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May 13, 2013

California Energy Commission
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TN 70785
MAY 13 2013

Christine Stora
Compliance Project Manager
Siting, Transmission and Environmental Protection Division
California Energy Commission
1516 Ninth Street, MS-2000
Sacramento, CA 95814-5512

Subject: **PALEN SOLAR HOLDINGS, LLC'S RESPONSE TO WORKSHOP QUERIES**
PALEN SOLAR ELECTRIC GENERATING SYSTEM
DOCKET NO. (09-AFC-7C)

Dear Ms. Stora,

On behalf of Palen Solar Holdings, LLC, enclosed for filing with the California Energy Commission is the electronic version of **PALEN SOLAR HOLDINGS, LLC'S RESPONSE TO WORKSHOP QUERIES,** for the Palen Solar Electric Generating System (09-AFC-7C).

Sincerely,

Scott A. Galati
Counsel to Palen Solar Holdings, LLC

Response to Workshop Queries

In support of the

PETITION TO AMEND

for the

PALEN SOLAR ELECTRIC GENERATING SYSTEM

(09-AFC-7C)

Submitted to the:

California Energy Commission

Submitted by:

PALEN SOLAR HOLDINGS, LLC

Prepared by:

centerline

MAY 2013

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Section 1 INTRODUCTION

Attached are Palen Solar Holding, LLC's (PSH) responses to California Energy Commission (CEC) Workshop Queries for the Palen Solar Electric Generating System (PSEGS or Modified Project) Petition For Amendment (09-AFC-7C). The Workshop Queries are questions or data requests raised at Staff Public Workshops that were recorded by PSH representatives in order to facilitate the timely exchange of relevant information for the parties to complete their analyses. There were three workshops: Workshop 1 was held at the Commission in Sacramento on April 17, 2013; Workshop 2 was held at the Commission in Sacramento on April 30, 2013; and Workshop 3 was held at University of California at Riverside, Palm Desert campus on May 1, 2013 and then continued to May 6, 2013 at the Commission in Sacramento.

The Workshop Queries are grouped by individual discipline or topic area. Within each discipline area, the responses are presented in the same order that they were raised in the workshops. For tracking purposes we have assigned a number to each query using the nomenclature WSQ X-Y, where X is the number of the workshop and Y is the number in sequence of the query. Additional tables, figures, or documents submitted in response to a Workshop Query (e.g., supporting data, stand-alone documents such as plans, folding graphics, etc.) are found at the end of a discipline-specific section and are not sequentially page-numbered consistently with the remainder of the document, although they may have their own internal page numbering system.

Section 2 TRANSMISSION SYSTEM ENGINEERING

WSQ 1-1 What is the size of the conductor for overhead gen-tie line? Please provide an estimate of the number of poles (if available)?

WSQ Response 1-1. <u>Generation Tie Line Characteristics</u>

The conductor proposed for the gen-tie line is a single circuit, twin-bundled 795-thousand circular mill "Drake" capable of carrying 1814A at 75°C" (see Petition For Amendment Section 2.6.1, Transmission System Description, page 2-26.) While final design of the gen-tie line has not been finalized, PSH estimates the number poles will be approximately 38 poles plus additional poles to support turning points. Additionally, the gen-tie will be approximately 6.9 miles long extending from the PSEGS switchyard to the existing SCE Red Bluff Substation.

WSQ 1-2 What is the size and length of the underground cable which connects the units in the power block to the switchyard?

WSQ Response 1-2. <u>Internal Transmission Line Characteristics</u>

Electrical power will be transmitted from the two solar plants to the 230 kV Switchyard located on the northern border of the project via underground 230 kV transmission lines. This approach is detailed on Drawing Number E-SKE-103, Revision A, Electrical On-Site 230kV Transmission Plan, Attachment WSQ 1-2-1.

The underground cable will include a copper conductor with a size estimated to be between 1,250 and 1,750 kcmil, XLPE insulation and a polyethylene jacket. See attached Southwire data sheet, Attachment WSQ 1-2-2.

The transmission line for plant 1 will proceed to the northeast and then directly north into the Switchyard. The plant 1 line will be approximately 6,234 feet long (4,101 + 2,138 feet). The plant 2 line will proceed to the northwest to plant 1 and then follow the same path as the plant 1 line. The plant 2 line will be approximately 14,586 feet long (8,347 + 6,234 feet).

The transmission lines will be routed in trenches adjacent to project roads. The trenches will range in width from 8 to 12 feet and in depth from 6 to 8 feet. A cable splice vault will be required approximately every 2,000 feet. These vaults will measure 10 feet wide by 10 feet deep by 30 feet long.

WSQ 1-3 Please clarify whether the change from double circuit to single circuit will require any changes to originally proposed gen-tie pole design.

WSQ Response 1-3. <u>Generation Tie Line Clarification</u>

The License for the Approved Project allowed for construction and operation of a single circuit generation tie line and not a double circuit generation tie line. The PSEGS will use a single circuit design and therefore the only change in the generation tie line is the slight westerly shift in the route as described in the Petition For Amendment.

A steel monopole design for the gen-tie line will be used. A figure of a typical 230 kV monopole design was provided during the proceedings for the Approved Project (Data Adequacy Supplement, Figure 2-14, October 26, 2009). The poles will be approximately 120 feet tall as detailed in the original AFC and License. The poles will be twelve-sided steel monopoles with three arms for power conductors and one arm for the static wire based on the single circuit design approved in the Commission Decision for the Approved Project. The exact dimensions of the poles will be determined during final design; however, for visual modeling a base diameter of 6 feet and a top diameter of 3 feet should work. The spacing between the poles will be approximately 1,100 feet.

WSQ 1-4 Provide copy of the letter from the California Independent System Operator (CAISO) demonstrating that the existing LGIA is valid for the PSEGS.

WSQ Response 1-4. <u>CAISO Letter</u>

In a letter dated April 22, 2012, CAISO concluded that the change in technology from solar trough to solar power tower would not be a material modification and approved the technology change. See Attachment WSQ 1-4-1.

Section 3 BIOLOGICAL RESOURCES

WSQ 1-5 Please provide the resume of Paul Frank

WSQ Response 1-5. <u>Resume of Paul Frank</u>

Mr. Frank's resume is included as Attachment WSQ 1-5-1. Mr. Frank has been conducting biological surveys of all types in the desert since 1990. He has seen hundreds of burrowing owls, pellets and burrows, and is fully qualified to conduct BUOW surveys as he is experienced with identifying all BUOW sign.

WSQ 1-6 How close is the PSEGS gen-tie line to the Desert Sunlight survey area?

WSQ Response 1-6. <u>Relationship of PSEGS Gen-Tie Line to Desert Sunlight Survey Area</u>

The westerly shift of the PSEGS generation tie line was elected for the purpose of locating the line adjacent to the permitted Desert Sunlight generation tie line. The westerly shift is entirely within the Desert Sunlight Survey Area as shown in Figure DR 5-3 to PSH's Data Responses Set 1. See Attachment WSQ 1-6-1.

WSQ 1-7 Provide information on methods used to calculate numbers in Supplement Bio Table-1.

WSQ Response 1-7. <u>Disturbance Acreage Calculation Methodology</u>

The disturbance acreages calculated in Table 1 of the Supplement Number 1 were calculated by plotting the same field data used to support the License for the Approved Project on the new PSEGS map and subtracting the amount of reduction in the project footprint from each of the previously mapped biology habitats. In other words, no new methodology for calculating habitat was employed. The same methodology used for the Approved Project was used for the Modified Project and the reduction in disturbance is entirely related to the project boundary reductions. A complete set of shape files of the habitat and the PSEGS footprint were previously delivered to the CEC GIS department and the CPM.

WSQ 1-8 Provide CEC and CDFW an anticipated schedule for conducting the surveys and if/when a 1602 permit application and fees will be submitted to CDFW.

WSQ Response 1-8. **Survey and Reporting Schedule**

The biological field surveys for the new natural gas pipeline and the westerly shift of the generation tie line have recently concluded. A report of the results is being prepared and PSH anticipates delivering the report to the CEC Staff by May 17, 2013.

WSQ 1-9 Identify the number of heliostats located in the sand transport area.

WSQ Response 1-9. **Number of Heliostats in the Sand Transport Area**

During the Licensing process for the Approved Project, it was generally agreed that there were three sand transport zones. Zone 1 is the easternmost zone and transports the vast majority of sand for the corridor. Zone 2 was thought to carry between 10 and 20 percent of the volume of sand for the sand transport corridor and lies immediately adjacent and south west of Zone 2. Zone 3 was thought to carry very little sand and is located immediately south and west of Zone 2. The Approved Project reconfigured its footprint to avoid all of Zone 1 and the vast majority of Zone 2. The PSEGS footprint is within the Approved Project footprint and has replaced the Approved Project's 30 foot tall wind fences with open chain link security fences approximately 8 feet tall.

There are no heliostats or any component of the Modified Project in Zone 1. There are approximately 4,200 heliostats in Zone 2. There are approximately 30,000 heliostats in Zone 3. A sand transport study is currently underway in accordance with Staff Data Request 19 and will be submitted in PSH's Data Responses Set 2.

WSQ 1-10 Provide results of all field surveys by April 30th if possible.

WSQ Response 1-10. **Biology Survey Results**

PSH expects to docket the results of the various new biological surveys being conducted for the natural gas line and the westerly shift of the generation tie line by May 17, 2013. Results of the Spring Avian surveys will be docketed as soon as they are available with a formal report prepared by the end of May 2013.

WSQ 1-11 Please respond to CBD's request to analyze the amount of sand that will pile up at base of DT/securing fencing.

WSQ Response 1-11. **Desert Tortoise Fence Sand Blockage Estimates**

PSH has commissioned a sand transport study in accordance with Staff Data Request 19. PSH expects to docket the study by May 17, 2013 and the study will include an estimate of the amount of sand that may potentially be blocked along the Desert Tortoise Fence.

WSQ 1-12 Provide USFWS with copies of the SHAPE files submitted to the CEC.

WSQ Response 1-12. <u>Provide SHAPE files to FWS</u>

The SHAPE files were delivered to Jody Fraser, USFWS electronically on April 25, 2013.

WSQ 1-13 Prepare a "master" map of Table 1 areas for USFWS.

WSQ Response 1-13. <u>Master Map for USFWS</u>

The Master Map was sent to Jody Fraser, USFWS, electronically on April 18, 2013.

WSQ 3-8 Please provide background regarding barbed wire requirement in ISEGS ABPP.

WSQ Response 3-8. <u>Barbed Wire Security Fence and ISEGS ABPP</u>

PSH does not anticipate that barbed wire will be required under the PSEGS operations security plan. This is due to the fact that there will be security patrols and video monitoring at the Site, plus the security fence height will be 8 feet.

WSQ 3-9 Provide info on exact survey methodologies Applicant plans to use for fall and winter surveys.

WSQ Response 3-9. <u>Fall and Winter Avian Survey Methodologies</u>

WSQ 3-10 Provide written methodology for proposed for bat surveys.

WSQ Response 3-10. <u>Proposed Methodology For Bat Surveys</u>

Response to this workshop query will be provided under separate cover.

WSQ 3-11 Provide map of weed locations.

WSQ Response 3-11. **Map of Weed Locations**

A search of the original record indicates that weeds were noted in the original surveys for the Approved Project but no formal mapping had been completed. A Draft Weed Management Plan was prepared for the Approved Project and was submitted to the CEC Staff for review during the Licensing Process. The Draft Weed Management Plan was sufficient for the Commission to issue a License and craft **Condition of Certification BIO-14** which requires the Draft Weed Management Plan be finalized and approved by the CPM. PSH is currently revising the Draft Weed Management Plan and will submit it by May 17, 2013 and has agreed to **BIO-14** which would allow it to be finalized and approved as part of the compliance process consistent with other solar projects licensed by the Commission.

Section 4 VISUAL RESOURCES

WSQ 1-14 Respond to Joshua Tree National Park's (JTNP's) request to conduct night sky analysis.

WSQ Response 1-14. <u>Night Sky Analysis</u>

PSH strongly believes that the Commission analysis should focus on the difference between the Approved Project and the Modified Project. With respect to potential impacts to night sky, the only difference between the Approved Project and the Modified Project is the addition of the FAA required aviation hazard lights on the two towers. In order to cooperate with JTNP, PSH has agreed to conduct a night sky analysis including nighttime visual simulations from locations selected by JTNP personnel. That analysis is underway and will be submitted to JTNP when completed; however, such analysis is not expected to impact BLM's NEPA process or schedule.

WSQ 2-6 Will mirror washing activities be conducted during the day time; if so, how will this activity affect the position of the mirrors with regard to glint and glare.

WSQ Response 2-6. <u>Mirror Washing Activities and Position of Mirrors</u>

Response to this workshop query will be provided under separate cover.

WSQ 3-7 If possible, provide parties and National Park Service with information on opportunities to see ISEGS during commissioning

WSQ Response 3-7. <u>ISEGS Commissioning Schedule</u>

ISEGS is expected to begin commissioning activities during third quarter 2013. The parties and National Park Service personnel will be able to view the ISEGS site from publicly accessible roadways.

Section 5 SOIL AND WATER RESOURCES

WSQ 1-15 Review and docket comments on the Hidden Hills SOIL-5 condition.

WSQ Response 1-15. **Hidden Hills SOIL&WATER-5 Condition of Certification**

We understand that Staff is considering using **Condition of Certification SOIL&WATER-5** as a basis for crafting a specific drainage condition for PSEGS. PSH has reviewed the condition and finds it acceptable for PSEGS, with the exception that the condition should not refer to detention basins since PSEGS does not plan on using detention basins as part of its drainage design. PSEGS reserves the right to comment on the actual condition proposed by Staff in its Preliminary Staff Assessment (PSA).

Section 6 SOCIOECONOMIC RESOURCES

WSQ 2-1 Provide corrected /updated socioeconomic information for Table 6.2-1

WSQ Response 2-1. <u>Updated Table 6.2-1</u>

Table 6.2-1 is updated below.

TABLE 6.2-1
Summary of Total Economic Impacts from Construction

Capital Cost	$2,000,000,000
Local Materials and Supply Purchases	$71,400,000
Total Construction Payroll	$462,400,000
Construction Payroll (Disposable)	$323,700,000
Annual Local Construction Expenditures	$23,800,000
Annual Average Local Construction Payroll	$154,100,000
Annual Average Local Construction Payroll (Disposable)	$107,900,000
Average Monthly Direct Construction Employment	840
Indirect Employment	172
Induced Employment	3,274
Construction Employment Multiplier	5.1
Indirect Income	$11,000,000
Induced Income	$159,100,000
Construction Income Multiplier	1.37
Total Sales Taxes	$7,000,000

All values are approximate.

Section 7 AIR QUALITY AND PUBLIC HEALTH

WSQ 2-2 Provide an updated cumulative analysis for operation impacts

WSQ Response 2-2. <u>Air Quality Cumulative Operation Impact Analysis</u>

This analysis will be provided under separate cover.

WSQ 2-3 Provide health risk assessment for construction

WSQ Response 2-3. <u>Construction Health Risk Assessment (HRA)</u>

Attachment WSQ 2-3-1 is the summary sheet for the diesel construction HRA impacts. We did not run the HARP model, but rather took the maximum three locations from diesel PM modeling and hand calculated the results.

Additionally, Attachment WSQ 2-3-2 includes the construction NO2 input and output file for 1-hour. It appears that using ARM (0.8) on the 1-hour results produces the smallest impacts.

- 98th percentile NOx 1-hour = 208.1 ug/m3 * 0.8 (ARM) = 166.4 ug/m3.
- 98th percentile NOx 1-hour OLM = 168.66 ug/m3.

The background used on the project is 97.8 ug/m3.

With both OLM and ARM, the project by itself is less than the NAAQS for 1-hour NO2 at 188 ug/m3.

WSQ 2-4 Provide clarification as to which air quality modeling file provided on the CD should be used.

WSQ Response 2-4. <u>Modeling File Clarification</u>

A new CD of the modeling files was delivered to the CEC Staff on May 7, 2013.

Section 8 HAZARDOUS MATERIALS

WSQ 2-5 Confirm that chemical list in HAZ-1 table is complete

WSQ Response 2-5. <u>Chemical List</u>

PSH has confirmed that the chemical list in the Petition For Amendment is complete.

Section 9 WORKER SAFETY AND FIRE PROTECTION

WSQ 3-1 Provide draft language of revised TRANS-6 as developed by Applicant and Riverside County

WSQ Response 3-1. <u>Proposed Revisions to Proposed TRANS-6</u>

PSH provided Riverside County the following proposed revisions to PSH's Proposed Condition of Certification **TRANS-6** to address issues related to the County's concern regarding interference with its Public Safety Emergency Communications (PSEC) Project.

HELIOSTAT POSITIONING PLAN

TRANS-6 The project owner shall prepare and implement a Heliostat Positioning Plan ~~in coordination with the Avian Protection Plan specified in Condition of Certification **BIO-25**~~ that would minimize potential for human health and safety hazards ~~and bird injury or mortality~~ from solar radiation exposure ***and avoid heliostat and solar flux interference with the operation of the Riverside County PSEC microwave tower***.

Verification: Within 90 days before PSEGS ***commissioning*** ~~commercial operation~~, the project owner shall submit a Heliostat Positioning Plan (HPP) to the CPM for review and approval. The project owner shall also submit the plan to potentially interested parties that may include ***Riverside County,*** CalTrans, CHP, FAA, and the Department of Defense (DOD) Southwest Renewable Energy Work Group for review and comment and forward any comments received to the CPM. The Heliostat Positioning Plan shall accomplish the following:

1. Identify the heliostat movements and positions (including reasonably possible malfunctions) that could result in potential exposure of observers at various locations including in aircraft, motorists***, the Riverside County PSEC microwave tower***, pedestrians and hikers in nearby wilderness areas to reflected solar radiation from heliostats;
2. Describe within the HPP how programmed heliostat operation would address potential human health and safety hazards at locations of observers, and would limit or avoid potential for ***interference***

with operation of the Riverside County PSEC microwave tower ~~harm to birds~~;

3. Prepare a monitoring plan that would: a) obtain field measurements in candela per meters squared and watts per meter squared to validate that the Heliostat Positioning Plan would avoid potential for human health and safety hazards consistent with the methodologies detailed in the 2010 Sandia Lab document presented by Clifford Ho, et al[1], including those referenced studies and materials within related to ocular damage, and b) provide requirements and procedures to document, investigate and resolve legitimate human health and safety hazard complaints prioritizing localized response (e.g., screening at location of complaint) regarding daytime intrusive light.

4. The monitoring plan should be made available to interested parties including ***Riverside County,*** CalTrans, CHP, FAA, and the Department of Defense (DOD) Southwest Renewable Energy Work Group and be updated on an annual basis for the first 5 years, and at 2-year intervals thereafter for the life of the project.

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

Riverside County has not yet responded to the proposed language of the condition.

Section 10 WASTE MANAGEMENT

WSQ 3-4 ***Provide Staff with any information from original project info related to UXO***

WSQ 3-5 ***Provide an updated Phase 1 literature search for new linear features***

WSQ 3-6 ***Provide updated waste stream (see Table 5.16.6 in Final Decision)***

Responses to these workshop queries will be submitted under separate cover.

ATTACHMENT WSQ 1-2-1

DRAWING NUMBER E-SKE-103, REVISION A, ELECTRICAL ON-SITE 230KV TRANSMISSION PLAN

230KV TRANSMISSION LINE
230KV SWITCHYARD
12' PERIMETER DIRT ROAD OFFSET 5' FROM FENCE (TYP)
2138 FT
12' PERIMETER DIRT ROAD OFFSET 5' FROM FENCE (TYP)
NORTH
230KV UNDERGROUND TRANSMISSION 2 CIRCUITS ADJACENT TO ROAD
152.6' (TYP.)
4401 FT
10' WIDE HELIOSTAT MAINTENANCE DIRT ROAD
TOWER UNIT-1
N 77,303.18
E 33,956.42
R1414'
12' WIDE CIRCULAR DIRT ROAD
12' DIRT ROAD
230KV UNDERGROUND TRANSMISSION 1 CIRCUIT ADJACENT TO ROAD
5347 FT
152.6' (TYP.)
10' WIDE HELIOSTAT MAINTENANCE DIRT ROAD
TOWER UNIT-2
N 72,590.78
E 40,845.14
R1414'
12' WIDE CICULAR DIRT ROAD
EVAPORATION PONDS
COMMON AREA FACILITIES
20' PAVED ROAD
12' DIRT ROAD
12' PERIMETER DIRT ROAD
12' PERIMETER DIRT ROAD OFFSET 5' FROM FENCE (TYP)
840 0 840 1,680
Scale: 1 INCH = 840 FEET

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NO.	DATE	REVISION	BY	CHK
A	11/21/12	ISSUED FOR REVIEW	MRK	

REVISION APPROVAL		REV	DATE
DISCIPLINE	REVIEWED	DISCIPLINE	REVIEWED
CIVIL		ELECTRICAL	
STRUCTURAL		INST & CNTRL	
MECHANICAL		ARCHITECTURAL	
PROCESS		PLANT LAYOUTS	
PIPING			

STATUS					
ISSUED	REV	DATE	DM	SDE	PEM
PRELIMINARY					
FOR REVIEW AND APPROVAL					
APPROVED FOR CONSTRUCTION					
REVISED & APPROVED FOR CONSTRUCTION					

RESPONSIBLE ENGINEER
PE #

SCALE 1" = 840'-0"

BrightSource
BRIGHTSOURCE INDUSTRIES ISRAEL
PALEN SOLAR
ELECTRIC GENERATING SYSTEM

PROJECT NO. 459892

CH2MHILL

ELECTRICAL
ON-SITE 230KV TRANSMISSION PLAN

DWG. NO. E-SKE-103
REV. A

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

FILENAME:
PLOT DATE:
PLOT TIME:

ATTACHMENT WSQ 1-2-2

SOUTHWIRE DATA SHEET

KNOW YOUR OPTIONS: 230 KV POWER CABLES

CONDUCTOR MATERIAL AND SIZE

Conductor material is a matter of both customer preference and required current carrying capacity

- At 230 kV, copper is most common
- When both copper and aluminum conductors can meet your requirements, the more economical solution will be a function of the metal and the cable component costs

INSULATION THICKNESS

- For cables with a radial moisture barrier, “Southwire(SW) Standard Wall” reduced insulation thicknesses within AEIC specification CS9 are recommended
- For applications requiring smaller cable diameters, cables with reduced insulation thickness are available upon request within the stress limits in AEIC specification CS9

SHEATH MATERIAL

- Copper and aluminum corrugated sheaths offer the best mechanical and moisture protection for your HV cable, and copper will provide better short circuit performance and improved connectability
- Composite laminate sheaths in both copper and aluminum that offer excellent protection against moisture ingress

JACKET

- Standard outer jacket: extruded LLDPE with a co-extruded outer semi-conductive polyethylene layer for jacket integrity testing
- Halogen Free Fire Retardant (HFFR) compounds are available upon request for installations in cable trays and ventilated troughs

230 kV XLPE - Copper Conductor

SW STANDARD WALL XLPE COPPER CORRUGATED SHEATH

CABLE CONSTRUCTION

- Reverse Concentric Stranded Copper, Compressed Conductor or Milliken
- Super Smooth Conductor Shield
- Super Clean XLPE Insulation
- 850 mil XLPE minimum
- True Triple Extrusion and Dry Cured
- Firmly Bonded Insulation Shield
- Welded Copper Corrugated Sheath
- Polyethylene Jacket with Extruded Semi-Conductive Outer Layer

CABLE DATA	
Voltage Characteristics (kV)	
Max Voltage Rating	245
BIL Rating	1050
Temperatures (°C)	
Nominal Conductor	90
Max. Emergency Conductor	105
Short Circuit Conductor	250
Minimum Installation	-10
Design Characteristics	
Design Standards	AEIC, IEC
Typical Test Voltages	330 kV / 30 min.
XLPE Loss Factor	0.0005
Relative Permittivity	2.3

Conductor Size in kcmil[1]		1000	1250	1500	1750	2000	2500	3000	3500	4000
Dimensional	Nominal									
Conductor Diameter	in	1.12	1.25	1.37	1.48	1.61	1.76	1.92	2.08	2.21
	mm	28.5	31.8	34.8	37.6	40.9	44.7	48.8	52.8	56.1
Insulation Thickness	mils	960	910	890	880	870	850	850	850	850
	mm	24.4	23.1	22.6	22.4	22.1	21.6	21.6	21.6	21.6
Diameter over Insulation	in	3.16	3.19	3.27	3.36	3.44	3.66	3.82	3.98	4.11
	mm	80.2	81.0	83.1	85.3	87.5	93.0	97.1	101.0	104.4
Diameter over Sheath	in	3.75	3.79	3.87	3.98	4.06	4.31	4.49	4.66	4.80
	mm	95.3	96.2	98.4	101.0	103.1	109.4	113.9	118.3	121.9
Overall Jacket Diameter	in	4.03	4.07	4.15	4.26	4.34	4.59	4.77	4.94	5.08
	mm	102.4	103.3	105.5	108.1	110.3	116.6	121.1	125.4	129.0
Total Weight	lbs/ft	8.5	9.2	10.1	11.1	12.0	14.1	16.0	18.0	19.8
Min. Bending Radius (install/perm.)	in	81/60	81/61	83/62	85/64	87/65	92/69	95/71	99/74	102/76
Maximum Pulling Tension	lbs	8,000	10,000	12,000	14,000	16,000	20,000	24,000	28,000	32,000
Typical Shipping Reel Size										
Flange x Traverse	in	158x95	158x95	158x95	158x95	158x95	158x95	158x95	158x95	158x95
Shipping Reel Capacity[2]	ft	2,900	2,925	2,925	2,775	2,775	2,550	2,250	1,925	1,825
Electrical										
Electrical Stress @ U_o										
Conductor Shield	kV/mm	9.0	9.0	8.9	8.8	8.7	8.6	8.5	8.2	8.1
Insulation Shield	kV/mm	3.5	3.9	4.1	4.2	4.3	4.5	4.6	4.7	4.8
Short Circuit for 0.5s[3]										
Conductor	kA	102.5	128.1	153.8	179.4	205.0	256.3	307.5	358.8	410.0
Sheath	kA	47.0	47.5	48.5	49.8	50.9	54.0	56.2	58.3	60.2
Conductor Resistance										
DC @ 20° C	Ω/kft	0.011	0.008	0.007	0.006	0.005	0.004	0.004	0.003	0.003
DC @ 90° C	Ω/kft	0.014	0.011	0.009	0.008	0.007	0.005	0.005	0.004	0.003
Capacitance	pF/ft	41.6	46.1	49.6	52.5	55.3	62.4	66.2	69.8	73.0
Charging Current	Amps/kft	2.08	2.31	2.48	2.63	2.77	3.12	3.31	3.49	3.65
Ampacity @ 90° C	per circuit									
Typical Single Ductbank[4]	Amps	850	950	1030	1100	1170	1372	1486	1579	1659
Power Rating	MVA	339	379	411	439	467	547	592	630	661
Typical Double Ductbank[4]	Amps	720	800	860	920	960	1137	1225	1296	1357
Power Rating	MVA	287	319	343	367	383	453	489	517	541

[1] 2500-4000 kcmil conductors are 5 segment Milliken conductors.
[2] Increased shipping reel capacity can be accommodated on request.
[3] Declared values for 30 mils copper sheath. Thicker sheath can accommodate more current.
[4] 4ft top of duct, 1°C-m/W native, 0.8°C-m/W ductbank backfill, 25°C Ambient, 75% lf, 9" spacing, single-point or cross bonded

230 kV XLPE - Aluminum Conductor

SW STANDARD WALL XLPE ALUMINUM CORRUGATED SHEATH

CABLE CONSTRUCTION

- Reverse Concentric Stranded Aluminum, Compressed Conductor
- Super Smooth Conductor Shield
- Super Clean XLPE Insulation
- 870 mil XLPE minimum
- True Triple Extrusion and Dry Cured
- Welded Aluminum Corrugated Sheath
- Polyethylene Jacket with Extruded Semi-Conductive Outer Layer
- Firmly Bonded Insulation Shield

CABLE DATA	
Voltage Characteristics (kV)	
Max Voltage Rating	245
BIL Rating	1050
Temperatures (°C)	
Nominal Conductor	90
Max. Emergency Conductor	105
Short Circuit Conductor	250
Minimum Installation	-10
Design Characteristics	
Design Standards	AEIC, IEC
Typical Test Voltages	330 kV / 30 min.
XLPE Loss Factor	0.0005
Relative Permittivity	2.3

Conductor Size in kcmil		1000	1250	1500	1750	2000
Dimensional	Nominal					
Conductor Diameter	in	1.12	1.26	1.38	1.49	1.61
	mm	28.5	31.9	35.0	37.8	40.9
Insulation Thickness	mils	960	910	890	880	870
	mm	24.4	23.1	22.6	22.4	22.1
Diameter over Insulation	in	3.16	3.19	3.27	3.36	3.44
	mm	80.2	81.0	83.1	85.3	87.5
Diameter over Sheath	in	3.87	3.90	3.99	4.09	4.18
	mm	98.2	99.1	101.3	104.0	106.2
Overall Jacket Diameter	in	4.15	4.18	4.27	4.37	4.46
	mm	105.3	106.2	108.4	111.0	113.3
Total Weight	lbs/ft	5.5	5.8	6.1	6.5	6.8
Min. Bending Radius (install/perm.) in	in	83/62	84/63	85/64	87/66	89/67
Maximum Pulling Tension	lbs	6,000	7,500	9,000	10,500	12,000
Typical Shipping Reel Size						
Flange x Traverse	in	158x95	158x95	158x95	158x95	158x95
Shipping Reel Capacity[1]	ft	2,925	2,925	2,750	2,800	2,625
Electrical						
Electrical Stress @ U_o						
Conductor Shield	kV/mm	9.0	9.0	8.9	8.8	8.7
Insulation Shield	kV/mm	3.5	3.9	4.1	4.2	4.3
Short Circuit for 0.5s[2]						
Conductor	kA	67.7	84.6	101.5	118.5	135.4
Sheath	kA	52.9	53.3	54.5	56	57.2
Conductor Resistance						
DC @ 20° C	Ω/kft	0.017	0.014	0.012	0.010	0.009
DC @ 90° C	Ω/kft	0.022	0.018	0.015	0.013	0.011
Capacitance	pF/ft	41.6	46.1	49.6	52.5	55.3
Charging Current	Amps/ kft	2.08	2.31	2.48	2.63	2.77
Ampacity @ 90° C	per circuit					
Typical Single Ductbank[3]	Amps	670	760	830	900	960
Power Rating	MVA	267	303	331	359	383
Typical Double Ductbank[3]	Amps	570	640	700	750	800
Power Rating	MVA	228	255	279	299	319

[1] Increased shipping reel capacity can be accommodated on request.
[2] Declared values for 50 mils aluminum sheath. Thicker sheath can accommodate more current.
[3] 4ft top of duct, 1°C-m/W native, 0.8°C-m/W ductbank backfill, 25°C Ambient, 75% lf, 9" spacing, single-point or cross bonded

230 kV XLPE – Copper Conductor

SW STANDARD WALL, COPPER NEUTRALS, COPPER COMPOSITE LAMINATE SHEATH

CABLE CONSTRUCTION

- Reverse Concentric Stranded Copper, Compressed Conductor or Milliken
- Super Smooth Conductor Shield
- Super Clean XLPE Insulation
- 850 mil XLPE minimum
- True Triple Extrusion and Dry Cured
- Firmly Bonded Insulation Shield
- Copper Neutrals with Copper Composite Laminate Sheath
- Polyethylene Jacket with Extruded Semi-Conductive Outer Layer

CABLE DATA	
Voltage Characteristics (kV)	
Max Voltage Rating	245
BIL Rating	1050
Temperatures (°C)	
Nominal Conductor	90
Max. Emergency Conductor	105
Short Circuit Conductor	250
Minimum Installation	-10
Design Characteristics	
Design Standards	AEIC, IEC
Typical Test Voltages	330 kV / 30 min.
XLPE Loss Factor	0.0005
Relative Permittivity	2.3

Conductor Size in kcmil[1]		1000	1250	1500	1750	2000	2500	3000	3500	4000
Dimensional	Nominal									
Conductor Diameter	in	1.12	1.25	1.37	1.48	1.61	1.76	1.92	2.08	2.21
	mm	28.5	31.8	34.8	37.6	40.9	44.7	48.8	52.8	56.1
Insulation Thickness	mils	960	910	890	880	870	850	850	850	850
	mm	24.4	23.1	22.6	22.4	22.1	21.6	21.6	21.6	21.6
Diameter over Insulation	in	3.16	3.19	3.27	3.36	3.44	3.66	3.82	3.98	4.11
	mm	80.2	81.0	83.1	85.3	87.5	93.0	97.1	101.0	104.4
Diameter over Sheath	in	3.54	3.58	3.66	3.75	3.83	4.07	4.23	4.39	4.52
	mm	90.0	90.8	92.8	95.1	97.2	103.4	107.5	111.4	114.8
Overall Jacket Diameter	in	3.86	3.90	3.98	4.07	4.15	4.39	4.55	4.71	4.84
	mm	98.1	98.9	101.0	103.3	105.4	111.5	115.6	119.5	123.0
Total Weight	lbs/ft	8.3	9.1	9.9	10.8	11.7	13.8	15.6	17.5	19.3
Min. Bending Radius (install/perm.)	in	77/58	78/58	80/60	81/61	83/62	88/66	91/68	94/71	97/73
Maximum Pulling Tension	lbs	8,000	10,000	12,000	14,000	16,000	20,000	24,000	28,000	32,000
Typical Shipping Reel Size										
Flange x Traverse	in	150x95	150x95	150x95	158x95	158x95	158x95	158x95	158x95	158x95
Shipping Reel Capacity[2]	ft	3,000	3,000	3,000	2,925	2,925	2,700	2,375	2,100	1,900
Electrical										
Electrical Stress @ U_o										
Conductor Shield	kV/mm	9.0	9.0	8.9	8.8	8.7	8.6	8.5	8.2	8.1
Insulation Shield	kV/mm	3.5	3.9	4.1	4.2	4.3	4.5	4.6	4.7	4.8
Short Circuit for 0.5s[3]										
Conductor	kA	102.5	128.1	153.8	179.4	205	256.3	307.5	358.8	410
Sheath	kA	44.8	44.9	45.1	45.3	45.6	46.2	46.6	47.0	47.4
Conductor Resistance										
DC @ 20° C	Ω/kft	0.011	0.008	0.007	0.006	0.005	0.004	0.004	0.003	0.003
DC @ 90° C	Ω/kft	0.014	0.011	0.009	0.008	0.007	0.005	0.005	0.004	0.003
Capacitance	pF/ft	41.6	46.1	49.6	52.5	55.3	62.4	66.2	69.8	73.0
Charging Current	Amps/kft	2.08	2.31	2.48	2.63	2.77	3.12	3.31	3.49	3.65
Ampacity @ 90° C	per circuit									
Typical Single Ductbank[4]	Amps	860	970	1050	1130	1200	1435	1507	1689	1794
Power Rating	MVA	343	387	419	451	479	572	601	673	715
Typical Double Ductbank[4]	Amps	730	810	880	940	1000	1189	1296	1389	1471
Power Rating	MVA	291	323	351	375	399	474	517	554	587

[1] 2500-4000 kcmil conductors are 5 segment Milliken conductors.
[2] Increased shipping reel capacity can be accommodated on request.
[3] Declared values for 80 x 14 AWG copper wire screen with 6 mil copper tape shield. Larger wires can accommodate more current.
[4] 4ft top of duct, 1°C-m/W native, 0.8°C-m/W ductbank backfill, 25°C Ambient, 75% lf, 9" spacing, single-point or cross bonded

230 kV XLPE – Aluminum Conductor

SW STANDARD WALL, COPPER NEUTRALS, ALUMINUM COMPOSITE LAMINATE SHEATH

CABLE CONSTRUCTION

- Reverse Concentric Stranded Aluminum, Compressed Conductor
- Super Smooth Conductor Shield
- Super Clean XLPE Insulation
- 870 mil XLPE minimum
- True Triple Extrusion and Dry Cured
- Firmly Bonded Insulation Shield
- Copper Neutrals with Aluminum Composite Laminate Sheath
- Polyethylene Jacket with Extruded Semi-Conductive Outer Layer

CABLE DATA	
Voltage Characteristics (kV)	
Max Voltage Rating	245
BIL Rating	1050
Temperatures (°C)	
Nominal Conductor	90
Max. Emergency Conductor	105
Short Circuit Conductor	250
Minimum Installation	-10
Design Characteristics	
Design Standards	AEIC, IEC
Typical Test Voltages	330 kV / 30 min.
XLPE Loss Factor	0.0005
Relative Permittivity	2.3

Conductor Size in kcmil		1000	1250	1500	1750	2000
Dimensional	Nominal					
Conductor Diameter	in	1.12	1.26	1.38	1.49	1.61
	mm	28.5	31.9	35.0	37.8	40.9
Insulation Thickness	mils	960	910	890	880	870
	mm	24.4	23.1	22.6	22.4	22.1
Diameter over Insulation	in	3.16	3.19	3.27	3.36	3.44
	mm	80.2	81.0	83.1	85.3	87.5
Diameter over Sheath	in	3.55	3.58	3.66	3.75	3.83
	mm	90.1	90.9	92.9	95.2	97.3
Overall Jacket Diameter	in	3.87	3.90	3.98	4.07	4.15
	mm	98.2	99.0	101.1	103.4	105.5
Total Weight	lbs/ft	6.0	6.2	6.5	6.9	7.2
Min. Bending Radius (install/perm.)	in	77/58	78/58	80/60	81/61	83/62
Maximum Pulling Tension	lbs	6,000	7,500	9,000	10,500	12,000
Typical Shipping Reel Size						
Flange x Traverse	in	150x95	150x95	150x95	158x95	158x95
Shipping Reel Capacity[1]	ft	3,000	3,000	3,000	2,925	2,925
Electrical						
Electrical Stress @ U_o						
Conductor Shield	kV/mm	9.0	9.0	8.9	8.8	8.7
Insulation Shield	kV/mm	3.5	3.9	4.1	4.2	4.3
Short Circuit for 0.5s[2]						
Conductor	kA	67.7	84.6	101.5	118.5	135.4
Sheath	kA	43.7	43.8	44.0	44.2	44.4
Conductor Resistance						
DC @ 20° C	Ω/kft	0.017	0.014	0.012	0.010	0.009
DC @ 90° C	Ω/kft	0.022	0.018	0.015	0.013	0.011
Capacitance	pF/ft	41.6	46.1	49.6	52.5	55.3
Charging Current	Amps/ kft	2.08	2.31	2.48	2.63	2.77
Ampacity @ 90° C	per circuit					
Typical Single Ductbank[3]	Amps	690	770	850	920	980
Power Rating	MVA	275	307	339	367	391
Typical Double Ductbank[3]	Amps	580	650	710	770	820
Power Rating	MVA	232	259	283	307	327

[1] Increased shipping reel capacity can be accommodated on request.
[2] Declared values for 80 x 14 AWG copper wire screen with 8 mil aluminum tape shield. Larger wires can accommodate more current.
[3] 4ft top of duct, 1°C-m/W native, 0.8°C-m/W ductbank backfill, 25°C Ambient, 75% lf, 9" spacing, single-point or cross bonded

ATTACHMENT WSQ 1-4-1

CAISO RESPONSE TO MODIFICATION REQUEST FOR THE PSPP

California ISO
Shaping a Renewed Future

California Independent System Operator Corporation

April 22, 2013

Chifong Thomas
Sr. Director, Transmission & Strategy
Brightsource Energy, Inc.
1999 Harrison Street, STE 2150
Oakland, CA 94612

RE: Response to Modification Request for the Palen Solar Power Project (ISO Queue # 365)

Dear Ms. Thomas:

The California Independent System Operator Corporation ("ISO") has completed its review of Brightsource Energy, Inc. ("Brightsource") request dated December 6, 2012 to change the generation technology from parabolic trough field to solar tower for the Palen Solar Power Project ("Project"). Section 6.9.2.2 of the GIP (Appendix Y to the ISO tariff) provides that any modification to the generation facility may constitute a material modification.

At this time, the ISO has not found a material impact on this change in generation technology; therefore, the conversion to solar tower is approved. Southern California Edison ("SCE") concurs with this analysis and the ISO will work with SCE and Brightsource to incorporate these modifications for the Project in an amendment to the LGIA.

While the ISO has determined that this requested modification is not a material modification, any future change could have a material impact on later queued customers and will be subject to material modification review by the ISO. The ISO is focused on advancing projects in the queue to commercial operation. As part of this effort, the ISO will continue to request periodic updates pursuant to Section 5.7 of the LGIA to ensure that the Project is meeting its milestones and is on schedule to meet its COD. Please keep in mind that failure to meet the milestones, if not cured under the LGIA, may result in a breach of the LGIA.

Please feel free to contact Bruce McAllister at 916-608-7009 or at bmcallister@caiso.com with any questions.

Kindest regards,

Deborah A. Le Vine
Director, Infrastructure Contracts & Management

cc: John Tucker (SCE)
Drew Brabb (SCE)
Ayman Samaan (SCE)
Jorge Chacon (SCE)

ATTACHMENT WSQ 1-5-1

RESUME OF PAUL FRANK

PAUL FRANK

POSITION: Field Biologist

EXPERIENCE:

Desert Tortoise: Surveys and Research

May- 2008 through October 2009 (various times): Biological Consultant, Alice Karl and Associates, Davis CA. Conducted approximately 450 relative abundance transects throughout the proposed MCAGCC expansion area. As a service for the Marine Corps at MCAGCC in CA.

October 2003 - June 2009 (various times): Biological Consultant, Alice Karl and Associates, Davis CA. Hyundai America Test-Track Development; desert tortoise translocation study project; translocated, transmitter and data logger attachment and management, blood and nasal sampling, conducted health assessments on tortoises found on and then translocated off the Hyundai site, also the above tasks except translocation, on control animals located on public land.

August - October 1992 – 2007: Biological Consultant, Kiva Biological Consulting, and Inyokern, CA. Lead investigator on ten, and assistant investigator on twelve, intensive desert tortoise census for the AZ Game & Fish Dept. and Bureau of Land Management permanent study plots in AZ. Field responsibilities included all hands-on data collection activities related to the project including locating, marking, measuring, weighing, sex identification, behavioral observations and photography of tortoises. Also mapping of locations, collection of specimens and full report.

November 2005 - May 2007 (various times): Volunteer Field Biologist, Team member with a consortium of academic, government and consulting biologists from both Mexico and the United States. In a preliminary genetic, ecological, and health research effort of the "desert" tortoises living in the Deciduous Tropical Woodland of southern Sonora. My primary duty was to train Mexican biologists in attachment, maintenance and removal of radio transmitters on the tortoises, and radio tracking techniques.

September 2004 - July 2006 (various times): Biological Consultant, Alice Karl and Associates, Davis CA. Mesquite Regional Landfill in Imperial Co., CA. Preconstruction and clearance surveys as well as tortoise translocation and a translocation study; translocated, attached transmitters, obtained blood samples and conducted health assessments on tortoises found on and then translocated off the Landfill site, also the above tasks except translocation, on control animals located on public land.

October 2003 - December 2004 (various times): Biological Consultant, Bill Vanherweg Consulting, Bakersfield CA. Hyundai America Test-Track Development, assisted with desert tortoise location surveys and construction monitoring on the Hyundai property.

August - October 2003: Biological Consultant, Tracy Bailey, Ridgecrest CA. Conducted relative abundance strip transects, throughout the Rand Mtns and California City areas in the western Mojave Desert; as a service to the USGS.

June 2001 – 2003: Biological Consultant, Kiva Biological Consulting, Inyokern, and CA. Crew member in a long-term USGS tortoise health study. Collected blood and nasal samples from tortoises in numerous locations throughout the CA desert.

January - June 1998 - 2003: Biological Consultant, Kiva Biological Consulting, Inyokern, CA.
Line Distance Sampling: Supervised transect crews, radio transmitting of tortoises and the tracking of those animals, as well as establishing and walking Distance Transects. This work is being done for the US Fish and Wildlife Service throughout the California Desert and for the Dept. of the Navy at the Chocolate Mt. Aerial Gunnery Range and Marine Corps Air to Ground Combat Center, in CA.

July-August 2001 and July 2002: Biological Consultant, Alice Karl and Associates, Davis CA. And Charis Consulting, Barstow CA. Conducted approximately 250 relative abundance transects on Fort Irwin and throughout the proposed Fort Irwin expansion area, as a service for the US Army at the Fort Irwin National Training Center in CA.

June 2002: Biological Consultant, Alice Karl and Associates, Davis CA and Graystone Environmental Consultants, Denver CO. Preconstruction surveys for proposed Edison Electric Transmission line projects.

July-September 1999 and August-October 2001: Biological Consultant, Kiva Biological Consulting, Inyokern, CA. Conducted approximately 500 relative abundance strip transects; throughout the Western Mojave Desert; as a service to the BLM.

October 2000 and June 2001: Participant at the Training and Clinic for Desert Tortoise Health Assessments In Twentynine Palms, CA., and various other field locations in the Mojave Desert. These clinics provided intensive training for in-depth health assessments, drawing blood from the brachial vein, conducting nasal lavages and preparing blood for ELISA tests. The workshops were organized and funded by the NREA Division MCAGCC. I was able to obtain a sufficient number of blood samples from tortoises to be permitted by the US Fish and Wildlife Service to collect blood samples from desert tortoises.

July – August 2001 and July 2002: Biological Consultant, Alice Karl and Associates, Davis CA. And Charis Consulting, Barstow CA. Relative Abundance transects on Fort Irwin and throughout the proposed Fort Irwin expansion area, as a service to the US Army at the Fort Irwin National Training Center in CA.

Various times, 1992 – 1999: Biological Consultant, Alice Karl and Associates, Davis CA. Research team member on a multi-year project, this research is a component of the mitigation package for the proposed low level radioactive waste disposal facility in Ward Valley, CA. Much of this work has involved the radio tracking of desert tortoises.

Various times, 1997 – 1999: Biological Consultant, On-Track Consulting, Ridgecrest, CA. Survey crewmember conducting desert tortoise surveys for the USGS Biological Resource Division as a service to the US Army at the Fort Irwin National Training Center in CA.

June 1998: Biological Consultant, Alice Karl and Associates and the Chambers Group. Survey crewmember conducting desert tortoise surveys as a service to the US Army at Fort Irwin NTC in CA.

March - May 1997: Biological Consultant, Kiva Biological Consulting, Inyokern, CA. Principal fieldworker, on a 60-day desert tortoise census at the Chuckwalla Bench permanent study plot in CA., for the USGS Biological Resources Division

March - June 1994 and 1995 Biological Consultant, On-Track Consulting and EnviroPlus Consulting, Ridgecrest, Ridgecrest, CA. Research team member, joint US Biological Service /California Energy Commission, five-year, Highway 58-Barrier study. This project documented the effects on tortoise home ranges, movement patterns and highway mortality as the result of the installation of tortoise proof barriers. Radio telemetry and PIT tag technology were used extensively on this project.

February 1994 - March 1994: Biological Consultant-Construction Supervisor, EnviroPlus Consulting, Ridgecrest, CA. Participated in the planning phase and then supervised the construction of experimental barrier structures. This project was a Clark County, Nevada sponsored study to develop efficient and cost effective structures to reduced tortoise mortality along highways.

August 1994: Biological Consultant, Dames and Moore, Tucson, AZ. Survey crewmember conducting desert tortoise surveys for the US Air Force on Luke Air Force Base in AZ.

July 1993 - August 1993: Biological Consultant, Dames and Moore, Tucson, AZ. Survey crewmember conducting tortoise surveys for the Dept. of the Navy on the Chocolate Mt. Aerial Gunnery Range in CA.

March - June 1991 & 1993: Biological Consultant, EnviroPlus Consulting, Ridgecrest, CA. Principal fieldworker conducted 60-day desert tortoise census at the Fremont Mt. and Fremont Valley BLM permanent study plots in CA.

March 1992 - July 1992: Field Supervisor, EnviroPlus Consulting, Ridgecrest, CA. Supervised field activities for a BLM sponsored project to investigate the effects of sheep grazing on desert tortoise habitat in the western Mojave Desert. This involved managing and conducting logistical support for the field team.

Various times, 1990 – 2001: Biological Consultant, On-Track Consulting Ridgecrest, Kiva Consulting; Inyokern; EnviroPlus Consulting Ridgecrest, CA, and Fauna West Consultants, Boulder MT. Assistant investigator on fifteen different tortoise censuses on BLM permanent study plots in CA, NV and AZ.

Biological Services Related to Development in Desert Tortoise Habitat:

March 1990 – November 2010: Biological Consultant, Various firms and agencies. Worked as a field biologist assisting on a more than fifty surveys and more that fifteen construction monitoring projects, related to development activities, through out the range of the Desert Tortoise in AZ, CA, NV, and UT.

November 2002 - February 2003, Biological Monitor. Ecology and Environment, Inc. Lancaster NY. Biological monitor on the second Kern River pipeline, responsibilities included crew supervision, preconstruction surveys and monitoring of construction operations to insure minimal environmental impact and protection of the listed desert tortoise and other species.

June 1991 - October 1991: Biological Consultant, EnviroPlus Consulting, Ridgecrest, CA. Biological monitor, Kern River pipeline project. Preconstruction surveys and the monitoring of construction operations.

May 1990 - November 1990: Biological Consultant, Western Technologies Inc., Las Vegas, NV. Supervised tortoise survey and relocation crews. Tortoises inhabiting private lands slated for development were removed and relocated as stipulated by the Clark County Habit Conservation Plan.

Botanical Consulting

2007 through 2010 (various times): Biological Consultant, Alice Karl and Associates, Davis CA. Assisted with a variety of rare plant surveys on numerous projects related to energy development and transmission line construction in the California deserts.

Spring of 2010 (various times): Biological Consultant, Ironwood Consulting, Redlands CA. Assisted with a variety of rare plant surveys and censes on several projects related to energy development and transmission line construction in the California deserts.

2005 through 2008 (various times): Biological Consultant, Alice Karl and Associates, Davis CA. Assisted with a variety of perennial and annual plant surveys for the Hyundai America Test-Track Development; desert tortoise translocation study project. And the Mesquite Regional Landfill; desert tortoise translocation study project;

Other Biological Consulting:

May 2006 - July 2007: Small Mammal trapping Volunteer-trainee under the supervision of Permitted biologists, at various locations in the West Mojave (San Bernardino and Kern Counties).

October 1999: Biological Consultant, Alice Karl and Associates, Davis CA. Survey crewmember on an environmental pre-construction survey, for a proposed power line for PG&E Generating in Maricopa County AZ.

March 1997: Biological Consultant, On-Track Consulting, Ridgecrest, CA. Conducted common raven surveys for the USGS, as a service to the US Air Force at Edwards Air Force Base in CA.

April 1996 - August 1996: Biological monitor, Jones and Stokes Associates, Inc. Sacramento, CA. Monitored AT & T fiber optic line construction projects. Responsibilities include: monitoring construction operations to insure minimal environmental impact and protection of wetland areas and of agency, state and federally listed species in the Siskiyou Mountains of southwestern OR.

April 1989 - July 1989: Biological Consultant, Fauna West Consultants, Boulder, MT. Research crewmember on a demographic study of the common raven throughout the Mojave and Colorado Deserts in California for the BLM. This study was in response to raven predation on the desert tortoise.

Various times 1988 – 1991: Wildlife Biologist, Bio-West, Inc., Logan, UT. Black footed ferret surveys in Utah Wyoming and Colorado. These surveys followed standard US Fish & Wildlife Service, guidelines. I also worked on several fish and aquatic invertebrate projects.

Land Restoration, Native Seed Procurement and Agency Experience:

Various times 1987 - 1991 Project Manager, Pinion Mesa Native Seed Company - Glade Park and Leadville, CO. Managed or supervised numerous disturbed land restoration projects, including mined land, pipeline and highway projects. Directly involved with both mechanical and manual ground preparations, seeding, fertilizing and mulching techniques. Duties included seeding and live planting, irrigation system installation, job logistics, crew supervision, and equipment operation. Equipment operated included farm tractors, straw-blowers, hydro-seeders, trenchers.

June 1982 - June 1987 Owner-operator, Wildseed, Inc. Moab, UT. Provided commercial seed companies, revegetation contractors, researchers and government agencies with native plant seed from wild-land sources. The uses of this seed were generally for disturbed land restoration and revegetation with some plant research and ornamental uses. The business process, was to obtain seed orders for required species often from a specific geographical location; locate the plant population that matched the criteria of the order; then collect and process to specification depending on the peculiarity of the species.

September 1980 - June 1982 Biological Technician, US Forest Service, Shrub Sciences Laboratory, Great Basin Experiment Station, Ephraim, UT. Work included; field investigation, seed collection, disturbed land reclamation projects, also logistics, crew supervision and equipment maintenance. Equipment operated included small bulldozers, farm tractors and straw-blowers.

March 1980 - September 1980: Biological Technician, Bureau of Land Management, Riverside, CA. Team member for the preparation of an Environmental Impact Statement, duties included mapping, establishment of vegetative study plots assessing potential damage to vegetative and writing the vegetative chapters of an EIS for a proposed off road motorcycle race.

EDUCATION:

1972-1973. Mesa College, Grand Junction, CO. Major: Geology.
1974-1975. Colorado Mountain College, Glenwood Springs, CO. Major: Botany.
1976-1978. University of Northern Colorado, Greeley, CO. BA Biological Science.

CONTACT:

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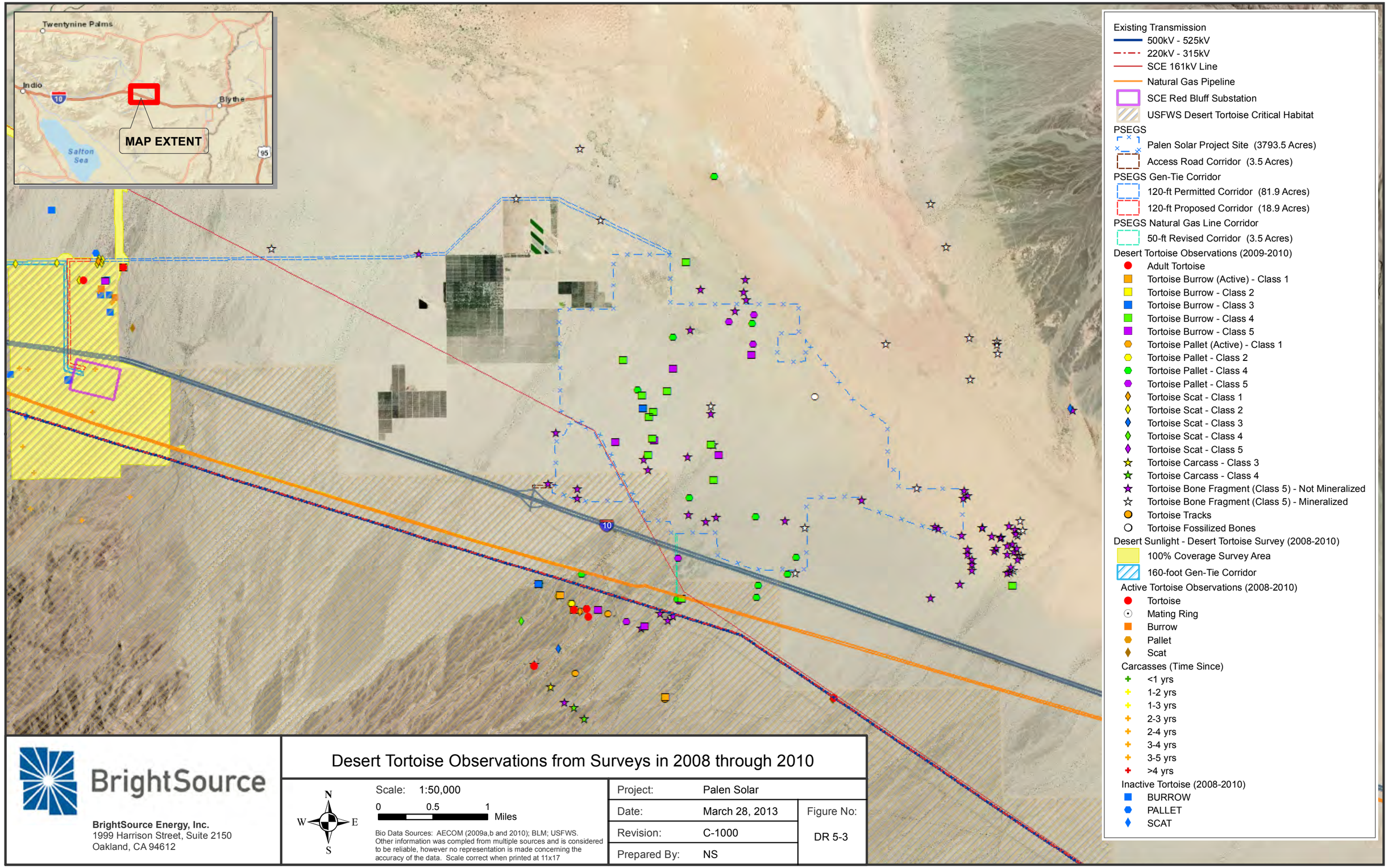
435 259 5381
801 910 4359 (cell)
paulfrank@frontiernet.net

ATTACHMENT WSQ 1-6-1

FIGURE DR 5-3 TO PSH'S DATA RESPONSES SET 1



BrightSource

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

Desert Tortoise Observations from Surveys in 2008 through 2010

N W E S

Scale: 1:50,000

0 0.5 1 Miles

Bio Data Sources: AECOM (2009a,b and 2010); BLM; USFWS. Other information was compiled from multiple sources and is considered to be reliable, however no representation is made concerning the accuracy of the data. Scale correct when printed at 11x17

Project:	Palen Solar	
Date:	March 28, 2013	Figure No:
Revision:	C-1000	DR 5-3
Prepared By:	NS	

Path: C:\WORKSPACE\BrightSource\CA_Palen\MapDocuments\CEC Bio Data Request 2013-03-29 (merged).mxd

ATTACHMENT WSQ 2-3-1

SUMMARY SHEET OF DIESEL CONSTRUCTION HRA IMPACTS

Diesel Particulate Matter Inhalation Risk Evaluation - Construction Period

Facility: Palen Solar Energy Generating Station
Process: Construction Diesel PM

Exposure Factor Data:

	Proposed	Upper Bound
Max Hrs/day:	16	20
Max Days/Wk:	5	6
Max Weeks/Yr:	52	52
Max Yrs:	2.75	3
LFE:	0.019	0.031

Results based on conservative upper-bound LFE

				DPM Concentration		DPM Risk Values		Lifetime	Cancer	Chronic
MIR #	**Receptor ID #**	**UTM E m**	**UTM N m**	**1 Hour ug/m3**	**Annual ug/m3***	**URF ug/m3**	**Chronic REL ug/m3**	**Exposure Factor**	**Risk per million**	**Hazard Index**
1	98	666515.35	3730182.56	n/a	0.04085	0.0003	5.0	0.031	3.75E-07	8.17E-03
2	107	666919.88	3730187.32	n/a	0.03562	0.0003	5.0	0.031	3.27E-07	7.12E-03
3	99	555560.3	3730183.09	n/a	0.03521	0.0003	5.0	0.031	3.23E-07	7.04E-03

1. no Acute REL exists for DPM, therefore no Acute HI is reported.
* 5 year modeled average.

References

1. Consolidated Table of OEHHA/ARB Approved Risk Assessment Hazard Values, 5/3/12.
2. Health Risk Assessment Guidance for Analyzing Cancer Risks from Mobile Sources of Diesel PM, SCAQMD, 12/02.
3. Health Risk Assessment Guidance for Analyzing Cancer Risks from Mobile Source Diesel Idling Emissions for CEQA AQ Analysis, SCAQMD, 8/03.
4. SCAQMD Rule 1401 and 212 Risk Assessment Procedures, Version 7.0, SCAQMD, 7/1/05.
5. Appendix K, Risk Reduction Plan to Reduce PM Emissions from Diesel Fueled Engines and Vehicles, CARB, 2000.
6. Proposed Identification of Diesel Exhaust as a Toxic Air Contaminant, CARB/OEHHA, 4/22/98.

ATTACHMENT WSQ 2-3-2

CONSTRUCTION NO2 INPUT AND OUTPUT FILE FOR 1-HOUR

(ELECTRONIC FILES PROVIDED SEPARATELY ON COMPACT DISK)

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA
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AMENDMENT
FOR THE PALEN SOLAR ELECTRIC GENERATING SYSTEM

Docket No. 09-AFC-7C
PROOF OF SERVICE
(Revised 05/09/2013)

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*Indicates change

OTHER ENERGY COMMISSION PARTICIPANTS (LISTED FOR CONVENIENCE ONLY):
After docketing, the Docket Unit will provide a copy to the persons listed below. Do not send copies of documents to these persons unless specifically directed to do so.

KAREN DOUGLAS
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Commissioners' Technical Adviser for Facility Siting

I, Marie Fleming, declare that on May 13, 2013, I served and filed copies of the attached, **PALEN SOLAR HOLDINGS, LLC'S RESPONSE TO WORKSHOP QUERIES** dated May 13, 2013. This document is accompanied by the most recent Proof of Service, which I copied from the web page for this project at: http://www.energy.ca.gov/sitingcases/palen/compliance/.

The document has been sent to the other parties in this proceeding (as shown on the Proof of Service) and to the Commission's Docket Unit, as appropriate, in the following manner:

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For service to all other parties and filing with the Docket Unit at the Energy Commission:

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

Dated: May 13, 2013

Marie Fleming