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BEACON SOLAR ENERGY PROJECT
08-AFC-2
SUPPLEMENT TO DATA REQUEST 34

Technical Area: Cultural Resources
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Where the disclosure of information on the location or the character of cultural resources may create a substantial risk of harm, theft, or destruction, one must submit such information under cover of an application for confidential designation pursuant to title 20, California Code of Regulations, section 2505.

BACKGROUND TO SUPPLEMENT

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

> ***BACKGROUND***
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> *The construction of the Beacon Solar Energy Project would entail large-scale modifications to the topography of the overall project area and relatively deep ground disturbance to construct individual project components. Subsection 2.5.6.6 notes that the proposed re-route of Pine Tree Creek would involve the creation of approximately 14,000 linear feet of new stream channel that would average 8 feet in depth and vary from 345 to 2,900 feet in width (approximately 1,400,000 cubic yards of earthwork for average channel depth and 345 foot channel width). Subsection 2.5.6.6 later explains that the construction of the project would include the mass grading of the project area for a total volume of approximately 5,160,000 cubic yards. Subsection 2.6 describes the construction of the natural gas pipeline that would fuel the generating facility. The specifications for the proposed 17.6-mile pipeline trench are given as being approximately 4 feet in width and 4 to 10 feet in depth (approximately 55,000 cubic yards of excavation for a 4-foot wide trench 4 feet deep). The construction of the proposed project would result, minimally, in the movement of 6,600,000 cubic yards of earth, in addition to the presently unknown volume of earth that the construction of the generating facility would require.*
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> *The Cultural Resources section of the AFC, section 5.4, and the Archaeological Resources Report provide no information on the potential for the construction of the project to truncate archaeological deposits that may lie buried beneath the surface of*

the project area. Archaeological deposits there may be associated with the Quaternary alluvial and lake bed units known to underlie the project area (pp. 5.9-5 and 5.9-6, AFC), may be too deep to present surface manifestations, and may yet be within reach of construction impacts. Staff needs finer resolution information on the age, the structure, and the character of the geologic units beneath the surface of the project area to develop a substantive analysis of the project's potential to substantially and adversely change the significance of historical resources that may lie buried in the project area.

DATA REQUEST

34. *Please provide a discussion of the historical geomorphology of the project site to better evidence a consideration of the potential there for buried archaeological deposits. The discussion should describe the development of the alluvial landforms and the lake bed deposits on which the project area is proposed with a focus on the character of local depositional regimes since the Late Pleistocene era. The basis for the discussion should be data on the geomorphology, sedimentology, pedology, and stratigraphy of the project area or the near vicinity. The source of these data may be a combination, as necessary, of extant literature or primary field research.*

Applicant Response to Data Request 34

In response to DR 34, the project applicant submitted a geomorphic study by Lemmer (2008). The study involves a review of the geologic literature and extant geologic mapping in the area, and cites the Cuddeback Lake 30' x 60' quadrangle (Amoroso and Miller 2006) as the primary source of geologic data which the study extrapolates onto the project site. The study did not include a map of the geologic units it discusses, and a subsequent map from the applicant (Beacon Solar 2008) appears to indicate that the primary source of data for the study is the Bakersfield and Trona Sheets (Jennings, Burnett, and Troxel 1962; Smith 1964). The study did not involve any fieldwork to ground-truth and refine the extant small-scale geologic mapping data.

The Lemmer study concludes that the project site contains two geomorphic surfaces, referred to as Surfaces A and B. Surface A, which extends over approximately 20 percent of the project site, is described as being "paleo-lake deposits" that are approximately 0 to 8,700 years of age. The study considers Surface A to have a low potential for buried archaeological deposits, because "a paleo-lake is an unlikely place to find archaeological deposits" (Lemmer 2008:4).

Surface B, which extends over approximately 80 percent of the project site, is described as being alluvial fan deposits that are approximately 1,000 to 8,000 years of age, and that are incised with drainage channels that are floored with alluvium less than 1,000 years old. Surface B and the inset alluvium in the drainage channels incised into that surface are considered to have the potential for buried archaeological deposits of Holocene age (12,000 years or younger) (Lemmer 2008:5).

The study estimates the depth of the boundary between the Holocene epoch and the preceding Pleistocene epoch to be approximately 32 feet beneath the surface of the project site. The study further notes that previous shallow trenches excavated on the project site by Kleinfelder West, consultant to the applicant, to depths of 5 feet, all exposed younger alluvial fan deposits that are approximately 1,000 to 8,000 years of age. It is therefore probable that most of the construction-related ground disturbance for the proposed project would occur in Holocene-age sediments.

Discovery of Buried Archaeological Deposits on the Project Site

In response to DR 30 and 32, the applicant investigated eight archaeological sites using archival research, hand excavation, and mechanical trenching (Apple, Cleland, and Glenny 2008). Based on the results in the subsequent report, five sites contain buried artifacts and archaeological features, including hearths that were found between approximately 5 inches and 2 feet below the present ground surface and dated by radiocarbon assay to be between approximately 190 and 880 years old. Four of the sites with buried deposits (Sites 9, 11, 12, and 13) are located in the area defined by Lemmer as geomorphic Surface A, where the potential for buried archaeological deposits was thought to be low, and one (Site 8) is located within geomorphic Surface B.

The four archaeological sites on and in Surface A are all north of the Cantil Valley Fault, and three of them (Sites 9, 11, and 12) are clustered near the fault and in the vicinity of possible earlier, now abandoned channels of Pine Tree Wash, which drains into Koehn Lake approximately six miles to the northeast. The fifth site (Site 8) is located southeast of the fault within Surface B.

Drawings or profiles of the local stratigraphy in the technical report generally indicate the presence of three sedimentary layers or strata. The cultural materials were found in Stratum II, which is underlain by Stratum III. Stratum III is described as being "lake bed" sediments. It is not clear whether these sediments are the same as the Surface A sediments described by Lemmer.

The archaeological sites in the subject technical report that have subsurface deposits are found in the extreme northern and northeastern portions of the project site. No subsurface data are presently available for most of the central and southern portions of the project site, which are on Surface B and proposed for grading up to depths of as much as approximately 17 feet.

Reports of Other Buried Archaeological Deposits near the Project Site

Recent investigations near the project site may indicate a broad, local level of sensitivity for buried archaeological deposits. The results of investigations by Sutton (1991) at archaeological site CA-KER-2211 on the Honda Test Track project, immediately east of the Beacon project site, are similar to those obtained by the applicant on the project site. The 1991 study found eight hearths, four of which were well-defined, a house floor, seven other archaeological features, and a cache of large obsidian flakes. The four well-defined hearths ranged in depth from 1 to 2 feet below the ground surface and from 150 to 940 years of age. The house floor was approximately 2 feet deep and 940 to 1,300 years of age. The apparent context for the features was a zone of man-made sediments, or midden, beneath a disturbed plow zone and above a layer or stratum of sterile yellow sand. In another study conducted west of the project site at CA-KER-3939 (Gardner, McGill, and Sutton 2002), three hearth features, buried between 4 and 15 feet below the present ground surface, were dated by radiocarbon assay to be between approximately 5,600 and 7,000 years old.

Information Needs

Taking all of the above sources of information into account, current data demonstrate that buried archaeological deposits are present on the project site in both of the identified geomorphic surfaces, and indicate that these deposits may be present to the maximum depth of ground disturbance anticipated for the construction of the proposed project. The demonstrated presence of buried archaeological deposits in shallow contexts on the project site and the potential evidence for the presence of further such deposits deeper in the project site are insufficient information to enable the substantive analysis and mitigation of the impacts that the construction of the proposed project may have on cultural resources. To develop a factual approximation of the scope of the impacts that the project would have on cultural resources and to develop effective mitigation measures, staff needs information on the potential distribution patterns of buried archaeological deposits across and beneath the project site, on the geologic deposits with which the buried archaeological deposits are associated, and the approximate ages and types of archaeological sites that those deposits represent. More specific questions relating to the completion of staff's analysis of the potential range of buried archaeological deposits across the project site may include:

- What is the depth of the contact, at locations across the project site, between Holocene-age deposits which could contain buried resources and Pleistocene-age deposits which would be much less likely to contain them?
- Current information suggestions that all portions of the project site are covered by Holocene alluvium and thus would require construction

monitoring for buried resources. Are there any areas on the project site that are of greater age and would not require construction monitoring?

- Are the ages of subsurface deposits the same on both sides of the Cantil Valley Fault?
- Are the "lakebed sediments" identified as Stratum III in the applicant's recent technical report (Apple, Cleland, and Glenny 2008) of Holocene age? Are they culturally sensitive? Do they overlie other, deeply buried strata that could contain buried resources at depths that will be graded?

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), staff proposes the following protocol for a geoarchaeology field study:

Landform and Major Landform Feature Mapping

The first phase of the geoarchaeology field study would be to map the landforms and major landform features that are present on the project site. The available literature appears to indicate that alluvial fans and the playa basin of Koehn Lake are the principal landforms on the project site. One goal of the mapping phase of the field study would be verify the landform composition of the project site. Following the mapping of the principal landforms, the applicant would map the major landform features of each principal landform. On the alluvial fans, such landform features may include, among others, major ephemeral stream channels that present with inset alluvial deposits, zones of braided ephemeral streams, and fault scarps. The applicant would attempt to discern active stream channels from relict meanders of Pine Tree Wash and other streams, and to discern relict springs, seeps, and sag ponds along fault scarps. Landform features associated with the playa basin may include, among others, sand dunes or sheet sand, playa surfaces, and playa marshes or march deposits.

The production of landform and major landform feature maps would ostensibly be done using a combination of remote sensing and field data. The resulting maps should be reproducible at a scale of 1 inch = 200 feet and display overlays of landform, major landform feature, and geologic unit data.

Documentation of Project Site Stratigraphy

The second phase of the geoarchaeology field study would be to document the stratigraphy of the project site. The applicant would need to design the field sample for the study, design the methods to execute the sample, and implement the study.

Field Sample Design

The applicant would need to design a field sample that would enable the development of a master stratigraphic column for each landform and major landform feature where project construction would exceed 1 foot in depth. Staff recommends a minimum of 3 backhoe trenches for each such area, not to exceed a total of 24 backhoe trenches for the whole study. The field sample design should show the preliminary placement of each backhoe trench and provide a rationale for the placement of each trench. The design should also allow for field adjustments to trench placement on the basis of new information found while in the field. The rationale for such adjustments would be one aspect of the ultimate report. The initial sample design would take into consideration extant archaeological site information, and include trenches near known archeological site clusters and between such clusters to test the reliability of surface archaeological deposits as indices for subsurface deposits.

Design of Field Sampling Methods

The applicant would also need to design the field sampling methods for the study. Staff recommends that the applicant completely record the stratigraphy in a minimum of one of the three backhoe trenches for each landform or major landform feature. Complete recordation would include, but not be limited to, the

1. documentation of one clean profile from each chosen backhoe trench to include reasonably detailed written descriptions, appropriate to the character of each type of stratigraphic unit, of each lithostratigraphic and pedostratigraphic unit in each profile, a measured profile drawing, and a profile photograph with a metric scale and north arrow,
2. screening of a small (3, 5 gallon buckets) sample of sediment from the major lithostratigraphic units in each profile, or, where lithostratigraphic units are not apparent, from arbitrary levels in each profile, every 18 inches of depth, through 1/4 inch hardware cloth, and
3. collection and assaying of enough soil humate samples, in the absence of other reliable chronometric data, to reliably radiocarbon date the master stratigraphic column for each landform and major landform feature.

The recordation of the stratigraphy in the other two backhoe trenches in each landform and major landform feature may be less intensive than the complete recordation standard, but the purpose of the recordation should be to collect sufficient information to reliably correlate the stratigraphic

units in the odd two trenches with the stratigraphic units in the master profile for each landform and major landform feature.

The design of the field sampling methods should take into account the necessary logistics to excavate backhoe trenches to a depth that equals the maximum extent of the anticipated construction disturbance. The depth of each trench should, at a minimum, match the anticipated depth of construction disturbance on the portion of the project site where each trench is placed. The applicant should anticipate the need for step trenches and shoring where excavation will be deep, and should plan to step and shore in a manner that would facilitate the recordation of the stratigraphy in deep trenches.

The design of the field sampling methods should also take into account the possibility that the applicant may encounter archaeological deposits during the excavation of the backhoe trenches. Archaeological deposits are one component of the local stratigraphy on the project site that it is one purpose of the field study to document. Staff recommends, with one exception, that the applicant excavate through any archaeological deposits that are encountered during the excavation of the backhoe trenches. Upon the recognition that archaeological deposits have been encountered in a backhoe trench, staff recommends that the archaeologist on site set an arbitrary thickness of spit to use to excavate through the encountered deposits. Each spit would be separately documented and a sample of each spit would be screened through 1/4 inch hardware cloth. All diagnostic artifacts and samples, as appropriate, of other artifact classes would be retained, by spit.

The one exception to the above method of excavating through archaeological deposits in backhoe trenches is when human remains are encountered. In that event, the applicant would need to follow the appropriate statutory and regulatory protocols to deal with the remains, cease excavation where the remains are found, and either laterally extend the discovery trench to avoid further contact with human remains or begin the excavation of a new trench.

Material Culture and Field Data Analyses

The third phase of the geoarchaeology field study would be to analyze the artifacts and ecofacts, any archaeological sediments, any radiocarbon or other chronometric samples, and the field notes from the study. The artifacts and ecofacts that are retained as a result of the excavation of backhoe trenches or of the recordation of backhoe trench profiles would be subject to standard professional archaeological description and analysis, as would any archaeological sediments that, in the professional judgment of the project archaeologist, may yield data significant to the

interpretation of project site stratigraphy. Radiocarbon or other chronometric samples would be sent out for professional analysis.

Archaeological Assessment of Project Site

The fourth and final phase of the geoarchaeology field study would be to prepare a report of the field study, the conclusion of which would be a relatively thorough assessment of the subsurface archaeology of the project site. The report of the field study would include, among other components, as appropriate, explicit discussions of the designs of the field sample and the sampling methods, the chronology of the execution of the study, the presentation of the stratigraphy of each landform and major landform feature investigated, drawing in relevant data from the analyses of archaeological materials and chronometric samples, and a synthesis of the stratigraphy of the project site that attempts to correlate the geologic units documented as a result of the field study with the geologic units reported in the extant literature and in the recent technical report on the archaeology of the project site.

The report should conclude with an assessment of the physical contexts and the likely distribution of archaeological deposits that are buried beneath the project site. The assessment should include

1. a discussion of the present geomorphic regimes operating on the project site,
2. a reconstruction of the historical geomorphology of the project site,
3. assessments of the relative likelihood that buried archaeological deposits are present in each principal landform, major landform feature, and constituent sedimentary deposit across the project site, and
4. a discussion of the ages, types, and cultural affiliations of the potential buried archaeological deposits relative to the principal landforms and major landform features of the project site.

REFERENCES CITED

Amorosa and Miller 2006—Lee Amoroso and D.M. Miller. *Preliminary Surficial Geologic Map of the Cuddeback Lake 30' x 60' Quadrangle, California* (1:100,000). Open File Report No. OF-2006-1276. Denver, CO: U.S. Geological Survey.

Apple, Cleland, and Glenny 2008—Rebecca McCorkle Apple, James H. Cleland, and Wayne Glenny. October 2008. EDAW, Inc., *Evaluation of Cultural Resources for Beacon Solar Energy Project, Kern County, California*, Attachment DR-34, Supplemental Responses to CEC Data

Requests 16; 30 and 32; 101-103, 106-109, 112, 114-115, and 117-123. Dated on 10/23/2008. Submitted to CEC / Docket Unit on 10/23/2008.

Beacon Solar 2008—Beacon Solar, LLC. Figure Geomorph-2, Eligible Archaeological Sites and Geomorphology. In *Beacon Solar Energy Project Data Request No. 2 Supplemental Workshop Data Responses*. November 2008.

Gardner, McGill, and Sutton 2002—Jill K. Gardner, Sally F. McGill, and Mark Q. Sutton. Buried Hearth Features along the Garlock Fault. *Pacific Coast Archaeological Society Quarterly* 38(4):45–59, 2002.

Jennings, Burnett, and Troxel 1962—Charles W. Jennings, John L. Burnett, and Bennie W. Troxel. *Geologic Map of California: Trona Sheet*, (1:250,000). Sacramento, CA: California Division of Mines and Geology, 1962.

Lemmer 2008—Robert E. Lemmer. *Desktop Geomorphic Study of the Beacon Solar Energy Project Site and Vicinity, Kern County*. August 15, 2008. Kleinfelder West, Inc., Attachment DR-34, Supplemental Response to CEC Data Requests Set 1. Dated on 08/18/2008. Submitted to CEC / Docket Unit on 08/19/2008.

Smith 1964—Arthur R. Smith. *Geologic Map of California: Bakersfield Sheet*, (1:250,000). Sacramento, CA: California Division of Mines and Geology, 1964.

Sutton 1991—Mark Q. Sutton. *Archaeological Investigations at Cantil, Fremont Valley, Western Mojave Desert, California.* California State University, Bakersfield, Occasional Papers in Anthropology No. 1. Bakersfield, California.