would transition to a new riser on an existing Kramer-Victor 115-kV overhead transmission support structure.

From this new riser, approximately 2.8 miles of new overhead fiber optic cable would be installed on the existing Kramer-Victor 115-kV overhead structures, which generally parallel Highway 395 in proximity of the Kramer Substation. A new riser drop down, approximately 500 feet of new underground conduit, and a new line riser would be required to cross under 287-kV transmission lines owned by the Los Angeles Department of Water and Power. From this point, the new fiber optic cable would be installed on the existing Kramer-Victor 115-kV overhead structures for approximately 0.8 mile. A new riser drop down, approximately 500 feet of new underground conduit, and a new line riser would be required to cross under the existing SCE Kramer-Lugo 220 kV transmission lines. From this point, the new fiber optic cable would again be installed on the existing Kramer-Victor 115-kV overhead structures for approximately 1.2 miles where it would then be routed in and out of the existing SCE Roadway Substation.

To enter the Roadway Substation MEER, a new riser drop down and approximately 350 feet of new underground conduit would be required. To exit the Roadway Substation MEER, approximately 575 feet of new cable would be installed within existing underground conduit, approximately 600 feet of new cable would be installed on new underground conduit, and a new line riser would be required. From this point, approximately 570 feet of new overhead cable would be installed back to the Kramer-Victor 115-kV line where it would then head north for approximately 29 miles towards the Kramer Substation. A new riser drop down would be required on the last Kramer-Victor 115-kV pole just outside the Kramer Substation and approximately 1,000 feet of

new underground conduit towards the Kramer Substation MEER would complete the fiber optic communications path between the existing Victor Substation and Kramer Substation. Approximately 30 new wood or lightweight steel poles would be installed in specific areas within existing transmission line right-of-way to support ground clearance requirements. The number and exact location, as well as type of poles would be determined during final engineering.

Implementation of SCE's proposed SPS would also require installation of an optical repeater site at the existing Roadway Substation, which is along the Kramer Substation to Victor Substation fiber optic route, approximately 5 miles north of the Victor Substation.

2.4 CONSTRUCTION METHODS

The following sections summarize the general construction methods that would be employed for the Lockhart Substation and interconnection as well as the proposed fiber optic lines. Refer to SCE's Project Description for a detailed description (SCE 2010c).

Lockhart Substation and Interconnection

Because the proposed Lockhart Substation would be located within the boundaries of the AMS project, grading for the substation site would be included within Abengoa's overall grading design. Land disturbance areas and earth-moving quantities at the substation location were included in the AMS Application for Certification (AFC) and impacts from land disturbance were analyzed in the Energy Commission's Staff Assessment (SA) and Supplemental Staff Assessment (SSA) for the AMS project.

During construction and operation, the proposed substation site would be accessed through the AMS internal road network from the main AMS access point on Harper Lake Road. This internal road network would be both paved and unpaved. A temporary, 1.5-acre staging yard would be established within the AMS project site for substation construction and interconnection.

Construction of the Lockhart Substation and interconnection facilities would occur within the boundaries of the AMS project site or within the existing SCE 220-kV transmission line corridor. Construction of the new transmission support structures may require a temporary concrete batch plant within the boundaries of the AMS project.

Detailed estimates of the labor force and equipment required for each type of activity associated with construction of the proposed Lockhart Substation and the AMS interconnection facilities (i.e., 220-kV transmission line loop-in, existing transmission line structure modification/ replacement, and 220-kV gen-tie connection) as well as the proposed distribution line for station light and power are provided in SCE's Project Description (SCE 2010c, Tables 2 and 4 through 7) and are typical of substation construction and interconnection.

Fiber Optic Lines

SCE would utilize its existing Victor, Roadway, Kramer, Tortilla, and Coolwater substations as well as its Barstow Service Center and the proposed Lockhart Substation

as marshalling yards to support the installation of the telecommunications facilities required for the DU project. SCE or contractor crews would use standard construction methods to construct the fiber optic cables and would comply with all laws, ordinances, regulations, and standards (LORS) during the construction phase.

Portions of the fiber optic cable would be constructed on existing overhead distribution and transmission wood and light-duty steel poles. In addition, portions of the cable would be constructed on new overhead structures and within newly constructed underground conduit systems, subject to determination through further engineering design. Generally, no hazardous material would be used in installing the fiber-optic cables and there would generally be no need for local services or utilities (e.g., water). SCE's Project Description (SCE 2010k, Tables 9 and 10) presents an estimate of the labor force and equipment required for each type of activity associated with construction of the proposed fiber optic lines. Total labor force and crew days are shown in Table 1 for each fiber optic line segment.

2.5 APPLICANT-PROPOSED MEASURES

Conditions of Certification included in the SA and SSA for the AMS project are applicable to the Lockhart Substation and interconnection facilities within the boundary of the permitted AMS project site, and are hereby incorporated by reference.

Improvements proposed outside of the AMS project site, including interconnection facilities and the proposed fiber optic telecommunication lines would be licensed by the CPUC and potentially the BLM or DOE. Additional measures beyond those identified in the following sections may be required by these or other permitting agencies, pending further environmental analysis conducted by other agencies pursuant to CEQA and NEPA.

SCE will be the proposed builder of these facilities and operates under the following standard best management practices (BMPs), which are incorporated into the project description for the anticipated downstream upgrades (SCE 2010c).

Air Quality

AIR-1 The construction activities would be in compliance with Air Quality Management District (AQMD) requirements, as applicable to the project

Aesthetics and Visual Resources

AES-1 Lattice steel towers and tubular steel poles would be galvanized steel with a dulled grey finish that minimizes reflected light.

AES-2 Insulators that minimize reflection of light would be utilized.

AES-3 Substation equipment would have materials that minimize reflective light.

AES-4 If chain link fence is used, it would have a dulled-finish.

AES-5 The substation lighting would be designed to be manually operated for non-routine nighttime work.

Biological Resources

- BIO-1** Preconstruction biological clearance surveys would be conducted to identify special-status plants and wildlife.
- BIO-2** SCE would prepare a Worker Environmental Awareness Program (WEAP). All construction crews and contractors would be required to participate in WEAP training prior to starting work on the project.
- BIO-3** All transmission and subtransmission towers and poles would be designed to be avian-safe in accordance with the suggested practices for Avian Protection on Power Lines: the State of the Art in 2006 (Avian Power Line Interaction Committee 2006).

Cultural Resources

- CR-1** A cultural resource inventory of the project area would be conducted for cultural resources prior to any disturbance. All surveys would be conducted and documented as per applicable laws, regulations, and guidelines.
- CR-2** To the extent feasible, all ground-disturbing activities shall be sited to avoid or minimize impacts to cultural resources listed as, or potentially-eligible, for listing as, unique archaeological sites, historical resources, or historic properties.
- CR-3** A protective buffer zone would be established and maintained around each recorded archaeological site within or immediately adjacent to the right-of-way.

Paleontology Resources

- PALEO-1** A paleontologist would conduct a pre-construction field survey of the project area.
- PALEO-2** Prior to construction, a certified paleontologist would supervise monitoring of construction excavations.

Geology and Soils

- GEO-1** Prior to final design, investigations would be conducted to identify site-specific geologic conditions and potential geologic hazards in sufficient detail to support sound engineering practices.
- GEO-2** For new substation construction, specific requirements for seismic design would be followed based on the Institute of Electrical and Electronic Engineers' 693 "Recommended Practices for Seismic Design of Substations."
- GEO-3** New access roads, where required, would be designed to minimize ground disturbance during grading.
- GEO-4** Cut and fill slopes would be minimized by a combination of benching and following natural topography where feasible.

GEO-5 Any disturbed areas associated with temporary construction would be returned to preconstruction conditions (to the extent feasible) after the completion of project construction.

Hazards and Hazardous Waste

HAZ-1 A Phase I Environmental Site Assessment would be performed at each new or expanded substation location and along newly acquired transmission and sub-transmission line rights-of-way.

HAZ-2 SCE would implement standard fire prevention and response practices for the construction activities.

HAZ-3 As applicable, SCE would follow fire codes per Cal Fire Power Line Fire Prevention Fire Guide requirements for vegetation clearance during construction of the project to reduce the fire hazard potential.

HAZ-4 Hazardous materials and waste handling would be managed in accordance with the following SCE plans and programs:

- *Spill Prevention, Countermeasure, and Control Plan (SPCC Plan)*. In accordance with Title 40 of the CFR, Part 112, SCE would prepare a SPCC for proposed and/or expanded substations, as applicable.
- *Hazardous Materials Business Plans (HMBPs)*. Prior to operation of new or expanded substations, SCE would prepare or update and submit, in accordance with Chapter 6.95 of the CHSD, and Title 22 CCR, an HMBP, as applicable.
- *Storm Water Pollution Prevention Plan (SWPPP)*: A project-specific construction SWPPP would be prepared and implemented prior to the start of construction of the transmission line and substation.
- *Health and Safety Program*: SCE would prepare and implement a health and safety program to address site-specific health and safety issues.
- *Hazardous Materials and Hazardous Waste Handling*: A project specific hazardous materials management and hazardous waste management program would be developed prior to initiation of the project. Material Safety Data Sheets would be made available to all Project workers
- *Emergency Release Response Procedures*: An Emergency Response Plan detailing responses to releases of hazardous materials would be developed prior to construction activities. All construction personnel, including environmental monitors, would be aware of state and federal emergency response reporting guidelines.

HAZ-5 Hazardous materials would be used or stored and disposed of in accordance with Federal, State, and Local regulations.

HAZ-6 The substation would be grounded to limit electric shock and surges that could ignite fires.

HAZ-7 All construction and demolition waste would be removed and transported to an appropriately permitted disposal facility.

Hydrology and Water Quality

HYDRO-1 Construction equipment would be kept out of flowing stream channels as feasible.

HYDRO-2 Towers would be located to avoid active drainage channels, especially downstream of steep hill slope areas, to minimize the potential for damage.

Land Use

LAND USE-1 SCE shall provide 14 days of advance notice of the start of construction to property owners located within 300 feet of construction-related activities.

Noise

NOISE-1 SCE would comply with local noise ordinances.

Transportation and Traffic

TRANS-1 Traffic control services would be used for equipment, supply delivery, and conductor stringing, as applicable.

TRANS-2 Construction traffic would be scheduled for off-peak hours to the extent feasible and would not block emergency equipment routes.

TRANS-3 If work requires modifications or activities within local roadway and railroad rights-of-way, appropriate permits would be obtained prior to the commencement of construction activities.

3.0 ANALYSIS OF TRANSMISSION AND TELECOMMUNICATIONS SYSTEM FACILITIES

This section examines the potential environmental impacts of the construction and operation of proposed downstream upgrades that may be required as a result of interconnection of the AMS project to the SCE transmission system.

The proposed downstream upgrades would be constructed by SCE and will be fully evaluated pursuant to CEQA and NEPA in a future environmental document prepared by the CPUC and BLM or DOE. SCE has filed applications (SF299 - Application for Transportation and Utility Systems and Facilities on Federal Lands) with BLM to modify existing utility right of ways to include the proposed fiber optic lines. Applications have been filed for each proposed route including, Victor Substation to Kramer Substation, Kramer Substation to Lockhart Substation and Lockhart Substation to Tortilla Substation. In reviewing the applications, BLM will complete an environmental review pursuant to NEPA and their implementing regulations. This screening-level impact analysis for the AMS anticipated downstream upgrades is based on available planning-level information and may be used by BLM in the future to inform their environmental review.

Several of the areas normally studied in a Staff Assessment (Facility Design, Power Plant Efficiency, Power Plant Reliability, Transmission System Engineering, and Transmission Line Safety and Nuisance) are not applicable to the CEQA analysis of downstream actions and are not included in this appendix.

3.1 AIR QUALITY

Environmental Setting

The air quality setting for the proposed project can be described regionally and locally. The proposed project is located within the western portion of San Bernardino County, within the Mojave Desert Air Basin (MDAB). MDAB is an assemblage of mountain ranges interspersed with long broad valleys, with a dry-hot desert climate. Air quality regulations in the MDAB are provided by the Mojave Desert Air Quality Management District (MDAQMD). The MDAQMD also provides an analysis of compliance with LORS.

Local air quality is based on proximity of sensitive air quality receptors to local air pollution sources (e.g., traffic-congested roadways and intersections). Sensitive air quality receptors include structures that house children, the elderly, and persons with preexisting respiratory or cardiovascular illness (i.e., schools, hospitals, and nursing homes).

Lockhart Substation and Interconnection

The proposed substation site is located in a remote area approximately 5.5 miles northeast of the intersection of SR 58 and Harper Lake Road in the county of San Bernardino. There are no sensitive air quality receptors located in proximity to the proposed substation and interconnection area. As described in the **Air Quality** section of the SSA, the nearest sensitive receptor is Hinkley Elementary School, which is approximately 10 miles southeast of the proposed Lockhart Substation and interconnection area.

Lockhart Substation to Tortilla Substation Fiber Optic Line

The Lockhart to Tortilla line is located partially within the AMS boundary and within existing transmission line corridors all the way to the existing Tortilla Substation in the city of Barstow. In the developed areas within and surrounding Barstow, there are residential areas adjacent to this route, an elementary school 0.33 mile south of the route, and a convalescent hospital approximately 0.6 mile west of the route; however, no sensitive air quality receptors are identified directly on or adjacent to the proposed route.

Lockhart Substation to Kramer Substation Fiber Optic Line

The Lockhart to Kramer line is located partially within the AMS property, as well as within existing transmission line corridors all the way to Kramer Substation. Most of this utility corridor is in a remote desert area of San Bernardino County, with the exception of the far west end, which is located near sparse retail, commercial, and industrial uses in the community of Kramer Junction. No sensitive air quality receptors are located in proximity to this proposed route; the nearest sensitive receptor is the Boron Elementary School, which is located approximately 8.5 miles west of the proposed route.

Kramer Substation to Victor Substation Fiber Optic Line

The Kramer to Lockhart line is located along Highway 395, partially within an undeveloped portion of San Bernardino County. There are residential areas adjacent to this route, primarily in the southern one-third of the alignment as the corridor nears Adelanto and the Victor Substation. The proposed route is within 0.25 mile of the St. Mary Medical Center; this is the only potentially sensitive receptor proximate to the proposed route.

Potential Impacts of Proposed Downstream Upgrades

The potential air pollutant emissions that would be generated by the project have been assessed qualitatively; the anticipated impacts of emissions have been identified and general measures to reduce potential impacts are recommended. Subsequent environmental review pursuant to CEQA and NEPA will require a quantitative analysis and specific mitigation measures would be identified accordingly.

The proposed project components (i.e., substation, interconnection, and fiber optic lines) would generate air pollutant emissions, primarily from facilities construction and, to a much lesser degree, from the operation and maintenance of the constructed facilities. Construction activities would generate temporary (short-term) emissions as fugitive dust emissions (particulate matter) from earth-moving activities and as exhaust emissions from the operation of construction equipment and vehicles. Exhaust emissions may include carbon monoxide (CO); ozone (O₃) precursors; nitrogen dioxide (NO₂); sulfur dioxide (SO₂); lead (Pb); and particulate matter, which is subdivided into two classes based on particle size: fine particles (PM_{2.5}) and inhalable particles (PM₁₀). Operation of the proposed DU project would generate minor stationary and mobile exhaust emissions from operation and maintenance of the proposed facilities (i.e., substation and fiber optic lines).

The construction emissions are not anticipated to be substantial or to exceed MDAQMD CEQA significance thresholds. Project operational emissions are anticipated to be negligible, as the emissions from the constructed substation and installed fiber optic lines would be limited to emergency generators and occasional maintenance.

In addition to regional impacts, localized air quality impacts of CO and toxic air contaminants (TACs) were also considered. Signalized intersections of unacceptable levels of service (LOS) are considered for localized CO impacts, where project traffic contributes to the unacceptable LOS condition. Impacts could occur if human receptors are located proximate to these intersections. Project-generated traffic would primarily be temporary (short-term) construction traffic; traffic from project operations would be negligible since the substation would be un-staffed and the interconnection and fiber optic cables would only require periodic maintenance. Project traffic is not anticipated to be substantial enough to result in increasing delays at intersections.

The AMS is projected to generate substantially more construction traffic than these downstream facilities, and its traffic impacts were found to be less than significant. Therefore, the proposed DU project would not have the potential to result in localized CO impacts. As stated in the AMS AFC, TACs of concern include diesel exhaust PM

(diesel PM), asbestos, and lead. The principal TAC of concern for the proposed project is diesel PM, which would result from diesel construction equipment and vehicles. The primary concern for diesel PM is sensitive receptors in proximity to high concentrations of diesel vehicle operation, such as construction sites, interstate highways, distribution centers, bus stations, or port facilities. The linear project construction areas (e.g., fiber optic line corridors) cover an extensive corridor area along roadways. A substantial use of diesel equipment and vehicles is not anticipated along the proposed fiber optic alignments.

For the most part, the nonlinear project facilities (e.g., Lockhart Substation) would be located away from sensitive air quality receptors. As described above, there are several residential areas and one sensitive receptor (i.e., St. Mary Medical Center) adjacent to the proposed alignments. However, fiber optic line installation would be temporary and short-term (approximately 1 to 2 days in any particular location). Overall, the diesel PM emissions generated from proposed DU project construction equipment and mobile sources are not anticipated to subject sensitive receptors to adverse levels of diesel PM or other emissions.

The following describes the type of activities and emissions associated with each DU project element and provide the basis for the conclusions presented above.

Lockhart Substation and Interconnection

The proposed Lockhart Substation and associated facilities would be located within the boundary of the AMS, or immediately adjacent. Air quality impacts for the AMS project site are included in Section 5.1 of the SSA, and were generally found to be less than significant with implementation of mitigation.

The substation and interconnection would generate air pollutant emissions primarily from facility site construction (i.e., substation and transmission lines) and linear facilities installation (i.e., fiber optic line); minor emissions would be generated from the post-construction operation and maintenance of the constructed substation. Construction activities would include site grading, facility installation, paving, and landscaping. Project emissions from the substation and interconnection are not anticipated to be substantial, and anticipated to be less than applicable MDAQMD CEQA significance thresholds, as identified in Table 5.2-8 in the AMS AFC.

Construction of new 220-kV transmission structures to replace the existing 220-kV transmission structures may require the installation and operation of a temporary concrete batch plant within the boundaries of the AMS for purposes of footings for the new transmission structures. The installation and removal of a temporary batch plant would generate temporary, short-term construction emissions of fugitive dust and exhaust from construction equipment and vehicles. Operation of the plant would generate temporary, short-term exhaust emissions from the operation of the plant's gas-powered mechanical equipment for the generation of concrete for the footings.

Lockhart to Tortilla Substation Fiber Optic Line

The Lockhart to Tortilla line includes approximately 31 miles of new fiber optic cable to be installed above ground on existing and new poles, except for approximately 1,900 feet of cable that would be installed in an underground conduit. Since the line would be located in existing utility rights-of-way along existing roadways, off-road construction vehicle travel is anticipated to be minor. Ground-disturbing activities from trenching for underground cable and excavation for the footings of new poles would generate minor levels of fugitive dust as well as construction equipment and vehicle exhaust.

Lockhart to Kramer Substation Fiber Optic Line

The Lockhart to Kramer line includes approximately 18 miles of new fiber optic cable to be installed above ground on existing and new poles, except for approximately 3,100 feet of cable that would be installed in an underground conduit. Since the line would be located in existing utility rights-of-way along existing roadways, off-road construction vehicle travel is anticipated to be minor. Ground-disturbing activities from trenching for underground cable and excavation for the footings of new poles would generate minor levels of fugitive dust, and construction equipment and vehicle exhaust.

Kramer to Victor Substation Fiber Optic Line

The Kramer to Victor line includes approximately 36 miles of new fiber optic cable to be installed above ground on existing and new poles, except for approximately 2,300 feet of cable that would be installed in underground conduit. Since the line would be located in existing utility rights-of-way along existing roadways, off-road construction vehicle travel is anticipated to be minor. Ground-disturbing activities from trenching for underground cable and excavation for the footings of new poles would generate minor levels of fugitive dust, and construction equipment and vehicle exhaust.

Impact Minimization Measures

The DU project would be required to comply with all MDAQMD rules, including portable equipment rules, which would dictate how the equipment could be operated. Mitigation measures would be implemented in compliance with the MDAQMD Ozone State Implementation Plan to reduce the emissions generated during project construction and operation.

Construction-related activities and emissions at the project site are consistent with activities and emissions encountered at any construction site. Compliance with the provisions of the following necessary construction permits generally results in minimal site emissions: 1) grading permit; 2) SWPPP requirements (construction site provisions); 3) use permit; 4) building permits; and 5) MDAQMD Authority to Construct permit, which requires compliance with the provisions of all applicable fugitive dust rules that pertain to the site construction phase.

Construction phase emissions are generally short-term in duration. Effective and comprehensive control measures would be needed to reduce equipment and fugitive dust emissions to the extent feasible. Staff recommends that the following measures be implemented during construction to mitigate potential impacts to air quality:

- Retain an on-site construction mitigation manager who would be responsible for the implementation and compliance of the construction mitigation program.
- Document the ongoing implementation and compliance with the construction mitigation program in a monthly construction compliance report.
- Implement fugitive dust control requirements, including paving the main access road to the main power block before construction begins on that part of the site, using durable non-toxic soil stabilizers on unpaved roads as soon as they are constructed, watering active construction areas, implementing trackout controls, and applying other activity-specific control measures to reduce fugitive dust emissions during construction.
- Limit the potential offsite impacts from visible dust emissions, by responding to situations when the fugitive dust control measures are not working effectively to control fugitive dust from leaving the construction area.
- Mitigate the PM and NO_x emissions from large diesel-fueled construction equipment by using newer cleaner engines and other various control measures such as idle time restrictions, engine maintenance, etc.

With effective and comprehensive control measures such as those recommended in this section, dust and equipment exhaust impacts would be reduced and would be less than significant.

Conclusions

The anticipated downstream upgrades would be required to comply with all MDAQMD rules, including portable equipment rules, which would dictate how the equipment could be operated. Mitigation measures would be implemented in compliance with the MDAQMD Ozone State Implementation Plan to reduce the emissions generated during project construction and operation. With effective and comprehensive control measures such as those recommended in this section and Section 2.3, dust and equipment exhaust impacts would be reduced to a less than significant level.

3.2 BIOLOGICAL RESOURCES

The biological resources analysis of the telecommunication/congestion management system is based on applicant-provided biological resource information for the Lockhart Substation Interconnection & Communication Facilities Environmental Analysis (AS 2010k) as well as the Draft Biological Assessment for the AMS project (AECOM 2010d). The anticipated downstream upgrades and their potentially resultant impacts to biological resources will undergo an independent analysis pursuant to CEQA and NEPA by the CPUC and BLM or DOE, respectively.

Environmental Setting

Regional Setting

The proposed project is located in the western Mojave Desert, within the county of San Bernardino, and within the cities of Barstow and Adelanto, California. The project area spans approximately 85 miles and would occur primarily within existing road and utility corridors. The region encompassing the proposed project is characterized by open space and areas of active and fallow agriculture, scattered with residences and urban areas. In addition, portions of the project area are surrounded by sensitive land uses such as Mohave ground squirrel (MGS) conservation area, desert wildlife management areas (DWMA), and desert tortoise critical habitat.

Existing Vegetation and Wildlife

The applicant conducted a reconnaissance-level survey of the anticipated downstream upgrades area by driving along access roads on April 4 and 5, 2010 (AS 2010k). As of this preliminary analysis, this is the only biological resources field survey effort conducted for the proposed telecommunication/congestion management system. Comprehensive biological surveys, including protocol surveys for desert tortoise, were conducted for the Lockhart substation footprint, as part of the AMS project. A wetland delineation has not been conducted outside the AMS project footprint; however, several drainages and the Mojave River traverse the proposed telecommunication/congestion management system area.

The following sections describe the vegetation communities observed and a preliminary assessment of the potential for special-status species to occur within the telecommunication/congestion management system area.

Vegetation Communities

Vegetation communities and land-use types (i.e., residential or developed) were mapped for each segment during the windshield survey. Although a weed survey was not conducted outside of the AMS project area, observations during the windshield survey identified tamarisk (*Tamarix ramosissima*), Russian thistle (*Salsola tragus*), and Saharan mustard (*Brassica tournefortii*) as the most abundant invasive weeds within the proposed telecommunication/congestion management system area. **Table 3** lists dominant vegetation communities and acreages for each project segment. Excluding the Lockhart substation, the project segments listed below refer to linear segments within a 100-foot-wide existing corridor. The vegetation communities for each project segment are described in further detail following **Table 3**.

Table 3 -Vegetation Communities and Acreage Occurring within the Project Area

Vegetation Communities and Cover Types	Lockhart Substation and Interconnection (acres)	Lockhart Substation to Tortilla Substation (acres)	Lockhart Substation to Kramer Substation (acres)	Kramer Substation to Victor Substation (acres)
Desert Saltbush Scrub	0	311.98	198.76	61.41
Mojave Creosote Bush Scrub	0	0	0	8.26
Mojave Creosote Bush Scrub	0	97.7	90.85	518.80
Mojave Creosote Bush-Atriplex Scrub	0	0	48.99	0
Tamarisk Scrub	0	8.55	0	0
Active Agriculture	0	39.18	9.17	0
Fallow Agriculture-Ruderal (weedy)	9.04	45.25	59.23	
Developed	0	0	15.73	45.08
Disturbed	0	0	0	22.75
Joshua Tree Woodland	0	0	0	1
Mojave Desert Wash – sandy areas	0	11.3	0	0
Mojave River	0	3.07	0	0

Source: AS 2010k

Lockhart Substation and Interconnection

The proposed Lockhart Substation and Interconnection would occur within and adjacent to the proposed AMS site footprint. Fallow agriculture-ruderal vegetation, dominated by Russian thistle, Saharan mustard, and Mediterranean grass (*Schismus arabicus*) occurs within the footprint and is interspersed with patches of disturbed saltbush scrub and tamarisk windbreaks. Disturbed desert saltbush scrub in this area is dominated by allscale (*Atriplex polycarpa*) and spinescale (*Atriplex spinifera*) with a non-native herbaceous understory. The windshield survey west along Lockhart Road and south along Harper Lake Road identified that ruderal habitat is the dominant vegetation community along this segment and it is interspersed with disturbed desert saltbush scrub and developed land.

Lockhart Substation to Tortilla Substation Fiber Optic Line

The proposed route for the 31-mile fiber optic line within this segment would originate at the proposed Lockhart Substation within the AMS project boundary and head west, following the existing Kramer-Coolwater 220-kV utility corridor south of the AMS project.

The Kramer-Coolwater utility corridor runs adjacent to disturbed desert salt bush scrub to the north and native Mojave creosote bush scrub characterized by creosote bush and white bursage (*Ambrosia dumosa*) habitat to the south. Sign of desert tortoise was observed during the windshield survey within this segment. The proposed alignment would intersect Harper Lake Road and head south. The dominant vegetation type proximate to Harper Lake Road is relatively undisturbed native saltbush scrub habitat. This cover type is characterized by Atriplex species including shadscale (*Atriplex confertifolia*), allscale, spinescale, winter fat (*Krascheninnikovia lanata*), horsebush (*Tetradymia canescens*), and creosote bush. Disturbed habitat occurs immediately adjacent to the road.

The fiber optic alignment then trends east for approximately 10 miles along SR 58 at its junction with Harper Lake Road. The primary vegetation occurring within this area is undisturbed desert saltbush scrub along the north side of existing tortoise-proof fencing. Other vegetation types along this SR 58 corridor include disturbed desert saltbush scrub and developed habitat. The alignment then turns south at Summerset Road and continues adjacent to agricultural fields. The alignment trends east along Community Road, which is dominated by fallow and active agriculture, for approximately 1.75 miles at which point sand dunes are present for the remaining 0.25 mile. The alignment then turns south to follow Lenwood Road and is adjacent to sand dunes, tamarisk, Russian thistle, disturbed desert saltbush scrub, and the Mojave River. Following the alignment north, the dominant habitat becomes disturbed creosote bush scrub in addition to commercial and residential development. Disturbed creosote bush scrub and residential development primarily occur where the alignment follows Sun Valley Drive. This portion of the proposed alignment would be located within an urban area dominated by residential development and disturbed creosote bush scrub. The remaining section of the alignment, between Bonanza Road and the Tortilla Substation, is dominated by disturbed creosote bush scrub, with frequent off-highway vehicle use and garbage dumping.

Lockhart Substation to Kramer Substation Fiber Optic Line

The 36-mile Lockhart to Kramer Substation segment is characterized by disturbed desert saltbush scrub and a residential property. Desert saltbush scrub occurs at lower elevations. This community is characterized by shadscale, allscale, spinescale, winter fat, horsebush, and creosote bush. At relatively higher elevations, Mojave creosote bush scrub occurs, characterized by cheesebush (*Hymenoclea solsolea*), Anderson's boxthorn (*Lycium andersonii*), and peachthorn (*Lycium cooperi*). Joshua trees are present near the western end of the alignment near Highway 395.

Kramer Substation to Victor Substation Fiber Optic Line

The portion of the 36-mile Kramer to Victor Substation segment nearest to the existing Kramer Substation is dominated by undisturbed Mojave creosote bush scrub and white bursage, interspersed with patches of desert saltbush scrub and Joshua tree woodlands. This segment traverses primarily undisturbed vegetation communities, except where access roads enter west from Highway 395. The alignment enters a residential area at Bartlett Avenue, 19 miles south of Kramer Junction. South of Bartlett Avenue the alignment is dominated by mixed residential and commercial development

with interspersed disturbed vegetation. Further south, disturbed desert creosote scrub occurs, which is interspersed with creosote bush and white bursage.

Special-Status Species

Special-status species include those listed as threatened or endangered under the federal or state endangered species acts, species proposed for listing, California species of concern, and other species that have been identified by the U.S. Fish and Wildlife Service (USFWS), and/or California Department of Fish and Game (CDFG) as unique or rare, as well as species included on the California Native Plant Society's (CNPS) list of rare, threatened, or endangered plants in California. **Table 4** identifies the special-status species that could potentially occur within the telecommunication/congestion management system area based on a review of existing databases (i.e., California Natural Diversity Database (CNDDDB) (CDFG 2010), CNPS online rare plant inventory (CNPS 2010), and web-based National Wetlands Inventory (USFWS 2010)). Special-status species for the Lockhart substation element are also included in the Biological Resources section of the SA and SSA. With exception of the Lockhart substation, protocol-level special-status biological surveys have not been conducted for the DU project area; therefore, special-status wildlife and plant presence is unknown. The results for potential occurrence have been provided by the applicant (AS 2010k). It is likely that additional species will be considered as further telecommunication/congestion management system design is prepared and a CEQA-level analysis is conducted.

Table 4 - Special-Status Species Potentially Occurring in the Project Area

Scientific Name	Common Name	Status*	Potential for Occurrence+
Plants			
<i>Abronia villosa</i> var. <i>aurita</i>	Chaparral sand-verbena	CNPS List 1B.1	Low
<i>Canbya candida</i>	White pygmy-poppy	CNPS List 4.2	Low
<i>Cymopterus deserticola</i>	Desert cymopterus	CNPS List 1B.2	Moderate to High
<i>Delphinium recurvatum</i>	Recurved larkspur	CNPS List 1B.2	Low
<i>Eriophyllum mohavense</i>	Barstow woolly sunflower	CNPS List 1B.2	Moderate to High
<i>Loefingia squarrosa</i> var. <i>artemisiarum</i>	Sagebrush loeflingia	CNPS List 2.2	Low
<i>Mimulus mohavensis</i>	Mojave monkeyflower	CNPS List 1B.2	Low
<i>Sclerocactus polyancistrus</i>	Mojave fish-hook cactus	CNPS List 4.2	Moderate to High
<i>Salicornia (Sarcocornia) utahensis</i>	Utah glasswort	CNPS List 2.2	Low
<i>Chorizanthe spinosa</i>	Mojave spineflower	CNPS List 4.2	Moderate to High
Reptiles			
<i>Gopherus agassizii</i>	Desert tortoise	FT/ST	Moderate to High
Birds			
<i>Circus cyaneus</i>	Northern harrier	CSC	Moderate to High
<i>Buteo swainsoni</i>	Swainson's hawk	ST	Moderate to High
<i>Falco mexicanus</i>	Prairie falcon	WL	Moderate to High
<i>Athene cunicularia</i>	Western burrowing owl	CSC	Moderate to High
<i>Eremophila alpestris actia</i>	California horned lark	CSC	Moderate to High
<i>Toxostoma lecontei</i>	Le Conte's thrasher	CSC	Moderate to High
<i>Lanius ludovicianus</i>	Loggerhead shrike	CSC	Moderate to High
Mammals			
<i>Vulpes macrotis</i>	Desert kit fox	CCR	Moderate to High
<i>Spermophilus mohavensis</i>	Mohave ground squirrel	ST	Moderate to High
<i>Taxidea taxus</i>	American badger	CSC	Moderate to High

***Status Legend** (Federal/State/California Native Plant Society (CNPS) lists, CNPS list is for plants only): **FT** = Federally listed Threatened; **ST** = State listed Threatened; **CSC** = California Species of Concern; **CCR** = Protected under CDFG Code Title 14, CCR §460; **WL** = State Watch List; **List 1B** = Rare or Endangered in California and elsewhere; **List 2** = Rare, threatened, or endangered in California but more common elsewhere; **List 4** = Limited distribution – a watch list; **.1** = Seriously threatened in California (high degree/immediacy of threat); **.2** = Fairly threatened in California (moderate degree/immediacy of threat) (Sources: CDFG 2010; CNPS 2010; AS 2010k)

+Definitions Regarding Potential Occurrence:

- High:** Species or sign not observed on the site, but reasonably certain to occur onsite
- Moderate:** Species or sign not observed on the site, but conditions suitable for occurrence
- Low:** Species or sign not observed on the site, conditions marginal for occurrence

Potential Impacts of Proposed Downstream Upgrades

Potential Impacts to Special-Status Plant Species

There is moderate to high potential for desert cymopterus, Barstow woolly sunflower, Mojave fish-hook cactus, Mojave spineflower, and potentially other sensitive plants to occur in the proposed DU project area. Rare plant surveys during the appropriate blooming period would be required to identify the distribution of potentially affected special-status plants.

Temporary impacts to the abovementioned vegetation communities would occur within the DU project area due to construction activities associated with cable stringing. Permanent impacts would occur to vegetation communities from grading and trenching required for the addition of 115 new transmission poles and underground fiber optic installation. Direct impacts to plants could occur during trenching and grading, or if plants are crushed or otherwise damaged by construction equipment and vehicle or foot traffic. If special-status plants are found to occur within the project area and cannot be avoided, then consultation with the appropriate agency (i.e., CDFG and/or USFWS) would identify appropriate mitigation measures. Ground-disturbing activities have the potential to indirectly affect adjacent vegetation communities by facilitating the transport and dispersal of invasive weed propagules, thereby potentially introducing new weeds and exacerbating invasions already present in the project vicinity.

Potential Impacts to Special-Status Wildlife Species

It is unknown at this time whether special-status wildlife occurs within the project area; however, it is likely that desert tortoise, Mohave ground squirrel, burrowing owl, and several other wildlife species listed in **Table 3** breed and/or forage within portions of the project area. In addition, breeding birds protected under the Migratory Bird Treaty Act are likely present within the proposed project area. Protocol-level or other focused surveys must be completed to identify the distribution of potentially affected special-status wildlife.

Potential impacts to special-status wildlife include direct mortality from encounters with construction equipment, burrow/nest destruction during equipment staging, entombing adults, eggs, or young, and disruption or harassment. In addition, short and long-term habitat loss, modification, and fragmentation, as well as the potential spread of noxious weeds could decrease local and regional wildlife habitat values.

Temporary impacts to special-status aquatic species inhabiting the Mojave River could occur from degradation of water quality from erosion or sedimentation during project construction activities.

Consultation with resource agencies (e.g., USFWS and CDFG) would be required to identify appropriate impact avoidance, minimization, and mitigation measures and ensure compliance with the federal and California endangered species acts.

Impacts to Sensitive Habitat

Direct impacts to potentially jurisdictional waters (e.g., drainages, Mojave River) could occur from trenching and the concomitant erosion and sedimentation from soil

disturbance. The Mojave River and drainages that occur within the project area are regulated by the CDFG under Fish and Game Code section 1600, the Lahontan Regional Water Quality Control Board, and potentially the U.S. Army Corps of Engineers (USACE) and the state and federal clean water acts, respectively. A formal wetland delineation would provide information to further assess potential impacts to jurisdictional wetlands and waters. If warranted, acquisition of a Lake and Streambed Alteration Agreement (section 1602 permit), Water Quality Certification (section 401 permit), and USACE section 404 permit and implementation of the measures therein would ensure that potential impacts to sensitive habitats are mitigated and compliance with applicable LORS is achieved.

Impact Minimization Measures

Agency consultation would identify appropriate measures to avoid minimize and mitigate potential impacts to species listed under the federal and/or California endangered species acts (e.g., desert tortoise, Mohave ground squirrel) and sensitive habitats (e.g., jurisdictional waters), as described above. If special-status species or sensitive habitats are identified within the project area, limited construction periods, no-disturbance buffers, passive relocation, translocation, artificial burrow construction, revegetation plans, and habitat compensation may be required to avoid, minimize, or mitigate impacts to special-status species and sensitive habitats.

To minimize impacts to nesting birds, pre-construction surveys would be conducted and no-disturbance buffers established if project activities occur during the nesting season (typically February 1 through August 30). At all times of the year, noise generating activities should be limited during early morning and evening to avoid impacts to birds protected under the Migratory Bird Treaty Act.

In addition, standard measures and best management practices recommended to minimize impacts to biological resources include but are not limited to:

- Designate a lead biologist to be on-site during construction activities to supervise, conduct and coordinate mitigation, monitoring and other biological resource compliance efforts.
- Develop and implement a Worker Environmental Awareness Program to inform and educate workers prior to site mobilization about sensitive biological resources associated with the project.
- Limit disturbance area by erecting temporary exclusion fencing to keep workers out of sensitive habitat and within designated work areas.
- Minimize traffic collisions with wildlife.
- Monitor during construction.
- Avoid use of toxic substances.
- Minimize lighting impacts.
- Avoid wildlife pitfalls by covering trenches, bores, and other excavations at the end of the work day.
- Avoid entrapment of wildlife.

- Report wildlife injury and mortality.
- Minimize standing water.
- Minimize spills of hazardous materials.
- Establish worker guidelines including trash containment, disposal, and removal.
- Avoid spread of noxious weeds and reestablish native vegetation quickly in temporarily disturbed areas.
- Implement erosion control measures.

Conclusion

Sensitive biological resources, including special-status species and jurisdictional waters, potentially occur within and adjacent to the anticipated downstream upgrades area. Additional surveys, including protocol surveys and a wetland delineation, may be required to determine the occurrence and distribution of these potentially affected biological resources. Potential direct and indirect to biological resources could be avoided, minimized, or mitigated, as necessary with implementation of standard and project-specific measures. Consultation with USFWS, CDFG, and USACE would likely be necessary to identify appropriate measures. In addition, permits may be required from these agencies to demonstrate compliance with the federal and state endangered species acts as well as the federal Clean Water Act. If compliance with all applicable LORS is achieved and impact avoidance, minimization, and mitigation measures are implemented as recommended by the resource agencies, the construction and operation of the proposed telecommunication/congestion management system would not result in significant, unmitigated impacts to biological resources.

3.3 CULTURAL RESOURCES

Environmental Setting

A records search was conducted by AECOM between April 5 and April 12, 2010 at the San Bernardino Archaeological Information Center (SBAIC). The records search included a 1.0-mile buffer around the proposed Lockhart Substation and Interconnection, Lockhart Substation to Tortilla Substation fiber optic line, Lockhart Substation to Kramer Substation fiber optic line, and the Kramer Substation to Victor Substation fiber optic line. The total percentage of the rights-of-way for the various facilities subject to previous cultural resources inventory is presently uncalculated. In addition to resources filed at California Historic Resources Information System (CHRIS), a number of sites recently identified by AECOM were found during field survey for the AMS project but have not yet been filed at CHRIS (AS 2010k, p. 30). Synthesis of these sources indicates that 730 cultural resources and isolates have been identified in the research area. For the purpose of impact analysis, resources within the boundary of the Lockhart Substation and a 300-foot wide corridor centered along the proposed fiber optic alignments were considered. The majority of the documented resources consist of historic sites related to homesteading and agricultural activities, such as structures or remnants of structures, homesteading sites, roads, trails, refuse dumps, wells, and water conveyance systems. Other historic sites included existing transmission and telecom lines, Highway 395, and the Atchison, Topeka and Santa Fe Railroad.

Prehistoric resources, consisting of lithic scatters, quarries, and isolates, as well as sites containing both prehistoric and historic components, are also present.

There are 140 resources and isolates that fall within the Lockhart Substation and a 150-foot wide corridor centered along the proposed fiber optic alignments (300 feet wide total).

- **Lockhart Substation and Interconnection Area.** The two sites falling within the Lockhart Substation and interconnection area include one historic site and one prehistoric isolate (AS 2010k, p. 30).
- **Lockhart Substation to Tortilla Substation Fiber Optic Line.** Seventeen resources and three isolates fall within 150 feet of the Lockhart to Tortilla Substation fiber optic line including five prehistoric sites, 14 historic sites and one multi-component site. Two of these historic sites, the Atchison, Topeka and Santa Fe Mojave Railroad (P-36-6693H) and the National Old Trails Highway and Monument (P-36-2910) have previously been determined eligible for the National Register of Historic Places (AS 2010k, pp. 31-32).
- **Lockhart Substation to Kramer Substation Fiber Optic Line.** Eleven resources and eleven isolates fall within 150 feet of the Lockhart to Kramer fiber optic line, including four prehistoric isolates, seven historic isolates and eleven historic resources. Two of the historic resources, the Atchison, Topeka and Santa Fe Mojave Railroad (P-36-6693H) and the Kramer-Victor 115-kV Transmission Line (P-36-10316H) have previously been determined eligible for listing on the National Register of Historic Places. Additionally, one historic property, U.S. Highway 395 (P-36-07545H) is listed in the Office of Historic Preservation's Directory of Properties (AS 2010k, pp. 32-33).
- **Kramer Substation to Victor Substation Fiber Optic Line.** The records search for the Kramer to Victor Substation fiber optic line identified the highest number of resources – 35 resources and 61 isolates within 150 feet of the line. Isolates include 36 historic and 25 prehistoric. Five multi-component sites were identified, as well as 14 prehistoric resource and 16 historic resources. One historic resource, the Kramer-Victor 115-kV Transmission Line (P-36-10316H), has previously been determined eligible for listing on the National Register of Historic Places. Additionally, one historic property, U.S. Highway 395 (P-36-07545H) is listed in the Office of Historic Preservation's Directory of Properties (AS 2010k, pp. 33-36).

If cultural resources, including structures, are more than 45 years old, and might be affected by the project, the cultural resources need to be evaluated for eligibility for listing on the California Register of Historical Resources (CRHR) and the National Register of Historic Places (NRHP). The Office of Historic Preservation Directory of Properties in the Historic Property Data File for San Bernardino County lists four historic properties in or near the project area. The National Old Trails Highway and Monument (P-36-2910), the Atchison, Topeka, and Santa Fe Mojave Railroad (P-36-6693H), and the Kramer-Victor 115-kV transmission line (P-36-10316H) have all been determined eligible for the National Register of Historic Places. U.S. Highway 395 (P-36-07545H) is listed in the Office of Historic Preservation's Directory of Properties Historic Property Data File.

SCE would request a list of Native American contacts from the Native American Heritage Commission (NAHC) and a contact program initiated as part of future CEQA/NEPA analysis. Those tribes that were contacted as a result of the AMS project would also be contacted during this outreach (AS 2010K, p. 39).

Potential Impacts of Proposed Downstream Upgrades

Ground disturbance, the presence of vehicles driving over the top of sites and the installation of new towers could damage archaeological resources. During the planning phase, pedestrian surveys would need to be conducted within all work areas and a geoarchaeological study may be necessary in areas of underground trenching to assess the potential for discovery of resources.

After the work area is defined and after archaeological and historic surveys are complete, prehistoric and historic properties may be identified in areas that have not been previously protocol-level surveyed. If any resources are determined eligible for the CRHR and/or the NRHP, the proposed project may result in an impact to prehistoric or historic resources. Whether the impact is significant would need to be determined after the resources are evaluated. The reasons for eligibility would determine the impact. Known and newly identified resources would be treated using standard treatment methods, including data recovery and public outreach.

Impact Minimization Measures

Staff recommends that after the construction area has been identified, and after work for CEQA and Section 106 has been completed, that prehistoric and historic resources be evaluated for eligibility for listing in the CRHR and/or NRHP, if it appears that any would be affected by the proposed project. Sites that have been evaluated as not eligible warrant no further consideration and avoidance is not required. Sites that have not been evaluated and sites that are considered potentially eligible would be treated as eligible resources pending formal evaluation.

Data recovery may be conducted as a mitigation measure for archaeological sites that are recommended as eligible to the CRHR or NRHP and would be impacted by the proposed project. Monitoring of project-related excavation within an archaeological site is not appropriate mitigation and may destroy the site. Should any cultural materials be encountered during construction or other ground-disturbing activities, all activities in the vicinity of the find (within 50 feet) should cease until the significance of the discovery is evaluated by a qualified archaeologist. If the discovery is determined significant, mitigation would be necessary, including compliance with provisions of the National Historic Preservation Act and consultation with the California State Historic Preservation Officer regarding appropriate mitigation.

Conclusion

The majority of sites in the 300-foot wide records search corridor are historic sites related to transportation and infrastructure activity, including roads, railroads and transmission lines, and resources related to farming activities such as structures, wells and refuse scatters, and residential activities such as refuse scatters. Prehistoric resources consist of lithic scatters and isolates. While it is anticipated that environmental impacts, including those on cultural resources, would be mitigated to a

less-than-significant level, it is possible that the project corridor has sensitive cultural resources that could be affected. Additionally, even if SCE were to follow the standard treatments for cultural resources in the impact area, there would likely be some cumulative effects because standard treatment measures, while reducing the impact to less-than-significant, do not completely eliminate the impact.

3.4 GEOLOGY AND PALEONTOLOGY

Environmental Setting

The proposed project is located in the Mojave Desert physiographic province in Southern California. The Mojave Desert is bounded on the north and northwest by the Tehachapi Mountains, on the west by the Garlock fault, on the east by the Colorado River, and on the south and southwest by the San Andreas Fault. The Mojave Desert is a broad interior region of isolated mountain ranges which separate vast expanses of desert plains and interior drainage basins.

The topography in the Mojave Desert of California is predominately southeast to northwest, and is associated with similarly-oriented faulting. A secondary east to west orientation correlates with structural trends in the Transverse Ranges physiographic province.

The region encompassing the proposed project is characterized by broad alluvial basins of Cenozoic sedimentary and volcanic materials overlying older plutonic and metamorphic rocks. The plutonic and metamorphic rocks are exposed as eroded hills throughout the region. The alluvial basins are up to several thousand feet thick.

Potential Impacts of Proposed Downstream Upgrades

Geology

Soils and rock testing should be conducted and analyzed by a professional, licensed geotechnical engineer or geologist to determine existing foundation conditions. The results of the geotechnical investigation would then be applied to the project's engineering design and this would ensure that potential impacts associated with problematic soils and slope instability are reduced to less than significant levels.

Construction would occur in relatively flat terrain and the geologic investigation described above would identify the affected soils and their site-specific erosion potential. Erosion control BMPs would be used where excavation and grading occurs as would be required by the project National Pollution Discharge Elimination System (NPDES) permits and the SWPPP (see the **Soils and Water Resources** section of this appendix). With proper construction practices there should be no notable erosion or transport of sediment from the site. Considering these factors, there should be little or no impact due to erosion or loss of topsoil. Potential impacts would be less than significant.

Regional and local geologic conditions would not be altered significantly by the long-term operation of the proposed upgrades. No major or unique geologic or physical features would be directly affected by the anticipated downstream upgrades.

The project area is subject to ground shaking from nearby and distant earthquakes. Project structures would be designed to meet current seismic design standards. More detailed investigations would identify whether ground rupture potential exists within the downstream upgrades; although, lines are typically designed to span the fault zones. Due to the depth to groundwater, liquefaction is not expected to occur. A properly designed facility would reduce the minor threat of damage to the proposed facilities as a result of lateral spreading, subsidence, liquefaction, or collapse to less than significant levels

Paleontology

Construction of the telecommunications facilities could disturb significant paleontological resources located within the project area as a result of construction-related ground disturbances. Indirect impacts to paleontological resources may include erosion of features due to channeling of runoff or damage to outcrop areas due to earth-shaking activities associated with drilling activities. Impacts to paleontological resources, if present, would be potentially significant.

Minerals

Since there are no known mining operations identified in the project area, construction of the downstream upgrades is unlikely to interfere with daily ongoing or planned mining operations.

Impact Minimization Measures

Site-specific geotechnical and seismic conditions would be appropriately addressed in the detailed engineering design and construction of the anticipated downstream upgrades. The following mitigation measures are recommended to reduce potential impacts:

- Soils testing and analysis should be conducted by a professional, licensed Geotechnical Engineer or Geologist, to determine existing soil conditions. Borings in a sufficient quantity to adequately gather variations in the site soils should be conducted to remove sample cores for testing. The type of soils, soil pressure, relative compaction, resistivity, and percolation factor are among the items that should be tested for. If contaminants are encountered, special studies and remediation measures in compliance with environmental regulations should be implemented by qualified professionals.
- Transmission structures, telecommunication facilities and substation facilities should be designed in accordance with current California Building Code (CBC) seismic standards and the design requirements and methodology of the Electrical Power Research Institute (EPRI).
- Transmission structures, telecommunication facilities and substation facilities should be designed in accordance with recommendations provided in preliminary geotechnical reports and as amended by future geotechnical investigations with respect to collapsible.

In addition, implementation of the recommended mitigation measures discussed under **Soils and Water Resources** would reduce the amount of erosion that would result from

construction (e.g., preparation and implementation of a SWPPP). With implementation of measures and best management practices that would ensure proper re-vegetation, erosion control, drainage, seismic design, among other requirements, downstream upgrades would result in a less than significant impact to geology.

Recommended mitigation for potential paleontological resources would provide for a paleontological resources inventory after final project design, pre-construction planning for monitoring and treatment of paleontological resources, and for monitoring during construction. The mitigation should require a qualified paleontological monitor and qualified paleontologist to monitor for significant subsurface fossils and then collect, analyze and curate any significant fossils found. In addition, the following mitigation measures are recommended for paleontological resources:

- Prior to initiation of project construction activities, the proposed project area and access roads should be surveyed by a Qualified Paleontologist.
- Based on the results of the paleontological resource survey, a paleontological resource management plan should be prepared and submitted to the CPUC and BLM or DOE for review and approval.
- All project construction staff should be trained in the importance of paleontological resources and the routine identification of fossil resources.

Implementation of these suggested mitigation measures would reduce project impacts to paleontological resources to a less than significant level.

Conclusion

SCE would comply with applicable LORS pertinent to the anticipated downstream upgrades. No significant geological, paleontological or mineral resources have been identified in the proposed project area; however, technical investigations/surveys have not yet been performed. The upgraded lines and substation equipment would be designed and constructed in accordance with the seismic requirements of SCE's Construction Standards and CPUC General Order 95 and EPRI. With implementation of recommended mitigation and compliance with applicable LORS, the proposed project would have minimal potential to impact geological, paleontological or mineral resources.

3.5 LAND USE

Environmental Setting

The Land Use analysis for the telecommunication/congestion management system (proposed DU project) focuses on the proposed project's compatibility with the existing and planned land uses, and the proposed project's consistency with local land use plans, ordinances, and policies. The anticipated downstream upgrades are located partially within the AMS project boundaries and utilizes existing transmission towers in established utility corridors. The proposed substation and interconnection facilities are within the jurisdiction of the County of San Bernardino (county). The majority of the fiber optic lines are also within the county's jurisdiction, with portions of the lines also within the jurisdictions of the cities of Barstow and Adelanto. As such, the proposed telecommunication/congestion management system would be subject to consistency with the general plan of each jurisdiction. In addition, lands within the sites proposed for

the system are subject to the BLM's West Mojave Plan (WMP), which states all new linear facilities must be located within a utility corridor (BLM 2005). The plan also identifies conservation areas; however, the project components are not proposed within a conservation area.

Land within the proposed project area consists primarily of undeveloped land where the dominant land uses are open space, agricultural, and rural residential. In addition, the portions of the fiber optic lines within the cities of Barstow and Adelanto and the proposed interconnection to the Kramer Substation would be constructed in areas with urban land uses including residential, commercial, and industrial development.

Potential Impacts of Proposed Downstream Upgrades

The proposed Lockhart Substation and associated facilities would be located within the boundary of the AMS. Land use related impacts for the AMS project site are included in Section 5.5 of the SSA. Outside of the AMS project site, the telecommunication/congestion management system would also include the proposed transmission line loops to the Kramer—Coolwater 220-kV transmission line and three fiber optic lines. Although final design information is not available, it is assumed existing transmission right-of-way would be utilized for these components. Therefore, the system would not involve changing existing or planned land uses in the county or the cities of Barstow or Adelanto. Furthermore, since the utility corridors are established land uses, the system is not expected to conflict with applicable LORS.

Construction of the Lockhart Substation would be located within the boundaries of the AMS project and grading for the substation site would be included within Abengoa's overall grading design. Construction methodology for the new 220-kV transmission structures, removal of the existing 220-kV transmission structures, and stringing the 220-kV conductor would take place within the boundaries of the existing AMS or within the existing SCE 220-kV transmission line right-of-way. Construction of the fiber optic lines would utilize SCE's existing Victor, Roadway, Kramer, Tortilla, and Coolwater substations, as well as SCE's Barstow Service Center, and the proposed Lockhart Substation as marshalling yards, to support the installation of the telecommunications facilities required for the proposed project. Any construction impacts to land use would be temporary and short term. Because construction would be temporary and would not displace any existing use, the impact would not be significant.

Impact Minimization Measures

The telecommunication/congestion management system would be constructed within the proposed AMS project boundaries and within existing utility corridors. To minimize land use impacts, the transmission line route should follow existing SCE rights-of-way where feasible, and any new rights-of-way should be developed along parcel edges and in accordance with all applicable land use LORS. Authorization and use would be subject to administrative review at the time of issuance of a final CPUC decision regarding the authorization or use.

Staff recommends that SCE post notices on the right-of-way and provide notices to properties within 300 feet of sites where the public would be affected by construction activities. Notices should be posted approximately one month prior to commencing

work. At right-of-way ingress and egress points, postings should be placed along the right-of-way and at work sites approximately two weeks prior to the closing of public access. Recommended mitigation should require SCE to identify and provide a public liaison person before and during construction to respond to public concerns about construction disturbances.

Conclusion

The telecommunication/congestion management system would not cause a change in land use. Since the proposed system is proposed to be located entirely within existing and established rights-of-way, it would not disrupt or divide the physical arrangement of an established community. Also for these reasons, the telecommunication/congestion management system would not restrict existing or future land uses along the route.

3.6 NOISE AND VIBRATION

Environmental Setting

The proposed project is located within the western portion of San Bernardino County, in remote areas, and in the surrounding areas of the cities of Barstow and Adelanto. Noise regulations in the downstream upgrades area are provided by the County. A LORS compliance analysis is presented in Section 5.8.3 of the AMS AFC and would also apply to this project.

Lockhart Substation and Interconnection

The Lockhart Substation site and some of the associated interconnection facilities are proposed to be located within the limits of the AMS. As described in the **Noise** section of the AMS SSA, the proposed site is located on private land in a remote area approximately 5.5 miles northeast of the intersection of SR 58 and Harper Lake Road in the county of San Bernardino. There are no noise-sensitive receptors located in proximity to these facilities.

Lockhart to Tortilla Substation Fiber Optic Line

The Lockhart to Tortilla fiber optic line is located partially within the AMS boundary and mostly along existing transmission line corridors all the way to Tortilla Substation in the city of Barstow. There are noise sensitive receptors located in proximity to the southern portion of this alignment, including residential areas adjacent to this route, primarily in the developed areas surrounding Barstow.

Lockhart to Kramer Substation Fiber Optic Line

The Lockhart to Kramer fiber optic line is located partially within the AMS project site, but mostly along existing utility corridors all the way to Kramer Substation. Most of this route is in remote areas of San Bernardino County with the exception of the far west end of the route that traverses a mixed-use retail/commercial zone near the intersection of Highway 395 and SR 58.

Kramer to Victor Substation Fiber Optic Line

The Kramer to Victor fiber optic line is located mostly along Highway 395 in an undeveloped portion of San Bernardino County. However, the southern portion of the route would traverse through residential neighborhoods, which are considered noise-sensitive land uses.

Potential Impacts of Proposed Downstream Upgrades

The proposed project would generate noise above ambient levels from construction of the substation and interconnection facilities, and installation of the telecommunication cables. Construction noise would include the operation of construction equipment and vehicles at the proposed construction sites, and the transport of construction materials and workers as vehicle trips to and from the project sites. Construction would generate temporary noise levels from construction equipment and vehicles during support demolition, site grading activities, conveyance line and pole installation, substation construction, and surface paving. Construction along the communication line routes would occur on weekdays from 7 a.m. to 7 p.m.; thus, construction noise from line activity would be temporary and short term (1 to 2 workdays) at any one location along the route. Construction of site facilities (i.e., substation) would be over a longer term (approximately 1 year) at the substation site.

Noise impacts from construction are a function of the noise generated by equipment, the location and sensitivity of nearby land uses, and the timing and duration of the noise-generating activities. Potential impacts to noise-sensitive receptors from construction noise would be limited to receptors in proximity to site facilities and conveyance line routes. Construction would occur on weekdays between 7 a.m. and 7 p.m. and would not disturb typical weeknight sleep when in proximity to housing receptors. Daytime receptors such as schools and hospitals could be temporarily subjected to and affected by construction noise, including instantaneous maximum noise levels and/or noise levels averaged over time and duration depending on the type of construction (conveyance line or site facility) and proximity to receptors.

The construction equipment required for this project is anticipated to be typical (e.g., no pile drivers or rock blasting), but may include pavement breakers along roadways for underground lines or pole footings. Typical construction equipment for the project options is estimated to generate maximum noise levels of short duration not to exceed 90 A-weighted decibels (dBA) at 50 feet, or average levels of approximately 80 dBA equivalent sound level (Leq) at 50 feet. Without intervening topography or structures, these levels would attenuate over distance at a conservative rate of approximately 6 dBA per doubling of distance (i.e., 80 dBA at 50 feet would attenuate to approximately 74 dBA at 100 feet, and approximately 68 dBA at 200 feet, etc.).

Project construction noise is not anticipated to be substantial and would not exceed San Bernardino County and CEQA significance thresholds. Project operational noise is anticipated to be negligible, as the constructed substation noise would be limited to emergency generators and occasional operation and maintenance activities. Similarly, noise from the installed overhead fiber optic cables would be limited to occasional operation and maintenance activities.

The San Bernardino County Noise Ordinance does not limit construction noise levels. Areas approximately 100 feet from project construction would experience average construction noise levels attenuated to less than 75 dBA Leq (averaged over 1 hour), which many municipal jurisdictions have adopted as an acceptable construction noise level. However, receptors within this distance would be subject to maximum instantaneous construction noise levels of up to 85 dBA, which could be disturbing to receptor activities such as concentration within offices or classrooms, or convalescing at hospitals. Increasing the distance from the construction activities would further attenuate construction noise, thereby lessening the disturbance.

After construction, the proposed substation facilities would generate noise from limited operations and maintenance activities, which may increase short-term ambient noise levels in proximity to the constructed facilities. The effect of operational noise levels on receptors is expected to be less than significant since the substation facilities are remote from receptors.

Construction-noise exposure to sensitive receptors along the fiber optic corridors would be of relatively short duration (approximately 1 to 2 days) at each receptor. Therefore, the combined noise impact of overlapping utility routes at a receptor would be several noise events of short duration staggered over the overall construction period for all of the anticipated downstream upgrades. The communication lines would not generate operational noise except for maintenance activities, including emergency repair.

Lockhart Substation and Interconnection

The substation and interconnection would generate noise primarily from facility site construction (i.e., substation and interconnection elements) and linear facilities installation (i.e., fiber optic cable); minor noise would be generated from the post-construction operation and maintenance of the constructed substation. Construction activities would include site grading, facility installation, paving, and landscaping. Project noise from the substation and interconnection are not anticipated to be substantial, and anticipated to be less than and not to exceed any County or CEQA significance thresholds. Noise-sensitive receptors are not located in proximity to the site and would not be affected by construction noise. Noise impacts for the AMS project site are included in Section 5.6 of the AMS SSA, and were generally found to be less than significant with implementation of mitigation.

Construction of new 220-kV transmission structures to replace the existing 220-kV transmission structures may require the installation and operation a temporary concrete batch plant within the boundaries of the AMS for purposes of footings for the new transmission structures. The possible concrete batch plant located at the substation site would generate temporary, short-term noise during installation and operation. Due to its remote location, the plant's construction and operation would not result in noise impacts to sensitive receptors. In addition, the batch plant's operation would be limited to weekday, daytime operation per the County Noise Ordinance. Concrete batch plant operations generate noise levels in the range of mid-70 dBA at 100 yards, depending on design specifications of the plant. Truck traffic transporting materials to the plant (e.g.,

aggregate) generates additional noise levels, which can be of concern depending on the truck route. However, the batch plant and truck route would not be located in proximity to noise-sensitive receptors.

Lockhart to Tortilla Substation Fiber Optic Line

The Lockhart to Tortilla fiber optic line includes approximately 31 miles of new fiber optic cable to be installed aboveground on both existing and new poles, except for approximately 1,900 feet of cable that would be installed in both a new underground conduit along Harper Lake Road and an existing underground conduit near the Tortilla Substation.

The overhead cable would require the construction of approximately 55 new poles between the Lockhart Substation and Harper Lake Road. Construction noise from stringing cable on existing poles would be less than noise from trenching and new pole construction. As noted for the substation and interconnection activities above, typical construction equipment for the proposed project is estimated to generate maximum noise levels of short duration not to exceed 90 dBA at 50 feet, or average levels of approximately 80 dBA Leq at 50 feet. Trenching uses typical construction equipment. At 100 feet, these levels would attenuate below typical levels of significance (75 dBA Leq).

Since San Bernardino County does not establish construction noise level limits, trenching activities for the proposed project would not result in a significant noise impact, but would generate temporary short-term noise levels that could be a nuisance to the receptors nearest the trenching activities. Since the line would be located in existing utility rights-of-way along existing roadways, off-road construction vehicle travel is anticipated to be minor.

Lockhart to Kramer Substation Fiber Optic Line

The Lockhart to Kramer line includes approximately 18 miles of new fiber optic cable to be installed above ground on existing and new poles, except for approximately 3,100 feet of cable that would be installed in an underground conduit. The overhead cable at this location would require the construction of approximately 30 new poles. The majority of this line would involve stringing cable on existing overhead utility poles, limiting the construction noise impacts to stringing equipment.

The majority of this alignment is within existing utility rights-of-way in remote areas away from noise sensitive receptors. Ground-disturbing activities including new trenching for underground cable within the AMS property and excavation for the footings of new poles would generate typical construction noise levels. The stringing and installation of fiber optic cable on existing poles would generate lower noise levels associated with equipment and installation vehicles. Refer to the typical noise levels, above, under both the Lockhart Substation and Lockhart to Tortilla fiber optic line.

Kramer to Victor Substation Fiber Optic Line

The Kramer to Victor fiber optic line includes approximately 36 miles of new fiber optic cable to be installed above ground on existing and new poles, except for approximately 2,300 feet of cable that would be installed in an underground conduit within Bellflower

Street and underground conduits within the Victor and Kramer substations. The overhead cable would require the construction of approximately 30 new poles along existing utility rights-of-way and along existing roadways. Construction activities for trenching for the underground cable in Bellflower Street would result in typical construction noise; however, the addition of equipment for pavement cutting could elevate noise levels by 5 to 10 dBA Leq. San Bernardino County does not have a dBA threshold and no significant impacts are anticipated. The stringing and installation of fiber optic cable on existing poles would generate fairly low noise levels, as noted above.

Impact Minimization Measures

It is likely that no additional noise control features or mitigation measures are needed beyond the proposed project's compliance with all applicable noise and vibration LORS for both operation and construction. The proposed project is not anticipated to produce significant adverse noise impacts on people within the affected area, directly, indirectly, or cumulatively.

3.7 SOCIOECONOMICS

Environmental Setting

This preliminary analysis of potential socioeconomic impacts relies on a qualitative assessment of the environmental setting. When a CEQA and NEPA review is conducted, a complete demographic screening should be conducted based on information contained in *Environmental Justice: Guidance Under the National Environmental Policy Act* (Council on Environmental Quality, 1997) and *Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses* (Council on Environmental Quality, 1998). The demographic screening analysis will determine the potentially affected area in which to analyze impacts.

Populations within a six-mile radius of the AMS site were considered in the **Socioeconomic** section of the AMS SSA. This area encompasses the proposed Lockhart Substation and interconnection as well as the northern portions of the proposed Lockhart to Tortilla Substation and Lockhart to Kramer Substation fiber optic lines. The total minority population is 49.17 percent and the total low-income population is 10.21 percent within this area. These percentages are likely to be lower in consideration of the entire DU project area which encompasses the cities of Adelanto, Barstow, and Victorville.

Potential Impacts of Proposed Downstream Upgrades

Typically, long-term employment of people from regions outside the study area could potentially result in significant adverse socioeconomic impacts as a result of relocations and population influx; this would not be required for the DU project. No significant adverse socioeconomic impacts would occur as result of the construction or operation of the anticipated downstream upgrades. The downstream upgrades would not cause a significant adverse impact on population, employment, housing, public finance, local economies, or public services. In addition, because there would be no adverse project-related socioeconomic impacts, minority and low-income populations would not be

disproportionately impacted. The anticipated downstream upgrades would slightly benefit the study area in terms of an increase in local expenditures and payrolls during construction. These activities would have a short-term positive effect on the local and regional economy. No impact minimization measures are recommended.

3.8 SOIL AND WATER RESOURCES

Environmental Setting

The downstream upgrades would be located within the Mojave River area in the western Mojave Desert. Characteristic landforms in the Mojave Desert include broad alluvial fans, old dissected terraces, playas, the Mojave River and its flood plain, and scattered mountains. The Mojave River originates where the West Fork of the Mojave River joins the Deep Creek River. The river flows northward and then eastward past the City of Barstow. A flood plain 0.5 to 1.0-mile wide flanks the Mojave River along most of its course. The environmental setting for the Lockhart substation and interconnection is described in the **Soil and Water Resources** section of the SSA. The proposed fiber optic line routes would cross numerous ephemeral streams and the Mojave River channel.

Potential Impacts of Proposed Downstream Upgrades

All construction activity would require water for dust suppression, soil compaction, drinking and sanitation. Portable sanitation facilities would also be required. The source of water during construction has not been identified. Portable sanitation facilities would have to be serviced regularly, with sanitation waste disposed of at a local treatment facility. Excavated soil would either be reused onsite or disposed of at an appropriately licensed waste facility. Construction waste generated would be disposed of at an appropriately licensed waste facility.

Lockhart Substation and Interconnection

Soil and stabilizing vegetation would be impacted during construction of the transmission interconnection. This construction would involve the preparation of existing roads for SCE construction vehicles and equipment. Preparation of these roads would require clearing of vegetation, blade-grading to remove potholes, ruts, and other surface irregularities, and recompaction to provide a smooth and dense surface. These roads would be graded to a width of approximately 14 feet with 2 foot shoulders on each side. New roads would be graded to similar specification as existing roads and would be constructed to ensure proper drainage to reduce road erosion and rutting.

Construction of the new towers would require an area of approximately 200 by 200 feet to be cleared of vegetation. The towers would require concrete footings set to approximately one to four feet above ground level. Removal of the existing tower would require a temporary laydown area that is approximately 150 by 150 feet, also cleared of vegetation. The footings of the existing tower would be removed, leaving holes of approximately 2 feet below ground surface that would be backfilled and regraded to ground level.

Temporary 220-kV structures may be used during the removal and replacement of the existing 220-kV structure. After the transfer is complete, these structures would have to

be removed. Construction and removal of these temporary structures would disturb the soil and vegetation. Soil and vegetation would also be disturbed by conductor and overhead ground wire stringing, which requires tensioning and pulling equipment. Three tensioning areas, 150 by 500 feet, would be required and three pull areas, 150 by 300 feet, would be required. In addition, six temporary conductor field snub/transfer areas, 150 by 200 feet, would be required to sag conductor wire to the correct tension.

Fiber Optic Lines

The fiber optic line routes would cross several soils types with differing susceptibility to wind and water erosion and compaction. The disturbed soil is more susceptible to erosion and compacted soil can accelerate storm water erosion. In addition, the proposed fiber optic line routes would cross numerous ephemeral streams and the Mojave River channel. Vehicles and equipment crossing these ephemeral streams and the river channel would disturb and compact the soil and potentially cause the loss of stabilizing vegetation. Existing and new poles installed in ephemeral streams and the river channel would be subject to channel scour during storm events.

Impact Minimization Measures

The **Soil and Water Resources** section of the SSA discusses mitigation measures that are designed to avoid and reduce the amount of soil loss due to wind and water erosion. These mitigation measures include implementation of a construction SWPPP. The Clean Water Act (CWA) (33 U.S.C. Section 1251 *et seq.*), formerly the Federal Water Pollution Control Act of 1972, regulates discharges through the NPDES permit process (CWA Section 402). In California, the NPDES program is administered by the State Water Resources Control Board (SWRCB). Pursuant to NPDES permit requirements, SCE would be required to prepare and adhere to a SWPPP that would minimize construction erosion. The SWPPP would include temporary and permanent BMPs to protect water quality and soil resources, demonstrate no increase in offsite flooding potential, and identify all monitoring and maintenance activities. SCE should complete all engineering plans, reports, and documents necessary for the lead agency to conduct a review of the project and provide a written evaluation as to whether the proposed grading, drainage improvements, and flood management activities comply with all requirements of the construction SWPPP. Examples of BMPs that should be included in the SWPPP are:

- The use of existing poles should be optimized during fiber optic cable installation to reduce the amount of soil and vegetation that could be disturbed and compacted.
- Erosion control measures should be developed and implemented to ensure minimum soil loss and to maintain water quality. Examples include: silt fences, sediment basins, sediment traps, check dams, fiber rolls, gravel bag berms, sandbag barriers, straw bale barriers, storm drain inlet protection, street sweeping and vacuuming, wind erosion control, soil binders and weighting agents, stabilized construction entrance/exit, stabilized construction roadway, and entrance/outlet tire wash.
- Measures should be taken to insure that contaminants would not be discharged from the construction site.

- All areas disturbed by the construction activity, except for access roads, should be restored to preconstruction conditions. This restoration may include grading and restoration of sites to original contours to facilitate natural re-vegetation, proper drainage, prevent erosion, and reseeding where appropriate.
- SCE should conduct a final inspection to ensure that all BMPs have been implemented successfully.

The following suggested measures or similar should be implemented in areas that are temporarily disturbed:

- Soils and vegetation disturbance and removal should be limited to the minimum area necessary for access and construction.
- Vehicles should be inspected daily for fluid leaks before leaving the staging area.
- Spill controls and cleanup plans and procedures should be developed. Spill-control and cleanup materials should be kept onsite at all times during construction. Workers should be trained in their use.

The following suggested measures or similar should be implemented for earth disturbing activities associated with work on tower footings:

- Removed topsoil should be segregated and stockpiled for reuse if practicable.
- All activity should be minimized during winter and other wet periods to avoid accelerating erosion and increasing compaction of the soil.
- All soil excavated for structure foundations should be backfilled and tamped around the foundations, and used to provide positive drainage around the structure foundations.
- Use of ground-disturbing mechanical equipment to remove vegetation should be avoided on slopes over 30 percent or on highly erosive soils, unless it can be demonstrated that erosion of the disturbed slopes would not accelerate.

The following suggested measures or similar should be implemented during construction activities in and around any water bodies or ephemeral washes:

- Discharge of material, such as displaced soils and vegetation debris, within waters of the United States may be subject to USACE regulations under the CWA.
- Wetland delineation surveys should be conducted before each phase of project construction to identify jurisdictional wetlands and Waters of the U.S.
- Mitigation for the permanent loss of jurisdictional wetlands or Water of the U.S. should be provided per agreement with the USACE.
- Access ways should be located to avoid wetlands or, if necessary, crossed at the least sensitive feasible point.
- If wet areas cannot be avoided, SCE should use wide-track or balloon tire vehicles or timber mats.

- Grading should be minimized as much as possible. When required, grading should be conducted away from watercourses/washes to reduce the potential for material to enter the watercourse.
- Excavated material or other construction materials should not be stockpiled or deposited near or in stream banks or other watercourse perimeters.
- Sediment control devices, such as placement of native rock, should be used at all dry wash crossings as appropriate.
- All fill or rip-rap placed within a stream or river channel should be limited to the minimum area required for access or protection of existing SCE facilities.

Conclusion

It is expected that construction of the downstream upgrades would be done in compliance with all pertinent LORS. Crossing of jurisdictional waters, such as the Mojave River, may require a permit from the USACE and Lahontan Regional Water Quality Control Board for dredge and fill activities. Additionally, the downstream upgrades would need to implement measures similar to those discussed above as well as construction SWPPP/BMPs to avoid and reduce environmental impacts to soil and water resources to levels that are less than significant.

3.9 TRAFFIC & TRANSPORTATION

Environmental Setting

The anticipated downstream upgrades would involve construction of the Lockhart Substation, looping of and transmission lines and connecting the AMS, within and adjacent to the AMS site. The project would also involve stringing new telecommunication / fiber optic lines adjacent to, and across, portions of two highways (SR 58 and Highway 395) and numerous surface streets such as: Harper Lake Road, Summerset Road, Community Boulevard, Lenwood Road, Sun Valley Road, and Bonanza Road.

SR 58 and Highway 395 are mostly 4-lane¹, high speed, divided roadways in the project area. The traffic volumes are 12,100 on SR 58 (near Harper Lake Road) and 7,800 on Highway 395 (south of SR 58) (AS 2010a; Table 5.13-2). The surface streets described above are 2-lane roadways with relatively light traffic volumes.

Potential Impacts of Proposed Downstream Upgrades

Lockhart Substation and Interconnection

Traffic and transportation impacts for the AMS project site are included in Section 5.10 of the SSA, and were generally found to be less than significant with implementation of mitigation. Impacts for substation-related activities would create similar types of impacts but at a reduced level.

¹ Caltrans is pursuing a construction project to widen the only 2-lane section of SR 58 (east of Harper Lake Road) to 4 lanes.

Fiber Optic Lines

The anticipated downstream upgrades would involve a 12-person construction crew and approximately 7 small- to medium-size trucks (with some pulling trailers). The potential congestion impacts from a 12-person crew are negligible. Assuming all personnel commuted to and from the construction area in their own vehicles, this would equate to 24 trips per day. As all of the construction is expected to occur in SCE rights-of-way (not in the roadways), the construction workers are not anticipated to drive in the streets as part of the construction activity. They may need to occasionally cross a street during the course of the construction, but this would be infrequent and not contribute to any congestion.

To put the expected 24 trips per day into perspective, the expected trip generation from the AMS project is 2,278 trips per day during construction and 250 trips per day during typical operations. The addition of 24 trips per day would be imperceptible on the study area roadways and would not result in any impacts.

Installation of fiber optic lines would not require any road closures or lane reductions. However, should the temporary closure of any roadways or lanes (for example, to string cable from pole-to-pole across a roadway or trench under a roadway), then SCE should identify these issues. Depending on the roadway closed/lane reduced and the duration of its closure/lane reduction, impacts to traffic and transportation during construction could be potentially significant without mitigation.

Routine maintenance required for the substation, towers and fiber optic lines would not generate traffic and transportation impacts due to limited occurrences and vehicle use.

Impact Minimization Measures

No significant traffic impacts would result from construction and/or operation of the Lockhart Substation, interconnection, and telecommunication facilities. Construction vehicles would comply with all local, state, and federal LORS. It is recommended that SCE prepare a Construction Traffic Control Plan to identify any issues or roadway closures and appropriate treatment and mitigation.

Conclusion

The fiber optic line construction would require an average of four personnel for each of the three segments and would not result in any long-term significant impacts. The Lockhart Substation would be an un-staffed facility; no personnel would be assigned to the station for daily operations. Routine maintenance would require periodic trips to the station or to check on fiber optic lines and interconnection lines, but traffic associated with those trips is considered negligible. No significant traffic impacts are projected as a result of the proposed project. Construction vehicles would comply with all local, state, and federal LORS.

3.10 WASTE MANAGEMENT AND HAZARDOUS MATERIALS

Environmental Setting and Potential Impacts

Construction and operation of the proposed Lockhart Substation would require the limited use of hazardous materials such as fuels, lubricants, and cleaning solvents. The

fiber optic lines and related facilities would be routed mostly through undeveloped publicly-owned desert land with relatively few activities that could generate hazardous wastes or contaminated areas.

Waste management activities associated with the anticipated downstream upgrades would include the storage, transport, recycling, or disposal of all project waste streams. Waste streams generally include solid waste, including excavated soil that could not be backfilled, vegetation and sanitation waste as well as empty cable reels and cut-off pieces of fiber optic cable. All waste streams are regulated and discharges or disposal of any waste material either requires specific permitting, or disposal at a permitted facility based on the type of waste. Both solid and liquid waste streams can be either hazardous or non hazardous, depending on the constituents in the waste stream and the characteristics (e.g., ignitability, reactivity, toxicity, and corrosivity) of the waste. The status of the waste stream determines both the storage options for the material, and the disposal method for the material. With exception of the proposed Lockhart substation, limited quantities of waste materials would be generated.

Solid waste disposal sites are permitted as either Class III facilities, which accept municipal solid waste, or Class I facilities which accept hazardous waste. Within San Bernardino County, there are seven existing Class III commercial solid waste disposal facilities which could accommodate the wastes generated by the downstream upgrades.

Impact Minimization Measures

Staff recommends that the following measures be implemented during construction to mitigate potential impacts resulting from improper waste or hazardous materials management:

- A Phase 1 Environmental Site Assessment should be prepared to identify documented contamination sites relative to project sites outside of existing rights-of-way. Additional analysis and avoidance/mitigation measures may be needed based on initial results.
- If visual contamination indicators are observed during construction, the contractor should be required to stop work until the material is properly characterized and appropriate measures are taken to protect human health and the environment. A Professional Engineer or Professional Geologist should inspect the site, determine what is required to characterize the nature and extent of contamination, and provide a report to the CPUC and DTSC with findings and recommended actions.
- A waste management plan should be prepared to ensure that all construction materials and debris would be removed from the area and recycled or properly disposed of offsite.
- Construction waste should be recycled where feasible.
- Hazardous waste handling should incorporate the following: properly store, package, and label all hazardous waste; use only approved transporters; prepare hazardous waste manifests; keep detailed records; and appropriately train employees to comply with state and federal hazardous waste management requirements.

- Hazardous wastes should be stored onsite in accordance with accumulation time limits and then properly manifested, transported to, and disposed of at a permitted hazardous waste management facility by licensed hazardous waste collection and disposal companies.
- Portable liquid waste systems (port-a-potties) should be utilized at all construction locations, including regular maintenance of the facilities.

Conclusion

The downstream upgrades would comply with all applicable LORS regulating the management of hazardous and non-hazardous wastes during both project construction and operation. In addition, the site should be managed such that contaminants would not pose a significant risk to humans or to the environment. Implementing the measures recommended above or similar for construction and operation would avoid impacts to workers and the environment.

3.11 WORKER SAFETY/PUBLIC HEALTH AND SAFETY

Environmental Setting

Fire support services to the anticipated downstream upgrades area would be under the jurisdiction of the San Bernardino County Fire Department (SBCFD), North Desert Division. There are a total of twenty fire stations within the SBCFD North Desert Division, the closest of which would be Hinkley Station #125, in Hinkley; Silver Lakes/Helendale Station #4, located off Route 66 between Barstow and Victorville; and Harvard Station #46, located northeast of Barstow. Response time would vary as some stations are staffed with paid on-call firefighters, and others are staffed with full-time personnel. All personnel at the SBCFD North Desert Division are trained as Emergency Medical Technicians (EMT) Level-1 and as first responders to hazardous materials incidents. The large majority of personnel are also trained paramedics (SBCFD 2010 in the SSA).

Potential Impacts of Proposed Downstream Upgrades

Two issues are assessed in worker safety:

1. The potential for impacts on the safety of workers during construction, and operations activities, and
2. Fire prevention/protection, emergency medical response, and hazardous materials spill response during construction, and operations.

Worker safety issues are thoroughly addressed by Cal/OSHA regulations. If all LORS are followed, workers would be adequately protected and no impacts would occur. No impact minimization measures are recommended. Compliance with LORS would also protect the public.

3.12 VISUAL RESOURCES

Environmental Setting

The regional landscape in the anticipated downstream upgrades area is formed by north-south-trending mountain ranges separated by broad valleys and is characterized by native low, shrubby Mojave creosote scrub vegetation and an absence of trees. Notable man-made features in the area include numerous high-voltage electric transmission lines of various sizes and configurations, electric substations, highways, and sparse commercial, industrial and residential development.

Lockhart Substation and Interconnection

The proposed Lockhart Substation would be located on the AMS project site, which is in unincorporated San Bernardino County in the Harper Lake Valley of the western Mojave Desert. Refer to Section 4.12 (**Visual Resources**) of the AMS SSA for a description of the AMS visual resources setting, which would also apply to the proposed Lockhart Substation and interconnection area.

Lockhart to Tortilla Substation Fiber Optic Line

The existing high-voltage transmission lines are the predominant visual reference point along the northern portion of the route east of the proposed Lockhart Substation and along Harper Lake Road; this portion of the route is bound mostly by open space and limited agriculture.

Where the route turns and heads east along SR 58, the Hinkley Substation is the primary visual focus since it is the only structure in the vicinity and is surrounded by open space. Most of this portion of the route along SR58 can be described as flat terrain, abutted on both sides of road by open space, agriculture, and rural residential toward the east end of this segment. The existing poles along Summerset Road, Community Boulevard, and Lenwood Road traverse through similar, flat terrain, with the addition of more rural residential uses on either side of the roads. The route continues south crossing railroad tracks and Main Street, which is the main thoroughfare into Barstow.

As the existing overhead transmission line crosses south of Main Street along Sun Valley Drive and then northeast, the visual setting consists of more of mixed land uses, including commercial, residential, and light industrial, followed by medium density residential land uses along I Street and Bonanza Road, until the existing overhead transmission line traverses through an open field in a southeast direction to the Tortilla Substation. The substation and existing overhead line are situated in the middle of an open field surrounded by residential communities to the west and north. No significant visual resources exist along the Lockhart to Tortilla Substation fiber optic line.

Lockhart to Kramer Substation Fiber Optic Line

The northern portion of the Lockhart Substation to Kramer Substation fiber optic route is described visually as vast desert open space marked only by the existing transmission structures and line and dirt roads crisscrossing the route. The route on the west side of Highway 395, heading to the Kramer Substation, is more of a retail, industrial setting,

since the crossroads of Highway 395 and SR 58 are surrounded by service stations, restaurants, and the Kramer Substation. The existing overhead transmission line is not the dominant visual feature near this intersection. The cable would continue south connecting with the Kramer Substation, which is a relatively large and industrial facility. No significant visual resources exist along the Lockhart to Kramer Substation fiber optic line.

Kramer to Victor Substation Fiber Optic Line

As noted above, the Kramer Substation is a dominant feature at the crossroads of SR 58 and Highway 395; however, this industrial land use is located near an intersection with a number of retail and commercial land uses, including fuel stations and restaurants. As such, the substation is not considered a visual distraction given the nature of this intersection. The proposed fiber optic cable between Kramer and Victor substations would follow within the rights-of-way of three existing transmission line corridors that parallel the west side of Highway 395. These three existing transmission lines are prominent in the view of motorists driving along this stretch of the highway. Views to the west are interrupted by the existing transmission structures and line since the corridors are close to the highway's western right-of-way.

The existing visual setting between the Kramer Substation and three quarters of this alignment south consists of undeveloped open space with varying topography, but mostly gently rolling slopes and knolls within approximately 0.25 mile of the west side of Highway 395. The terrain to the east is relatively flat, with fairly long-distance views to the east across the desert. At approximately 5.4 miles south of the Kramer Substation, the three existing transmission lines bend westerly to route around one of the higher knolls. At this point, the transmission towers and lines are not visible from Highway 395 for approximately one mile.

As the proposed route nears the city of Adelanto, retail, commercial, light industrial, and residential land uses become more evident along both sides of the highway. The proposed fiber optic line would transition from new poles to existing poles that continue along the west side of the highway, turning slightly west along Bellflower Street and through commercial and then residential land uses.

The existing transmission line poles follow along the east side of Bellflower Street until a transition to underground trenching is required within this street, just south of Lee Avenue. This area consists of medium to high-density residential land uses on both sides of the street, so the visual character of this proposed underground segment is more urban, with existing utility poles a common feature that blend in with the setting.

The fiber optic cable would transition back to overhead south to Bartlett Avenue where the existing poles head east toward Highway 395. This area continues to be characterized as urban with more retail and commercial uses as the poles near the intersection of Highway 395. This visual setting of retail and commercial urban land uses continues south and all along the highway corridor until the existing poles intersect with Palmdale Avenue Road and head east to the Victor Substation. The existing overhead poles and line for this southern portion of the alignment are not prominent visual features and tend to blend into the urban setting.

The Victor Substation, a large substation similar to the Kramer Substation, is east of Highway 395 but still within a fairly urban setting between the retail and commercial uses along the highway and residential communities to the east. The substation is a prominent visual feature along this stretch of Palmdale Road.

Potential Impacts of Proposed Downstream Upgrades

The proposed Lockhart Substation and interconnection facilities are consistent with the adjacent solar power-generating facility to the northwest and the existing high-voltage transmission lines. The substation structure would not exceed the heights of proposed AMS facilities and the substation and interconnection elements are not located in an area considered to have sensitive visual features.

Fiber optic cable would be installed overhead on new poles and existing poles as well as underground. New poles would be located within existing utility rights-of-way and parallel to existing overhead lines. The new poles would be equal to or lower in height to the existing wooden transmission poles and substantially smaller in scale than the existing 220-kV towers. Stringing activities and construction equipment would be located within existing utility rights-of-way. Because the fiber optic cable would either utilize existing overhead utility poles, be placed underground, or utilize new poles within existing utility corridors that already contain overhead transmission lines, these cables would represent only a minor visual change and would be consistent in character with existing facilities.

Construction and operation of the downstream upgrades would not adversely affect scenic vistas, would not damage or remove any scenic resources, and would not degrade existing visual character or quality. Further, the anticipated downstream upgrades would not result in sources of substantial light or glare that would impact day or nighttime views, with implementation of design features below.

Impact Minimization Measures

With the inclusion of the following recommended mitigation measures or similar, potential visual impacts related to construction activities would be less than significant:

- During construction of the telecommunications system, work sites should be kept clean of debris and construction waste. Material and construction storage areas should be selected to minimize views from public roads, trails, and any nearby residences.
- Where excavated materials would be visible from sensitive viewing locations, such materials should be disposed of in a manner that is not visually evident and does not create visual contrasts.
- All areas disturbed during construction should be appropriately rehabilitated in conformance with applicable Erosion Control and Revegetation Plans.

With the inclusion of the following recommended mitigation measures or similar, potential visual impacts related to operation activities would likely be less-than-significant:

- Non-specular and non-reflective cable should be used wherever the cable is strung overhead in order to reduce its visibility and visual contrast;
- Hardware used on overhead sections should be non-reflective and non-refractive.

Conclusion

Construction of the downstream upgrades would require only permanent disturbance for construction of the Lockhart substation and temporary disturbance for installation of new poles and trenching for underground conduits. Placement of the Lockhart substation at the AMS site would not increase visible impacts associated with the AMS project.

Since the telecommunications system would mostly utilize existing overhead utility poles, be placed underground, or install new poles within existing transmission line corridors, the fiber optic cable would constitute a relatively minor visual change. The addition of the new poles would not substantially alter the existing visual setting of the DU project area. The use of non-specular cable and non-reflective and non-refractive hardware would minimize the potential for any long-term impacts associated with operation of the telecommunications system. The DU project would not cause a reduction in scenic quality and no significant visual impacts are expected.

4.0 SUMMARY OF CONCLUSIONS

This analysis of downstream upgrades was prepared to inform the Energy Commission Committee and the general public of the potential direct and indirect effects of this project, which is considered a reasonably foreseeable development resulting from the AMS project. The analysis of potential environmental impacts is based on a planning-level project description of required facilities and measures to minimize potential effects are recommended.

The proposed project would not result in significant and unmitigable impacts to any issue area. The following issue areas would not be impacted by the proposed project: Facility Design, Power Plant Efficiency, Power Plant Reliability, and Transmission Line Safety and Nuisance. For the remainder of the issue areas, it is anticipated that environmental impacts associated with the proposed downstream upgrades would be less than significant with implementation of the recommended mitigation measures identified herein. Additional measures may be required by CPUC and BLM or DOE upon further environmental analysis pursuant to CEQA and NEPA, once preliminary project design information is available.

5.0 REFERENCES

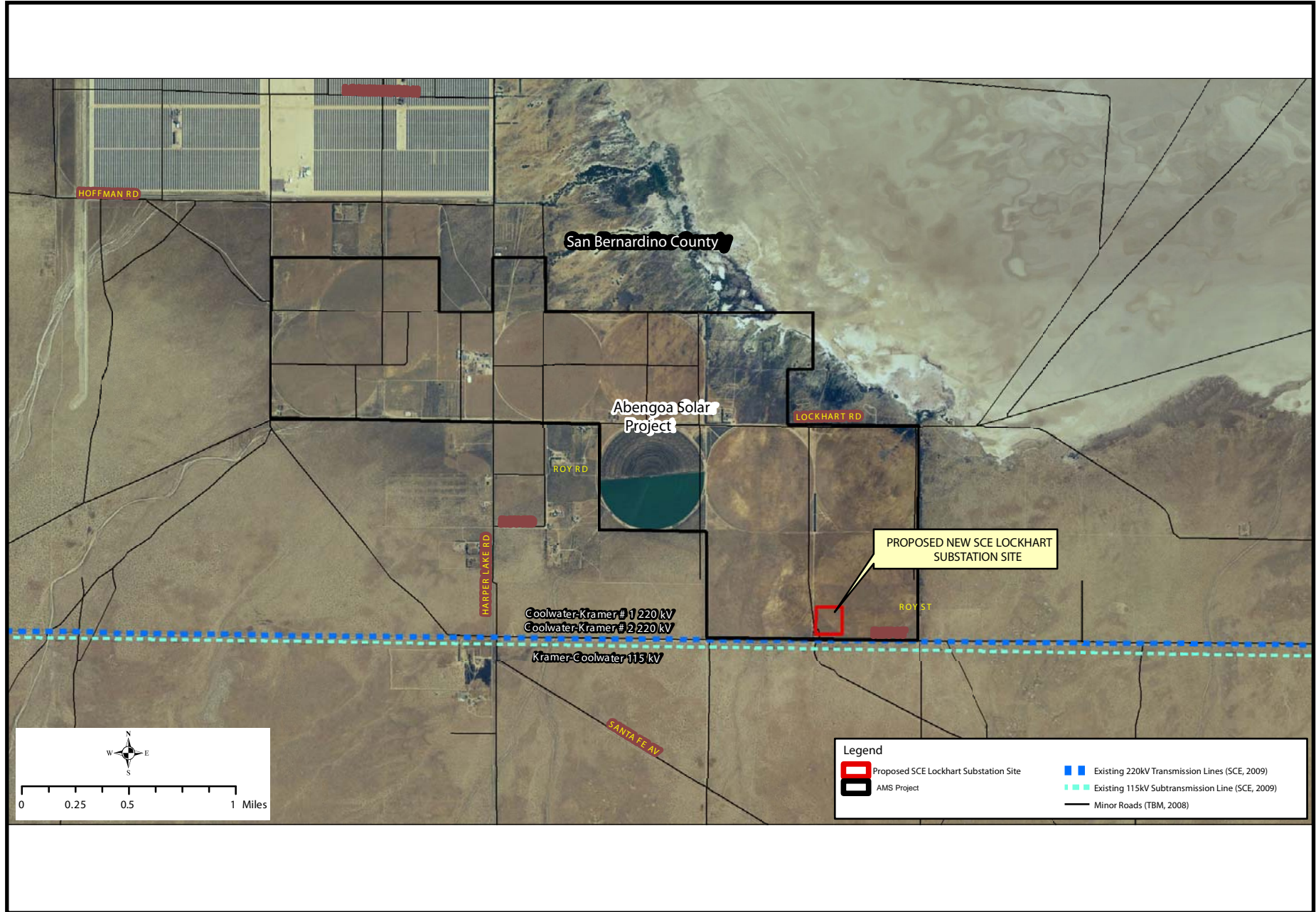
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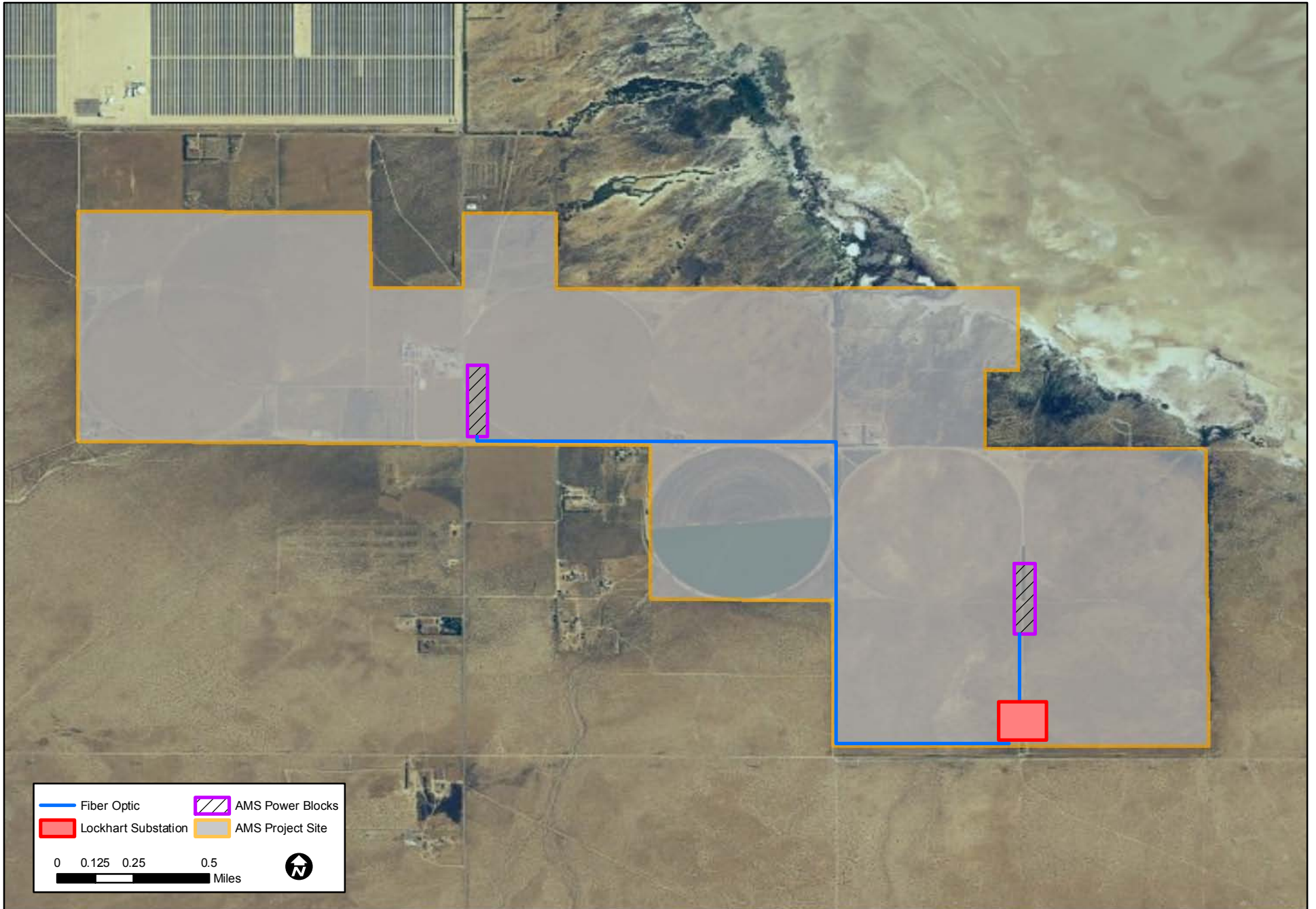
TRANSMISSION SYSTEM ENGINEERING - APPENDIX A - FIGURE 1
Abengoa Mojave Solar Project - Proposed SCE Lockhart Substation Site

TRANSMISSION SYSTEM ENGINEERING



TRANSMISSION SYSTEM ENGINEERING - APPENDIX A - FIGURE 2
Abengoa Mojave Solar Project - AMS to Lockhart Substation Fiber Optic Lines

TRANSMISSION SYSTEM ENGINEERING

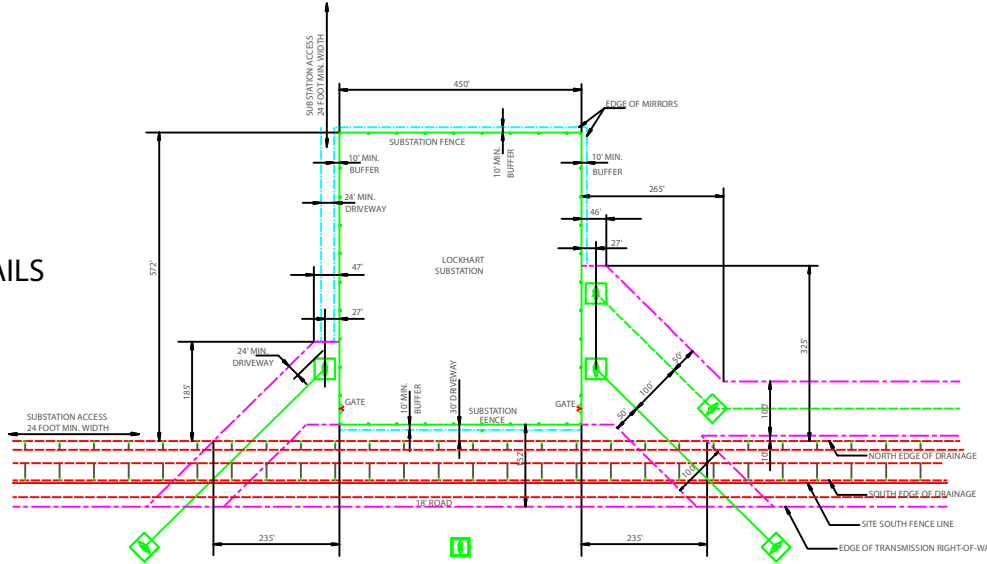


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Adapted from SCE Lockhart Substation Project Description for Abengoa Solar Inc., 4-15-2010, Fig. 3-5

TRANSMISSION SYSTEM ENGINEERING - APPENDIX A - FIGURE 3
 Abengoa Mojave Solar Project - Lockhart Substation Interconnection

SUBSTATION DETAILS

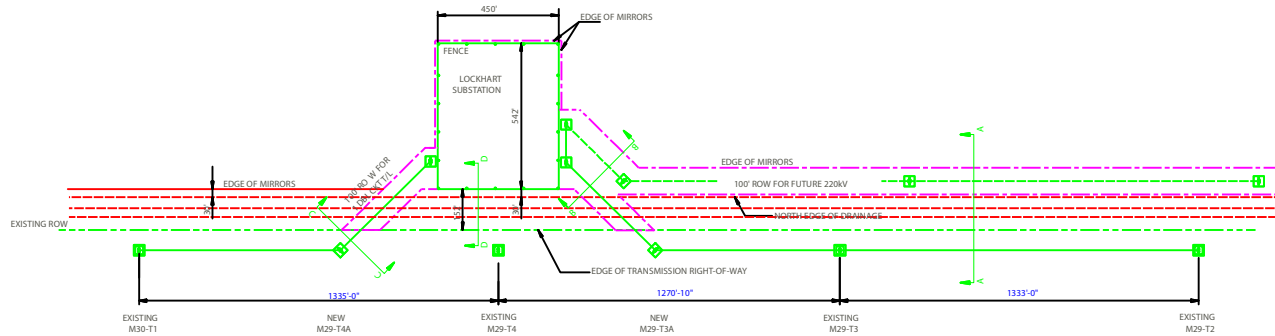


LEGEND

- SCE SUBSTATION FENCE
- TEN-FOOT OPEN SPACE BUFFER OUTSIDE THE SUBSTATION FENCE
- SCE TRANSMISSION RIGHT-OF-WAY
- DRAINAGE CHANNEL TOP OF SLOPE
- DRAINAGE CHANNEL BOTTOM OF SLOPE
- SOLAR FARM FENCE
- FUTURE GEN-TIE LINE
- EXISTING SCE 220KV TRANSMISSION TOWERS
- PROPOSED SCE 220KV TRANSMISSION TOWERS
- FUTURE GENERATION TIE LINE TOWERS

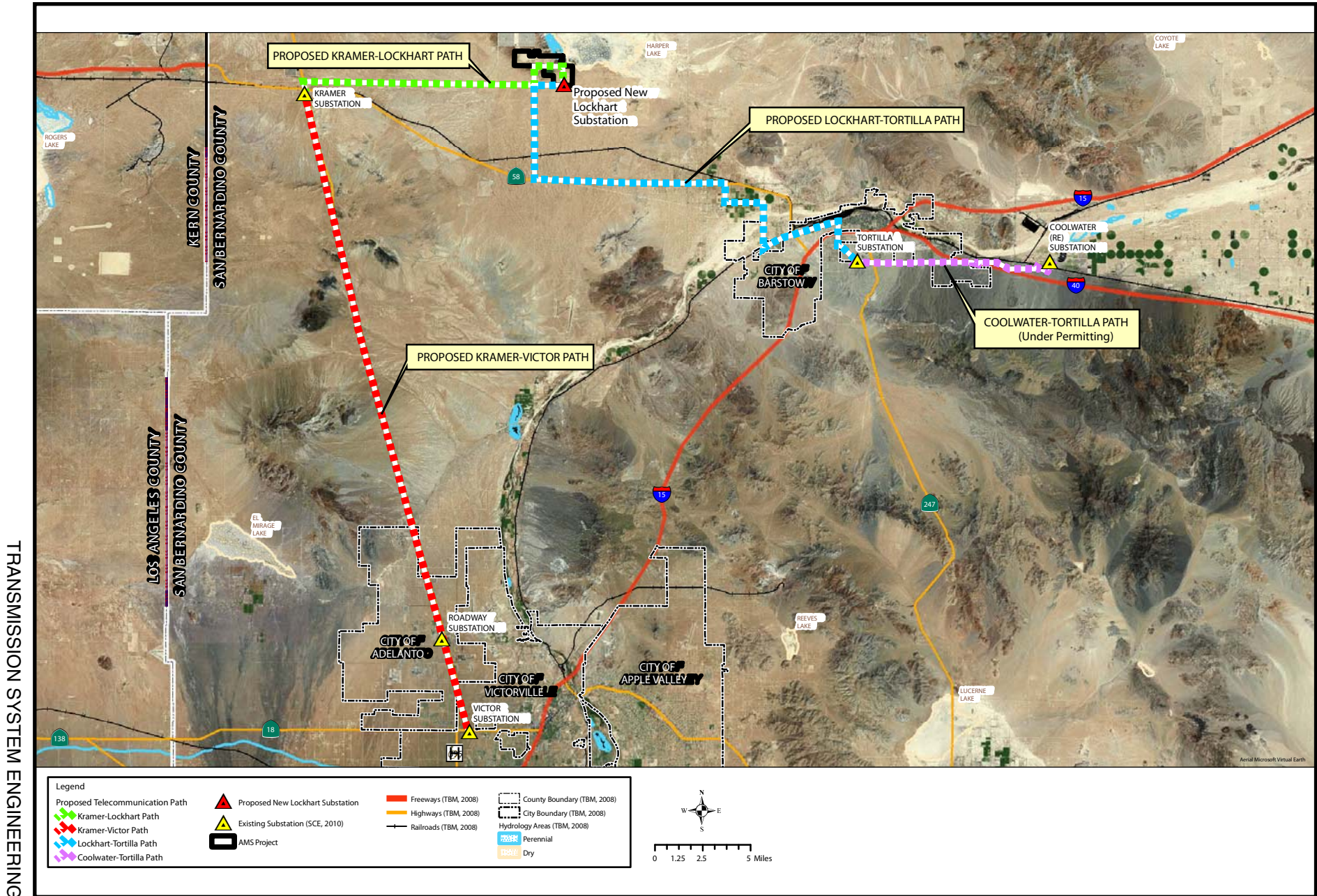
Note: CONCEPTUAL ENGINEERING, DO NOT SPOT

SITE PLAN



TRANSMISSION SYSTEM ENGINEERING

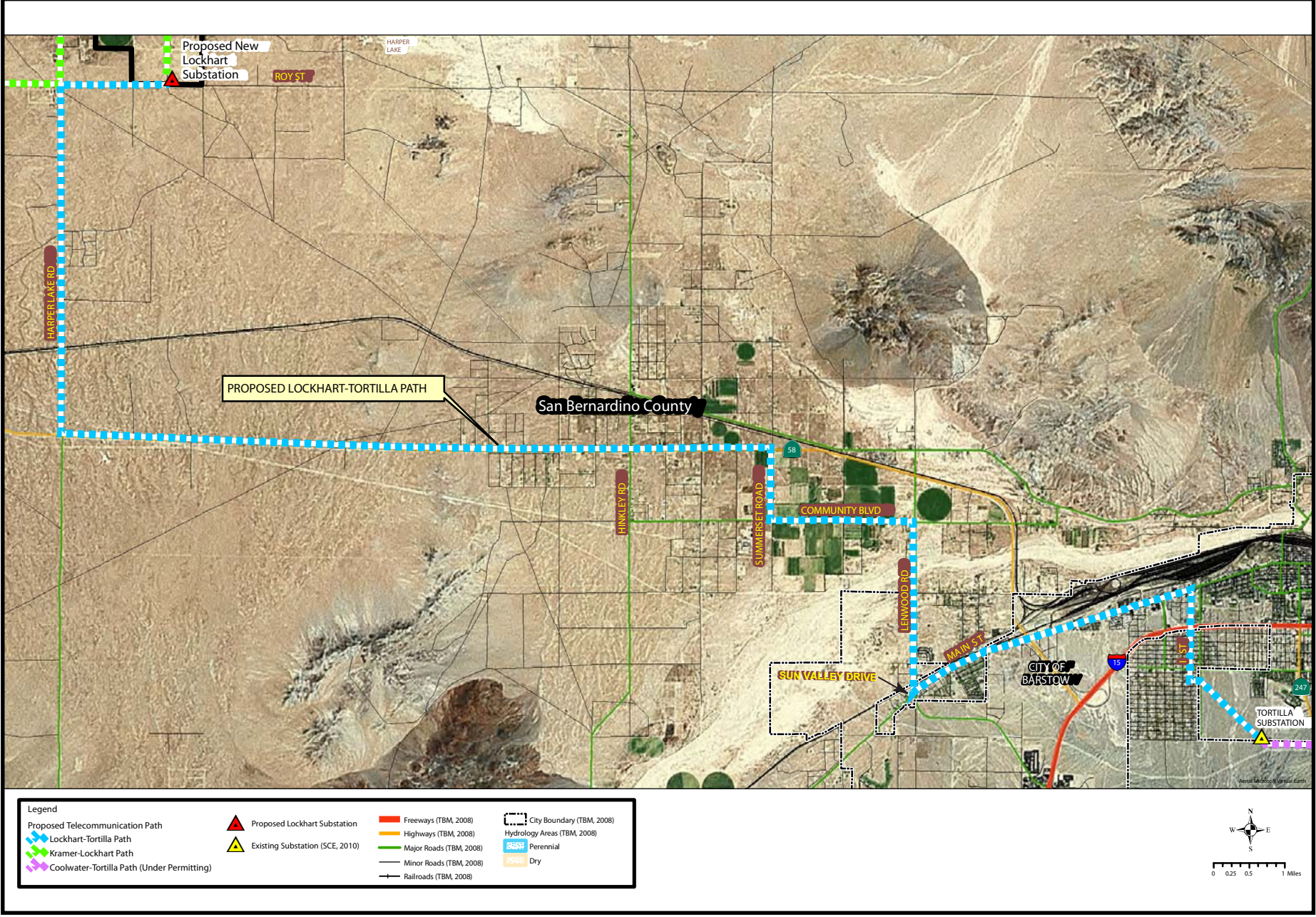
TRANSMISSION SYSTEM ENGINEERING - APPENDIX A - FIGURE 4
Abengoa Mojave Solar Project - Overview of Proposed Fiber Optic Lines



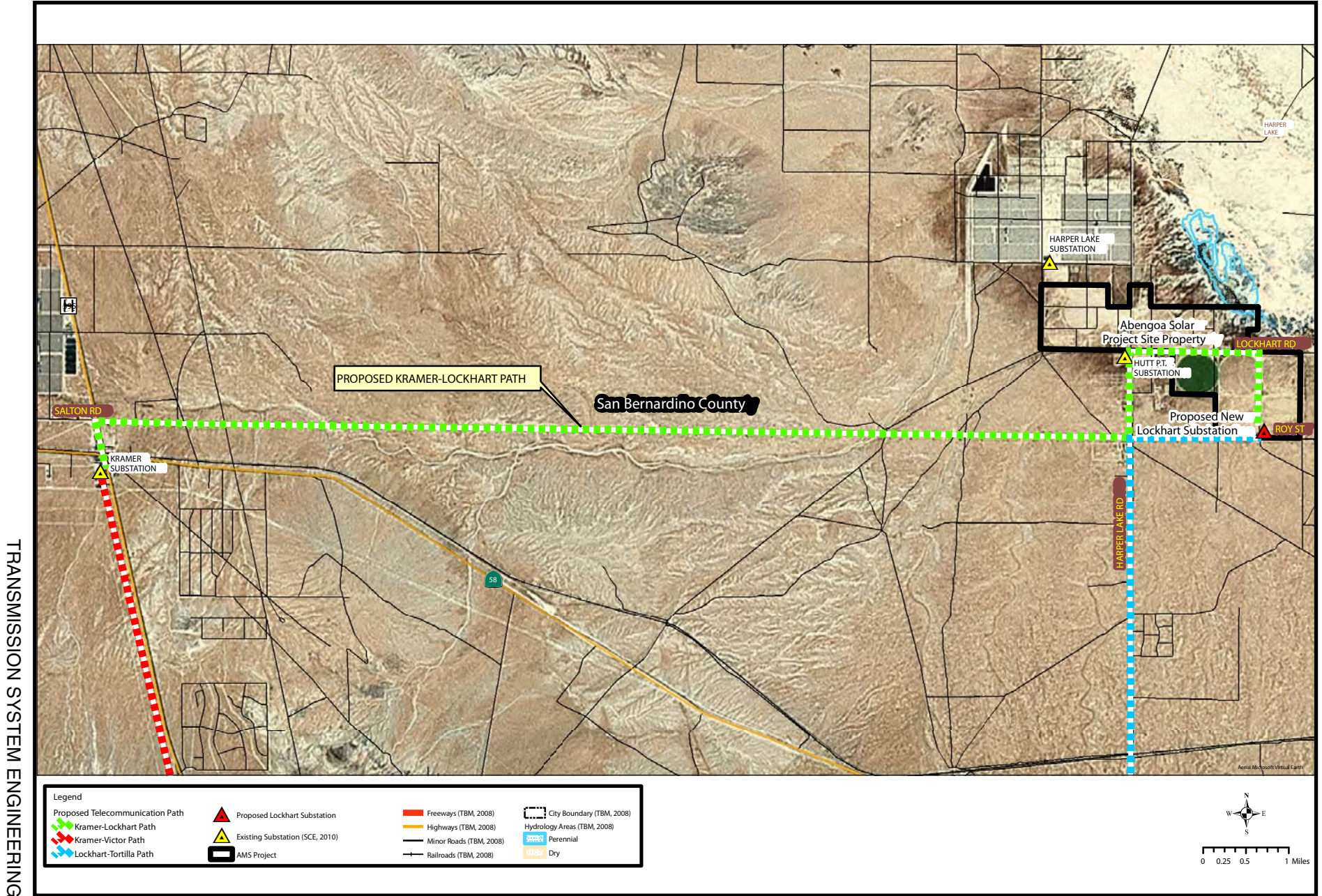
TRANSMISSION SYSTEM ENGINEERING

TRANSMISSION SYSTEM ENGINEERING - APPENDIX A - FIGURE 5
Abengoa Mojave Solar Project - Proposed Lockhart to Tortilla Fiber Optic Line

TRANSMISSION SYSTEM ENGINEERING

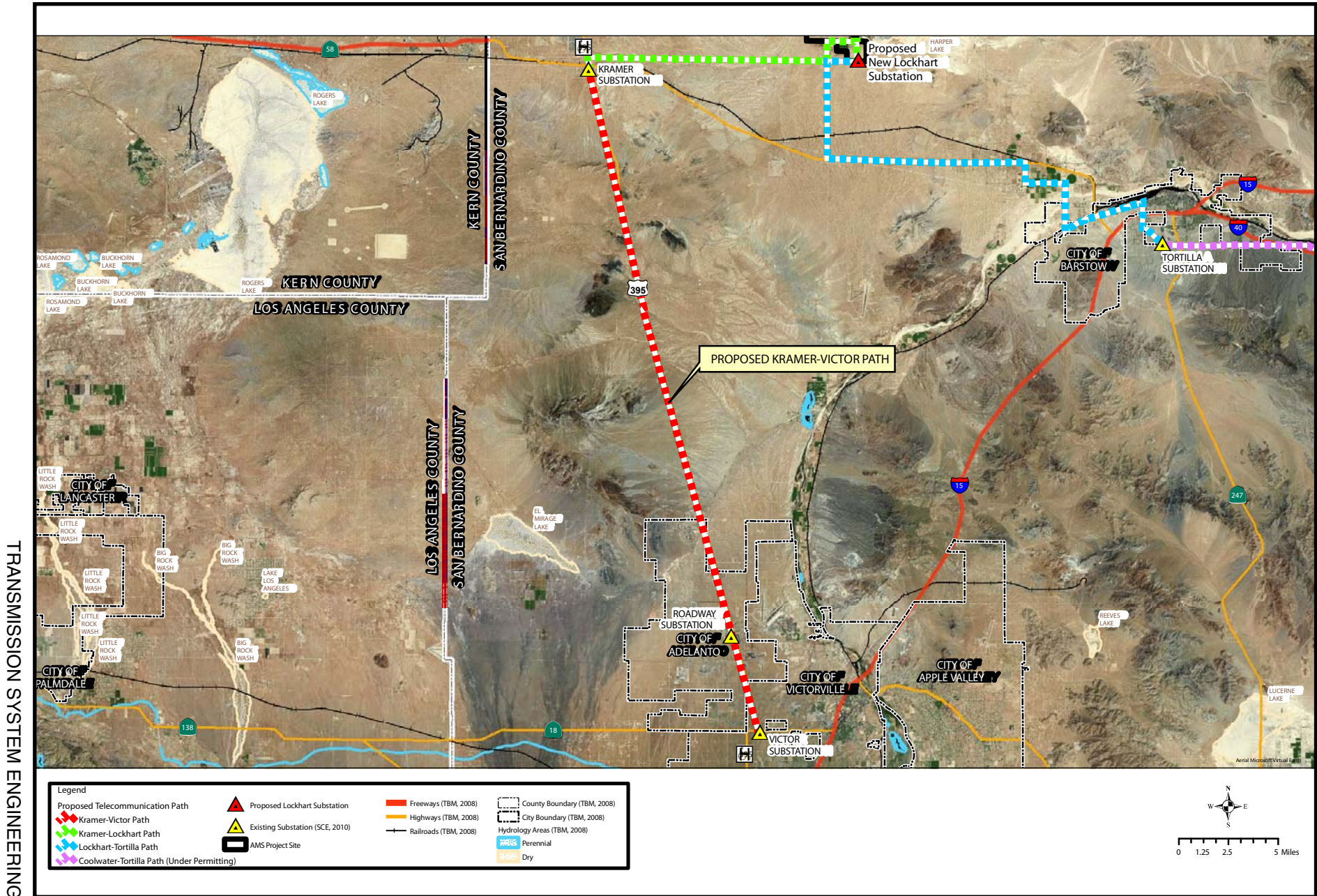


TRANSMISSION SYSTEM ENGINEERING - APPENDIX A - FIGURE 6
 Abengoa Mojave Solar Project - Proposed Lockhart to Kramer Fiber Optic Lines



TRANSMISSION SYSTEM ENGINEERING

TRANSMISSION SYSTEM ENGINEERING - APPENDIX A - FIGURE 7
Abengoa Mojave Solar Project - Proposed Kramer to Victor Fiber Optic Line



TRANSMISSION SYSTEM ENGINEERING

PREPARATION TEAM

**ABENGOA MOJAVE SOLAR
09-AFC-5
PREPARATION TEAM**

Executive Summary Craig Hoffman
Transmission System EngineeringAjoy Guha, P.E. and Mark Hesters
Transmission System Engineering – Appendix A..... Heather Blair
Project Assistant April Albright
Staff Counsel.....Christine Hammond

**DECLARATION OF
Craig Hoffman**

I, Craig Hoffman, declare as follows:

1. I am presently employed by the California Energy Commission in the Siting, Transmission and Environmental Protection Division, as a Project Manager (Planner III).
2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.
3. I prepared the staff testimony on the **Executive Summary** for the **Abengoa Mojave Solar** project (09-AFC-5) based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.
4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed therein.
5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

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

Dated: 6/10/10

Signed: Original signed by C. Hoffman

At: Sacramento, California

CRAIG D. HOFFMAN

EDUCATION

Master of Rural and Town Planning May 1997
California State University, Chico

Bachelor of Arts in History; Minor in Planning and Development May 1995
California State University, Chico

PROFESSIONAL EXPERIENCE

California Energy Commission June 2009 to Present
Siting, Transmission and Environmental Protection Division

Project Manager

Responsible for the day-to-day management of the certification process for thermal power plants of 50 megawatts or greater along with transmission lines, fuel supply lines, and related facilities to serve them. Works as a team leader on the coordination of activities and work product of technical specialists in 20 environmental and engineering disciplines. Coordinates project calendaring, public notices, workshops and public hearing meetings, the preparation of a preliminary staff assessment (draft EIR) and final staff assessment (final EIR). Responsible for identifying key technical and process issues and notifying management team of issues and process concerns. Recommends actions, policies and procedures affecting projects and program direction in order to ensure that needed energy facilities were authorized in an expeditious, safe and environmentally acceptable manner, consistent with the requirements of the Warren-Alquist Act and the California Environmental Quality Act (CEQA).

Trinity Investment Partners December 2008 to June 2009

Senior Associate

Was involved in project site investigation, due diligence, feasibility reports, budgets, funding source books and presentations to financial investors and institutions. Projects ranged in complexity and were typically impaired brownfield developments. Interacted with local jurisdiction community development staff to determine appropriate project land use mix and determine design feature limitations. The selection of project sites and land use assumptions were important to gain funding and financial backing to move

forward with the entitlement and development of projects. Prepared CEQA screening studies in order to determine potential impacts and provide the jurisdictions base line information for preparation of CEQA environmental reviews.

RCH Group / The Hodgson Company

November 2007 to December 2008

Project Manager

Provided a full-range of real estate consulting and advisory services in mixed-use land development, entitlement processing, urban design and project management. These services included a range of legal, strategic, management and political advisory services - from advocating a project property before government agencies to resolving conflicts among project participants. Was the project manager for several large specific plans in the Sacramento region. This included coordination with owners groups, consultants, city and county jurisdictions, preparation of budgets, time lines and process charts and interaction with public and jurisdictional groups. Coordinated the preparation of EIRs and EIS's for projects along with securing proposals from various consultants to prepare technical studies for the environmental document. Also prepared numerous property evaluation and feasibility reports for lending institutions on foreclosed properties including large development entitlements.

Dunmore Communities / Dunmore Capital

April 2005 to September 2007

Project Manager

As a project manager, was involved in project development from the acquisition of undeveloped property to the ultimate development of a successful project. These projects included the entitlement of large land parcels for master planned communities, commercial developments and residential subdivisions. Prepared due diligence, feasibility reports, and budgets; interacted with local jurisdiction staff; was involved in the layout and development of land plans; worked on design charrettes; presented projects at public hearings; processed construction documents and helped facilitate building contracts and activities. Coordinated the preparation of EIRs and EIS's for projects along with securing proposals from various consultants to prepare technical studies for the environmental document. Prepared CEQA screening studies in order to determine potential impacts and provide the jurisdictions base line information for preparation of CEQA environmental reviews.

Pacific Municipal Consultants

January 2000 to April 2005

Associate and Senior Planner

As a public agency contract planner, provided current, long range and environmental planning services to numerous city and county jurisdictions. Work efforts included the processing of General Plan Amendments, Specific Plans, Rezones, Williamson Act Contracts, Annexations, Vesting Tentative Subdivision Maps, Tentative Subdivision

Maps, Use Permits, Design Review for large scale residential master plans, commercial centers, multi-family projects, and mixed-use sites, policy document preparation, and appropriate environmental documentation for projects consistent with the requirements of CEQA. Presentations to community groups, Planning Commissions, City Councils and Board of Supervisors were routine activities and an integral part of public hearing process.

Was a senior planner from 2001 to 2003 and was the lead current planner for the City of Elk Grove from 2003 to 2005. Was responsible for the management of projects that were complicated, had the potential for public scrutiny and the city needed the projects to move forward. Was the lead planner on the Laguna Ridge Specific Plan and coordinated the planning process, the EIR and all approval documents.

Sierra County Planning Department

October 1997 to January 2000

Planner II

Responsible for current planning functions including review, recommendation, and presentation to Planning Commission and Board of Supervisors. Evaluation of land-use and development applications, including general plan amendments, zone amendments, zone variances, special use permits, site plan review, reclamation plans, and tentative parcel map review, for consistency with County and State regulations. Prepared environmental documents as required by CEQA for development projects. A typical environmental document was the preparation of a mitigated negative declaration with attached technical studies. Review of building applications for consistency with General Plan, Zoning Ordinance and other County policies. Answer public inquiries regarding county planning and building issues, demographics and statistics.

**DECLARATION OF
Ajoy Guha**

I, **Ajoy Guha**, declare as follows:

1. I am presently employed by the California Energy Commission in the Siting, Transmission and Environmental Protection Division, as an Associate Electrical Engineer.
2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.
3. I prepared the staff testimony on the **Transmission System Engineering** for the **Abengoa Mojave Solar** project (09-AFC-5) based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.
4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed therein.
5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

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

Dated: June 23, 2010

Signed: Original signed by A. Guha

At: Sacramento, California

RESUME

AJOY GUHA

*Associate Electrical Engineer
California Energy Commission
1516 Ninth Street, MS 46
Sacramento, CA 95814*

EDUCATION:

MSEE, POWER SYSTEMS ENGINEERING, PURDUE UNIVERSITY, INDIANA
BSEE, ELECTRICAL ENGINEERING, CALCUTTA UNIVERSITY, INDIA

CERTIFICATIONS:

REGISTERED PROFESSIONAL ENGINEER, CALIFORNIA, INDIANA & ILLINOIS
MEMBER OF IEEE; MEMBER OF THE INSTITUTION OF ENGINEERS OF INDIA

SUMMARY OF PROFESSIONAL BACKGROUND:

Ajoy Guha, P. E. has 34 years of electric utility experience with an extensive background in evaluating and determining current and potential transmission system reliability problems and their cost effective solutions. He has a good understanding of the transmission issues and concerns. He is proficient in utilizing computer models of electrical systems in performing power flow, dynamic stability and short circuit studies, and provide system evaluations and solutions, and had performed generator interconnection studies, area transfer and interconnected transmission studies, and prepared five year transmission alternate plans and annual operating plans. He is also experienced in utilizing Integrated Resource Planning computer models for generation production costing and long term resource plans, and had worked as an Executive in electric utilities and experienced in construction, operation, maintenance and standardization of transmission and distribution lines.

WORK EXPERIENCE:

CALIFORNIA ENERGY COMMISSION, ENERGY FACILITIES SITING AND ENVIRONMENTAL DIVISION, SACRAMENTO, CA, 11/2000-Present.

Working as Associate Electrical Engineer in the Transmission System Engineering unit on licensing generation projects. Work involves evaluating generation interconnection studies and their impacts on transmission system, and providing staff assessments and testimony to the commission, and coordination with utilities and other agencies.

ALLIANT ENERGY, DELIVERY SYSTEM PLANNING, MADISON, WI, 4/2000-9/2000.

Worked as Transmission Services Engineer, performed Generator Interconnection studies and system planning studies.

IMPERIAL IRRIGATION DISTRICT, POWER DEPT., Imperial, California, 1985-1998.

Worked as Senior Planning Engineer in a supervisory position and in Transmission, Distribution and Integrated Resource planning areas. Performed interconnection studies for 500 MW geothermal plants and developed plan for a collector system, developed methodologies for transmission service charges, scheduling fees and losses. Worked as the Project Leader in the 1992 Electricity Report (ER 92) process of the California Energy Commission. Worked as the Project Leader for installation of an engineering computer system and softwares. Assumed the Project Lead in the standardization of construction and materials, and published construction standards.

CITY LIGHT & POWER, Frankfort, Indiana, 1980 – 1985.

Worked as Assistant Superintendent and managed engineering, construction and operation depts.

WESTERN ILLINOIS POWER CO-OP., Jacksonville, Illinois, 1978 – 1980.

Worked as Planning Engineer and was involved in transmission system planning.

THE CALCUTTA ELECTRIC SUPPLY CORPORATION LTD. (CESC), Calcutta, India, 1964 –1978.

Worked as District Engineer and was responsible for managing customer relations, purchasing and stores, system planning, construction, operation and maintenance departments of the most industrialized Transmission and Distribution division of the Utility. Worked as PROJECT MANAGER for construction of a 30 mile Double Circuit 132 kV gas-filled Underground Cable urban project. During 1961-63, worked as Factory Engineer for design, manufacturing and testing of transformers, motor starters and worked in a coal-fired generating plant.

**DECLARATION OF
Mark Hesters**

I, Mark Hesters, declare as follows:

1. I am presently employed by the California Energy Commission in the Siting, Transmission and Environmental Protection Division, as a Senior Electrical Engineer.
2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.
3. I prepared the staff testimony on the **Transmission System Engineering** for the **Abengoa Mojave Solar** project (09-AFC-5) based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.
4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed therein.
5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

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

Dated: June 23, 2010

Signed: Original signed by M. Hesters

At: Sacramento, California

Mark Hesters

916-654-5049

mark.hesters@energy.state.ca.us

Qualifications

- Analyzed the reliability impacts of electric power plants for nine years.
- As an expert witness, produced written and oral testimony in numerous California Energy Commission proceedings on power plant licensing.
- Expertise in power flow models (GE PSLF and PowerWorld), production cost models (GE MAPS), Microsoft word-processing, spreadsheet and database programs.
- Contributing author to many California Energy Commission reports.
- Represented the Energy Commission in the development of electric reliability and planning standards for California.

Experience

Senior Electrical Engineer

2005-Present California Energy Commission, Sacramento, CA

- Program manager of the transmission system engineering analysis for new generator Applications of Certification.
- Lead the development of transmission data collection regulations.
- Overhauled the transmission data adequacy regulations for the Energy Commission's power plant certification process.
- Participated in the analysis of regional transmission projects.
- Technical lead for Commission in regional planning groups.
- Energy Commission representative to the Western Electric Coordinating Council Operations Committee.

Associate Electrical Engineer

1998–2005 California Energy Commission, Sacramento, CA

- Lead transmission systems analyst for power plant licensing under 12-month, 6-month and 21-day licensing processes.
- Provided expert witness testimony on the potential transmission impacts of new power plants in California Energy Commission licensing hearings.
- Authored chapters for California Energy Commission staff reports on regional transmission issues.
- Studied the economics of transmission projects using electricity production simulation tools.
- Analyzed transmission systems using the GE PSLF and PowerWorld load flow models.
- Collected and evaluated transmission data for California and the Western United States

Electric Generation Systems Specialist

1990–1998 California Energy Commission, Sacramento, CA

- Lead generation planner for southern California utilities.
- Analyzed electric generation systems using complex simulation tools.
- Provided analysis on the impact of resource plans on air quality and electricity costs for California Energy Commission reports.
- Developed modeling characteristics for emerging technologies.
- Evaluated resource plans.

Education

1985–1989 University of California at Davis

Davis, CA

- B.S., Environmental Policy Analysis and Planning

**DECLARATION OF
Heather Blair**

I, Heather Blair, declare as follows:

1. I am presently employed as a consultant to the California Energy Commission in the Siting, Transmission and Environmental Protection Division.
2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.
3. I prepared the staff testimony on **Biological Resources** and **Transmission System Engineering – Appendix A** for the **Abengoa Mojave Solar** project (09-AFC-5) based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.
4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed therein.
5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

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

Dated: June 23, 2010

Signed: Original signed by H. Blair

At: Sacramento, California



HEATHER BLAIR
Environmental Scientist

ACADEMIC BACKGROUND

M.S., Conservation Biology, Sacramento State University, In Progress
B.S., Ecology, San Diego State University, 2004

PROFESSIONAL EXPERIENCE

Heather Blair is an Environmental Scientist experienced in a range of natural resource investigations and environmental impact analysis including botanical and wildlife research, inventory, and survey techniques; technical writing; and data analysis. She has experience preparing environmental documents pursuant to applicable federal, state and local environmental regulations, including the California Environmental Quality Act, National Environmental Policy Act, and the California and federal Endangered Species Acts.

Aspen Environmental Group

2004 to present

Selected project experience at Aspen includes the following:

Power Generation and Transmission Interconnection Projects

- **California Energy Commission.** Aspen has a multi-year contract to provide support to the Energy Facility Planning and Licensing Programs. Under this contract Ms. Blair has participated in the following projects:
 - **Biological Resources Assessment for the Abengoa Mojave Solar Project.** Ms. Blair is currently serving as the lead technical staff for the analysis of impacts to biological resources from the 250 MW power plant in the Mojave Desert. Important biological issues include impacts to Harper Dry Lake from potentially decreased water availability, desert tortoise, and Mojave ground squirrel.
 - **Biological Resources Assessment for the San Joaquin Solar 1&2 Hybrid Project.** Ms. Blair is currently serving as the lead technical staff for the analysis of impacts to biological resources from the 107 MW solar thermal/biomass hybrid power plant. Important biological issues include potential impacts to San Joaquin kit fox habitat and movement corridor connectivity.
 - **Biological Resources Assessment for the Genesis Solar Energy Project.** Ms. Blair is currently serving as the assistant technical staff for the analysis of impacts to biological resources from the 250 MW power plant in an undeveloped area of the Sonoran Desert. Important biological issues include direct and indirect (downstream) impacts to ephemeral drainages from site development and indirect impacts to sand dune dependent vegetation and wildlife communities from disruption of Aeolian processes.
 - **Biological Resources Assessment for the Carlsbad Energy Center.** Ms. Blair is currently serving as the lead technical staff for the analysis of impacts to biological resources from the 540 MW CECP. Important biological issues include potential impacts to Agua Hedionda Lagoon and consistency with the Carlsbad Habitat Management Plan. Ms. Blair recently testified as an expert witness in biological resources during Evidentiary Hearings before the Commission.
 - **Biological Resources Assessment for the CPV Sentinel Project.** Ms. Blair served as the lead technical staff for the analysis of impacts to biological resources from the 850 MW CPV Sentinel project. Important biological issues include potential impacts from groundwater drawdown to the mesquite hummock plant community and the special-status species it supports.
 - **Biological Resources Assessment for the CPV Vaca Station Project.** Ms. Blair is currently serving as the lead technical staff for the analysis of impacts to biological resources from the 660 MW CPVVS.

Important biological issues include potential impacts to giant garter snake from reduced flows in Old Almao Creek and loss of Swainson's hawk foraging habitat.

- **Biological Resources Assessments for the Marsh Landing and Willow Pass Generating Stations.** Ms. Blair is currently serving as the lead technical staff for the analysis of impacts to biological resources from the 930 MW MLGS and 550 MW WPGS. Important biological issues include potential indirect impacts to listed plant species in the Antioch Dunes National Wildlife Refuge from nitrogen deposition.
- **Biological Resources Assessments for the Panoche and Starwood Energy Centers.** Ms. Blair served as the lead technical staff for the analysis of impacts to biological resources from the 400 MW Panoche Energy Center and 120 MW Starwood Project. These projects required coordination with USFWS and CDFG regarding impacts to the State and federally listed San Joaquin kit fox.
- **Northern California CO₂ Storage Pilot, Confidential Client, CEQA and NEPA compliance, (2008).** Contributed to the preparation of Department of Energy NEPA environmental questionnaire to comply with Category Exclusion requirements and preparation of the Initial Statement under CEQA for the proposed CO₂ sequestration pilot test site in Montezuma Hills, California. Ms. Blair conducted focused nesting surveys of the State-threatened Swainson's hawk (*Buteo swainsonii*).
- **Arizona Utilities CO₂ Storage Pilot, CEC and University of California, NEPA compliance, (2007).** Contributed to the preparation of Department of Energy NEPA environmental questionnaire to comply with Category Exclusion requirements for the proposed CO₂ sequestration pilot test site near Joseph City, Arizona. Ms. Blair conducted focused surveys of the federally endangered Peebles Navajo cactus (*Pediocactus peeblesianus* var. *peeblesianus*).
- **Environmental Screening Tool for Out-of-State Renewables, KEMA and CEC, Staff (2009).** Assessed the potential for California laws, ordinance, regulations and standards to be impacted by out-of-state renewable facilities seeking RPS certification. Ms. Blair prepared the assessment of impacts associated with geothermal projects.
- **Nuclear Power Plant Assessment (Assembly Bill 1632).** Ms. Blair managed the preparation of and was a contributing author for a major Appendix to the Nuclear Power Plan Assessment Report for the Energy Commission. This report evaluated nuclear power issues in the state in response to recent legislation (AB 1632), including environmental issues associated with alternatives (including renewable) to the state's two nuclear facilities.
- **Diablo Canyon Power Plant Steam Generator Replacement Project.** Ms. Blair supported the management team in preparing the project description, alternatives and supporting sections of the Draft and Final EIR.

Transmission Line and Substation Projects

- **Sunrise Powerlink Transmission Line Project.** Under contract to the California Public Utilities Commission (CPUC), Aspen prepared an EIR/EIS for a 150-mile proposed transmission line from Imperial Valley Substation, near El Centro, California, to Peñasquitos Substation in northwestern San Diego County. The Proposed Project would potentially deliver renewable resources from the Imperial Valley via a 500 kV transmission line to a new 500/230 kV substation, and from the new substation to western San Diego via 230 kV overhead and underground transmission lines. Ms. Blair analyzed the impacts to wilderness and recreation. Additionally, she wrote the project description and assisted with overall project support.
- **TANC Transmission Project.** Aspen was awarded a contract with the Transmission Agency of Northern California (TANC) for CEQA/NEPA and environmental permitting support for 600-miles of proposed 500 and 230 kV transmission lines between Lassen County and Santa Clara County, California. The project included evaluation of over 600 additional miles of alternative routes, six new substations, and modifications to six existing substations. Ms. Blair was the Deputy Project Manager, responsible for coordinating the biological and cultural resource field surveys. The project was cancelled in July 2009.

- **Sacramento Area Voltage Support Project.** Under contract to Western Area Power Administration (Western) and in cooperation with SMUD, Aspen prepared an SEIS and EIR for a double-circuit 230 kV circuit between Western's O'Banion/Sutter Power Plant and Elverta Substation/Natomas Substation. Ms. Blair was part of the project management team and managed the wetland delineation, Biological Survey Report, and Biological Evaluation.
- **North Area ROW Maintenance Project.** Under contract to Western, Ms. Blair is currently providing project support to prepare an Environmental Assessment and Operation and Maintenance Program associated with the operation and maintenance procedures along Western's transmission line ROWs between Sacramento (Sutter/Yuba County line) and the Oregon border. This project also includes a detailed survey of the biological and cultural resources along 434 miles of North Area ROW, 342 miles of COTP ROW, and several hundred miles of access and maintenance roads. Ms. Blair is working closely with project management and resource specialists to coordinate and execute over 800 miles of surveys. She conducted wildlife inventory and surveyed portions of ROW for sensitive species and recorded habitat types, jurisdictional waters and infrastructure using a Trimble GeoXT GPS unit. Additionally, Ms. Blair was integrally involved in the management and development of the North Area O&M GIS database.
- **Categorical Exclusions for Routine Operation and Maintenance.** Under contract to Western, Ms. Blair has prepared multiple CXs for routine maintenance activities along Western's CVP, PACI, and COTP transmission line ROWs and access roads. She has developed a streamlined and highly efficient system to use the results and analysis for the North Area ROW Maintenance Project to complete these documents.
- **GIS Data Verification and Resource Database Development for the Trinity County PUD Direct Interconnection Project.** Under contract to Western, Ms. Blair was the Deputy Project Manager for this project and also be coordinated and conducted biological resources in support of the development of an O&M GIS database, which included identification of sensitive resources and associated project conservation measures for this new segment of Western's CVP transmission system.
- **Seventh Standard Substation Project.** Under contract to the CPUC, Ms. Blair prepared the biological resource section of an Initial Study/Mitigated Negative Declaration for a proposed 4.9 acre 115/21 kV substation and transmission interconnection in northwest Bakersfield, Kern County, California. Important biological issues included impacts to the State and federally listed San Joaquin kit fox and western burrowing owl (a California species of special concern), as well as compliance with the Metropolitan Bakersfield Habitat Conservation Plan.
- **Atlantic-Del Mar Reinforcement Project Mitigated Negative Declaration.** Under contract to the CPUC, Ms. Blair served as an assistant environmental monitor during the construction of four miles of overhead transmission towers and lines and approximately 1.3 miles of underground lines. The project involved trenching, horizontal drilling and blasting and requires avoidance of several wetlands, seasonal pools and threatened and endangered species.
- **Miguel-Mission 230 kV #2 Project EIR Addendum.** Under contract to the CPUC, Ms. Blair helped to prepare a detailed addendum associated with engineering design changes for the Miguel-Mission 230 kV #2 Project.

Other Infrastructure, Resource Management, and Monitoring Projects

- **Hazardous Fuels and Vegetation Management for Angeles National Forest.** Under contract to the U.S. Forest Service, Ms. Blair conducted botanical and wildlife surveys at approximately 100 sites ranging from one to 2500 acres throughout the Angeles National Forest. Modifications to current fuel management practices were proposed in response to increased frequency and intensity of wildfire resulting from climate change. She prepared 75 Biological Evaluations/Biological Assessments that assessed the biological impacts of proposed fuel management practices throughout the forest.

- **Rare Plant Surveys for the East Branch Extension Pipeline Project.** Under contract to the Department of Water Resources, Ms. Blair conducted rare plant surveys of the endangered Santa Ana River woolly star (*Eriastrum densifolium* ssp. *sanctorum*) and the state and federally endangered slender horned spine flower (*Dodecahema leptoceras*) in response to the proposed construction of a water pipeline through San Bernardino and Riverside Counties.
- **Upper San Antonio Creek Watershed Giant Reed Removal Project.** Ms. Blair prepared the biological resource analysis of an Initial Study to remove invasive plant species from the Upper San Antonio Creek Watershed. Required field survey and development of impact avoidance measures for several special-status species, including California red-legged frog, southern steelhead, and riparian nesting birds.
- **Least Tern Monitoring for the Montezuma Slough Tidal Wetlands Restoration Project.** Under contract to EcoBridges Environmental, Ms. Blair monitored the nesting success of three nesting colonies of the federally and State endangered least tern. This effort involved counting and mapping the nest sites and tern chicks once a week for two years.
- **Endangered Species Monitoring for the Lomita Canal Vegetation Clearing Project.** Monitored the federally threatened California Red-legged frog and the state- and federally endangered San Francisco Giant Garter Snake during vegetation clearing activities along the Lomita Canal at the San Francisco International Airport. Involved identification of these species, relocation of California red-legged frogs, and re-direction of work in the event a SF Garter Snake was spotted.

PREVIOUS EXPERIENCE

Soil Ecology and Restoration Group

January to May 2004

Research Assistant. Ms. Blair assisted in managing the greenhouse where native seeds were germinated and propagated. In this role, she collected seeds from native plants and analyzed the composition of the soil present in their native habitat to ensure seedling viability. The plants were subsequently used in the restoration of degraded habitat as contracted by the U.S. Army Corps of Engineers and others.



BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT
COMMISSION OF THE STATE OF CALIFORNIA
1516 NINTH STREET, SACRAMENTO, CA 95814
1-800-822-6228 – WWW.ENERGY.CA.GOV

APPLICATION FOR CERTIFICATION
FOR THE **ABENGOA MOJAVE
SOLAR POWER PLANT**

Docket No. 09-AFC-5
PROOF OF SERVICE
(Revised 6/8/2010)

APPLICANT

Emiliano Garcia Sanz
General Manager
Abengoa Solar Inc.
11500 West 13th Avenue
Lakewood, CO 80215
emiliano.garcia@solar.abengoa.com

Scott D. Frier
Chief Operating Officer
Abengoa Solar Inc.
13911 Park Ave., Ste. 206
Victorville, CA 92392
scott.frier@solar.abengoa.com

Tandy McMannes
2030 Addison Street, Suite 420
Berkeley, CA 94704
tandy.mcmannes@solar.abengoa.com

APPLICANT'S CONSULTANTS

Frederick H. Redell, PE
Engineering Manager
Abengoa Solar, Inc.
11500 West 13th Avenue
Lakewood, CO 80215
frederick.redell@solar.abengoa.com

COUNSEL FOR APPLICANT

Christopher T. Ellison
Ellison, Schneider & Harris
2600 Capitol Ave.
Sacramento, CA 95816
cte@eslawfirm.com

INTERESTED AGENCIES

California ISO
E-mail Preferred
e-recipient@caiso.com

INTERVENORS

County of San Bernardino
Ruth E. Stringer, County Counsel
Bart W. Brizzee, Deputy County Counsel
385 N. Arrowhead Avenue, 4th Floor
San Bernardino, CA 92415-0140
bbrizzee@cc.sbcounty.gov

California Unions for Reliable Energy ("CURE")
Tanya A. Gulesserian
Marc D. Joseph
Elizabeth Klebaner
Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080

E-mail Preferred

tgulesserian@adamsbroadwell.com
eklebaner@adamsbroadwell.com

Luz Solar Partners Ltd., VIII
Luz Solar Partners Ltd., IX
Jennifer Schwartz
700 Universe Blvd
Juno Beach, FL 33408
jennifer.schwartz@nexteraenergy.com

ENERGY COMMISSION

ANTHONY EGGERT
Commissioner and Presiding Member
aeggert@energy.state.ca.us

JAMES D. BOYD
Vice Chairman and Associate Member
jboyd@energy.state.ca.us

Kourtney Vaccaro
Hearing Officer
kvaccaro@energy.state.ca.us

***Lorraine White**
Adviser to Commissioner Eggert
lwhite@energy.state.ca.us

Craig Hoffman
Project Manager
choffman@energy.state.ca.us

Christine Hammond
Staff Counsel
chammond@energy.state.ca.us

Jennifer Jennings
Public Adviser's Office
publicadviser@energy.state.ca.us

DECLARATION OF SERVICE

I, April Albright, declare that on June 30, 2010, I served and filed copies of the attached Supplemental Staff Assessment – Part C. The original documents, filed with the Docket Unit, are 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/abengoa/index.html>].

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:

- sent electronically to all email addresses on the Proof of Service list;
- by personal delivery;
- CDs delivered on this date, for mailing with the United States Postal Service with first-class postage thereon fully prepaid, to the name and address of the person served, for mailing that same day in the ordinary course of business; that the envelope was sealed and placed for collection and mailing on that date. **Hard copies are available upon request.**

AND

For filing with the Energy Commission:

- 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-5
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, that I am employed in the county where this mailing occurred, and that I am over the age of 18 years and not a party to the proceeding.

Original signed by: _____
April Albright

Memorandum

Date: July 2, 2010
Telephone: (916) 654-4781
File: 09-AFC-5

To: Commissioner Anthony Eggert, Presiding Member
Commissioner James Boyd, Associate Member
Kourtney Vaccaro Hearing Officer

From: **California Energy Commission - Craig Hoffman**
1516 Ninth Street
Sacramento, CA 95814-5512
Siting Project Manager

Subject: **ABENGOA MOJAVE SOLAR 09-AFC-5**
ENERGY COMMISSION STAFF'S ERRATA TO THE SUPPLEMENTAL STAFF
ASSESSMENT PART B - AIR QUALITY SECTION - (EXHIBIT 305)

This document presents minor changes to the Conditions of Certification, both staff conditions and the Mojave Desert Air Quality Management District's (District) conditions, but does not impact the staff's findings as presented in the Supplemental Staff Assessment. The substantive requirements under the conditions have not changed except to the extent they reflect new requirements in the District's revised Final Determination of Compliance (FDOC). The revisions to the proposed staff conditions and to the District conditions and equipment descriptions are provided in underline/strikeout.

The format revisions in staff's conditions are based on comments from Energy Commission legal staff, and these revisions are primarily made based on California Environmental Quality Act requirements that the substantive requirements remain in the conditions rather than the verifications of the conditions. There are a few other minor revisions that have been completed to address consistency issues between the current projects being licensed by the Energy Commission.

The District has revised its FDOC primarily to address consistency issues with the conditions for the Heat Transfer Fluid piping system and gasoline tank (MDAQMD 2010c). These revisions do not change the District's or staff's findings regarding compliance with laws, ordinances, regulations and standards.

cc: Proof of Service List
Docket 09-AFC-5

AIR QUALITY ERRATA

Testimony of William Walters, P.E.

INTRODUCTION

This document presents minor changes to the Conditions of Certification (CoCs), both staff conditions and the Mojave Desert Air Quality Management District's (District) conditions, but does not impact the staff's findings as presented in the Supplemental Staff Assessment. The substantive requirements under the conditions have not changed except to the extent they reflect new requirements in the District's revised Final Determination of Compliance (FDOC). The revisions to the proposed staff conditions and to the District conditions and equipment descriptions are provided in underline/strikeout.

The format revisions in staff's conditions are based on comments from Energy Commission legal staff, and these revisions are primarily made based on California Environmental Quality Act requirements that the substantive requirements remain in the conditions rather than the verifications of the conditions. There are a few other minor revisions that have been completed to address consistency issues between the current projects being licensed by the Energy Commission.

The District has revised its FDOC primarily to address consistency issues with the conditions for the Heat Transfer Fluid piping system and gasoline tank (MDAQMD 2010c). These revisions do not change the District's or staff's findings regarding compliance with laws, ordinances, regulations and standards

REVISED PROPOSED CONDITIONS OF CERTIFICATION

The CoCs with proposed revisions are provided below. The other proposed conditions remain as provided in the Supplemental Staff Assessment.

STAFF CONDITIONS OF CERTIFICATION

AQ-SC3 Construction Fugitive Dust Control: The AQCMM shall submit documentation to the CPM in each Monthly Compliance Report that demonstrates compliance with the Air Quality Construction Mitigation Plan (AQCMP) mitigation measures for the purposes of minimizing fugitive dust emission creation from construction activities and preventing all fugitive dust plumes that would not comply with the performance standards identified in **AQ-SC4** from leaving the project site. The following fugitive dust mitigation measures shall be included in the Air Quality Construction Mitigation Plan (AQCMP) required by **AQ-SC2**, and any deviation from the AQCMP mitigation measures shall require prior CPM notification and approval.

~~**Verification:** The AQCMM shall provide the CPM a Monthly Compliance Report to include the following to demonstrate control of fugitive dust emissions:~~

~~A. A summary of all actions taken to maintain compliance with this condition;~~

~~B. Copies of any complaints filed with the District in relation to project construction; and~~

~~C. Any other documentation deemed necessary by the CPM and AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner's discretion.~~

~~The following fugitive dust mitigation measures shall be included in the Air Quality Construction Mitigation Plan (AQCMP) required by **AQ-SC2**.~~

- a. The main access roads through the facility to the power block areas will be either paved or stabilized using soil binders, or equivalent methods, to provide a stabilized surface that is similar for the purposes of dust control to paving, that may or may not include a crushed rock (gravel or similar material with fines removed) top layer, prior to initiating construction in the main power block area, and delivery areas for operations materials (chemicals, replacement parts, etc.) will be paved or treated prior to taking initial deliveries.
- b. All unpaved construction roads and unpaved operation and maintenance site roads, as they are being constructed, shall be stabilized with a non-toxic soil stabilizer or soil weighting agent that can be determined to be both as efficient as or more efficient for fugitive dust control as than ARB approved soil stabilizers, and that shall not increase any other environmental impacts, including loss of vegetation to areas beyond where the soil stabilizers are being applied for dust control. All other disturbed areas in the project and linear construction sites shall be watered as frequently as necessary during grading (consistent with **BIO-7** ~~Bio-7~~); and after active construction activities shall be stabilized with a non-toxic soil stabilizer or soil weighting agent, or alternative approved soil stabilizing methods, in order to comply with the dust mitigation objectives of Condition of Certification **AQ-SC4**. The frequency of watering can be reduced or eliminated during periods of precipitation.
- c. No vehicle shall exceed 10 miles per hour on unpaved areas within the construction site, 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.
- d. Visible speed limit signs shall be posted at the construction site entrances.
- e. All construction equipment vehicle tires shall be inspected and washed as necessary to be cleaned free of dirt prior to entering paved roadways.
- f. Gravel ramps of at least 20 feet in length must be provided at the tire washing/cleaning station.
- g. All unpaved exits from the construction site shall be graveled or treated to prevent track-out to public roadways.
- h. All construction vehicles shall enter the construction site through the treated entrance roadways, unless an alternative route has been submitted to and approved by the CPM.

- i. Construction areas adjacent to any paved roadway below the grade of the surrounding construction area or otherwise directly impacted by sediment from site drainage shall be provided with sandbags or other equivalently effective measures to prevent run-off to roadways, or other similar run-off control measures as specified in the Storm Water Pollution Prevention Plan (SWPPP), only when such SWPPP measures are necessary so that this condition does not conflict with the requirements of the SWPPP.
- j. All paved roads within the construction site shall be swept daily or as needed (less during periods of precipitation) on days when construction activity occurs to prevent the accumulation of dirt and debris.
- k. At least the first 500 feet of any paved public roadway exiting the construction site or exiting other unpaved roads en route from the construction site or construction staging areas shall be swept as needed (less during periods of precipitation) on days when construction activity occurs or on any other day when dirt or runoff resulting from the construction site activities is visible on the public paved roadways.
- l. All soil storage piles and disturbed areas that remain inactive for longer than 10 days shall be covered, or shall be treated with appropriate dust suppressant compounds.
- m. All vehicles that are used to transport solid bulk material on public roadways and that have potential to cause visible emissions shall be provided with a cover, or the materials shall be sufficiently wetted and loaded onto the trucks in a manner to provide at least one foot of freeboard.
- n. Wind erosion control techniques (such as windbreaks, water, chemical dust suppressants, and/or vegetation) shall be used on all construction areas that may be disturbed. Any windbreaks installed to comply with this condition shall remain in place until the soil is stabilized or permanently covered with vegetation.

Verification: The AQCMM shall provide the CPM a Monthly Compliance Report to include the following to demonstrate control of fugitive dust emissions:

- A. A summary of all actions taken to maintain compliance with this condition;
- B. Copies of any complaints filed with the District in relation to project construction; and
- C. Any other documentation deemed necessary by the CPM or AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner's discretion.

AQ-SC4 Dust Plume Response Requirement: The AQCMM or an AQCMM Delegate shall monitor all construction activities for visible dust plumes. Observations of visible dust plumes that have the potential to be transported (A) off the project site and within 400 feet upwind of any regularly occupied structures not

owned by the project owner or (B) 200 feet beyond the centerline of the construction of linear facilities indicate that existing mitigation measures are not resulting in effective mitigation. The AQCMP shall include a section detailing how the additional mitigation measures will be accomplished within the time limits specified. The AQCMM or Delegate shall implement the following procedures for additional mitigation measures in the event that such visible dust plumes are observed:~~described in the verification below and how they will be implemented to meet these fugitive dust control performance standards.~~

~~**Verification:** The AQCMM shall provide the CPM a Monthly Compliance Report to include:~~

- ~~A. A summary of all actions taken to maintain compliance with this condition;~~
- ~~B. Copies of any complaints filed with the District in relation to project construction; and~~
- ~~C. Any other documentation deemed necessary by the CPM and AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner's discretion.~~

~~The AQCMP shall include the following additional mitigation measure implementation procedures that will be used to ensure that the performance standards of this condition are met:~~

- ~~• The AQCMM or Delegate shall implement the following procedures for additional mitigation measures in the event that visible dust plumes as defined above are observed:~~

~~Step 1: The AQCMM or Delegate shall direct more intensive application of the existing mitigation methods within 15 minutes of making such a determination.~~

~~Step 2: The AQCMM or Delegate shall direct implementation of additional methods of dust suppression if Step 1, specified above, fails to result in adequate mitigation within 30 minutes of the original determination.~~

~~Step 3: The AQCMM or Delegate shall direct a temporary shutdown of the activity causing the emissions if Step 2, specified above, fails to result in effective mitigation within one hour of the original determination. The activity shall not restart until the AQCMM or Delegate is satisfied that appropriate additional mitigation or other site conditions have changed so that visual dust plumes will not result upon restarting the shutdown source. The project owner may appeal to the CPM any directive from the AQCMM or Delegate to shut down an activity, if the shutdown shall go into effect within one hour of the original determination, unless overruled by the CPM before that time.~~

~~**Verification:** The AQCMM shall provide the CPM a Monthly Compliance Report to include:~~

- ~~A. A summary of all actions taken to maintain compliance with this condition;~~

- B. Copies of any complaints filed with the District in relation to project construction; and
- C. Any other documentation deemed necessary by the CPM or AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner's discretion.

AQ-SC5 Diesel-Fueled Engine Control: The AQCMM shall submit to the CPM, in the Monthly Compliance Report, a construction mitigation report that demonstrates compliance with the AQCMP mitigation measures for purposes of controlling diesel construction-related emissions. The following off-road diesel construction equipment mitigation measures shall be included in the Air Quality Construction Mitigation Plan (AQCMP) required by AQ-SC2, and ~~a~~Any deviation from the AQCMP mitigation measures shall require prior and CPM notification and approval.

~~**Verification:** The AQCMM shall include in the Monthly Compliance Report the following to demonstrate control of diesel construction-related emissions:~~

- ~~A. A summary of all actions taken to control diesel construction related emissions;~~
- ~~B. A list of all heavy equipment used on site during that month, including the owner of that equipment and a letter from each owner indicating that equipment has been properly maintained; and~~
- ~~C. Any other documentation deemed necessary by the CPM, and the AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner's discretion.~~

~~The following off road diesel construction equipment mitigation measures shall be included in the Air Quality Construction Mitigation Plan (AQCMP) required by **AQ-SC2**.~~

- a. All diesel-fueled engines used in the construction of the facility shall have clearly visible tags issued by the on-site AQCMM showing that the engine meets the conditions set forth herein.
- b. All construction diesel engines with a rating of 50 hp or higher and lower than 750 hp shall meet, at a minimum, the Tier 3 California Emission Standards for Off-Road Compression-Ignition Engines, as specified in California Code of Regulations, Title 13, section 2423(b)(1), unless a good faith effort to the satisfaction of the CPM that is certified by the on-site AQCMM demonstrates that such engine is not available for a particular item of equipment. Engines larger than 750 hp shall meet Tier 2 engine standards. In the event that a Tier 3 engine is not available for any off-road equipment larger than ~~50400~~ 400 hp and smaller than 750 hp, that equipment shall be equipped with a Tier 2 engine, or an engine that is equipped with retrofit controls to reduce exhaust emissions of nitrogen oxides (NOx) and diesel particulate matter (DPM) to no more than Tier 2 levels unless certified by engine manufacturers or the on-site AQCMM that the use of such devices is not practical for specific engine types. For purposes of this condition, the use of such devices is "not practical" for the following, as well as other, reasons.

1. There is no available retrofit control device that has been verified by either the California Air Resources Board or U.S. Environmental Protection Agency to control the engine in question to Tier 2 equivalent emission levels and the highest level of available control using retrofit or Tier 1 engines is being used for the engine in question; or
 2. The construction equipment is intended to be on site for 10 days or less.
 3. The CPM may grant relief from this requirement if the AQCMM can demonstrate a good faith effort to comply with this requirement and that compliance is not practical.
- c. The use of a retrofit control device may be terminated immediately, provided that the CPM is informed within 10 working days of the termination and that a replacement for the equipment item in question meeting the controls required in item "b" occurs within 10 days of termination of the use, if the equipment would be needed to continue working at this site for more than 15 days after the use of the retrofit control device is terminated, if one of the following conditions exists :
1. The use of the retrofit control device is excessively reducing the normal availability of the construction equipment due to increased down time for maintenance, and/or reduced power output due to an excessive increase in back pressure.
 2. The retrofit control device is causing or is reasonably expected to cause engine damage.
 3. The retrofit control device is causing or is reasonably expected to cause a substantial risk to workers or the public.
 4. Any other seriously detrimental cause which has the approval of the CPM prior to implementation of the termination.
- d. All heavy earth-moving equipment and heavy duty construction-related trucks with engines meeting the requirements of (b) above shall be properly maintained and the engines tuned to the engine manufacturer's specifications.
- e. All diesel heavy construction equipment shall not idle for more than five minutes. Vehicles that need to idle as part of their normal operation (such as concrete trucks) are exempted from this requirement.
- f. Construction equipment will employ electric motors when feasible.

Verification: The AQCMM shall include in the Monthly Compliance Report the following to demonstrate control of diesel construction-related emissions:

A. A summary of all actions taken to control diesel construction related emissions;

- B. A list of all heavy equipment used on site during that month, including the owner of that equipment and a letter from each owner indicating that equipment has been properly maintained; and
- C. Any other documentation deemed necessary by the CPM or AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner's discretion.

AQ-SC8 The project owner shall provide the CPM copies of all District issued Authority-to-Construct (ATC) and Permit-to-Operate (PTO) documents for the facility.

The project owner shall submit to the CPM for review and approval any modification proposed by the project owner to any project federal air permit. The project owner shall submit to the CPM any modification to any federal air permit proposed by the District or U.S. Environmental Protection Agency (U.S. EPA), and any revised federal air permit issued by the District or U.S. EPA, for the project.

Verification: The project owner shall submit any ATC, PTO, and proposed federal air permit modifications to the CPM within five working days of its submittal either by 1) the project owner to an agency, or 2) receipt of proposed modifications from an agency. The project owner shall submit all modified ATC/PTO documents and all federal air permits to the CPM within 15 days of receipt.

DISTRICT CONDITIONS

District Revised Final Determination of Compliance Conditions (MDAQMD 2010c)

Application No. 00010906 and 00010907 (Two - HTF Ullage/Expansion TankSystem)

EQUIPMENT DESCRIPTION

Two HTF ullage/expansion systemstanks.

- AQ-16** The project owner shall establish an inspection and maintenance program to determine, repair, and log leaks in HTF piping network, ~~storage tanks, distillation units~~ and expansion tanks. Inspection and maintenance program and documentation shall be available to District staff upon request.
- a. All pumps, compressors and pressure relief devices (pressure relief valves or rupture disks) shall be electronically, audio, or visually inspected once every operating day.
 - b. All accessible valves, fittings, pressure relief devices (PRDs), hatches, pumps, compressors, etc. shall be inspected quarterly using a leak detection device such as a Foxboro OVA 108 calibrated for methane.

- ~~c. VOC leaks greater than 100-ppmv shall be tagged (with date and concentration) and repaired within seven calendar days of detection.~~
- c. Inspection frequency for accessible components, except pumps, compressors and pressure relief valves, may be changed from quarterly to annual when two percent or less of the components within a component type are found to leak during an inspection for five consecutive quarters.
- d. Inspection frequency for accessible components, except pumps, compressors and pressure relief valves, shall be increased to quarterly when more than two percent of the components within a component type are found to leak during any inspection or report.
- e. If any evidence of a potential leak is found the indication of the potential leak shall be eliminated within 7 calendar days of detection.
- ~~df. VOC leaks greater than 10,000-ppmv shall be tagged and repaired within 24-hours of detection.~~
- ~~g. The project owner shall maintain record of the amount of HTF degradation products removed from system on a monthly basis for a period of five (5) years~~
- g. After a repair, the component shall be re-inspected for leaks as soon as practicable, but no later than 30 days after the date on which the component is repaired and placed in service.
- ~~h. Any detected leak exceeding 100-ppmv and not repaired in 7-days and 10,000-ppmv not repaired within 24-hours shall constitute a violation of this Authority to Construct (ATC)/Permit to Operate (PTO).~~
- eh. The project owner shall maintain a log of all VOC leaks exceeding 10,000-ppmv, including location, component type, date of leak detection, emission level (ppmv), method of leak detection, date of repair, date and emission level of reinspection after leak is repaired, and repair made.
- ~~i. The project owner shall place an adequate number of isolation valves in the Heat transfer Fluid (HTF) pipe loops so as to be able to isolate a solar panel collector loop in the event of a leak of fluid. These valves shall be actuated automatically, manually, and remotely, or locally as determined during detailed engineering design. The detailed engineering design drawings showing the number, location, and type of isolation valves shall be provided to the District for review and approval prior to the commencement of the solar array construction.~~
- i. The project owner shall maintain records of the total number of components inspected, and the total number and percentage of leaking components found, by component types made.

- fj. The project owner shall maintain record of the amount of HTF replaced on a monthly basis for a period of five (5) years.

Verification: The inspection and maintenance plan shall be submitted to the CPM for review and approval at least 30 days before taking delivery of the HTF. As part of the Annual Compliance Report, the project owner shall provide the quantity of used HTF fluid removed from the system and the amount of new HTF fluid added to the system each year. The project owner shall make the site available for inspection of HTF piping Inspection and Maintenance Program records and HTF system equipment by representatives of the District, ARB, and the Energy Commission.

AQ-18 The project owner shall perform the following initial compliance tests on this equipment in accordance with the MDAQMD Compliance Test Procedural Manual. The test report shall be submitted to the District within 180 days of initial start up. The following compliance tests are required:

- a. VOC as CH₄ in ppmvd and lb/hr (measured per USEPA Reference Methods 25A and 18 or equivalent).
- b. Benzene in ppmvd at and lb/hr (measured per CARB method 410 or equivalent).

Verification: The project owner shall submit the test results to the District and to the CPM within 180 days after initial start up.

Application No. 00010712 and 00010713 (Two - 4,190 HP Emergency IC Engine)

EQUIPMENT DESCRIPTION

Two - ~~Tier II~~ 4,190 HP diesel fueled emergency generator engines, each driving a generator.

Application No. 00010714 and 00010715 (Two - 346 HP Emergency IC Engine)

EQUIPMENT DESCRIPTION

Two - ~~Tier III~~ 346 HP diesel fueled emergency generator engines, each driving a fire suppression water pump.

Application No. 00010995 (One – Gasoline Storage Tank)

EQUIPMENT DESCRIPTION

One – Above ground gasoline storage tank and fuel receiving and dispensing equipment.

AQ-50 The toll-free telephone number that must be posted is 1-800-635-4617 or 1-877-723-8070.

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-51 The project owner shall maintain a log of all inspections, repairs, and maintenance on equipment subject to Rule 461. Such logs or records shall be maintained at the facility for at least two (2) years and shall be available to the District upon request. Records of Maintenance, Tests, Inspections, and Test Failures shall be maintained and available to District personal upon request; record form shall be similar to the Maintenance Record form indicated in EO VR-401-A, Figure 2N.

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-53 ~~The gasoline~~ Pursuant to EO VR-401-A, vapor vent pipe(s) are to be equipped with Husky 5885 pressure relief valve(s) ~~per applicable CARB~~ requirements.

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-54 The project owner shall perform the following tests within 60 days of construction completion and annually thereafter in accordance with the ~~applicable CARB~~ following test methods/procedures:

- a. Determination of Static Pressure Performance of Vapor Recovery Systems at Gasoline Dispensing Facilities with Aboveground Storage Tanks shall be conducted per EO VR-401-A Exhibit 4. and,
- b. Phase I Adapters, Emergency Vents, Spill Container Drain Valve, Dedicated gauging port with drop tube and tank components, all connections, and fittings shall NOT have any detectable leaks; test methods shall be per EO VR-401-A Table 2-1, and
- c. Liquid Removal Test (if applicable) per TP-201.6, and

Summary of Test Data shall be documented on a Form similar to EO VR-401-A Form 1.

The District shall be notified a minimum of 10 days prior to performing the required tests with the final results submitted to the District within 30 days of completion of the tests.

The District shall receive passing test reports no later than six (6) weeks prior to the expiration date of this permit.

Verification: The project owner shall notify the District at least 10 days prior to performing the required tests. The test results shall be submitted to the District within 30 days of completion of the tests and shall be made available to the CPM if requested.

AQ-55 Pursuant to California Health and Safety Code sections 39600, 39601 and 41954, this aboveground tank shall be installed and maintained in accordance with Executive Order (EO) VR-401-A for EVR Phase I, and Standing Loss requirements:

<http://www.arb.ca.gov/vapor/eos/eo-vr401/eo-vr401a/eo-401a.pdf>

Additionally, Phase II Vapor Recovery System shall be installed and maintained per G-70-116-F with the exception that hanging hardware shall be EVR Balance Phase II type hanging hardware (VST or other CARB Approved EVR Phase II Hardware).

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-56 Pursuant to EO VR-401-A: Maintenance and repair of system components, including removal and installation of such components in the course of any required tests, shall be performed by OPW Certified Technicians.

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-57 Pursuant to EO VR-401-A, Maintenance Intervals for OPW; Tank Gauge Components; Dust Caps Emergency Vents; Phase I Product and Vapor Adapters, and Spill Container Drain Valve, shall be conducted by an OPW trained technician annually.

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-5558 The annual throughput of gasoline shall not exceed ~~25600~~,000 gallons per year. Throughput Records shall be kept on site and available to District personnel upon request. Before this annual throughput can be increased the facility may be required to submit to the District a site specific Health Risk Assessment in accord with a District approved plan. In addition public notice and/or comment period may be required.

Verification: The project owner shall submit to the CPM gasoline throughput records demonstrating compliance with this condition as part of the Annual Compliance Report. The project owner shall maintain on site the annual gasoline throughput records and shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-5659 ~~The project owner shall install, maintain, and operate, and maintain CARB approved EVR Phase I and in compliance with CARB Executive Order VR-401-A, and Phase II vapor recovery in accordance with G-70-116-F. In the event of conflict between these permit conditions and/or the referenced EO's the more stringent requirements shall govern. systems on the proposed facility gasoline tank and dispensing system. The Phase I and Phase II vapor recovery systems will meet all applicable CARB standards at the time of installation for the systems selected.~~

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

~~**AQ-57** The California Air Resources Board (CARB) has established a timeline for Aboveground Storage Tanks (AST) Enhanced Vapor Recovery (EVR) system~~

~~implementation. Pursuant to CARB requirements and State mandated retrofits, the project owner shall ensure that this tank meets all the applicable requirements within the designated timeframes. Prior to conducting any modifications the project owner shall obtain a District approved Authority to Construct (ATC) Permit. See the following link for AST EVR Timeline:
http://o3.arb.ca.gov/vapor/asttimeline_123009.pdf~~

Verification: ~~The project owner shall provide the District and the GPM documentation, at least 30 days prior to installation, showing that the tank at the time of installation will meet appropriate ARB EVR requirements.~~

REFERENCES

MDAQMD 2010c - Mojave Desert Air Quality Management District / A. De Salvio.
Abengoa Mojave – Final Decision/Determination of Compliance, Revision A,
dated 7/1/2010. Submitted to CEC on 7/1/2010.

**DECLARATION OF
Testimony of William Walters, P.E.**

I, **William Walters**, declare as follows:

1. I am presently employed by Aspen Environmental Group, a contractor to the California Energy Commission's Siting, Transmission and Environmental Protection Division, as a senior associate in engineering and physical sciences.
2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.
3. I helped prepare the staff testimony on **Air Quality Errata** for the **Abengoa Mojave Solar** project (09-AFC-5) based on my independent analysis of the Application for Certification and supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.
4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.
5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

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

Dated: July 1, 2010

Signed: Original signed by W. Walters

At: Agoura Hills, California

WILLIAM WALTERS, P.E.
Air Quality Specialist

ACADEMIC BACKGROUND

B.S., Chemical Engineering, 1985, Cornell University

PROFESSIONAL EXPERIENCE

Mr. Walters has over 20 years of technical and project management experience in environmental compliance work, including environmental impact reports, emissions inventories, source permitting, energy and pollution control research RCRA/CERCLA site assessment and closure, site inspection, and source monitoring.

Aspen Environmental Group

2000 to present

Responsible as lead technical and/or project manager of environmental projects. Specific responsibilities and projects include the following:

- **Engineering and Environmental Technical Assistance to Conduct Application for Certification Review for the California Energy Commission:**
 - Preparation and project management of the air quality section of the Staff Assessment and/or Initial Study and the visual plume assessment for the following California Energy Commission (CEC) licensing projects: Hanford Energy Park; United Golden Gate, Phase I; Huntington Beach Modernization Project (including Expert Witness Testimony); Woodland Generating Station 2; Ocotillo Energy Project, Phase I; Magnolia Power Project; Colusa Power Project; Inland Empire Energy Center; Rio Linda/Elverta Power Plant Project; Roseville Energy Center; Henrietta Peaker Project; Tracy Peaking Power Plant Project (including Expert Witness Testimony); Avenal Energy Project; San Joaquin Valley Energy Center (including expert witness testimony); Salton Sea Unit 6 Project (including expert witness testimony); Modesto Irrigation District Electric Generation Station (including expert witness testimony); Walnut Energy Center (including expert witness testimony); Riverside Energy Resource Center (including expert witness testimony); Pastoria Energy Facility Expansion; Panoche Energy Center; Starwood Power Plant; and Riverside Energy Resource Center Units 3 and 4 Project (in progress).
 - Preparation and project management of the visual plume assessment for the following California Energy Commission (Energy Commission) licensing projects: Metcalf Energy Center Power Project (including Expert Witness Testimony); Contra Costa Power Plant Project (including Expert Witness Testimony); Mountainview Power Project; Potrero Power Plant Project; El Segundo Modernization Project; Morro Bay Power Plant Project; Valero Cogeneration Project; East Altamont Energy Center (including expert witness testimony); Russell City Energy Center; SMUD Cosumnes Power Plant Project (including expert witness testimony); Pico Power Project; Blythe Energy Project Phase II; City of Vernon Malburg Generating Station; San Francisco Electric Reliability Project; Los Esteros Critical Energy Facility Phase II; Roseville Energy Park; City of Vernon Power Plant; South Bay Replacement Project; Walnut Creek Energy Park; Sun Valley Energy Project; Highgrove Power Plant; Colusa Generating Station; Russell City Energy Center; Avenal Energy Project; Carlsbad Energy Center; Community Power Project; Panoche Energy Center; San Gabriel Generating Station; Sentinel Energy Project; and Victorville 2 Hybrid Power Project.
 - Assistance in the aircraft safety review of thermal plume turbulence for the Riverside Energy Resources Center; Russell City Energy Center Amendment (including expert witness testimony); Eastshore Energy Power Plant (including expert witness testimony); Carlsbad Energy Center (in progress), Riverside Energy Resource Center Units 3 and 4 Project; Victorville 2 Hybrid Power Project; and the Blythe Energy Power

Plant and Blythe Energy Project Phase II (including expert witness testimony) siting cases. Assistance in the aircraft safety review of thermal and visual plumes of the operating Blythe Energy Power Plant. Preparation of a white paper on methods for the determination of vertical plume velocity determination for aircraft safety analyses.

- Preparation and instruction of a visual water vapor plume modeling methodology class for the CEC.
- Preparation and project management of the public health section of the Initial Study for the Woodland Generating Station 2 Energy Commission licensing project.
- Preparation of project amendment or project compliance assessments, for air quality or visual plume impacts, for several licensed power plants, including: Metcalf Energy Center; Pastoria Power Plant; Elk Hills Power Plant; Henrietta Peaker Project; Tracy Peaker Project; Magnolia Power Project; Delta Energy Center; SMUD Cosumnes Power Plant; Walnut Energy Center; San Joaquin Valley Energy Center; City of Vernon Malburg Generating Station; Otay Mesa Power Plant; Los Esteros Critical Energy Facility; Pico Power Project; Riverside Energy Resource Center; Blythe Energy Project Phase II; Inland Empire Energy Center; Salton Sea Unit 6 Project; and Starwood Power-Midway Peaking Power Plant.
- Preparation of the air quality section of the staff paper “A Preliminary Environmental Profile of California’s Imported Electricity” for the Energy Commission and presentation of the findings before the Commission.
- Preparation of the draft staff paper “Natural Gas Quality: Power Turbine Performance During Heat Content Surge”, and presentation of the preliminary findings at the California Air Resources Board Compressed Natural Gas Workshop and a SoCalGas Technical Advisory Committee meeting.
- Preparation of the staff paper “Emission Offsets Availability Issues” and preparation and presentation of the Emission Offsets Constraints Workshop Summary paper for the Energy Commission.
- Preparation of information request and data analysis to update the Energy Commission’s Cost of Generation Model capital and operating cost factors for combined and simple cycle gas turbine projects. Additionally, performed a review of the presentation for the revised model as part of the CEC’s 2007 Integrated Energy Policy Report workshops, and attended the workshop and answering Commissioner questions on the data collection and data analysis.
- **For the Los Angeles Department of Water and Power (LADWP):**
 - Preparation of the Air Quality Inventory for the LADWP River Supply Pipeline Project EIR.
 - Project management and preparation of the Air Quality Section for the LADWP Valley Generating Station Stack Removal IS/MND support project.
- **For the U.S. Army Corps of Engineers (Corps):**
 - Preparation of the Air Quality Section and General Conformity Analysis for the Matilija Dam Ecosystem Restoration Project EIS/R for the Corps.
 - Preparation of emission inventory and General Conformity Analysis of the Murrieta Creek Flood Control Project and the Joint Red Flag exercise to be conducted in the Nevada Test and Training Range.
 - Emission inventory for the construction activities forecast for the San Jose/Old San Jose Creeks Ecosystem Restoration project for the Corps.
- **Other Projects:**
 - Preparation of the Air Quality Section of the LAUSD New School Construction Program EIR and provided traffic trip and VMT calculation support for the Traffic and Transportation Section.

- Preparation of the draft staff paper “Natural Gas Quality: Power Turbine Performance During Heat Content Surge”, and presentation of the preliminary findings at the California Air Resources Board Compressed Natural Gas Workshop and a SoCalGas Technical Advisory Committee meeting.
- Preparation of the Air Quality Section of the Environmental Information Document in support of the Coastal Consistency Determinations for the suspension of operation requests for undeveloped units and leases off the Central California Coast.
- Preparation of comments on the Air Quality, Alternatives, Marine Traffic, Public Safety, and Noise section of the Cabrillo Port Liquefied Natural Gas Deepwater Port Draft EIS/EIR for the City of Oxnard.
- Preparation of the emission estimates used in the Air Quality Sections for the DWR Tehachapi Second Afterbay Project Initial Study and EIR.

Camp Dresser & McKee, Inc.

1998 to 2000

Mr. Walters was responsible as lead technical and/or project manager of environmental projects. Specific responsibilities and projects include the following:

- Preparation of emission inventories and dispersion modeling for criteria and air toxic pollutants for the Los Angeles International Airport Master Plan (LAXMP) EIS/EIR.
- Project Manager/Technical lead for the completion of air permit applications and air compliance audits for two Desa International fireplace accessory manufacturing facilities located in Santa Ana, California.
- Project manager/technical lead for the completion of Risk Management Plans (RMPs) for four J.R. Simplot food processing facilities in Oregon, Idaho, and Washington and the Consolidated Reprographics facility located in Irvine, California.

Planning Consultants Research

1997 to 1998

Mr. Walters was responsible as lead technical and/or project manager of environmental projects. Specific responsibilities and projects include the following:

- Project Manager for a stationary source emission audit of the entire Los Angeles International Airport complex for Los Angeles World Airports (LAWA) in support of the LAXMP.
- Review of the Emission Dispersion Modeling System (EDMS) and preparation of a report with findings to the Federal Aviation Administration for LAWA in support of the LAXMP.
- Project manager for the ambient air monitoring and deposition monitoring studies performed for LAWA in support of the LAXMP, including the selection of the monitoring sites and specialty subcontractor, and review of all monitoring data.

Aspen Environmental Group/Clean Air Solutions

1995 to 1996

Mr. Walters was responsible as lead technical and/or project manager of environmental projects. Specific responsibilities and projects include the following:

- Manager of the Portland, Oregon, office of Clean Air Solutions from March 1995 to December 1995, with responsibilities including Project Management, Business Development, and Administration.
- Control technology assessment, engineering support and Notice of Intent to construct preparation for J.R. Simplot’s Hermiston, Oregon, food processing facility. Review and revision of an Air Contaminant Discharge Permit application, Title V permit application, and PSD modeling analysis for J.R. Simplot's Hermiston facility.

- Air quality compliance report including an air emission inventory, regulation and permit compliance determination, and recommendations for compliance for Lumber Tech, Inc.'s Lebanon, Oregon, wood products facility.

Fluor Daniel, Inc.

1990 to 1995 and 1996 to 1997

Mr. Walters was responsible as lead technical or project manager for major environmental projects for both government and private clients. His projects included:

- Prepared several air permit applications for the ARCO Los Angeles Refinery Polypropylene Plant Project; Phase I environmental assessments for properties located in Southern California; and a site investigation and RCRA closure plan for a hazardous waste storage site in Vernon, California.
- Project manager of the Anaconda Smelter site for the U.S. Environmental Protection Agency's (EPA) Alternative Remedial Contract System (ARCS) project during the conclusion of technical activities and project closeout. Prepared a cost recovery report for the project.
- Performed environmental analysis for the Bonneville Power Authority, including air pollution BACT analysis, wastewater analysis, and evaluation of secondary environmental effects of electric power producing technologies.

Jacobs Engineering Group

1988 to 1990

Mr. Walters was responsible for a wide range of air pollution regulatory and testing projects, including the following:

- Project manager of air toxic emission inventory reports prepared for U.S. Borax's boron mining and refining facility and the Naval Aviation Depot (N. Island Naval Base, San Diego, California).
- Prepared air permit applications and regulatory correspondence for several facilities including the U.S. Department of Energy's Feed Material Production Center uranium processing facility in Fernald, Ohio; Evaluation of a sludge dewatering process at Unocal's Wilmington, California, Refinery; and United Airlines blade repair facility at the San Francisco Airport.
- Characterized and quantified air emissions for offshore oil and gas development activities associated with Federal oil and gas Lease Sale 95, offshore southern California, for the U.S. Minerals Management Service.

CERTIFICATIONS

- Chemical Engineer, California License 5973
- CARB, Fundamentals of Enforcement Seminar
- EPA Methods 1-8, 17; Training Seminar

AWARDS

- California Energy Commission Outstanding Performance Award 2001

Memorandum

Date: June 29, 2010
Telephone: (916) 654-4781
File: 09-AFC-5

To: Commissioner Anthony Eggert, Presiding Member
Vice Chair James Boyd, Associate Member
Kourtney Vaccaro, Hearing Officer

DOCKET	
09-AFC-5	
DATE	<u>JUN 29 2010</u>
REC'D	<u>JUN 29 2010</u>

From: California Energy Commission - Craig Hoffman
1516 Ninth Street Siting Project Manager
Sacramento, CA 95814-5512

Subject: **ABENGOA MOJAVE SOLAR 09-AFC-5**

ENERGY COMMISSION STAFF'S REBUTTAL TESTIMONY TO THE APPLICANT'S OPENING TESTIMONY – DECLARATIONS AND RESUMES (Exhibit 306)

Energy Commission staff is providing declarations and resumes for rebuttal testimony that was published on June 17, 2010. (Exhibit 306) These declarations and resumes are a part of Exhibit 306.

Declarations and Resumes are provided for the following technical sections:

- Biological Resources - Heather Blair
- Hazardous Materials – Alvin J. Greenberg, Ph.D.
- Noise and Vibration - Shahab Khoshmashrab
- Soils and Water Resources – Christopher B. Dennis, John L. Fio, Eugene B. Yates and Mike Conway
- Traffic and Transportation - Steven J. Brown
- Visual Resources - Thomas Packard, William D. Kanemoto and James Jewell
- Waste Management – Ellen Townsend-Hough
- Worker Safety and Fire Protection - Alvin J. Greenberg, Ph.D.

cc: Proof of Service List
Docket 09-AFC-5

**DECLARATION OF
Heather Blair**

I, Heather Blair, declare as follows:

1. I am presently employed as a consultant to the California Energy Commission in the Siting, Transmission and Environmental Protection Division.
2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.
3. I prepared the staff rebuttal testimony on the **Biological Resources** for the **Abengoa Mojave Solar** project (09-AFC-5) based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.
4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed therein.
5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

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

Dated: June 23, 2010

Signed: Original signed by H. Blair

At: Sacramento, California



HEATHER BLAIR
Environmental Scientist

ACADEMIC BACKGROUND

M.S., Conservation Biology, Sacramento State University, In Progress
B.S., Ecology, San Diego State University, 2004

PROFESSIONAL EXPERIENCE

Heather Blair is an Environmental Scientist experienced in a range of natural resource investigations and environmental impact analysis including botanical and wildlife research, inventory, and survey techniques; technical writing; and data analysis. She has experience preparing environmental documents pursuant to applicable federal, state and local environmental regulations, including the California Environmental Quality Act, National Environmental Policy Act, and the California and federal Endangered Species Acts.

Aspen Environmental Group

2004 to present

Selected project experience at Aspen includes the following:

Power Generation and Transmission Interconnection Projects

- **California Energy Commission.** Aspen has a multi-year contract to provide support to the Energy Facility Planning and Licensing Programs. Under this contract Ms. Blair has participated in the following projects:
 - **Biological Resources Assessment for the Abengoa Mojave Solar Project.** Ms. Blair is currently serving as the lead technical staff for the analysis of impacts to biological resources from the 250 MW power plant in the Mojave Desert. Important biological issues include impacts to Harper Dry Lake from potentially decreased water availability, desert tortoise, and Mojave ground squirrel.
 - **Biological Resources Assessment for the San Joaquin Solar 1&2 Hybrid Project.** Ms. Blair is currently serving as the lead technical staff for the analysis of impacts to biological resources from the 107 MW solar thermal/biomass hybrid power plant. Important biological issues include potential impacts to San Joaquin kit fox habitat and movement corridor connectivity.
 - **Biological Resources Assessment for the Genesis Solar Energy Project.** Ms. Blair is currently serving as the assistant technical staff for the analysis of impacts to biological resources from the 250 MW power plant in an undeveloped area of the Sonoran Desert. Important biological issues include direct and indirect (downstream) impacts to ephemeral drainages from site development and indirect impacts to sand dune dependent vegetation and wildlife communities from disruption of Aeolian processes.
 - **Biological Resources Assessment for the Carlsbad Energy Center.** Ms. Blair is currently serving as the lead technical staff for the analysis of impacts to biological resources from the 540 MW CECP. Important biological issues include potential impacts to Agua Hedionda Lagoon and consistency with the Carlsbad Habitat Management Plan. Ms. Blair recently testified as an expert witness in biological resources during Evidentiary Hearings before the Commission.
 - **Biological Resources Assessment for the CPV Sentinel Project.** Ms. Blair served as the lead technical staff for the analysis of impacts to biological resources from the 850 MW CPV Sentinel project. Important biological issues include potential impacts from groundwater drawdown to the mesquite hummock plant community and the special-status species it supports.
 - **Biological Resources Assessment for the CPV Vaca Station Project.** Ms. Blair is currently serving as the lead technical staff for the analysis of impacts to biological resources from the 660 MW CPVVS.

Important biological issues include potential impacts to giant garter snake from reduced flows in Old Almao Creek and loss of Swainson's hawk foraging habitat.

- **Biological Resources Assessments for the Marsh Landing and Willow Pass Generating Stations.** Ms. Blair is currently serving as the lead technical staff for the analysis of impacts to biological resources from the 930 MW MLGS and 550 MW WPGS. Important biological issues include potential indirect impacts to listed plant species in the Antioch Dunes National Wildlife Refuge from nitrogen deposition.
- **Biological Resources Assessments for the Panoche and Starwood Energy Centers.** Ms. Blair served as the lead technical staff for the analysis of impacts to biological resources from the 400 MW Panoche Energy Center and 120 MW Starwood Project. These projects required coordination with USFWS and CDFG regarding impacts to the State and federally listed San Joaquin kit fox.
- **Northern California CO₂ Storage Pilot, Confidential Client, CEQA and NEPA compliance, (2008).** Contributed to the preparation of Department of Energy NEPA environmental questionnaire to comply with Category Exclusion requirements and preparation of the Initial Statement under CEQA for the proposed CO₂ sequestration pilot test site in Montezuma Hills, California. Ms. Blair conducted focused nesting surveys of the State-threatened Swainson's hawk (*Buteo swainsonii*).
- **Arizona Utilities CO₂ Storage Pilot, CEC and University of California, NEPA compliance, (2007).** Contributed to the preparation of Department of Energy NEPA environmental questionnaire to comply with Category Exclusion requirements for the proposed CO₂ sequestration pilot test site near Joseph City, Arizona. Ms. Blair conducted focused surveys of the federally endangered Peebles Navajo cactus (*Pediocactus peeblesianus* var. *peeblesianus*).
- **Environmental Screening Tool for Out-of-State Renewables, KEMA and CEC, Staff (2009).** Assessed the potential for California laws, ordinance, regulations and standards to be impacted by out-of-state renewable facilities seeking RPS certification. Ms. Blair prepared the assessment of impacts associated with geothermal projects.
- **Nuclear Power Plant Assessment (Assembly Bill 1632).** Ms. Blair managed the preparation of and was a contributing author for a major Appendix to the Nuclear Power Plan Assessment Report for the Energy Commission. This report evaluated nuclear power issues in the state in response to recent legislation (AB 1632), including environmental issues associated with alternatives (including renewable) to the state's two nuclear facilities.
- **Diablo Canyon Power Plant Steam Generator Replacement Project.** Ms. Blair supported the management team in preparing the project description, alternatives and supporting sections of the Draft and Final EIR.

Transmission Line and Substation Projects

- **Sunrise Powerlink Transmission Line Project.** Under contract to the California Public Utilities Commission (CPUC), Aspen prepared an EIR/EIS for a 150-mile proposed transmission line from Imperial Valley Substation, near El Centro, California, to Peñasquitos Substation in northwestern San Diego County. The Proposed Project would potentially deliver renewable resources from the Imperial Valley via a 500 kV transmission line to a new 500/230 kV substation, and from the new substation to western San Diego via 230 kV overhead and underground transmission lines. Ms. Blair analyzed the impacts to wilderness and recreation. Additionally, she wrote the project description and assisted with overall project support.
- **TANC Transmission Project.** Aspen was awarded a contract with the Transmission Agency of Northern California (TANC) for CEQA/NEPA and environmental permitting support for 600-miles of proposed 500 and 230 kV transmission lines between Lassen County and Santa Clara County, California. The project included evaluation of over 600 additional miles of alternative routes, six new substations, and modifications to six existing substations. Ms. Blair was the Deputy Project Manager, responsible for coordinating the biological and cultural resource field surveys. The project was cancelled in July 2009.

- **Sacramento Area Voltage Support Project.** Under contract to Western Area Power Administration (Western) and in cooperation with SMUD, Aspen prepared an SEIS and EIR for a double-circuit 230 kV circuit between Western's O'Banion/Sutter Power Plant and Elverta Substation/Natomas Substation. Ms. Blair was part of the project management team and managed the wetland delineation, Biological Survey Report, and Biological Evaluation.
- **North Area ROW Maintenance Project.** Under contract to Western, Ms. Blair is currently providing project support to prepare an Environmental Assessment and Operation and Maintenance Program associated with the operation and maintenance procedures along Western's transmission line ROWs between Sacramento (Sutter/Yuba County line) and the Oregon border. This project also includes a detailed survey of the biological and cultural resources along 434 miles of North Area ROW, 342 miles of COTP ROW, and several hundred miles of access and maintenance roads. Ms. Blair is working closely with project management and resource specialists to coordinate and execute over 800 miles of surveys. She conducted wildlife inventory and surveyed portions of ROW for sensitive species and recorded habitat types, jurisdictional waters and infrastructure using a Trimble GeoXT GPS unit. Additionally, Ms. Blair was integrally involved in the management and development of the North Area O&M GIS database.
- **Categorical Exclusions for Routine Operation and Maintenance.** Under contract to Western, Ms. Blair has prepared multiple CXs for routine maintenance activities along Western's CVP, PACI, and COTP transmission line ROWs and access roads. She has developed a streamlined and highly efficient system to use the results and analysis for the North Area ROW Maintenance Project to complete these documents.
- **GIS Data Verification and Resource Database Development for the Trinity County PUD Direct Interconnection Project.** Under contract to Western, Ms. Blair was the Deputy Project Manager for this project and also be coordinated and conducted biological resources in support of the development of an O&M GIS database, which included identification of sensitive resources and associated project conservation measures for this new segment of Western's CVP transmission system.
- **Seventh Standard Substation Project.** Under contract to the CPUC, Ms. Blair prepared the biological resource section of an Initial Study/Mitigated Negative Declaration for a proposed 4.9 acre 115/21 kV substation and transmission interconnection in northwest Bakersfield, Kern County, California. Important biological issues included impacts to the State and federally listed San Joaquin kit fox and western burrowing owl (a California species of special concern), as well as compliance with the Metropolitan Bakersfield Habitat Conservation Plan.
- **Atlantic-Del Mar Reinforcement Project Mitigated Negative Declaration.** Under contract to the CPUC, Ms. Blair served as an assistant environmental monitor during the construction of four miles of overhead transmission towers and lines and approximately 1.3 miles of underground lines. The project involved trenching, horizontal drilling and blasting and requires avoidance of several wetlands, seasonal pools and threatened and endangered species.
- **Miguel-Mission 230 kV #2 Project EIR Addendum.** Under contract to the CPUC, Ms. Blair helped to prepare a detailed addendum associated with engineering design changes for the Miguel-Mission 230 kV #2 Project.

Other Infrastructure, Resource Management, and Monitoring Projects

- **Hazardous Fuels and Vegetation Management for Angeles National Forest.** Under contract to the U.S. Forest Service, Ms. Blair conducted botanical and wildlife surveys at approximately 100 sites ranging from one to 2500 acres throughout the Angeles National Forest. Modifications to current fuel management practices were proposed in response to increased frequency and intensity of wildfire resulting from climate change. She prepared 75 Biological Evaluations/Biological Assessments that assessed the biological impacts of proposed fuel management practices throughout the forest.

- **Rare Plant Surveys for the East Branch Extension Pipeline Project.** Under contract to the Department of Water Resources, Ms. Blair conducted rare plant surveys of the endangered Santa Ana River woolly star (*Eriastrum densifolium* ssp. *sanctorum*) and the state and federally endangered slender horned spine flower (*Dodecahema leptoceras*) in response to the proposed construction of a water pipeline through San Bernardino and Riverside Counties.
- **Upper San Antonio Creek Watershed Giant Reed Removal Project.** Ms. Blair prepared the biological resource analysis of an Initial Study to remove invasive plant species from the Upper San Antonio Creek Watershed. Required field survey and development of impact avoidance measures for several special-status species, including California red-legged frog, southern steelhead, and riparian nesting birds.
- **Least Tern Monitoring for the Montezuma Slough Tidal Wetlands Restoration Project.** Under contract to EcoBridges Environmental, Ms. Blair monitored the nesting success of three nesting colonies of the federally and State endangered least tern. This effort involved counting and mapping the nest sites and tern chicks once a week for two years.
- **Endangered Species Monitoring for the Lomita Canal Vegetation Clearing Project.** Monitored the federally threatened California Red-legged frog and the state- and federally endangered San Francisco Giant Garter Snake during vegetation clearing activities along the Lomita Canal at the San Francisco International Airport. Involved identification of these species, relocation of California red-legged frogs, and re-direction of work in the event a SF Garter Snake was spotted.

PREVIOUS EXPERIENCE

Soil Ecology and Restoration Group

January to May 2004

Research Assistant. Ms. Blair assisted in managing the greenhouse where native seeds were germinated and propagated. In this role, she collected seeds from native plants and analyzed the composition of the soil present in their native habitat to ensure seedling viability. The plants were subsequently used in the restoration of degraded habitat as contracted by the U.S. Army Corps of Engineers and others.

**DECLARATION OF
Alvin J. Greenberg, Ph.D.**

I, **Alvin J. Greenberg, Ph. D.**, declare as follows:

1. I am presently a consultant to the California Energy Commission, Energy Facility Siting and Environmental Protection Division.
2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.
3. I prepared the rebuttal testimony on **Hazardous Materials Management and Worker Safety/Fire Protection** for the **Abengoa Mojave Solar** project based on my independent analysis of the amendment petition, supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.
4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.
5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

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

Dated: June 15, 2010

Signed: Original signed by A. Greenberg

At: Oakland, California

Risk Science Associates

121 Paul Dr., Suite A, San Rafael, Ca. 94903-2047

415-479-7560 fax 415-479-7563

e-mail agreenberg@risksci.com

Name & Title: **Alvin J. Greenberg, Ph.D., FAIC, REA, QEP**
Principal Toxicologist

Dr. Greenberg has had over two decades of complete technical and administrative responsibility as a team leader in the preparation of human and ecological risk assessments, air quality assessments, hazardous materials handling and risk management/prevention, infrastructure vulnerability assessments, occupational safety and health, hazardous waste site characterization, interaction with regulatory agencies in obtaining permits, and conducting lead surveys and studies. He has particular expertise in the assessment of dioxins, lead, diesel exhaust, petroleum hydrocarbons, mercury, the intrusion of subsurface contaminants into indoor air, and the preparation and review of public health/public safety sections of EIRs/EISs. Dr. Greenberg's expertise in risk assessment has led to his appointment as a member of several state and federal advisory committees, including the California EPA Advisory Committee on Stochastic Risk Assessment Methods, the US EPA Workgroup on Cumulative Risk Assessment, the Cal/EPA Peer Review Committee of the Health Risks of Using Ethanol in Reformulated Gasoline, the California Air Resources Board Advisory Committee on Diesel Emissions, the Cal/EPA Department of Toxic Substances Control Program Review Committee, and the DTSC Integrated Site Mitigation Committee. Dr. Greenberg is the former Chair of the Bay Area Air Quality Management District Hearing Board, a former member of the State of California Occupational Health and Safety Standards Board (appointed by the Governor), and former Assistant Deputy Chief for Health, California OSHA. And, since the events of 9/11, Dr. Greenberg has been the lead person for developing vulnerability assessments, power plant security programs, and conducting safety and security audits of power plants for the California Energy Commission and has assisted the CEC in the assessment of safety and security issues for proposed LNG terminals. In addition to providing security expertise to the State of California, Dr. Greenberg was the Team Leader and main consultant to the State of Hawaii on the updating of their Energy Emergency Preparedness Plan.

Years Experience: 26

Education:

B.S. 1969 Chemistry, University of Illinois Urbana

Ph.D. 1976 Pharmaceutical/Medicinal Chemistry, University of California,
San Francisco

Postdoctoral Fellowship 1976-1979 Pharmacology/Toxicology, University of
California, San Francisco

Postgraduate Training 1980 Inhalation Toxicology, Lovelace Inhalation
Toxicology Research Institute, Albuquerque, NM

Professional Registrations:

Board Certified as a Qualified Environmental Professional (QEP)
California Registered Environmental Assessor - I (REA)
Fellow of the American Institute of Chemists (FAIC)

Professional Affiliations:

Society for Risk Analysis
Air and Waste Management Association
American Chemical Society
American Association for the Advancement of Science
National Fire Protection Association

Technical Boards and Committee Memberships - Present:

Squaw Valley Technical Review Committee
(appointed 1986)

Technical Boards and Committee Memberships - Past:

July 1996 – March 2002

Member, Bay Area Air Quality Management District Hearing Board
(Chairman 1999-2002)

September 2000 – February 2001

Member, State Water Resources Control Board Noncompliant Underground
Tanks Advisory Group

January 1999 – June 2001

Member, California Air Resources Board Advisory Committee on Diesel
Emissions

January 1994 - September 1999

Vice-Chairman, State Water Resources Control Board Bay Protection and Toxic
Cleanup Program Advisory Committee

September 1998

Member, US EPA Workgroup on Cumulative Risk Assessment

April 1997 - September 1997

Member, Cal/EPA Private Site Manager Advisory Committee

January 1986 - July 1996

Member, Bay Area Air Quality Management District Advisory Council
(Chairman 1995-96)

January 1988 - June 1995

Member: California Department of Toxic Substance Control Site Mitigation
Program Advisory Group

January 1989 - February 1995

Member: Department of Toxics Substances Control Review Committee, Cal-EPA

October 1991 - February 1992

Chair: Pollution Prevention and Waste Management Planning Task Force of the Department of Toxics Substances Control Review Committee, Cal-EPA

September 1990 - February 1991

Member: California Integrated Waste Management Board Sludge Advisory Committee

September 1987 - September 1988

ABAG Advisory Committee on Regional Hazardous Waste Management Plan

March 1987 - September 1987

California Department of Health Services Advisory Committee on County and Regional Hazardous Waste Management Plans

January 1984 - October 1987

Member, San Francisco Hazardous Materials Advisory Committee

March 1984 - March 1987

Member, Lawrence Hall of Science Toxic Substances and Hazardous Materials Education Project Advisory Board

Jan. 1, 1986 - June 1, 1986

Member, Solid Waste Advisory Committee, Governor's Task Force on Hazardous Waste

Jan. 1, 1983 - June 30, 1985

Member, Contra Costa County Hazardous Waste Task Force

Sept. 1, 1982 - Feb. 1, 1983

Member, Scientific Panel to Address Public Health Concerns of Delta Water Supplies, California Department of Water Resources

Present Position

January 1983- present

Owner and principal with Risk Sciences Associates, a Marin County, California, environmental consulting company specializing in multi-media human health and ecological risk assessment, air pathway analyses, hazardous materials management-infrastructure security, environmental site assessments, review and evaluation of EIRs/EISs, preparation of public health and safety sections of EIRs/EISs, and litigation support for toxic substance exposure cases.

Previous Positions

Jan. 2, 1983 - June 12, 1984

Member, State of California Occupational Safety and Health Standards Board (Cal/OSHA), appointed by the Governor

Aug. 1, 1979 - Jan. 2, 1983

Assistant Deputy Chief for Health, California Occupational Safety and Health Administration

Feb. 1, 1979 - Aug. 1, 1979

Administrative Assistant to Chairperson of Finance Committee, Board of Supervisors, San Francisco

Jan. 1, 1976 - Feb. 1, 1979

Research Pharmacologist and Postdoctoral Fellow, Department of Pharmacology and Toxicology, School of Medicine, University of California, San Francisco

Jan. 1, 1975 - Dec. 31, 1975

Acting Assistant Professor, Department of Pharmaceutical Chemistry, University of California, San Francisco

Experience

General

Dr. Greenberg has been a consultant in Hazardous Materials Management and Security, Human and Ecological Risk Assessment, Occupational Health, Toxicology, Hazardous Waste Site Characterization, and Toxic Substances Control Policy for over 26 years. He has broad experience in the identification, evaluation and control of health and environmental hazards due to exposure to toxic substances. His experience includes Community Relations Support and Risk Communication through experience at high-profile sites and presentations at professional society meetings.

He has considerable experience in the review and evaluation of exposure via the air pathway - particularly to emissions from power plants, refineries, and diesel exhaust - and a thorough knowledge of the regulatory requirements through his experience at Cal/OSHA, the BAAQMD Hearing Board, as a consultant to the California Energy Commission, and in preparing such assessments for local government and industry. He has assessed exposures to diesel exhaust during construction and operations of stationary and mobile sources and has testified at evidentiary hearings numerous times on this subject.

He is presently assisting the California Energy Commission in assessing the risks to workers and the public of proposed power plants and LNG terminals in the state. His experience in hazard identification, exposure assessment, risk assessment, occupational safety and health, emergency response, and Critical Infrastructure Protection has made him a valuable part of the CEC team addressing this issue. He has reviewed and commented on the DEIS/DEIR for the proposed SES LNG Port of Long Beach terminal, focusing on security issues for the CEC and on safety matters for the City of Long Beach. He has presented technical information and analysis to the State of California Interagency LNG Working Group on thermal radiation public exposure criteria and safety/security at an east coast urban LNG terminal. (Both presentations are confidential owing to the nature of the material.) He has conducted numerous evaluations of the safety and hazards of natural gas pipelines for the CEC and has presented his findings and recommendations at public meetings and evidentiary hearings.

He served for over five years as the Vice-chair of the California State Water Resources Control Board Advisory Committee convened to address toxic substances in sediments in bays, rivers, and estuaries. He has been a member of the Squaw Valley Technical Review Committee since 1986 establishing chemical application management plans at golf courses to protect surface and

groundwater quality. He has also conducted numerous ecological risk assessments and characterizations, including those for marine and terrestrial habitats.

Dr. Greenberg has extensive experience in data collection and preparation of human and ecological risk assessments on numerous military bases and industrial sites with Cal/EPA DTSC and RWQCB oversight. He has also been retained to provide technical services to the Cal/EPA Department of Toxic Substances Control (preparation of human health risk assessments) and the Office of Environmental Health Hazard Assessment (review and evaluation of air toxics health risk assessments and preparation of profiles describing the acute and chronic toxicity of toxic air contaminants). He has also conducted several surveys of sites containing significant lead contamination from various sources including lead-based paint, evaluated potential occupational exposure to lead dust and fumes in industrial settings, prepared numerous human health risk assessments of lead exposure, and prepared safety and health plans for remedial investigation of lead contaminated soils. Dr. Greenberg is also a recognized expert on the requirements of California's Proposition 65 and has served as an expert on Prop. 65 litigation.

Sites with EPA, RWQCB and/or DTSC Oversight

Dr. Greenberg has specific experience in assessing human health and ecological risks at contaminated sites at the land/water interface, including petroleum contaminants, metals, mercury, and VOCs at several locations in California including Oxnard, Richmond, Avila Beach, Mare Island Naval Shipyard, San Diego, Hollister, San Francisco, Hayward, Richmond, the Port of San Francisco, and numerous other locations. He has used Cal/EPA methods, US EPA methods, and ASTM Risk Based Corrective Action (RBCA) and Cal/Tox methodologies. He is extremely knowledgeable about SWRCB and SF Bay RWQCB regulations on underground storage tank sites and with ecological issues presented by contaminated sediments including sediment analysis, toxicity testing, tissue analysis, and sediment quality objectives. Dr. Greenberg served on the State Water Resources Control Board Bay Protection and Toxic Cleanup Program Advisory Committee from 1994 until the end of the program in 1999.

Dr. Greenberg experience on many of these contaminated sites has been as a consultant to local governments, state agencies, and citizen groups. He assisted the City and County of San Francisco in developing local ordinance requiring soil testing (Article 20, Maher ordinance) and hazardous materials use reporting (Article 21, Walker ordinance). He served as the City of San Rafael's consultant to provide independent review and evaluation of the site characterization and remedial action plan prepared for a former coal gasification site. He was a consultant to a citizen group in northern California regarding exposure and risks due to accidental releases from a petroleum refinery and assisted in the assessment of risks due to crude petroleum contamination of a southern California beach. He has prepared a number of risk assessments addressing crude petroleum, diesel and gasoline contamination, including coordinating site investigations, environmental monitoring, and health risk assessment for the County of San Luis Obispo regarding Avila Beach subsurface petroleum contamination. That high-profile project lasted for over one year and Dr. Greenberg managed a team of experts with a budget of \$750,000. Another high-profile project included the preparation of an extensive comprehensive human and ecological risk assessment for the Hawaii Office of Space Industry on rocket launch impacts and transportation/storage of rocket fuels at the southern end of the Big Island of Hawaii. Dr. Greenberg's risk assessments were part of the EIS for the project. Dr. Greenberg also worked on another high-profile project conducting Air Pathway Analysis of off-site and on-site impacts

from landfill gas constituents, including indoor and outdoor air measurements, air dispersion modeling, flux chamber investigations, and health risk assessment for the County of Santa Barbara. Dr. Greenberg has conducted RI/FS work, prepared health risk assessments, evaluated hazardous waste sites and hazardous materials use at numerous locations in California, Hawaii, Oregon, Minnesota, Michigan, and New York. He has considerable experience in the development of clean-up standards and the development of quantitative risk assessments for site RI/FS work at CERCLA sites, as well as site closures, involving toxic substances and petroleum hydrocarbon wastes. He is experienced in working with both Region IX EPA and the State of California DTSC in negotiating clean-up standards based on the application of both site-specific and non site-specific health and ecological based clean-up criteria. He has significant experience in the development of site chemicals of concern list, quantitative data quality levels, site remedial design, the site closure process, the design and execution of data quality programs and verification of data quality prior to its use in the decision making process on large NPL sites.

Examples

The Avila Beach Health Study Phase 1: Reconnaissance Sampling Findings, Conclusions, and Recommendations. (July 1997) Volume 1: Baseline Human Health Risk Assessment. (May 1998)

The Avila Beach Health Study Phase 1, Volume 2: Environmental Monitoring. (May 1998)

Health Risk Assessment and Air Pathway Analysis for the Ballard Canyon Landfill, Santa Barbara County, Ca. (March 1999)

Screening Human Health Risk Assessment, Calculation of Soil Clean-up Levels, and Aquatic Ecological Screening Evaluation, Galilee Harbor, Sausalito, Ca. (May 1998)

Health Risk Assessment Due to Diesel Train Engine Emissions, Oakland, Ca. (June 1999)

Health Risk Assessment for Residual Mercury at the Deer Creek Facility, 3475 Deer Creek Road, Palo Alto, California. (July 1997)

Phase 2 Human Health Risk Assessment, Teledyne Inc., San Diego, Ca. (February 1997)

Human Health Risk Assessment, Teledyne Ryan Aeronautical, McCormick Selph Ordnance. Hollister, California. (December 1996)

Initial Phase Human Health Risk Assessment, Teledyne Inc., San Diego, Ca. (October 1996)

Human Health Risk Assessment, Ecological Screening Evaluation, and Development of Proposed Remediation Goals for the Flair Custom Cleaners Site, Chico, California (January 1996)

Human Health Risk Assessment for the X-3 Extrudate Project at Criterion Catalyst, Pittsburg, Ca. (November 1994)

Screening Health Risk Assessment and Development of Proposed Soil Remediation Levels at Hercules Plant #3, Culver City, Ca. (July 1993)

Ecological Screening Evaluation for the Altamont Landfill, Alameda County, Ca. (June, 1993)

Focused Ecological Risk Characterization, Hawaiian Electric Company, Keahole Generating Station Expansion, Hawaii (June 1993)

Human Health Risk Assessment for the Proposed Palima Point Space Launch Complex, prepared for the Hawaii Office of Space Industry (April 1993)

Ecological Risk Assessment for the Proposed Palima Point Space Launch Complex, prepared for the Hawaii Office of Space Industry (March 1993)

Human Health Risk Assessment for Current and Proposed Expanded Class II and Class III Operations at the Altamont Sanitary Landfill, Alameda County, Ca. (March, 1993)

Screening Health Risk Assessment for the Proposed Expansion of the West Marin Sanitary Landfill, Point Reyes Station, Ca. (March, 1993)

Health Risk Assessment for the Proposed Expansion of the Forward, Inc. Landfill, Stockton, Ca. (September 14, 1992)

Health Risk Assessment for the Rincon Point Park Project, San Francisco, Ca. Prepared for Baseline Environmental Consulting and the San Francisco Redevelopment Agency. (August 10, 1992)

Health Risk Assessment for the South Beach Park Project, San Francisco, Ca. Prepared for Baseline Environmental Consulting and the San Francisco Redevelopment Agency. (August 10, 1992)

Screening Health Risk Assessment and Development of Proposed Soil and Groundwater Remediation Levels, Kaiser Sand and Gravel, Mountain View, Ca. Prepared for Baseline Environmental Consulting (January 30, 1992)

Development of Proposed Soil Remediation Levels for the Marine Corps Air-Ground Combat Center, 29 Palms, California (May 30, 1991)

Preliminary Health Risk Assessment for the City of Pittsburg Redevelopment Agency, Pittsburg, California (May 29, 1991)

Military Bases

Dr. Greenberg has experience in conducting assessments at DOD facilities, including RI/FS work, preparation of health risk assessments, evaluation of hazardous waste sites and hazardous materials use at the following Navy sites in California: San Diego Naval Base; Marine Corps Air-Ground Combat Center, 29 Palms; Mare Island Naval Shipyard, Vallejo; Treasure Island Naval Station, San Francisco, Hunters Point Naval Shipyard, San Francisco, and the Marine

Corps Logistics Base, Barstow. He worked with the U.S. Navy and the U.S. EPA in the implementation of Data Quality Objectives (DQO's) at MCLB, Barstow.

Examples

Review and Evaluation of the Remedial Investigation Report and Human Health Risk Assessment for the U. S. Naval Station at Treasure Island, Ca. (June 1999)

Screening Health Risk Assessment for the Proposed San Francisco Police Department's Helicopter Landing Pad at Hunters Point Shipyard, San Francisco, Ca. (September 1997)

Development of Proposed Soil Remediation Levels for the Marine Corps Air-Ground Combat Center, 29 Palms, California (May 30, 1991)

Health Risk Assessment for the Chrome Plating Facility, Mare Island Naval Shipyard, Vallejo, California (October 24, 1988)

Background Levels and Health Risk Assessment of Trace Metals present at the Naval Petroleum Reserve No.1, 27R Waste Disposal Trench Area, Lost Hills, California (August 12, 1988)

RCRA Facility Investigation (RFI) Work Plan of Lead Oxide Contaminated Areas, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (August 14, 1989)

Hazardous Waste and Solid Waste Audit and Management Plan, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (July 3, 1989)

Water Quality Solid Waste Assessment Test (SWAT) Proposal RCRA Landfill, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (October 31, 1988)

Waste Disposal Facilities, Waste Haulers, Waste Recycling Facilities Report, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (September 22, 1988)

Sampling and Analysis Plan, Health and Safety Plan, Site Characterization of Lead Oxide Contaminated Areas, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (September 2, 1988)

Air Quality Solid Waste Assessment Test (SWAT) Proposal, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (August 25, 1988)

Liquefied Natural Gas (LNG)

Dr. Greenberg assisted the CEC in the preparation of the "background" report on the risks and hazards of siting LNG terminals in California ("LNG in California: History, Risks, and Siting" July 2003) and consulted for the City of Vallejo on a proposed LNG terminal and storage facility at the former Mare Island Naval Shipyard. He has also conducted an evaluation and prepared comments on the risks, hazards, and safety analysis of the DEIS/DEIR for the City of Long

Beach on a proposed LNG terminal at the Port of Long Beach (POLB) and conducted an analysis on vulnerability and critical infrastructure security for the CEC on this same proposed LNG terminal. He currently advises the CEC on the POLB LNG proposal on risks, hazards, human thresholds of thermal exposure, vulnerability, security, and represented the CEC at a U.S. Coast Guard briefing on the Waterway Suitability Assessment that included the sharing of SSI (Sensitive Security Information). He has presented technical information and analysis to the State of California LNG Interagency Working Group on thermal radiation public exposure criteria and safety/security at an east coast urban LNG terminal. (Both presentations are confidential owing to the nature of the material.) He has conducted numerous evaluations of the safety and hazards of natural gas pipelines for the CEC and has presented his findings and recommendations at public meetings and evidentiary hearings.

Infrastructure Security

Since 2002, Dr. Greenberg has been trained by and is working with the Israeli company SB Security, LTD, the most experienced and tested security planning and service company in the world. Since the events of 9/11, Dr. Greenberg has been the lead person for developing vulnerability assessments and power plant security programs for the California Energy Commission (CEC). In taking the lead for this state agency, Dr. Greenberg has interfaced with the California Terrorism Information Center (CATIC) and provided analysis, recommendations, and testimony at CEC evidentiary hearings regarding the security of power plants within the state. These analyses include the assessment of Critical Infrastructure Protection, threat assessments, criticality assessments, and the preparation of vulnerability assessments and off-site consequence analyses addressing the use, storage, and transportation of hazardous materials, recommendations for security to reduce the threat from foreign and domestic terrorist activities, perimeter security, site access by personnel and vendors, personnel background checks, management responsibilities for facility security, and employee training in security methods. Dr. Greenberg is the lead person in developing a model power plant security plan, vulnerability assessment matrix, and a security training manual for the CEC. The model security plan is used by power plants in California as guidance in developing and implementing security measures to reduce the vulnerability of California's energy infrastructure to terrorist attack. He has testified at several evidentiary hearings for the CEC on power plant security issues. He also leads an audit team conducting safety and security audits at power plants throughout California that are under the jurisdiction of the CEC. In addition to providing security expertise to the State of California, in August 2004, a team of experts led by Dr. Greenberg was awarded an 18-month contract by the State of Hawaii to update and improve the state's Energy Emergency Preparedness Plan and make recommendations for increased security of critical energy infrastructure on this isolated group of islands.

Air Pathway Analysis

Dr. Greenberg has prepared numerous Air Pathway Analyses and human health risk assessments, evaluating exposure at numerous locations in California, Hawai'i, Oregon, Minnesota, Michigan, and New York. He is experienced in working with Region IX EPA, the State of California DTSC, and the Hawai'i Department of Health Clean Air Branch in the application of both site-specific and non site-specific health risk assessment criteria.

Examples

Human Health Risk Assessment for the Open Burn/Open Detonation Operation at McCormick Selph, Inc., Hollister, Ca. (June 2003)

Air Quality and Human Health Risk Assessment for the Royal Oaks Industrial Complex, Monrovia, Ca. (January 2003)

Human Health Risk Assessment and Indoor Vapor Intrusion Assessment for the former Pt. St. George Fisheries Site, Santa Rosa, Ca. (October 2002)

Human Health Risk Assessment for the former Sargent Industries Site, Huntington Park, Ca. (July 2001)

Health Risk Assessment Due to Diesel Train Engine Emissions, Oakland, Ca. (June 1999)

The Avila Beach Health Study Phase 1: Reconnaissance Sampling Findings, Conclusions, and Recommendations. (July 1997) Volume 1: Baseline Human Health Risk Assessment. (May 1998)

The Avila Beach Health Study Phase 1, Volume 2: Environmental Monitoring. (May 1998)

Health Risk Assessment and Air Pathway Analysis for the Ballard Canyon Landfill, Santa Barbara County, Ca. (March 1999)

Human Health Risk Assessment, Teledyne Ryan Aeronautical, McCormick Selph Ordnance. Hollister, California. (December 1996)

Initial Phase Human Health Risk Assessment, Teledyne Inc., San Diego, Ca. (October 1996)

Human Health Risk Assessment for Current and Proposed Expanded Class II and Class III Operations at the Altamont Sanitary Landfill, Alameda County, Ca. (March, 1993)

Focused Ecological Risk Characterization, Hawaiian Electric Company, Keahole Generating Station Expansion, Hawai'i (June 1993)

Human Health Risk Assessment for the Proposed Palima Point Space Launch Complex, prepared for the Hawai'i Office of Space Industry (April 1993)

Ecological Risk Assessment for the Proposed Palima Point Space Launch Complex, prepared for the Hawai'i Office of Space Industry (March 1993)

Human Health Risk Assessment Due to Emissions from a Medical Waste Incinerator, prepared for Kauai Veterans Memorial Hospital, Kauai, Hawai'i (1994)

Cancer Risk Assessment for the H-Power Generating Station, Campbell Industrial Park, Oahu, Hawai'i (1988)

Hazardous Materials Assessments, Waste Management Assessments, Worker Safety and Fire Protection Assessments, and Public Health Impacts Assessments

Dr. Greenberg also has significant experience as a consultant and expert witness for the California Energy Commission providing analysis, recommendations, and testimony in the areas of hazardous materials management, process safety management, waste management, worker safety and fire protection, and public health impacts for proposed power plant/cogeneration facilities. These analyses include the evaluation and/or preparation of the following:

- Off-site consequence analyses of the handling, use, storage, and transportation of hazardous materials,
- Risk Management Plans (required by the Cal-ARP) and Business Plans (required by H&S Code section 25503.5),
- Safety Management Plans (required by 8 CCR section 5189),
- Natural gas pipeline safety,
- Solid and hazardous waste management plans,
- Phase I and II Environmental Site Assessments,
- Construction and Operations Worker Safety and Health Programs,
- Fire Prevention Programs,
- Human health risk assessment from stack emissions and from diesel engines, and
- Mitigation measures to address PM exposure, including diesel particulates

Examples

- Almond 2 Power Plant Project, City of Ceres, Ca. 2009 – present. Public health.
- Watson Cogeneration Steam and Electric Reliability Project, Carson, Ca. 2009 – present. Public health.
- Hanford Combined-Cycle Power Plant (amendment), Kings County, Ca. 2008 – present. Public health.
- Henrietta Combined-Cycle Power Plant (amendment), Kings County, Ca. 2008 – present. Public health.
- Lodi Energy Center, Lodi, Cal. 2008 – present. Hazardous materials management, worker safety/fire protection.
- Marsh Landing Generating Station, City of Antioch, Ca. 2008 – present. Hazardous materials management, worker safety/fire protection.
- Palmdale Hybrid Power Plant, Palmdale, Ca. 2008 – present. Hazardous materials management, worker safety/fire protection, public health.
- Stirling Energy Systems Solar 1 Project, San Bernardino County, Ca. 2008 – present. Public health.
- Stirling Energy Systems Solar 2 Project, Imperial County, Ca. 2008 – present. Public health.
- San Joaquin Solar 1&2, Fresno County, Ca. 2008 – present. Hazardous materials management, worker safety/fire protection, public health.
- GWF Tracy Combined Cycle Power Plant, Tracy, Ca. 2008 – present. Hazardous materials management, worker safety/fire protection, public health.
- CPV Vaca Station Power Plant, Vacaville, Ca. 2008 – present. Hazardous materials management, worker safety/fire protection.

- Willow Pass Generating Station, Pittsburg, Ca. 2008 – present. Hazardous materials management, worker safety/fire protection, waste management.
- Avenal Energy Power Plant, Avenal, Ca. 2008 – 2009. Worker safety/fire protection, public health.
- Orange Grove Energy, San Diego County, Ca. 2008-2009. Public health.
- Riverside Energy Resource Center Units 3&4, Riverside, Ca. 2008 – 2009. Hazardous materials management.
- Canyon Power Plant, Anaheim, Ca. 2007 – present. Hazardous materials management, worker safety/fire protection, public health.
- Carlsbad Energy Center, Carlsbad, Ca. 2007 – present. Hazardous materials management, worker safety/fire protection, public health.
- Ivanpah Solar Electric Generating System, San Bernardino County, Ca. 2007 – present. Public health.
- Kings River Conservation District Community Power Project, City of Parlier, Ca. 2007 – 2009. Hazardous materials management, worker safety/fire protection.
- Chula Vista Energy Upgrade Project, Chula Vista, Ca. 2007 – 2009. Hazardous materials management, worker safety/fire protection.
- Chevron Richmond Power Plant Replacement Project, Richmond, Ca. 2007 – 2008. Hazardous materials management, public health.
- Humboldt Bay Generating Station, Eureka, Ca. 2006 – 2008. Hazardous materials management, worker safety/fire protection, waste management.
- El Centro Power Plant – Unit 3 Repower Project, El Centro, Ca. 2006 – 2007. Public health.
- San Francisco Energy Reliability Project, San Francisco, Ca. 2004 – 2006. Hazardous materials management, worker safety/fire protection, waste management, public health
- Inland Empire Energy Center, Romoland, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- Malburg Generating Station Project, City of Vernon, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- Blythe II, Blythe, Ca. 2002-3. hazardous materials, worker safety/fire protection,
- Palomar Energy Center, Escondido, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- Cosumnes Power Project, Rancho Seco, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- Tesla Power Project, Tesla, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- San Joaquin Valley Energy Center, San Joaquin, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management
- Morro Bay Power Plant, Morro Bay, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management
- Potrero Power Plant Unit 7, San Francisco, Ca., 2001-2: hazardous materials, worker safety/fire protection
- El Segundo Power Redevelopment Project, El Segundo, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management
- Rio Linda Power Project, Rio Linda, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health

- Pastoria II Energy Facility Expansion, Grapevine, Ca., 2001: hazardous materials, worker safety/fire protection
- East Altamont Energy Center, Byron, Ca., 2001-2: hazardous materials, worker safety/fire protection
- Magnolia Power Project, Burbank, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Russell City Energy Center, Hayward, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management
- Woodbridge Power Plant, Modesto, Ca., 2001: hazardous materials, worker safety/fire protection, waste management
- Colusa Power Plant Project, Colusa County, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Valero Refinery Cogeneration Project, Benicia, Ca., 2001: hazardous materials, worker safety/fire protection
- Ocotillo Energy Project, Palm Springs, Ca., 2001: hazardous materials, worker safety/fire protection
- Gilroy Energy Center Phase II Project, Gilroy, Ca., 2001-2: hazardous materials, worker safety/fire protection
- Los Esteros Critical Energy Facility, San Jose, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Roseville Energy Facility, Roseville, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Spartan Power, San Jose, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Inland Empire Energy Center, Romoland, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- South Star Cogeneration Project, Taft, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Tesla Power Plant, Eastern Alameda County, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Tracy Peaker Project, Tracy, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Henrietta Peaker Project, Kings County, Ca., 2001: hazardous materials, worker safety/fire protection, waste management, public health
- Central Valley Energy Center, San Joaquin, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Cosumnes Power Plant, Rancho Seco, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Los Banos Voltage Support Facility, Western Merced County, Ca., 2001-2: waste management, public health
- Palomar Energy Project, Escondido, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Metcalf Energy Center, San Jose, Ca., 2000-1: hazardous materials
- Blythe Power Plant, Blythe, Ca., 2000-1: hazardous materials
- San Francisco Energy Co. Cogeneration Project, San Francisco, Ca., 1994-5: hazardous materials

- Campbell Soup Cogeneration Project, Sacramento, Ca., 1994: hazardous materials
- Proctor and Gamble Cogeneration Project, Sacramento, Ca., 1993-4: hazardous materials
- San Diego Gas and Electric South Bay Project, Chula Vista, Ca., 1993: hazardous materials
- SEPCO Project, Rio Linda, Ca., 1993: hazardous materials
- Shell Martinez Manufacturing Complex Cogeneration Project, Martinez, Ca., 1993: hazardous materials and review and evaluation of EIR

Occupational Safety and Health/Health and Safety Plans/Indoor Air Quality

Dr. Greenberg has significant experience in occupational safety and health, having directed the development, adoption, and implementation of over 50 different Cal/OSHA regulations, including airborne contaminants (>450 substances), lead, asbestos, confined spaces, and worker-right-to-know (MSDSs). He has conducted numerous occupational health surveys and has extensive experience in the sampling and analysis of indoor air quality at residences, workplaces, and school classrooms. He is currently the team leader conducting safety and security audits at power plants throughout California for the California Energy Commission. Safety issues audited include compliance with regulations addressing several safety matters, including but not limited to, confined spaces, lockout/tagout, hazardous materials, and fire prevention/suppression equipment.

Examples

Review and Evaluation of Public and Worker Safety Issues at the proposed SES LNG Facility, Port of Long Beach. prepared for the City of Long Beach. (November 2005)

Confidential safety and security audit reports for 18 power plants in California. prepared for the California Energy Commission. (January 2005 through March 2006)

Report on the Accidental release and Worker Exposure to Anhydrous Ammonia at the BEP I Power Plant, Blythe, Ca. prepared for the California Energy Commission. (October 2004)

Investigation of a Worker Death in a Confined Space, La Paloma Power plant. prepared for the California Energy Commission. (July 2004)

Preliminary Report on Indoor Air Quality in Elementary School Portable Classrooms, Marin County, Ca. (December 1999)

Health Risk Assessment Due to Diesel Train Engine Emissions, Oakland, Ca. (June 1999)

Air Pathway Analysis for the Ballard Canyon Landfill. Submitted to the County of Santa Barbara, (March 1999)

Review and Evaluation of the Health Risk Assessment for Outdoor and Indoor Exposures at the Former Golden Eagle Refinery Site, Carson, Ca. (May 1998)

The Avila Beach Health Study Phase 1: Reconnaissance Sampling Findings, Conclusions, and Recommendations. (July 1997) Volume 1: Baseline Human Health Risk Assessment. (May 1998)

The Avila Beach Health Study Phase 1, Volume 2: Environmental Monitoring. (May 1998)

Phase 2 Human Health Risk Assessment, Teledyne Inc., San Diego, Ca. (February 1997)

Determination of Occupational Lead Exposure at a Tire Shop in Placerville, Ca. (April 1993)

Development of an Environmental Code of Regulations for Hazardous Waste Treatment Facilities on La Posta Indian Tribal lands, San Diego County, Ca. (August 1992)

Sampling and Analysis Plan, Health and Safety Plan, Site Characterization of Lead Oxide Contaminated Areas, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (September 2, 1988)

Mercury Contamination

Dr. Greenberg has prepared and/or reviewed several human health and ecological risk assessments regarding mercury contamination in soils, sediments, and indoor surfaces. Dr. Greenberg served on the State Water Resources Control Board Bay Protection and Toxic Cleanup Program Advisory Committee from 1994 until the end of the program in 1999.

Examples

Review and evaluation of a human health risk assessment of ingestion of sport fish caught from San Diego Bay and which contain tissue levels of mercury and PCBs (November 2004 – present)

Screening Human Health Risk Assessment, Calculation of Soil Clean-up Levels, and Aquatic Ecological Screening Evaluation, Galilee Harbor, Sausalito, Ca. (May 1998)

Health Risk Assessment for Residual Mercury at the Deer Creek Facility, 3475 Deer Creek Road, Palo Alto, California. (July 1997)

Human Health Risk Assessment Due to Emissions from a Medical Waste Incinerator, prepared for Kauai Veterans Memorial Hospital, Kauai, Hawai'i (1994)

DECLARATION OF SHAHAB KHOSHMAHRAB

I, **SHAHAB KHOSHMAHRAB**, declare as follows:

1. I am presently employed by the California Energy Commission in the **ENGINEERING OFFICE** of the Facilities Siting Division as a **MECHANICAL ENGINEER**.
2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.
3. I participated in the preparation of the staff rebuttal testimony on **Noise and Vibration** for the **Abengoa Mojave Solar Project** based on my independent analysis of the Application for Certification, Transmission System Engineering Appendix A, and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.
4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.
5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

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

Dated: June 23, 2010 Signed: Original signed by S. Khoshmashrab

At: Sacramento, California

Shahab Khoshmashrab
Mechanical Engineer

Experience Summary

Nine years experience in the Mechanical, Civil, Structural, and Manufacturing Engineering fields involving engineering and manufacturing of various mechanical components and building structures. This experience includes QA/QC, construction/licensing of electric generating power plants, analysis of noise pollution, and engineering and policy analysis of thermal power plant regulatory issues.

Education

- California State University, Sacramento-- Bachelor of Science, Mechanical Engineering
- Registered Professional Engineer (Mechanical), California

Professional Experience

2001-2004--Mechanical Engineer, Systems Assessment and Facilities Siting-- California Energy Commission

Performed analysis of generating capacity, reliability, efficiency, noise and vibration, and the mechanical, civil/structural and geotechnical engineering aspects of power plant siting cases.

1998-2001--Structural Engineer – Rankin & Rankin

Engineered concrete foundations, structural steel and sheet metal of various building structures including energy related structures such as fuel islands. Performed energy analysis/calculations of such structures and produced structural engineering detail drawings.

1995-1998--Manufacturing Engineer – Carpenter Advanced Technologies

Managed manufacturing projects of various mechanical components used in high tech medical and engineering equipment. Directed fabrication and inspection of first articles. Wrote and implemented QA/QC procedures and occupational safety procedures. Conducted developmental research of the most advanced manufacturing machines and processes including writing of formal reports. Developed project cost analysis. Developed/improved manufacturing processes.

**DECLARATION OF
Christopher B. Dennis, P.G.**

I, **Christopher B. Dennis**, declare as follows:

1. I am presently employed by the California Energy Commission for the in the Environmental Office of the Siting, Transmission and Environmental Protection Division as an Engineering Geologist.
2. My professional qualifications and experience are attached hereto and incorporated by reference herein.
3. I helped prepare the Staff Rebuttal Testimony on **Soil and Water Resources** for the Abengoa Mojave Solar project based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.
4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.
5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

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

Dated: June 23, 2010 Signed: Original signed by C. Dennis

At: Sacramento, California

CHRISTOPHER B. DENNIS, P.G., J.D.

EXPERIENCE SUMMARY

Mr. Dennis is a licensed Professional Geologist with the State of California. His professional experience includes over 17 years of innovative technical and management experience. He has worked with a wide variety of CEQA and environmental management issues including soil, water, and waste compliance, investigation, and remediation. He has recently worked with siting and compliance of natural gas-fired and solar power plants. He has been a portfolio manager for several major oil companies and the East Bay Municipal Utility District's trench spoils program. He actively managed Unocal CERT, ExxonMobil, and ChevronTexaco pipeline, service station, bulk fueling, and terminal sites. He is knowledgeable of California's regulatory structure and laws, and is proficient in CEQA analysis, risk assessment, site assessment, remediation, environmental due diligence, and database/GIS development and management.

EDUCATION/REGISTRATION/CERTIFICATIONS

Pepperdine Law School, Certificate in Dispute Resolution, 1997

Whittier College of Law, J.D., 1996

California State University, Fullerton, B.S. Geology, 1989

Licensed Professional Geologist, State of California #7184

OSHA-SARA 40-Hour Hazardous Waste Activity Training 29 CFR 1910.120

PROFESSIONAL HISTORY

2007 to Current California Energy Commission, Engineering Geologist

2004 to 2007 Science Applications International Corporation, Senior Geologist

2004 to 2004 Bay Consulting Services, LLC, Principal

2001 to 2004 Cambria Environmental Technology, Inc., Senior Geologist

2000 to 2001 Alisto Engineering, Inc, Senior Geologist

1998 to 2000 TRC, Inc., Senior Geologist

1993 to 1995 GeoResearch, Inc., Project Manager

1990 to 1993 AeroVironment, Inc., Staff Geologist

1989 to 1990 Applied Geosciences, Inc., Technician

2007 to Current California Energy Commission, Sacramento, CA

Siting, Transmission, and Environmental Protection Division. Focusing on siting and compliance for simple-cycle, combined cycle, solar, and hybrid power plants. Developed a broad knowledge of CEQA impact analysis and mitigation involving water resources, water quality, soil resources, and waste management. Developed preliminary and final staff assessments involving issues of basin water management, overdraft, water quality, water conservation, water transfers, flood potential, and wind and water soil erosion. Deeply involved in issues surrounding the recently proposed large-scale solar power projects including project grading designs, flood management, water use, biological resource impacts, interagency cooperation, and laws, ordinances, regulations, and standards compliance. Also participating in the Quarterly Fuels and Energy Reporting (QFER) program and Environmental Policy Report. Oversaw the development of a QFER database for the collection and management of water use and wastewater discharge by all power plants 20 MW and greater in California.

2004 to 2007 Science Applications International Corporation, Sacramento, CA

Chevron, Northern California (various sites). Managed several former pipeline right-of-way and pump stations sites within the Central California region. Developed and implemented new written field quality assurance/quality control procedures for the entire portfolio of sites. Developed and implemented an analytical laboratory evaluation plan. Managed the groundwater monitoring and sampling program for the portfolio. Initiated low-flow sampling and the use of pre-packed filter screens in boreholes to reduce turbidity in groundwater samples and attain low risk-assessment level detection limits. Initiated a crude oil remediation study for the portfolio that is proving to be a pivotal tool for closure of the pipeline sites. Submitted the first soil vapor survey workplan to the RWQCB for the portfolio and was given approval of that workplan without comment. Worked with a GIS team to incorporate all pertinent site data into a web-based GIS and geo-reference the GIS as appropriate. This portfolio required a significant amount of for-end planning and coordination. Developed and managed all sites budgets and billing.

2004 to 2004 Bay Consulting Services, LLC, Rocklin, CA

Chevron, Northern California (various sites). Completed several closure requests with Tier I/II risk analysis. Started and operated this experimental company for two months.

2001 to 2004 Cambria Environmental Technology, San Ramon and Rocklin, CA

Chevron, Northern California (various sites). Responsible for a large portfolio (40 - 60+ active sites) of ChevronTexaco service station, bulk fueling, and terminal sites in Northern California, some of which were located in the sensitive Lake Tahoe area. Started Cambria's Rocklin office and grew that office to a staff of over 12 in less than a year through initiative and hard work. Helped develop and received State Underground Storage Tank (UST) Fund pre-approved for ~100 low-risk ChevronTexaco sites as part of a management transfer initiative. Through good regulatory communication, solid analysis, and hard work, closed over 30 sites in two years (half of one portfolio). Site closures were risk-based using both natural attenuation and active remediation approaches. Worked with Caltrans on a freeway (CA I-80) expansion project that required excavation and dewatering beneath a former Chevron site. Through a series of constructive meetings, built into the Caltrans request for bid, specifications for handling petroleum impacted excavated soils and water. The expansion project has proceeded as expected and planned. Liaison for the client and regulators. Developed and managed all sites budgets and billing.

East Bay Municipal Utility District, Northern California (various sites). Brought to Cambria a three-year, \$275K/yr maximum EBMUD contract. The contract focused on pre-trenching activity soil sampling/analysis for potential contaminant identification and on trench spoils sampling/analyses for soil disposal. Developed a small group of professionals to manage this portfolio. As part of this project, managed several EPA SW-846 statistical soil analysis projects at District landfill sites with volumes up to ~180,000 cubic yards of landfilled soil. Created and surveyed statistical grids on the landfills and characterized the soil for removal to Class III or Class II landfills. Conducted site investigations and quarterly groundwater monitoring projects. Liaison for the client and regulators. Developed and managed all sites budgets and billing.

2000 - 2001 Alisto Engineering, Lafayette, CA

Caltrans, Northern California (various sites). Conducted statistical analyses of the soil from the shoulders of several Caltrans highways in Southern California. Performed the statistical

analyses to determine lead hazard levels for use soil management planning in proposed construction corridors. The statistical analyses were performed on sample populations ranging from approximately 80 to 300. Liaison for the client and regulators. Developed and managed all sites budgets and billing.

Industrial Facilities, Northern California (various sites). Conducted site investigations at several industrial sites in Northern California. Developed storm water pollution prevention plans (SWPPPs) for development projects in downtown San Jose and a Caltrans project along CA I-680. Liaison for the client and regulators. Developed and managed all sites budgets and billing.

1998 - 2000 TRC, Concord, CA

ExxonMobil, Northern California (various sites). Responsible for a mid-size portfolio (15 - 20+ active sites) of ExxonMobil service station and bulk fueling sites in Northern California. Through good regulatory communication, solid analysis, and hard work, closed over 30 sites. Site closures were risk-based using both natural attenuation and active remediation approaches. For one bulk plant on the sensitive Napa River, secured a public recession of a RWQCB cleanup and abatement order and site closure for Mobil after two years of negotiations, technical presentations, and meetings. Conducted high vacuum, dual-phase extraction at several ExxonMobil sites. Liaison for the client and regulators. Developed and managed all sites budgets and billing.

Quick Stop Markets, Northern California (various sites). Developed and managed a small portfolio of Quick Stop Market sites in Northern California. Saved the client thousands of dollars in lease fees by closing a site through solid regulatory negotiation and communication, and aggressive site assessment and remediation. The site was located a few blocks upgradient from Lake Merritt in Oakland. Conducted high vacuum, dual-phase extraction at several Quick Stop sites. Liaison for the client and regulators. Developed and managed all sites budgets and billing.

Miscellaneous Sites, Northern California. Team member of the Level 3 Communications environmental impact report (EIR) submittals, preparing geologic hazard evaluations. Conducted site investigations at several industrial sites in Northern California. Liaison for the client and regulators. Developed and managed all sites budgets and billing.

1993 - 1995 Project Manager, GeoResearch, Long Beach, CA

Unocal CERT, Southern California (various sites). Project manager of a portfolio of active Unocal CERT sites. Frequently utilized mobile laboratories to assist in the placement of soil borings, vapor extraction, and groundwater wells. Conducted risk assessments, site assessments, tanks pulls, station demolitions, aquifer and vapor extraction tests, and remediation system designs and installations.

1990 - 1993 Staff Geologist, AeroVironment, Monrovia, CA

Project manager and project geologist for industrial sites and government projects. Team leader for documenting homestead well locations and archaeological and biological concerns at over 400 former homestead sites at Edwards AFB using GPS technology. Conducted groundwater sampling according to AFCEE protocols, and soil-vapor and geophysical surveys at Vandenberg AFB. Member of the design team of a mobile soil-vapor laboratory. Lead designer of an insitu soil-vapor sample collection system. Managed two teams for monitoring landfill vapor emissions and subsurface migration at active county operated landfills, and wrote the standard operating procedures, conducted field training, and prepared quarterly AQMD reports.

**DECLARATION OF
John L. Fio**

I, John L. Fio, declare as follows:

1. I am presently a consultant to the California Energy Commission for the Siting Office of the Energy Facilities Siting Division as a Hydrogeologic Consultant through Aspen Environmental Group.
2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.
3. I helped prepare the staff rebuttal testimony on **Soil and Water Resources** for the Abengoa Mojave Solar project based on my independent analysis of the Application for Certification and the supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.
4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.
5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

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

Dated: June 23, 2010 Signed: Original signed by J. Fio

At: Davis, California

JOHN L. FIO

QUALIFICATIONS

John L. Fio has over 25 years of problem-solving experience. Mr. Fio analyzes groundwater systems, quantifies chemical transport in the subsurface, and evaluates groundwater surface-water interactions. He is a recognized expert on hydrologic and water quality issues in the San Francisco Bay Area and the San Joaquin Valley, California.

John Fio:

- Develops and employs numerical models for site, water district, and basin-wide investigations.
- Calculates extraction effects on groundwater levels, stream flow, and lake levels.
- Establishes water quality monitoring programs.
- Designs water management plans.
- Evaluates groundwater quality effects of wastewater and recycled water disposal to land.
- Develops and implements Geographic Information System (GIS) databases.
- Determines water sources using chemical and age-dating techniques.

PROFESSIONAL EXPERIENCE

January, 1998 – present

Principal Hydrologist, HydroFocus, Inc.

Davis, CA

- Technical Groundwater Expert, Bureau of Water and Power, City of Beijing, China. Providing review, oversight, and direction for data collection, data interpretation, and groundwater-flow and constituent transport modeling of recycled water groundwater storage project.
- Water supply master plan, California Water Service Company, South San Francisco, California. Assessed water supply and quality benefits of alternative water supply projects in the Westside Groundwater Basin.
- Data and modeling analysis of regional drainage conditions – San Joaquin Valley, California.
- Groundwater-flow, solute-transport, and water-quality impacts from wastewater disposal to land: sanitary districts and municipalities located in San Joaquin and Contra Costa Counties, California.
- Groundwater quality, sea water intrusion and groundwater flow in San Francisco and San Mateo Counties, California. Field data collection, groundwater-flow and geochemical modeling to define seawater intrusion and quantify processes affecting groundwater quality.
- Groundwater extraction to control and remediate solvent plume – San Mateo County. Use of groundwater-flow model and field data collection and analysis to quantify contaminant movement and remediation.

- Quantitative hydrogeochemical assessment of contaminant transport near Menlo Park, California. Development of groundwater-flow and solute-transport models to quantify hydrocarbon transport beneath industrial facility near San Francisco Bay.
- Groundwater recharge and subsurface storage, Merced County, California. Developed and implemented regional groundwater-flow model to assess groundwater recharge and pumping projects.
- Depletion of subsurface flow to the North Platte River, Wyoming and Nebraska. Data analysis and modeling of stream aquifer interactions in support of interstate water rights conflict.
- Hydrologic and geochemical impacts of groundwater pumping and surface water injection– Sacramento County.

1995 to 1997

Senior Project Hydrologist, Hydrologic Consultants, Inc. *Sacramento, CA*

Project experience in the evaluation of groundwater flow, water quality, and solute transport. Consulting assignments included the following:

- Developed relationships to describe geologic controls and load-flow relationships for Santa Ynez River drainage system. The Santa Ynez River is a significant source of water recharging the Lompoc Groundwater Basin, and the relationships were part of a network of interacting reservoir operations, surface-water, and groundwater-flow and transport models.
- Evaluation of groundwater-flow paths beneath South San Francisco Bay. The groundwater-flow system was quantified using a groundwater-flow model to assess system response to pumping centers located east and west of the Bay.
- Coordination with the California Regional Water Quality Control Board on the remediation of a VOC plume in Mountain View, California.
- Assess the response of groundwater levels, streamflow, and spring discharge to groundwater pumpage in the Mammoth Basin, California.
- Quantifying stream flow depletions owing to increased consumption and groundwater pumping.

1990 to 1995

Research Grade Hydraulic Engineer, U.S. Geological Survey *Sacramento, CA*

- Conducted regional and geohydrologic and groundwater quality investigations in the western San Joaquin Valley, California.
- Directed the development of a regional Geographic Information System database for the South San Francisco and Peninsula Area, California.
- Supervised data collection and development of databases, data analyses, and report writing.
- Constructed groundwater flow models for parts of the western San Joaquin Valley and South San Francisco Bay areas, California.
- Interacted with private and public cooperators and funding agencies.

1987 to 1990

Civil Engineer, U.S. Geological Survey

Sacramento, CA

- Conducted field-scale investigations of on-farm drainage systems.
- Developed groundwater-flow model of tile drainage system. Assessed flow paths and salt transport in shallow flow-system. Quantified regional groundwater-flow paths intercepted by on-farm drainage systems.
- Integrated particle-tracking models with groundwater-flow model results to assess advective transport of salts and selenium.

1985 to 1987

Hydrologist, U.S. Geological Survey

Sacramento, CA

- Designed and conducted sorption experiments and incorporated results into a solute transport model.
- Assessed the distribution of salts and selenium in unsaturated and saturated soil profiles.
- Developed analytical method to estimate organic selenium concentrations in soil extracts.

1983 to 1984

Research Assistant, University of California

Davis, CA

- Conducted an assessment of methods used to analyze for selenium in soil extracts, aqueous samples, and animal tissues.
- Implemented experiments to assess arsenic volatilization from soils.
- Conducted laboratory analyses to estimate the buffering capacity of soils in response to acidic deposition.

ACADEMIC BACKGROUND

Master of Science, 1987, Civil Engineering, University of California at Davis
Bachelor of Science, 1984, Soil and Water Science, University of California at Davis

PROFESSIONAL AFFILIATIONS

American Society of Civil Engineers
Association of Groundwater Scientists and Engineers
California Groundwater Resources Association

AWARDS AND HONORS

U.S. Geological Survey Performance Award: 1989, 1990, 1992, 1993, and 1994
Citation for Outstanding Performance, University of California, Davis (1981)
Edward Kraft Scholarship Prize, University of California, Davis (1981)

RELEVANT PUBLICATIONS

Hydrogeology of the San Francisco Bay Area

Metzger, L.F. and **Fio, John L.**, 1997, Ground-water development and the effects on ground-water levels and water quality in the Town of Atherton, San Mateo County, California, U.S. Geological Survey Water-Resources Investigations Report 97-4033, 31p.

Fio, John L., and Leighton, D.A., 1995, Geohydrologic framework, Historical Development of the ground-water system, and general hydrologic and water-quality conditions in 1990, south San Francisco Bay and Peninsula area, California: U.S. Geologic Survey Open-File Report 94-357, 46 p.

Leighton, D.A., **Fio, John L.**, and Metzger, L.F., 1995, Database of well and areal data, South San Francisco Bay and Peninsula area, California: U.S. Geological Survey Water-Resources Investigation Report 94-4151, 47 p.

Geochemistry and Salt Migration

Fio, John L., Fujii, R. and Deverel, S.J., 1991, Selenium mobility and distribution in irrigated and nonirrigated alluvial soils: Soil Science Society of America Journal, v. 55, p. 1313-1320.

Deverel, S.J., and **Fio, John L.**, 1991, Ground-water Flow and solute movement to drain laterals, western San Joaquin Valley, California. 1: Geochemical Assessment, Water Resources Research, v. 27, no. 9, 2233-2246 p.

Fio, John L., and Fujii, R., 1990, Selenium speciation methods and application to soil saturation extracts from San Joaquin Valley, California: Soil Science Society of America Journal, v. 54, p. 363-369.

Fujii, R. and **Fio, John L.**, 1988, Partitioning and speciation of soluble and adsorbed selenium in soils: Agronomy Abstracts, Amer. Soc. Agron. Annual meetings, Anaheim, California, p. 196-97.

Numerical Modeling – Groundwater flow and contaminant transport

Fio, John L., 1997, Geohydrologic effects on drainwater quality: Journal of Irrigation and Drainage Engineering, ASCE 123(3).

Fio, John L., and Leighton, D.A., 1994, Effects of ground-water chemistry and flow on quality of drainflow in the western San Joaquin Valley, California: U.S. Geological Survey Open-File Report 94-72, 28 p.

Fio, John L., 1994 Calculation of a water budget and delineation of contributing sources to drain flows in the western San Joaquin Valley, California: U.S. Geological Survey Open-File Report 94-45, 28 p.

Barlow, Paul M., Wagner, B.J., Belitz, K., and **Fio, John L.**, 1993, Effects of Management alternatives on the shallow, saline ground water in the western San Joaquin Valley, California, Water Fact Sheet, Open-File Report 93-665.

Fio, John L., and Deverel, S.J., 1991, Ground-water flow and solute movement to drain laterals, western San Joaquin Valley, California. 2: Quantitative hydrologic assessment. Water Resources Research, v. 27, no. 9, 2247-2257 p.

Fio, John L., and Deverel, S.J., 1990, Interaction of shallow ground water and subsurface drains: implications for selenium transport and distribution in the western San Joaquin Valley, California. Abstract for technical session on ground-water flow systems and land use: relation to quality of shallow ground water, Association of Ground Water Scientists and Engineers, Anaheim, California, in Journal of Ground Water, v. 28, no. 5, p. 788-789.

Fio, John L., and Deverel, S.J., 1989, Ground-water flow to subsurface drains in the western San Joaquin Valley, California: U.S. Geological Survey Second National Symposium on Water Quality, Orlando, Florida, November 12-17, 1989, abstracts and technical sessions, U.S. Geological Survey Open-File Report 89-409, p. 25.

Fio, John L., and Deverel, S.J., 1988, Ground-water flow to subsurface agricultural drains in the western San Joaquin Valley, California: Transactions of the American Geophysical Union, v. 69, no. 44.

Monitoring

Leighton, D.A. and **Fio, John L.**, 1995, Evaluation of a monitoring program for assessing the effects of management practices on the quantity and quality of drainwater from the Panoche Water District, Western San Joaquin Valley, California, U.S. Geological Survey Open-File Report 95-731, 25 p.

Puckett, L.K., Alemi, M.M., Fan, A.M., **Fio, John L.**, Hansen, D., Wallender, and W., Wernette, F., 1992, Long-term monitoring plan, San Joaquin Valley Drainage Implementation Program.

**DECLARATION OF
Eugene B. (Gus) Yates**

I, Gus Yates, declare as follows:

1. I am presently a consultant to the California Energy Commission for the Siting Office of the Energy Facilities Siting Division as a Hydrogeologic Consultant through Aspen Environmental Group.
2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.
3. I helped prepare the staff rebuttal testimony on **Soil and Water Resources** for the Abengoa Mojave Solar project based on my independent analysis of the Application for Certification and the supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.
4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.
5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

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

Dated: June 23, 2010 Signed: Original signed by E. Yates

At: Davis, California

EUGENE B. (GUS) YATES

QUALIFICATIONS

Gus Yates has been a professional hydrologist in California for over 25 years. His role in water resources management projects commonly bridges the technical and policy realms. He specializes in rapidly identifying the key water-related issues for a project and addressing them with appropriate quantitative tools that make the best use of available data. He ties his technical work back into management plans and regulatory compliance documents. He has extensive experience in analysis and management of groundwater basins and related surface water and habitat systems throughout central and northern California. Mr. Yates is registered with the State of California as a professional geologist and certified hydrogeologist.

PROFESSIONAL EXPERIENCE

April, 2009 – present

Senior Hydrologist, HydroFocus Inc.

Davis, CA

Evaluates groundwater conditions at local and basinwide scales using modeling and statistical techniques; leads stakeholder processes to develop groundwater and watershed management plans that are grounded in technical understanding of the hydrologic system; applies operations models to optimize project design and quantify environmental impacts; applies training and experience in CEQA, NEPA, water-quality regulations, water rights, group facilitation, and litigation.

January, 1999 - March, 2009

Consulting Hydrologist in Private Practice

Berkeley, CA

- Groundwater flow and transport model, San Benito County, CA – Developed a regional groundwater flow and salinity model with MODFLOW and MT3DMS.
- Groundwater flow model, Laguna Seca subarea, Monterey County, CA – Developed and jointly calibrated a soil-moisture-recharge model and groundwater flow model to evaluate safe yield in a small, structurally complex coastal basin.
- Southeast Chico drainage study – Applied MODFLOW and HEC-RAS models to determine the cause of periodic shallow flooding in a new suburb.
- Groundwater flow model, Yuba goldfields wet-pit gravel quarry, Yuba County, CA – Developed a local-scale MODFLOW model to estimate the impacts of a proposed gravel quarry that would penetrate a regional confining layer.
- Seaside Basin update on groundwater conditions, Seaside, CA – Updated and improved prior estimates of pumping, recharge, aquifer characteristics and yield to help resolve a water-rights dispute.
- Cambria Community Services District water-supply master plan – Quantified the frequency and duration of drought-related water shortages and evaluated feasibility of water supply alternatives.
- Fish habitat improvements, Yolo Bypass, CA -- Applied HEC-RAS stream hydraulics model with input from landowners and biologist to design creek modifications that would improve anadromous fish passage and create localized inundation for splittail spawning and rearing.

- Integrated water resources management plan, Yolo County, CA -- Provided technical expertise and local knowledge as coauthor of a countywide water management with state and local agencies.
- Groundwater management plan, Soquel Creek Water District, Santa Cruz County, CA -- Served as technical advisor and coauthor for GMP update to meet SB1938 requirements and focus monitoring and management actions on emerging key issues.

1991-1999

Environmental Scientist, Jones & Stokes Associates

Sacramento, CA

- Willow Slough watershed management plan, Yolo County, CA – Facilitated stakeholder process; documented groundwater, flooding and habitat conditions; and developed BMPs for agriculture.
- Groundwater management plan, northern San Benito County, CA – Served as facilitator, technical advisor and author for a multi-party planning process to identify issues and realistic solutions in a heavily-used groundwater basin.
- Subsidence impacts of groundwater pumping, Mendota, CA – Developed regression equations based on extensive USGS data to predict subsidence from groundwater transfers.
- Nitrate contamination from septic systems, Los Osos, CA – Served as expert advisor for field investigation of nitrate contamination from septic systems in a sandy coastal aquifer.
- Operations model for conjunctive use of desal plant and groundwater, Cambria, CA – Developed a probabilistic, real-time operations model to guide the conjunctive use of a desalination plant with existing water-supply wells.
- Instream flow litigation, Putah Creek, Yolo and Solano Counties, CA – Expert witness in a trial challenging the adequacy of instream flows below Monticello Dam.

1982-1990

Hydrologist, U.S. Geological Survey

Sacramento, CA

- Groundwater model of Salinas Valley groundwater basin, Monterey County, CA – Developed one of the earliest models of the Salinas Valley groundwater basin and applied optimization theory to conjunctive use operations.
- Groundwater flow model, Los Osos, CA – Created a groundwater flow model to evaluate 3-D interactions of Los Osos Creek, the Pacific Ocean and groundwater flow in a layered coastal groundwater basin. Subsequently added solute transport module to estimate long-term nitrate impacts of a wastewater project.
- Groundwater flow and quality, Santa Rosa and San Simeon Creek basins, Cambria, CA – Managed a comprehensive investigation of groundwater conditions in two coastal stream valleys, and developed finite-element models to integrate data and explore management options.

ACADEMIC BACKGROUND

Master of Science, 1985, Water Science, University of California at Davis
 Bachelor of Arts, 1979, Geology, Harvard University, Cambridge, MA

PROFESSIONAL AFFILIATIONS

American Institute of Hydrology – certified professional hydrogeologist
Groundwater Resources Association of California

**DECLARATION OF
Mike Conway**

I, Mike Conway, declare as follows:

1. I am presently employed by the California Energy Commission in the Siting, Transmission and Environmental Protection Division, as an Engineering Geologist.
2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.
3. I prepared the staff rebuttal testimony on the **Soil and Water Resources** for the **Abengoa Mojave Solar** project (09-AFC-5) based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.
4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed therein.
5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

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

Dated: June 23, 2010

Signed: Original signed by M. Conway

At: Sacramento, California

Resume For: Mike Conway

Education: Bachelor of Science in Geology, University of California, Davis, August 2003.
Master of Science in Geology, California State University, Sacramento, expected 2011

Certifications: Certified Professional in Erosion and Sediment Control (CPESC)
Certified Erosion, Sediment and Storm Water Inspector (CESSWI)
Leadership in Energy and Environmental Design Accredited Professional (LEED AP)

Experience:

Engineering Geologist: California Energy Commission, Sacramento, CA 2009

- Conduct analyses of soil and water resource reports submitted to Commission
- Assess impacts to soil and water resources from construction and operation of energy producing facilities
- Perform onsite evaluations of soil and water resources pre and post-project
- Implement a CEQA-like review of proposed energy projects to evaluate environmental impacts

Environmental Scientist: Central Valley Water Board, Rancho Cordova, CA 2009

- Wrote municipal storm water permits for Phase I communities in the Central Valley
- Reviewed storm water annual reports for Phase I and II municipalities
- Conducted audits of industrial sites for compliance with storm water permits
- Conducted audits of municipalities for compliance with municipal permits
- Help communities better understand how to effectively implement storm water programs
- Represented Water Board in large technical workshops and other public forums

Environmental Consultant: Wood Rodgers, Inc., Sacramento, CA 2006-2009

- Consulted clients on how to comply with Federal, State and local storm water quality and environmental regulations
- Helped public and private sector clients gain State Water Resources Control Board (SWRCB) permit coverage under Large and Small MS4 General Permits, NPDES Permits, CWA Section 401 Permits
- Consulted clients on Army Corps of Engineers, 404 Permitting
- Developed a storm water quality manual for Yolo County
- Prepared Caltrans environmental documentation and design for all project phases
- Prepared Storm Water Management Plans (SWMP) and Storm Water Pollution Prevention Plans (SWPPP)
- Drafted water pollution control exhibits using both AutoCAD and MicroStation
- Prepared Caltrans Storm Water Data Reports including cost estimates
- Designed landscaping plans for Caltrans' Modesto Ramp Rehabilitation Project
- Prepared Spill Prevention Control and Countermeasure (SPCC) plans
- Created Hazardous Materials Business Plan for City of Fort Bragg, California
- Prepared proposals for outgoing environmental quality project bids
- Performed field visits to evaluate Best Management Practice (BMP) effectiveness in reducing erosion and sedimentation
- Facilitated multiple storm water quality training workshops for groups up to 20 plus

Storm Water Quality Consultant: EnviroSafety Services, Elk Grove, CA 2004-2006

- Wrote site specific SWPPPs to include guidance specific to city, county, and geographical constraints
- Designed BMP exhibits using AutoCAD
- Conducted inspections at construction sites throughout the Central Valley for (SWPPP) compliance
- Resolved storm water compliance issues in cooperation with site superintendents, county and city inspectors
- Researched current storm water protection regulations to best protect clients

Post-Graduate Researcher: Dept. of Land, Air, and Water Resources, U.C. Davis, CA 2003

- Studied the effects of irrigation practices on wetland ecology and water quality
- Independently organized monthly analyses and data processing of selenium contaminated invertebrate, algae, and water samples from the Tulare Lake Drainage District
- Managed concentrated acids, carcinogenic solutions, and final fluorescence measurements
- Compiled research data and presented findings to a team of eight colleagues

Lab Technician: Raney Geotechnical Laboratory, West Sacramento, CA 2001

- Conducted moisture density, unconfined compression tests, Atterburg Limit, curve, plasticity tests, and basic calculations for soil samples
- Administered load tests on concrete cylinders and mortar samples
- Performed percolation tests and Dynamic Cone Penetrator (DCP) tests in the field and gathered water samples for environmental analysis

**DECLARATION OF
Steven J Brown, PE**

I, Steven J Brown, declare as follows:

1. I have been retained as a consultant to the California Energy Commission for my professional specialty of transportation.
2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.
3. I prepared the staff testimony of the **Traffic & Transportation Section**, which includes the Supplemental Staff Assessment, Appendix A, and Response to Comments regarding the **Abengoa Mojave Solar** project (09-AFC-5) based on my independent analysis of the Application for Certification and supplements, data from reliable documents and sources, and my professional experience and knowledge.
4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue(s) addressed therein.
5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

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

Dated: 6/23/10

Signed: 

At: Santa Monica, CA

STEVEN J. BROWN, PE

Senior Principal



Mr. Brown is a Senior Principal with 22 years of experience in transportation planning and engineering. In addition to his 15 years of consulting experience, Mr. Brown was the Director of Transportation Planning for the City of Sacramento. He has managed projects in 8 states that include the following disciplines: transportation master plans, traffic calming, environmental impact assessments, parking and circulation studies, bicycle and pedestrian facility plans, new-urbanist planning, freeway interchanges, intersection/signal designs and corridor studies. Mr. Brown earned a Master's Degree in Transportation from the University of California, Berkeley, and a Master's in Business Administration from Golden Gate University in San Francisco. He is a registered traffic engineer in California.

EDUCATION

Bachelor of Science in Civil Engineering with Honors, University of California, Berkeley, 1985
Master of Science in Transportation, University of California at Berkeley, 1987
Masters in Business Administration, Golden Gate University, 1998

PROFESSIONAL AFFILIATIONS

Institute of Transportation Engineers (ITE): Member, Northern California Section President 2000-2001,
Co-chair ITE District 6 Conference, 2004

PROFESSIONAL REGISTRATION

Licensed Traffic Engineer, State of California (TR1510)

AREAS OF EXPERTISE

Traffic Engineering •

PUBLICATIONS

US Traffic Calming Manual, co-authored with Reid Ewing, APA & ASCE, 2009
Skinny Streets, co-authored with Reid Ewing, ULI July 2007
Traffic Calming Revisited, co-authored with Reid Ewing and Aaron Hoyt, ITE Journal November 2005
Traffic Calming Revisited, TRB Conference, 2004
Community Based Street Design Standards, co-authored with Gwen Owens, ITE District 6 Conference, 1998
Measurable Traffic Calming Results, co-authored with Martin Hanneman & Ken Grehm, ITE District 6 Annual Conference, 1999
Calming the Community (Traffic Calming in Downtown Sacramento), co-authored with Steve Fitzsimons, ITE National and District 6 Conference, 1997
Traffic-Generation Characteristics of Distribution Centers, co-authored with Alan Telford, ITE District 6 Conference, 1990
The Single-Signal Interchange, co-authored with Gerald Walters, ITE National Conference, 1988

CEC PROJECTS

Moss Landing
Sterling Solar 2
Abengoa Mojave
Morro Bay

**DECLARATION OF
Thomas Packard**

I, Thomas Packard, declare as follows:

1. I am presently under contract with William Kanemoto to provide environmental technical assistance to Aspen Environmental Group and the California Energy Commission. I am serving as a Visual Resource Specialist to provide Peak Workload Support for the Energy Facility Siting Program and for the Energy Planning Program.
2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.
3. I prepared the staff rebuttal testimony on **Visual Resources** for the **Abengoa Mojave Solar** project (09-AFC-5) based on my independent analysis of the Application for Certification and supplements thereto, data from documents and sources deemed to be reliable, and my professional experience and knowledge.
4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.
5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

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

Dated: June 23, 2010

Signed: Original signed by T. Packard

At: Oakland, California

TOM PACKARD

& ASSOCIATES

Thomas Packard, ASLA
Tom Packard & Associates

Tom Packard is a freelance planning consultant who specializes exclusively in scenic resource planning, visual impact assessment, and visual impact mitigation. Educated in landscape architecture, Mr. Packard has over 23 years of experience preparing scenic resource management plans and conducting visual impact studies. He has worked in both the private and public sector on projects ranging from urban and parkland development to transportation, mining, and major utilities. Much of his work during the past five years has been in the Lake Tahoe Basin. Mr. Packard has designed and conducted comprehensive visual surveys of landscapes covering large areas as the basis for developing land use and resource management plans. He has designed and implemented public perception studies as a means of determining visual impacts of projects that have unique circumstances. He is experienced in the technical application of all major visual assessment methodologies, particularly the Scenery Management System employed by the USDA Forest Service, the Visual Management System used by the Bureau of Land Management, and the Tahoe Regional Planning Agency's Scenic Resource Threshold system. Mr. Packard lectures on the subject of visual resource management and impact assessment.

Selected Project Experience

- Principal Investigator and Project Manager for the **Landscape Inventory and Character Type Mapping of the Shoreline Area of Lake Tahoe**. This project was conducted for the Tahoe Regional Planning Agency as part of its 2007 update of the Regional Plan for the Lake Tahoe Basin. The inventory, which examines the Tahoe Basin landscape as seen from the surface of Lake Tahoe, provides detailed tabular and photographic documentation of the landscape's physical features and appearance characteristics. The inventory focuses on attributes of the natural landscape and the characteristics of human development. The data was used to define and map shoreline landscape character types and determining their ability to absorb human development without a loss in visual quality or exhibit undesirable changes in visual character. The information is suitable for formulating spatially explicit design guidelines that account for and respond to the specific landscape conditions in each area.
- Principal Investigator of scenic resources for the proposed **Stateline to Stateline Bike Trail Project**. The proposed project, presently in the planning stages, consists of a continuous, 30-mile long bike trail from North Stateline around the east side of Lake Tahoe to South Stateline. As part of a multi-disciplinary team, scenic resources are being studied to identify opportunities and constraints of potential routes for the bike trail. Potential impacts of the bike trail on scenic quality threshold indicators are being determined as part of the environmental review of the project.
- Principal Author and Project Manager of the **Eastshore Drive National Scenic Byway Corridor Management Plan** for 15 miles of State Route 28 along the east shore of Lake Tahoe within the State of Nevada. The Scenic Byway Corridor Management Plan addressed natural and cultural resource protection, interpretation of significant features, issues associated with limited parking, and provision of public access to beaches. The study area, from Incline Village south to Spooner Summit, receives heavy, year-round recreation use. Worked directly with the Scenic Byway Steering Committee throughout the project. Coordinated the involvement of the Tahoe Regional Planning Agency, Nevada DOT, US

Forest Service, Nevada Division of State Parks, county agencies and local jurisdictions, private citizens and public special interest groups.

- Principal Investigator for the **Marin County Local Coastal Program Inventory of Visual and Scenic Resources** as part of the County's recent update of their Local Coastal Plan. The inventory produced mapped, written, and photographic records of the coastal landscape as of February-March 2003. In addition, key viewpoints from which important scenic resources are seen and where outstanding vistas occur were identified and mapped. The County used this information to revise local coastal planning policies that guide future planning decisions.
- Principal investigator of potential visual impacts for the proposed **Beach Club on Lake Tahoe Project EIS**. The proposed project consists of a 20-acre, 142-unit condominium development in Douglas County, Nevada off of US Highway 50 reaching to the shore of Lake Tahoe. It includes a beachfront clubhouse with 159-foot pier. The project's scenic quality impacts were evaluated in accordance with the TRPA Code of Ordinances and Scenic Threshold Standards. The potential effect on TRPA scenic quality threshold indicators (SR-1 through SR-4) was determined by analyzing the visual presence of the proposed project as if built through the use of photo simulations. Compliance with the Code of Ordinances Chapter 30 - Design Standards was also evaluated. In the shoreland portion of the project, consistency with shoreland ordinances was determined by applying the Visual Magnitude – Contrast Rating System.
- Principal Investigator of the **Visual Resource Survey of Point Molat ** as part of the San Pablo Peninsula Open Space Study. The study involved cataloguing landscape features and characteristics of the study site and the major views that occur within and from the study area located at the north end of the San Francisco Bay. The visual characteristics of topography and landform, vegetation types and patterns, man-made features, shoreline configuration, views to off-site areas, views of on-site areas, and major features of visual interest were recorded. The information was used to analyze landscape character, assess scenic quality, and to identify visual resources opportunities and constrains for potential future public recreation use of the area.
- Member of TRPA Science Team, a panel of 11 different resource experts participating as Core Group members in the **Pathway 2007 Tahoe Regional Plan Update** by the Tahoe Regional Planning Agency and US Forest Service. Mr. Packard was selected as a panel member for his expertise in evaluating scenic resources, his knowledge of the TRPA scenic threshold system, and his understanding of US Forest Service Scenery Management practices. He helped develop proposed modifications to the Scenic Threshold system and scenic resource management strategies for future implementation.
- Principal Investigator of aesthetic resources for the **Cloverdale Ranch Study**, a project of the Peninsula Open Space Trust (POST). The project site is located on along the Pacific Coast on 5,638 acres between Ano Nuevo State Reserve and Butano State Park in San Mateo County, California. The study consisted of an inventory of the landscape and evaluation of scenic opportunities and constraints as part of the process to develop a unified vision and implementation strategy for the preservation, restoration, and enhancement of the ranch land for future public use and enjoyment.

Other Project Experience

- Investigator of visual impacts for the **Sonoma Country Inn EIR** which evaluated a proposed hillside restaurant, 50-room resort facility, and new winery near the Town of Kenwood in a highly scenic area of Sonoma County along Route 12, a designated State Scenic Highway.
- Principal investigator of visual impacts for the proposed **Village at Loch Lomond Marina Development**, a mixed use, waterfront project in San Rafael, California
- Prepared visual impact assessment as part of the City of Emeryville's **Saint Alban's Senior Housing Project EIR**, California, which studied the potential visual impacts of a proposed high-rise building on the Emeryville Peninsula on the east shore of San Francisco Bay.
- Principal investigator of visual/aesthetic and shadow impacts of the proposed **Rincon Sports and Entertainment Center** in downtown San Francisco, which considered view blockage and consistency of the visual character, mass, and scale of the proposed project with existing development in the surrounding area.
- Principal Investigator and Project Manager for the visual impact assessment of the **NAS Alameda Reuse Plan EIS/EIR**.
- Co-Investigator and Project Manager for the visual impact assessment of the **NS Treasure Island Reuse Plan EIS/EIR**.
- Prepared the visual analysis for the City of San Leandro's **Lake Chabot Terrace Project EIR**, California, which examined the potential visual effects of developing a 60-acre quarry site with approximately 137 single-family houses, identified building and layout design alternatives, and suggested ways to reduce or avoid adverse visual effects.
- Principal Investigator and Project Manager of the **Visibility Study of the East Palo Alto University Circle Redevelopment Project** that evaluated the degree of visual intrusion on Palo Alto neighborhoods that would result from two proposed 275-foot office towers and associated development in nearby East Palo Alto.
- Principal Investigator and Project Manager of the **Lafayette Athletic Club Visibility Study**.
- Prepared visual analysis for the **North Wavecrest Redevelopment Project Specific Plan and EIR** which examined the potential effects of subdividing and developing a vacant 490-acre coastal site immediately adjacent to State Highway 1 (Cabrillo Highway) and the Pacific Ocean in the City of Half Moon Bay, California.
- Principal Investigator of visual impacts for the **Palo Verde Ranch EIR** for a 340-unit subdivision project located on 485 acres of land along the south side of I-580 between Pleasanton and Hayward, California.
- Prepared visual analysis for the Town of Ross' **Monte Bello Subdivision EIR**, California, which examined the potential effects of subdividing a 37-acre vacant site immediately adjacent to a local park and Marin Municipal Water District watershed lands.
- Principal Investigator and Aesthetic Resource Analyst for the **West Pleasanton Expanded Planning Area Study**.
- Principal Investigator of potential visual impacts of various development scenarios for the **Bernal Property** in Pleasanton, California.
- Principal investigator of visual impacts for the proposed **Academy Heights Residential Development**, a high-end development project of seven lots in San Rafael, California.
- Principal Investigator of visual impacts for the **Paulsen-Whiting Bridge Replacement Project** in Watsonville, California.
- Principal Investigator of scenic impacts for the **Sierra Colina Village Project**, a proposed multi-unit residential development at Stateline, Nevada within the Lake Tahoe basin.
- Co-investigator for visual impact study of a proposed **Home Depot Development Project** adjacent to Highway 101 at the northern limits of the City of Santa Rosa.

- Co-investigator of visual studies for the **Lake Tahoe Shorezone Development Standards**, Lake Tahoe Basin which evaluated proposed Shorezone Development Standards for consistency with the Lake Tahoe Scenic Thresholds.
- Principal Investigator for the **Sign Ordinance and State Route 28 Beautification Plan Evaluation** in Lake Tahoe's North Stateline casino area at Crystal Bay, Nevada that assessed the effect of new commercial signs and proposed streetscape improvements relative to TRPA's scenic resource thresholds.
- Prepared visual analysis of the proposed **Hyatt Lake Tahoe Expansion Project** at Incline Village, Nevada.
- Project Manager of the **Roundhill to Stateline 120-kV Transmission Line EIR/EIS** and Principal Investigator for visual, land use, recreation and earth resources.
- Principal Investigator and Project Manager for the **Kingsbury Grade Scenic Mitigation Plan** for the lower portion of Kingsbury Grade (Nevada State Route 207) in Douglas County, Nevada.
- Principal Investigator and Project Manager for the **Mono Lake Basin Visual Resource Impact Analysis** in conjunction with the California State Water Resources Control Board's EIR for the Review of Mono Basin Water Rights of the City of Los Angeles.
- Principal investigator and project manager for the **Bodie Project Visual Resources Program**, Mono County, California that assessed the potential effects of proposed mineral exploration and possible future mine development on the visual resources of the region, particularly the "ghost town" of Bodie.
- Principal Investigator for the visual/aesthetic impact analysis of the **New Melones Lake Resource Management Plan (RMP)**, and **Environmental Report**, for the U.S. Bureau of Reclamation in California.
- Principal Investigator for the visual resource component of the **Cascade Reservoir Management Plan** for the U.S. Bureau of Reclamation.
- Principal Investigator and Project Manager for the **Statewide Scenic Highway Inventory and Eligibility Review** to identify state highways throughout California that are currently listed as eligible for State Scenic Highway designation but no longer meet the criteria for official designation.
- Principal Investigator and Project Manager for the visual analysis of the **Pittsburg/Antioch Transportation Corridor Study** that examined the visual impacts of three transportation alternatives between Concord and Antioch, California.
- Principal Investigator and Project Manager for the visual impact analysis of the **Rt. 101 Widening Project**, a major state highway improvement project through downtown Santa Rosa, California which involved adding new lanes to the highway and the removal of substantial amounts of mature trees and shrubs along a three mile stretch.
- Principal Investigator and Project Manager for the visual impact assessment of the **Rt. 84 Freeway Project** in Fremont, California, to U.S. Highway 101.
- Principal Investigator and Project Manager for the visual impact assessment of the **Rt. 87 Freeway Project** from downtown San Jose, California, to U.S. Highway 101.
- Principal Investigator and Project Manager for the **visual impact analysis of major state highway improvement projects** throughout seven Bay-area counties including Sonoma, Marin, Solano, San Francisco, Contra Costa, Alameda, and San Mateo.
- Principal Investigator and Project Manager for the visual analysis of **See-through Bridge Railing Designs** for state highways in California.
- Principal Investigator and Project Manager for the visual impact analysis of the **Rt. 101 Widening Project**, a major state highway improvement project through downtown Santa Rosa, California.
- Lecturer on the **Visual Impact Assessment of Highway Projects** at the California

Department of Transportation Landscape Architecture Academy, Environmental Planning Academy, and Environmental Planning Short Course.

- Principal Investigator for the visual impact analysis of a **Proposed Sign Ordinance Amendment, City of Fremont, California** that would authorize “large” freeway signs in any retail shopping center within the City which abuts a city limit line.
- Principal Investigator of visual impacts for the **Mountain Pass Mine EIR**.
- Principal Investigator for visual resources on the County of Yolo's **Off-Channel Mining Plan** and **Cache Creek Resources Management Plan EIRs for Lower Cache Creek**.
- Principal Investigator and Project Manager for the visual impact assessment of the **VCR Mining Project** in Imperial County, California.
- Principal Investigator and Project Manager for the visual impact assessment of the **Pine Tree Project**, a proposed open pit gold mine and ore processing facilities on 3,200 acres within the historic Mother Lode of Mariposa County, California.
- Principal Investigator and Project Manager for the **Penn Mine Site Long-Term Solution Project Environmental Impact Report; Calaveras County, California**.
- Co-investigator and Project Manager for the visual analysis of the proposed **Marsh Canyon Landfill** in Contra Costa County, California.
- Co-investigator for the visual analysis of the **Crockett Co-Generation Project**, a proposed facility at the existing C&H sugar plant in Crockett, California.
- Principal investigator for the visual analysis of **Idaho Power Company's Bliss, Lower Salmon Falls and Upper Salmon Falls Hydroelectric Projects** in conjunction with FERC re-licensing studies.
- Principal investigator for Aesthetic Resources as part of the FERC license application for **PacifiCorp's North Umpqua Hydroelectric Project**.
- Principal investigator of aesthetic impacts of PG&E's **Pitt No. 1 Hydroelectric Development** on the Pitt River in northeastern California situated in the Cascade region between Mt. Shasta and Mt. Lassen near the confluence of the Fall River and Pit River.
- Principal Investigator for the visual resource component of **PacifiCorp's Powerdale Hydroelectric Project FERC Relicensing Project** located on the Hood River, Oregon, 1 mile upstream of the Columbia River and partially within the Columbia River Gorge National Scenic Area.
- Principal Investigator for the visual resource component of **PacifiCorp's Yale Hydroelectric Project FERC Relicensing**, located on the Lewis River, Washington.
- Principal Investigator for visual resources for FERC relicensing of **Washington Water Power's Clark Fork Projects** in northwestern Montana and author of an Aesthetics Management Plan which identifies enhancement and mitigation measures and describes strategies to protect scenic resources over the life of the project license.
- Co-investigator of overall aesthetic impacts related to the proposed **El Portal Hydroelectric Development** on the Merced River at the western entrance to Yosemite National Park.
- Principal Investigator of visual impacts for the FERC re-licensing for PG&E's **Haas Kings Hydroelectric Project** in the highly scenic King's River region of California's central Sierra Nevada mountains.
- Co-investigator of impacts for the **SMUD/SPPCo Trans-Sierra 500kV Intertie Transmission Line** project.
- Principal Investigator and Project Manager for the visual impact assessment and environmental assessment of the **Carson City Transmission Line Relocation Project**.
- Principal Investigator for the visual impact assessment of the **CIP to Waiiau 138 kV Transmission Line Project** which analyzed candidate routes through rural, suburban and urban settings, including shore zone management areas of Oahu.
- Principal Investigator and Project Manager for the visual impact assessment of the

Sagebrush Mojave-Vincent 230-kV Transmission Line Project.

- Principal Investigator and Project Manager for the **Tonkin Spring Transmission Line Environmental Assessment.**
- Principal Investigator and Project Manager for the **Cove 120-kV Transmission Line Environmental Assessment.**
- Principal Investigator for visual impacts for the **El Vado to Abiquiu Transmission Line.**
- Project Manager and Principal Investigator for the development of award-winning courtroom graphics for the **U.S. Department of Justice Reserved Water Rights Case.**
- Project Manager and Principal Investigator for the development of award-winning courtroom graphics for the **U.S. Department of Justice South Florida Everglades Litigation.**

Education

- B.L.A., University of Illinois, 1983
- M.L.A. Program, University of Illinois, Land Resource Planning track with concentration on visual assessment

Memberships

- American Society of Landscape Architects

Honors and Awards

- ASLA Honor Award, 1990, U.S. Department of Justice Reserved Water Rights Case
- ASLA Merit Award, 1995, U.S. Department of Justice South Florida Everglades Case
- Sigma Lambda Alpha, Honor Society for Academic Excellence in Landscape Architecture

**DECLARATION OF
William D. Kanemoto**

I, William Kanemoto, declare as follows:

1. I am presently under contract with Aspen Environmental Group, a contractor to the California Energy Commission, Systems Assessment and Facilities Siting Division. I am serving as a Visual Resource Specialist to provide Peak Workload Support for the Energy Facility Siting Program and for the Energy Planning Program.
2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.
3. I participated in preparation of staff rebuttal testimony on Visual Resources for the **Abengoa Mojave Solar Project** based on my independent analysis of the Application for Certification and supplements hereto, data from documents and sources deemed to be reliable, and my professional experience and knowledge.
4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issues addressed therein.
5. I am personally familiar with the facts and conclusions applicable to the vapor plume simulations and if called as a witness could testify competently thereto.

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

Dated: June 23, 2010

Signed: 

At: Oakland, California

William Kanemoto

Visual Resource/Aesthetics Analyst

Academic Background:

M. Landscape Architecture, University of Michigan, Ann Arbor, 1982
B.A. Liberal Arts (Honors), University of California, Santa Cruz, 1973

Professional Experience:

Principal

William Kanemoto & Associates, Oakland, California, 1993 - Present

William Kanemoto is Principal of William Kanemoto & Associates, an environmental consulting practice specializing in visual analysis and computer visualization in the context of environmental review. In this capacity he has served as principal investigator for visual analysis and simulation on a wide range of major infrastructure and development projects, including the High Desert Power Project AFC, Port of Oakland Expansion EIS, Route 4 East/Pittsburg BART EIS, FMC Substation and Transmission Line PEA, and numerous other infrastructure and transportation projects. Mr. Kanemoto received recognition from the California Association of Environmental Professionals for visual analysis, computer simulation, animation, and video production for the Stanford Sand Hill Road Projects EIR, prepared by EIP Associates and judged 'Best State-Wide EIR of 1997'.

Associate Director

Environmental Simulation Laboratory,
Institute of Urban and Regional Development,
Center for Environmental Design Research
University of California, Berkeley, 1994 - 2000

Instructed graduate students in the College of Environmental Design, U.C. Berkeley, served as consultant on various major planning projects in the San Francisco Bay Area, and conducted design collaborations with counterparts at Keio University and ARK CyberUniversity in Tokyo, Japan via the Internet.

Principal Investigator/Project Manager

Dames & Moore, San Francisco/Oakland, California, 1988-1992

Served as principal investigator of numerous visual analyses of major infrastructure projects throughout the U.S., in Europe, and in Asia. Gained extensive familiarity with the application of a wide range of professionally accepted visual assessment techniques in the context of CEQA, NEPA, and related regulatory requirements of the CPUC, CEC, FERC, DOT, U.S. Forest Service, BLM, and other agencies.

Project Manager

LSA Associates, Pt. Richmond, California, 1987-1988

Project manager and planner on environmental impact reports for various residential and commercial development projects in northern California.

Environmental Planner

Holton Associates, Berkeley, California, 1984-1987

Preparation of various resource and regulatory studies including EIRs, FERC Exhibit E, Section 404 alternative analyses, riparian restoration studies, and cumulative impact methodology studies for EPRI and Sierra County, CA.

DECLARATION OF
JAMES EARL JEWELL

I, James Earl Jewell, declare as follows:

1. I am currently under contract with the Aspen Environmental Group to provide environmental technical assistance to the California Energy Commission. Under Contract No. 700-05-002 I am serving as an Illuminating Engineer to provide Peak Workload Support for the Energy Facility Siting Program and for the Energy Planning Program.
2. A copy of my professional qualifications and experience is attached hereto and incorporated herein.
3. I assisted in the preparation of the staff rebuttal testimony on **Visual Resources** for the **Abengoa Mojave Solar** project based on my independent analysis of the Application for Certification and supplements thereto, data from reliable sources and documents, and my professional experience and knowledge.
4. It is my professional opinion that the prepared testimony is accurate and valid with respect to the issues addressed therein.
5. I am familiar personally with the facts and conclusions applicable to matters of intrusive light and glare and relative brightnesses, and if called as a witness, could testify competently thereto.

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

Dated: June 23, 2010 Signed: Original signed by J. E. Jewell

At: San Francisco, California

JAMES EARL JEWELL, LC, ATF, IES, CIES (Hon), SAH

EDUCATION:

BA, College of the Pacific
MFA, School of Drama, Yale University

EMPLOYMENT:

1957-67, Engineering Division, Holzmüller Corporation
1967-69, Theatre Consulting Service, Bolt, Beranek & Newman
1969-87, Lighting Services Administrator, Pacific Gas & Electric Company
1987- present, Consultant in Lighting
Since 1993 in association with Alan Lindsley, AIA, IES

PROFESSIONAL ACTIVITIES:

Illuminating Engineering Society
President – 1984-85
Vice President – 1983-84
Director – 1979-86
Office Lighting Committee – 1976 - present, Chairman, 1978-80
Roadway Lighting Committee – 1974 – present, Chairman, 1990-92
Regional Energy Committee Chairman – 1974-76, 1978-84
Energy Advisory Committee – 1973-75
Technical Missions – China – 1984, 1987, 1988

European Lighting Congress: Strasbourg, 1969; Florence, 1977; Granada, 1981;
Lausanne, 1985; Budapest, 1989; Edinburgh, 1993; Berlin, 2001

Pacific Basin Lighting Congress: Chairman, Shanghai, 1989; Bangkok, 1993;
Nagoya, 1997; Organizing Committee, Delhi, 2002; Cairns, 2005; Bangkok,

2009

Edison Electric Institute: Street Lighting Committee – 1971-87, Chairman 1979-81

International Commission on Illumination:

Board of Administration – 1983-87, 1987-91
Division Four (Lighting for Transport)
Technical Committee 4.34 -- 1980-95
Technical Committee 4.25 -- 1992-99

Professional Light Designers Convention: London, 2007; Berlin, 2009

Expert Witness – Admitted as an expert witness in the Superior Courts of Amador,
Contra Costa, and San Francisco Counties.

AWARDS AND HONOURS:

IES Regional Technical Award – 1985
IES Distinguished Service Award – 1986
College of Fellows of the American Theatre --1988
Honourary Member, China IES – 1989
CIE Distinguished Service Award – 1991
IES Louis B. Marks Award – 1993

CERTIFICATION:

LC – Granted in 1990 by the National Council on the Qualification of Lighting Professionals

RELEVANT WORK EXPERIENCE:

With PG&E appeared before CEC Committee and Staff on lighting issues with respect to the siting and licensing of Geysers steam power plants.

On behalf of PG&E and the IES appeared before the Simonson Committee to consult on the development of the lighting portions of Title 24.

On behalf of PG&E and the IES appeared before the CEC on numerous occasions to support the development of fluorescent lamp promotional programs and to assist in developing rigorous lighting ballast standards for California and on other lighting energy management issues.

While at PG&E supported and oversaw funding for projects on daylight following and electronic ballasts. Projects supported by both the DOE and CEC.

In practice as a lighting consultant worked with private clients and jurisdictions on matters concerned with light trespass and “intrusive” lighting.

JEJewell
19 February, 2010

DECLARATION OF Ellen Townsend-Hough

I, **Ellen Townsend-Hough** declare as follows:

1. I am presently employed by the California Energy Commission in the Environmental Siting Office of the Energy Facilities Siting Division as an Associate Mechanical Engineer.
2. A copy of my professional qualifications and experience is attached hereto and incorporated by reference herein.
3. I helped prepare the staff rebuttal testimony on **Waste Management** for the **Abengoa Mojave Solar** project (09-AFC-5) based on my independent analysis of the Application for Certification and supplements thereto, data from reliable documents and sources, and my professional experience and knowledge.
4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.
5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

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

Dated: June 23, 2010 Signed: Original signed by E. Townsend-Hough

At: Sacramento, California

Ellen Townsend-Hough

SUMMARY

I am a chemical engineer with 27 years of experience. My professional career has afforded me many unique growth and development opportunities. I have a working knowledge of the California Environmental Quality Act. My strengths are in analyzing and performing complex environmental engineering analyses, in areas such as Waste Management, Hazardous Materials Management, Worker Safety, and Water Resources. I worked as a policy advisor to a California Energy Commissioner for three years. I am also an US Environmental Protection Agency Environmental Justice trainer.

PROFESSIONAL EXPERIENCE

Writing

- Write letters, memos, negative declarations, environmental impact reports that require technical evaluation of mechanical engineering and environmental aspects of pollution control systems, environmental impacts, public health issues and worker safety.

Technical Analysis and Presentation

- Performs mechanical engineering analysis of designs for complex mechanical engineering analysis of designs for systems such as combustion chambers and steam boilers, turbine generators, heat transfer systems, air quality abatement systems, cooling water tower systems, pumps and control systems
- Review and process compliance submittals in accordance with the California Environmental Quality Act, the Warren Alquist Act, the Federal Clean Air Act and the California and Federal Occupational Health and Safety Acts to assure compliance of projects
- Provides licensing recommendations and function as an expert witness in regulatory hearings.
- Provide public health impact analysis to assess the potential for impacts associated with project related air toxic/non-criteria pollutant emissions.
- Evaluate the potential of public exposure to pollutant emissions during routine operation and during incidents due to accidents or control equipment failure
- Provide an engineering analysis examining the likelihood of compliance with the design criteria for power plants and also examine site specific potential significant adverse environmental impacts

Technical Skills

- Establish mitigation that reduces the potential for human exposure to levels which would not result in significant health impact or health risk in any segment of the exposed population.
- Assist with on-site audits and inspection to assure compliance with Commission decisions.
- Review and evaluate the pollution control technology applied to thermal power plants and other industrial energy conversion technologies.
- Work with the following software applications: WORD, Excel, and PowerPoint.

Policy Advisor

- Provided policy, administrative and technical advice to the Commissioner Robert Pernell. My work with the Commissioner focused on the policy and environmental issues related to the Commission's power plant licensing, research and development and export programs.
- Track and provide research on varied California Energy Commission (CEC) programs. Prepare analysis of economic, environmental and public health impacts of programs, proposals and other Commission business items.
- Represent Commissioner's position in policy arenas and power plant siting discussions.
- Write and review comments articulating commission positions before other regulatory bodies including Air Resources Board, California Public Utilities Commission, and the Coastal Commission.
- Wrote speeches for the Commissioner's presentations.

EDUCATION

Bachelor of Science, Chemical Engineering
Drexel University, Philadelphia Pennsylvania

Continuing Education

Hazardous Material Management Certificate, University California Davis
Urban Redevelopment and Environmental Law, University of California Berkley
Analytical Skills, California Department of Personnel Administration (DPA) Training Center
Legislative Process/Bill Analysis, DPA Training Center
Federally Certified Environmental Justice Trainer

References furnished upon request.



BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT
COMMISSION OF THE STATE OF CALIFORNIA
1516 NINTH STREET, SACRAMENTO, CA 95814
1-800-822-6228 – WWW.ENERGY.CA.GOV

APPLICATION FOR CERTIFICATION
FOR THE **ABENGOA MOJAVE
SOLAR POWER PLANT**

Docket No. 09-AFC-5
PROOF OF SERVICE
(Revised 6/8/2010)

APPLICANT

Emiliano Garcia Sanz
General Manager
Abengoa Solar Inc.
11500 West 13th Avenue
Lakewood, CO 80215
emiliano.garcia@solar.abengoa.com

Scott D. Frier
Chief Operating Officer
Abengoa Solar Inc.
13911 Park Ave., Ste. 206
Victorville, CA 92392
scott.frier@solar.abengoa.com

Tandy McMannes
2030 Addison Street, Suite 420
Berkeley, CA 94704
tandy.mcmannes@solar.abengoa.com

APPLICANT'S CONSULTANTS

Frederick H. Redell, PE
Engineering Manager
Abengoa Solar, Inc.
11500 West 13th Avenue
Lakewood, CO 80215
frederick.redell@solar.abengoa.com

COUNSEL FOR APPLICANT

Christopher T. Ellison
Ellison, Schneider & Harris
2600 Capitol Ave.
Sacramento, CA 95816
cte@eslawfirm.com

INTERESTED AGENCIES

California ISO
E-mail Preferred
e-recipient@caiso.com

INTERVENORS

County of San Bernardino
Ruth E. Stringer, County Counsel
Bart W. Brizzee, Deputy County Counsel
385 N. Arrowhead Avenue, 4th Floor
San Bernardino, CA 92415-0140
bbrizzee@cc.sbcounty.gov

California Unions for Reliable Energy ("CURE")
Tanya A. Gulesserian
Marc D. Joseph
Elizabeth Klebaner
Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080

E-mail Preferred

tgulesserian@adamsbroadwell.com
eklebaner@adamsbroadwell.com

Luz Solar Partners Ltd., VIII
Luz Solar Partners Ltd., IX
Jennifer Schwartz
700 Universe Blvd
Juno Beach, FL 33408
jennifer.schwartz@nexteraenergy.com

ENERGY COMMISSION

ANTHONY EGGERT
Commissioner and Presiding Member
aeggert@energy.state.ca.us

JAMES D. BOYD
Vice Chairman and Associate Member
jboyd@energy.state.ca.us

Kourtney Vaccaro
Hearing Officer
kvaccaro@energy.state.ca.us

***Lorraine White**
Adviser to Commissioner Eggert
lwhite@energy.state.ca.us

Craig Hoffman
Project Manager
choffman@energy.state.ca.us

Christine Hammond
Staff Counsel
chammond@energy.state.ca.us

Jennifer Jennings
Public Adviser's Office
publicadviser@energy.state.ca.us

DECLARATION OF SERVICE

I, April Albright, declare that on June 29, 2010, I served and filed copies of the attached Energy Commission Staff's Rebuttal Testimony to the Applicant's Opening Testimony – Declarations and Resumes (Exhibit 306), dated June 29, 2010. The original documents, filed with the Docket Unit, are 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/abengoa/index.html>].

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:

- sent electronically to all email addresses on the Proof of Service list;
- by personal delivery;
- CDs delivered on this date, for mailing with the United States Postal Service with first-class postage thereon fully prepaid, to the name and address of the person served, for mailing that same day in the ordinary course of business; that the envelope was sealed and placed for collection and mailing on that date. **Hard copies are available upon request.**

AND

For filing with the Energy Commission:

- 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-5
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, that I am employed in the county where this mailing occurred, and that I am over the age of 18 years and not a party to the proceeding.

Original signed by: _____
April Albright

**Abengoa Mojave Solar
09-AFC-5**

DOCKET 09-AFC-5
DATE _____
RECD. JUL 01 2010

SUBJECT: Exhibit 312: Email Message from Ashleigh Blackford to Heather Blair

At the June 28, 2010, evidentiary hearing in this matter, Staff requested that the evidentiary record be kept open to receive an email message from the United States Fish and Wildlife Service (USFWS) to supplement Staff's testimony on Biological Resources. The email message from Ashleigh Blackford of the USFWS to Heather Blair is attached, along with the Supplemental Declaration of Heather Blair. Staff proposes to mark this document as Exhibit 312. If there is no objection by parties, Staff will request at the July 15 evidentiary hearing that this exhibit become a part of the record by stipulation.

**PROOF OF SERVICE (REVISED 6-8-10) FILED WITH
ORIGINAL MAILED FROM SACRAMENTO ON 07-1-10**

From: <Ashleigh_Blackford@fws.gov>
To: <HBlair@aspenerg.com>
CC: Christine Hammond <Chammond@energy.state.ca.us>, Rick York <Ryork@energy...>
Date: 6/29/2010 4:16 PM
Subject: AMS evidentiary hearings

Hi Heather-

I wanted to resend my communication to you from 6/28/10 so that you had it for your records.

Please let me know if you need anything in addition.

ashleigh

Hi Heather-

I apologize that I will be unable to join you this afternoon for the evidentiary hearings. I wanted to briefly address some of the questions we have discussed. Please do not hesitate to send me any questions that may come up today. If my response are not clear, please let me know.

(1) the agencies coordinated closely - I worked very closely with Heather Blair in developing the biological conditions of certification. I commented on drafts and helped develop conditions that were relevant to the desert tortoise and other biological concerns of the Service's .

(2) the purpose of the coordination was to achieve consistency and avoid inconsistency between the CEC permit and the Service take permit;- I agree with this statement. The Service has not entered into formal consultation at this time and therefore has not begun our analysis of the project.

(3) Service agree with Heather's conditions - I agree that the desert tortoise conditions that Heather has written are appropriate, as previously stated the Terms and Conditions which will be developed by the Service will require our own analysis of the proposed project.

ashleigh

 Ashleigh Blackford
 Wildlife Biologist
 U.S. Fish & Wildlife Service
 2493 Portola Road Suite B
 Ventura, CA 93003
 office: 805-644-1766 x 234
 fax: 805-644-3958
 ashleigh_blackford@fws.gov


**SUPPLEMENTAL DECLARATION OF
Heather Blair**

I, Heather Blair, declare as follows:

1. I am presently employed as a consultant to the California Energy Commission in the Siting, Transmission and Environmental Protection Division.
2. A copy of my professional qualifications and experience has previously been submitted in this proceeding and are incorporated by reference herein.
3. I received an email message from Ashleigh Blackford of the United States Fish and Wildlife Service on June 29, 2010 at 4:16 p.m. with the subject line, "AMS evidentiary hearings." The content of the email message concerns the Abengoa Mojave Solar Project and the California Energy Commission's Application for Certification proceeding for the Abengoa Mojave Solar Project (Docket No. 09-AFC-5).
4. I am personally familiar with Ms. Blackford's June 29, 2010 email message and if called as a witness could testify competently thereto.

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

Dated: June 30, 2010

Signed:  _____

At: Sacramento, California



BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT
COMMISSION OF THE STATE OF CALIFORNIA
1516 NINTH STREET, SACRAMENTO, CA 95814
1-800-822-6228 – WWW.ENERGY.CA.GOV

APPLICATION FOR CERTIFICATION
FOR THE **ABENGOA MOJAVE
SOLAR POWER PLANT**

Docket No. 09-AFC-5
PROOF OF SERVICE
(Revised 6/8/2010)

APPLICANT

Emiliano Garcia Sanz
General Manager
Abengoa Solar Inc.
11500 West 13th Avenue
Lakewood, CO 80215
emiliano.garcia@solar.abengoa.com

Scott D. Frier
Chief Operating Officer
Abengoa Solar Inc.
13911 Park Ave., Ste. 206
Victorville, CA 92392
scott.frier@solar.abengoa.com

Tandy McMannes
2030 Addison Street, Suite 420
Berkeley, CA 94704
tandy.mcmannes@solar.abengoa.com

APPLICANT'S CONSULTANTS

Frederick H. Redell, PE
Engineering Manager
Abengoa Solar, Inc.
11500 West 13th Avenue
Lakewood, CO 80215
frederick.redell@solar.abengoa.com

COUNSEL FOR APPLICANT

Christopher T. Ellison
Ellison, Schneider & Harris
2600 Capitol Ave.
Sacramento, CA 95816
cte@eslawfirm.com

INTERESTED AGENCIES

California ISO
E-mail Preferred
e-recipient@caiso.com

INTERVENORS

County of San Bernardino
Ruth E. Stringer, County Counsel
Bart W. Brizzee, Deputy County Counsel
385 N. Arrowhead Avenue, 4th Floor
San Bernardino, CA 92415-0140
bbrizzee@cc.sbcounty.gov

California Unions for Reliable Energy ("CURE")
Tanya A. Gulesserian
Marc D. Joseph
Elizabeth Klebaner
Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard, Suite 1000
South San Francisco, CA 94080
E-mail Preferred

tgulesserian@adamsbroadwell.com
eklebaner@adamsbroadwell.com

Luz Solar Partners Ltd., VIII
Luz Solar Partners Ltd., IX
Jennifer Schwartz
700 Universe Blvd
Juno Beach, FL 33408
jennifer.schwartz@nexteraenergy.com

ENERGY COMMISSION

ANTHONY EGGERT
Commissioner and Presiding Member
aeggert@energy.state.ca.us

JAMES D. BOYD
Vice Chairman and Associate Member
jboyd@energy.state.ca.us

Kourtney Vaccaro
Hearing Officer
kvaccaro@energy.state.ca.us

**Lorraine White*
Adviser to Commissioner Eggert
lwhite@energy.state.ca.us

Craig Hoffman
Project Manager
choffman@energy.state.ca.us

Christine Hammond
Staff Counsel
chammond@energy.state.ca.us

Jennifer Jennings
Public Adviser's Office
publicadviser@energy.state.ca.us

DECLARATION OF SERVICE

I, Teraja Golston, declare that on July 1, 2010, I served and filed copies of the attached Exhibit 312 - Email from Ashleigh Blackbird to Heather Blair Regarding Agency Coordination. The original documents, filed with the Docket Unit, are accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at: [\[http://www.energy.ca.gov/sitingcases/abengoa/index.html\]](http://www.energy.ca.gov/sitingcases/abengoa/index.html).

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:

- sent electronically to all email addresses on the Proof of Service list;
- by personal delivery;
- by delivering on this date, for mailing with the United States Postal Service with first-class postage thereon fully prepaid, to the name and address of the person served, for mailing that same day in the ordinary course of business; that the envelope was sealed and placed for collection and mailing on that date to those addresses **NOT** marked "email preferred."

AND

For filing with the Energy Commission:

- 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-5
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, that I am employed in the county where this mailing occurred, and that I am over the age of 18 years and not a party to the proceeding.

Original signed by: _____
Teraja Golston

Memorandum

Date: July 2, 2010
Telephone: (916) 654-4781
File: 09-AFC-5

To: Commissioner Anthony Eggert, Presiding Member
Commissioner James Boyd, Associate Member
Kourtney Vaccaro, Hearing Officer

From: California Energy Commission - Craig Hoffman
1516 Ninth Street Siting Project Manager
Sacramento, CA 95814-5512

Subject: ABENGOA MOJAVE SOLAR 09-AFC-5
**ENERGY COMMISSION STAFF'S SUPPLEMENTAL OPENING TESTIMONY REGARDING
PROPOSED CONDITION OF CERTIFICATION WORKER SAFETY-6**

Energy Commission staff offer this Supplemental Opening Testimony regarding staff's proposed Condition of Certification **WORKER SAFETY-6**.

cc: Proof of Service List
Docket 09-AFC-5

**Abengoa Mojave Solar
Staff's Opening Testimony
June 29, 2010**

**Worker Safety/Fire Protection
Alvin Greenberg, Ph.D.**

Staff offers this supplemental Opening Testimony regarding staff's proposed Condition of Certification **WORKER SAFETY-6**

WORKER SAFETY-6

This proposed condition would require mitigation of direct and cumulative project-related impacts to the San Bernardino County Fire Department (SBCFD). The applicant is requesting the removal of any dollar amount from the options listed. The applicant claims that the presence of a dollar amount would inhibit negotiation with the SBCFD.

Staff is sympathetic to all parties who must deal with this very difficult issue of mitigation. However, the California Environmental Quality Act (CEQA) requires staff to identify impacts and propose appropriate mitigation and not defer mitigation to some later negotiation. While staff strongly supports the project owner reaching an agreement with the SBCFD regarding funding of its project-related share of costs to provide appropriate mitigation of project-related impacts on fire protection, accidental spills/releases of hazardous materials (Hazmat), rescue, and emergency medical services (EMS services), it cannot abrogate its responsibility under CEQA to propose feasible mitigation.

Background

Since the publication of the Revised Staff Assessment, staff has continued to review the emergency response needs of the proposed solar power plants which would be located in San Bernardino, Riverside, and Kern Counties. Staff has also met with the SBCFD and the Riverside County Fire Department. Staff has considered the position of the SBCFD and all relevant information as well as past experience at existing solar power plants that are similar to but smaller than the proposed AMS project. Staff reviewed the records of emergency responses of the San Bernardino County Fire Department (SBCFD) to the only three thermal solar power plants in the state. These are the Solar Electric Generating Station (SEGS) 1 & 2 (43.8 MW) in Daggett (operating since 1984), SEGS 3-7 (150 MW) at Kramer Junction (1989), and SEGS 8 & 9 (160 MW) at Harper Dry Lake (1989). Staff also reviewed what records were immediately available at the three solar plants. All sources stated that their records were incomplete and not comprehensive. Staff believes that the past experience at the three active thermal solar power plants in San Bernardino County is applicable to all similar solar power plants being proposed regardless of the county involved. Staff offers this background information as a basis to support staff's contention that no matter where the solar plant is located, the local fire department having jurisdiction will have to provide some level of services in five areas of response:

1. Plan reviews, inspections, and permitting
2. Fire response
3. Hazmat spill response
4. Rescue
5. Emergency Medical Services (EMS)

Past Fire Department Responses at Existing Thermal Solar Power Plants

Three types (as categorized by the SBCFD) of fire department responses to the solar power plants were surveyed (CEC 21010r; CSBFD 2010a, d, e, f, and h):

1. Plan reviews
2. Hazmat and fire inspections
3. Emergency Response including medical, fire, rescue, and hazardous materials incidents

Regarding visits to the sites for plan review during the years the plant was operating, the SBCFD made four visits to the Kramer Junction facility and one visit to the Harper Lake facility.

Regarding site visits for inspections, reviews, enforcement activities, and follow ups, the SBCFD made 10 inspections to Daggett since 2008, totaling 24 hours of time, 48 visits to Kramer Junction since 2003, totaling 128 hours of time, and 29 visits to Harper Lake since 2004, totaling 105 hours of time.

Including emergency response for fire, rescue, medical and hazardous materials incidents, approximately 30 incidents occurred since 1998 that required the SBCFD (and other fire stations through mutual aid agreements) to respond to the three solar power plant sites. These included fires, fire alarm activations, injuries, medical emergencies, hazardous materials spills, complaints/calls from the public, and false alarms. However, the available records did not include documentation of a major fire at the SEGS 8 facility (80 MW) in January of 1990 that required a large part of the regional resources from four different fire districts including the San Bernardino County, Edwards Air Force Base, California Department of Forestry (now Cal Fire), and the Kern County fire departments (CSBFD 2010c). Note that AMS is 250 MW, at one site. This fire is the largest incident that has occurred at a solar thermal plant in California and demonstrates the magnitude of fire department resources that can be required to respond to a fire at a large thermal solar facility. The inability to quickly control this event had ramifications for the project's finances and reliability - it took almost two years to bring the SEGS 8 heaters back on-line and supplement the solar field generation.

According to the Daggett solar plant records, only three incidents in the life of the plant required emergency services (CEC 2010p):

1. Feb 25, 1999: An HTF fire occurred in the HTF tanks. This was a major fire and the fire department allowed the fire to burn itself out over 2 days. There were no injuries, but extensive damage occurred.

2. Feb 28, 2000: An employee had a suspected heart attack (which was actually caused by drinking a whole bottle of hot sauce), and an ambulance responded from the fire department.
3. May 15-17, 2010: An HTF spill of about 60 gallons occurred in the solar field. The facility personnel cleaned it up on May 15 and reported it to San Bernardino County on the next business day, May 17. When receiving the report the dispatcher misunderstood the report and sent out a 911 call indicating a spill is in progress. The whole fire department showed up on scene.

According to information received from the Kramer Junction plant, the following incidents required fire department response:

1. August 2002 for an unknown HazMat incident.
2. In 2007 when 30,000 gallons of HTF spilled.
3. In Feb. 2009 when a flex hose failure and a vapor cloud ignited. According to Kramer Junction plant officials, the fire department was not needed as plant staff had the situation under control. A concerned citizen had made a 911 call.

According to information received from the Harper Lake plant, only the January 1990 fire required fire department response.

To summarize, relying on sparse data received from the SBCFD for only the past 10 years and not including the 1990 SEGS 8 fire, the department responded to about 30 incidents and emergencies at the three solar locations, including two fires and two hazardous materials spills. During the same period, the SBCFD conducted approximately 90 inspections and visits for enforcement actions/plan reviews, totaling about 260 hours of personnel time. The incident rate, therefore, for all three power plants would be 30 in 12 years or 2.5 emergency calls per year or 0.83 emergencies per solar plant per year. [Note: Staff wishes to caution that since the number of thermal solar power plants is so few and their operating history so short, any conclusion as to accident incident rates is weak from a statistical perspective. Simply put, the data set is not robust enough to draw any definitive conclusions about the safety records of these solar power plants. Nevertheless, this information and the incidence rate of emergency response are provided to give a general idea of the past need for emergency response.)

Analysis of Impacts Due to the Abengoa Mojave Solar Project

The proposed power plant would be located in an area that is currently served by the SBCFD. Within 15 miles is SBCFD Station #125 located in Hinkley, which is not permanently staff, but served by trained on-call local fire fighters and led by an off-site Battalion Chief. According to the SBCFD, the station may or may not be able to respond, and if they do, may only be able to respond with one or two engines, depending upon the number of fire fighters who respond to the fire station. The next stations to respond (Silver Lakes/Helendale Station and the Harvard Station) would take 20 to 50 minutes to respond.

The proposed AMS solar power plant (250 MW) is very different from the industrial, commercial, and residential development in the San Bernardino County desert region. It

is also different from the existing solar plants located at Harper Lake and Kramer Junction in San Bernardino County. The AMS solar power plant would be larger in scale than the existing solar power plants and will have a huge amount of highly flammable oxygenated heat transfer fluid in use at elevated temperatures and stored on site, approximately 2,300,000 gallons. The amount of highly flammable oxygenated flammable material stored and used on-site, combined with the rather remote location and the potential for escalation of a small fire into a large conflagration, presents an emergency response challenge for the SBCFD.

Presently, the SBCFD is not able to respond to fire, hazmat, rescue, and EMS emergencies in a timely manner at the AMS power plant. Staff has visited the SBCFD fire station at Hinkley (Station #125). The station is small and out-dated with no room for fire fighters to stay over-night. The standard fire department response for a fire or for a hazmat spill includes response of six engines and at least three fire fighters on each engine. To fight a fire inside a structure, the SBCFD must adhere to standard operating procedures and Cal-OSHA regulations that require "two in, two out" (OSHA 2010a). Thus, a response of three fire fighters from one station would not allow fire fighters to attack a fire from within a structure or conduct a rescue. Confined space and collapsed trench rescues would also be problematic with only three fire fighters. Therefore, no matter what size the fire or how many workers are initially in need of rescue, the SBCFD would dispatch engines from at least three fire stations so that at a minimum, nine firefighters are sent to the scene but the SBCFD would eventually dispatch a total of 9 engines. Even if mutual aid was available and a mutual aid pact was in effect, the SBCFD would still have to respond to an emergency at the AMS site because it is the Authority Having Jurisdiction.

Additionally, it is very important to note that the AMS power plant (along with the other solar power plants) will be located in an extremely harsh desert environment. The ability of a fire fighter to perform duties while wearing a turn-out coat, heavy boots, and a respirator (self contained breathing apparatus) is limited under the best of circumstances. If conducting a rescue or fighting a fire that necessitates use of a respirator, the high-temperatures of the desert, often exceed 115° F, severely limits a fire fighter's ability to perform the duties to 15 minutes at a time. This severe time restriction necessitates the mobilization of more fire fighters to respond to the emergency.

Staff has considered the position of the SBCFD and all relevant information as well as past experience at existing solar power plants that are similar to the proposed project. The proposed facility would be located in an area that is currently served by the SBCFD. The inspection, fire, hazmat, rescue, and EMS needs at the proposed AMS power plant are real and would pose significant added demands on local fire protection services. In addition, staff finds that the SBCFD's Hazmat Response Team cannot respond to hazardous materials incidents at the proposed facility with an adequate response time due to the great distant involved. Staff has determined that the AMS power plant would cause a significant direct and cumulative impact on the local fire department. Staff also noted that the potential exists for a fire to escalate not only within

the solar power plant but beyond the power plant into a wild land fire. Even though this is a desert environment, the scrub grasses and native plants are concentrated enough to sustain a wild fire. Thus, a fire at the AMS site would place the nearby homes at risk and possibly require more fire equipment and personnel. Note that the site is 1765 acres, with a 10 mile fence line. The personnel and equipment needed to survey and control this large perimeter to ensure a fire does not spread from the site is considerable.

The County of San Bernardino is faced with a multitude of renewable energy projects proposed or considered for formal proposal. Some are wind and photovoltaic while others are solar thermal projects that utilize large volumes of flammable heat transfer fluid (AMS) or large volumes of highly flammable and explosive hydrogen gas (Calico). All the projects are remotely located in the Mojave Desert in the largest county in the United States. Response times for rescue, EMS, and fire suppression to these remote sites would be very high even for a rural environment. The SBCFD has begun planning to provide services for these projects and has produced a map showing the potential locations of renewal energy facilities, existing fire stations, and possible new fire stations (CSBFD 2010k). Under CEQA, staff must take into consideration the direct individual project impacts to fire protection services as well as the cumulative impacts. Staff also notes that budgetary shortfalls that impact fire services are common today and San Bernardino County is no exception. These fiscal impacts limit the SBCFD from providing the services that are needed to fulfill its mission.

Mitigation

Regarding potential mitigation, staff is proposing Condition of Certification **WORKER SAFETY- 6** that requires the AMS power plant to either negotiate a mitigation fee agreement with the SBCFD to fund fire department capital improvements and make an annual payment to mitigate the project's individual impacts and its share of a cumulative impact on the fire department.

Alternatively, staff suggests that AMS form and join a solar industry group or association that will provide membership to all solar power plants located within the jurisdiction of the SBCFD or even across the greater California desert region to negotiate payment for their project-related shares of capital and operating costs to build and operate new fire protection/response infrastructure for these large, remote industrial facilities. The group could ensure appropriate equipment and personnel as mitigation of project-related impacts on fire protection services on the most cost-effective basis. Staff proposes that the project owner be given this option to form and join a power generation industry association or group so that this association or group could negotiate payment for their project-related shares of SBCFD capital and operating costs. The association would be able to raise funds, negotiate payment for emergency response services with the SBCFD, and audit county and district fire department protection/emergency response expenditures to ensure that funds go towards associated emergency response needs. And, most importantly, develop and implement an appropriate fee structure for its members based on project characteristics (e.g., size, technology, chemical usage, or project location relative to emergency response infrastructure) and the re-payment of

funds provided by its initial members upon the joining of new members. Staff urges the applicant and the Committee to consider this approach.

Also, staff has developed an Emergency Response Matrix that staff, the fire departments, and project owners may use to assess the level of emergency response need (CEC 2010q). This analytical tool has a weighting scheme for the various categories of fire department response and utilizes professional judgment in the assignment of the “score” to the categories. Staff has tested this methodology on existing and planned solar power plants and finds it to be useful but cautions against using it as the sole basis for determining need or for allocating financial responsibility for direct individual or cumulative impacts. Otherwise, staff recommends that the applicants prepare an independent fire needs assessment and a fire risk assessment for this and each solar project to best assess impacts on emergency response services in the jurisdictions.

The SBCFD has modified this tool to address its own needs and has used it in part to arrive at its estimated allocated costs for the AMS power plant (CSBFD 2010b; CSBFD 2010k Table 4). The minor difference in what staff calculated using the matrix for the AMS project and that which the SBCFD calculated using its modified matrix are not significant; both resulted in a score that the AMS project is a very high priority of needing additional resources and mitigation. The amount of money proposed in the Condition of Certification is based on a thorough review by SBCFD of its present capabilities and needs. Staff met with representatives of the SBCFD and expert consultants hired by the fire department to develop costs for capital improvements and annual operating and maintenance (O&M) and allocate these costs to new projects proposed for construction in the County. The SBCFD states that it needs three additional fire stations, upgrades to three existing fire stations, and three new fire engines and appropriate staffing in order to provide adequate service and emergency response to 14 proposed renewable energy projects in the county (CSBFD 2010i and j). Using the analysis prepared by Hoffman and Associates for the County of San Bernardino (CSBFD 2010l), the county determined that a total capital cost of \$12,539,000 would be needed. Using the Emergency Response Matrix and weighting it for the size in MW of each energy project and applying an “allocation factor” of 29% for solar project based upon fire department service calls to various land use categories in 2009, the SBCFD determined that the AMS project should be allocated \$860,000 of these costs for capital improvements. As for annual O&M and staffing costs, \$793,000 (CSBFD 2010l) was found by the above method to be the appropriate allocation for the AMS project. The County has committed to fund the remaining 71 percent of the costs through taxes and general fund expenditures to ensure that the needed fire stations, upgrades, and staffing are provided.

Staff has reviewed the cost figures and map of proposed renewable energy facilities and fire stations prepared by the county and finds the costs to be reasonable and consistent with the costs per square foot for building a fire station, for a new fire engine, and for fire fighter salaries and benefits. Staff also agrees that the SBCFD’s methodology for allocating costs of building and staffing new and upgraded fire stations

to the AMS project is reasonable and fair. This method is, in staff's opinion and experience, the most objective and documented method staff has seen in the past two decades of interacting with fire departments in California. Staff also bases its determination, in part, on the Staff Emergency Response Matrix that staff developed to help determine impacts (CEC 2010q). The staff matrix shows that the proposed AMS project rated a score of 3.65 as compared to the existing solar power plant at Kramer Junction (3.95) and the existing solar power plant at Harper Lake (2.4). Staff contends that the proximity of a home to the AMS plant causes the increased score due to risk of fire or explosion. Staff furthermore bases its determination, in part, on its professional experience and judgment.

Staff recommends that **WORKER SAFETY-6** be revised as follows:

WORKER SAFETY-6 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 San Bernardino County Fire Department (SBCFD) 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) Shall fund its share of the capital costs in the amount of \$860,000 and provide an annual payment of \$793,000 to the SBCFD 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 SBCFD or, if the owner joins a power generation industry association, a copy of the bylaws and group's agreement/contract with the SBCFD.

or

(2) Documentation that the amount of \$860,000 has been paid to the SBCFD, documentation that the first annual payment of \$793,000 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.

References

CEC 2010p- CEC / S. Greenberg (TN 57272). ROC Between R. Frymyer General Manager for SEGS 1 and 2 and Shon Greenberg. Submitted to CEC on 6/22/2010.

CEC 2010q- CEC / A. Greenberg (TN 57321). Staff Decision Matrix. Submitted to CEC on 6/24/2010.

CEC 2010r- CEC / A. Greenberg (TN 57264) Staff Draft Summary of SBCFD Responses to Solar Power Plants. Submitted to CEC on 6/22/2010.

CSBFD 2010a- San Bernardino County Fire Department (TN 57267) SBCFD - Response Log 1998 to 2009 Submitted to CEC on 6/22/2010.

CSBFD 2010b- San Bernardino County Fire Department (TN 57268) SBCFD - Mitigation Response Material from June 2010. Submitted to CEC on 6/22/2010.

CSBFD 2010c- San Bernardino County Fire Department (TN 57270) SBCFD - Log Notes from January 1999. Submitted to CEC on 6/22/2010.

CSBFD 2010d- San Bernardino County Fire Department (TN 57271) SBCFD - Activity Log Submitted to CEC on 6/22/2010.

CSBFD 2010e- San Bernardino County Fire Department (TN 57273) SBCFD - Plan Reviews at Solar Plants. Submitted to CEC on 6/22/2010.

CSBFD 2010g- San Bernardino County Fire Department (TN 57287) SBCFD - Haz Mat Inspections. Submitted to CEC on 6/22/2010.

CSBFD 2010h- San Bernardino County Fire Department (TN 57288) EMS Response From SBCFD. Submitted to CEC on 6/22/2010.

CSBFD 2010i- San Bernardino County Fire Department (TN 57303) SBCFD staffing cost estimates for a fire station. Submitted to CEC on 6/24/2010.

CSBFD 2010j- San Bernardino County Fire Department (TN 57304) SBCFD Estimated Costs Station Construction, Equipment and Staffing. Submitted to CEC on 6/24/2010.

CSBFD 2010k- San Bernardino County Fire Department (TN 57378) SBCFD Map of Renewable Energy Projects, March 2010. Submitted to CEC on 6/29/2010.

CSBFD 2010l- San Bernardino County Fire Department (TN 57410) Estimated Allocation of Fire Facility Costs to Proposed Solar Energy Installations prepared

by Hoffman Associates for San Bernardino County Fire Department. Submitted to CEC on 7/1/2010.

OSHA 2010a- Occupational Safety and Health Administration (TN 57384) Fire Fighters' Two-in/Two-out Regulation. Submitted to CEC on 6/29/2010.

CSBFD 2010i- San Bernardino County Fire Department (TN 57303) SBCFD
staffing cost estimates for a fire station.

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09-AFC-5

DATE JUN 24 2010

RECD. JUN 24 2010

FY 09/10 Position Title	Pay Grade	Step	Ben 5	Fill #	Hrs	Rate	Salary- Regular	Overtime	Retirement - Employer Paid SAF	Retirement - Employer Pickup	Med Premium Subsidy	Soc Sec - Medicare	Workers Comp	Life Insurance/ RMT	Uniform	Total	# of Emp	Total for # of Emp
Costed @ Step 11																		
BG Fire Fighter (PM)	893	11	PMREG	1	128	\$22.78	84,511	4,761	24,791	5,999	8,836	1,294	5,963	809	1050	138,126	3	414,379
BG Engineer	894	11		1	128	\$26.12	89,304	5,459	25,914	6,271	8,836	1,374	6,330	927	1050	145,577	3	436,732
BG Captain I	895	11		1	128	\$31.07	106,228	6,494	30,825	7,459	8,836	1,634	7,530	1,103	1050	171,271	3	513,812
Totals							280,043	16,714	81,530	19,729	26,508	4,302	19,823	2,839	3,150	454,974	9	1,364,923
Costed @ varied Steps 7, 9, & 11																		
BG Fire Fighter (PM)	893	7	PMREG	1	128	\$20.65	77,229	4,316	22,678	5,488	8,836	1,182	5,447	733	1050	127,071	3	381,214
BG Engineer	894	9		1	128	\$24.89	85,098	5,202	24,694	5,976	8,836	1,309	6,032	884	1050	139,193	3	417,579
BG Captain I	895	11		1	128	\$31.07	106,228	6,494	30,825	7,459	8,836	1,634	7,530	1,103	1050	171,271	3	513,812
Totals							268,555	16,012	78,197	18,923	26,508	4,125	19,009	2,720	3,150	437,535	9	1,312,605

CSBFD 2010j- San Bernardino County Fire Department (TN 57304) SBCFD
Estimated Costs Station Construction, Equipment and Staffing.

San Bernardino County Fire															
Fire Service Plan															
Estimated Costs Station Construction, Equipment & Staffing															
Re Newable Energy Facilities Mitigation Costs															
Fire Station															
Improvement yr															
Station Construction															
Architecture/Eng															
Construction															
Proj Mgt/Misc															
Station Set up Costs															
Total Station Const Costs															
Type 1 Engine															
Total Pre Operation Cost															
Annual Operating Costs															
Staffing															
Services & Supplies															
Engine Replacement															
Est Annual Operating Costs															
Total Start Up Cost															
Pre Operational +															
Annual Operating Costs															
Architecture/ Eng @ 2% per year															
Construction @ 2.5% per year															
Staffing @ 5% per year															
Services Supplies @3% per year															

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36,637,730

CEC 2010q- CEC / A. Greenberg (TN 57321). Staff Decision Matrix.

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Emergency Response Matrix

DATE JUN 24 2010

RECD. JUN 24 2010

Emergency Response Matrix		DATE	JUN 24 2010					
		RECD.	JUN 24 2010	points	weighting factor	SEGS 4-7	SEGS 8-9	AMS
A. Response Criteria								
1. Inspections					0.10			
	a.	minimal need		1				
	b.	average need		3		3	3	3
	c.	significant need		5				
					<i>Net --></i>	0.3	0.3	0.3
2. Fire					0.50			
A. Quantity liquid fuel or hydrogen gas stored on-site					0.20			
	a.	<1,000 gal or <1000 lbs hydrogen gas		1				
	b.	>1000 and <100,000 gal or <10,000 lbs hydrogen gas		2				
	c.	>100,000 gal or >10,000 lbs hydrogen gas		5		5	5	5
					<i>Net --></i>	1.00	1.00	1.00
B. Fire/Explosion off-site consequences					0.30			
	a.	Limited to site		1			1	
	b.	Potential for smoke and/or fire and/or minor blast effects off-site		2				
	c.	Potential for major fire/blast structure damage and/or injuries/fatalities off-site and/or major hwy disruption/closure		5		5		5
					<i>Net --></i>	1.50	0.30	1.50
3. HazMat					0.10			
A. Proximity to sensitive receptors					0.05			
	a.	no sig quant of hazmats or no potential for off-site impacts within 1/2 mile		1			1	
	b.	<5 receptors within 1/2 mile		2				2
	c.	5-10 receptors within 1/2 mile		3				
	d.	>10 within 1/2 mile		4				
	e.	impacts major highway/interstate		5		5		
					<i>Net --></i>	0.25	0.05	0.10
B. Hazmat response time					0.05			
	a.	<30 minutes		1				
	b.	30 - 60 minutes		3		3	3	3
	c.	>60 minutes		5				
					<i>Net --></i>	0.15	0.15	0.15
4. Rescue					0.15			
	a.	<30 minutes		1		1	1	1
	b.	30 - 60 minutes		3				
	c.	>60 minutes		5				
					<i>Net --></i>	0.15	0.15	0.15
5. EMS								
EMS response time					0.15			
	a.	in-house EMT or <5 minutes response time		1				
	b.	5 - 10 minute response time		2				
	c.	>10 and <15 minute response time		3			3	3
	d.	>15 and <30 minute response time		4		4		
	e.	>30 minute response time		5				
					<i>Net --></i>	0.60	0.45	0.45
Sum weighting factors					1.00			
TOTAL SCORE					=====>	3.95	2.4	3.65
LOW Priority: additional resources and mitigation may be needed.					0.1 - 1.5			
MEDIUM Priority: additional resources and mitigation needed.					1.5 - 2.5			
HIGH Priority: very significant need for additional resources and mitigation.					2.5 - 3.5			
VERY HIGH Priority: urgent need for additional resources and mitigation.					>3.5			

**DECLARATION OF
Alvin J. Greenberg, Ph.D.**

I, **Alvin J. Greenberg, Ph.D.** declare as follows:

1. I am presently a consultant to the California Energy Commission, Energy Facilities Siting and Environmental Protection Division.
2. A copy of my professional qualifications and experience was attached to my previous testimony and incorporated by reference herein.
3. I prepared staff's supplemental opening testimony on **Worker Safety/Fire Protection** for the **Abengoa Mojave Solar** project based on my independent analysis of the amendment petition, supplements hereto, data from reliable documents and sources, and my professional experience and knowledge.
4. It is my professional opinion that the prepared testimony is valid and accurate with respect to the issue addressed therein.
5. I am personally familiar with the facts and conclusions related in the testimony and if called as a witness could testify competently thereto.

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

Dated: July 1, 2010 Signed: Original signed by A. Greenberg

At: Sacramento, California

Risk Science Associates

121 Paul Dr., Suite A, San Rafael, Ca. 94903-2047

415-479-7560 fax 415-479-7563

e-mail agreenberg@risksci.com

**Name & Title: Alvin J. Greenberg, Ph.D., FAIC, REA, QEP
Principal Toxicologist**

Dr. Greenberg has had over two decades of complete technical and administrative responsibility as a team leader in the preparation of human and ecological risk assessments, air quality assessments, hazardous materials handling and risk management/prevention, infrastructure vulnerability assessments, occupational safety and health, hazardous waste site characterization, interaction with regulatory agencies in obtaining permits, and conducting lead surveys and studies. He has particular expertise in the assessment of dioxins, lead, diesel exhaust, petroleum hydrocarbons, mercury, the intrusion of subsurface contaminants into indoor air, and the preparation and review of public health/public safety sections of EIRs/EISs. Dr. Greenberg's expertise in risk assessment has led to his appointment as a member of several state and federal advisory committees, including the California EPA Advisory Committee on Stochastic Risk Assessment Methods, the US EPA Workgroup on Cumulative Risk Assessment, the Cal/EPA Peer Review Committee of the Health Risks of Using Ethanol in Reformulated Gasoline, the California Air Resources Board Advisory Committee on Diesel Emissions, the Cal/EPA Department of Toxic Substances Control Program Review Committee, and the DTSC Integrated Site Mitigation Committee. Dr. Greenberg is the former Chair of the Bay Area Air Quality Management District Hearing Board, a former member of the State of California Occupational Health and Safety Standards Board (appointed by the Governor), and former Assistant Deputy Chief for Health, California OSHA. And, since the events of 9/11, Dr. Greenberg has been the lead person for developing vulnerability assessments, power plant security programs, and conducting safety and security audits of power plants for the California Energy Commission and has assisted the CEC in the assessment of safety and security issues for proposed LNG terminals. In addition to providing security expertise to the State of California, Dr. Greenberg was the Team Leader and main consultant to the State of Hawaii on the updating of their Energy Emergency Preparedness Plan.

Years Experience: 26

Education:

B.S. 1969 Chemistry, University of Illinois Urbana

Ph.D. 1976 Pharmaceutical/Medicinal Chemistry, University of California, San Francisco

Postdoctoral Fellowship 1976-1979 Pharmacology/Toxicology, University of California, San Francisco

Postgraduate Training 1980 Inhalation Toxicology, Lovelace Inhalation Toxicology Research Institute, Albuquerque, NM

Professional Registrations:

Board Certified as a Qualified Environmental Professional (QEP)
California Registered Environmental Assessor - I (REA)
Fellow of the American Institute of Chemists (FAIC)

Professional Affiliations:

Society for Risk Analysis
Air and Waste Management Association
American Chemical Society
American Association for the Advancement of Science
National Fire Protection Association

Technical Boards and Committee Memberships - Present:

Squaw Valley Technical Review Committee
(appointed 1986)

Technical Boards and Committee Memberships - Past:

July 1996 – March 2002

Member, Bay Area Air Quality Management District Hearing Board
(Chairman 1999-2002)

September 2000 – February 2001

Member, State Water Resources Control Board Noncompliant Underground
Tanks Advisory Group

January 1999 – June 2001

Member, California Air Resources Board Advisory Committee on Diesel
Emissions

January 1994 - September 1999

Vice-Chairman, State Water Resources Control Board Bay Protection and Toxic
Cleanup Program Advisory Committee

September 1998

Member, US EPA Workgroup on Cumulative Risk Assessment

April 1997 - September 1997

Member, Cal/EPA Private Site Manager Advisory Committee

January 1986 - July 1996

Member, Bay Area Air Quality Management District Advisory Council
(Chairman 1995-96)

January 1988 - June 1995

Member: California Department of Toxic Substance Control Site Mitigation
Program Advisory Group

January 1989 - February 1995

Member: Department of Toxics Substances Control Review Committee, Cal-EPA

October 1991 - February 1992

Chair: Pollution Prevention and Waste Management Planning Task Force of the Department of Toxics Substances Control Review Committee, Cal-EPA

September 1990 - February 1991

Member: California Integrated Waste Management Board Sludge Advisory Committee

September 1987 - September 1988

ABAG Advisory Committee on Regional Hazardous Waste Management Plan

March 1987 - September 1987

California Department of Health Services Advisory Committee on County and Regional Hazardous Waste Management Plans

January 1984 - October 1987

Member, San Francisco Hazardous Materials Advisory Committee

March 1984 - March 1987

Member, Lawrence Hall of Science Toxic Substances and Hazardous Materials Education Project Advisory Board

Jan. 1, 1986 - June 1, 1986

Member, Solid Waste Advisory Committee, Governor's Task Force on Hazardous Waste

Jan. 1, 1983 - June 30, 1985

Member, Contra Costa County Hazardous Waste Task Force

Sept. 1, 1982 - Feb. 1, 1983

Member, Scientific Panel to Address Public Health Concerns of Delta Water Supplies, California Department of Water Resources

Present Position

January 1983- present

Owner and principal with Risk Sciences Associates, a Marin County, California, environmental consulting company specializing in multi-media human health and ecological risk assessment, air pathway analyses, hazardous materials management-infrastructure security, environmental site assessments, review and evaluation of EIRs/EISs, preparation of public health and safety sections of EIRs/EISs, and litigation support for toxic substance exposure cases.

Previous Positions

Jan. 2, 1983 - June 12, 1984

Member, State of California Occupational Safety and Health Standards Board (Cal/OSHA), appointed by the Governor

Aug. 1, 1979 - Jan. 2, 1983

Assistant Deputy Chief for Health, California Occupational Safety and Health Administration

Feb. 1, 1979 - Aug. 1, 1979

Administrative Assistant to Chairperson of Finance Committee, Board of Supervisors, San Francisco

Jan. 1, 1976 - Feb. 1, 1979

Research Pharmacologist and Postdoctoral Fellow, Department of Pharmacology and Toxicology, School of Medicine, University of California, San Francisco

Jan. 1, 1975 - Dec. 31, 1975

Acting Assistant Professor, Department of Pharmaceutical Chemistry, University of California, San Francisco

Experience

General

Dr. Greenberg has been a consultant in Hazardous Materials Management and Security, Human and Ecological Risk Assessment, Occupational Health, Toxicology, Hazardous Waste Site Characterization, and Toxic Substances Control Policy for over 26 years. He has broad experience in the identification, evaluation and control of health and environmental hazards due to exposure to toxic substances. His experience includes Community Relations Support and Risk Communication through experience at high-profile sites and presentations at professional society meetings.

He has considerable experience in the review and evaluation of exposure via the air pathway - particularly to emissions from power plants, refineries, and diesel exhaust - and a thorough knowledge of the regulatory requirements through his experience at Cal/OSHA, the BAAQMD Hearing Board, as a consultant to the California Energy Commission, and in preparing such assessments for local government and industry. He has assessed exposures to diesel exhaust during construction and operations of stationary and mobile sources and has testified at evidentiary hearings numerous times on this subject.

He is presently assisting the California Energy Commission in assessing the risks to workers and the public of proposed power plants and LNG terminals in the state. His experience in hazard identification, exposure assessment, risk assessment, occupational safety and health, emergency response, and Critical Infrastructure Protection has made him a valuable part of the CEC team addressing this issue. He has reviewed and commented on the DEIS/DEIR for the proposed SES LNG Port of Long Beach terminal, focusing on security issues for the CEC and on safety matters for the City of Long Beach. He has presented technical information and analysis to the State of California Interagency LNG Working Group on thermal radiation public exposure criteria and safety/security at an east coast urban LNG terminal. (Both presentations are confidential owing to the nature of the material.) He has conducted numerous evaluations of the safety and hazards of natural gas pipelines for the CEC and has presented his findings and recommendations at public meetings and evidentiary hearings.

He served for over five years as the Vice-chair of the California State Water Resources Control Board Advisory Committee convened to address toxic substances in sediments in bays, rivers, and estuaries. He has been a member of the Squaw Valley Technical Review Committee since 1986 establishing chemical application management plans at golf courses to protect surface and

groundwater quality. He has also conducted numerous ecological risk assessments and characterizations, including those for marine and terrestrial habitats.

Dr. Greenberg has extensive experience in data collection and preparation of human and ecological risk assessments on numerous military bases and industrial sites with Cal/EPA DTSC and RWQCB oversight. He has also been retained to provide technical services to the Cal/EPA Department of Toxic Substances Control (preparation of human health risk assessments) and the Office of Environmental Health Hazard Assessment (review and evaluation of air toxics health risk assessments and preparation of profiles describing the acute and chronic toxicity of toxic air contaminants). He has also conducted several surveys of sites containing significant lead contamination from various sources including lead-based paint, evaluated potential occupational exposure to lead dust and fumes in industrial settings, prepared numerous human health risk assessments of lead exposure, and prepared safety and health plans for remedial investigation of lead contaminated soils. Dr. Greenberg is also a recognized expert on the requirements of California's Proposition 65 and has served as an expert on Prop. 65 litigation.

Sites with EPA, RWQCB and/or DTSC Oversight

Dr. Greenberg has specific experience in assessing human health and ecological risks at contaminated sites at the land/water interface, including petroleum contaminants, metals, mercury, and VOCs at several locations in California including Oxnard, Richmond, Avila Beach, Mare Island Naval Shipyard, San Diego, Hollister, San Francisco, Hayward, Richmond, the Port of San Francisco, and numerous other locations. He has used Cal/EPA methods, US EPA methods, and ASTM Risk Based Corrective Action (RBCA) and Cal/Tox methodologies. He is extremely knowledgeable about SWRCB and SF Bay RWQCB regulations on underground storage tank sites and with ecological issues presented by contaminated sediments including sediment analysis, toxicity testing, tissue analysis, and sediment quality objectives. Dr. Greenberg served on the State Water Resources Control Board Bay Protection and Toxic Cleanup Program Advisory Committee from 1994 until the end of the program in 1999.

Dr. Greenberg experience on many of these contaminated sites has been as a consultant to local governments, state agencies, and citizen groups. He assisted the City and County of San Francisco in developing local ordinance requiring soil testing (Article 20, Maher ordinance) and hazardous materials use reporting (Article 21, Walker ordinance). He served as the City of San Rafael's consultant to provide independent review and evaluation of the site characterization and remedial action plan prepared for a former coal gasification site. He was a consultant to a citizen group in northern California regarding exposure and risks due to accidental releases from a petroleum refinery and assisted in the assessment of risks due to crude petroleum contamination of a southern California beach. He has prepared a number of risk assessments addressing crude petroleum, diesel and gasoline contamination, including coordinating site investigations, environmental monitoring, and health risk assessment for the County of San Luis Obispo regarding Avila Beach subsurface petroleum contamination. That high-profile project lasted for over one year and Dr. Greenberg managed a team of experts with a budget of \$750,000. Another high-profile project included the preparation of an extensive comprehensive human and ecological risk assessment for the Hawaii Office of Space Industry on rocket launch impacts and transportation/storage of rocket fuels at the southern end of the Big Island of Hawaii. Dr. Greenberg's risk assessments were part of the EIS for the project. Dr. Greenberg also worked on another high-profile project conducting Air Pathway Analysis of off-site and on-site impacts

from landfill gas constituents, including indoor and outdoor air measurements, air dispersion modeling, flux chamber investigations, and health risk assessment for the County of Santa Barbara. Dr. Greenberg has conducted RI/FS work, prepared health risk assessments, evaluated hazardous waste sites and hazardous materials use at numerous locations in California, Hawaii, Oregon, Minnesota, Michigan, and New York. He has considerable experience in the development of clean-up standards and the development of quantitative risk assessments for site RI/FS work at CERCLA sites, as well as site closures, involving toxic substances and petroleum hydrocarbon wastes. He is experienced in working with both Region IX EPA and the State of California DTSC in negotiating clean-up standards based on the application of both site-specific and non site-specific health and ecological based clean-up criteria. He has significant experience in the development of site chemicals of concern list, quantitative data quality levels, site remedial design, the site closure process, the design and execution of data quality programs and verification of data quality prior to its use in the decision making process on large NPL sites.

Examples

The Avila Beach Health Study Phase 1: Reconnaissance Sampling Findings, Conclusions, and Recommendations. (July 1997) Volume 1: Baseline Human Health Risk Assessment. (May 1998)

The Avila Beach Health Study Phase 1, Volume 2: Environmental Monitoring. (May 1998)

Health Risk Assessment and Air Pathway Analysis for the Ballard Canyon Landfill, Santa Barbara County, Ca. (March 1999)

Screening Human Health Risk Assessment, Calculation of Soil Clean-up Levels, and Aquatic Ecological Screening Evaluation, Galilee Harbor, Sausalito, Ca. (May 1998)

Health Risk Assessment Due to Diesel Train Engine Emissions, Oakland, Ca. (June 1999)

Health Risk Assessment for Residual Mercury at the Deer Creek Facility, 3475 Deer Creek Road, Palo Alto, California. (July 1997)

Phase 2 Human Health Risk Assessment, Teledyne Inc., San Diego, Ca. (February 1997)

Human Health Risk Assessment, Teledyne Ryan Aeronautical, McCormick Selph Ordnance. Hollister, California. (December 1996)

Initial Phase Human Health Risk Assessment, Teledyne Inc., San Diego, Ca. (October 1996)

Human Health Risk Assessment, Ecological Screening Evaluation, and Development of Proposed Remediation Goals for the Flair Custom Cleaners Site, Chico, California (January 1996)

Human Health Risk Assessment for the X-3 Extrudate Project at Criterion Catalyst, Pittsburg, Ca. (November 1994)

Screening Health Risk Assessment and Development of Proposed Soil Remediation Levels at Hercules Plant #3, Culver City, Ca. (July 1993)

Ecological Screening Evaluation for the Altamont Landfill, Alameda County, Ca. (June, 1993)

Focused Ecological Risk Characterization, Hawaiian Electric Company, Keahole Generating Station Expansion, Hawaii (June 1993)

Human Health Risk Assessment for the Proposed Palima Point Space Launch Complex, prepared for the Hawaii Office of Space Industry (April 1993)

Ecological Risk Assessment for the Proposed Palima Point Space Launch Complex, prepared for the Hawaii Office of Space Industry (March 1993)

Human Health Risk Assessment for Current and Proposed Expanded Class II and Class III Operations at the Altamont Sanitary Landfill, Alameda County, Ca. (March, 1993)

Screening Health Risk Assessment for the Proposed Expansion of the West Marin Sanitary Landfill, Point Reyes Station, Ca. (March, 1993)

Health Risk Assessment for the Proposed Expansion of the Forward, Inc. Landfill, Stockton, Ca. (September 14, 1992)

Health Risk Assessment for the Rincon Point Park Project, San Francisco, Ca. Prepared for Baseline Environmental Consulting and the San Francisco Redevelopment Agency. (August 10, 1992)

Health Risk Assessment for the South Beach Park Project, San Francisco, Ca. Prepared for Baseline Environmental Consulting and the San Francisco Redevelopment Agency. (August 10, 1992)

Screening Health Risk Assessment and Development of Proposed Soil and Groundwater Remediation Levels, Kaiser Sand and Gravel, Mountain View, Ca. Prepared for Baseline Environmental Consulting (January 30, 1992)

Development of Proposed Soil Remediation Levels for the Marine Corps Air-Ground Combat Center, 29 Palms, California (May 30, 1991)

Preliminary Health Risk Assessment for the City of Pittsburg Redevelopment Agency, Pittsburg, California (May 29, 1991)

Military Bases

Dr. Greenberg has experience in conducting assessments at DOD facilities, including RI/FS work, preparation of health risk assessments, evaluation of hazardous waste sites and hazardous materials use at the following Navy sites in California: San Diego Naval Base; Marine Corps Air-Ground Combat Center, 29 Palms; Mare Island Naval Shipyard, Vallejo; Treasure Island Naval Station, San Francisco, Hunters Point Naval Shipyard, San Francisco, and the Marine

Corps Logistics Base, Barstow. He worked with the U.S. Navy and the U.S. EPA in the implementation of Data Quality Objectives (DQO's) at MCLB, Barstow.

Examples

Review and Evaluation of the Remedial Investigation Report and Human Health Risk Assessment for the U. S. Naval Station at Treasure Island, Ca. (June 1999)

Screening Health Risk Assessment for the Proposed San Francisco Police Department's Helicopter Landing Pad at Hunters Point Shipyard, San Francisco, Ca. (September 1997)

Development of Proposed Soil Remediation Levels for the Marine Corps Air-Ground Combat Center, 29 Palms, California (May 30, 1991)

Health Risk Assessment for the Chrome Plating Facility, Mare Island Naval Shipyard, Vallejo, California (October 24, 1988)

Background Levels and Health Risk Assessment of Trace Metals present at the Naval Petroleum Reserve No.1, 27R Waste Disposal Trench Area, Lost Hills, California (August 12, 1988)

RCRA Facility Investigation (RFI) Work Plan of Lead Oxide Contaminated Areas, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (August 14, 1989)

Hazardous Waste and Solid Waste Audit and Management Plan, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (July 3, 1989)

Water Quality Solid Waste Assessment Test (SWAT) Proposal RCRA Landfill, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (October 31, 1988)

Waste Disposal Facilities, Waste Haulers, Waste Recycling Facilities Report, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (September 22, 1988)

Sampling and Analysis Plan, Health and Safety Plan, Site Characterization of Lead Oxide Contaminated Areas, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (September 2, 1988)

Air Quality Solid Waste Assessment Test (SWAT) Proposal, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (August 25, 1988)

Liquefied Natural Gas (LNG)

Dr. Greenberg assisted the CEC in the preparation of the "background" report on the risks and hazards of siting LNG terminals in California ("LNG in California: History, Risks, and Siting" July 2003) and consulted for the City of Vallejo on a proposed LNG terminal and storage facility at the former Mare Island Naval Shipyard. He has also conducted an evaluation and prepared comments on the risks, hazards, and safety analysis of the DEIS/DEIR for the City of Long

Beach on a proposed LNG terminal at the Port of Long Beach (POLB) and conducted an analysis on vulnerability and critical infrastructure security for the CEC on this same proposed LNG terminal. He currently advises the CEC on the POLB LNG proposal on risks, hazards, human thresholds of thermal exposure, vulnerability, security, and represented the CEC at a U.S. Coast Guard briefing on the Waterway Suitability Assessment that included the sharing of SSI (Sensitive Security Information). He has presented technical information and analysis to the State of California LNG Interagency Working Group on thermal radiation public exposure criteria and safety/security at an east coast urban LNG terminal. (Both presentations are confidential owing to the nature of the material.) He has conducted numerous evaluations of the safety and hazards of natural gas pipelines for the CEC and has presented his findings and recommendations at public meetings and evidentiary hearings.

Infrastructure Security

Since 2002, Dr. Greenberg has been trained by and is working with the Israeli company SB Security, LTD, the most experienced and tested security planning and service company in the world. Since the events of 9/11, Dr. Greenberg has been the lead person for developing vulnerability assessments and power plant security programs for the California Energy Commission (CEC). In taking the lead for this state agency, Dr. Greenberg has interfaced with the California Terrorism Information Center (CATIC) and provided analysis, recommendations, and testimony at CEC evidentiary hearings regarding the security of power plants within the state. These analyses include the assessment of Critical Infrastructure Protection, threat assessments, criticality assessments, and the preparation of vulnerability assessments and off-site consequence analyses addressing the use, storage, and transportation of hazardous materials, recommendations for security to reduce the threat from foreign and domestic terrorist activities, perimeter security, site access by personnel and vendors, personnel background checks, management responsibilities for facility security, and employee training in security methods. Dr. Greenberg is the lead person in developing a model power plant security plan, vulnerability assessment matrix, and a security training manual for the CEC. The model security plan is used by power plants in California as guidance in developing and implementing security measures to reduce the vulnerability of California's energy infrastructure to terrorist attack. He has testified at several evidentiary hearings for the CEC on power plant security issues. He also leads an audit team conducting safety and security audits at power plants throughout California that are under the jurisdiction of the CEC. In addition to providing security expertise to the State of California, in August 2004, a team of experts led by Dr. Greenberg was awarded an 18-month contract by the State of Hawaii to update and improve the state's Energy Emergency Preparedness Plan and make recommendations for increased security of critical energy infrastructure on this isolated group of islands.

Air Pathway Analysis

Dr. Greenberg has prepared numerous Air Pathway Analyses and human health risk assessments, evaluating exposure at numerous locations in California, Hawai'i, Oregon, Minnesota, Michigan, and New York. He is experienced in working with Region IX EPA, the State of California DTSC, and the Hawai'i Department of Health Clean Air Branch in the application of both site-specific and non site-specific health risk assessment criteria.

Examples

Human Health Risk Assessment for the Open Burn/Open Detonation Operation at McCormick Selph, Inc., Hollister, Ca. (June 2003)

Air Quality and Human Health Risk Assessment for the Royal Oaks Industrial Complex, Monrovia, Ca. (January 2003)

Human Health Risk Assessment and Indoor Vapor Intrusion Assessment for the former Pt. St. George Fisheries Site, Santa Rosa, Ca. (October 2002)

Human Health Risk Assessment for the former Sargent Industries Site, Huntington Park, Ca. (July 2001)

Health Risk Assessment Due to Diesel Train Engine Emissions, Oakland, Ca. (June 1999)

The Avila Beach Health Study Phase 1: Reconnaissance Sampling Findings, Conclusions, and Recommendations. (July 1997) Volume 1: Baseline Human Health Risk Assessment. (May 1998)

The Avila Beach Health Study Phase 1, Volume 2: Environmental Monitoring. (May 1998)

Health Risk Assessment and Air Pathway Analysis for the Ballard Canyon Landfill, Santa Barbara County, Ca. (March 1999)

Human Health Risk Assessment, Teledyne Ryan Aeronautical, McCormick Selph Ordnance. Hollister, California. (December 1996)

Initial Phase Human Health Risk Assessment, Teledyne Inc., San Diego, Ca. (October 1996)

Human Health Risk Assessment for Current and Proposed Expanded Class II and Class III Operations at the Altamont Sanitary Landfill, Alameda County, Ca. (March, 1993)

Focused Ecological Risk Characterization, Hawaiian Electric Company, Keahole Generating Station Expansion, Hawai'i (June 1993)

Human Health Risk Assessment for the Proposed Palima Point Space Launch Complex, prepared for the Hawai'i Office of Space Industry (April 1993)

Ecological Risk Assessment for the Proposed Palima Point Space Launch Complex, prepared for the Hawai'i Office of Space Industry (March 1993)

Human Health Risk Assessment Due to Emissions from a Medical Waste Incinerator, prepared for Kauai Veterans Memorial Hospital, Kauai, Hawai'i (1994)

Cancer Risk Assessment for the H-Power Generating Station, Campbell Industrial Park, Oahu, Hawai'i (1988)

Hazardous Materials Assessments, Waste Management Assessments, Worker Safety and Fire Protection Assessments, and Public Health Impacts Assessments

Dr. Greenberg also has significant experience as a consultant and expert witness for the California Energy Commission providing analysis, recommendations, and testimony in the areas of hazardous materials management, process safety management, waste management, worker safety and fire protection, and public health impacts for proposed power plant/cogeneration facilities. These analyses include the evaluation and/or preparation of the following:

- Off-site consequence analyses of the handling, use, storage, and transportation of hazardous materials,
- Risk Management Plans (required by the Cal-ARP) and Business Plans (required by H&S Code section 25503.5),
- Safety Management Plans (required by 8 CCR section 5189),
- Natural gas pipeline safety,
- Solid and hazardous waste management plans,
- Phase I and II Environmental Site Assessments,
- Construction and Operations Worker Safety and Health Programs,
- Fire Prevention Programs,
- Human health risk assessment from stack emissions and from diesel engines, and
- Mitigation measures to address PM exposure, including diesel particulates

Examples

- Almond 2 Power Plant Project, City of Ceres, Ca. 2009 – present. Public health.
- Watson Cogeneration Steam and Electric Reliability Project, Carson, Ca. 2009 – present. Public health.
- Hanford Combined-Cycle Power Plant (amendment), Kings County, Ca. 2008 – present. Public health.
- Henrietta Combined-Cycle Power Plant (amendment), Kings County, Ca. 2008 – present. Public health.
- Lodi Energy Center, Lodi, Cal. 2008 – present. Hazardous materials management, worker safety/fire protection.
- Marsh Landing Generating Station, City of Antioch, Ca. 2008 – present. Hazardous materials management, worker safety/fire protection.
- Palmdale Hybrid Power Plant, Palmdale, Ca. 2008 – present. Hazardous materials management, worker safety/fire protection, public health.
- Stirling Energy Systems Solar 1 Project, San Bernardino County, Ca. 2008 – present. Public health.
- Stirling Energy Systems Solar 2 Project, Imperial County, Ca. 2008 – present. Public health.
- San Joaquin Solar 1&2, Fresno County, Ca. 2008 – present. Hazardous materials management, worker safety/fire protection, public health.
- GWF Tracy Combined Cycle Power Plant, Tracy, Ca. 2008 – present. Hazardous materials management, worker safety/fire protection, public health.
- CPV Vaca Station Power Plant, Vacaville, Ca. 2008 – present. Hazardous materials management, worker safety/fire protection.

- Willow Pass Generating Station, Pittsburg, Ca. 2008 – present. Hazardous materials management, worker safety/fire protection, waste management.
- Avenal Energy Power Plant, Avenal, Ca. 2008 – 2009. Worker safety/fire protection, public health.
- Orange Grove Energy, San Diego County, Ca. 2008-2009. Public health.
- Riverside Energy Resource Center Units 3&4, Riverside, Ca. 2008 – 2009. Hazardous materials management.
- Canyon Power Plant, Anaheim, Ca. 2007 – present. Hazardous materials management, worker safety/fire protection, public health.
- Carlsbad Energy Center, Carlsbad, Ca. 2007 – present. Hazardous materials management, worker safety/fire protection, public health.
- Ivanpah Solar Electric Generating System, San Bernardino County, Ca. 2007 – present. Public health.
- Kings River Conservation District Community Power Project, City of Parlier, Ca. 2007 – 2009. Hazardous materials management, worker safety/fire protection.
- Chula Vista Energy Upgrade Project, Chula Vista, Ca. 2007 – 2009. Hazardous materials management, worker safety/fire protection.
- Chevron Richmond Power Plant Replacement Project, Richmond, Ca. 2007 – 2008. Hazardous materials management, public health.
- Humboldt Bay Generating Station, Eureka, Ca. 2006 – 2008. Hazardous materials management, worker safety/fire protection, waste management.
- El Centro Power Plant – Unit 3 Repower Project, El Centro, Ca. 2006 – 2007. Public health.
- San Francisco Energy Reliability Project, San Francisco, Ca. 2004 – 2006. Hazardous materials management, worker safety/fire protection, waste management, public health
- Inland Empire Energy Center, Romoland, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- Malburg Generating Station Project, City of Vernon, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- Blythe II, Blythe, Ca. 2002-3. hazardous materials, worker safety/fire protection,
- Palomar Energy Center, Escondido, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- Cosumnes Power Project, Rancho Seco, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- Tesla Power Project, Tesla, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management, public health
- San Joaquin Valley Energy Center, San Joaquin, Ca. 2002-3. hazardous materials, worker safety/fire protection, waste management
- Morro Bay Power Plant, Morro Bay, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management
- Potrero Power Plant Unit 7, San Francisco, Ca., 2001-2: hazardous materials, worker safety/fire protection
- El Segundo Power Redevelopment Project, El Segundo, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management
- Rio Linda Power Project, Rio Linda, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health

- Pastoria II Energy Facility Expansion, Grapevine, Ca., 2001: hazardous materials, worker safety/fire protection
- East Altamont Energy Center, Byron, Ca., 2001-2: hazardous materials, worker safety/fire protection
- Magnolia Power Project, Burbank, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Russell City Energy Center, Hayward, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management
- Woodbridge Power Plant, Modesto, Ca., 2001: hazardous materials, worker safety/fire protection, waste management
- Colusa Power Plant Project, Colusa County, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Valero Refinery Cogeneration Project, Benicia, Ca., 2001: hazardous materials, worker safety/fire protection
- Ocotillo Energy Project, Palm Springs, Ca., 2001: hazardous materials, worker safety/fire protection
- Gilroy Energy Center Phase II Project, Gilroy, Ca., 2001-2: hazardous materials, worker safety/fire protection
- Los Esteros Critical Energy Facility, San Jose, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Roseville Energy Facility, Roseville, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Spartan Power, San Jose, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Inland Empire Energy Center, Romoland, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- South Star Cogeneration Project, Taft, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Tesla Power Plant, Eastern Alameda County, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Tracy Peaker Project, Tracy, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Henrietta Peaker Project, Kings County, Ca., 2001: hazardous materials, worker safety/fire protection, waste management, public health
- Central Valley Energy Center, San Joaquin, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Cosumnes Power Plant, Rancho Seco, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Los Banos Voltage Support Facility, Western Merced County, Ca., 2001-2: waste management, public health
- Palomar Energy Project, Escondido, Ca., 2001-2: hazardous materials, worker safety/fire protection, waste management, public health
- Metcalf Energy Center, San Jose, Ca., 2000-1: hazardous materials
- Blythe Power Plant, Blythe, Ca., 2000-1: hazardous materials
- San Francisco Energy Co. Cogeneration Project, San Francisco, Ca., 1994-5: hazardous materials

- Campbell Soup Cogeneration Project, Sacramento, Ca., 1994: hazardous materials
- Proctor and Gamble Cogeneration Project, Sacramento, Ca., 1993-4: hazardous materials
- San Diego Gas and Electric South Bay Project, Chula Vista, Ca., 1993: hazardous materials
- SEPCO Project, Rio Linda, Ca., 1993: hazardous materials
- Shell Martinez Manufacturing Complex Cogeneration Project, Martinez, Ca., 1993: hazardous materials and review and evaluation of EIR

Occupational Safety and Health/Health and Safety Plans/Indoor Air Quality

Dr. Greenberg has significant experience in occupational safety and health, having directed the development, adoption, and implementation of over 50 different Cal/OSHA regulations, including airborne contaminants (>450 substances), lead, asbestos, confined spaces, and worker-right-to-know (MSDSs). He has conducted numerous occupational health surveys and has extensive experience in the sampling and analysis of indoor air quality at residences, workplaces, and school classrooms. He is currently the team leader conducting safety and security audits at power plants throughout California for the California Energy Commission. Safety issues audited include compliance with regulations addressing several safety matters, including but not limited to, confined spaces, lockout/tagout, hazardous materials, and fire prevention/suppression equipment.

Examples

Review and Evaluation of Public and Worker Safety Issues at the proposed SES LNG Facility, Port of Long Beach. prepared for the City of Long Beach. (November 2005)

Confidential safety and security audit reports for 18 power plants in California. prepared for the California Energy Commission. (January 2005 through March 2006)

Report on the Accidental release and Worker Exposure to Anhydrous Ammonia at the BEP I Power Plant, Blythe, Ca. prepared for the California Energy Commission. (October 2004)

Investigation of a Worker Death in a Confined Space, La Paloma Power plant. prepared for the California Energy Commission. (July 2004)

Preliminary Report on Indoor Air Quality in Elementary School Portable Classrooms, Marin County, Ca. (December 1999)

Health Risk Assessment Due to Diesel Train Engine Emissions, Oakland, Ca. (June 1999)

Air Pathway Analysis for the Ballard Canyon Landfill. Submitted to the County of Santa Barbara, (March 1999)

Review and Evaluation of the Health Risk Assessment for Outdoor and Indoor Exposures at the Former Golden Eagle Refinery Site, Carson, Ca. (May 1998)

The Avila Beach Health Study Phase 1: Reconnaissance Sampling Findings, Conclusions, and Recommendations. (July 1997) Volume 1: Baseline Human Health Risk Assessment. (May 1998)

The Avila Beach Health Study Phase 1, Volume 2: Environmental Monitoring. (May 1998)

Phase 2 Human Health Risk Assessment, Teledyne Inc., San Diego, Ca. (February 1997)

Determination of Occupational Lead Exposure at a Tire Shop in Placerville, Ca. (April 1993)

Development of an Environmental Code of Regulations for Hazardous Waste Treatment Facilities on La Posta Indian Tribal lands, San Diego County, Ca. (August 1992)

Sampling and Analysis Plan, Health and Safety Plan, Site Characterization of Lead Oxide Contaminated Areas, Mare Island Naval Shipyard, Vallejo, California. Prepared in conjunction with Kaman Sciences Corp. (September 2, 1988)

Mercury Contamination

Dr. Greenberg has prepared and/or reviewed several human health and ecological risk assessments regarding mercury contamination in soils, sediments, and indoor surfaces. Dr. Greenberg served on the State Water Resources Control Board Bay Protection and Toxic Cleanup Program Advisory Committee from 1994 until the end of the program in 1999.

Examples

Review and evaluation of a human health risk assessment of ingestion of sport fish caught from San Diego Bay and which contain tissue levels of mercury and PCBs (November 2004 – present)

Screening Human Health Risk Assessment, Calculation of Soil Clean-up Levels, and Aquatic Ecological Screening Evaluation, Galilee Harbor, Sausalito, Ca. (May 1998)

Health Risk Assessment for Residual Mercury at the Deer Creek Facility, 3475 Deer Creek Road, Palo Alto, California. (July 1997)

Human Health Risk Assessment Due to Emissions from a Medical Waste Incinerator, prepared for Kauai Veterans Memorial Hospital, Kauai, Hawai'i (1994)