CH2M HILL
2485 Natomas Park Drive
Suite 600
Sacramento, CA 95833
Tel 916-920-0300
Fax 916-920-8463

CH2MHILL

August 10, 2009
File No.: 04.02.16.02
Project No. 357891

Mr. John Kessler, Project Manager
California Energy Commission
Systems Assessment and Facilities Siting Division
1516 9th Street, MS 15
Sacramento, CA 95814-5504

RE: Supplemental Data Response, Set 2I
Ivanpah Solar Electric Generating System (07-AFC-5)

Dear Mr. Kessler:

On behalf of Solar Partners I, LLC, Solar Partners II, LLC, Solar Partners IV, LLC, and Solar Partners VIII, LLC, please find attached one original and four hard copies and five CD copies of the Supplemental Data Response, Set 2I.

Please call me if you have any questions.

Sincerely,

CH2M HILL

John L. Carrier, J.D.
Program Manager

Enclosure
c: POS List
Project File

Ivanpah Solar Electric Generating System (ISEGS)

(07-AFC-5)

Supplemental Data Response, Set 2I

(Response to Data Request: Biological Resources)

Submitted to the

California Energy Commission

Submitted by

Solar Partners I, LLC; Solar Partners II, LLC; Solar Partners IV, LLC; and Solar Partners VIII, LLC

August 10, 2009

With Assistance from

CH2MHILL
2485 Natomas Park Drive
Suite 600
Sacramento, CA 95833

Contents

Section Page

Introduction.....1

Biological Resources (BR-5).....2

Introduction

Attached is a supplemental response by Solar Partners I, LLC; Solar Partners II, LLC; Solar Partners IV, LLC; and Solar Partners VIII, LLC (Applicant) to the California Energy Commission (CEC) Staff's data request for the Ivanpah Solar Electric Generating System (Ivanpah SEGS) Project (07-AFC-5). This data request was the result of the PSA workshop discussion held at Primm, Nevada on January 9, 2009. As before, within each discipline area, the responses are presented in alphabetical order and are numbered for tracking and reference convenience. New graphics or tables are numbered in reference to the Supplemental Data Request number. For example, if a table were used in response to Data Request BR-5, it would be numbered Table BR5-1. The first figure used in response to Data Request BR-5 would be Figure BR5-1, and so on.

The Applicant looks forward to working cooperatively with the CEC and Bureau of Land Management (BLM) staff and the other resource agencies as the Ivanpah SEGS Project proceeds through the licensing process. We trust that these responses address the Staff's questions and we remain available to have any additional dialogue the Staff may require.

Biological Resources (BR-5)

BR-5 During the January 9, 2009 workshop held in Primm, Nevada, Brian Croft of the USFWS provided materials for use as guidance in developing a desert tortoise translocation/relocation plan. Such a plan needs to be prepared by the Applicant with input from the various resource agencies. It will then be included in the Biological Assessment.

Response: A Draft Desert Tortoise Translocation/Relocation Plan was submitted in Supplemental Data Response Set 2A as Attachment BR5-1A. Comments on that Plan were received and addressed in a revised Draft Desert Tortoise Translocation/Relocation Plan (Revision 1) as Attachment BR5-1B, which was submitted as Supplemental Data Response Set 2D.

Comments on the Revision 1 document were received from CDFG and CEC on July 14, 2009. In that letter, the CEC stated, "*As described in the enclosed memo from CDFG, the revised Plan still lacks crucial details, but the absence of any habitat quality assessment is the most serious omission…..The joint agencies encourage you to attempt to find adequate habitat for relocation/translocation in the area directly west of ISEGS*."

In response to those comments, the Applicant has prepared a vegetation assessment of areas to the west of the Ivanpah SEGS project and to the southwest of the project, near I-15. A technical memo describing the methods used and results is provided as Attachment BR5-2A. The result of that analysis was that generally speaking, the relocation areas to the west of the Ivanpah SEGS units have higher shrub and succulent diversity and richness than the Ivanpah SEGS units themselves. Based on the stipulations provided by CDFG and CEC, the area to the west of the site appears to be suitable for the relocation or translocation of desert tortoise, in terms of vegetation.

ATTACHMENT BR5-2A

Vegetation Surveys for Potential Relocation and Translocation Areas

TECHNICAL MEMORANDUM CH2MHILL

Ivanpah SEGS: Vegetation Surveys for Potential Relocation and Translocation Areas

PREPARED FOR: California Energy Commission
California Dept. of Fish and Game
Bureau of Land Management, Needles Field Office

PREPARED BY: Cindy Newman/CH2M HILL
Victor Leighton/CH2M HILL
Geof Spaulding/CH2M HILL

COPIES: BrightSource Energy
John Carrier/CH2M HILL
John Cleckler/CH2M HILL

DATE: August 10, 2009

In a letter dated July 8, 2009, the California Department of Fish and Game (CDFG) identified the Ivanpah Solar Electric Generation System (Ivanpah SEGS) site as having good quality habitat for the desert tortoise (*Gopherus agassizii*). They asked that a vegetation survey of the proposed relocation and translocation areas be conducted to determine whether these areas contain similar vegetation as the project site and, if it was found that the relocation and translocation areas do not have the same ecological make up as the site, they would be considered lower in quality. A July 14, 2009 letter from the California Energy Commission (CEC) concurred that vegetation surveys should be conducted to assess habitat quality in the relocation and translocation areas.

Site vegetation surveys and analyses of vegetation data were conducted at Ivanpah SEGS and surrounding areas in the northwestern Ivanpah Valley during April and July 2009. These data were first gathered to characterize existing vegetation baseline conditions, and then for the evaluation of desert tortoise habitat. The latter is to be used to determine the suitability of proposed relocation and translocation areas for desert tortoise that may need to be moved during implementation of the Ivanpah SEGS project.

Survey Objectives

The objectives of these vegetation surveys were as follows.

1. To characterize vegetation and collect shrub and succulent data for each unit within the Ivanpah SEGS project and surrounding areas, including species composition, abundance, diversity, and richness.
2. To determine whether proposed relocation and translocation areas have similar shrub and succulent species composition, diversity, and richness as each of the Ivanpah SEGS units.

Due to the fact that most of the data was collected during summer and well after the flowering period of most winter and spring annuals, the focus of this study was on

perennial shrubs and succulents alone. Separate desert tortoise surveys were also conducted and their results will provide information on elements of desert tortoise habitat other than the vegetative environment important to this herbivorous reptile.

Survey Protocol

Sampling for shrub and succulent abundance, diversity (Smith, 1992), and richness were conducted using 12-meter radius relevés (a term used in vegetation ecology for an arbitrarily assigned vegetation sampling plot) (CNPS, 2000). The number of individuals of each species was tallied within each relevé. Data was collected within the three Ivanpah units, within potential relocation and translocation areas in the vicinity, and in other surrounding areas (Figure BR5.2A-1, all figures are at the end of this memo).

Sample locations were as follows:

- **Ivanpah SEGS Units:** Three relevés were sampled in Ivanpah 1 (I1-R1 through R3) and Ivanpah 2 (I2-R1 through R3). Due to its larger size, five relevés were sampled in Ivanpah 3 (I3-R1 through R5).
- **Relocation Area[1]:** Seven relevés were sampled in the blue shaded proposed relocation area to the west of the Ivanpah SEGS units (Figure BR5.2A-1): one relevé in the relocation area west of Ivanpah 1 (RI1-R2), two relevés in the relocation area west of the Construction Logistics Area (RIST-R1 and R2), one relevé in the relocation area west of I2 (RI2-R1), three relevés in the relocation area to the west of Ivanpah 3 (RI3-R1 through R3).
- **Southern Translocation Areas:** Three relevés were sampled in each of the southern translocation areas, located near I-15 (TS1-R1 through 3, TS2-R1 through R3, and TS3-R1 through R3).
- **Other Surrounding Areas:** One relevé was sampled to the south of Ivanpah 1 (RI1-R1), one relevé to the east of Ivanpah 1 (BP), one relevé to the north of Ivanpah 3 (KRGT2), and one to the northeast of Ivanpah 3 (KRGT1).

Survey Findings

The project area lies on the bajada east of Clark Mountain and near the upper elevational limits of the creosote bush (*Larrea tridentata*) scrub. Above creosote bush scrub, observation indicates that a mixed desert scrub vegetation zone occurs between about 3,200 and 4,600 feet elevation and, above that, blackbrush (*Coleogyne ramosissima*) desert scrub.

Species Composition and Abundance

The most abundant shrub or succulent in the three Ivanpah SEGS units is burrobush (*Ambrosia dumosa*), followed by creosote bush, and then ratany (*Krameria sp*.). However, in two Ivanpah 3 relevés (I3-R1 and I3-R5), cheesebush (*Hymenoclea salsola*) was the most or second-most abundant shrub or succulent. Cheesebush is a disturbance-adapted shrub most

[1] The northern translocation areas are located within the relocation area to the west of the Ivanpah SEGS units. No relevés are located within the northern translocation areas because the exact placements of these translocation areas were determined after the vegetation sampling was completed.

common in washes, and its relative abundance here is consistent with greater surface roughness.

In most of the potential relocation areas directly south and west of the Ivanpah SEGS units, burrobush and creosote bush were also most abundant. The exception to this finding is at two of the highest elevation relevés (RI3-R2 and RI3-R3), which are in the transition zone (ecotone) at the upper limits of the creosote bush zone. Here blackbrush and burrobush are both present in numbers. In RI3-R2, California buckwheat (*Eriogonum fasciculatum*) was most abundant, followed by creosote bush and ratany. In RI3-R3, blackbrush was the most abundant, followed by burrobush and slender poreleaf (*Porophyllum gracile*).

In the southern translocation areas (TS), burrobush and creosote bush were the most abundant species. Cheesebush was second in abundance in TS1-R3.

In the relevé to the north of Ivanpah 3 (KRGT2), burrobush was most abundant, followed by Death Valley ephedra (*Ephedra* cf. *funerea*) and Mojave yucca (*Yucca schidigera*). In the relevé to the northeast of Ivanpah 3 (KRGT1), burrobush again was most abundant, followed by creosote bush, and then Death Valley ephedra. In the relevé to the east of Ivanpah 1 (BP), creosote bush was most abundant followed by burrobush.

Species Diversity and Richness

Shrub species diversity was calculated from Simpson's Index of Diversity (Smith, 1992), using the following formula:

$$Diversity = 1 - \frac{\sum n(n-1)}{N(N-1)}$$

Where,

N = Total number of individual shrubs

n = Number of individuals of a particular species

Species richness is the total number of unique shrub species at each site sampled.

Shrub and succulent diversity and richness for each relevé are presented in Table BR5.2A-1. Within the Ivanpah SEGS units, the Ivanpah 3 shrub and succulent plant community is more diverse and richer in species than Ivanpah 1 or 2; which are similar in diversity and richness to each other. Similarly, in the potential relocation areas, the relevés directly west of Ivanpah 3 (RI3-R1, RI3-R2, and RI3-R3) had the highest diversity and richness. Surprisingly, the relevé west of Ivanpah 1 (RI1-R2) had comparable diversity and richness to the relocation area west of Ivanpah 3. The relevés to the south of Ivanpah 1, to the west of the Substation Area, and to the west of Ivanpah 2 had lower diversity and richness.

In the three potential southern translocation areas near I-15, the relevés in TS1 had the highest diversity and richness and TS3 had the lowest diversity and richness. The relevé to the east of Ivanpah 1 (BP) had the lowest diversity and richness of all of the relevés sampled. Only three species were present (creosote bush, burrobush, and pencil cholla (*Opuntia ramosissima*)). The relevé to the north (KRGT1) had high diversity and the highest species

richness (19 shrub and succulent species) of all of the relevés. The relevé to the northeast (KRGT1) had similar diversity and richness to Ivanpah 3.

TABLE BR5.2A-1
Species Diversity and Richness

Sample Site	Simpson's Index of Diversity (1-D)	Average Species Diversity	Species Richness	Average Species Richness	Elevation (ft asl)
Ivanpah 1		0.40		8.7	
I1-R1	0.50		9		2804
I1-R2	0.40		11		2825
I1-R3	0.29		6		2862
Ivanpah 2		0.45		9.3	
I2-R1	0.39		9		2986
I2-R2	0.52		10		3001
I2-R3	0.43		9		3072
Ivanpah 3		0.64		11.4	
I3-R1	0.80		16		3228
I3-R2	0.37		8		3048
I3-R3	0.70		12		3102
I3-R4	0.63		8		3046
I3-R5	0.70		13		3321
Relocation Ivanpah 1		0.65		13.5	
RI1-R1	0.47		12		2980
RI1-R2	0.82		15		3117
Relocation Ivanpah Substation		0.51		13.5	
RIST-RI	0.61		15		3186
RIST-R2	0.41		12		3268
Relocation Ivanpah 2		0.59		14	
RI2-R1	0.59		14		3221
Relocation Ivanpah 3		0.84		15.7	
RI3-R1	0.82		14		3478
RI3-R2	0.87		15		3596
RI3-R3	0.83		18		3460

TABLE BR5.2A-1
Species Diversity and Richness

Sample Site	Simpson's Index of Diversity (1-D)	Average Species Diversity	Species Richness	Average Species Richness	Elevation (ft asl)
Translocation Area South 1		0.66		13	
TS1-R1	0.59		11		3071
TS1-R2	0.65		14		3139
TS1-R3	0.75		14		3105
Translocation Area South 2		0.48		10	
TS2-R1	0.38		7		2953
TS2-R2	0.34		13		2964
TS2-R3	0.72		10		3013
Translocation Area South 3		0.39		4.3	
TS3-R1	0.35		3		2844
TS3-R2	0.32		5		2909
TS3-R3	0.49		5		2920
Borrow Pit Undisturbed		0.27		3	
BP-UD	0.27		3		2687
Kern River Gas Transmission Site 1, Undisturbed		0.56		11	
KRGT1-UD	0.56		11		2836
Kern River Gas Transmission Site 2, Undisturbed		0.67		19	
KRGT2-UD	0.67		19		3270

Notes:
Shrubs were counted as separate individuals when clumps of stems protruded from distinctly different locations on the ground. This was most common for *Larrea tridentata* and *Ambrosia dumosa*.
Each *Yucca schidigera* stem was counted as a separate individual.
Species richness calculated as number of species found per releve'

In Table BR5.2A-2, the sites are ordered from lowest elevation to highest elevation. In general, species diversity and richness increase with increasing elevation, as shown on Figures BR5.2A-2 and BR5.2A-3, respectively. This is to be expected in this desert environment where plant-available water, a critically limiting variable, increases with elevation as a function of declining temperatures and increasing precipitation.

TABLE BR5.2A-2
Species Diversity and Richness Trends with Elevation

fSite	Elevation (ft asl)	Simpson's Index of Diversity (1-D)	Species Richness
BP-UD	2687	0.27	3
I1-R1	2804	0.50	9
I1-R2	2825	0.40	11
KRGT1-UD	2836	0.56	11
TS3-R1	2844	0.35	3
I1-R3	2862	0.29	6
TS3-R2	2909	0.32	5
TS3-R3	2920	0.49	5
TS2-R1	2953	0.38	7
TS2-R2	2964	0.34	13
RI1-R1	2980	0.47	12
I2-R1	2986	0.39	9
I2-R2	3001	0.52	10
TS2-R3	3013	0.72	10
I3-R4	3046	0.63	8
I3-R2	3048	0.37	8
TS1-R1	3071	0.59	11
I2-R3	3072	0.43	9
I3-R3	3102	0.70	12
TS1-R3	3105	0.75	14
RI1-R2	3117	0.82	15
TS1-R2	3139	0.65	14
RIST-RI	3186	0.61	15
RI2-R1	3221	0.59	14
I3-R1	3228	0.80	16
RIST-R2	3268	0.41	12
KRGT2-UD	3270	0.67	19
I3-R5	3321	0.70	13
RI3-R3	3460	0.83	18
RI3-R1	3478	0.82	14
RI3-R2	3596	0.87	15

Notes:
Shrubs were counted as separate individuals when clumps of stems protruded from distinctly different locations on the ground. This was most common for *Larrea tridentata* and *Ambrosia dumosa*.
Each *Yucca schidigera* stem was counted as a separate individual.
Species richness calculated as number of species found per belt transect or releve'

Table BR5.2A-3 presents a comparison of the species diversity and richness between the Ivanpah units and the respective relocation areas. The relocation areas to the west of the Ivanpah SEGS units are more diverse and species-rich than each respective Ivanpah unit.

TABLE BR5.2A-3
Comparison of Species Diversity and Richness Between the Ivanpah Units and the Relocation Areas

Site	Average Species Diversity		Average Species Richness	
	Ivanpah Site	Relocation Area	Ivanpah Site	Relocation Area
I1 and RI1	0.40	0.65	8.7	13.5
RIST		0.51		13.5
I2 and RI2	0.45	0.59	9.3	14
I3 and RI3	0.64	0.84	12	15.7

Table BR5.2A-4 presents a comparison of the species diversity and richness between the Ivanpah SEGS units and the elevationally comparable southern translocation areas. The average diversity in Ivanpah 1 is similar to TS3; however, the average richness in TS3 is about half of that in Ivanpah 1. The average diversity and richness in Ivanpah 2 are similar to TS2. The average diversity and richness in Ivanpah 3 and TS1 are also very similar to each other.

TABLE BR5.2A-4
Comparison of Species Diversity and Richness between the Ivanpah Units and the Southern Translocation Areas

Site	Average Species Diversity		Average Species Richness	
	Ivanpah Site	Southern Translocation Area	Ivanpah Site	Southern Translocation Area
I1 and TS3	0.40	0.39	8.7	4.3
I2 and TS2	0.45	0.48	9.3	10
I3 and TS1	0.64	0.66	12	13

Discussion of Vegetation Survey Results

Desert tortoises have been found in the Mojave Desert from below sea level to 7,300 feet (2,225 meters). At lower elevations, they occupy creosote bush scrub dominated alluvial fans, plains, and colluvial/bedrock slopes and, at higher elevations, they can be found on rocky slopes in blackbrush dominated scrub, Joshua tree (*Yucca brevifolia*) woodlands, and juniper (*Juniperus* spp.) woodland. Typical desert tortoise habitat in the Mojave Desert has been characterized as gently sloping terrain with friable, but not crumbling, sandy gravel soils in creosote bush scrub with high perennial plant diversity and high production of ephemerals, and where precipitation ranges from 2 to 8 inches (5 to 20 cm). (Luckenbach 1982, Turner 1982, Turner and Brown 1982, Germano *et al.* 1994, and USFWS 1994 all *in* USFWS 2008; Nussear *et al.* 2009).

Desert tortoises forage primarily on annual forbs (e.g., evening primrose (*Camissonia* spp.), cryptantha (*Cryptantha* spp.), desert dandelion (*Malacothrix glabrata)*, desert chicory *(Rafinesquia neomexicana*), and wire lettuce *(Stephanomeria exigua*)), but are also known to eat grasses, woody perennials, cacti (e.g., beavertail cactus (*Opuntia basilaris*)), and non-native species (e.g., red brome (*Bromus madritensis* ssp. *rubens*), Mediterranean grass (*Schismus barbata*) and red-stem filaree (*Erodium cicutarium*)) (Avery 1998 *in* Boarman 2009; USFWS 2008). All these species were documented during the 2007 and 2008 vegetation surveys of the Ivanpah SEGS project area.

Efforts have been made to quantify the relationship between desert tortoise abundance and habitat characteristics; however, these efforts have found habitat to be difficult and complex to characterize with any accuracy (Weinstein *et al.* 1987, Weinstein 1989 *in* Boarman 2009). A recently released model of desert tortoise habitat shows the entire bajada (alluvial fan below the mountains) to the west of I-15 has high potential for desert tortoise habitat (model score of 0.9) (Nussear *et al.* 2009). The core variables making up the model are soils, landscape, climate, and biological characteristics (Nussear *et al.* 2009).

Summary

Due to their higher elevation, the relocation areas to the west of the Ivanpah SEGS units generally have higher shrub and succulent diversity and richness than the Ivanpah SEGS units themselves. Based on the stipulations provided by CDFG and CEC, the area to the west of the site appears to be suitable for the relocation or translocation of desert tortoise, in terms of vegetation. It is important to note that the western half of the relocation area to the west of Ivanpah 3 has a different plant species composition than the Ivanpah SEGS units and the remainder of the relocation area. This northwestern portion of the relocation area is in a transition zone, where blackbrush is present and creosote bush and burrobush are less common. In RI3-R3, out of 18 species, blackbrush is the most abundant species and creosote bush is 8th most abundant. Tortoises typically do not occupy these areas as commonly as creosote-dominated areas (Nussear *et al.* 2009); however, one live tortoise and four tortoise carcasses were found in translocation area N1 during recent tortoise surveys (complete results discussed in a separate memorandum).

Based upon the results of this study, the northern translocation areas (N1 through N4) are expected to have suitable tortoise habitat for translocation of tortoises. Although vegetation sampling was not conducted within these translocation areas, greater shrub and succulent diversity and richness is expected because the elevation is higher than the Ivanpah SEGS units.

The southern translocation area 1 (TS1) and the southwestern (higher elevation) half of TS2 have comparable habitat to the Ivanpah SEGS units. These areas meet the vegetation-related habitat criteria set forth by CDFG and CEC for translocation of desert tortoise. TS3 and the northeastern (lower elevation) half of TS2 have lower species richness than the Ivanpah SEGS units and, therefore, do not meet the CDFG criteria that the translocation area have comparable ecological make up as the habitat where the tortoises currently reside.

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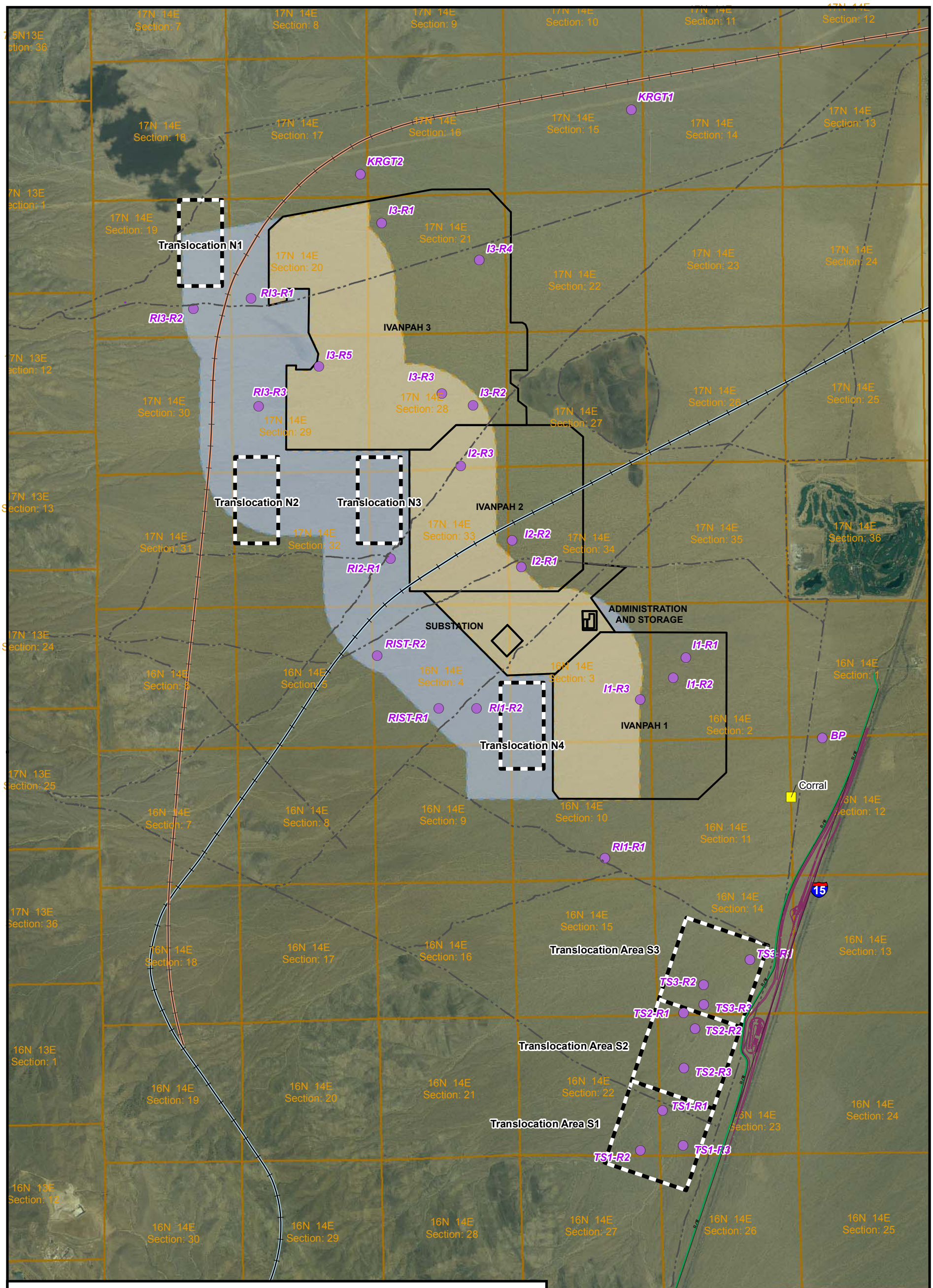

LEGEND

- Shrub & Succulent Sampling Sites
- Corral Location
- Train Line Option 4B
- Train Line Option 4C
- Trails
- Project Site
- Relocation Area
- Translocation Area
- Proposed Joint Point of Entry (JPOE) Facilities
- Tortoise Fence

KEY

I1-R1 through I1-R3: Ivanpah 1, relevés 1 - 3
I2-R1 through I2-R3: Ivanpah 2, relevés 1 - 3
I3-R1 through I3-R5: Ivanpah 3, relevés 1 - 5
RI1-R1 and RI1-R2: Relocation Area for Ivanpah 1, relevés 1 and 2
RI2-R1: Relocation Area for Ivanpah 2, relevé 1
RIST-R1 and RIST-R2: Relocation Area for Ivanpah Substation, relevés 1 and 2
RI3-R1 through RI3-R3: Relocation Area for Ivanpah 3, relevés 1 - 3
TS1-R1 through TS1-R3: Southern Translocation Area 1, relevés 1 - 3
TS2-R1 through TS2-R3: Southern Translocation Area 2, relevés 1 - 3
TS3-R1 through TS3-R3: Southern Translocation Area 3, relevés 1 - 3
KRGT1 and KRGT2: Kern River Gas Transmission Line Undisturbed Relevés 1 and 2
BP: Borrow Pit Undisturbed Relevé

FIGURE BR5.2A-1
VEGETATION SAMPLING FOR PROPOSED DESERT TORTOISE RELOCATION AND TRANSLOCATION AREAS

IVANPAH SOLAR ELECTRIC GENERATING SYSTEM

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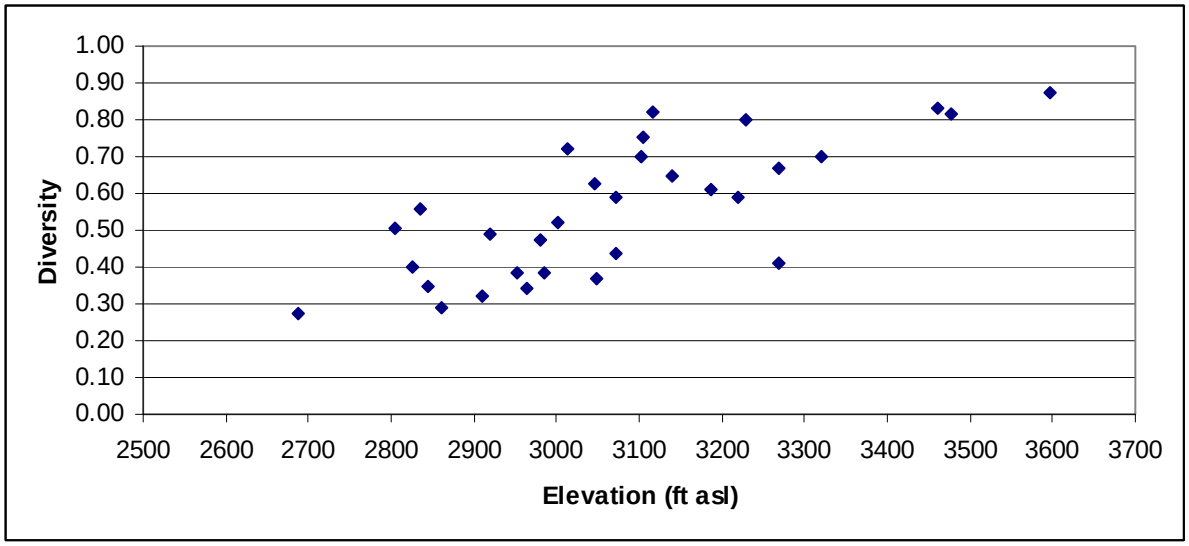

FIGURE BR5.2A-2: Elevational Trend for Species Diversity

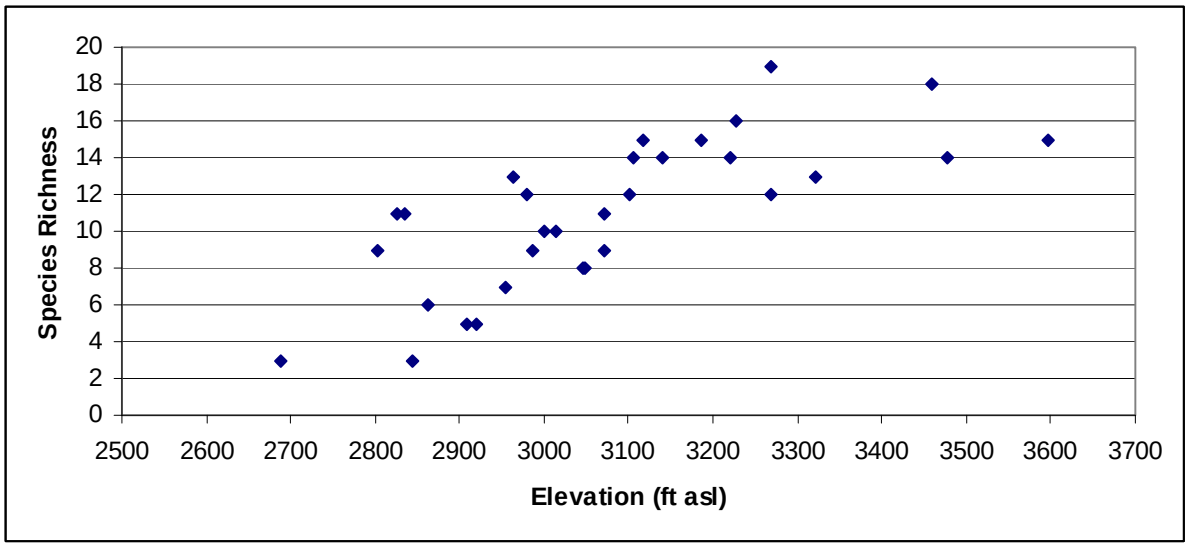

FIGURE BR5.2A-3: Elevational Trend for Species Richness

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 *IVANPAH SOLAR ELECTRIC GENERATING SYSTEM*

DOCKET NO. 07-AFC-5
PROOF OF SERVICE
(Revised 7/20/09)

APPLICANT

Solar Partners, LLC
John Woolard,
Chief Executive Officer
1999 Harrison Street, Suite #500
Oakland, CA 94612

Todd A. Stewart, Project Manager
Ivanpah SEGS
sdeyoung@brightsourceenergy.com
E-mail Preferred
Steve De Young, Project Manager
Ivanpah SEGS.
1999 Harrison Street, Ste. 2150
Oakland, CA 94612
tstewart@brightsourceenergy.com

APPLICANT'S CONSULTANTS

John L. Carrier, J. D.
2485 Natomas Park Dr. #600
Sacramento, CA 95833-2937
jcarrier@ch2m.com

COUNSEL FOR APPLICANT

Jeffery D. Harris
Ellison, Schneider
& Harris L.L.P.
2600 Capitol Avenue, Ste. 400
Sacramento, CA 95816-5905
jdh@eslawfirm.com

INTERESTED AGENCIES

California ISO
e-recipient@caiso.com

Tom Hurshman,
Project Manager
Bureau of Land Management
2465 South Townsend Ave.
Montrose, CO 81401
tom_hurshman@blm.gov

*indicates change

*Raymond C. Lee, Field Manager
Bureau of Land Management
1303 South U.S. Highway 95
Needles, CA 92363
Raymond_Lee@ca.blm.gov

Becky Jones
California Department of
Fish & Game
36431 41st Street East
Palmdale, CA 93552
dfgpalm@adelphia.net

INTERVENORS

California Unions for Reliable Energy ("CURE")
Tanya A. Gulesserian
Marc D. Joseph
Adams Broadwell Joseph & Cardozo
601 Gateway Boulevard, Ste 1000
South San Francisco, CA 94080
tgulesserian@adamsbroadwell.com

Western Watersheds Project
Michael J. Connor, Ph.D.
P.O. Box 2364
Reseda, CA 91337-2364
mjconnor@westernwatersheds.org

Gloria Smith, Joanne Spalding
Sidney Silliman, Sierra Club
85 Second Street, 2nd Fl.
San Francisco, CA 94105
E-mail Service Preferred
gloria.smith@sierraclub.org
joanne.spalding@sierraclub.org
gssilliman@csupomona.edu

INTERVENORS CONT.

Joshua Basofin, CA Rep.
Defenders of Wildlife
1303 J Street, Ste. 270
Sacramento, CA 95814
E-mail Service Preferred
jbasofin@defenders.org

Basin and Range Watch
Laura Cunningham
Kevin Emmerich
P.O. Box 70
Beatty, NV 89003
atomictoadranch@netzero.net

Center for Biological Diversity
Lisa T. Belenky, Sr. Attorney
Ileene Anderson, Public Lands Desert Director
351 California Street, Ste. 600
San Francisco, CA 94104
E-mail Service Preferred
lbelenky@biologicaldiversity.org
ianderson@biologicaldiversity.org

California Native Plant Society
Greg Suba, Tara Hansen & Jim Andre
2707 K Street, Suite 1
Sacramento, California, 95816-5113
E-mail Service Preferred
gsuba@cnps.org
thansen@cnps.org
granite@telis.org

ENERGY COMMISSION

JEFFREY D. BYRON
Commissioner and Presiding Member
jbyron@energy.state.ca.us

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

Paul Kramer
Hearing Officer
pkramer@energy.state.ca.us

John Kessler
Project Manager
jkessler@energy.state.ca.us

Dick Ratliff
Staff Counsel
dratliff@energy.state.ca.us

Elena Miller
Public Adviser
publicadviser@energy.state.ca.us

*indicates change

DECLARATION OF SERVICE

I, John Carrier, declare that on August 10, 2009, I served and filed copies of the attached, Supplemental Data Response Set 2I dated August 10, 2009. The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at: [www.energy.ca.gov/sitingcases/ivanpah].

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

(*Check all that Apply*)

FOR SERVICE TO ALL OTHER PARTIES:

___x___ sent electronically to all email addresses on the Proof of Service list;

___x___ by personal delivery or by depositing in the United States mail at Sacramento** with first-class postage thereon fully prepaid and addressed as provided on the Proof of Service list above to those addresses NOT marked "email preferred."

AND

FOR FILING WITH THE ENERGY COMMISSION:

___x___ sending an original paper copy and one electronic copy, mailed and emailed respectively, to the address below (*preferred method*);

OR

_____ depositing in the mail an original and 12 paper copies, as follows:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 07-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.

John L. Carrier, J.D.

**or by other delivery service, e.g., Fed Ex, UPS, courier, etc.

*indicates change