BEACON SOLAR ENERGY PROJECT
08-AFC-2 SUPPLEMENTAL RESPONSE TO DATA REQUEST 34
February 6, 2009

Technical Area: Cultural Resources

The first round of data requests on June 16, 2008 (Data Requests 1 through 70) included Data Request 34, which addresses the need for information on the historical geomorphology of the project area to assess the potential there for buried archaeological deposits.

Data Request Supplement 34S

Based on the Lemmer study (2008), the technical archaeological report (Apple, Cleland, and Glenny 2008), and the available pertinent literature (Gardner, McGill, and Sutton 2002; Sutton 1991), on December 16, 2008 CEC staff proposed a protocol for a geoarchaeology field study. A clarification of this protocol was obtained from the CEC and a Trenching Plan was submitted to CEC for review. The Trenching Plan was approved on January 22, 2009. Based on this Trenching Plan, the field work was conducted in January 2009. The attached report is a brief post-field summary of results and recommendations provided by Far Western geoarchaeologist Dr. Craig Young as an initial Supplemental response to Data Request 34S. A more detailed final technical report will be submitted in April.

Preliminary Results Beacon Solar Energy Project Geoarchaeology

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Over a field session of six days (January 24 – 29, 2009), I documented the stratigraphy exposed in 17 trenches across five distinct landforms that comprise the Beacon Solar Energy Project study area. The locations of the trenches with respect to project site boundaries and landform categories are shown on the attached figure. Along with the landform description outlined in the original trenching plan, the trench profiles provide data on the geometry, structure, and chronology of landform development. This information can then be used to better understand and evaluate the archaeological potential of the project area. In this brief preliminary report, I outline field techniques and present results of stratigraphic analysis and expedited radiocarbon results. I close with a series of management recommendations to guide cultural resources monitoring that might be required during project construction.

Field Techniques

Mechanical excavations focused on documenting a specific landform group during each day of fieldwork; I typically relied on the profiles of three or four trenches in each landform. Trench depths varied from five to six meters (16 to 20 feet) depending on sediment characteristics. It was necessary, due to the relatively deep level of each excavation, to bench and shore trenches requiring complete documentation. Considerable effort was made to provide a safe working environment in those trenches requiring complete documentation. It was typical to document and sample one trench profile and closely monitor the excavation of each additional trench for stratigraphic variability.

Once shoring and access ladders were in place, the profile was cleaned using a trowel. I typically cleaned both profiles (i.e., both sides of the trench) but selected one for documentation and sampling. The clean profile was photographed and measured for illustration. Sediment characteristics, such as particle size, contacts, bedding geometry, and organic content were documented for the profile. Unless discrete organic or charcoal deposits were located, major stratigraphic boundaries were highlighted for radiocarbon sampling. Discrete charcoal samples were collected in separate containers. Once the samples were retrieved, all shoring was removed.

Two samples collected for dating were submitted for Accelerated Mass Spectrometer (AMS) dating with expedited services and these dates are included in this report. These two samples were selected to provide confirmation that at depth (i.e., approximately 20 feet), Hf2 dates to the Holocene and to demonstrate that Hf1 represents an older landform. Additional samples will be submitted for dating and the results will be provided in the final report in April.

After complete documentation of the initial trench, additional trenches were excavated while closely monitoring the deposits (e.g., profile and backdirt) for variations in landform stratigraphy. In general, landform deposits appear to be relatively consistent over large areas and the documentation of a single "type"-trench proved successful. Trenches were closed and re-contoured at the close of each day.

Preliminary Results

Trench excavation and profile documentation supported general observations of the initial surface mapping fieldwork. The trench profiles conform to the overall geometry of the local fan system; that is, landforms above the fault have been relatively stable for a long period of time and landforms below the fault are active, relatively young features. It also follows that profiles in mid-fan locations show high-energy depositional events and distal fan location show low-energy depositional regimes. Trench profiles and forthcoming chronological information will be included in a final report.

Hf1 (*Trenches TL3: 1-3)*

A series of trenches excavated into the Hf1 landform above (south of) the Cantil Valley fault scarp encountered a thick series of fine sands and silts below a shallow alluvial and aeolian cap. The silt deposits are distal fan environments of the axial valley, probably deposited prior to significant uplift or warping along the fault. Organics at the top of a thick silt bed two meters below the modern surface have been dated at 9,550 ± 50 radiocarbon years ago (Beta-255186). The date is derived from pooled organics and represents a minimum age due to the long-term process of soil formation and weathering as organics were introduced. The contact at two meters was likely exposed for several millennia allowing the incorporation of organics. In any case, due to the process of organic accumulation, the deposit below 2 meters in depth is actually older than the radiocarbon date obtained from it. This distal fan environment is underlain by bedded course to fine gravel of the Pleistocene-age alluvial fan.

The upper portion of the profile has moderate potential for containing archaeological contexts due to varying erosional and depositional energy. The antiquity of the landform below 2 meters precludes the deposition of archaeological remains.

Hf1d (*Trenches TL2: 1-3)*

Trenches excavated into the Hf1d revealed an uplifted sequence of fan deposition. The upper portion of the profile is predominantly Holocene-age fan deposits mixed with aeolian coppice dunes and sand sheets. One meter below the surface this young deposit changes to a sequence of fine sands and silts of a distal fan environment. These fine sedimentary deposits are common in the middle portion of the profile, below one meter, and likely reflect deposition in distal fan environments similar to the more recent Hf2 area to the north. However, these Hf1 deposits are much older than the Hf2 situated below the Cantil Valley fault scarp. Although not yet dated, this middle stratigraphic sequence is very similar to the earliest Holocene date obtained on the fine-grained profile from TL3 (Hf1) nearby. The bottom of the profile consisted of steeply dipping cobbles and gravels deposited in large flood and wash events; this deep portion of the profile is certainly Pleistocene in age.

The upper portion of the profile has moderate potential for containing archaeological contexts due to varying erosional and depositional energy. The antiquity of the landform below 2 meters precludes the deposition of archaeological remains.

Hf2 (*Trenches TL5a: 1-2 and TL5b: 1-2)*

A series of trenches in the distal fan environments of the Hf2 revealed a deep series of upward-fining sheetwash and low-energy flood deposits. Portions of the profile show more than 16 preserved flood events (i.e., individual fine sand to silt sequence) per meter. The top of each event shows evidence of playa formation with well-preserved clay films and polygonal cracking. Each sequence reflects an individual flood or high water event reaching the distal fan followed by gradual drying and playa formation (i.e., each sequence ends with conditions similar to the modern surface). The fine sands occasionally contain charcoal pieces scoured from natural burns on the local landscape. These provide discrete dates of depositional events throughout the profile (unlike the more relative dates obtained from pooled organics). The TL5a and TL5b excavations revealed consistent distal fan profiles of upward-fining sequences even though the trench locations were separated by several hundred meters.

The upper sets of low-energy deposits in all trenches (and in the archaeological excavations already completed) are relatively thick (20 to 30 centimeters), when compared to underlying sequences, suggesting prolonged surface flow reaching the valley bottom. Surface flows were followed by relatively long-term pooling. Known archaeological features rest on the thick silt deposits resulting from this pooling; sites were occupied as the surface dried and distal fan pools contracted. Correlation of archaeological occupations and these recent flood and pooling events will be significant. Prior to the prolonged events of the past millennium, the profile shows a long series of short-lived and repetitive floods. A radiocarbon date on charcoal (4250 ± 40 radiocarbon years BP [Beta-255187]) from the middle of the sequence (Stratum 8 is 2.8 meters below the modern surface) shows that these events were occurring across the middle and late Holocene. Additional dates will provide information on the depositional rates in this dynamic setting. At approximately 4.0 meters below the surface the profile shows a significant change in flow regime and energy. A high-energy flood followed by prolonged drying may be evidence of the early Holocene environments in the region (additional dates should be compelling).

The presence of dynamic, Holocene-age, low-energy depositional environments has implications for the local archaeological record. Low-energy sheetwash and flood events can result in a well-preserved archaeological and paleontological record. There is a greater likelihood that artifacts and ecofacts are preserved in primary context resulting in high data potential. For example, a well-preserved hearth feature with charcoal remaining in direct contact with oxidized and burned sediments was encountered in the upper profile (80 centimeters below the surface) of TL5b-1. Similar archaeological features have been documented in almost identical positions in other portions of this landform. Additional features may be encountered at this level, and preservation potential for older, deeply buried features exist high.

The informal hearth encountered in TL5b-1 is 80 centimeters below surface and 120 centimeters wide, and is between 2 and 4 centimeters thick. The feature is clearly defined and contains a charcoal lens with an oxidized sediment layer below and thin lens of sediment above. The feature lacked associated fire-affected rocks or otherwise structural rocks.

Hf3 (*Trenches TL1: 1-3)*

A trench into the Hf3 landform revealed a deep sequence of recent, Holocene-age sheetwash and flood events. The landform is generally aggrading via a series of fining-upward (thick gravel to thin silt) deposits. The overall clast size (cobbles are present in the latest series of flood events) reflect deposition in relative high-energy flows, some of which were confined to incised channels while others spread broadly across the surface. The depositional environments documented at Trench Location 1 are not conducive to site preservation. Occasional archaeological materials (i.e., flakes) were collected from the trench excavations to a depth of almost four meters below the modern surface, but these have clearly been incorporated into the general gravel deposits and the provenience of their cultural deposition is unclear. Re-deposited material may be common on and in this landform. Overall sensitivity for buried sites on and in this landform is low.

Hf4 (*Trenches TL4a: 1-2 and TL4b: 1-2)*

Trenches excavated into the recent fan that forms the terminus of Pine Tree Wash revealed that this deposit obscures a portion of the Holocene-age landforms (Hf2 and Hf3). It was clear from the profiles that the recent fan is a unique landform and that its upper profile contains the most recent sedimentary deposit in the study area. With this in mind, I have re-labeled this unit Hf4 as opposed to Hf3p, a designation that was related to the Holocene-age fan to the west. The Hf3 fan is buried approximately 4 meters below the surface of the western portion of Hf4.

The stratigraphy of the Hf4 landform, revealed in the TL4a and TL4b trenches, shows complex inter-fingering with adjacent landforms due to the shifting nature of depositional environments. The upper profile (0 – 2 meters below the surface) consists of gravels and sands of recent fan deposition due to floods emanating from Pine Tree Wash. The middle profile (2 – 4 meters below the surface) reveals a series of sheetwash and minor floods with deposits similar in character to the adjacent Hf2 distal deposits. This sheetwash may have originated from drainages other than the Pine Tree Wash (e.g., Jawbone or other unnamed washes to the west of the project area). This section of the profile is interesting because it illustrates a pattern of expansion and contraction of the distal reaches of the local fan; this may have implications for the resource productivity of valley-bottom environments. The lowest portion of the profile (> 4.0 meters in depth) reveals high-energy sheetwash and channel flows that are very similar those underlying Hf3.

Overall this landform is deposited by moderate- to high-energy flood regimes that are not conducive to the intact preservation of archaeological sites. Interfingering with adjacent Hf2 occurs in the eastern and north portion of this landform (i.e., portions of the Hf2 landform may be shallowly buried). Due to the overall energy regime of the landform but considering the potential to encounter the buried Hf2, this Hf4 landform has moderate sensitivity for buried archaeological materials.

Landform Sensitivity

The results of trenching and stratigraphic documentation, along with supporting chronological information already obtained, provide the basis for management recommendations regarding cultural resources that might be impacted during construction activities within the Beacon Solar Energy Project area (Table 1).

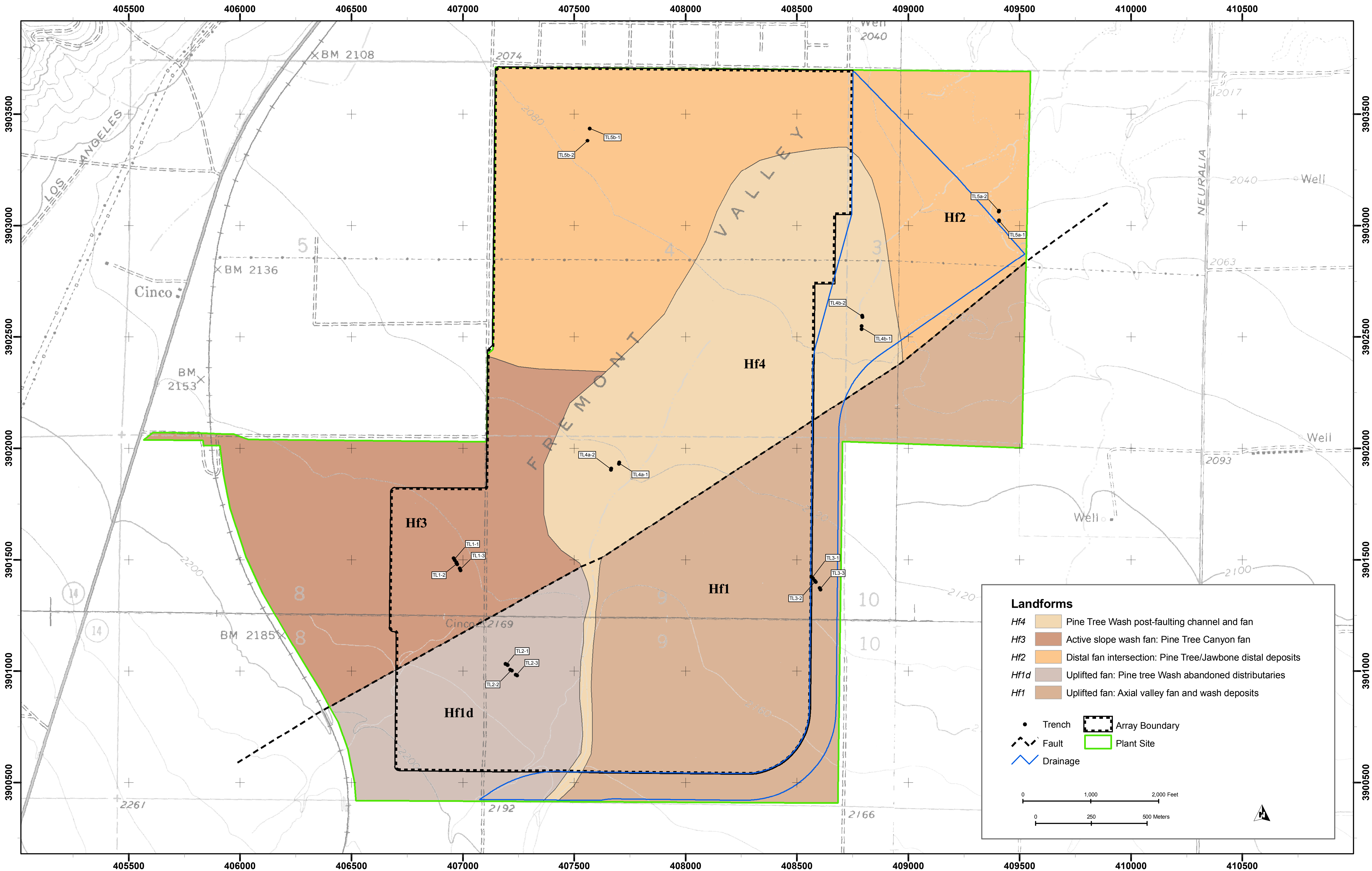
The potential of encountering well-preserved and intact archaeological resources (i.e., artifact, features, and sites) is high on and in the Hf2 landform. The Hf2 landform extends below and interfingers with the Hf4 landform where archaeological sensitivity is moderate on and in Hf4. There is also moderate potential for buried archaeological contexts in the upper profile of the Hf1 and Hf1d landforms. Energy regimes vary greatly in the Holocene-age portion of the Hf1 and Hf1d profiles, so that pin-pointing the location of the appropriate combination of time and energy and the preservation of archaeological material is difficult. The relative high-energy environment of the Holocene-age Hf3 fan is not conducive to archaeological preservation. Although archaeological materials (i.e., artifacts) occur on and within the fan, the potential of encountering well-preserved, intact features and/or sites on or in the Hf3 landform is very low.

Table 1. Sensitivity

Landform Category	Landform Description	Sensitivity
Hf1	Uplifted fan: Holocene-age fan and wash deposits resting on Pleistocene-age fan at 2 meters below surface.	Moderate
Hf1d	Uplifted fan: Holocene-age fan and distributary deposits resting on Pleistocene age fan at 2 meters below surface.	Moderate
Hf2	Distal fan intersection: Holocene-age distal fan environment to depths greater than 4 meters.	High

Hf3	Active slope wash fan: Moderate to high-energy alluvial fan channels and slopewash.	Low
Hf4	Holocene-age to recent fan of Pine Tree Wash	Moderate

The trenching program provided information augmenting observation derived from air-photo/satellite mapping and ground-truthing. These studies support a reduced need for monitoring of cultural resources during construction of the Beacon Solar Energy Project.



Landforms
Hf4 Pine Tree Wash post-faulting channel and fan
Hf3 Active slope wash fan: Pine Tree Canyon fan
Hf2 Distal fan intersection: Pine Tree/Jawbone distal deposits
Hf1d Uplifted fan: Pine tree Wash abandoned distributaries
Hf1 Uplifted fan: Axial valley fan and wash deposits
Trench
Fault
Drainage
Array Boundary
Plant Site
0 1,000 2,000 Feet
0 250 500 Meters
Hf4
Hf3
Hf2
Hf1d
Hf1
FREMONT VALLEY
LOS ANGELES
NEURALIA
Cinco
BM 2108
BM 2136
BM 2153
BM 2185
Cinco 2169
Well
TL1-1
TL1-2
TL1-3
TL2-1
TL2-2
TL2-3
TL3-1
TL3-2
TL3-3
TL4a-1
TL4a-2
TL4b-1
TL4b-2
TL5a-1
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BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA

APPLICATION FOR CERTIFICATION FOR THE BEACON SOLAR ENERGY PROJECT	DOCKET NO. 08-AFC-2 **PROOF OF SERVICE** (Revised 2/9/09)

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Declaration of Service

I, Lois Navarrot, declare that on February 10, 2009, I served and filed copies of the attached **Beacon Solar Energy Project Supplemental Response to Data Request 34**. 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/beacon. The document has been sent to both the other parties in this proceeding (as shown on the Proof of Service List) and to the Commission's Docket Unit, in the following manner:

(check all that apply)

For Service to All Other Parties

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

_X___ by personal delivery or by depositing in the United States mail at Sacramento, California 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 e-mailed respectively, to the address below **(preferred method)**;

OR

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

California Energy Commission
Attn: Docket No. 08-AFC-2
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.

/s/
Lois Navarrot