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5.16 PALEONTOLOGICAL RESOURCES

Hydrogen Energy California LLC (HECA LLC) is proposing an Integrated Gasification Combined Cycle (IGCC) polygeneration project (HECA or Project). The Project will gasify a fuel blend of 75 percent coal and 25 percent petroleum coke (petcoke) to produce synthesis gas (syngas). Syngas produced via gasification will be purified to hydrogen-rich fuel, and used to generate a nominal 300 megawatts (MW) of low-carbon baseload electricity in a Combined Cycle Power Block, low-carbon nitrogen-based products in an integrated Manufacturing Complex, and carbon dioxide (CO_2) for use in enhanced oil recovery (EOR). CO_2 from HECA will be transported by pipeline for use in EOR in the adjacent Elk Hills Oil Field (EHOF), which is owned and operated by Occidental of Elk Hills, Inc. (OEHI). The EOR process results in sequestration (storage) of the CO_2.

Terms used throughout this section are defined as follows:

- **Project or HECA.** The HECA IGCC electrical generation facility, low-carbon nitrogen-based products Manufacturing Complex, and associated equipment and processes, including its linear facilities.
- **Project Site or HECA Project Site.** The 453-acre parcel of land on which the HECA IGCC electrical generation facility, low-carbon nitrogen-based products Manufacturing Complex, and associated equipment and processes (excluding off-site portions of linear facilities), will be located.
- **OEHI Project.** The use of CO_2 for EOR at the EHOF and resulting sequestration, including the CO_2 pipeline, EOR processing facility, and associated equipment.
- **OEHI Project Site.** The portion of land within the EHOF on which the OEHI Project will be located and where the CO_2 produced by HECA will be used for EOR and resulting sequestration**.**
- **Controlled Area.** The 653 acres of land adjacent to the Project Site over which HECA will control access and future land uses.

This introduction provides brief descriptions of both the Project and the OEHI Project. Additional HECA Project description details are provided in Section 2.0. Additional OEHI Project description details are provided in Appendix A of this Application for Certification (AFC) Amendment.

5.16.1 HECA Project Linear Facilities

The HECA Project includes the following linear facilities, which extend off the Project Site (see Figure 2-7, Project Location Map):

- **Electrical transmission line.** An approximately 2-mile-long electrical transmission line will interconnect the Project to a future Pacific Gas and Electric Company (PG&E) switching station east of the Project Site.

- **Natural gas supply pipeline.** An approximately 13-mile-long natural gas interconnection will be made with PG&E natural gas pipelines located north of the Project Site.

- **Water supply pipelines and wells.** An approximately 15-mile-long process water supply line and up to five new groundwater wells will be installed by the Buena Vista Water Storage District (BVWSD) to supply brackish groundwater from northwest of the Project Site. An approximately 1-mile-long water supply line from the West Kern Water District (WKWD) east of the Project Site will provide potable water.

- **Coal transportation.** HECA is considering two alternatives for transporting coal to the Project Site:

  - **Alternative 1, rail transportation.** An approximately 5-mile-long new industrial railroad spur that will connect the Project Site to the existing San Joaquin Valley Railroad (SJVRR) Buttonwillow railroad line, north of the Project Site. This railroad spur will also be used to transport some HECA products to market.

  - **Alternative 2, truck transportation.** An approximately 27-mile-long truck transport route via existing roads from an existing coal transloading facility northeast of the Project Site. This alternative was presented in the 2009 Revised AFC.

5.16.2 OEHI Project

OEHI will be installing the CO_2 pipeline from the Project Site to the EHOF, as well as installing the EOR Processing Facility, including any associated wells and pipelines needed in the EHOF for CO_2 EOR and sequestration. The following is a brief description of the OEHI Project, which is described in more detail in Appendix A of this AFC Amendment:

- **CO_2 EOR Processing Facility.** The CO_2 EOR Processing Facility and 13 satellites are expected to occupy approximately 136 acres within the EHOF. The facility will use 720 producing and injection wells: 570 existing wells and 150 new well installations. Approximately 652 miles of new pipeline will also be installed in the EHOF.

- **CO_2 pipeline.** An approximately 3-mile-long CO_2 pipeline will transfer the CO_2 from the HECA Project Site south to the OEHI CO_2 EOR Processing Facility.

5.16.3 Paleontological Resources Study Area

The Paleontological Resources Study Area (PRSA) evaluated in this section consists of the area within a 1-mile radius of the 453-acre HECA Project Site, HECA linear facilities and the OEHI CO_2 pipeline north of the California Aqueduct. All of the proposed HECA linear facilities, as well as the OEHI CO_2 pipeline north of the California Aqueduct, were surveyed by PaleoResource Consultants (PRC) for paleontological resources. PRC's confidential technical report showing locations of fossil discoveries is provided in Appendix O. No impacts to paleontological resources related to coal transportation Alternative 2 (truck transportation) are expected because the coal transloading facility is an existing use and trucks would use existing roads. Therefore, coal transportation Alternative 2 (truck transportation) is not further evaluated in this section. This section does address potential impacts associated with Alternative 1 (rail transportation).

OEHI conducted the surveys for the area south of the California Aqueduct along the current CO_2 pipeline alignment, as well as for the CO_2 EOR Processing Facility. The results of those surveys are presented in Appendix A-1 of this AFC Amendment, Section 4.5.

5.16.4 Introduction

Paleontological resources (fossils) are the remains or traces of prehistoric animals and plants. Fossils are important scientific and educational resources because of their use in (1) documenting the presence and evolutionary history of particular groups of now extinct organisms, (2) reconstructing the environments in which these organisms lived, (3) determining the relative ages of the strata in which they occur, and (4) determining the geologic events that resulted in the deposition of the sediments in which they were buried.

This section of the AFC Amendment summarizes the potential environmental impacts on paleontological resources that could result from construction of the Project. This paleontological resources inventory and impact assessment was prepared by Dr. Lanny H. Fisk, Ph.D., a California-licensed professional geologist (PG) and Principal Paleontologist, and by Stephen J. Blakely, Project Manager and Staff Paleontologist, both with PaleoResource Consultants (PRC). It meets all requirements of the California Energy Commission (CEC) regulations (CEC, 2007) and the standard measures for mitigating adverse construction-related environmental impacts on significant paleontological resources established by the Society of Vertebrate Paleontology (SVP, 1996 and 2010).

5.16.5 Affected Environment

5.16.5.1 Geographic Location

The Project Site is located near the unincorporated community of Tupman in western Kern County, California (Figure 2-7) within Section 10 of Township 30 South, Range 24 East. The site is located approximately 7 miles west of Bakersfield, California, and is near the EHOF Unit. The center of the site is at approximately latitude 35°19'41" north and longitude 119°23'08" west.

At present, the majority of the Project Site is used for agricultural purposes, including cultivation of cotton, alfalfa, and onions. Existing surface elevations vary from about 288 feet above mean sea level (msl) in the southeast corner to about 285 feet above msl in the northwest corner. Elevation along the right-of-way (ROW) of linear facilities varies greatly, from less than 300 feet to over 900 feet.

The PRSA is located near the northern edge of the Elk Hills, which are near the western border of the San Joaquin Valley. The San Joaquin Valley comprises roughly the southern two-thirds of the major north-northwest-oriented synclinorium called either the Valle Grande (Clark, 1929), Great Valley (Fenneman, 1931; Hackel, 1966), Great Interior Valley (Harradine, 1950), Great San Joaquin Valley (Piper *et al.*, 1939; Davis *et al.*, 1957), or California Trough (Piper *et al.*, 1939). The Great Valley Physiographic Province is located between the Sierra Nevada Physiographic Province on the east and the Coast Ranges Physiographic Province on the west

(Jahns, 1954). The Elk Hills are approximately 17 miles long and 7 miles wide; they reach an elevation of 1,551 feet, which is approximately 1,200 feet above the floor of the San Joaquin Valley (Berryman, 1973).

5.16.5.2 Regional Geologic Setting

The general geology of the San Joaquin Valley has been described in some detail by Mendenhall (1908), Mendenhall *et al.* (1916), Piper *et al.* (1939), Hoots *et al.* (1954), Davis *et al.* (1957, 1959, 1964), Davis and Hall (1959), Hoffman (1964), Croft and Wahrhaftig (1965), Hackel (1966), Croft and Gordon (1968), Bull (1973), Page (1986), Marchand (1977), Bartow and Marchand (1979), Marchand and Allwardt (1981), Lettis (1988), Bartow (1987, 1991), Beyer and Bartow (1988), Callaway and Rennie (1991), and Lettis and Unruh (1991), among others.

Only a few authors have specifically described the geology in the vicinity of the unincorporated community of Tupman or the Elk Hills, including Woodring *et al.* (1932), Porter (1943), Wells (1952), Adkison (1973), Berryman (1973), Dibblee (1973), and Maher *et al.* (1975). Surficial geologic mapping of the Project vicinity has been provided at a scale of 1:1,000,000 by Wahrhaftig *et al.* (1993); at a scale of 1:750,000 by Jennings (1977); at a scale of 1:500,000 by Mendenhall *et al.* (1916), Jenkins (1938), and Bartow (1987, 1991); at a scale of approximately 1:320,000 by Morton and Troxel (1962); at a scale of 1:250,000 by Smith (1964); at a scale of 1:62,500 by Dibblee (1972); at a scale of 1:31,680 by Woodring *et al.* (1932); and at a scale of 1:24,000 by Dibblee (2005a-f).

The information in these geologic maps and published and unpublished reports form the basis of the following discussion. Individual maps and publications are incorporated into this section and referenced where appropriate. For obtaining the older geological literature, the exhaustive compilation entitled Geological Literature on the San Joaquin Valley of California by Maher *et al.* (1973) was particularly helpful. The aspects of geology pertinent to this report are the types, distribution, and age of sediments immediately underlying the Project area and their probability of producing fossils during construction. The site-specific geology in the vicinity of the Project is discussed separately below.

The San Joaquin Valley is a great structural depression between the westerly tilted Sierra Nevada block on the east and the complexly folded and faulted Coast Ranges on the west. The San Joaquin Valley is filled with a thick sequence of Mesozoic and Tertiary marine and non-marine sediments covered by a relatively thin veneer of Quaternary alluvial sediments (Bailey, 1966). The Elk Hills are located along the western edge of the San Joaquin Valley, where they rise above the surrounding, relatively flat valley. The Elk Hills are the topographic expression of the Elk Hills Anticline, which is part of the *en echelon* folding of the Tertiary and Quaternary sedimentary strata along the western side of the San Joaquin Valley (White, 1987). The axes of these folds trend generally northwest-southeast, and are associated with strain caused by movement along the San Andreas Fault (White, 1987).

5.16.5.3 Resource Inventory Methods

To develop a baseline paleontological resource inventory of the Project Site and surrounding geographical and geological area, and to assess the potential paleontological productivity of each stratigraphic unit present, the published as well as available unpublished geological and paleontological literature was reviewed. Stratigraphic and paleontologic inventories were compiled, synthesized, and evaluated (see below). These methods are consistent with CEC (2007) and SVP (2010) procedures for assessing the importance of paleontological resources in areas of potential environmental effect.

Geologic maps and reports covering the bedrock and surficial geology of the Project vicinity were reviewed to determine the exposed and subsurface rock units, to assess the potential paleontological productivity of each rock unit, and to delineate their respective areal distribution in the Project area. Museum records searches were conducted at the University of California Museum of Paleontology (UCMP) at Berkeley, the Los Angeles County Natural History Museum (LACM), and the San Bernardino County Museum of Natural History (SBMNH) to determine whether any of the stratigraphic units found within the Project vicinity had previously yielded significant paleontological resources. In addition, aerial photographs of the area were examined to aid in determining the areal distribution of distinctive sediment and soil types. No subsurface exploration was conducted for this assessment. However, a PRC field paleontologist was present during augering for geotechnical boreholes at the former HECA Project Site, which was approximately 1 mile south of the current Project Site, and did observe subsurface stratigraphy and fossils (see the discussion below).

A field survey, which included visual inspection of exposures of potentially fossiliferous strata in the Paleontological Resources Study Area, was conducted to document the presence of sediments suitable for containing fossil remains and the presence of any previously unrecorded fossil sites. All of the proposed HECA linear facilities as well as the OEHI CO_2 pipeline north of the California Aqueduct were surveyed by PRC for paleontological resources. The field survey for this assessment was conducted over several site visits from March 2008 through April 2010.

- Dr. Lanny H. Fisk, PhD, PG, the principal paleontologist with PRC, surveyed on March 4, and March 12, 2008; from May 14 through May 15, 2008; and from May 20 to May 21, 2008.

- Dr. Hugh M. Wagner, PhD, a senior paleontologist with PRC, surveyed from March 4 to March 8, 2008; from March 9 to March 12, 2008; and on April 29, 2008.

- Mr. Patrick W. Riseley, PG, a field paleontologist with PRC, surveyed from March 2 to March 7, March 9 to March 13, March 19 to March 21, and on March 31, 2008; on April 4 and from April 6 to April 7, 2008; and from May 20 to May 22, 2008.

- David M. Maloney, a field supervisor with PRC, surveyed the site on March 5 and March 6, 2008; from May 20 to May 22, 2008; from March 17 to March 20, 2009; on December 8, 2009; and on April 6, 2010.

- Stephen J. Blakely, staff paleontologist with PRC, surveyed from January 22 to January 23, 2009, and from March 17 to March 20, 2009.

- Levi R. Pratt, a field paleontologist with PRC, surveyed from January 22 to January 23, 2009.

- John N. Adrian, a field paleontologist with PRC, surveyed on March 31 and from April 1 to April 4, 2008.

- Phil R. Peck, a field paleontologist with PRC, surveyed May 8 to May 9, May 12 to May 15, May 20 to May 23, and on May 28, 2008.

- Richard J. Serrano, a field paleontologist with PRC, surveyed from May 8 to May 10, May 12 to May 15, May 20 to May 24, and May 28 to May 29, 2008. During the field survey, stratigraphy was observed in arroyos, hillslopes, badlands, and road cuts. Exposed sediments up to approximately 30 feet were observed in locations in the vicinity of the Project.

5.16.5.4 Paleontological Resource Assessment Criteria

The SVP (2010), in common with other environmental disciplines such as archaeology and biology (specifically in regard to listed species), considers any fossil specimen significant, unless demonstrated otherwise, and protected by environmental statutes. This position is held because fossils are uncommon and only rarely will a fossil locality yield a statistically significant number of specimens representing the same species. In fact, vertebrate fossils are so uncommon that, in most cases, each fossil specimen found will provide additional important information about the characteristics or distribution of the species it represents.

A stratigraphic unit (such as a formation, member, or bed) known to contain significant fossils is considered to be “sensitive” to adverse impacts if there is a high potential that earth-moving or ground-disturbing activities in that rock unit will either disturb or destroy fossil remains. This definition of potential differs fundamentally from that for archaeological resources:

> It is extremely important to distinguish between archaeological and paleontological resources (see “definitions” section in this document) when discussing the paleontological potential of rock units. The boundaries of an archaeological resource site define the areal/geographic extent of an archaeological resource, which is generally independent from the rock unit on which it sits. However, paleontological sites indicate that the containing sedimentary rock unit or formation is fossiliferous. Therefore, the limits of the entire rock formation, both areal and stratigraphic, define the extent of paleontologic potential (SVP, 2010).

This distinction between archaeological and paleontological sites is important. Most archaeological sites have a surface expression that allows for their geographic location. Fossils, on the other hand, are an integral component of the rock unit below the ground surface; therefore, they are not observable unless exposed by erosion or human activity. Thus, a paleontologist cannot know either the quality or quantity of fossils present before the rock unit is exposed as a result of natural erosion processes or earth-moving activities. The paleontologist can only make conclusions on potential-to-impact based upon what fossils have been found in the rock unit in the past, along with a judgment as to whether the depositional environment of the sediments that compose the rock unit is likely to have resulted in the burial and preservation of fossils.

Fossils are seldom uniformly distributed within a rock unit. Most of a rock unit may lack fossils, but at other locations within the same rock unit concentrations of fossils may exist. Even within a fossiliferous portion of the rock unit, fossils may occur in local concentrations. For example, Shipman (1977, 1981) excavated a fossiliferous site using a three-dimensional grid and removed blocks of matrix of a consistent size. The site chosen was known prior to excavation to be richly fossiliferous, yet only 17 percent of the blocks actually contained fossils. These studies demonstrate the physical basis for the difficulty in predicting the location and quantity of fossils in advance of Project-related ground disturbance.

Since it is unfortunately not possible to determine where fossils are located without actually disturbing a rock unit, monitoring of excavations by an experienced paleontologist during construction increases the probability that fossils will be discovered and preserved. Preconstruction mitigation measures such as surface prospecting and collecting will not prevent adverse impacts on fossils because many sites will be unknown in advance because of an absence of fossils at the surface.

The non-uniform distribution of fossils within a rock unit is typical. Many paleontological resource assessment and mitigation reports conducted in support of environmental impact documents and mitigation plan summary reports document similar findings (see Lander, 1989 and 1993; Reynolds, 1987 and 1990; Spencer, 1990; Fisk *et al.*, 1994; and references cited in each of these sources). In fact, most fossil sites recorded in reports of impact mitigation (where construction monitoring has been implemented) had no previous surface expression. Because the presence or location of fossils within a rock unit cannot be known without the exposure resulting from erosion or excavation, under SVP (2010) standard procedures, an entire rock unit is assigned the same level of potential based on recorded fossil occurrences.

Using SVP (2010) criteria, the paleontological importance or potential (high, undetermined, low, or no) 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 areal distribution of each rock unit can be delineated on a topographic or geologic map. The paleontological potential of a stratigraphic unit reflects (1) its potential paleontological productivity and (2) the scientific significance of the fossils it has produced. This method of paleontological resources assessment is the most appropriate because discrete levels of paleontological importance can be delineated on a topographic or geologic map.

The potential paleontological productivity of a stratigraphic unit exposed in a project area is based on the abundance/densities of fossil specimens and/or previously recorded fossil sites in exposures of the unit in and near a project site. The underlying assumption of this assessment method is that exposures of a stratigraphic unit in a project site are most likely to yield fossil remains that are similar both in quantity and density to those previously recorded from that stratigraphic unit in and near the project site.

An individual fossil specimen is considered scientifically important if it is:

- Identifiable
- Complete
- Well preserved
- Age diagnostic
- Useful in paleo-environmental reconstruction
- A type or topotypic specimen
- A member of a rare species
- A species that is part of a diverse assemblage
- A skeletal element different from or a specimen more complete than those now available for that species

All identifiable land mammal fossils are considered scientifically important because of their potential use in providing relative age determinations and paleo-environmental reconstructions for the sediments in which they occur. Moreover, vertebrate remains are comparatively rare in the fossil record. Although fossil plants are usually considered of lesser importance because they are less helpful in age determination, they are actually more sensitive indicators of their environment (Miller *et al.*, 1971) and as sedentary organisms, are more valuable than mobile animals for paleo-environmental reconstructions. For marine sediments, invertebrate and marine algal fossils, including microfossils, are scientifically important for the same reasons that land mammal and/or land plant fossils are valuable in terrestrial deposits. The value or importance of different fossil groups varies depending on the age and depositional environment of the stratigraphic unit that contains the fossils.

The following tasks were completed to establish the paleontological importance and potential of each stratigraphic unit exposed within the Paleontological Resources Study Area:

- The potential paleontological productivity of each rock unit was assessed based on previously recorded and newly documented fossil sites that the unit contains at and/or near the Project Site.

- The scientific importance of fossil remains recorded from a stratigraphic unit exposed at and/or near the Project Site were assessed.

- The paleontological importance of a rock unit was assessed based on its documented and/or potential fossil content in the area surrounding the Project Site.

Categories of Potential

In its standard procedures for assessment and mitigation of adverse impacts on paleontological resources, the SVP (2010) established four categories of potential for paleontological resources: high, undetermined, low, and no.

High Potential. Stratigraphic units in which significant fossils have been previously found have a high potential to produce additional fossils and are therefore considered to be highly sensitive. In the significance criteria of the SVP (2010), all identifiable vertebrate fossils and uncommon invertebrate, plant, and trace fossils are categorized as having significant scientific value, and all stratigraphic units in which these fossils have previously been found have high potential. In areas of high potential, full-time monitoring is recommended during any project-related ground disturbance.

Undetermined Potential. Stratigraphic units that have not had any previous paleontological resource surveys or any fossil finds are considered to have undetermined potential. After reconnaissance surveys, observation of artificial exposures (e.g., road cuts) and natural exposures (e.g., stream banks), and possible subsurface testing (e.g., augering or trenching), an experienced professional paleontologist can often determine whether the stratigraphic unit should be categorized as having high, low, or no potential.

Low Potential. Stratigraphic units that are not sedimentary in origin or that have not been known to produce fossils in the past are considered to have low potential. Monitoring is usually not recommended nor needed during excavation in a stratigraphic unit with low potential.

No Potential. Some rock units do not contain or preserve fossils (such as high-grade metamorphic or plutonic igneous rocks) and are considered to have no potential. Monitoring is not recommended nor needed during excavation in a rock unit with no potential.

Although no public lands will be directly impacted by the Project, Bureau of Land Management (BLM) classification systems are widely used as objective measures of significance. In the BLM (1998) Paleontological Resources Handbook H-8270-1 entitled *General Procedural Guidance for Paleontological Resource Management*, the BLM uses a slightly different classification system for ranking areas according to their potential to contain significant fossils. These rankings are used in land-use planning as well as to identify areas that may warrant special management and/or special designation, such as Areas of Critical Environmental Concern. Public lands may be classified based on their potential to contain such fossils, using the following criteria:

Condition 1. Areas that are known to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils.

Condition 2. Areas with exposures of geological units or settings that have high potential to contain vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils.

Condition 3. Areas that are very unlikely to produce vertebrate fossils or noteworthy occurrences of invertebrate or plant fossils based on their surficial geology; igneous or metamorphic rocks; extremely young alluvium, colluvium, or aeolian deposits; or the presence of deep soils.

In 2007, the BLM introduced the Potential Fossil Yield Classification (PFYC) System which is intended to classify geologic units by identifying the potential for the occurrence of significant paleontological resources in a geologic unit and the associated risk for impacts within that unit (BLM, 2007). The class rankings listed below attempt to classify geologic units based upon the relative abundance of paleontological resources found within, and therefore the risk of adversely impacting those resources. Geologic units are classified under the PFYC based upon the following criteria:

Class 1—Very Low. Geologic units that are not likely to contain recognizable fossil remains.

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

Class 2—Low. Sedimentary geologic units that are 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 the present.
- Recent aeolian deposits.
- Sediments that exhibit significant physical and chemical changes (i.e., diagenetic alteration).

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.
- 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 to 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 Class 3b may eventually be placed in a different class when sufficient survey and research are performed. The unknown potential of the units in Class 3b should be carefully considered when developing any mitigation or management actions.

Class 4—High. Geologic units containing a high occurrence of significant 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 2 acres. Paleontological resources may be susceptible to adverse impacts from surface-disturbing actions.

- *Class 4b*. These areas are underlain by geologic units with high potential, but have lowered risks 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 on 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 2 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 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 2 contiguous acres. Paleontological resources are highly susceptible to adverse impacts from surface-disturbing actions.
- *Class 5b*. These areas are underlain by geologic units with very high potential, but have lowered risks 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 2 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.

The previously described BLM criteria have been widely used by both lead agencies and professional mitigation paleontologists as objective measures of significance. In this paleontological resource impact assessment, the criteria of both the SVP (2010) and the BLM (1998, 2007) are applied. BLM lands will not be directly impacted by the proposed Project or by any of its associated linear facilities. However, BLM lands do occur within 1 mile of the PRSA (i.e., 1 mile from the Project Site and linear facilities), so the criteria will be considered.

5.16.5.5 Resource Inventory Results

The following inventory results pertain to the Paleontological Resources Study Area. As noted above, OEHI conducted the surveys south of the California Aqueduct along the current CO_2 pipeline alignment, as well as for the CO_2 EOR Processing Facility. The results of those surveys are presented in Appendix A-1 of this AFC Amendment, Section 4.5.

Stratigraphic Inventory

Regional geologic mapping in the vicinity of the HECA Project was provided by Jennings (1977; 1:750,000); Mendenhall *et al.* (1916; 1:500,000); Jenkins (1938; 1:500,000); Bartow (1987, 1991; 1:500,000); Morton and Troxel (1962; ~1:320,000); and Smith (1964; 1:250,000). Larger scale mapping of the Project Site was provided by Dibblee (1972; 1:62,500), Woodring *et al.* (1932; 1:31,680), and Dibblee (2005a-f; 1:24,000).

Project Geology

Based upon the available geologic literature, recent geologic maps, and field observations, two stratigraphic units will be potentially impacted during Project construction activities. In the discussion below, the stratigraphic nomenclature will follow that of Dibblee (2005a-f), the most detailed and also most recent geologic maps available. Dibblee (2005a-f) identified two stratigraphic units within the Project vicinity: Quaternary alluvium and Tulare Formation. Each of these stratigraphic units is described below.

In his geologic mapping, Dibblee (2005a-f) mapped the area in the vicinity of the Project Site and the linear ROWs as either Quaternary alluvium or Tulare Formation. The site of the main HECA facility is mapped as Quaternary alluvium, although the map indicates that this alluvium unconformably overlies sediments of the Tulare Formation (Dibblee, 2005f). Thus, although Quaternary alluvium is mapped as being present at the surface over the Project Site, the older Tulare Formation may still be encountered in the shallow subsurface. This was confirmed in a geotechnical investigation performed for a previous project at the site, which indicated that sediments of the Tulare Formation are present at approximately 10 feet below ground surface. Linear features associated with Project construction will also potentially impact sediments of the Tulare Formation. Many of the linear options will at some point pass through areas mapped as Tulare Formation or areas mapped as Quaternary alluvium overlying Tulare Formation (Dibblee, 2005a through f).

Tulare Formation. Late Pliocene to Pleistocene age Tulare Formation was named by Anderson (1905), who did not designate a type section. Woodring *et al.* (1940) later designated the Kettleman Hills North Dome as the type section for the Tulare Formation. Dibblee (1973) described the Tulare Formation as “locally deformed dissected valley deposits composed of gravel, sand, and silt.” Lithologically, the Tulare Formation consists of argillaceous sand and silt deposits with lenses of coarse sand and gravel. White (1987) described sediments of the Tulare Formation found in the Elk Hills as “low-angle, cross-bedded, fine to medium pebbly sands interbedded with structureless to faintly laminated, gypsiferous, olive-green, brown and gray muds and clays. Conglomerate units do occur, but are rare overall. Pebbles and clasts of siliceous shale are common and are most likely derived from the Monterey Formation exposed in the Temblor Range to the west." Tulare Formation sediments in the Elk Hills have a thickness of up to approximately 2,000 feet, while Tulare sediments found elsewhere may be as much as 5,000 feet thick (Maher *et al.*, 1975; White, 1987). Most of the formation is composed of reworked sedimentary materials whose origin is from erosion of the Coast Ranges. The Tulare Formation overlies the San Joaquin Formation, likely conformably, in the Elk Hills area, although in other places throughout the San Joaquin Valley it unconformably overlies sediments of various formations and ages (Dibblee, 1973; Lettis, 1982). The age of the Tulare Formation has been determined based upon structural and stratigraphic relationships, paleontological correlations, radiometric dating methods, and paleomagnetic data. Most recently, White (1987) used measured magnetic polarities within the Tulare Formation from locations in the southern San Joaquin Valley to determine the age of the Tulare Formation to be between 2.48 and 0.90 million years.

Quaternary Alluvium. Quaternary alluvium is composed primarily of fluvial sands and gravels reworked from older formations and transported from the topographically high adjacent areas. Within and in the immediate vicinity of the Project Site, the alluvium is primarily composed of either reworked Tulare Formation material and recent soils or sediments of the Kern River distal fan. There is also some lacustrine material in the local alluvium, including sediments of Buena Vista Lake and other periodic lakes. Two drill sites located northeast of the unincorporated community of Buttonwillow produced fossil wood that was analyzed using radiometric dating methods (Manning, 1968). These samples, recovered at 20 and 35 feet below ground surface, produced a late Pleistocene radiocarbon age (14,060 ± 450 and 13.350 ± 450 years B.P.).

Paleontological Resource Inventory

An inventory of known paleontological resources previously discovered in the vicinity of the Project is presented below, and the paleontological importance of these resources is assessed. The literature review and UCMP, LACM, and SBMNH archival records search conducted for this inventory documented no previously recorded fossil sites within the HECA Project Site. Previously reported fossil sites do occur within 1 mile of HECA linear facilities or the OEHI CO_2 pipeline, and numerous previously unreported fossil sites were identified during the field survey for this Project. In addition, sediments of Quaternary alluvium and Plio-Pleistocene Tulare Formation have yielded fossilized remains of extinct species of continental vertebrates and other types of organisms at previously recorded fossil sites in the region (Jefferson, 1991a and 1991b; UCMP records; others described below).

Tulare Formation. The Tulare Formation has yielded fossil remains at numerous sites in the San Joaquin Valley. These remains include algal stromatolites (vertically layered mat-like algal growths); diatoms; petrified wood; shells of snails and clams; and the bones and teeth of bony fishes, amphibians, turtles, lizards, snakes, birds, and a diversity of extinct land mammals, including moles, ground sloths, rabbits, squirrels, gophers, pocket mice, kangaroo rats, pack rats, deer mice, cotton rats, grasshopper mice, canids, saber-tooth cats, horses, peccaries, camels, tapirs, and deer (Merriam, 1903, 1905, 1914, 1915a, 1915b, and 1917; Anderson and Pack, 1915; Arnold and Johnson, 1910; Gester, 1917; Woodring *et al.*, 1932; Stirton and VanderHoof, 1933;

Porter, 1943; Hoots *et al.*, 1954; Davis *et al.*, 1957 and 1959; Wood and Davis, 1959; Taylor, 1966; Foss and Blaisdell, 1968; Maher *et al.*, 1975; Repenning, 1980; Reynolds, 1987 and 1990; Lander, 1993; UCMP records). Anderson and Pack (1915) also reported recycled fossils from older beds in the Tulare Formation.

A number of previously recorded Tulare Formation fossil sites occur near the Paleontological Resources Study Area. Included among the previously reported fossil sites are several sites in the Elk Hills and several others from neighboring areas such as McKittrick (Woodring *et al.*, 1932; Jefferson, 1991a and 1991b; LACM records; UCMP records). A search of the UCMP online database yielded two localities in the vicinity of the Elk Hills. These localities have produced remains of horse, saber-tooth cat, and bone-crushing dog (*Borophagus*). The latter taxon represents the type specimen for its species (Merriam, 1903, Wang *et al.*, 1999). LACM reports no vertebrate localities from within the study area, but the museum has records of localities within the Elk Hills (LACM 3775) and near McKittrick (LACM 3720). These localities have produced fossil camels and rabbits. Woodring *et al.* (1932) reported several fossil localities from the Elk Hills that produced specimens of camel, horse, rabbit, wood rat, cotton rat, and silicified wood. Additionally, Woodring *et al.* (1932) described freshwater invertebrates from oil well “ditch samples” in the Elk Hills. Fish remains, ostracodes, pelecypods, gastropods, and reworked foraminifers have also been identified from oil wells within the Elk Hills (Maher *et al.*, 1975). Blakely and Fisk (2011) also reported a fossil horse tooth and ichnofossils from two separate sites in the Buena Vista Hills.

During the field survey for prospective fossil localities, many previously unrecorded sites were identified within one mile of the Project and its associated linear features. Fossils at these localities included vertebrate fossil bones and bone fragments, invertebrate shells, and fossilized wood. Numerous paleosols were also identified within the Tulare Formation, which contained ichnofossils.

In summary, sediments referable to the Tulare Formation have yielded an abundance of vertebrate, invertebrate, and plant fossils, plus microfossils and ichnofossils from numerous localities throughout Kern, Kings, Alameda, and San Joaquin counties. Moreover, several previously recorded (Jefferson, 1991b; LACM records; UCMP records) and previously unrecorded (this report) fossil localities are found near the PRSA, including several sites within the Elk Hills. Because this unit has in the past produced significant fossils, the Tulare Formation is judged to have high potential for impacts on paleontological resources during any future ground disturbance. Additional identifiable fossil remains recovered from the Tulare Formation during any excavation activities could be scientifically important and significant.

Quaternary Alluvium. No fossil localities have previously been reported from Quaternary alluvium at the Project Site. However, significant vertebrate fossils have been reported from Holocene and Pleistocene sediments in several areas of Kern County (Jefferson, 1991a and 1991b; UCMP records). Jefferson (1991a, 1991b) compiled a database of California Late Pleistocene (Rancholabrean NALMA) to earliest Holocene vertebrate fossils from published records, technical reports, unpublished manuscripts, information from colleagues, and inspection of museum paleontological collections at over 40 public and private institutions. He listed over 70 individual sites in Kern County that yielded vertebrate fossils of these ages. Many of these sites are not assigned to a specific formation, group, or member, and may be referable to sediment of unnamed Quaternary alluvium. Among these localities is a Rancholabrean vertebrate fossil locality discovered during construction of the Bakersfield Canal (UCMP V-65247). Fossils discovered during that construction project have been identified as an extinct species of horse. Additionally, Pleistocene fossil wood was recovered from well borings 10 to 15 miles northwest of the unincorporated community of Buttonwillow (Manning, 1968).

During the field survey performed for the HECA Project, previously unrecorded fossil localities were identified. Specimens identified during the field survey included freshwater invertebrate shells and ichnofossils.

Fossils occurring in Quaternary alluvium are valuable to the scientific community because they provide information about climatic conditions in the not too distant past. The occurrences of large and small mammals are well documented from these and older subsurface deposits, and with further observation of earth-moving activities and prospecting for fossils, more specimens could be unearthed. Since fossil vertebrates have been previously reported from Quaternary alluvium in Kern County, the Quaternary alluvium is also judged to have high potential based on SVP procedures (2010).

Summary

In summary, although no fossils were previously reported to directly underlie the Project Site, numerous fossil localities nearby within the Quaternary alluvium and the Tulare Formation have been reported in both the published scientific literature and museum records. In addition, numerous previously unrecorded fossil localities were identified during the field surveys of the Project Site and linear facility ROWs. Many of these previously reported and unreported localities occur within 1 mile of the HECA linear facilities and the OEHI CO_2 pipeline. The presence of fossils in sediments of Quaternary alluvium within 1 mile of the Project and elsewhere in Kern County, and of fossils in sediments of Plio-Pleistocene Tulare Formation within 1 mile of the Project and elsewhere in the Elk Hills suggests that there is a high potential for additional similar fossil remains to be uncovered by excavations during Project construction. Under SVP (2010) criteria, these stratigraphic units have a high potential for producing additional sensitive paleontological resources.

Identifiable fossil remains salvaged from Quaternary alluvium or the Plio-Pleistocene Tulare Formation during Project construction may be scientifically important and significant. Identifiable fossil remains discovered during construction may represent new taxa or new fossil records for the San Joaquin Valley, for the state of California, for the Quaternary/Tertiary, or for a stratigraphic unit. They may also represent geographic or temporal range extensions. Moreover, discovered fossil remains may make it possible to more accurately determine the age, paleo-climate, and depositional environment of the sediments from which they are salvaged. Finally, fossil remains salvaged during Project construction can provide a more comprehensive documentation of the diversity of animal and plant life that once existed in Kern County and may result in a more accurate reconstruction of the geologic and paleo-biologic history of the San Joaquin Valley and the Elk Hills area.

5.16.6 Environmental Consequences

Potential impacts on paleontological resources resulting from the Project can be divided into construction-related impacts and operation-related impacts. The potential environmental effects from construction and operation of the Project on paleontological resources are presented in the following subsections.

5.16.6.1 Potential Impacts from Project Construction

Construction-related impacts to paleontological resources primarily involve terrain modifications (excavations and drainage diversion measures). Paleontological resources, including an undetermined number of fossil remains and unrecorded fossil sites, associated specimen data and corresponding geologic and geographic site data, and the fossil-bearing strata, can be adversely affected by (i.e., will be sensitive to) ground disturbance and earth-moving associated with construction of the Project. Direct impacts could result from vegetation clearing; grading of roads and the Project Site; trenching for pipelines; augering for foundations for electrical towers or poles; and other earth-moving activities that disturb or bury previously undisturbed fossiliferous sediments, making those sediments and their paleontologic resources unavailable for future scientific investigation.

Clearing, grading, and excavations that encounter previously undisturbed sediment at the Project can result in significant adverse impacts on paleontological resources. At the Project Site, this may occur within 5 feet of the ground surface. At other locations along the linear ROWs, undisturbed sediment occurs at ground surface. In addition, the construction of supporting facilities, such as temporary construction offices, laydown areas, and parking areas, has the potential to cause adverse impacts on significant paleontological resources if the construction also involves new ground disturbance. Thus, any Project-related ground disturbance can have adverse impacts on significant paleontological resources. However, with a properly designed and implemented mitigation program, as has been proposed, these impacts will be reduced to less than significant.

5.16.6.2 Potential Impacts from Project Operation

No impacts on paleontological resources are expected to occur from the continuing operation of the Project or the linear facilities.

5.16.6.3 Potential Impacts from OEHI Project Construction and Operation

Information and analysis related to the paleontological impacts of the OEHI Project are contained in Appendix A to this AFC Amendment. According to the analysis contained in Section 4.5 of Appendix A-1 and Section 2.16 of Appendix A-2, construction and operation of the OEHI Project would not result in significant adverse impacts to paleontological resources.

5.16.7 Cumulative Impacts Analyses

Under certain circumstances, CEQA requires consideration of a project’s cumulative impacts (CEQA Guidelines § 15130). A “cumulative impact” consists of an impact which is created as a result of the combination of the project under review together with other projects causing related impacts (CEQA Guidelines § 15355). CEQA requires a discussion of the cumulative impacts of a project when the project's incremental effect is cumulatively considerable (CEQA Guidelines § 15130[a]). "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (CEQA Guidelines § 15065 [a][3]).

When the combined cumulative impact associated with a project's incremental effect and the effects of other projects is not significant, further discussion of the cumulative impact is not necessary (CEQA Guidelines § 15130[a]). It is also possible that a project's contribution to a significant cumulative impact is less than cumulatively considerable and thus not significant (CEQA Guidelines § 15130[a]).

The discussion of cumulative impacts should reflect the severity of the impacts and their likelihood of occurrence, but the discussion need not provide as great a level of detail as is provided for the effects attributable to the project under consideration (CEQA Guidelines § 15130[b]). The discussion should be guided by standards of practicality and reasonableness (CEQA Guidelines § 15130[b]).

A cumulative impact analysis starts with a list of past, present, and probable future projects within a defined geographical scope with the potential to produce related or cumulative impacts (CEQA Guidelines § 15130[b]). Factors to consider when determining whether to include a related project include the nature of the environmental resource being examined, the location of the project, and its type (CEQA Guidelines § 15130[b]). For purposes of this AFC Amendment, Kern County was contacted to obtain a list of related projects, which is contained in Appendix I. Depending on its location and type, not every project on this list is necessarily relevant to the cumulative impact analysis for each environmental topic. For purposes of paleontological resources, it was determined that none of the projects were relevant for the cumulative impact analysis.

If paleontological finds were to be encountered during Project construction, the potential for cumulative impacts will exist. The Elk Hills and PRSA are highly disturbed by a number of previous impacts. If mitigation measures were not implemented for this Project, Project construction could potentially add to the cumulative impact on paleontological resources. However, mitigation measures will be implemented to salvage such resources and reduce cumulative impacts to a level that is less than significant. The mitigation measures proposed in Section 5.16.4, Mitigation Measures, will effectively preserve the value to science of any significant fossils uncovered during Project-related excavations.

According to the analysis contained in Section 4.5 of Appendix A-1 and Section 2.16 of A-2, construction and operation of the OEHI Project would not result in significant cumulative adverse impacts to paleontological resources.

5.16.8 Mitigation Measures

This section describes mitigation measures that will be implemented to reduce potential adverse impacts on significant paleontological resources resulting from Project construction. Mitigation measures are necessary because of the potential adverse impacts of Project construction on significant paleontological resources within the Quaternary alluvium and the Plio-Pleistocene Tulare Formation. The paleontological resource impact mitigation program will reduce direct, indirect, and cumulative adverse environmental impacts on paleontological resources that could result from Project construction to a less-than-significant level. The mitigation measures summarized below are consistent with SVP standard procedures for mitigating adverse construction-related impacts on paleontological resources (SVP, 1996 and 2010), and they fulfill the requirements of the BLM (1998, 2007).

Implementation of these mitigation measures will reduce the potentially significant adverse environmental impact of Project-related ground disturbance and earth-moving on paleontological resources to a less-than-significant level by allowing for the salvage of fossil remains and associated specimen data and corresponding geologic and geographic site data that otherwise might be lost to earth-moving and to unauthorized fossil collecting.

With a well-designed and implemented paleontological resource monitoring and mitigation plan, Project construction could actually result in beneficial impacts on paleontological resources through the discovery of fossil remains that would not have been exposed without Project construction and, therefore, would not have been available for study. The salvage of fossil remains as part of Project construction could help answer important questions regarding the geographic distribution, stratigraphic position, and age of fossiliferous sediments in the Project area.

5.16.8.1 PALEO-1—Paleontological Monitoring

Prior to construction, a qualified paleontologist will be retained to both design and implement a monitoring and mitigation program. During construction, ground-disturbing activities will be monitored where these activities will potentially disturb previously undisturbed sediment. Monitoring will not be conducted in areas where the ground has been previously disturbed or in areas where exposed sediment will be buried, but not otherwise disturbed. Construction monitoring will be conducted to ensure that unanticipated discoveries are addressed in a timely manner.

5.16.8.2 PALEO-2—Paleontological Monitoring and Mitigation Program.

The paleontological resource monitoring and mitigation program will include preconstruction coordination; construction monitoring; emergency discovery procedures; sampling and data recovery, if needed; preparation, identification, analysis, and museum curation of any fossil specimens and data recovered; and reporting. This monitoring and mitigation plan will be consistent with SVP (2010) standard procedures for the mitigation of construction-related adverse impacts on paleontological resources, as well as the requirements of the designated museum repository for any fossils collected (SVP, 1996).

5.16.8.3 PALEO-3—Construction Personnel Education

Prior to start of Project construction, construction personnel involved with earth-moving activities will be informed: (1) that fossils may be discovered during excavating, (2) that these fossils are protected by laws, (3) on the appearance of common fossils, and, (4) on proper notification procedures. This worker training will be prepared and presented by a qualified paleontologist.

5.16.8.4 PALEO-4—Paleontological Monitoring

Prior to the start of construction, the paleontologist will conduct a field survey of exposures of sensitive stratigraphic units that will be disturbed and any fossils discovered should be salvaged. Earth-moving construction activities should be monitored wherever these activities will disturb previously undisturbed sediment. Monitoring will not need to be conducted in areas where sediments have been previously disturbed or in areas where exposed sediments will be buried, but not otherwise disturbed.

5.16.9 Laws, Ordinances, Regulations, and Standards

Paleontological resources are classified as non-renewable scientific resources and are protected by several federal and state statutes (California State Historic Preservation Office, 1983; Marshall, 1976; West, 1991; Fisk and Spencer, 1994; Gastaldo, 1999), most notably by the 1906 Federal Antiquities Act and Paleontological Resources Preservation Act (PRPA) and by the State of California's environmental regulations (California Environmental Quality Act [CEQA], Section 15064.5). Professional standards for assessment and mitigation of adverse impacts on paleontological resources have been established by the SVP (1996, 2010). . Table 5.16-1, Summary of LORS—Paleontological Resources, summarizes federal and state LORS applicable to paleontological resources; both federal and state LORS are discussed in the subsections following Table 5.16-1, together with county and city requirements and SVP professional standards.

5.16.9.1 Federal

Federal legislative protection for paleontological resources stems from the Antiquities Act of 1906 (Public Law [P.L.] 59-209; 16 United States Code [U.S.C.] 431 *et seq.*; 34 Statute 225), which calls for protection of historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest on federal land. The Antiquities Act of 1906 forbids disturbance of any object of antiquity on federal land without a permit issued by the responsible managing agency. This act also establishes criminal sanctions for unauthorized appropriation or destruction of antiquities. The Federal Highways Act of 1958 clarified that the Antiquities Act applied to paleontological resources and authorized the use of funds appropriated under the Federal-Aid Highways Act of 1956 to be used for paleontological salvage in compliance with the Antiquities Act and any applicable state laws. Paleontological resources on federal lands are also explicitly protected under the PRPA (16 U.S.C. 470aaa). This act, signed into law on 30 March 2009, criminalizes the unauthorized removal of fossils from federal land.

In addition to the Antiquities Act and the PRPA, other federal statutes protect fossils. The Historic Sites Act of 1935 (P.L. 74-292; 49 Statute 666, 16 U.S.C. 461 *et seq.*) declares it national policy to preserve objects of historical significance for public use and gives the Secretary of the Interior broad powers to execute this policy, including criminal sanctions. The National Environmental Policy Act (NEPA) of 1969 (P.L. 91-190, 31 Statute 852, 42 U.S.C. 4321-4327) requires that important natural aspects of our national heritage be considered in assessing the environmental consequences of any proposed project. The Federal

Land Policy Management Act (FLPMA) of 1976 (P.L. 94-579; 90 Statute 2743, U.S.C. 1701-1782) requires that public lands be managed in a manner that protects the quality of their scientific values. Paleontological resources are also afforded federal protection under 40 Code of Federal Regulations (CFR) 1508.27 as a subset of scientific resources.

5.16.9.2 State

The CEQA lead agency having jurisdiction over a project is responsible to ensure that paleontological resources are protected in compliance with CEQA and other applicable statutes. California Public Resources Code § 21081.6, entitled Mitigation Monitoring Compliance and Reporting, requires that the lead agency demonstrate project compliance with mitigation measures developed during the environmental impact review process.

Other state requirements for paleontological resources management are in Public Resources Code Chapter 1.7, § 5097.5 (Statute 1965, c. 1136, p. 2792), entitled Archaeological, Paleontological, and Historical Sites. This statute defines any unauthorized disturbance or removal of a fossil site or fossil remains on public land as a misdemeanor and specifies that state agencies may undertake surveys, excavations, or other operations as necessary on state lands to preserve or record paleontological resources. This statute will apply to the Project if the Project will be built on city-owned or state managed lands.

5.16.9.3 Local

California Planning and Zoning Law requires each county and city jurisdiction to adopt a comprehensive, long-term general plan for its development. The general plan is a policy document designed to give long-range guidance to those making decisions affecting the future character of the planning area. It represents the official statement of the community’s physical development as well as its environmental goals. The general plan also acts to clarify and articulate the relationship and intentions of local government to the rights and expectations of the general public, property owners, and prospective investors. Through its general plan, the local jurisdiction informs these groups of its goals, policies, and development standards; thereby, communicating what must be done to meet the objectives of the general plan. State planning law requires each jurisdiction to identify environmental resources and to prepare and implement policies which relate to the utilization and management of these resources.

The Kern County General Plan addresses paleontological resources in the Land Use, Open Space, and Conservation Element under “General Provisions 1.10.3: Archaeological, Paleontological, Cultural, and Historical Preservation.” Under this heading, Policy 25 states that “the County will promote the preservation of cultural and historic resources which provide ties with the past and constitute a heritage value to residents and visitors.” Implementation Measure L for this Policy states that “the County shall address archaeological and historical resources for discretionary projects in accordance with CEQA.” Implementation Measure M for this Policy states that “in areas of known paleontological resources, the County should address the preservation of these resources where feasible.”

5.16.10 Involved Agencies and Agency Contacts

Other than CEC, no state or local agencies have specific jurisdiction over paleontological resources and therefore, no state or local agencies were contacted.

5.16.11 Permits Required and Permit Schedule

No state or local agency requires a paleontological-collecting permit to allow for the salvage of fossil remains discovered as a result of construction-related earth moving on non-federal public or private land in a project site.

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Table 5.16-1
Summary of LORS—Paleontological Resources

LORS	Requirements	Conformance Section	Administering Agency	Agency Contact
Federal Jurisdiction				
Antiquities Act of 1906	Protects paleontological resources on federal lands.	5.16.5	(see Note 1)	(see Note 1)
NEPA, 1969	Protects paleontological resources on federal lands.	5.16.5	USEPA	TBD
PRPA, 2009	Protects paleontological resources on federal lands	5.16.5	BLM	TBD
State Jurisdiction				
CEQA	Protects paleontological resources on state lands.	5.16.5	CEC	Eileen Allen 916-654-4082
Public Resources Code Sections 5097.5/5097.9	Protects paleontological resources on state lands.	5.16.5	CEC	Eileen Allen 916-654-4082
Local Jurisdiction				
Kern County General Plan	Protects paleontological resources on county lands.	5.16.5	Kern County Planning Department	Cheryl Casdorph 661-862-8600

Notes:

1. The Antiquities Act of 1906 (16 United States Code [USC]) requires that objects of antiquity be taken into consideration for federal projects and the California Environmental Quality Act, Appendix G, also requires the consideration of paleontological resources. The Paleontological Resources Preservation Act of 2009 requires the Secretaries of the United States Department of the Interior and Agriculture to manage and protect paleontological resources on Federal land using scientific principles and expertise.

BLM = Bureau of Land Management
CEC = California Energy Commission
CEQA = California Environmental Quality Act (of 1970)
LORS = laws, ordinances, regulations, and standards
NEPA = National Environmental Policy Act
PRPA = Paleontological Resources Preservation Act
TBD = to be determined
USEPA = United States Environmental Protection Agency