URS

October 9, 2012

Pierre Martinez
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California Energy Commission
1516 Ninth Street, MS-15
Sacramento, CA 95814

Subject: Applicant's Paleontological Resource Delineation Work Plan
Rio Mesa Solar Electric Generating Facility (11-AFC-04)

Dear Mr. Martinez:

On behalf of Rio Mesa Solar I, LLC and Rio Mesa Solar II, LLC, collectively the "Applicant" for the Rio Mesa Solar Electric Generating Facility project ("Rio Mesa SEGF"), we submit the Applicant's Paleontological Resource Delineation Work Plan.

Sincerely,

Angela Leiba, Vice President
Senior Project Manager/ Environmental Department Manager

Enclosure

cc: POS List
Project File

D R A F T

PALEONTOLOGICAL RESOURCE DELINEATION WORK PLAN

Prepared for

Rio Mesa Solar I, LLC. and Rio Mesa Solar II, LLC.

URS Project No. 27652105.00505

Prepared by

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September 2012

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Attachment 2 California E*n*ergy Commission Letter to Todd Stewart of Rio Mesa Solar I, LLC. and Rio Mesa Solar II, LLC., July 30, 2012

AMSL	Above mean sea level
BLM	Bureau of Land Management
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CRS	Colorado River Substation
FLPMA	Federal Land Policy and Management Act
ka	Thousand years
MWD	Metropolitan Water District
NEPA	National Environmental Policy Act
SBCM	San Bernardino County Museum
UCMP	University of California Museum of Paleontology
WAPA	Western Area Power Administration

SECTION 1 INTRODUCTION

This Paleontological Resource Delineation Work Plan (Plan) has been prepared to guide fieldwork and the documentation of potential impacts upon paleontological resources within the Area of Potential Effect (APE) of the Rio Mesa SEGF (Project).

The primary purpose of this research design is to determine the three-dimensional delineation of the Palo Verde Mesa Paleosol (PFYC 4a), Chemehuevi Formation equivalents (PFYC 4b), and Late Pleistocene silts, sands, and gravels (PFYC 3b), including lateral extent, depth, thickness, and paleontological sensitivity, within the Project APE. This delineation will permit a realistic assessment of possible Project impacts to this paleosol and the best methods to mitigate those impacts (if needed) to a less-than-significant level.

1.1 BACKGROUND AND STUDY METHODOLOGY

This delineation study will follow the Bureau of Land Management (BLM) "Guidelines for Assessment and Mitigation of Potential Impacts to Paleontological Resources" (Attachment 1), as recommended by California Energy Commission (CEC) staff in their July 30, 2012 letter to Mr. Todd Stewart, Rio Mesa Solar I, LLC. and Rio Mesa Solar II, LLC, Senior Director of Project Development (Attachment 2).

Natural and artificial exposures of paleosol have been observed at many locations within the Project APE on both private and BLM-administered lands. Paleontological resource surveys in 2011 and 2012 resulted in the identification of more than 800 vertebrate fossils eroding from this paleosol (Rio Mesa Solar Electric Generation Facility 2011, 2012a, 2012b). These vertebrate fossils date to the later part of the Pleistocene Epoch. The work on BLM-administered lands was done under BLM Permit No. CA-08-00-009P and BLM Paleontological Fieldwork Authorization #11-02. A single Accelerator Mass Spectrometry radiocarbon date has been obtained from fragments of fossil tortoise eggshell within the paleosol (Rio Mesa Solar Electric Generation Facility 2012a). The date obtained, when adjusted for demonstrated temporal fluctuations in the rate of formation of atmospheric ^{14}C, is 13,620 to 13,790 calendar years before present (Beta-305905).

Since the paleontological resource surveys were completed, one of the three solar plants was removed from the project design (see project description below), limiting the two remaining solar plants to private lands. On the revised footprint, approximately 809 vertebrate fossils have been documented from the two remaining solar plants and transmission line path (Rio Mesa Solar Electric Generation Facility 2012b).

A Paleontological Resource Assessment letter report will be prepared within 30 days of completion of the proposed paleontological resource delineation study and submitted to the CEC and BLM for review. The primary purpose of the Assessment will be to provide the results of the study and to set forth initial conclusions regarding the objectives of the research design. The Assessment will serve as a supplemental response to CEC Data Request 128.

Resource Inventory methods are discussed under 2.3 in Section 2 of this document.

1.2 PROJECT DESCRIPTION

The Project site is located in Riverside County, approximately 13 miles southwest of Blythe, California (Figure 1). The Project will consist of two solar plants: the southernmost plant will be known as Rio Mesa I and the northernmost plant will be known as Rio Mesa II. Rio Mesa Solar I, LLC and Rio Mesa Solar II, LLC, the owners of the two separate solar plants, are jointly known as the "Applicant."

Each plant will include a power block area surrounded by an array of approximately 85,000 heliostats, and will require approximately 1,850 acres (or 2.9 square miles) of land to operate. The nominal capacity of each solar plant will be 250 megawatts (MW), for a total Project nominal output of 500 MW. Certain facilities for the Project, located in a common area, will be shared by the two plants. These shared facilities will include a combined administration, control, maintenance, and warehouse building, and mobile equipment maintenance facilities for the maintenance crew and operators. The total area required for both plants, including the common area, is approximately 3,805 acres (5.95 square miles).

The Project will deliver power at 220 kilovolts (kV) to Southern California Edison's (SCE's) Colorado River Substation (CRS), located approximately 9.7 miles to the northwest. From the plant switchyards, power will be transmitted underground, at 220 kV, to the Project switchyard (located in the common area).

1.3 FEDERAL AND STATE AGENCIES

Federal and State agencies with purview over this Project are described in this section.

Federal

BLM will be the federal lead agency under the National Environmental Policy Act (NEPA), since the road access and transmission line are proposed on federal lands managed by BLM. The California Energy Commission (CEC) is the state lead agency under the California Environmental Quality Act (CEQA) and has a certified regulatory program under CEQA.

BLM has developed *General Procedural Guidance for Paleontological Resource Management* in its document *H-8270-1*. *BLM Handbook H-2870-1* (Handbook) combines with *Manual Section 8270, Paleontological Resource Management* to form the *8270 Manual*. The Handbook is intended to enhance the general policy and broad direction contained in the Manual Section by giving practical guidance to Bureau of Land Management (BLM) managers and staff whose duties include coordination of planning, permitting, and other activities related to the management of paleontological resources on BLM public lands. Sections of the Handbook that are applicable to the proposed project are summarized below:

> Surface-disturbing federal actions on public and split-estate lands may cause direct adverse impacts to paleontological resources through the damage or destruction of fossils, or the disturbance of the stratigraphic context in which they are located. Indirect adverse impacts may be created from increased accessibility to fossils leading to looting or vandalism activities. Land tenure adjustments may result in the loss of significant paleontological resources to the public if fossils pass from public ownership.

Under the Federal Land Policy and Management Act (FLPMA) and the National Environmental Policy Act (NEPA), federal actions and land tenure adjustments that may impact or result in a loss of paleontological resources on public or split-estate lands are evaluated, and necessary mitigation is identified.

BLM Field Offices must assess all proposed federal actions to identify possible effects to significant paleontological resources that are potentially recoverable and are likely to be within the zone of expected surface disturbance or relatively close to the surface. The direct effects of all surface activities and the indirect effects of increased public access and land tenure adjustments must be considered in any paleontological assessment. The assessment will determine whether further analysis will be necessary. The BLM Paleontology Program Coordinator (Paleontology Coordinator) has primary responsibility for the scoping process for projects within the Field Office area. (The BLM Paleontology Program Coordinator for this project is Tiffany Thomas).

If the initial scoping identifies the possibility for adversely affecting significant paleontological resources, further analysis is necessary. If there will be no impact or potential impact based on the action or the fossil resource may be impacted, but is too deep to be recovered, e.g., deep well bore passing through a fossil formation, the project file must be documented, and no additional assessment is necessary.

State

State requirements for paleontological resources management exist within the California Energy Commission's licensing authority under Public Resources Code § 25000 *et. seq.,* California Environmental Quality Act (Public Resources Code §§ 21000-21177), and Public Resources Code §§ 5097.5-5097.9, which prohibits unauthorized disturbance or removal of a fossil site or fossil remains.

1.4 AREA OF POTENTIAL EFFECT (APE)

The paleontological study APE is currently assumed to be equivalent to the direct effects APE. The delineation of paleontological resources study area was determined based on the CEC Rules of Practice and Procedure and Power Plant Site Regulations and Designation of Transmission Corridor Zones, Appendix B (g)(2)(C) (CEC 2008). For the purposes of this Project, the paleontological study APE also is equivalent to the Paleontological APE found in the *BLM 8270 Manual* and *H-8270-1 Handbook*.

The paleontological study APE consists of the project site, laydown area, gen-tie and access routes, plus an additional 200 feet around the project site and laydown area, a 650-foot buffer on either side of the gen-tie, and a 50-foot buffer on either side of the access routes.

SECTION 2 ENVIRONMENTAL SETTING

2.1 GEOGRAPHIC & PHYSIOGRAPHIC SETTING

The Project is located in the Palo Verde Mesa, above and east of the Palo Verde Valley, an area on the west bank of the Colorado River in eastern California. The Mule Mountains are to the west and the Palo Verde Mountains are to the south and southwest. Some of the literature considers the Palo Verde Mesa to lie within the Colorado Desert physiographic province while other sources consider it to lie within the Mojave Desert physiographic province. The salient difference between the two is that the Mojave Desert is high desert, whereas the Colorado Desert is low desert (Norris and Webb 1990). Given that the elevation of the Project varies from 310 to 660 feet above mean sea level (AMSL), for the purposes of this document, the Project is considered part of the Colorado Desert physiographic province.

The Palo Verde Mesa is a nearly continuous terrace on the north and west sides of the Colorado River between the southern limit of the Big Maria Mountains and the eastern piedmont of the Palo Verde Mountains.

2.2 GEOLOGIC SETTING

The project site lies on the Palo Verde Mesa which lies above the north and west side of the current Colorado River Valley. Whereas the geology of most areas in the Mojave Desert and some parts of the Colorado Desert are dominated by mountains, alluvial fans, and basins, the project area also has a major geological component from the Colorado River. Shlemon (1980) characterized the Quaternary history of the region as epochs of alluviation preceded and followed by relative landscape stability and soil formation.

2.3 RESOURCE INVENTORY

The following sections describe the resource inventory methods used for the paleontological assessment, the resource assessment criteria applied to the assessment, and the results of the resource inventory.

2.3.1 Resource Inventory Methods

The methods used to develop the paleontological resource inventory of the proposed project site and surrounding area are described below. These procedures follow guidelines from the CEC (2007) and the Society of Vertebrate Paleontology (SVP) (1995, 1996), and include both a literature search and field investigation.

Published and unpublished literature concerning area paleontological and geological topics was also consulted. It is possible to define the surface distribution of the formations involved to estimate their subsurface distribution, and to gain some estimate of the paleontological productivity of these units from the literature. Another important source of data concerning area distribution of known paleontological localities and productivity of various rock units is the records of pertinent paleontological collections. An archival database search was executed by staff at the San Bernardino County Museum (SBCM) to

determine whether any of the stratigraphic units found within the project area had previously yielded significant paleontological resources and whether any known localities lie within or near the Project site.

URS paleontologists surveyed the Project footprint and regulatory buffer, searching for fossils and insights into the local geology. Professional geologists and paleontologists with experience in the local vicinity were also interviewed.

2.3.2 Paleontological Resource Assessment Criteria

It is the position of the SVP (1995) that a vertebrate fossil is considered scientifically important unless otherwise demonstrated. This position is based on the relative rarity of vertebrate fossils. Vertebrate fossils are so uncommon that, in many cases, each recovered specimen will provide additional important information about the morphological variation or the geographic distribution of its species. The SVP recommendations (1995) also mention that certain invertebrate or botanical fossils are considered important paleontological resources.

A rock unit is considered "sensitive" to adverse impacts if there is a high probability that grading, excavation, or other earthmoving activities will jeopardize important fossil remains. Using criteria published by the SVP (1995), the paleontological importance or sensitivity (high, low, or undetermined) of each rock unit exposed in a project site or surrounding area is the measure most amenable to assessing the significance of paleontological resources because the area distribution of each rock unit can be delineated on a topographic or geologic map. The paleontological sensitivity of a stratigraphic unit reflects its potential paleontological productivity and sensitivity as well as the scientific significance of the fossils it has produced. This method of paleontological resource assessment is the most appropriate because discrete levels of paleontological importance can be delineated on a topographic or geologic map.

Reasons for considering an individual fossil specimen scientifically important include:

- if it is well preserved;
- if it can be identified;
- if it is more complete than most specimens for that species;
- if it preserves one or more elements not known in most specimens of that species;
- if it is indicative of a particular time period;
- if it has not been recorded from that sedimentary unit;
- if it provides information concerning the environment in which it lived;
- if it could be the basis for description of a new species or comes from a site that produced the type (definitive) specimen of its species; and/or
- if it belongs to a species rarely encountered.

For specimens meeting the above, the following criteria were considered in establishing the importance and paleontological sensitivity of each rock unit exposed in the project site or within the one-mile buffer zone.

1. Estimation of the potential paleontological productivity of each rock unit on the evidence of fossil localities in or near the proposed Project, on the basis of published and unpublished sources.

2. Consideration of the scientific significance of fossils from each of the rock units exposed within the proposed project area.

2.3.3 Categories of Sensitivity

In its standard guidelines for assessment and mitigation of adverse impacts to paleontological resources, the SVP (1995) established three categories of sensitivity for paleontological resources. These categories are low, high, and undetermined.

- Low sensitivity paleontological resources are categorized as rock units that are not sedimentary in origin. Likewise, sedimentary rock units that have been well examined and have not produced paleontological resources are considered to have low sensitivity. Monitoring is not usually recommended or needed during excavation in a rock unit with low sensitivity.
- High sensitivity paleontological resources are categorized as rock units older than Recent for which vertebrate or significant invertebrate fossils or a significant suite of plant fossils have been recovered. In areas of high sensitivity, full-time monitoring is recommended during any project-related ground disturbance.
- Paleontological resources with undetermined sensitivity are categorized as sedimentary rock units for which little information is available. It is often possible for an experienced paleontologist to determine whether such a rock unit should be assigned a high or low sensitivity after he or she has performed a pedestrian survey and has made detailed observations of both natural and artificial exposures of the rock unit.

The BLM adopted a different paleontological resource assessment system in 2008. It is known as the Potential Fossil Yield Classification system (PFYC). Under the PFYC, there are five classes, including several sub-classes. They are described as follows:

Class 1 – **Very Low**. Geologic units not likely to contain recognizable fossil remains.

- Units that are igneous or metamorphic, excluding reworked volcanic ash units.
- Units that are Precambrian in age or older.

Class 1 Summary

1) Management concern for paleontological resources in Class 1 units is usually negligible or not applicable.

2) Assessment or mitigation is usually unnecessary except in very rare or isolated circumstances.

The probability for impacting any fossils is negligible. Assessment or mitigation of paleontological resources is usually unnecessary. The occurrence of significant fossils is non-existent or extremely rare.

Class 2 – **Low**. Sedimentary geologic units not likely to contain vertebrate fossils or scientifically significant nonvertebrate fossils.

- Vertebrate or significant invertebrate or plant fossils not present or very rare.
- Units that are generally younger than 10,000 years before present.
- Recent aeolian deposits.
- Sediments that exhibit significant physical and chemical changes (i.e., diagenetic alteration).

Class 2 Summary

1) Management concern for paleontological resources is generally low.
2) Assessment or mitigation is usually unnecessary except in rare or isolated circumstances.

The probability for impacting vertebrate fossils or scientifically significant invertebrate or plant fossils is low. Assessment or mitigation of paleontological resources is not likely to be necessary. Localities containing important resources may exist, but would be rare and would not influence the classification. These important localities would be managed on a case-by-case basis.

Class 3 – **Moderate** or **Unknown**. Fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence; or sedimentary units of unknown fossil potential.

- Often marine in origin with sporadic known occurrences of vertebrate fossils.
- Vertebrate fossils and scientifically significant invertebrate or plant fossils known to occur intermittently; predictability known to be low.

(or)

- Poorly studied and/or poorly documented. Potential yield cannot be assigned without ground reconnaissance.

Class 3a – **Moderate Potential**. Units are known to contain vertebrate fossils or scientifically significant nonvertebrate fossils, but these occurrences are widely scattered. Common invertebrate or plant fossils may be found in the area, and opportunities may exist for hobby collecting. The potential for a project to be sited on or impact a significant fossil locality is low, but is somewhat higher for common fossils.

Class 3b – **Unknown Potential**. Units exhibit geologic features and preservational conditions that suggest significant fossils could be present, but little information about the paleontological resources of the unit or the area is known. This may indicate the unit or area is poorly studied, and field surveys may uncover significant finds. The units in this class may eventually be placed in another class when sufficient survey and research is performed. The unknown potential of the units in this class should be carefully considered when developing any mitigation or management actions.

Class 3 Summary

1) Management concern for paleontological resources is moderate or cannot be determined from existing data.
2) Surface-disturbing activities may require field assessment to determine appropriate course of action.

This classification includes a broad range of paleontological potential. It includes geologic units of unknown potential, as well as units having a moderate or infrequent occurrence of significant fossils. Management considerations cover a broad range of options as well, and could include pre-disturbance surveys, monitoring, or avoidance. Surface-disturbing activities will require sufficient assessment to determine whether significant paleontological resources occur in the area of a proposed action, and whether the action could affect the paleontological resources. These units may contain areas that would be appropriate to designate as hobby collection areas due to the higher occurrence of common fossils and a lower concern about affecting significant paleontological resources.

Class 4 – **High**. Geologic units containing a high occurrence of scientifically important fossils. Vertebrate fossils or scientifically significant invertebrate or plant fossils are known to occur and have been documented, but may vary in occurrence and predictability. Surface disturbing activities may adversely affect paleontological resources in many cases.

Class 4a – Unit is exposed with little or no soil or vegetative cover. Outcrop areas are extensive with exposed bedrock areas often larger than two acres. Paleontological resources may be susceptible to adverse impacts from surface disturbing actions. Illegal collecting activities may impact some areas.

Class 4b – These are areas underlain by geologic units with high potential but that have a reduced risk of human-caused adverse impacts and/or lowered risk of natural degradation due to moderating circumstances. The bedrock unit has high potential, but a protective layer of soil, thin alluvial material, or other conditions may lessen or prevent potential impacts to the bedrock resulting from the activity.

- Extensive soil or vegetative cover; bedrock exposures are limited or not expected to be impacted.
- Areas of exposed outcrop are smaller than two contiguous acres.
- Outcrops form cliffs of sufficient height and slope so that impacts are minimized by topographic conditions.
- Other characteristics are present that lower the vulnerability of both known and unidentified paleontological resources.

- Class 4 Summary

  1) Management concern for paleontological resources in Class 4 is moderate to high, depending on the proposed action.
  2) A field survey by a qualified paleontologist is often needed to assess local conditions.
  3) Management prescriptions for resource preservation and conservation through controlled access or special management designation should be considered.

4) Class 4 and Class 5 units may be combined as Class 5 for broad applications, such as planning efforts or preliminary assessments, when geologic mapping at an appropriate scale is not available. Resource assessment, mitigation, and other management considerations are similar at this level of analysis, and impacts and alternatives can be addressed at a level appropriate to the application.

The probability for impacting significant paleontological resources is moderate to high, and is dependent on the proposed action. Mitigation considerations must include assessment of the disturbance, such as removal or penetration of protective surface alluvium or soils, potential for future accelerated erosion, or increased ease of access resulting in greater looting potential. If impacts to significant fossils can be anticipated, on-the-ground surveys prior to authorizing the surface disturbing action will usually be necessary. On-site monitoring or spot-checking may be necessary during construction activities.

Class 5 – **Very High**. Highly fossiliferous geologic units that consistently and predictably produce vertebrate fossils or scientifically significant invertebrate or plant fossils, and that are at risk of human-caused adverse impacts or natural degradation.

Class 5a – Unit is exposed with little or no soil or vegetative cover. Outcrop areas are extensive with exposed bedrock areas often larger than two contiguous acres. Paleontological resources are highly susceptible to adverse impacts from surface disturbing actions. Unit is frequently the focus of illegal collecting activities.

Class 5b – These are areas underlain by geologic units with very high potential but that have a reduced risk of human-caused adverse impacts and/or lowered risk of natural degradation due to moderating circumstances. The bedrock unit has very high potential, but a protective layer of soil, thin alluvial material, or other conditions may lessen or prevent potential impacts to the bedrock resulting from the activity.

- Extensive soil or vegetative cover; bedrock exposures are limited or not expected to be impacted.
- Areas of exposed outcrop are smaller than two contiguous acres.
- Outcrops form cliffs of sufficient height and slope so that impacts are minimized by topographic conditions.
- Other characteristics are present that lower the vulnerability of both known and unidentified paleontological resources.

2.4 RESOURCE INVENTORY RESULTS

Geologic mapping of the project area has not been performed in great detail. Jennings (1977) mapped the entire state of California at a scale of 1:250,000. Metzger et al. (1973) mapped the geology of the Palo Verde Mesa at a scale of 1:125,000. Jennings (1967) mapped the Needles 30’ by 60’ quadrangle at a scale of 1:100,000. Stone (1990) mapped the Blythe 30’ x 60’ quadrangle at a scale of 1:100,000, and Stone (2006) mapped the west half of the Blythe 30’ by 60’ quadrangle at the same scale.

Jennings (1967) mapped the sediments of the Palo Verde Mesa as Qc and Qal (Pleistocene nonmarine deposits and Quaternary alluvium). Metzger et al. (1973) mapped them as QTa and Qa (older alluviums

and younger alluvium). Jennings (1977) mapped them as Qoa and Qal (older Quaternary alluvium and Quaternary alluvium). Stone (1990) mapped them as QTa (alluvial fan and fluvial deposits) and Stone (2006) mapped them as Qpv (alluvial deposits of Palo Verde Mesa).

According to Metzger et al. (1973), the Palo Verde Mesa consists of five alluviums (Units A through E). Unit B (subsurface) has Pliocene roundstone gravels of exotic provenance. The rounded pebbles and cobbles of the Pliocene Unit B are polymineralic. They are composed of various sedimentary, metamorphic, and igneous rock types.

Literature on the geology of the mesa indicates that the part at and near the surface has been treated differently by various authors. All, however, agree that the lower Colorado River underwent an atypical period of deposition of fine-grained sediments at that time (late Pleistocene). Metzger et al. (1973) divided the uppermost (aboveground) strata of the Palo Verde Mesa into Units D and E. They considered Units D and E to be roughly equivalent to the Chemehuevi Formation, although not of lacustrine origin. Metzger et al. defined Unit D as including a basal gravel layer overlain by characteristic muds. They designated very late Pleistocene terraces incised into Unit D as well as Unit E.

Howard and Malmon (2008) recognized that the Chemehuevi Formation (in their usage, equivalent to Unit D of Metzger et al. 1973) and late Pleistocene terrace gravels that formed when the river re-incised into the Chemehuevi Formation (presumably equivalent to Unit E of Metzger et al. 1973) included elements from the nearby Pliocene conglomerate. Their term for these elements is young terrace gravels. In Applicant's analysis, they are designated young terrace sediments, because they are not always composed of gravel.

Lundstrom et al. (2008) studied the fine grained sediments of the lower Colorado River and did not use the term "Chemehuevi Formation" to describe any of those sediments because of the variety of meanings that have accompanied that term. They found that up to 15 meters of coarse sand, rounded exotic gravel, and angular, locally derived gravel disconformably overlie more than 15 meters of finely bedded reddish mud, clay and silt. This is consistent with the observations of URS paleontologist on the Palo Verde Mesa.

A records search obtained from SBCM [contained within Appendix 5.8B of the Application for Certification (AFC)] indicated that no vertebrate paleontology localities were known within several miles of the Project footprint. A search of the database of the University of California Museum of Paleontology (UCMP) produced two records of Pleistocene tortoise specimens recovered from the site of the Blythe Energy Center west of Blythe and northeast of the project area. The geologic unit that produced them is listed as Chemehuevi Formation.

A field survey for any visible fossil remains within the proposed project site and a one-mile radius was conducted from March 1 to June 17, 2011, by Joe D. Stewart (URS paleontologist), Michael Williams (URS paleontologist), Scott Musick (URS paleontologist) and Marjorie Hakel (Manpower paleontologist). See Appendix 5.8C of the AFC for resumes. A search was performed for exposures of sediment appropriate for producing fossils. During the field survey, attempts were made to detect the presence and nature of subsurface native sediments. Areas of younger alluvium (active drainage channels) were not surveyed as they have low sensitivity for paleontological resources, according to SVP Guidelines (1995).

2.5 FIELD PROGRAM

A separate field program to recover the specimens and associated data began on July 6, 2011, and ended September 1, 2011.

During the paleontological field survey of the Project site, a widely distributed red paleosol (fossil soil) developed on Colorado River silts, sands, and gravels was encountered. Some horizons of the red paleosol produced hundreds of vertebrate fossils. The surface of the red paleosol usually shows polygonal joints (see AFC Figure 5.8-3). These are the surface manifestation of the prismatic soil structure. Near the top of the red paleosol, the joints are irregular, sporadic, or absent. The red paleosol is sandy and less consolidated near the top, but more consolidated lower down. It consists of silt, sand, slight amounts of clay, and scattered gravel and cobbles. Calcium carbonate nodules occur near the base of the red paleosol. The current mesa surface, where not covered by desert pavement, is deflating through this red paleosol. The sediments beneath the red paleosol are usually uncemented alluvium, often quite loose, and erode quite quickly when not protected by carbonate horizons.

Also present in the western part of the project site are alluvial fans issuing from the Mule Mountains. Where post-Pleistocene erosion has developed washes on the Mesa surface, modern (Holocene) wash sediments are present. Holocene eolian sands form irregular drifts on the red paleosol surface.

The Colorado River abandoned the Palo Verde Mesa by early Holocene times. Up to 40 meters of Holocene alluvium underlie the historic floodplain of the Lower Colorado River (Lundstrom et al. 2008). These sediments make up most of the cultivated land in the area between Palo Verde Mesa and the Colorado River. Three radiocarbon dates from these sediments are 8,610, 6,250, and 5,380 radiocarbon years before present (BP) (Metzger et al. 1973). This recent alluvium is the sediment on which most agriculture land use along the lower Colorado River takes place.

A geologic map of the project area is provided in Section 5.4 of the AFC (see Figure 5.4-1). In summary, there are now a total of 809 vertebrate fossils collected within the current project area as of July, 2012 (see Table 5.8-2 in Applicant's Environmental Enhancement Proposal - Amending the Project from Three Power Plants to Two).

2.6 ENVIRONMENTAL ANALYSIS

This analysis recognizes seven geological units in the area of the proposed Project. These are (1) Chemehuevi Formation equivalents; (2) late Pleistocene sands, silts, and gravels; (3) Palo Verde Mesa red paleosol; (4) alluvial fans; (5) Holocene alluvium of the Palo Verde Mesa; (6) eolian sediments of the Palo Verde Mesa; and (7) alluvium of the current Colorado River floodplain. The following paragraphs provide the foundation for this determination.

- **Chemehuevi Formation equivalents**. The finely bedded reddish mud, clay and silt assigned to the Chemehuevi Formation by some authors are visible on the lower parts of the bluffs of the Palo Verde Mesa, but rarely occur at the surface within the Project footprint. A few exposures thought to be Chemehuevi Formation equivalents were encountered. They are probably present in the subsurface over much of the project site. Metzger et al. (1973) mention fossils of turtle, snake, lizard, bird, and proboscidean tusk from their Unit D near Ehrenberg, Arizona, about 25

miles from the project area. Bell et al. (1978) published uranium-thorium dates of 96,000 to 102,000 thousand years thousand years (ka) on proboscidean tusk from the Chemehuevi Formation. Lundstrom et al. (2008) reported dates of infrared stimulated luminescence dates of 41-59 (ka) for Chemehuevi equivalents in the Cottonwood Landing area of the Colorado River in southern Nevada. They also reported thermoluminescence dates of 56-79 ka for the same section. Blair (1996) reported a radiocarbon date of 35,000 years.*Sensitivity rating in terms of the system proposed by SVP (1995): High. Sensitivity in terms of the PFYC system: Class 4b (High).*

- **Late Pleistocene silts, sands and gravels.** Late Pleistocene silts, sands and gravels (overlying the Chemehuevi Formation equivalent) were laid down by the Colorado River over an erosional surface of the Chemehuevi Formation equivalent. They include exotic rounded cobbles reworked from a Pliocene conglomerate. Ichnofossils, apparently of aquatic origin, occur in the lower parts. Just below the paleosol, terrestrial ichnofossils can be seen. These are the result of organisms that once lived in the paleosol having penetrated the base of the paleosol and having entered the underlying sediments. *Sensitivity rating in terms of the system proposed by (SVP 1995): High. Sensitivity in terms of the PFYC system: Class 3b (Unknown).*

- **Palo Verde Mesa red paleosol**. This red paleosol is developed on sediments that were laid down by the Colorado River. It is an aridosol; there is no concentration of humic material in its upper horizon. The total depth is at least 12 feet. Within the red paleosol are scattered clasts of local rocks as well as exotic rounded cobbles from the Colorado River. The middle part of the red paleosol is characterized by prismatic structure because of desiccation cracks. This prismatic structure gives rise to a polygonal pattern on weathering surfaces of the red paleosol. The prismatic part of the red paleosol ranges from approximately five and one half to seven feet thick, where not reduced by erosion or deflation. Carbonate can be dispersed flecks, soft clumps, small hard carbonate clumps, even large hard carbonate clumps, or even plates. The carbonate deposition is usually heavier toward the base of the red paleosol (Bk horizon). This more heavily calichified basal part has an approximate thickness of five feet. At the base of the red paleosol in some localities, rhizoliths (former roots now preserved as carbonate sleeves) and invertebrate trace fossils extend into the unconsolidated sands. Approximately 834 vertebrate fossils have been recovered from this unit. Of these, only 791 are now within the Project (see Section 5.8.5 in Applicant's Environmental Enhancement Proposal - Amending the Project from Three Power Plants to Two). The fossils usually have at least a thin coating of caliche, as do the pebbles, clasts, and cobbles. Fossil birds, snakes, lizards, *Gopherus* sp. (tortoises), *Sylvilagus* (cottontail), *Lepus* (jackrabbit), rodents, *Taxidea* (badger), probable bighorn sheep, deer, *Equus* (horse), and *Mammuthus* (mammoth) have been recovered from this red paleosol. It should be mentioned that the only way that fossils of large vertebrates can be found in paleosols is if rodents or carnivores drag pieces of the skeleton into their burrows. The mammoth is represented only by ivory fragments. The deer is represented only by antler fragments. The horse is represented only by tooth fragments. The only organisms represented by associated remains are tortoises, rabbits, rodents, and a badger. Multiple partial eggs also have been found; one occurrence is a presumed clutch with multiple eggs. One of the *Gopherus* partial skeletons appears to be in a burrow filled with silt and sand. The burrow is dug into a much harder carbonate horizon. This occurrence demonstrates that that carbonate horizon predates the tortoise and its burrow. It should be noted that the red paleosol is exposed at the desert floor over large areas of the Project. It is found on both sides of the road that parallels the southern border of the project (but not fossiliferous there),

both sides of the road that parallels the Western Area Power Administration (WAPA) power line along the eastern part of the project, and along both sides of the proposed transmission line. It also underlies the entire temporary construction logistics area and part or all of the "common area". Caliche horizons are quite visible in the roads at many points. *Sensitivity rating in terms of SVP 1995: High. Sensitivity in terms of the PFYC system: Class 4a (High)*.

- **Alluvial fans.** This geologic unit consists of clasts of Precambrian granitic rocks from the Mule Mountains. Near the west edge of the project site, these can be cemented by heavy caliche. *Sensitivity rating in terms of SVP 1995: Low. Sensitivity in terms of the PFYC system: Class 2 (Low)*.
- **Holocene alluvium of the Palo Verde Mesa**. Large eastward-draining arroyos have cut through the red paleosol and at least some of the late Pleistocene silts, sands, and gravels. These arroyos carry sediments reworked from the various geologic units upstream. There can be reworked fossils in this alluvium, but they are of little significance. *Sensitivity rating in terms of SVP 1995:Low. Sensitivity in terms of the PFYC system: Class 2 (Low)*.
- **Eolian sediments of the Palo Verde Mesa.** In many areas, the red paleosol is obscured by drifting sand. This sand is reworked from Pleistocene sediments. The only fossils found in these drifting sands are reworked. Near the northwestern terminus of the proposed power transmission line are large areas covered by dunes. *Sensitivity rating in terms of SVP 1995: Low. Sensitivity in terms of the PFYC system: Class 2 (Low)*.
- **Alluvium of the current Colorado River floodplain**. The current floodplain of the Colorado River near the Project is used for agriculture. There are no reports of paleontological resources from these sediments, and they are generally too young to produce significant paleontological resources. *Sensitivity rating in terms of SVP 1995: Low. Sensitivity in terms of the PFYC system: Class 2 (Low)*.

2.7 ANALYSIS OF 2011 GEOTECHNICAL BORINGS AND TEST PITS

In 2011, Ninyo and Moore performed a preliminary geotechnical evaluation for the Project (see AFC Appendix 5.4A). The purpose of the study was to assess geologic and geotechnically related considerations pertaining to the Project site and to provide preliminary conclusions and recommendations.

URS sent a provisional map of the proposed geoarchaeological and paleontological investigation sites to the CEC on 12 April 2012, and the proposed locations were reviewed and approved by CEC staff on 13 April 2012.

As part of the assessment, Ninyo & Moore reviewed pertinent background data, including in-house geotechnical data, and published soils and geologic maps and literature. They also performed a geologic reconnaissance at the Project site to evaluate the presence of faults, ground fissures, and other potential geologic hazards that could affect design and construction of the Project. Sixteen exploratory borings were drilled, logged and sampled to depths up to approximately 20 feet. The purpose of the soil borings was to evaluate the subsurface soil profile and groundwater conditions, and to obtain soil samples for laboratory testing. Additionally, Ninyo & Moore performed 16 cone penetration tests to depths of up to approximately 25 feet adjacent to each of the boring locations. Moreover, they excavated, logged and

sampled 15 exploratory test pits to depths up to approximately 10 feet to evaluate subsurface conditions and to obtain soil samples for laboratory testing. The soil samples were tested in the lab to evaluate in-place moisture content and dry density, gradation, plasticity, consolidation characteristics, shear strength, maximum dry density and optimum moisture content, chloride content, pH, reduction-oxidation potential, sodium content, sulfate content, sodium sulfate content, solubility potential (total salts), and resistivity. Once the fieldwork and laboratory tests were complete, the accumulated data were compiled and analyzed, and subsequently prepared for publication in a geotechnical evaluation report (Ninyo and Moore, 2011).

URS obtained some of the geotechnical samples because their geographic placement and/or their pit profiles suggested they may have penetrated paleosols. These samples were wet screened and sorted under a microscope. The results are presented in Confidential Table 1. Five samples produced identifiable microvertebrate fossils. Given that these were, from the perspective of paleontology, random samples, the presence of so many identifiable microvertebrate fossils is surprising. The three pit profiles (TP-4, TP-11, and TP-13) that appeared to show a paleosol/fluvial sediment interface were confirmed. The upper resistant layer in each pit was a paleosol, and the underlying loose, sandy sample from each pit represented fluvial sediments. As TP-13 lies in an area where we had already mapped paleosols, it was confirmation of our mapping. Likewise, TP-11 lies in an area where we had already mapped paleosols and noted that they did not produce any vertebrate fossils. One of the implications of this testing is that a high percentage of random paleosol samples might produce microvertebrate fossils. Another is that there may be a paleosol exposed at B-1, B-11, and TP-4. The latter two are slightly west of where we had mapped paleosols. These may represent the tan (older) paleosol rather than the red (younger) paleosol. That might explain why the fossils at B-11 had such thick coatings of caliche. The thickness of the paleosols, at the three test pits, based upon the geotechnical logs, are 7 feet at TP-4, 7 feet at TP-11, and 7 feet at TP-13.

A map showing the 16 boring locations and 15 test pits that were selected on Metropolitan District of Southern California (MWD) land for geotechnical boring and trenches in 2011 accompanies this document (Confidential Figure 3).

2.8 2011-2012 SPECIMEN COLLECTION AND CURATION

A report detailing results of the collection and analysis of the paleontological resources found within and adjacent to the project footprint, as originally proposed, is being prepared. Approximately 834 vertebrate fossils were collected, identified, and will be curated at the San Bernardino County Museum. They come from one widespread, and a second limited, Pleistocene paleosol. These paleosols appear to be limited to terraces on the west side of the Colorado River Valley. The paleosols are developed on late Pleistocene fluvial sediments assigned to the Chemehuevi Formation. The distribution of the specimens spans more than eight miles. These specimens document a paleocommunity that existed on the Palo Verde Mesa approximately 14,000 years ago. The reported fauna consist of an anuran, numerous specimens assigned to a species of *Gopherus,* lizards, snakes, a bird, four rodent species, two carnivorans, two rabbit species, a horse, a pronghorn, a bighorn sheep, a cervid, and a proboscidean. The significance of this collection must be viewed in the context that the records searches indicated no vertebrate fossils had been recorded from the area prior to our survey. Pleistocene paleosols producing vertebrate fossils are quite rare in California. The collection includes the first fossil tortoise eggs from California, and the first sidewinder,

desert horned lizard, and desert kangaroo rat fossils from Riverside County. Many of the specimens are microvertebrates, and there are places within the footprint where screening of sediments produced abundant microvertebrate fossils. The fauna consist primarily of burrowing organisms.

SECTION 3 DELINEATION PLAN

This section explicitly enumerates the research questions, data needs and sampling strategy used to guide the paleontological study.

3.1 DELINEATION ISSUES

The goal of the study is to evaluate the potential for significant impacts on vertebrate fossil resources. CEC staff and Applicant agree that the plan to monitor the proposed Project construction earthmoving activities (trenching, grading, excavation, and augering) in areas where vertebrate fossils are expected to occur will negate the possibility that these Project activities will significantly impact macrovertebrate fossil resources (readily visible to the eye and large enough to be easily recognized and removed). However, where heliostat pedestals are inserted into the ground using vibratory insertion techniques, penetration of fossil bearing deposits could occur without detection, identification, or recovery of buried macrovertebrate fossils. Confidential Figure 2 shows the solar arrays mapped on the Project geology. The fossiliferous red paleosol seems to be developed on the sediments mapped as "Qpv" (= Quaternary sediments of the Colorado River on the Palo Verde Mesa). Of the 170,000 pedestals necessary to anchor the solar arrays, 35,700 will be on the Qpv sediment. Thus, 21 % of the solar arrays will lie on Qpv sediment. The area occupied by the 35,700 pedestals will be 28,024.5 ft^2, which is 0.08% of the 792 acres of the Qpv sediment occupied. Likewise, the volume of sediment impacted by the augering will be 0.08% of the sediment not impacted. However, when one considers the volume of sediment impacted, much of that will not be paleosol, so the volume of paleosol impacted will be substantially less than 0.08%.

Most of the vertebrate macrofossils found on the survey of the original, three plant project were fragments of tortoise shells. There were seven partial tortoise shells, a few fragments of ivory, a coyote jaw, a badger skull, a few rabbit jaws or leg bones, perhaps two horse teeth, and a few fragments of ruminant bones. Given the presence of these macrofossils, it is probable that a few such specimens will be impacted by the heliostat pedestals, but this is not a significant impact when compared to those that will be salvaged by Project construction monitoring and those in the 792 acres of the Qpv sediment that will not be impacted by the heliostat pedestals (over 99%). In addition, the study should be designed to evaluate the Project's potential impact on microvertebrate fossil resources (too small to be readily visible within the sedimentary matrix). Preliminary study of geotechnical sediment samples collected in 2011 indicates that microvertebrate fossils are relatively common in random samples of the red paleosol. If this is true across the red paleosol, then the question of mitigation changes from whether we can recover all the microvertebrate fossils to what constitutes an adequate sample. Some samples that may represent the tan paleosol indicated abundant microvertebrate fossils, but stratigraphy at the site of origin remains to be confirmed. The Society of Vertebrate Paleontology (1995) recommends the processing of some standard samples (6,000 pounds of sediment) from the areas and horizons thought to have microvertebrate fossils. A representative sample of the microvertebrate fauna is the goal. Recommendations for an adequate sample size are provided below to the CEC and BLM that will reduce the impacts to microvertebrate fossil resources to a less than significant level. These are consistent with recommendations of the SVP (1995).

3.1.1 Research Questions

The following research questions will guide Applicant's implementation of the Research Design:

- Where do paleosol sediments, Chemehuevi Formation equivalents, and Late Pleistocene silts, sands, and gravels occur in the subsurface within the Project site?
- What is the paleosol thickness and Chemehuevi Formation equivalents and Late Pleistocene silts, sands, and gravels occurrences at various localities within the Project site?
- What is the elevation of these units at these localities?
- Are fossil bearing sediments of the Chemehuevi Formation equivalents, and Late Pleistocene silts, sands and gravels present, and, if so, are they significant?
- Are the paleosol sediments equally fossiliferous at the proposed exploration localities?
- Are the paleosol sediments equally fossiliferous in their various horizons?
- What are the relative and absolute ages of the paleosol sediments at these localities? Do the red paleosol exposures represent one unit formed simultaneously or do multiple soils span different time periods?
- Can we confirm our interpretation of the inset terraces, which is that the red paleosol (younger) terminates before the tan paleosol (older) is encountered and, therefore, that the red paleosol should not underlie the tan paleosol?

3.1.2 Data Needs

- Three-dimensional orientation of the deposit at each boring and trench, including presence/absence (lateral extent of deposit), depth (elevation) and thickness.
- Documentation of fossil density for the red or tan paleosol based on the findings from each boring and trench
- Relative ages of deposit and/or fossils
- Absolute ages of deposits and/or fossils
  - Radiocarbon dates obtained from eggshell or charcoal associated with a fossil would provide absolute dates of fossils encountered in the soil deposit. (Attempts to obtain radiocarbon dates on fossil bone from the Palo Verde Mesa paleosols have been unsuccessful due to insufficient collagen content.)
  - Radiocarbon dates obtained from humic material within the paleosols would provide absolute dates of the paleosols

  - Absolute dates of soil or fluvial deposits could be determined from luminescence or optically stimulated luminescence dating of grains of sand (quartz or feldspar)

- Data that confirm the superposition and relative ages of both the red and tan paleosol deposits, Chemehuevi Formation equivalents, and Late Pleistocene silts, sands and gravels, if appropriate.

3.2 FIELD METHODS

Excavations are necessary to evaluate subsurface geotechnical conditions, geoarchaeological conditions, and paleontological conditions. Eight test pits and 29 boreholes are planned for the geotechnical investigations. The geoarchaeological research will involve 19 trenches. The paleontological investigation to delineate the paleosols requires 10 trenches and five boreholes. In order to minimize additional impacts to the paleontological and archaeological resources, all trenching, digging, and boring will be observed by the Project Paleontologist and the Project Geoarchaeologist, as well as a Paleontological and a Cultural Monitor. The following fieldwork protocols will guide Applicant's implementation of the Research Design to determine the surface and subsurface limits (lateral extent), elevation (depth) and thickness of the Palo Verde Mesa paleosols, Chemehuevi Formation equivalents, and Late Pleistocene silts, sands, and gravels at localities tested within the Project, sensitivity of the various horizons within the localities tested, and attempt to assign a date to remains or soils, if feasible. A revised excavation map showing twenty-nine locations that have been selected on MWD land for geoarchaeological/paleontological trenches accompanies this document (Confidential Figure 3). These were selected to assist in determining the three dimensional extent of the paleosol deposit: paleosol deposit presence or absence in each trench (lateral extent), paleosol deposit depth (elevation), and thickness in areas where the topography does not afford a view of such details. In addition to these, three locations have been selected for the placement of exploratory geotechnical trenches (Confidential Figure 3). Preliminary analysis of some of the sediment samples gathered for a Rio Mesa geotechnical report (Ninyo & Moore, 2011) has confirmed that subsurface horizons at several locations chosen for solely geotechnical reasons (random samples for the purposes of paleontology) contain identifiable microvertebrate fossils (rodents, lizard, tortoise eggshell fragments, and an anuran).

3.2.1 Three-dimensional Limits of the Paleontological Resources

Nineteen trenches are planned for geoarchaeological purposes. Ten additional trenches were added for purely paleosol assessment, as well as a transect of five boreholes. Some of the trenches are placed in areas where we do not expect to find the paleosol. Others are placed where we do expect to find the paleosol to be found, and to provide other data for the assessment. All trenches will be assessed for the presence of the Chemehuevi Formation equivalents and the Late Pleistocene silts, sands, and gravels. The borehole transect will test our interpretation that the fossiliferous paleosol will not extend subsurface from the younger eastern inset terrace onto the older terrace to the west. If that proves to be true, we will be able to estimate the placement of the west edge of the east paleosol body by geomorphologic evidence. Applicant expects that a total of twenty-nine trenches and five boreholes will adequately delineate the extent of the Palo Verde Mesa paleosol within the APE. The borehole transect will also be used to identify whether the Chemehuevi Formation equivalents and Late Pleistocene silts, sands and gravels are present at depths that may be disturbed by heliostat pedestal installations. In addition to these 29 trenches and five boreholes, eight test pits and 21 boreholes will be made for geotechnical purposes.

Backhoe excavating, logging and sampling for geotechnical assessment purposes of exploratory trenches to depths of three meters will be completed by the Geotechnical Contractor, Ninyo & Moore. A JCB 215 backhoe with a 2-foot bucket and an extend-a-hoe will be used for the trenches. Ninyo & Moore will also excavate eight (8) additional test pits to depths up to approximately ten (10) feet to evaluate subsurface conditions and to obtain soil samples for testing in their laboratory, similar to the 2011 preliminary assessment.

Ninyo & Moore will also drill, log and sample for geotechnical assessment purposes all exploratory borings within the Project area (n=21) to depths of approximately 15 to 20 feet (4.5 to 6 meters). The borings will be performed by a track-mounted CME-75 drill rig utilizing 8-inch diameter hollow stem augers. The borings will be performed with an all-terrain drill rig. The purposes of the borings locations under the heading "2012 MWD Geotechnical Exploration" (Confidential Figure 3) within the Project area will be to evaluate the general subsurface soil and groundwater conditions, and to obtain soil samples for laboratory testing. For the borings labeled "Paleo Boring Transect" (Confidential Figure 3), Ninyo and Moore will use a continuous coring sampler.

Moreover, Ninyo and Moore will drill, log and sample for geotechnical assessment purposes all exploratory borings within the transmission line corridor (n=7) for the Gen-tie to depths of approximately 50 feet (15 meters) using a continuous coring to obtain suitable soil samples for laboratory analysis. These borings will be monitored by a paleontologist and an archaeologist. The borings will be performed with a truck-mounted Drill Rig and shall include penetration testing, split barrel and/or thin-walled tube (Shelby tube) sampling, and rock coring where applicable. Penetration testing and split barrel sampling shall conform to ASTM D 1586 using a two-inch O.D., O.D. "Modified California", or approved equivalent sampler. Thin-walled tube sampling shall conform to ASTM D 1587 and rock coring shall conform to ASTM D 2113. Samples shall be sealed in air/water tight containers, handled carefully to avoid disturbance, and be delivered promptly to the soil/geotechnical-testing laboratory.

Generally, the Geotechnical Contractor will proceed with the geoarchaeology/paleontology trenching and boring from north to south, starting with the explorations in the eastern portion of the site along the WAPA 115kV power line. Then the contractor will continue south to north to complete the trenching and boring in the western portion of the site.

We already know that the paleosol does not occur in arroyos or drainages where the paleosol has been removed by erosion. If the mesa surface is interrupted in those areas, so is the paleosol. This can and has been demonstrated by observation and digging around the edges of the arroyos. Ground level for each trench will be determined by a Qualified Paleontologist plotting the location on an existing one-foot contour topographic map of the Project. Each trench will be approximately five meters long at the surface and be excavated to the maximum depth of subsurface disturbance (approximately three meters), unless conditions are present (e.g., extremely coarse or indurated sediments) that preclude the need or ability to complete the trench. Trenches and excavated spoils will primarily be observed and documented from the surface by a Qualified Paleontologist, for safety reasons and for compliance with OSHA standards and directives related to trenching and excavation. Binoculars may be used by a Qualified Paleontologist to clarify details of the stratigraphy if it is not safe for personnel to enter the pit. If pedogenic or paleontological features are observed which require closer inspection and/or sampling (based on the project Paleontologist's expert judgment), the trench will be shored using hydraulic speed

shoring, so that by a Qualified Paleontologist can enter the trench safely, document subsurface stratigraphy and pedogenic indicators in detail, and collect soil and dating samples. Excavated spoils will be searched for paleontological resources by a Qualified Paleontologist. The Project Paleontologist will produce a measured profile drawing, using a metric scale, on one sidewall from each excavated trench, where the drawings are produced on the basis of observation from the surface. A horizontal datum will be established within arm's length of the ground level by taping a hand level to a bar and mounting the bar on spikes in the wall so that the bar is horizontal. It may be necessary for the assisting Qualified Paleontologist to lower a measuring stick from above the wall so that the Project Paleontologist can determine distances above or below the datum. Observed stratigraphic units will be described by a Qualified Paleontologist based on physical characteristics such as composition (grain size, parent material), color, structure, superposition, textural transitions, and pedogenic properties (i.e., relative soil development). Each profile, including all observable textural and soil transitions, will be logged on a graph paper and be photographed with a metric scale and north arrow by a Qualified Paleontologist. These diagrams will include a detailed description of each lithostratigraphic and pedostratigraphic unit and will be used to correlate units identified in other trenches. These diagrams will also be reproduced in the Technical Report.

3.2.2 Microvertebrate Sensitivity

At least one additional Qualified Paleontologist will be on-site to assist in the screening and transport of sediment samples, and the monitoring and sorting of spoils excavated from the trenches. The guidelines for microvertebrate sampling are the following and are standard recommendations provided by the SVP. Many significant vertebrate fossils (e. g., small mammal, bird, reptile, amphibian, or fish remains) are referred to as "microvertebrates". Small fossils also include non-vertebrate paleoenvironmental indicators (e. g., foraminifers, small gastropods, and plant seeds). Fine-grained sedimentary horizons (e. g., mudstones and paleosols) most often contain such fossils, which are typically recovered through a process of bulk matrix sampling followed by screen washing through 20 and/or 30 mesh screens. If indicators of potential microvertebrate fossils are found (e. g., plant debris, abundant mollusks, clay clasts, carbonate-rich paleosols, or mudstones) screening of a "test sample" (0.4 cubic yard/meter, ~600 lbs) may produce significant returns and indicate whether or not a larger sample needs to be screen washed. An adequate sample (standard sample) consists of approximately 4.0 cubic yards/meters (6,000 lbs or 2,500 kg) of matrix from each site, horizon, or paleosol, or sample representative of the Chemehuevi formation equivalents and Late Pleistocene silts, sands and gravels. A 5-gallon sample of each 30 cm interval will be retrieved from any detected paleosols. The depth below ground surface will be recorded for each sample. These samples will be dry screened through ¼-inch hardware mesh. Clasts and caliche lumps or concretions not passing through the screen will be discarded. Any paleontological resources recognized will be put in Ziploc bags with the appropriate geographic and stratigraphic data. The material that passes through the ¼ inch hardware mesh will be caught on a tarp, placed in 5-gallon or smaller buckets, given appropriate geographic and stratigraphic labels, and prepared for wet screening. To avoid delays of personnel and machinery, samples of matrix will be removed from the project site, processed at Hodges Drain, and wet-screened through 30 mesh screen. The resultant concentrate will be dried, transported to the URS laboratory, and sorted under a binocular microscope. It may be necessary to use heavy liquid separation to reduce the amount of concentrate that must be sorted under a microscope. The data generated will reveal the microvertebrate fauna in the tan paleosol and will be implemented in the

Paleontological Resource Monitoring and Mitigation Plan. Therefore, impacts to paleontological resources are expected to be mitigated to a less than significant level.

Any identifiable fossils retrieved will be identified, reported, and curated in the collections of the San Bernardino County Museum, in accordance with the URS curation agreement.

3.2.3 Dating

A maximum of four radiocarbon samples will be submitted for analysis to determine the approximate ages of the major paleosol horizons present, and collect enough soil humate samples, in the absence of other reliable chronometric data, to reliably assay and radiocarbon date the master stratigraphic column for each landform and each major landform feature. Discrete, in-place charcoal samples and/or eggshell fragments will be used for dating. Attempts to assign a date to fossil bone from the Palo Verde Mesa paleosols have been unsuccessful due to insufficient collagen preservation. One attempt to assign a date to tortoise eggshell fragments from the Rio Mesa site succeeded (Beta-305905; 13,620 to 13,790 calendar years before present) and proves the feasibility of the approach. Tortoise eggshell fragments have been found in random paleosol sediment samples. They will probably prove to be present only at some of the localities that will be tested. If sufficient amounts of eggshell or charcoal cannot be found, residual humic material in the paleosol will be used for dating. Beta Analytic will be the laboratory used for the radiocarbon dating.

Nine luminescence or optically- or infrared-stimulated luminescence dates of sediments will be attempted. One date each will be obtained from the sediments of the Chemehuevi Formation equivalents and the Late Pleistocene silts, sands, and gravels which underlie the paleosol. At two localities with deep exposures of the Palo Verde Mesa paleosol, a sample from the bottom and the top of each will be obtained to demonstrate reproducibility and to establish the approximate time range of the paleosol. One exposure of a reddish paleosol near GPT-9 will be dated to see if it falls within the time range of the Palo Verde Mesa paleosol, and two dates will be taken from exposures of the tan paleosol. It will probably be necessary to have a representative of the Geochronology Laboratory of the Desert Research Institute in Reno, Nevada, travel to the Project site to properly collect the samples and to take dosimeter readings. Additionally, a maximum of four radiocarbon samples will be submitted for analysis to determine the approximate ages of the fossils that may be collected from within the upper portions of the Chemehuevi formation equivalents and Late Pleistocene silts, sands and gravels. Beta Analytic will be the laboratory used for the radiocarbon dating.

3.2.4 Curation

Fossil collection, retention/disposal, and curation will follow standard protocols and policies. Applicant commits to curate all paleontological materials, in accordance with the SVP guidelines (SVP, 1996), into a retrievable storage collection in a public repository or museum. Moreover, Applicant commits to pay all curation fees for fossils recovered and for related documentation.

SECTION 4 TECHNICAL REPORT

As per the August 2, 2012 Workshop with CEC Staff, in compliance with Data Request 128, Rio Mesa Solar I, LLC. and Rio Mesa Solar II, LLC. agreed to prepare a Paleontological Resource Delineation Work Plan specifically in regards to delineating the three-dimensional extent of one resource, the Palo Verde Mesa Paleosol (PFYC 4a). On August 31, 2012, BSE submitted the Work Plan to CEC for their review including only the one resource. In comments provided to BSE by CEC Staff (Casey Weaver) on the Work Plan, the level of effort requested increased to not only include the Palo Verde Mesa Paleosol, but also two additional geologic landforms of paleontological significance: the Chemehuevi Formation equivalents (PFYC 4b), and Late Pleistocene silts, sands and gravels (PFYC 3b).

The analysis of and reporting on all three formations cannot be completed within the original 30 day reporting period for Data Request 128. Conventional radiocarbon dating cannot be used on the sediments within the Chemehuevi Formation equivalents because the formation is too old and exceeds the maximum age limits that radiocarbon dating can be reliably used for. Instead, Optically Stimulated Luminescence (OSL) dating must be used to assign a date to the Chemehuevi Formation equivalents, which requires a 3 month processing period for each sample. Additionally, the number of 5 gallon sediment samples that need to be processed for microvertebrate fossils will triple to approximately 480 samples, also requiring an approximate 3 month processing period.

Therefore, Rio Mesa Solar I, LLC. and Rio Mesa Solar II, LLC. propose to provide CEC staff with all the information requested for DR 128, but in phases. The Paleontological Resource Delineation report will focus on the original scope of work agreed to by BSE on August 2 and will be provided to Staff within 30 days from completion of the geotechnical trenching and boring work. The report will include the analysis and reporting on the Palo Verde Mesa Paleosol. A Supplemental Paleontological Resource Delineation report will focus on the additional paleontological information requested by Staff as part of comments on the August 31st Plan and will be provided to Staff within 90-120 days from completion of the geotechnical testing and boring work. The report will include the analysis and reporting on the Chemehuevi Formation equivalents and Late Pleistocene silts, sands and gravels.

Reports will include the following details.

1. Name, affiliation, address, date of report, and permit number of the paleontologist doing the survey.

2. Project name and number (if used), name of proponent, and general location of project.

3. Date(s) of the fieldwork and names of any personnel assisting with the fieldwork.

4. Brief description of project and expected impacts to paleontological resources.

5. A description of field methods used.

6. A summary of findings, including important discoveries.

7. A discussion of the significance of the findings/discoveries.

8. A description of potentially fossiliferous areas to allow for future assessment of sites, even if no fossils were located during the project monitoring.

9. A completed BLM locality form 8270-3 or equivalent for each new locality, using Universal Transverse Mercator (UTM) NAD 83 coordinates, and 1:24000 scale maps with new localities plotted using points or polygons as appropriate. Locality forms, maps, and any other information containing specific fossil locations will be bound separately or assembled as a separate section to allow for preservation of confidential locality data.

10. List of specimen field numbers and field identifications of collected material, cross-referenced to the locality field number. This list may be submitted in electronic format, preferably in a spreadsheet format.

11. A summary of regional and local geology; this will reference earlier projects for relevant information.

12. A summary of regional and local paleontology; this will reference earlier projects for relevant information.

13. Potential impacts to paleontological resources resulting from the project.

14. Detailed mitigation recommendations that may lessen potential adverse impacts.

15. Map of project area, indicating areas surveyed, known localities, and new discoveries.

16. Relevant photos, diagrams, tables to aid in explaining, clarifying, or understanding the findings.

SECTION 5 PROJECT PERSONNEL AND MANAGEMENT

All paleontological resources work will be carried out under the direct supervision of paleontologists who meet the SVP standards, and will be consistent with the procedures for compliance with NEPA, and CEQA Section 15064.5. All decisions on level of effort or discretionary actions described in this plan will be approved by BLM/CEC prior to implementation.

The key paleontological resources personnel who will conduct the study and prepare the technical report are:

- Joe Stewart, Ph.D. (URS Principal Investigator)
- Mike Williams, Ph.D. (URS Paleontologist)

SECTION 6 REFERENCES

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Limitations

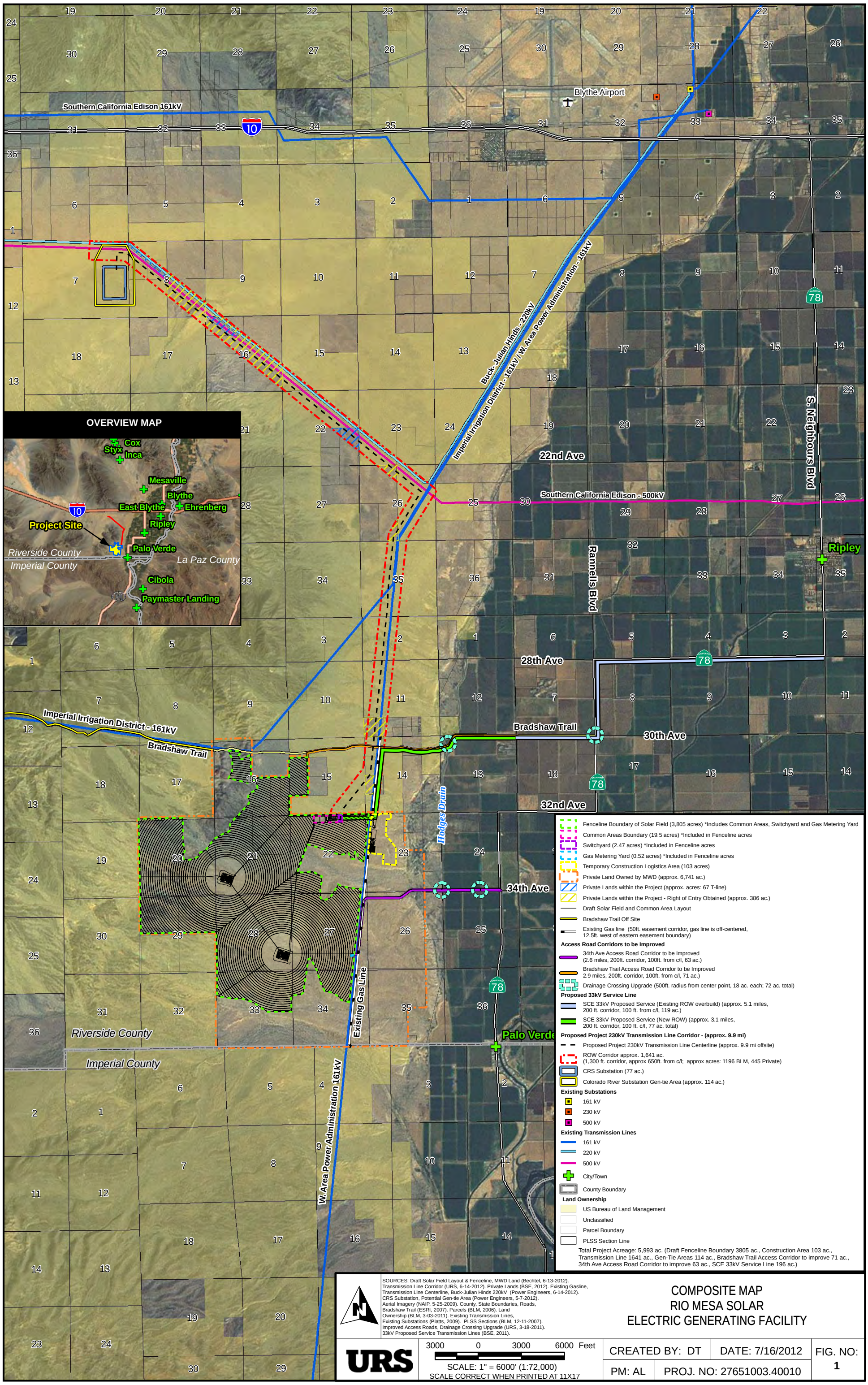
This plan has been prepared based on certain key assumptions made by URS that substantially affect the conclusions and recommendations of this report. The assumptions, although thought to be reasonable and appropriate, may not prove to be true in the future. The conclusions and recommendations of URS are conditioned upon these assumptions.

This delineation plan was composed based on information provided by Ninyo and Moore (2011), POWER Engineers, and Rio Mesa Solar I, LLC. and Rio Mesa Solar II, LLC. (2011 and 2012), and direct observation of site conditions and other information that is generally applicable as of August 1, 2012, and the conclusions and recommendations herein are therefore applicable only to that timeframe.

Information obtained from these sources in this timeframe is assumed to be correct and complete. URS will not assume any liability for findings or lack of findings based upon misrepresentation of information presented to URS or for items not visible, or not made available, accessible, or present at the site at the time of the Project site survey.

Table 1
Results of Analysis of 2011 Geotechnical Borings and Test Pits
(Confidential Table will be sent under separate cover)

Figure 1 Composite Map


OVERVIEW MAP
Cox
Styx
Inca
Mesaville
Blythe
East Blythe
Ehrenberg
Ripley
Project Site
Palo Verde
Riverside County
La Paz County
Imperial County
Cibola
Paymaster Landing
Blythe Airport
Southern California Edison 161kV
Buck- Julian Hinds - 220kV
Imperial Irrigation District - 161kV / W.Area Power Administration - 161kV
22nd Ave
S. Neighbours Blvd
Southern California Edison - 500kV
Rannells Blvd
Ripley
28th Ave
Imperial Irrigation District - 161kV
Bradshaw Trail
30th Ave
32nd Ave
Hodges Drain
34th Ave
Existing Gas Line
W. Area Power Administration 161kV
Palo Verde
Riverside County
Imperial County
78
10
Fenceline Boundary of Solar Field (3,805 acres) *Includes Common Areas, Switchyard and Gas Metering Yard
Common Areas Boundary (19.5 acres) *Included in Fenceline acres
Switchyard (2.47 acres) *Included in Fenceline acres
Gas Metering Yard (0.52 acres) *Included in Fenceline acres
Temporary Construction Logistics Area (103 acres)
Private Land Owned by MWD (approx. 6,741 ac.)
Private Lands within the Project (approx. acres: 67 T-line)
Private Lands within the Project - Right of Entry Obtained (approx. 386 ac.)
Draft Solar Field and Common Area Layout
Bradshaw Trail Off Site
Existing Gas line (50ft. easement corridor, gas line is off-centered, 12.5ft. west of eastern easement boundary)
Access Road Corridors to be Improved
34th Ave Access Road Corridor to be Improved (2.6 miles, 200ft. corridor, 100ft. from c/l, 63 ac.)
Bradshaw Trail Access Road Corridor to be Improved 2.9 miles, 200ft. corridor, 100ft. from c/l, 71 ac.)
Drainage Crossing Upgrade (500ft. radius from center point, 18 ac. each; 72 ac. total)
Proposed 33kV Service Line
SCE 33kV Proposed Service (Existing ROW overbuild) (approx. 5.1 miles, 200 ft. corridor, 100 ft. from c/l, 119 ac.)
SCE 33kV Proposed Service (New ROW) (approx. 3.1 miles, 200 ft. corridor, 100 ft. c/l, 77 ac. total)
Proposed Project 230kV Transmission Line Corridor - (approx. 9.9 mi)
Proposed Project 230kV Transmission Line Centerline (approx. 9.9 mi offsite)
ROW Corridor approx. 1,641 ac. (1,300 ft. corridor, approx 650ft. from c/l; approx acres: 1196 BLM, 445 Private)
CRS Substation (77 ac.)
Colorado River Substation Gen-tie Area (approx. 114 ac.)
Existing Substations
161 kV
230 kV
500 kV
Existing Transmission Lines
161 kV
220 kV
500 kV
City/Town
County Boundary
Land Ownership
US Bureau of Land Management
Unclassified
Parcel Boundary
PLSS Section Line
Total Project Acreage: 5,993 ac. (Draft Fenceline Boundary 3805 ac., Construction Area 103 ac., Transmission Line 1641 ac., Gen-Tie Areas 114 ac., Bradshaw Trail Access Corridor to improve 71 ac., 34th Ave Access Road Corridor to improve 63 ac., SCE 33kV Service Line 196 ac.)
SOURCES: Draft Solar Field Layout & Fenceline, MWD Land (Bechtel, 6-13-2012). Transmission Line Corridor (URS, 6-14-2012). Private Lands (BSE, 2012). Existing Gasline, Transmission Line Centerline, Buck-Julian Hinds 220kV (Power Engineers, 6-14-2012). CRS Substation, Potential Gen-tie Area (Power Engineers, 5-7-2012). Aerial Imagery (NAIP, 5-25-2009). County, State Boundaries, Roads, Bradshaw Trail (ESRI, 2007). Parcels (BLM, 2006). Land Ownership (BLM, 3-03-2011). Existing Transmission Lines, Existing Substations (Platts, 2009). PLSS Sections (BLM, 12-11-2007). Improved Access Roads, Drainage Crossing Upgrade (URS, 3-18-2011). 33kV Proposed Service Transmission Lines (BSE, 2011).
COMPOSITE MAP
RIO MESA SOLAR
ELECTRIC GENERATING FACILITY
URS
3000 0 3000 6000 Feet
SCALE: 1" = 6000' (1:72,000)
SCALE CORRECT WHEN PRINTED AT 11X17
CREATED BY: DT
DATE: 7/16/2012
FIG. NO: 1
PM: AL
PROJ. NO: 27651003.40010
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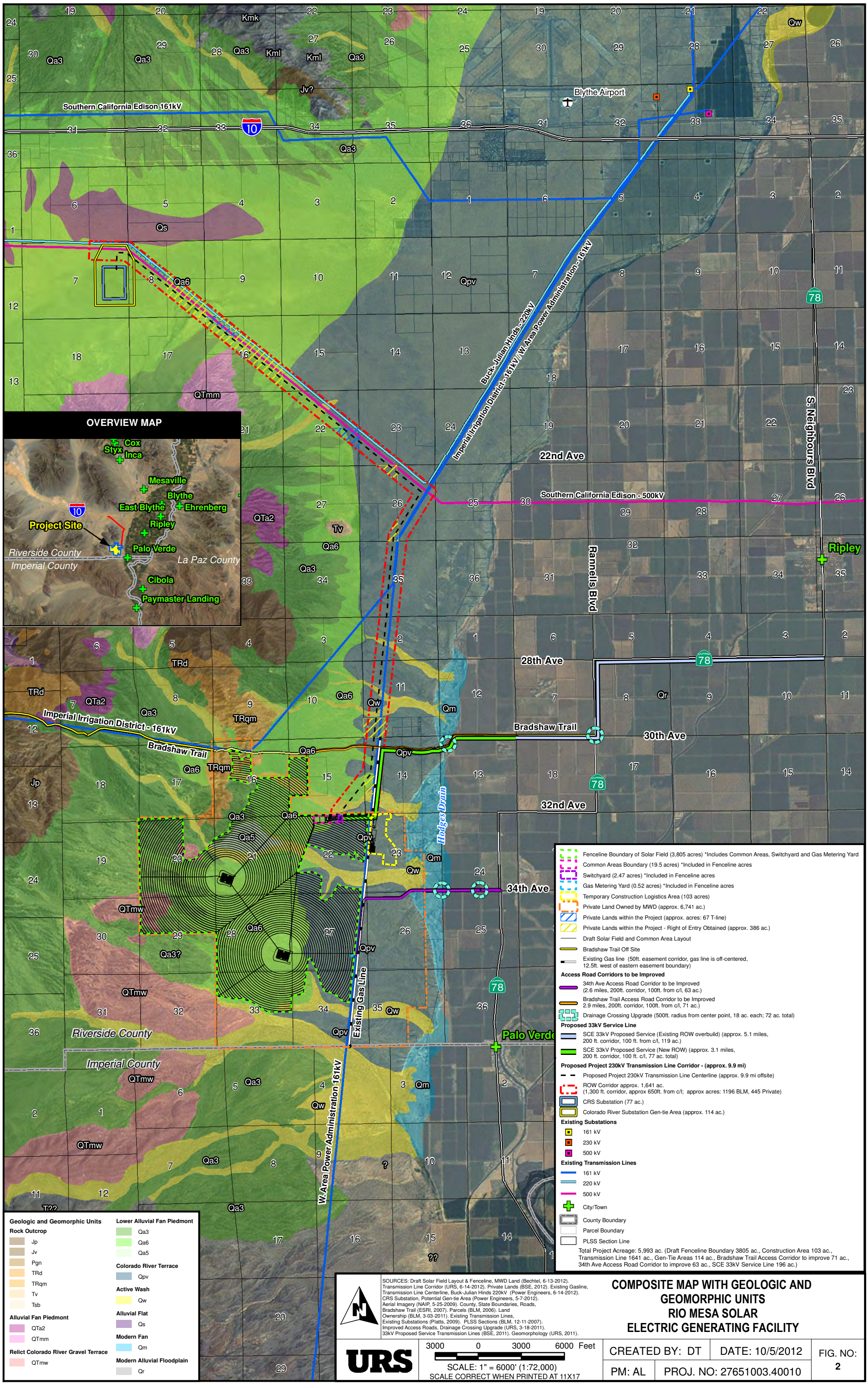
DRAFT - Internal Planning Use Only

Figure 2 Composite Map with Geology and Geomorphic Units and Rio Mesa Electric Generating Facility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Ripley
Palo Verde
Kmk
Kml
Qa3
Jv?
Qs
Qa6
QTmm
QTa2
Tv
TRd
TRqm
Qpv
Qw
Qm
Qa5
QTmw
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Qr
Fenceline Boundary of Solar Field (3,805 acres) *Includes Common Areas, Switchyard and Gas Metering Yard
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Geologic and Geomorphic Units
Rock Outcrop
Jp
Jv
Pgn
TRd
TRqm
Tv
Tsb
Alluvial Fan Piedmont
QTa2
QTmm
Relict Colorado River Gravel Terrace
QTmw
Lower Alluvial Fan Piedmont
Qa3
Qa6
Qa5
Colorado River Terrace
Qpv
Active Wash
Qw
Alluvial Flat
Qs
Modern Fan
Qm
Modern Alluvial Floodplain
Qr
SOURCES: Draft Solar Field Layout & Fenceline, MWD Land (Bechtel, 6-13-2012). Transmission Line Corridor (URS, 6-14-2012). Private Lands (BSE, 2012). Existing Gasline, Transmission Line Centerline, Buck-Julian Hinds 220kV (Power Engineers, 6-14-2012). CRS Substation, Potential Gen-tie Area (Power Engineers, 5-7-2012). Aerial Imagery (NAIP, 5-25-2009). County, State Boundaries, Roads, Bradshaw Trail (ESRI, 2007). Parcels (BLM, 2006). Land Ownership (BLM, 3-03-2011). Existing Transmission Lines, Existing Substations (Platts, 2009). PLSS Sections (BLM, 12-11-2007). Improved Access Roads, Drainage Crossing Upgrade (URS, 3-18-2011). 33kV Proposed Service Transmission Lines (BSE, 2011). Geomorphology (URS, 2011).
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SCALE CORRECT WHEN PRINTED AT 11X17
COMPOSITE MAP WITH GEOLOGIC AND GEOMORPHIC UNITS
RIO MESA SOLAR
ELECTRIC GENERATING FACILITY
CREATED BY: DT
DATE: 10/5/2012
PM: AL
PROJ. NO: 27651003.40010
FIG. NO: 2
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Figure 3 **Combined Paleosol and 2011-2012 Geotechnical Points (Confidential Figures will be sent under separate cover)**

Guidelines for Assessment and Mitigation of Potential Impacts to Paleontological Resources

Contents:

Introduction
I. Assessment of Potential Impacts to Paleontological Resources
    A. Scoping
    B. Analysis of Existing Data
    C. Determining the Need for Field Surveys and Mitigation
II. Procedures for Conducting a Paleontological Field Survey
    A. Definition of Field Survey
    B. Conducting Field Survey
    C. Report of Survey Findings
    D. Report Approval
III. Determination of Further Mitigation Requirements
    A. Relocation
    B. Deferred Fossil Collection
IV. Procedures for Field Monitoring
    A. Monitoring Plan
    B. Types of Monitoring
    C. Types of Field Personnel
    D. Work Stoppage
V. Final Project Report When Paleontological Resources are Collected
VI. Completion of Mitigation Responsibility
VII. Collections Resulting from Mitigation and Monitoring
VIII. Resource Management Updates
Appendix A – Definitions

Introduction

Surface disturbing federal actions on public and split-estate lands may cause direct adverse impacts to paleontological resources through the damage or destruction of fossils or the disturbance of the stratigraphic context in which they are located. Indirect adverse impacts may be created from increased accessibility to fossils leading to looting or vandalism activities. Land tenure adjustments may result in the loss of significant paleontological resources to the public if fossils pass from public ownership.

Under the Federal Land Policy and Management Act (FLPMA) and the National Environmental Policy Act (NEPA), federal actions and land tenure adjustments that may impact or result in a loss of paleontological resources on public or split-estate lands are evaluated, and necessary mitigation is identified.

I. ASSESSMENT OF POTENTIAL IMPACTS TO PALEONTOLOGICAL RESOURCES

The following sections outline general steps designed to assist in the analysis and assessment of possible impacts to paleontological resources from proposed actions. These sections are sequential in order and provide for termination of the assessment at various stages if the analysis indicates no impacts are likely to occur.

A. Scoping. Field Offices must assess all proposed federal actions to identify possible effects to significant paleontological resources (see Appendix A for definition) that are potentially recoverable and are likely to be within the zone of expected surface disturbance or relatively close to the surface. The direct effects of all surface activities and the indirect effects of increased public access and land tenure adjustments must be considered in any paleontological assessment. The assessment will determine whether further analysis will be necessary. The Paleontology Program Coordinator (Paleontology Coordinator – see Appendix A for definition) has primary responsibility for the scoping process for projects within the Field Office area, but the Paleontology Program Lead (Paleontology Lead – see Appendix A for definition) may be responsible for projects that span multiple Field or District Offices, and can support the Paleontology Coordinator as requested.

1. Surface only activities – If the proposed project will not disturb potentially fossil-yielding bedrock or alluvium, no additional work is necessary. The project file should be documented as appropriate. Examples of such projects include weed spraying, mechanical brush treatment, geophysical exploration, or surface disturbing activities such as road construction when the fossil resource is expected to be buried well below project compression or excavation depth or when surface fossil resources would be left undamaged.

2. Land Tenure Adjustments – If parcels are identified to pass from public ownership in a proposed land tenure adjustment action but contain no potential for recoverable, significant paleontological resources, no additional work is necessary. The project file should be documented as appropriate**,** and conclusions addressed in the environmental document. This situation may arise, for example, in areas consisting only of granitic bedrock where paleontological resources would not normally occur.

3. Young alluvial deposits or deep soils may cover and obscure sedimentary bedrock, and any fossils that may occur in that bedrock would be unidentifiable or irretrievable prior to disturbance actions. In most of these cases, the fossil resources cannot be quantified, but the potential for impacting paleontological resources should be mentioned in the evaluation of the proposal, i.e., the planned disturbance will pass through the soil layer and impact a bedrock unit which is known to contain significant fossils elsewhere.

If the initial scoping identifies the possibility for adversely affecting significant paleontological resources, further analysis is necessary. If there will be no impact or potential impact based on the action or the fossil resource may be impacted, but is too deep to be recovered, e.g., deep well bore passing through a fossil formation, the project file must be documented, and no additional assessment is necessary.

B. Analysis of Existing Data. If scoping suggests the possibility of disturbing fossil-yielding bedrock or alluvium that is near to the surface and that may contain significant paleontological resources that are potentially recoverable, more in-depth analysis is necessary. Geologic mapping reflecting the Potential Fossil Yield Classification (PFYC) should be consulted, along with any other easily accessible information, such as GIS-based locality data, other known paleontological locality information, and existing paleontological reports for the area, aerial photos, or soils maps.

1. Potential Fossil Yield Classification (PFYC) – This is a system for categorizing the probability of geologic units to contain scientifically significant paleontological resources or noteworthy fossil occurrences. It has five levels or Classes, with Class 1 applied to geologic units that are not likely to contain significant fossils through Class 5 for geologic formations that have a high potential to yield scientifically significant fossils on a regular basis (see IM No. 2008-009). This classification does not reflect rare or isolated occurrences of significant fossils or individual localities, only the relative occurrence on a formation- or member-wide basis. Any rare occurrences may require additional assessment and mitigation if they fall within the area of anticipated impacts.

2. If the results of the preliminary analysis determine that the proposed project will only affect geologic units not likely to contain significant fossils or that have a very low or low potential for significant fossils (PFYC Class 1or 2), and no scientifically important localities are known to occur in the area, the project file should be documented, and no additional paleontology assessment is necessary.

3. The results of an analysis of a proposed project may indicate the potential to disturb PFYC Class 3, 4, or 5 formations or potentially fossil-bearing alluvium, or known significant localities, which may then suggest the need for field surveys and/or other mitigation measures. The results may also identify areas where little or nothing is known of the fossil record so that additional attention may be given to these areas during field survey. The analysis should consider the likely impacts on the known or potential fossil resource and should be the basis for determining the need for or level of additional assessments.

C. Determining the Need for Field Surveys and Mitigation. The previously discussed procedures may result in the determination that the project may encounter bedrock or an alluvial zone that has a moderate or high potential to contain significant paleontological resources. However, it does not determine the appropriate action, such as a field survey, on-site monitoring, special stipulations, avoidance, or other mitigation.

1. If the need for further work is not clearly evident after the analysis, the Authorized Officer and/or Project Leader should be consulted for a final decision. The Paleontology Lead or Regional Paleontologist may also be consulted. A brief written report of findings should be prepared, including the rationale for supporting the decision not to require a field survey or additional monitoring. The report should be signed by the Authorized Officer and placed in the project file. For example, a seismic survey using vibroseis trucks may be proposed on areas of deep soils, or a temporary recreational event may be planned in an area of low fossil potential. These types of projects are not likely to have a reasonable potential to adversely affect important

paleontological resources. The file should be documented and a standard discovery stipulation attached to the permit proposal.

2. If the analysis in Sec. I.B indicates a reasonably high expectation of not just encountering a potential fossil-bearing zone and also causing adverse impacts to significant paleontological resources, the determination must be made as to (1) whether adverse effects cannot be avoided; (2) whether the adverse impacts can be avoided by altering the location or scope of the project; (3) whether the impacts can be mitigated through development of special stipulations such as requiring on-site monitoring; or (4) whether field surveys will be necessary to determine the presence or absence of significant paleontological resources.

3. In the case where it is known that significant paleontological resources will be adversely impacted, the preferred course of action is avoidance of the impact by moving or rerouting the site of construction, or eliminating or reducing the need for surface disturbance.

4. Application of specific stipulations may reduce or eliminate adverse impacts in many cases. A standard discovery stipulation should be included in any permit approval that is likely to affect significant paleontological resources. The stipulation should mandate an immediate work stoppage in the area of discovery, notification to the Authorized Officer, and protection of the material and geological context. Other stipulations may be appropriate on a case-by-case basis.

(a) A suggested standard discovery stipulation for a discretionary federal action is:

> The permittee shall immediately notify the BLM Authorized Officer of any paleontological resources discovered as a result of operations under this authorization. The permittee shall suspend all activities in the vicinity of such discovery until notified to proceed by the Authorized Officer and shall protect the discovery from damage or looting. The permittee may not be required to suspend all operations if activities can be adjusted to avoid further impacts to a discovered locality or be continued elsewhere. The Authorized Officer will evaluate, or will have evaluated, such discoveries as soon as possible, but not later than 10 working days after being notified. Appropriate measures to mitigate adverse effects to significant paleontological resources will be determined by the Authorized Officer after consulting with the operator. Within 10 days, the operator will be allowed to continue construction through the site, or will be given the choice of either (1) following the Authorized Officer's instructions for stabilizing the fossil resource in place and avoiding further disturbance to the fossil resource, or (2) following the Authorized Officer's instructions for mitigating impacts to the fossil resource prior to continuing construction through the project area.

Note: C.1 and C.2 above would be conducted at the permittee's expense. By regulation, after a 3809 plan of operations is approved or where there is no plan, the BLM is responsible for the cost of any investigation and recovery of fossil materials.

(b) Other stipulations may be developed to reduce potential impacts, preferably in consultation with the project proponent. These may include (1) techniques to reduce surface

disturbance, (2) briefings for all personnel about the potential for discovery, (3) requiring all finds be reported, and (3) using a "light touch" in sensitive areas. These should be made a formal part of the authorization for the project and discussed at a preconstruction meeting or an on-site meeting in the case of oil and gas operations.

(c) All proponents should be directed to share the current rules and regulations regarding fossil theft and the limitations to free use collecting of invertebrate and plant fossils on BLM-administered lands with all employees and subcontractors under their direction. Unlawful removal, damage, or vandalism of paleontological resources will be prosecuted by federal law enforcement. Theft or damage to government property by a proponent, a proponent's employee, or a subcontractor that is under a proponent's direction may lead to legal actions against the proponent.

5. If avoidance actions or stipulating measures are insufficient to protect known paleontological resources, a written assessment must be completed to determine the need for field survey or monitoring. This assessment must include the anticipated direct or indirect impacts associated with the project, the inadequacies of avoidance or special stipulations to protect the resource, existing paleontological information and known localities, relevant geologic information, and the potential for additional discoveries. The assessment must be completed by the Paleontology Coordinator.

(a) In some cases, bedrock will not be visible at the surface in the project area (for example, where thin soils or alluvium obscure all outcrops), but the proposed excavation will likely penetrate into bedrock with known significant paleontological resources. Because fossil material will not be visible at the ground surface in these cases, it may be appropriate to forego a field survey prior to excavation, but require on-site monitoring or spot-checks when bedrock is finally encountered. If construction monitoring is proposed, the written assessment must include a thorough justification for the recommendation.

(b) The State Office may require the Paleontology Coordinator to notify the Paleontology Lead that a field survey or monitoring is deemed appropriate prior to the final decision to require the survey or monitoring. The notification should minimally include the name of the project, the legal description of the location or other locational information, a brief summary of the proposed action, reason(s) for the decision to require a survey or monitoring, and any other relevant information. Concurrence of the Paleontology Lead or Regional Paleontologist may be required prior to the final decision for requiring a survey or monitoring.

(c) A standardized assessment document may be developed that can be applied to projects that are similar in nature, relatively small, and repetitive in approach for use within a Field Office or District. This written assessment is intended to simplify the documentation process for those projects that are likely to have minimal impacts, and may be structured as a programmatic assessment, a form, a checklist, or other document with standard items. This assessment must include the name of the project, the legal description of the location or other locational reference, a brief summary of the proposed action, reason(s) for the decision, and any other relevant information. The parameters in the assessment should be designed to identify the need for a field survey. For example, the parameters may indicate a field survey may be required

for road and well pad construction activities occurring on Class 4 or 5 formations where the formation is likely to be encountered during surface disturbing activities. The Field Manager, in consultation with the Paleontology Lead, must approve the use of a programmatic assessment prior to initial implementation.

6. The decision to require a field survey or monitoring must be made by the Authorized Officer and documented in the project file. If required, a copy of the decision must be furnished to the Paleontology Lead.

II. PROCEDURES FOR CONDUCTING A PALEONTOLOGICAL FIELD SURVEY

If the assessment of existing data indicates: (a) the presence or high probability of occurrence of vertebrate fossils or uncommon nonvertebrate fossils (PFYC Class 4 or 5), or that the probability is unknown (Class 3), in the area of a proposed federal action or transfer of title, and (b) a reasonable probability that those resources will be adversely affected by the proposed action, a paleontological field survey should be conducted.

A. Definition of Field Surveys. Field Surveys are pedestrian surveys to be performed in areas where significant fossils can be expected to occur within the boundary and immediate vicinity of the anticipated disturbance, or where the probability of encountering significant fossils is unknown.

1. Field surveys are performed prior to any surface disturbing activities. Before conducting field surveys, the project location should be as final as possible and any staking of the location should be complete.

2. Surveys are conducted by a BLM Regional Paleontologist, Paleontology Lead, Paleontology Coordinator, appropriately trained and supervised BLM staff, or by a BLM-permitted consulting paleontologist hired by the project proponent.

(a) At the Field Manager's discretion, other qualified BLM staff may conduct surveys on small projects. Performance of surveys by BLM staff must also be approved by the Regional Paleontologist, Paleontology Lead, or Paleontology Coordinator.

(b) Surveys that are complex in nature, constrained by construction schedules, or otherwise cannot be performed by BLM staff should be performed by a consulting paleontologist holding a valid BLM Paleontological Resources Use Permit. Submission of reports may be done directly by the paleontologist to the BLM. The project proponent is also responsible for all costs associated with the survey, including the consulting paleontologist's fees and charges, all survey costs, fossil preparation to the basic identification stage, analyses, reports, and curation costs directly related to mitigation of the project's anticipated impacts. Any required monitoring and mitigation costs are also the responsibility of the project proponent. These costs are to be negotiated between the project proponent and the consulting paleontologist prior to beginning any data gathering, analysis, or field work, and these negotiations do not require BLM

involvement or approval. Any new, additional, or modified curation agreements between the paleontologist and the official repository must be in place prior to starting field work.

(c) Authorization for an activity to proceed cannot be given by a consulting paleontologist. Performance of the survey, either by a consulting paleontologist or BLM staff, or submission of the report DOES NOT constitute approval for the activity to proceed. The BLM must review the report, including adequacy of the field methods and findings. The Authorized Officer must approve the findings and determine the need for monitoring prior to approval to proceed.

B. Conducting Field Surveys. Field surveys must be performed by the Principal Investigator or an approved Field Agent or Field Monitor (see section IV.C., Types of Field Personnel for descriptions of these individuals) as authorized under a Paleontological Resource Use Permit, or by a BLM Regional Paleontologist or qualified BLM designee. Field surveys and collections performed as a mitigation measure are not intended to be scientific research studies, but are meant to identify, avoid, or recover paleontological resources to prevent damage or destruction from project activities. However, proper scientific techniques and procedures must be utilized during all mitigation efforts. Safety should be an important consideration; therefore, surveys should not be attempted on cliff faces, in open, non-reinforced trenches deeper than five feet, or other unsafe areas.

1. The scope of the survey is dependent upon the scale of the project. Small projects are defined as less than 10 acres, or, if linear, less than five miles; large projects exceed those dimensions.

2. At the start of field work, the consulting paleontologist (paleontologist) must contact the Paleontology Coordinator in each affected Field Office who may require a visit to that office. After an initial visit each year, the paleontologist may contact the Field Office by telephone or email prior to subsequent field trips, at the discretion of the Field Office. Information about the survey schedule, additional personnel, emergency field contact information, and any other pertinent data should be provided to the Paleontology Coordinator. The Field Office will inform the paleontologist of any conditions that may impact the survey, such as fire danger or restrictions, drought restrictions, wildlife timing restrictions, management restrictions, road restrictions or construction, and any other relevant information.

3. During the field survey, the paleontologist surveys, locates, and documents all paleontological resources within 200 feet of the proposed project location or corridor, or less distance upon approval.

(a) Where significant paleontological resources are at risk, data collection alone does not constitute mitigation of damage. All significant fossils that may be damaged or destroyed during project activities must be collected, along with all relevant contextual and locational data. Specimens must be collected during the survey or prior to commencement of any surface-disturbing activities.

(b) In many cases, isolated gar scales, chelonid (turtle) carapace or plastron fragments, crocodile and fish teeth, and unidentifiable bone fragments do not need to be collected. The location must be recorded and a description of the fossil material noted in the field notes and on a BLM Locality Form as part of the report. The context of these types of fossils should be considered, as they may represent rare occurrences or unusual faunal associations, and thus may be scientifically important and must be documented and voucher specimens collected where appropriate.

(c) Occurrences of plant or invertebrate fossils should be recorded and representative examples or voucher specimens collected where appropriate. Additional mitigation measures may be appropriate in some cases for these types of localities.

(d) If a large specimen or a concentration of significant fossils is located during the field survey, the available time and/or personnel may not allow for full recovery during the survey. The specimen(s) and locality(ies) should be stabilized as needed, and a determination made as to whether avoidance is necessary or whether full recovery of the specimen is required at a later time prior to disturbance activities. The Authorized Officer and project proponent must be notified, the mitigation alternatives discussed including funding for recovery, and a decision reached as soon as possible. If avoidance or later recovery is selected for mitigation, the find should be stabilized, buried if needed to protect the fossils and context, and appropriate measures implemented to reduce adverse effects from natural or human causes.

4. During the survey, locations or areas that exhibit a lithology suggesting a high probability of subsurface fossil material must be recorded, and a recommendation for the need for on-site monitoring, spot-checking, or testing should be made in the report. This may include areas where no fossil material was found on the surface during the survey. The recommendation should consider the size and type of planned disturbance, such as the depth of a trenching operation or the acreage of surface disturbance.

5. Surveys must be performed only during times when the ground is visible and not frozen. This will often preclude surveys during winter months in many areas. Biological timing restrictions, such as critical nesting or birthing times, may confine or delay field activities. Project proponents should be informed of BLM's requirement for performing any field surveys as soon as possible and should be advised of the possibilities for delays in survey completion based on seasonal weather conditions or other management restrictions to allow for adequate scheduling of available time.

C. Report of Survey Findings. After completion of the field survey, the paleontologist must file a written report with the BLM and the designated repository. If required, a copy should also be filed with the project proponent. This report must summarize the results of the survey as well as appropriate geological and paleontological background information as described below. It should also include any recommendations for on-site monitoring or other mitigation. For small projects (less than 10 acres), the report must be filed within 30 days after completion of the survey unless specific approval for a different time frame has been received from the BLM. The time frame for submission of the report for large projects should be negotiated during project scoping. On a case-by-case basis, approval to begin project activities may be granted for those

portions of the project area noted to be less paleontologically sensitive prior to final approval of the report.

1. Reports of the general findings and the background information must be submitted to the BLM project manager or Authorized Officer (if appropriate), the Paleontology Lead or Regional Paleontologist, and each affected Field Office. Reports must include the following details, as applicable. Items (a) and (b) should appear at the beginning of the report and may be presented as a title page in multi-page reports. Some of these categories may be combined.

(a) Name, affiliation, address, date of report, and permit number (if consultant) of paleontologist doing the survey.
(b) Project name and number (if used), name of proponent, and general location of project.
(c) Date(s) of survey and names of any personnel assisting with the survey.
(d) Brief description of the proposed project, emphasizing potential impacts to paleontological resources.
(e) Description of background research conducted. (Include overview of known paleontological information, institutions consulted, previous surveys in the area, previous projects of similar nature in the area, and general description of survey techniques employed).
(f) Summary of regional and local geology. May reference earlier projects for relevant information.
(g) Summary of regional and local paleontology. May reference earlier projects for relevant information.
(h) Summary of the survey results.
(i) Significance of findings.
(j) Potential impacts to paleontological resources resulting from the project.
(k) Detailed mitigation recommendations that may lessen potential adverse impacts.
(l) Potential fossiliferous areas to allow for future assessment of sites if applicable.
(m) Cited and other pertinent references.
(n) Map of project area, indicating areas surveyed, known localities, and new discoveries.
(o) Relevant photos, diagrams, tables to aid in explaining, clarifying, or understanding the findings.
(p) Listing of collected material, including field numbers, field identifications, and elements, cross-referenced to locality field numbers. This list may be submitted in electronic format, preferably in spreadsheet format.
(q) BLM locality form (8270-3) or equivalent for each new locality (including localities where fossils were observed but not collected) with a 1:24000 scale map showing the localities (not reduced in scale during photocopying) (see items 2 and 3 below).

2. Exact locations of fossil localities contained in these reports are considered sensitive and must not be included in any public document. The BLM locality form (8270-3) or

equivalent, 1:24000 scale map showing the localities, and any other information containing specific fossil locations may be bound separately or placed in a separate section to allow for preservation of confidential locality data. A copy of this confidential section must be submitted to the Paleontology Lead (in some cases, two copies may be required). A copy for each affected Field Office may be required. Another copy must be submitted to the official repository with the collected materials.

3. BLM GPS recording and data standards must be used to report paleontological locality data. Existing USGS topographic maps are often based on the NAD27 standard, so locality data calculated from a map base must be converted before submission. Data must be recorded and reported with a mean error of +/- 12.5 meters or less, at a 95 percent confidence level. For small localities, data should be reported as point data. Larger polygonal localities should be reported using coordinates of a centroid and a description of the approximate size, or the key coordinate points of a bounding polygon. Linear features, such as roads or surveyed project boundaries, must be reported as line data. The 1:24000 scale map(s) accompanying the locality forms should graphically illustrate the locality, either as a point or an outline of the locality as appropriate, and be clearly labeled with the locality or field number.

D. Report Approval. The Authorized Officer will analyze the Survey Report for adequacy within 10 working days of receipt. Notification accepting the report, or explaining any identified deficiencies, will be sent to the consulting paleontologist and the project proponent with a copy placed in the project file. Any deficiencies must be corrected as soon as possible, usually initiated within five working days, and the report must be resubmitted for approval. Any resubmissions must be prompt, but consideration will be made for the amount of time needed for major corrections. Deficiencies directly affecting the survey, such as inadequate survey procedures or incomplete data, must be corrected before granting approval for the project to proceed. Deficiencies not directly affecting the survey, such as curation issues, will not prevent approval of the project, but must be corrected as soon as possible.

III. DETERMINATION OF FURTHER MITIGATION REQUIREMENTS

The need for additional mitigation to protect paleontological resources will be determined on a case-by-case basis. The Authorized Officer, in consultation with Regional Paleontologist or the Paleontology Lead, will analyze the Survey Report for survey findings and any mitigation recommendations. If no further mitigation is needed, the Authorized Officer will promptly notify the project proponent that there are no additional paleontological surveys or mitigation measures required, and the project may proceed pending any other approvals. The project file must be documented indicating acceptance of the survey report and identifying any additional mitigation requirements. If it is determined that additional mitigation efforts are needed to protect or preserve the paleontological resources, the project proponent will be notified as soon as possible. The Authorized Officer and/or the Paleontology Lead usually develop and approve the mitigation procedures or recommend a project be redesigned in consultation with the project proponent. Factors such as locality or specimen significance, economics, safety, and project urgency will be considered when developing mitigation measures. Additional mitigation

measures will be developed and implemented as timely as possible so as not to delay project actions.

A. Relocation. The preferred mitigation technique is to change the project location based on the results of the field survey. Relocation, however, may necessitate a field survey of the new area, as well as resurveys by other resource specialists. Anticipation of this contingency prior to or during the original survey may allow for survey of an expanded area at the same time. If relocation will eliminate impacts and is acceptable to all parties, then a report to the file, including a map showing the original and revised locations, must be completed documenting the change. Approval for the project to proceed in the revised location may then be granted by the Authorized Officer to the project proponent. When avoidance is not possible, appropriate mitigation may include excavation or collection (data recovery), stabilization, monitoring, protective barriers and signs, or other physical and administrative protection measures.

B. Deferred Fossil Collection. In some cases, fossil material may have been identified, but not completely collected during the initial field survey, such as a partial dinosaur or other large fossil assemblage. It may be possible to complete the recovery of this material and all related data prior to beginning construction activities, and thus mitigate the adverse impact. This may require a shift in the project schedule and must be coordinated with the project proponent. Approval by the Authorized Officer for the project to proceed will only be granted when recovery of the fossil material and field data is completed. A report to the file and the project proponent documenting the recovery and indicating that no further mitigation is required must be completed, and the report signed by the Authorized Officer. If the discovery cannot be fully collected within the available time frame, it may have to be avoided by relocating or redesigning the project.

IV. PROCEDURES FOR FIELD MONITORING

The purpose of on-site monitoring is to assess and collect any previously unknown fossil material uncovered during the project activities or soon after surface-disturbing actions. Based on the initial scoping, the field survey and recommendations, and the plan of operations, it may be necessary to require monitoring of surface-disturbing activities. Monitoring may be required as part of an overall mitigation for a project which was developed during the NEPA process, or upon the discovery of paleontological resources during project activities.

A. Monitoring Plan. A monitoring plan can be developed by a BLM paleontologist or a qualified paleontologist hired by the proponent. The plan must be appropriately scaled to the size and complexity of the anticipated monitoring. If developed by a third party, the appropriate Paleontology Lead or Regional Paleontologist shall review the plan for sufficiency prior to acceptance. Monitoring of the project may proceed when the monitoring plan is approved by the Authorized Officer. A monitoring plan indicates the treatments recommended for the area of the proposed disturbance and must minimally address the following:

1. The recommended approach to additional specimen collection, such as total or partial recovery or sampling; and

2. The specific locations and intensity of monitoring or sampling recommended for each geologic unit, stratigraphic layer, or area impacted.

Monitoring intensity is determined based on the analysis of existing data and/or field surveys and any previous monitoring efforts.

B. Types of Monitoring. There are two types of monitoring: 1) on-site, performed during ongoing operations, and 2) spot-checks, performed during or after disturbance, or at key times during the progress of the project.

1. On-site monitoring – In areas with a high probability for buried fossils, the presence of a monitor at the site of disturbance at all times that disturbance is occurring may be warranted. The need for a full-time monitor is based on the findings of the survey, the local geology, and the proposed actions. Efforts will be made to complete fossil recovery with minimal work stoppage. However, in some cases, an extended period of work stoppage may be required, so coordination with the project proponent or representative is important (see D below). Prior to beginning the monitoring work, the monitor, company supervisor, and machinery operators should agree on procedures for brief work stoppages to allow for examination of finds. It is critical that safety be of utmost concern because of the presence of heavy machinery and open trenches.

The monitor must assess any finds, collect loose fossil material and related data, and take appropriate steps to mitigate any current or potential damage. Consideration of the size of the expected fossils must also be considered; for example, microfossils may not be visible during excavation activities. It may be appropriate to collect samples of matrix for later recovery of microvertebrate fossils or other analyses. Activities planned to occur during night time should be assessed relative to the potential to uncover significant fossils. Fossils may not be visible at night in trenching or grading operations, so construction activities may need to be suspended during night time in sensitive areas.

2. Spot-checking – In areas with a moderate to high probability for unknown fossil material, it may be more appropriate to check only at key times rather than maintain continuous monitoring of operations. Key times for scheduling spot-checking are when the fossil-bearing bedrock is exposed to view or prior to placing spoil material back into the excavation. Examples of these key times may be when a pipeline trenching operation is complete but before pipe is placed and the trench backfilled or prior to redistribution of topsoil. Spot-checking requires close coordination with the project proponent and the paleontologist, and usually requires the paleontologist to be available on short notice. In some instances, it may be advantageous to allow rain and/or wind to erode away loose matrix and concentrate fossil material to increase visibility. The paleontologist will coordinate with the project proponent to allow sufficient time for this action to occur, as appropriate to conditions, expected fossil material, and construction schedules.

The paleontologist should report potentially fossiliferous areas in the final report to allow for future assessment of sites, even if no fossils were located during the project monitoring.

C. Types of Field Personnel. Depending on the complexity of the project, it may be necessary to employ a number of paleontology field personnel simultaneously. There may be a lack of fully qualified paleontologists to perform all the necessary monitoring during the scheduled times of construction. Use of additional personnel for field work is permissible, but Field Agents and Field Monitors (described below) must be requested by the Permittee and authorized by the BLM prior to field work.

1. **Principal Investigator** – The person listed as Permittee (Permit item 1a) on the Paleontological Resources Use Permit is the Principal Investigator (PI) and is responsible for all actions under the permit, for meeting all permit terms and conditions, and for the performance of all other personnel. This person is also the contact person for the project proponent and the BLM.

2. **Field Agent** – Other qualified paleontologists may perform field work independently of the PI under the conditions of this permit. Résumés must be submitted to BLM and must demonstrate qualifications equivalent to those of Permittees. Field Agents must be listed on the permit under "Name(s) of individual(s) responsible for planning, supervising, and carrying out fieldwork" (Permit item 8) or authorized in a separate letter from BLM. They must follow all the permit terms and conditions applicable to field work and must carry a copy of the permit, included terms and conditions, and separate authorizing letter (if used) while in the field. Field work results must be reported to the PI, who will then submit required reports.

3. **Field Monitor** – Field Monitors may be utilized for supplemental on-site monitoring of surface-disturbing activities when the PI or a Field Agent is performing field work elsewhere. Field Monitors must have sufficient field experience to demonstrate acceptable knowledge of fossil identification, collection methods, and paleontological techniques. The PI must supply a summary of each person's experience to the BLM prior to field work. Field Monitors must be approved by the BLM prior to performing field work and must carry a copy of the permit while in the field. The PI or Field Agent must be in communication with the Field Monitor using a portable communication device, such as a cell phone or two-way radio, and are required to be near enough to the Field Monitor to allow for prompt examination of all fossil discoveries (no more than two hours away) by the PI or Field Agent.

4. **Field Assistant** – Additional personnel not meeting the previously cited experience or knowledge levels may be utilized during field work, but must be under direct, on-site supervision of either the PI or a Field Agent as part of a supervised crew. Field assistants must have at least four to eight hours of training or experience received from a qualified paleontologist in identifying paleontological resources prior to performing field work or when first utilized in this capacity. A listing of all Field Assistants (including contact information) must be supplied prior to any field work. All discoveries made by a Field Assistant must be immediately reported to the PI or Field Agent on site. To ensure proper supervision, an appropriate ratio of Field Assistants per PI or Field Agent must be maintained. The complexity of the project, the area to be covered, and the experience of the assistants are some of the factors that should be considered in determining the proper ratio, but commonly five to seven assistants is the maximum number that can be supervised by one PI or Field Agent.

D. Work Stoppage. If significant fossil material is discovered during construction activities, the PI, Field Agents, and Field Monitors have the authority to temporarily halt surface disturbing actions until an assessment of the find is completed and appropriate protection measures taken. Efforts will be made to complete fossil recovery with minimal work stoppage. However, in some cases, an extended period of work stoppage may be required. If the paleontological resource can be avoided, mitigated, or collected within approximately two hours, work may resume after approval from the PI or Field Agent, and the Authorized Officer must be notified as soon as possible of the discovery and any mitigation efforts that were undertaken. If the find cannot be mitigated within a reasonable time (two hours), the concurrence of the Authorized Officer or official representative for a longer work stoppage must be obtained. Work may not resume until approval is granted from both the PI or Agent and the Authorized Officer.

V. FINAL PROJECT REPORT

Upon completion of all field work, including survey and monitoring, the PI must submit within 30 days, a written final report to the Authorized Officer, Paleontology Lead, and the designated repository. A copy of the report may be provided to the project proponent if required**,** but without the BLM Locality forms. Reports must include the following details. Items 1 and 2 should appear at the beginning of the report, and may be presented as a title page in multi-page reports.

1. Name, affiliation, address, date of report, and permit number (if consultant) of the paleontologist doing the survey.
2. Project name and number (if used), name of proponent, and general location of project.
3. Date(s) of the survey and names of any personnel assisting with the survey.
4. Brief description of project and expected impacts to paleontological resources.
5. A summary of mitigation performed.
6. A summary of findings, including important discoveries.
7. A description of potentially fossiliferous areas to allow for future assessment of sites, even if no fossils were located during the project monitoring.
8. A completed BLM locality form 8270-3 or equivalent for each new locality using Universal Transverse Mercator (UTM) NAD 83 coordinates, and 1:24000 scale maps with new localities plotted using points or polygons as appropriate. Locality forms, maps, and any other information containing specific fossil locations should be bound separately or assembled as a separate section to allow for preservation of confidential locality data.
9. List of specimen field numbers and field identifications of collected material, cross-referenced to the locality field number. This list may be submitted in electronic format, preferably in a spreadsheet format.

If the survey was performed by BLM, a report similar in contents must be written and filed in the project file, and the project proponent notified as soon as possible upon completion.

VI. COMPLETION OF MITIGATION RESPONSIBILITY

When the final report with the specimen inventory and the signed receipt of confirmation of museum deposition are accepted by the BLM, mitigation for paleontological resources related to the project will be considered completed. The project proponent will be notified in writing as soon as possible by the Authorized Officer after consulting with the Paleontology Lead or Regional Paleontologist and a copy of the notification placed in the project file.

The responsibility of the project proponent ends when appropriate mitigation related directly to the project is completed and final approval is received from the Authorized Officer. Any additional field collection, quarrying, final specimen preparation, etc. will be considered to be research, and will be the responsibility of the consulting paleontologist or another approved party. The project proponent will not be held responsible for completion of any research project. However, the project proponent can choose to sponsor further research. A separate research permit will be required for additional research activities.

VII. COLLECTIONS RESULTING FROM ASSESSMENT AND MITIGATION

Fossil specimens and related data collected from public lands during field surveys and mitigation remain the property of the Federal government. They must be placed in the approved repository(s) identified on the Paleontological Resource Use Permit held by the consulting paleontologist as soon as practical and receipt(s) of collections submitted to the BLM, but no later than 60 days after all field work is completed. Written approval from the Paleontology Lead or Regional Paleontologist is required if additional time is needed for transfer of all specimens and field data.

VIII. RESOURCE MANAGEMENT UPDATES

Based on findings resulting from any of the above steps, the project file, locality and specimen information, and other BLM data should be updated to reflect any new or modified information. Paleontology permit files should be checked and updated, as well as any other administrative information.

The PFYC Class assignments can be assessed based on the analysis, survey, and monitoring results. New information may indicate a change in the PFYC Class is appropriate for one or several geologic units. Other applications of the PFYC system should be considered, such as the use for impact analyses in planning documents or for survey and mitigation determinations for other projects. Any changes in classification must be made in consultation with the Paleontology Lead or Regional Paleontologist to maintain consistency across Field Office boundaries.

APPENDIX A – DEFINITIONS

(As applicable to BLM management of paleontological resources)

Alluvium – A general term for clay, silt, sand, gravel, or similar unconsolidated detrital material [fragments of rock or mineral material derived from older rocks] deposited during relatively recent geologic time by a stream or other body of running water as a sorted or semi-sorted sediment in the bed of the stream or its flood plain or delta, or as a cone or fan at the base of a mountain slope; especially, such a deposit of fine-grained texture (silt or silty clay) deposited during a time of flood (*from* American Geological Institute (AGI), Glossary of Geology, 1972 ed.)

Alluvium may contain paleontological resources in older alluvial deposits. The location on the landscape often will provide clues to the potential for paleontological resources within alluvial deposits. As an example, alluvium developed near major river courses or lake margins has a much higher potential to contain significant paleontological resources than alluvium (colluvium) formed from slope wash.

Approved Repository – Meets the Department of the Interior 411 Departmental Manual (DM) provisions for museum property, including capability for providing adequate long-term curatorial services, such as a physically secure environment, and maintaining professional staff qualified to catalog, care for, preserve, retrieve, and loan, where appropriate, these materials and associated records.

Bedrock – A general term for the rock, usually solid, that underlies soil or other unconsolidated, surficial material (*from* American Geological Institute (AGI), Glossary of Geology, 1972 ed.) For paleontological purposes, bedrock generally excludes alluvium, colluvium, sand dunes, and loess (fine-grained blanket deposit of marl or loam). In certain situations, bedrock may contain recent soils/sediments with fossils.

Colluvium – A general term applied to any loose, heterogeneous, and incoherent mass of soil material or rock fragments deposited chiefly by mass-wasting, usually at the base of a steep slope or cliff; e.g., talus, cliff debris, and avalanche material. Also, alluvium deposited by unconcentrated surface run-off or sheet erosion, usually at the base of a slope (*from* American Geological Institute (AGI), Glossary of Geology, 1972 ed.)

Field Agent – Other qualified paleontologists may perform field work independently of the PI under the conditions of this permit. Résumés must be submitted to BLM and must demonstrate qualifications equivalent to those of Permittees. Field Agents must be listed on the permit under "Name(s) of individual(s) responsible for planning, supervising, and carrying out fieldwork" (Permit item 8) or authorized in a separate letter from BLM. They must follow all the permit terms and conditions applicable to field work and must carry a copy of the permit, included terms and conditions, and separate authorizing letter (if used) while in the field. Field work results must be reported to the PI, who will then submit required reports.

Field Assistant – Additional personnel not meeting the previously cited experience or knowledge levels may be utilized during field work, but must be under direct, on-site supervision

of either the PI or a Field Agent as part of a supervised crew. Field assistants must have at least 4 to 8 hours of training or experience received from a qualified paleontologist in identifying paleontological resources prior to performing field work or when first utilized in this capacity. A listing of all Field Assistants (including contact information) must be supplied prior to any field work. All discoveries made by a Field Assistant must be immediately reported to the PI or Field Agent on site. To ensure proper supervision, an appropriate ratio of Field Assistants per PI or Field Agent must be maintained. The complexity of the project, the area to be covered, and the experience of the assistants are some of the factors that should be considered in determining the proper ratio, but commonly five to seven assistants is the maximum number that can be supervised by one PI or Field Agent.

Field Monitor – Field Monitors may be utilized for supplemental on-site monitoring of surface-disturbing activities when the PI or a Field Agent is performing field work elsewhere. Field Monitors must have sufficient field experience to demonstrate acceptable knowledge of fossil identification, collection methods, and paleontological techniques. The PI must supply a summary of each person's experience to the BLM prior to field work. Field Monitors must be approved by BLM prior to performing field work and must carry a copy of the permit while in the field. The PI or Field Agent must be in communication with the Field Monitor using a portable communication device, such as a cell phone or two-way radio, and are required to be near enough to the Field Monitor to allow for prompt examination of all fossil discoveries (no more than two hours) by the PI or Field Agent.

Field Survey – Pedestrian (walking) surveys performed in areas where significant fossils are expected to occur within the boundary or immediate vicinity of an anticipated disturbance. Surveys are performed by a qualified paleontologist or BLM Regional Paleontologist or other officially appointed BLM employee prior to any surface disturbing activities. Survey activities also include concurrent collection of significant fossils.

Land Tenure Adjustments/Change in Title – Changes in ownership or administration of surface or mineral estates, typically exchanges or sales, which may result in a change in ownership or control of paleontological resources.

Monitoring – a) On-site observation during all surface disturbing activities to assess and collect any previously-unknown fossil material uncovered by the project activities. b) Examination of excavation or spoil piles at key times during project activities. Monitoring must be performed by a permitted paleontologist, field agent, or field monitor (see section ***IV.C***.), Regional Paleontologist, or other officially appointed BLM employee, and occurs during or soon after surface disturbing actions.

Paleontological Locality (Locality) – A geographic point or area where a fossil or associated fossils are found in a related geological context. A paleontological locality is confined to a discrete stratigraphic layer, structural feature, or physiographic area.

Paleontology Program Coordinator (Paleontology Coordinator) – The employee designated by the local BLM Office Manager to manage paleontological resource issues, including planning, mitigation, budget, and other administrative duties. The local point of contact for

paleontological resource use permittees, the State Office Paleontology Program Lead, and the Regional Paleontologist. The employee is usually a geologist or archaeologist.

(a) In some offices, additional employees may be designated by the supervisor to determine the need for field surveys and monitoring for some projects, or other duties in support of the paleontology program. The scope of duties for these additional employees must be approved by the Paleontology Program Lead and closely coordinated with the Paleontology Coordinator.

(b) A few current BLM employees may meet the same professional qualifications that are required for a BLM Paleontological Resources Use Permit applicant. BLM-approved training and field experience may also allow employees to gain sufficient background to achieve competency in the field. With the approval of the Regional Paleontologist and the Office Manager or Deputy State Director, these employees may be designated as qualified to perform field surveys or monitoring. The current availability of these employees must also be approved by the unit manager or Deputy State Director, typically on a project-by-project basis or within a defined time period. Depending on official duties, local roles and responsibilities, and management preferences, these employees may or may not be the Paleontology Coordinator.

Paleontology Program Lead (Paleontology Lead) – Any one of the following: the Regional Paleontologist in the states with an identified position; the paleontologist at Grand Staircase-Escalante National Monument; or the State Office Archeologist in the states without a Regional Paleontologist.

Principal Investigator – The person listed as Permittee (Permit item 1a) on the Paleontological Resources Use Permit is the Principal Investigator (PI) and is responsible for all actions under the permit, for meeting all permit terms and conditions, and for the performance of all other personnel. This person is also the contact person for the project proponent and the BLM.

Regional Paleontologist – The BLM paleontologist that provides professional expertise in paleontology, and is responsible for interpreting relevant laws, authorities, and policy for the administration of the BLM paleontology program for all States in his/her respective region, and as the program interface between Field and/or District Offices, State Offices, and the Washington Office. In some cases, the Regional Paleontologist also serves as the State Office Paleontologist.

Significant Paleontological Resource (syn. **Significant Fossil Resource**) – Any paleontological resource that is considered to be of scientific interest, including most vertebrate fossil remains and traces, and certain rare or unusual invertebrate and plant fossils. A significant paleontological resource is considered to be scientifically important because it is a rare or previously unknown species, it is of high quality and well-preserved, it preserves a previously unknown anatomical or other characteristic, provides new information about the history of life on earth, or has identified educational or recreational value. Paleontological resources that may be considered to not have paleontological significance include those that lack provenience or context, lack physical integrity because of decay or natural erosion, or that are overly redundant or are otherwise not useful for research.

Vertebrate fossil remains and traces include bone, scales, scutes, skin impressions, burrows, tracks, tail drag marks, vertebrate coprolites (feces), gastroliths (stomach stones), or other physical evidence of past vertebrate life or activities.

Soil – The natural medium for growth of land plants (*from* American Geological Institute (AGI), Glossary of Geology, 1972 ed.) Generally, well-developed soils do not contain paleontological resources. However, the C horizon (the substratum above bedrock that is little affected by soil forming processes) may occasionally contain Pleistocene-aged fossils.

Stipulations – Written conditions that may restrict or impose limits on approved activities, or require that certain procedures be followed. The general usage herein encompasses several formal terms specific to other use authorizations such as Mitigation, Terms and Conditions, Conditions of Approval, and Standard Stipulations.

Surface disturbance – Disruption of the ground surface and subsurface. Disruption may damage or destroy significant paleontological resources and their geological context.

– Generally excludes: fire (but not fire activities, see below), vegetation mowing, weed spraying, grazing, natural erosion, fence building

– Some activities that may impact the ground surface and must be assessed on a case-by-case basis are:

* Mechanized vegetative treatments – chaining, sagebrush chopping, etc
* Seismic activities – vibroseis techniques, cross-country travel
* Fire management activities – line building, brush removal and thinning using mechanized equipment
* Recreational activities – OHV, rock collecting, mountain biking, public events

Voucher Specimen – A representative sample that verifies the kind of fossil material found during a field survey, and is collected and curated in an approved repository along with its associated field data.

CALIFORNIA ENERGY COMMISSION
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July 30, 2012

Mr. Todd Stewart
Senior Director of Project Development
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1999 Harrison Street, Ste. 2150
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RIO MESA SOLAR ELECTRIC GENERATING FACILITY (11-AFC-4) PALEONTOLOGICAL RESOURCES EVALUATION PHASE EXCAVATION AND STAFF COMMENTS TO APPLICANT RESPONSE TO DATA REQUESTS NO. 126 – 130, PALEONTOLOGICAL RESOURCES DELINEATION PLAN

Dear Mr. Stewart:

The Energy Commission Committee for the Rio Mesa Solar Electric Generating Facility (Rio Mesa SEGF) has set milestones for the licensing process. These include specific dates for publication of the Preliminary and Final Staff Assessments (PSA/FSA). Because the applicant has not provided the paleontological information requested in Data Requests Set 1B (Nos.126-130), the delineation of the paleontological resource in the project area will be incomplete in the PSA. The absence of this data will also preclude staff's ability to adequately assess, in the PSA, the potential effects that the proposed project would have on paleontological resources buried beneath the present surface of the project area or to include a construction monitoring plan appropriate to the project.

While we understand the applicant initially filed objections[1] to the data requests referenced above, your provision of some of the information requested subsequent to the objections and engagement with staff on the topic, as indicated in the data responses and through follow-up discussions, led us to believe that your were willing to find a way to provide staff with sufficient information to complete the required analysis, obviating the need for a motion to compel. Staff has provided guidance in discussions and data requests to assist the applicant in developing plans to address the location of the paleontological resource at the project site[2]. This letter is intended to encapsulate staff's recommendations for how the delineation should be conducted and identify the timeframe by which staff will need the information in order to complete its analysis for the Final Staff Assessment.

[1] Applicant's Response to Data Request Set 1B TN-64486
[2] Report of Conversation Re Delineation of Areas with Paleo Resources TN-66264

Paleontological Resources Delineation Phase Excavation (Delineation Plan)

1. Energy Commission staff must receive from the applicant a Delineation Plan for paleontological resources on the project site as soon as possible. Staff has committed to a two-week review. However, the applicant will need to expedite submission of the plan, requiring no further substantive revisions, for final staff approval.

2. Once staff approves the Delineation Plan, fieldwork can begin immediately. However, the applicant will need to complete the paleontological resources delineation fieldwork in time to return the results to staff, in a form consistent with the approved plan, no later than **August 24, 2012**. The results of the delineation fieldwork must provided in a Paleontological Resources Delineation Report that includes a recommendation on whether further delineation activities are required to adequately delineate the resource.

3. Upon review of the Paleontological Resources Delineation Report, staff will determine whether additional delineation efforts are required or not and advise the applicant of the need for further efforts by September 4, 2012.

   Should this be necessary, the applicant will need to:

   a. prepare, submit, and receive approval of a supplemental Paleontological Resources Delineation Plan;

   b. execute the related fieldwork; and

   c. interpret collected data and prepare a Supplemental Paleontological Resources Delineation Report.

   Energy Commission staff must receive from the applicant the Supplemental Paleontological Resources Delineation Report, if necessary, no later than **December 3, 2012.**

As a basis for developing the schedule above, staff provides the following comments on your recent paleontological resource submittals.

Energy Commission staff has reviewed the Rio Mesa Application for Certification (AFC), the Confidential Paleontological Technical Report (Confidential Appendix 5.8a of the AFC), the Paleontology Literature and Records Review (AFC, Appendix 5.8B), the Geoarchaeological Sensitivity Analysis, the Addendum to the Paleontological Technical Report, the applicant's objection to Data Requests Nos.126-130, information in the applicant's Response to Data Requests Nos. 126-127c, and participated in workshops, teleconferences, phone calls and email transmissions with applicant representatives and the applicant's consultants.

As presented in the AFC, the project owner's paleontological consultant discovered a previously unknown paleontological resource that, since discovery, has yielded nearly 800 vertebrate fossils. The applicant's paleontological consultant indicated that the fossils recently discovered on the project site are classified using the Bureau of Land Management's (BLM) Potential Fossil Yield Classification system as Class 4a, which is considered to be a high value paleontological resource.

The areal extent and thickness of this deposit containing the paleontological resources is unknown. The average density of fossils within this unit is also unknown. In order to address project impacts to this recently discovered resource, its location within and around the project must be determined. Staff concluded that it is likely that subsurface excavation will be required to determine the thickness and lateral extent of this deposit.

While the AFC provided proposed mitigation measures related to the discovery of fossils during construction excavations, there was no discussion regarding the potential significant impact to existing paleontological resources caused by heliostat pedestal installation. The insertion of heliostat pedestals using vibratory techniques will not allow the discovery and recovery of in-place fossils. Where encountered by this construction method, the fossils will be destroyed and no scientific value of these resources realized. Staff provided the project owner with data requests (Set 1B, Nos. 126 - 130) in an attempt to understand the areal extent, thickness and fossil density of the fossil bearing unit. The applicant objected to the data requests. The applicant argued that the information requested by staff was not reasonably available to the applicant. The applicant stated that further delineation of the paleontological resource could not be reasonably done without significant excavations, which would be extremely time consuming and expensive.

Staff continues to conclude that it will be necessary to excavate a number of trenches in the proposed project area to delineate the horizontal and vertical extent of the fossiliferous strata and evaluate the density of fossils within the strata to determine the significance of this resource. Staff has repeatedly emphasized this position with the applicant on numerous occasions and requested that the applicant provide an excavation plan to assure excavations will yield the information necessary to adequately delineate the resource. Staff provided the applicant with some guidance on the type of elements that should be addressed in an excavation plan.

Specifically staff identified the following as the type of elements required in an excavation plan to adequately delineate the paleontological resource:

1) Provide a revised excavation map (Figure 1, Combined Paleosol and 2011/2012 Geotechnical Points, Rio Mesa Solar Electrical Generating Facility, prepared by URS, dated 4/11/2012), that shows the proposed and previous (geotechnical) excavations on the amended site.
2) Provide the sequence of the proposed exploration. Will excavation start at one location and logically progress across the site?

3) Describe the specific equipment planned to perform the excavations.
4) Describe the excavation methodology. How will the excavations be advanced?
5) Discuss the final proposed depth of excavations. What are the contingencies for addressing conditions that prevent attaining final proposed depth.
6) Provide the sample collection and curation methodologies and sample depth intervals planned.
7) Provide the method planned for recording subsurface conditions.
8) Provide a description of the analyses to be performed on collected samples.
9) Provide a description o how the results of the analyses will be reported.
10) Describe the content of the resulting report.
11) Provide the schedule for conducting the field work, analyzing samples, interpreting resulting data and providing a report documenting findings.

Staff understands that subsurface excavations will be performed for additional geotechnical evaluation and geoarcheology exploration. Staff recommended that these additional excavations be incorporated into a "site wide excavation plan" that would include the paleontological resources delineation excavations to consolidate resources and minimize expenses while obtaining site wide subsurface information suitable for use by multiple resource disciplines.

The applicant's consultant assured staff that the Geoarchaeological Research Design *(Geoarchaeological Research Design, BrightSource Energy, Inc., Rio Mesa Solar Project, Riverside County, California* (Research Design) dated May 2012) incorporated the elements previously discussed that are necessary to adequately delineate the paleontological resource. However, staff found that these elements were not addressed for paleontological resources in the referenced document.

On June 28, 2012, staff provided applicant with a letter providing comments on the Geoarchaeological Research Design. Many of the comments provided to applicant for the Geoarchaeological Research Design are applicable for the development of a Paleontological Resources Delineation Plan. Especially the description of the protocol for logging excavated trenches.

The field methods protocol for the observation and documentation of each trench, as described in the Geoarchaeological Research Design, will be to:

a. produce a measured profile drawing of one sidewall from each excavated trench, where the drawings are produced on the basis of in-trench observation and the cleaning of trench sidewalls, as necessary, to accurately trace out stratigraphic contacts;

b. produce reasonably detailed written descriptions, appropriate to the character of each type of stratigraphic unit, of each lithostratigraphic and pedostratigraphic unit down a one meter-wide, shaved profile section along the sidewall for which the measured profile drawing is made;

c. produce a photograph of the measured profile sidewall, with a metric scale and north arrow;

d. for every five linear meters of trench edge, screen a small (3, 5 gallon buckets) sample of sediment from the major lithostratigraphic units in the measured profile, or, where lithostratigraphic units are not apparent, from arbitrary levels in each measured profile, every 0.5 meters of depth, through 1/4 inch hardware cloth; and

e. collect enough soil humate samples, in the absence of other reliable chronometric data, to reliably assay and radiocarbon date the master stratigraphic column for each landform and each major landform feature, where the total number of such samples for the entirety of the subject phase of Paleontological resource delineation will not exceed 75.

Staff requests that this information be incorporated into the Delineation Plan. Staff believes that the incorporation of the above comments into the plan, and the execution of the resultant plan, would provide the data necessary to adequately delineate the lateral and vertical extent of the paleontological resource and adequately assess the potential impacts of the proposed project's construction and operation on paleontological resources buried beneath the surface of the proposed project area; and refine the extent of construction monitoring that would be necessary, should the project be approved. The U.S. Bureau of Land Management's "Guidelines for Assessment and Mitigation of Potential Impacts to Paleontological Resources" supports this approach and also be viewed at:

http://www.blm.gov/pgdata/etc/medialib/blm/wo/Information_Resources_Management/policy/im_attachments/2009.Par.38537.File.dat/IM2009-011_att1.pdf

Staff also requests that the applicant provide to staff regular, but at least monthly, status updates on the progress of these data requests. Please confirm the applicant's intent to provide staff with the information requested in this letter no later than **August 10, 2012**. Because this information is absolutely critical to staff's analysis, any objection to providing the requested information in the timeframe noted above will necessitate staff bringing the matter before the Rio Mesa SEGF Committee with a motion to compel. If you have any questions, please call me at (916) 651-3765 or e-mail me at pierre.martinez@energy.ca.gov.

Sincerely,

Pierre Martinez, AICP
Project Manager

cc: Docket 11-AFC-4
Casey Weaver, Energy Commission

BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA
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APPLICATION FOR CERTIFICATION
FOR THE *RIO MESA SOLAR*
ELECTRIC GENERATING FACILITY

DOCKET NO. 11-AFC-04
PROOF OF SERVICE
(Revised 7/11/12)

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DECLARATION OF SERVICE

I, Cenne Jackson , declare that on July 30, 2012 , I served and filed a copy of the attached document dated July 30, 2012 . This document is accompanied by the most recent Proof of Service list, located on the web page for this project at: http://www.energy.ca.gov/sitingcases/riomesa/index.html.

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

(*Check all that Apply*)

For service to all other parties:

x Served electronically to all e-mail addresses on the Proof of Service list;

x Served by delivering on this date, either personally, or for mailing with the U.S. Postal Service with first-class postage thereon fully prepaid, to the name and address of the person served, for mailing that same day in the ordinary course of business; that the envelope was sealed and placed for collection and mailing on that date to those addresses NOT marked "e-mail preferred."

AND

For filing with the Docket Unit at the Energy Commission:

x by sending electronic copies to the e-mail address below (preferred method); *OR*

____ by depositing an original and 12 paper copies in the mail with the U.S. Postal Service with first class postage thereon fully prepaid, as follows:

CALIFORNIA ENERGY COMMISSION – DOCKET UNIT
Attn: Docket No. 11-AFC-04
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512
docket@energy.ca.gov

OR, if filing a Petition for Reconsideration of Decision or Order pursuant to Title 20, § 1720:

____ Served by delivering on this date one electronic copy by e-mail, and an original paper copy to the Chief Counsel at the following address, either personally, or for mailing with the U.S. Postal Service with first class postage thereon fully prepaid:

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

Originally Signed By Cenne Jackson

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APPLICATION FOR CERTIFICATION
FOR THE *RIO MESA SOLAR*
ELECTRIC GENERATING FACILITY

DOCKET NO. 11-AFC-04
PROOF OF SERVICE
(Revised 8/14/12)

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DECLARATION OF SERVICE

I, Darin Neufeld, declare that on October 9, 2012, I served and filed a copy of the attached document Paleontological Resource Delineation Work Plan dated September, 2012. This document is accompanied by the most recent Proof of Service list, located on the web page for this project at:
http://www.energy.ca.gov/sitingcases/riomesa/index.html.

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

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

Original Signed By
Darin Neufeld

*indicates change