

**PALEONTOLOGICAL SURVEY REPORT:
OCOTILLO WIND EXPRESS PROJECT**

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1.0 EXECUTIVE SUMMARY

Pattern Energy, through Ocotillo Express LLC (OE LLC), proposes to construct, operate, maintain and decommission a 561 megawatt (MW) wind generation facility on approximately 15,028 acres in the Ocotillo Express Wind Project Area (see Figure 1), hereafter referred to as the Project area. Paleo Solutions was retained by Aspen Environmental Group in order to identify and analyze possible effects to paleontological resources resulting from the implementation of the proposed Ocotillo Wind Express Project (Aron and Kelly, 2010), and to complete a pre-construction paleontological field survey in order to reduce potential adverse impacts on scientifically important surface fossils resulting from construction to a less than significant level. This report synthesizes all the paleontological data collected in order to perform the paleontological resources analysis for the Ocotillo Express Wind EIS, and presents the results of the paleontological field survey.

The Project area is located on approximately 15,002 acres of Bureau of Land Management (BLM) managed lands, and includes an additional 26 acres of private land proposed for wind monitoring. The Project area is located in Imperial County, California, close to the intersection of Highways 8 and 98 and the town of Ocotillo, approximately one mile south of the Coyote Mountains, and five miles north of the international border.

Prior to the completion of the paleontological field survey for the Project, a pre-survey paleontological assessment was completed (Aron and Kelly, 2010). The assessment analyzed the paleontological potential of the Project area using reviews of published scientific literature, geologic maps and museum records, and involved consultation with professional paleontologists who are familiar with the area. Based on the data obtained for the assessment, the geologic units within the Project area were ranked using the Potential Fossil Yield Classification System (PFYC) (BLM IM 2008-009), and the rankings were approved by the BLM. The results of the paleontological assessment were used to delineate locations within the Project area that were surveyed.

The paleontological assessment (Aron and Kelly, 2010) recommended all areas mapped as undifferentiated plutonic crystalline basement rocks (PFYC Class 1) and Quaternary Alluvium and Quaternary Terrace Alluvium (PFYC Class 2) for immediate paleontological clearance because these units have little or no potential for producing in-situ fossils (see Figure 2). These units were estimated to comprise approximately 11,361 acres of the total Project area. Areas mapped as Alverson Canyon Formation, Latrania Formation (Imperial Group), Split Mountain Formation, Palm Spring Formation, and Older Alluvium, have a moderate or unknown (PFYC Class 3) to very high potential (PFYC Class 5) for producing scientifically important fossil remains, and were recommended for a 100% pre-construction pedestrian inventory focused on areas with good exposures (i.e. unvegetated and not covered by soil, slopewash, etc.). Based on the geologic map, these deposits comprise approximately 3,640 acres of the Project area (see Figure 3).

The paleontological field survey was completed over a total of 10 days between December 21, 2010, and January 6, 2011, by Paleo Solutions. All field work was completed under BLM paleontological resources use permit CA-10-00-006P. Fifty six quarter-quarter sections (2,240 acres) that include exposed rocks of the Alverson Formation, Split Mountain Formation, Latrania

Formation, Palm Spring Formation, and Pleistocene older alluvium were surveyed. The survey was designed as a block inventory of all areas that could contain scientifically important surface fossils, so that adjustments to the locations of proposed Project facilities within the Project area will not result in the need for additional paleontological surveys.

The objective of the field survey was to document all scientifically significant surface fossils within the Project area. Thirty four fossil localities were documented during the field survey (see tables 3 and 4, and Figure 4). These include four localities in the Mio-Pliocene Latrania Formation consisting of fossil marine invertebrates, and 30 fossil localities in the Plio-Pleistocene Palm Spring Formation consisting of fossil vertebrates. Thirty one of the vertebrate and marine invertebrate fossil localities that were documented did not preserve scientifically significant fossils. Three fossil localities that preserved scientifically significant vertebrate fossils were initially documented and then collected following BLM consultation. These fossils include 16 specimens consisting of turtle carapace and plastron fragments and limb elements; camelid post-crania including a distal 1st phalanx of the extinct llama cf. *Hemiauchenia* sp., a lumbar vertebral centrum of the extinct camel cf. *Camelops* sp.; an undetermined artiodactyl astragalus, a lumbar vertebra (proximal portion of right transverse process) of an unidentified artiodactyl, and unidentified mammal bones collected from the Palm Spring Formation (written communication, G. Jefferson, ABDSP-DSRC, 2011). These fossils have been prepared, identified, and have been transferred to ABDSP-DSRC for permanent museum storage (Appendices C and D). Copies of BLM fossil locality forms are appended to this report (Appendix E). Occurrences of well-preserved fossil wood were found to be widespread throughout the Palm Spring Formation within the Project area, and as a result, none of these fossil localities were recorded, collected or recommended for avoidance. Deposits of Pleistocene older alluvium, although widespread, were found to be devoid of fossils, and it is recommended that these be downgraded to PFYC Class 2 within the Project area for future resource management purposes (although they were designated PFYC Class 3a at the time of this analysis).

With the completion of the field survey, all 30 fossil localities recorded in the Palm Spring Formation are recommended for avoidance by project-related surface disturbance because of the potential for impacting additional scientifically significant subsurface fossil remains. All of these localities are located in two larger areas of Palm Spring Formation that are recommended for avoidance by project-related surface disturbance because of the high density of fossil localities recorded in these areas during the field survey (see Figure 5). Based on the Project Proposed Action, these avoidance areas are currently not located within the area of potential effect, but it is recommended that they be avoided by future surface disturbing actions in order to preserve the fossils in their native geologic context for the benefit of future scientific research efforts. If avoidance of these areas is not feasible, then construction monitoring should be required. Four fossil localities located in the Latrania Formation (see Table 4) should be spot-check monitored during construction if they will be impacted. Based on the Project design plans, 63 acres of very high potential (PFYC Class 5) geologic units will be impacted by Project-related surface disturbance. These areas should be monitored for paleontological resources during construction (see Figure 6). Project construction is the only phase of Project operations that has the potential to result in direct adverse effects to subsurface fossils as the result of surface disturbance, although increased access to the area by the general public and Project personnel may result in greater indirect effects to surface fossils that erode onto the surface in the future. Prior to construction, all Project personnel involved with ground disturbing operations should

undergo training to be taught to recognize the presence of fossils in construction excavations. During construction and during future Project operations, the BLM Authorized Officer should be notified immediately if any fossils are encountered by construction or other Project personnel.

2.0 INTRODUCTION

Paleo Solutions was retained by Aspen Environmental Group in order to identify and analyze possible effects to paleontological resources resulting from the implementation of the proposed Ocotillo Wind Express Project. Pattern Energy, through Ocotillo Express LLC (OE LLC), proposes to construct, operate, maintain and decommission this 561 megawatt (MW) wind generation facility on approximately 15,002 acres in the Ocotillo Express Wind Project Area (figures 1 and 2). The Project area is located on approximately 15,002 acres of BLM managed lands, and includes an additional 26 acres of private land proposed for wind monitoring.

Paleontological resources, or fossils, are the remains of extinct organisms, and provide the only direct evidence of ancient life. They are considered to be non-renewable resources because they cannot be replaced once they are destroyed. The Federal Land Policy and Management Act of 1976 (FLPMA) mandates the treatment of paleontological resources as a scientific value (FLPMA section 102[8]). For the purpose of this analysis, and in accordance with existing BLM policy (BLM H-8270-1; BLM IM 2009-011), scientifically significant paleontological resources are defined as vertebrate fossils that are identifiable to taxon and/or element, noteworthy occurrences of invertebrate and plant fossils, and vertebrate trackways. In general, surface disturbing actions have the potential to cause adverse effects on surface and subsurface paleontological resources in rock units and overlying sediments known to contain them. Direct effects include destruction due to breakage and fragmentation. Indirect effects may result from increased accessibility to paleontological resources resulting in an increased likelihood of vandalism or unauthorized collection. In paleontologically sensitive areas, the objective of paleontological mitigation is to reduce adverse effects on paleontological resources to a less than significant level by recovering fossils and associated contextual data prior to and during ground disturbing activities. Paleontological mitigation results in a beneficial impact when scientifically important fossils and associated data are housed in perpetuity and made available for educational purposes and scientific research in an accredited and federally approved museum.

This report presents the results of the paleontological field survey completed for the Ocotillo Wind Express Project, and synthesizes the pre-survey data analysis. Prior to the completion of the paleontological field survey for the Project, a pre-survey paleontological assessment was completed (Aron and Kelly, 2010). The assessment analyzed the paleontological potential of the Project area using reviews of published scientific literature, geologic maps and museum records, and involved consultation with professional paleontologists who are familiar with the area.

Based on the results of the pre-survey paleontological assessment (Aron and Kelly, 2010), the field survey was focused on approximately 3,640 acres of Alverson Canyon Formation, Latrania Formation (Imperial Group), Split Mountain Formation, Palm Spring Formation, and Older Alluvium. Areas containing undifferentiated plutonic crystalline basement rocks, Quaternary Alluvium, and Quaternary Terrace Alluvium comprised approximately 11,361 acres of the Project area, and were not surveyed because they have little potential to produce fossil remains.

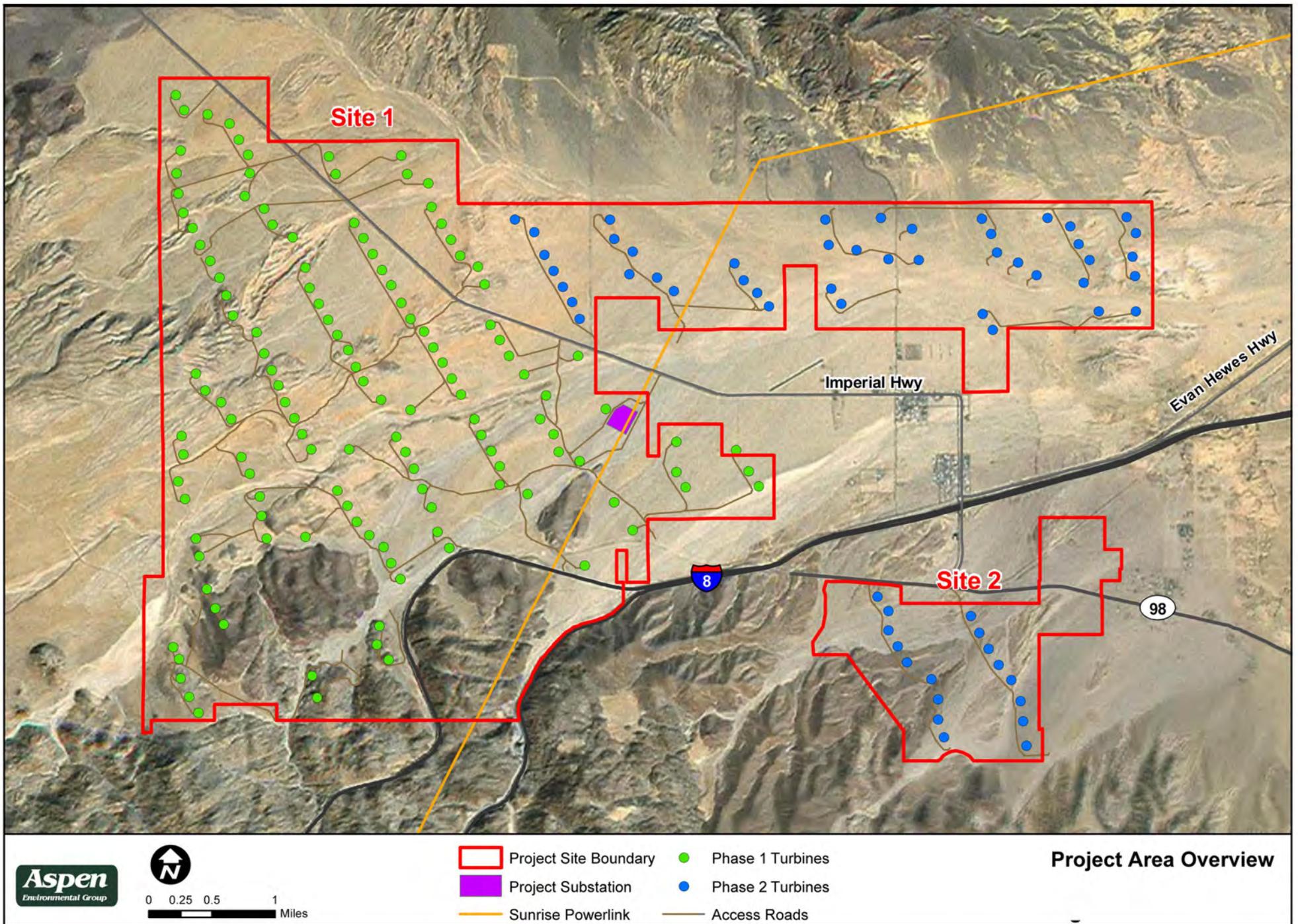


Figure 1. Map showing the boundaries and location of the Ocotillo Wind Express Project in Imperial County, California.

EXPLANATION
(from Dibblee, 2008)

Qa	Qa-Qc	Qc	Qs	Qt	Qt1
					Qd2

SURFICIAL SEDIMENTS
Unindurated, unconsolidated alluvial sediments; age, Recent

Qa Alluvial sand, gravel, silt, and clay of valleys areas
 Qa-Ca Caliche beds, thin series of tan-gray diatomaceous sands, and gravels deposited in former Lake Calhulla, fossiliferous. Qa-Qc where locally undifferentiated from Qa
 Qc Windblown dune sand, ranges from thin veneers to banded dunes at least 20 feet thick
 Qs Terrace deposits, includes Qt1, younger terraces of gravel and sand, locally undifferentiated from Qa, and Qd2, older terraces of boulder to pebble gravel and sand, locally footed and banded

Qoa	Qog
-----	-----

OLDER ALLUVIUM
Locally derived detritus of larger canyons and along upper margins of valleys; age, Pleistocene?

Qoa Older alluvium of poorly consolidated silts, sands, and gravels, typically form desert pavement terraces coated with desert varnish between dry washes; of poorly sorted, angular material reflecting lithology of nearby mountains
 Qog Funglomerate, tan gravels and silts, poorly sorted and largely unconsolidated

TPS

PALM SPRING FORMATION
(of Woodring, 1931) Thick sequence of non-marine deposits, forms discontinuous belt along lower flanks of Coyote and Fish Creek Mountains; age, middle Pliocene

Tps Sandstone, pink to green-gray to buff, calcareous, interbedded with reddish clay; includes fossil hardwoods

TI

IMPERIAL FORMATION
(of Woodring, 1931) Shallow brackish marine clastic, local thickness about 3000 feet; age, late Miocene to middle Pliocene

Ti Claystone, light gray-tan to yellow, conchoidally fractured, weathers to yellowish gray clay soil; contains interbeds of sandstone, buff to gray, laminated, friable to hard; commonly contains hard dark brown oyster reef fauna

TAV

ALVERSON CANYON VOLCANICS
Sequence of mostly andesitic flows and terrestrial sediments; age, probably late Miocene (Dibblee, 1951)

Tav Andesite, dark brown, basic, locally vesicular or amygdaloidal; locally includes minor interbeds of brown andesite agglomerate, gray tuff breccia, and non-marine sandstone and conglomerate

Tsm

SPLIT MOUNTAIN CONGLOMERATE
(of Tarbet and Hickey, 1940) Non-marine deposits up to 2700 feet thick; age, middle Miocene (Durham, 1954)

Tsm Boulder to pebble conglomerate and sandstone, gray to brown, massive to bedded; of granite and gneiss breccia, includes minor red beds locally

UNCONFORMITY

BASEMENT ROCKS

bc (qd & qd-gn) qd

PLUTONIC IGNEOUS ROCKS
Crystalline basement rocks of the southern California batholith; age, generally considered to be Miocene

bc Basement complex, includes a diverse types of plutonic and metamorphic rocks; qd, quartz diorite to diorite, dark gray, biotite-rich (not labeled) and qd-gn not separated from bc
 qd, Granite/diorite, light gray, age variable to late Tertiary (Bauer et al., 1952)

gn-gms gn

METAMORPHIC ROCKS
Thick (up to 10,000 feet) complex of metamorphic rocks in Carrizo Peak and Fish Creek Mountain areas; age, Paleozoic or older

gn-gms Granite or granoblastic granite, gray, medium grained, holocrystalline, with thin layers undulating or contorted
 gn Clay to white limestone recrystallized to marble

GEOLOGIC SYMBOLS

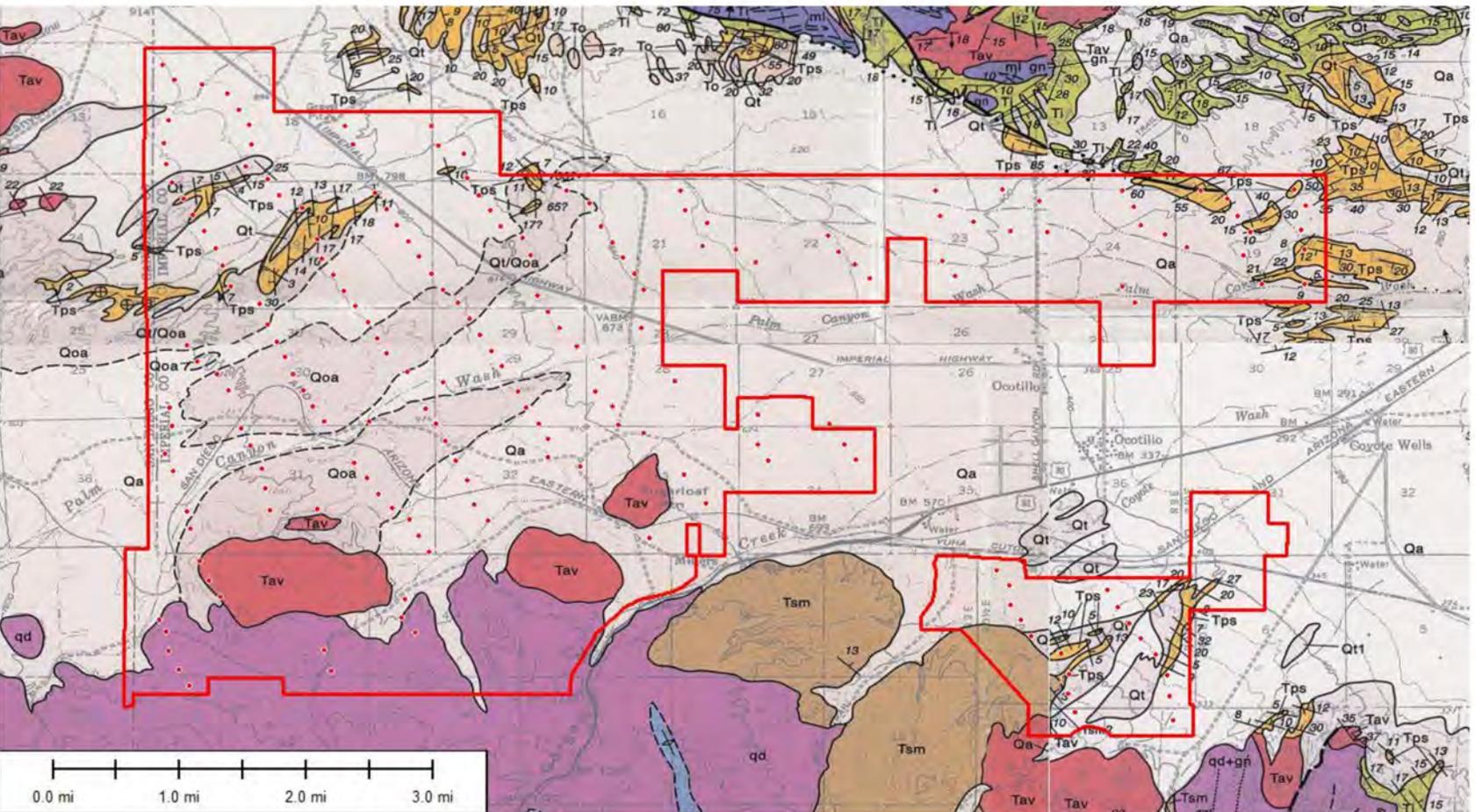
FORMATION CONTACT	MEMBER CONTACT	CONTACT BETWEEN SURFICIAL SEDIMENTS
<i>Formation boundary</i>	<i>Member boundary</i>	<i>Member boundary</i>
<i>Formation boundary</i>	<i>Member boundary</i>	<i>Member boundary</i>
<i>Formation boundary</i>	<i>Member boundary</i>	<i>Member boundary</i>

WELLS

WELL	ANTICLINE	WINDLINE
<i>Well and city of repository</i>	<i>Anticline</i>	<i>Windline</i>
<i>Well and city of repository</i>	<i>Anticline</i>	<i>Windline</i>
<i>Well and city of repository</i>	<i>Anticline</i>	<i>Windline</i>

OTHER SYMBOLS

<i>Project Boundary</i>	<i>Turbine</i>



- PERTINENT REFERENCES**
- Dibblee, T.W., 2008a, Geologic Map of the Jacumba 15 Minute Quadrangle (DF-404), San Diego and Imperial Counties, California.
 - Dibblee, T.W., 2008b, Geologic Map of the Coyote Wells and Heber 15 Minute Quadrangles (DF-405), Imperial County, California.
 - Dibblee, T.W., 2008c, Geologic Map of the Piasier City and Brawley 15 Minute Quadrangles (DF-406), Imperial County, California.
 - Dibblee, T.W., 2008d, Geologic Map of the Mount Laguna and Carrizo Mountain 15 Minute Quadrangle (DF-407), San Diego and Imperial Counties, California.

Figure 2. Geologic map of the Ocotillo Wind Express Project area (qd, Mesozoic and older crystalline basement rocks; Tsm, Split Mountain Formation; Tav, Alverson Formation; Ti, Latrania Formation of Imperial Group; Tps, Palm Spring Formation; Qoa, older alluvium; Qt, terrace deposits; Qa, alluvium (adapted from Dibblee (2008a-d).

3.0 PALEONTOLOGICAL RESOURCES

As defined by Murphey and Daitch (2007): *“Paleontology is a multidisciplinary science that combines elements of geology, biology, chemistry, and physics in an effort to understand the history of life on earth. Paleontological resources, or fossils, are the remains, imprints, or traces of once-living organisms preserved in rocks and sediments. These include mineralized, partially mineralized, or unmineralized bones and teeth, soft tissues, shells, wood, leaf impressions, footprints, burrows, and microscopic remains. Paleontological resources include not only fossils themselves, but also the associated rocks or organic matter and the physical characteristics of the fossils’ associated sedimentary matrix.*

The fossil record is the only evidence that life on earth has existed for more than 3.6 billion years. Fossils are considered non-renewable resources because the organisms they represent no longer exist. Thus, once destroyed, a fossil can never be replaced. Fossils are important scientific and educational resources because they are used to:

- *Study the phylogenetic relationships among extinct organisms, as well as their relationships to modern groups.*
- *Elucidate the taphonomic, behavioral, temporal, and diagenetic pathways responsible for fossil preservation, including the biases inherent in the fossil record.*
- *Reconstruct ancient environments, climate change, and paleoecological relationships.*
- *Provide a measure of relative geologic dating that forms the basis for biochronology and biostratigraphy, and which is an independent and corroborating line of evidence for isotopic dating.*
- *Study the geographic distribution of organisms and tectonic movements of land masses and ocean basins through time.*
- *Study patterns and processes of evolution, extinction, and speciation.*
- *Identify past and potential future human-caused effects to global environments and climates.”*

The BLM defines significant paleontological resources as any fossil 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 of scientific interest if 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 an identified educational or recreational value. Paleontological resources that may be considered not to have scientific 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 (BLM, 2008).

4.0 Methods

The scope of the pre-survey paleontological analysis for the Ocotillo Wind Express Project included geologic map research, a review of relevant scientific literature, and museum record searches. The pre-survey data were presented in a paleontological assessment report (Aron and Kelly, 2010). This report synthesizes the pre-survey data with the field survey results. It was conducted in accordance with current BLM paleontological resource management policy (BLM Manual and Handbook 8270-1, 1998; BLM IM 2008-009, 2007; BLM IM 2009-011, 2008).

4.1 Project Location

The Project area is located in Imperial County, California, close to the intersection of Interstate 8 and Highway 98 and the town of Ocotillo, approximately one mile south of the Coyote Mountains, and five miles north of the international border (figures 1 and 2).

4.2 Personnel

All paleontological work was supervised by Geraldine Aron of Paleo Solutions, PI on BLM Paleontological Resources Use Permit CA-10-00-006P. Jennifer Kelly of Paleo Solutions requested the records search and completed the literature search. The field work was completed by Geraldine Aron, Scott Armstrong, Maria Espinoza, Jeff Hathaway, and Mark Deering. The GIS analysis and map preparation was completed by Mark Deering. This report was prepared by Geraldine Aron and Jennifer Kelly.

4.3 Records Searches

The purpose of the record searches was to determine whether any museum fossil localities occur within or adjacent to the Project area, and ascertain the abundance and taxonomic diversity of fossils collected from the same geologic formations elsewhere in this part of the Imperial Valley to assist with the estimation of paleontological potential of the Project area. This was necessary because, to the best of our knowledge, no prior paleontological inventories within the Project area have been completed, although paleontological surveys of nearby areas by paleontological researchers at area museums have taken place over the years.

Paleontological record searches for this Project were requested by Paleo Solutions and were completed by curatorial staff at the San Diego Natural History Museum (SDNHM), Anza-Borrego Desert State Park (ABDSP-DSRC), and the Natural History Museum of Los Angeles County (LACM). Copies of the record search results are appended to this report (Appendix A), and the results are summarized in Section 7.0 of this report.

4.4 Literature Searches

The purpose of the literature searches was, like the records searches, to determine whether any previously recorded fossil localities occur within the Project area and to research the paleontological potential, stratigraphy, and general geology of the formations within the Project area based on research that has been completed elsewhere in the Imperial Valley. The literature reviewed included published scientific papers that were found at the library of the Biodiversity Research Center of the Californias, SDNHM, and on the internet.

4.5 Geologic Map Review

The purpose of the geologic map reviews was to determine the names and number of geologic formations and surficial deposits within the Project area and their geographic distribution. The geologic maps reviewed for this analysis include the following: Dibblee (2008a-d), Morton (1977), and Todd and Alvarez (2004). The geologic mapping of Dibblee (2008a-d) was used to create a PFYC map (see Section 9.0).

4.5 Field Survey

The objective of the field survey was to document all scientifically important surface fossils within the Project area. The field survey took place between December 21, 2010, and January 6, 2011. Fifty six quarter-quarter sections (2,240 acres) that include exposed rocks of the Alverson Formation, Split Mountain Formation, Latrania Formation, Palm Spring Formation, and Pleistocene older alluvium were surveyed. The survey was designed as a block inventory of all areas that could contain scientifically important surface fossils, so that adjustments to the locations of proposed Project facilities within the Project area will not result in the need for additional paleontological surveys.

The field survey protocol consisted of a pedestrian examination of all potentially fossil-bearing but safely accessible exposures and outcrops. All fossil localities were recorded using a Trimble GPS receiver (NAD 83 datum). All fossil localities were photographed, as well as the best-preserved and potentially diagnostic fossils. Occurrences of fossil wood including occasional fossil logs are widespread throughout the Project area in the Palm Spring Formation. Therefore, these were not recorded, and their locations are not included in this report.

The BLM requested that no fossils documented during the field survey be collected without prior authorization. Upon completion of the field survey, Paleo Solutions recommended to the BLM that the most scientifically significant fossils be collected. Not all of these fossils were re-located due to their small size. The fossils that were collected were then cleaned and prepared as appropriate, and transferred to the ABDSP-DSRC in January, 2011, for curation where they will be permanently available for future scientific inquiry. The findings of the field survey are compiled in this report, along with paleontological mitigation recommendations as appropriate.

5.0 Regulatory Requirements

This section of the report presents the regulatory requirements that are applicable to the Ocotillo Wind Express Project.

5.1 Federal Laws and Regulations

The management and preservation of paleontological resources on public lands are governed under various laws, regulations, and standards. For the past several decades, the BLM has used the Federal Land Management and Policy Act (FLPMA, 1976) as the legislative foundation for its paleontological resource management policies. The BLM has also developed general procedural guidelines (Manual H-8720-1; Instructional Memorandum [IM] 2008-009; IM 2009-011) for the management of paleontological resources (BLM, 2007, 2008). Paleontological resource management objectives include the evaluation, management, protection and location of fossils on BLM managed lands. Management policy also includes measures to ensure that

proposed land-use projects do not inadvertently damage or destroy scientifically significant paleontological resources. This technical assessment report was prepared to evaluate the potential for project-related impacts on scientifically significant fossils within the Project area, and includes mitigation recommendations.

The National Environmental Policy Act of 1969, as amended (Pub. L. 91-190, 42 U.S.C. 4321-4347, January 1, 1970, as amended by Pub. L. 94-52, July 3, 1975, Pub. L. 94-83, August 9, 1975, and Pub. L. 97-258 § 4(b), Sept. 13, 1982). Recognizes the continuing responsibility of the Federal Government to "preserve important historic, cultural, and natural aspects of our national heritage . . ." (Sec. 101 [42 USC § 4321]) (#382).

Federal Land Management and Policy Act of 1976 (43 U.S.C. 1712[c], 1732[b]); sec. 2, Federal Land Management and Policy Act of 1962 [30 U.S.C. 611]; Subpart 3631.0 et seq., Federal Register Vol. 47, No. 159, 1982. Defines significant fossils as: unique, rare or particularly well-preserved; an unusual assemblage of common fossils; being of high scientific interest; or providing important new data concerning [1] evolutionary trends, [2] development of biological communities, [3] interaction between or among organisms, [4] unusual or spectacular circumstances in the history of life, [5] or anatomical structure.

Paleontological Resources Preservation, Omnibus Public Lands Act, Public Law 111-011, Title VI, Subtitle D (OPLA-PRP, 2009). This legislation directs the Secretaries (Interior and Agriculture) to manage and protect paleontological resources on federal land using "scientific principles and expertise." OPLA-PRP incorporates most of the recommendations of the report of the Secretary of the Interior entitled Assessment of Fossil Management on Federal and Indian Lands (2000) in order to formulate a consistent paleontological resources management framework. In passing the OPLA-PRP, Congress officially recognized the scientific importance of paleontological resources on some federal lands by declaring that fossils from these lands are federal property that must be preserved and protected. The OPLA-PRP codifies existing policies of the BLM, National Park Service, U.S. Forest Service, Bureau of Reclamation, and U.S. Fish and Wildlife Service, and provides the following:

- *Uniform criminal and civil penalties for illegal sale and transport, and theft and vandalism of fossils from federal lands*
- *Uniform minimum requirements for paleontological resource-use permit issuance (terms, conditions, and qualifications of applicants)*
- *Uniform definitions for "paleontological resources" and "casual collecting"*
- *Uniform requirements for curation of federal fossils in approved repositories*

Federal legislative protections for scientifically significant fossils applies to projects that take place on federal lands (with certain exceptions such as DOD), involve federal funding, require a federal permit, or involve crossing state lines. Because the vast majority of the proposed Project area occurs on BLM managed lands, federal protections for paleontological resources apply under NEPA, FLPMA, and OPLA-PRP.

5.2 State and Local Regulations and Laws

The procedures, types of activities, persons, and public agencies required to comply with CEQA are defined in: Guidelines for the Implementation of CEQA, as amended March 29, 1999 (Title

14, Chapter 3, California Code of Regulations: 15000 et seq.). One of the questions listed in the CEQA Environmental Checklist (Section 15023, Appendix G, Section XIV, Part A) is: “Will the proposed project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?”

The State of California Public Resources Code (Chapter 1.7), Section 5097.5 and 30244, includes additional state level requirements for the assessment and management of paleontological resources. These statutes requires reasonable mitigation of adverse impacts to paleontological resources resulting from development on state lands, define the removal of paleontological “sites” or “features” from state lands as a misdemeanor, and prohibit the removal of any paleontological “site” or “feature” from state land without permission of the applicable jurisdictional agency. These protections apply only to State of California land, and thus apply only to portions of the proposed Project, if any, that occur on state land.

No other state or local laws and regulations are believed to be applicable to the proposed Project.

6.0 Permits and Approvals

This report was prepared under BLM Paleontological Resources Use Permit # CA-10-00-006P (expiration 4/20/2013). All paleontological work on BLM land must be approved and coordinated by the BLM El Centro Field Office. All fossils collected from BLM land must be housed in a federally approved paleontological repository. The paleontological repository for the above listed permit number is the SDNHM.

7.0 Resource Assessment Criteria

This analysis utilizes the BLM’s Potential Fossil Yield Classification System (PFYC). The PFYC follows, and is excerpted directly from BLM IM 2008-009 (2007).

Occurrences of paleontological resources are closely tied to the geologic units (i.e., formations, members, or beds) that contain them. The probability for finding paleontological resources can be broadly predicted from the geologic units present at or near the surface. Therefore, geologic mapping can be used for assessing the potential for the occurrence of paleontological resources. However, it is impossible to predict the specific types of fossils that will be found or their exact locations in a geologic formation.

Using the PFYC system, geologic units are classified based on the relative abundance of vertebrate fossils or scientifically significant invertebrate or plant fossils and their sensitivity to adverse impacts, with a higher class number indicating a higher potential. This classification is applied to the geologic formation, member, or other distinguishable unit, preferably at the most detailed mappable level. It is not intended to be applied to specific paleontological localities or small areas within units. Although significant localities may occasionally occur in a geologic unit, a few widely scattered important fossils or localities do not necessarily indicate a higher class; instead, the relative abundance of significant localities is intended to be the major determinant for the class assignment.

The PFYC system is meant to provide baseline guidance for predicting, assessing, and mitigating paleontological resources. The classification should be considered at an intermediate point in the analysis, and should be used to assist in determining the need for further mitigation assessment or actions.

The descriptions for the classes below are written to serve as guidelines rather than as strict definitions. Knowledge of the geology and the paleontological potential for individual units or preservational conditions should be considered when determining the appropriate class assignment. Assignments are best made by collaboration between land managers and knowledgeable researchers.

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 or older.

(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 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 present.
- Recent aeolian deposits.
- Sediments that exhibit significant physical and chemical changes (i.e., diagenetic alteration).

(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.

(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 of 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 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 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 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 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.

(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 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 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.

(1) Management concern for paleontological resources in Class 5 areas is high to very high. (2) A field survey by a qualified paleontologist is usually necessary prior to surface disturbing activities or land tenure adjustments. Mitigation will often be necessary before and/or during these actions. (3) Official designation of areas of avoidance, special interest, and concern may be appropriate.

The probability for impacting significant fossils is high. Vertebrate fossils or scientifically significant invertebrate fossils are known or can reasonably be expected to occur in the impacted

area. On-the-ground surveys prior to authorizing any surface disturbing activities will usually be necessary. On-site monitoring may be necessary during construction activities.

8.0 Literature and Geologic Map Reviews

Multiple published geologic maps that include the Project area were reviewed for this analysis (Dibblee, 2008a-d; Morton, 1977, Todd and Alvarez, 2004). For consistency of geologic unit nomenclature, we chose to utilize the geologic mapping of Dibblee (2008a-d) as our primary source. According to these workers, seven sedimentary geologic units (groups, formations, members, and informally named surficial deposits) occur within the Project area. Bedrock units include the middle Miocene Split Mountain Formation, middle Miocene Alverson Canyon Formation, the late Miocene and Pliocene Latrania Formation of the Imperial Group, and the Plio-Pleistocene Palm Spring Formation. These units are mostly mantled by surficial deposits of Quaternary (Pleistocene) Older Alluvium, Quaternary Alluvium, and Quaternary Terrace Alluvium. The geographic distribution of the geologic units within the Project area is illustrated in Figure 2.

No specific reports of fossil localities within the boundaries of the Project area were found in the literature reviewed for this analysis. However, numerous fossils have been described in the literature from the same geologic units at other locations in the Imperial Valley. The following subsections summarize the general geology, stratigraphy, and paleontological resources of the sedimentary geologic units that are present within the Project area.

8.1 Regional Geologic Setting

During the early Miocene, the evolution of the San Andreas Fault and East Pacific rise created a spreading zone between the North American and Pacific Plates (Crowell, 1974b). This change in the boundary orientation caused a graben to form between the plates (Singer 2005). The subsidence of the resulting fault-bounded basin combined with a global oceanic highstand caused much of the Imperial Valley to be inundated, forming an inland sea (Dorsey, 2006).

Simultaneous uplift and erosion of proximal regions provided nearby sediment sources (Crowell 1974a). This created an environment in which a massive influx of sediment was deposited unconformably on top of Cretaceous and older crystalline and metasedimentary basement rocks. Crustal thinning during the Miocene in this region also created conditions suitable for rift volcanism and igneous intrusion into sedimentary strata (Crowell, 1974a).

Miocene age sediments in the Imperial Valley consist of progradational and retrogradational sequences of conglomerate, sandstone, and siltstone on wave-cut terraces (Deméré, 2006). The Split Mountain Formation suggests a period of deposition by large debris flows and high energy braided rivers associated with a period of rapid uplift of nearby terrain and large scale rifting (Dorsey, 2006). The abrupt facies change between Split Mountain megabreccia conglomerates and the well-sorted sandstone beds of the Latrania Formation record the relatively rapid transition from nonmarine to marine deposition (Dorsey, 2006).

During the last one to two million years, modern strike slip faulting initiated widespread regional uplift that elevated and eroded older marine sediments (Dorsey, 2006). The gradual buildup of the Colorado River delta during the Pliocene formed a natural levee that enclosed the basin from marine intrusion and created an enclosed lake basin (Alles, 2007). Modern erosion continues to fill the basin with young alluvial sediments (Dorsey, 2006).

8.2 Mesozoic Crystalline Basement Rocks

According to Dibblee (2008a-d), one intrusive igneous rock unit occurs within the Project area. It consists of undifferentiated plutonic crystalline basement rocks including late Triassic to Jurassic dark gray biotite rich quartz diorite to diorite. Intrusive igneous rocks do not contain recognizable fossils because they are formed deep under the earth's surface at extremely high temperatures and pressures.

Based on this analysis, Mesozoic crystalline basement rocks within the Project are considered to have very low paleontological sensitivity (PFYC Class 1). Mesozoic crystalline basement rocks occur within much of the southern portion of the Project area (qd, Figure 2).

8.3 Split Mountain Formation

Tarbett and Holman (1944) named the Split Mountain Formation for a sequence of conglomerate, breccia, and sandy marine turbidite deposits that are exposed in Split Mountain Gorge (Dorsey, 2006; Woodard, 1974). Based on the conformable transition from terrestrial to marine strata, the upper, marine part of the Split Mountain Formation was reassigned to the lower Imperial Formation, and later renamed the Latrania Formation of the Imperial Group (Kerr and Kidwell, 1991; Remeika, 1998; Winker and Kidwell, 1996). In this revision, the Anza, Alverson and lower Split Mountain formations were assigned to the Split Mountain Group. The stratigraphy of the Split Mountain and lower Imperial groups is highly complex, with abrupt lateral facies, lithology, and thickness changes (Dorsey, 2006). For the purpose of this report, and for consistency with the stratigraphic nomenclature in the geologic maps utilized for this analysis, the original term Split Mountain Formation is followed here (Dibblee, 2008a).

Of middle Miocene age, the Split Mountain Formation is composed of granite- and gneiss-breccia, gray to brown, massive to bedded, boulder- to pebble-conglomerate and sandstone with localized minor red beds (Dibblee, 2008a). It was deposited on an erosional surface that was cut into Paleozoic and Cretaceous rocks (Dibblee, 2008a), in a rift basin as an alluvial fan of the Colorado River (Dorsey et al., 2007).

Due in large part to its depositional origins, the Split Mountain Formation contains few fossils, and no specific reports of fossils from this unit were found during the literature or museum record searches completed for this analysis. Because it is sparsely fossiliferous, any new fossils discovered within the Split Mountain Formation would be of particular scientific importance. Based on this analysis, the Split Mountain Formation is considered to have unknown paleontologic potential (PFYC Class 3b). Within the Project area, the Split Mountain Formation is limited to a small area of exposures located southwest of the town of Ocotillo (Tsm, Figure 2).

8.4 Alverson Canyon Formation

The middle Miocene Alverson Canyon Formation (also known as the Alverson Formation, Alverson Canyon Volcanics, or Alverson Andesite), is an approximately 700 foot thick sequence of non-marine sandstone and conglomerate associated with volcanic flows named by Tarbet and Holman (1944) for rocks located in Fossil (Alverson) Canyon on the southeast flank of the Coyote Mountains. Lithologies include andesite flows of varied color with interbedded tuff, breccia, non-marine sandstone and conglomerate (Morton, 1977). The Alverson Formation overlies and interfingers with the Anza Formation of the Split Mountain Group or overlies crystalline basement rocks, and underlies the Pliocene Imperial Group (Dibblee 2008a-d,

Morton, 1977; Todd and Alvarez, 2004). This formation has been radiometrically dated to approximately 16 million years old (Eberly and Stanley, 1978).

The volcanic facies of the Alverson Canyon Formation contains no recognizable fossil remains (PFYC Class 1). However, the sedimentary facies have produced the fossilized remains of algae, pollen, petrified wood, and mollusks, as well as unidentified vertebrate bone (Fourt, 1979). The SDNHM has recovered isolated teeth of heteromyid and sciurid rodents from a fine-grained sandstone bed in the Alverson Canyon Formation within one mile of the Project area (see Table 1) (Randall, 2010). Based on this analysis, the Alverson Canyon Formation has moderate paleontologic potential (PFYC Class 3a). The Alverson Canyon Formation is mapped as occurring in the southern portion of the Project area (Tav, Figure 2).

8.5 *Latrania Formation (Imperial Group)*

The upper Miocene to lower Pliocene (Deméré, 2006; Dibblee, 2008a-d) Imperial Formation was named by Woodring (1931), and is dominantly marine in origin (McDougall et al., 1999). The most recent (although informal) stratigraphic revision resulted in the elevation of the Imperial Formation to group status, consisting of a lower *Latrania* Formation and an upper Deguynos Formation. The *Latrania* Formation consists of up to 330 feet of coarse sandstone that commonly interfingers with coarse-grained alluvial conglomerate layers (Deméré, 2006). This unit lacks mud and silt, suggesting it is an inner to subtidal deposit (Deméré, 2006). The base of the *Latrania* Formation contains burrows into metamorphic limestone bedrock (Dorsey, 2006).

Fossils reported from the *Latrania* Formation of the Imperial Group include abundant and diverse assemblages of late Miocene and Pliocene marine invertebrates; primarily corals, mollusks, and echinoderms, although sponges and worm traces also occur (Powell, 2008; Schremp, 1981). The most common vertebrate fossils include bones and teeth of sharks, rays, bony fishes, sea turtle, sea cow, baleen whale, and camel (Deméré and Walsh, 1993; Deméré, 1993; 2006; Dorsey, 2006). Numerous other descriptions of fossils from the Imperial Group have been published. The SDNHM has two previously recorded fossil localities within one mile of the project area, and these produced numerous mollusk shells (see Table 1) (Randall, 2010). The LACM has two previously recorded fossil localities in the general vicinity of the Project area (see Table 1). One of these produced fossil mammal remains (camel) in association with gastropods and bivalves in Fossil Canyon. The second locality produced the holotype specimen of the fossil sea lion *Valenictus imperialensis* (McLeod, 2010; Mitchell, 1961). Because it produces locally abundant, diverse and scientifically important vertebrate and invertebrate fossils, the *Latrania* Formation of the Imperial Group has very high paleontologic potential (PFYC Class 5). The *Latrania* Formation is limited to small exposures located just to the west of the northeast corner of the project area (Ti, Figure 2).

8.6 *Palm Spring Formation*

The Plio-Pleistocene Palm Spring Formation was named by Woodring (1931) for a several thousand meter thick sequence of non-marine sandstone, siltstone and claystone that overlie the marine Imperial Group. Cassiliano (2002) elevated the Palm Spring Formation to the Palm Spring Group consisting of the following formations: Arroyo Diablo, Olla, Tapiado Claystone, and Huesos. For the purpose of this analysis and for consistency with the geologic mapping, the term Palm Spring Formation is used in this report.

The Palm Spring Formation is composed of interbedded light gray conglomerate, arkosic sandstone and claystone. The entire Palm Spring sequence is interpreted as representing a mixed fluvial and deltaic depositional facies prograding from the prehistoric Colorado River delta (Casilliano, 2002). According to Dibblee (1954), the formation is up to 6,500 feet thick north of Carrizo creek and thins to the west where it grades into the Canebrake Conglomerate, which is a basin margin facies containing granitic and metamorphic debris from the prehistoric adjacent mountains (Morton, 1977).

The Palm Spring Formation has produced over 100 species of Plio-Pleistocene fossil vertebrates including skulls, teeth, and/or bones of amphibians (frog), reptiles (tortoise, lizard, snake), birds (loon, grebe, pelican, condor, flamingo, duck, hawk, eagle, turkey, quail, crane, coot, owl, and crow), and mammals (shrew, mole, bat, ground sloth, rabbit, squirrel, gopher, kangaroo rat, woodrat, vole, wolf, coyote, fox, short-faced bear, raccoon, skunk, badger, jaguar, horse, tapir, camel, llama, deer, pronghorn, and mammoth) (Deméré and Walsh, 1993; Lundelius et al., 1987; San Diego DPW, 2007). Fossil localities just south of due east of the southern margin of the Project area in the Yuha Basin have produced fossil cat, camel, and horse (McLeod, 2010). Elsewhere in the formation, particularly in the Anza-Borrego Desert State Park, numerous vertebrate and invertebrate localities have been recorded (Jefferson, 2010; McLeod, 2010; Randall, 2010). The Palm Spring Formation has been noted to be of particular scientific importance because its Irvingtonian-Blancan faunas provide critical information for our understanding of the evolution and diversification of Pliocene-Pleistocene paleocommunities (Casilliano, 2002). Because it produces locally abundant, diverse and scientifically important vertebrate and invertebrate fossils, the Palm Spring Formation has very high paleontologic potential (PFYC Class 5). The Palm Spring Formation outcrops in the northwestern, northeastern, and southeastern portions of the project area (Tps, Figure 2).

8.7 Older Alluvium

Pleistocene older alluvium consists of poorly consolidated silts, sands, and gravels containing poorly sorted angular clasts derived from nearby mountains, and forming desert pavement terraces coated with desert varnish between dry washes and along upper margins of valleys (Dibblee, 2008a).

Older alluvial deposits are known to locally contain fossils of scientific importance in southern California. Deposits of similar age and lithology in the Coyote Mountains and the Vallecito-Fish Creek badlands in Anza-Borrego State Park have produced terrestrial vertebrate fossils (Randall, 2010). Additionally, the LACM has a locality in older alluvium to the south-southeast of the Project area west of Calexico that yielded a fossil horse (Equidae) (McLeod 2010) (see Table 1). Because it contains scattered but scientifically important fossil vertebrate remains of scientific importance, older alluvium has moderate paleontologic potential (PFYC Class 3a). Deposits of older alluvium occur in the western portion of the Project area (Qoa, Figure 2).

8.8 Alluvium and Terrace Deposits

Most of the Project area is underlain by Holocene age alluvium and terrace deposits. These unconsolidated sediments consist of mostly locally-derived sand, silt, clay and conglomerate deposited in valleys and on floodplains as the modern landscape evolved (Morton, 1977).

Deposits of Holocene age contain the unfossilized remains of modern species, and are generally considered too young to preserve fossil remains. However, at depth, deposits mapped as Holocene at the surface may well contain fossils because the deeper deposits may be of Pleistocene age (McLeod, 2010). For example, as noted by Jefferson (2010), Springer et al. (2009) documented scientifically Pleistocene significant fossils in a similar setting below Holocene deposits in Diamond Valley, Riverside County. Because surficial deposits of Holocene age sediments are too young to contain in-situ fossils, they have low paleontologic potential (PFYC Class 2). It should be noted however that construction excavations into Holocene alluvium and terrace deposits could expose fossils in underlying Pleistocene alluvium. Deposits mapped as Holocene alluvium and terrace deposits occupy most of the surface of the Project area (Qa, Qt, Figure 2).

9.0 Museum Record Search Results

Paleontological record searches for this Project were completed at the San Diego Natural History Museum (SDNHM), Anza-Borrego Desert State Park (ABDSP-DSRC), and the Natural History Museum of Los Angeles County (LACM). Copies of the record search results are appended to this report (Appendix A).

The record search results are summarized below in Table 1. None of the institutions have any previously recorded fossils localities within the Project area boundaries, although all of them have localities nearby in the same formations that occur within the Project area.

The SDNHM has three previously recorded fossil localities within a one mile radius of the Project area. SDSNH Locality 4372 (Alverson Formation) produced teeth of sciurid and heteromyid rodents, as well as unidentified mammalian remains. SDSNH Locality 351 (Latrania Formation) produced bivalve shells belonging to the families Strombinidae, Pectinidae, Bullidae, Architectonicidae, and Lucinidae. SDSNH Locality 2698 (Latrania Formation) produced bivalve shells belonging to the family Pectinidae (Randall, 2010). Additionally, the SDNHM has numerous other previously recorded fossil localities in the Latrania Formation and Palm Spring Formation.

The ABDSP-DSRC has previously recorded fossil localities (number and precise location not provided) in the sedimentary facies of the Alverson Formation located in the Volcanic Hills approximately nine miles northwest of the project area (Jefferson, 2010), and numerous additional fossil localities recorded in Neogene age rocks within Anza-Borrego Desert State Park.

The LACM has seven previously recorded fossil localities in the general vicinity of the Project area. The closest fossil locality is LACM Locality 1403 (Imperial Formation) is located just north of the Project area, and produced a specimen identified as Camelidae (camel), in association with fossil gastropods and bivalves. LACM (CIT) 472 (Imperial Formation) is located almost due north of the eastern boundary of the Project area in the lower reaches of Painted Gorge, and produced the holotype specimen of the fossil walrus *Valenictus imperialensis* that was described by E.D. Mitchell (1961). LACM localities 1718 and 4098, 4099 and 4100 (Palm Spring Formation) are situated just south of due east of the southern margin of the Project area in the Yuha Basin south of Yuha Wash, and produced specimens of the cat *Felis*, the camel *Titanotylopus*, and the horse *Equus*. The LACM has numerous additional fossil localities in the Palm Spring Formation, but they are located in the Carrizo badlands to the northwest of the

Table 1. Summary of previously recorded fossil localities near the Ocotillo Express Wind Express Project area in Imperial County, California.

Institution and Locality Number	Formation and Age	Fossils
SDNHM 351	Latrania Formation (Imperial Group), late Miocene and Pliocene	Strombinidae, Pectinidae, Bullidae, Architectonicidae, Lucinidae
SDNHM 2698	Latrania Formation (Imperial Group), late Miocene and Pliocene	Pectinidae
SDNHM 4372	Alverson Formation (sedimentary facies), middle Miocene	Heteromyidae, Sciuridae, Mammalia undetermined
ABDSP-DSRC, locality numbers not provided	Alverson Canyon Formation (sedimentary facies), middle Miocene	Fossil inventory list not provided
LACM 1403	Imperial Formation, late Miocene and Pliocene	Camelidae
LACM (CIT) 472	Imperial Formation, late Miocene and Pliocene	Holotype: <i>Valenictus imperialensis</i>
LACM 1718, 4098, 4099, 4100	Palm Spring Formation, Pliocene and Pleistocene	<i>Felis</i> , <i>Titanotylopus</i> , <i>Equus</i>
LACM 1719	Older Quaternary deposits	Equidae

Project area. LACM Locality (Older Quaternary deposits) 1719 is situated east-southeast of the Project area west of Calexico and Mount Signal, and produced a specimen of fossil horse (Equidae) (McLeod, 2010).

9.1 Preliminary Potential Fossil Yield Classification of Project Area

Based on the results of the literature and museum record searches, the geologic formations within the Project area were ranked using the PFYC (see Section 7.0). The results are summarized in Table 2, and are projected on a paleontological sensitivity map (Figure 3). This map groups the geologic formations based on their PFYC rankings, and was used to calculate the acreages of areas recommended for inclusion in the pre-construction pedestrian field survey. The PFYC rankings below were initially recommended by Aron and Kelly (2010) as part of the pre-survey paleontological assessment, and were approved by the BLM as part of the document review process. Following the completion of the field survey, and as described in Section 10.0 of this report, the PFYC rankings were updated based on existing conditions observed within the Project area during the pedestrian field survey.

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Table 2. Preliminary Fossil Yield Classification Rankings for the Ocotillo Wind Express Project.

Formation/Map Unit	Age	PFYC Ranking	Acres
Intrusive igneous basement rocks	Late Triassic to Jurassic	1	1,226.24
Split Mountain	Middle Miocene	3b	161.28
Alverson (sedimentary facies)	Middle Miocene	3a	773.824
Latrania (Imperial Group)	Late Miocene and Pliocene	5	8.00
Palm Spring	Pliocene and Pleistocene	5	436.915
Older Alluvium	Pleistocene	3a	2260.262
Terrace deposits	Holocene (possibly Pleistocene at depth)	2	424.096
Alluvium	Holocene (possibly Pleistocene at depth)	2	9710.982

10.0 Field Survey Results

All of the fossils documented during the field survey were located in the Palm Spring Formation and Latrania Formation. No fossils were observed in the other formations that were surveyed: Split Mountain Formation, Alverson Canyon Formation, and Older Alluvium. It should also be noted that bivalve shell fragments were locally observed in Older Alluvium, but it is believed that these were re-worked from older and topographically higher exposures of a marine deposit, possibly of the Imperial Group which outcrops extensively in mountains adjacent to the Project area.

Thirty four fossil localities were recorded during the field survey. Four of these are located in the Latrania Formation (Imperial Group) and 30 are located in the Palm Spring Formation. Table 3 summarizes the field survey data by quarter-quarter section. Table 4 summarizes the fossil localities documented during the field survey. Figure 4 shows the geographic point distribution of the fossil localities within the Project area.

The fossils documented in the late Miocene and Pliocene Latrania Formation of the Imperial Group consist of marine invertebrates including scallops, oysters, snails and barnacles. These fossils are highly fragmentary and preserved as a coquina in beach or near shore marine deposits at all of these localities. The marine invertebrate localities recorded during the field survey are not considered to be scientifically significant because they are poorly preserved due to their high degree of fragmentation. However, it is possible that construction excavations in the vicinity of these localities could unearth better preserved and more complete fossil material, and it is recommended that construction activities at these localities be spot-checked by a qualified and BLM permitted paleontologist in order to obtain a census collection of better preserved fossils if they are present.

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The fossils at the 30 localities documented in the Pliocene and Pleistocene Palm Spring Group consist of plants and vertebrates. The plants consist of fragmentary but locally well preserved silicified wood, some of which shows evidence of encrustation by fossil algae. Some near complete logs were also observed. It became readily apparent during the initial days of the field survey that fossil wood is so abundant throughout the Project area that it would be impractical to record wood localities. Vertebrate fossils are far more rare, and consist mostly of fragments of turtle shell (carapace and plastron) and mammalian bone and tooth enamel. Most of the mammalian fossils show evidence of a high degree of fluvial transport, and are unidentifiable due to their fragmentary nature and lack of diagnostic morphology, and as such, they lack scientific significance. Nevertheless, the presence of bone fragments on the surface indicates the potential for additional and potentially scientifically significant subsurface fossils at these localities. Therefore, all Palm Spring Formation fossil localities are recommended for avoidance by the Project.

Five of the Palm Spring Formation fossil localities contained surface fossils that were believed to be well-preserved to be diagnostic, and were therefore deemed to have scientific significance (see Table 4). At the conclusion of the field survey, a request was made to the BLM to re-visit these fossil localities and collect the fossils, and the request was approved. However, due to intervening heavy rains and the small size of the fossils, only three of the localities were re-located and collected (Table 5). The fossils collected include 16 specimens consisting of turtle carapace and plastron fragments and limb elements; camelid post-crania including a distal 1st phalanx of the extinct llama cf. *Hemiauchenia* sp., a lumbar vertebral centrum of the extinct camel cf. *Camelops* sp.; an unidentified artiodactyl astragalus, a lumbar vertebra (proximal portion of right transverse process) of an unidentified artiodactyl, and unidentified mammal bones collected from the Palm Spring Formation (written communication, G. Jefferson, ABDSP-DSRC, 2011). Although the Palm Spring Formation vertebrate fossils documented during the survey are fragmentary and generally poorly preserved, they do include remains that are identifiable to taxon and element, provide new records of fossils from an area in which fossil localities have not been previously documented, and provide important new information concerning the paleoenvironmental history of the region.

All fossils collected during the field survey were prepared, identified, and transferred to ABDSP-DSRC for permanent museum storage in January, 2011. Appendix C is a copy of the curation agreement letter provided by ABDSP-DSRC. Appendix D is a copy of the signed BLM repository receipt form for specimens that were delivered to ABDSP-DSRC. Appendix E includes all of the BLM locality forms, maps and photographs for fossil localities documented during the field survey.

All of the Palm Spring Formation fossil localities are located in two larger areas that are recommended for avoidance by project-related surface disturbance because of the high density of fossil localities recorded in these areas during the field survey (see Figure 5). Based on the Project Proposed Action, these avoidance areas are currently not located within the area of potential effect, but it is recommended that they be avoided by future surface disturbing actions in order to preserve the fossils in their native geologic context for the benefit of future scientific research efforts. If avoidance is not feasible, then any surface disturbing actions in these areas should be monitored by qualified and BLM permitted paleontologists.

Redacted for confidentiality purposes.) II XH

Redacted for confidentiality purposes.) II XH

Table 5. Fossils collected during the paleontological survey for the Ocotillo Wind Express Project. Note that BLM approval was obtained prior to collecting fossils, and only potentially scientifically important fossils were collected. All fossils were transferred to the Anza-Borrego Desert State Park (ABDSP-DSRC) in January, 2011.

Paleo Solutions Locality Number	ABDSP Fossil Identification(s)	ABDSP-DSRC Locality Number	ABDSP-DSRC Specimen Numbers
20101228MER-5	<i>Hemiauchenia</i> sp., distal 1 st phalanx; mammalia indeterminate, juvenile vertebral epiphysis	3465	V8885, V8886
20101228GLA-1	Testudines plastron, limb (2 individuals?); cf. <i>Camelops</i> sp., posterior centrum of lumbar vertebra; indeterminate bone fragments	3466	V8889, V8890, V8891, V8892, V8893
20101229PM-2	Testudines, primarily plastron, elements and lower level taxonomic identification indeterminate, Artiodactyla indet., astralagus	3467	V8894, V8895, V8896, V8897, V8898, V8899, V8900

Additionally, areas classified as PFYC Class 5 that intersect with proposed Project surface disturbance areas should be monitored for paleontological resources during construction. These areas comprise 62.47 acres of the Project area, and are shown on Figure 6.

Based on the results of the field survey, it is recommended for future management purposes that the PFYC ranking of the geologic formations within the Project area be revised as shown in Table 6 for future management purposes. Both the pre-survey (initial) and post-survey (revised) PFYC rankings are listed.

Table 6. Revised Fossil Yield Classification Summary for the Ocotillo Wind Express Project based on the field survey results.

Formation/Map Unit	Age	Initial PFYC Ranking	Revised PFYC Ranking
Intrusive igneous basement rocks	Late Triassic to Jurassic	1	1
Split Mountain	Middle Miocene	3b	3b
Alverson (sedimentary facies)	Middle Miocene	3a	2
Latrania (Imperial Group)	Late Miocene and Pliocene	5	3a
Palm Spring	Pliocene and Pleistocene	5	4
Older Alluvium	Pleistocene	3a	2
Terrace deposits	Holocene (possibly Pleistocene at depth)	2	2
Alluvium	Holocene (possibly Pleistocene at depth)	2	2

11.0 Paleontological Resource Impacts

Surface disturbing actions in areas (sedimentary geologic formations) known to contain scientifically significant fossils are known to produce adverse impacts on non-renewable paleontological resources. These impacts vary depending upon the depth and lateral extent of ground disturbance. Activities that disturb only the ground surface may result in impacts to surface fossils due to crushing and fragmentation beyond repair. Activities that disturb both the surface and subsurface may result in fossils located on the surface and preserved in subsurface sediments. The loss of these fossils and associated results in a permanent loss of an educational and scientific resource, and represents a significant adverse environmental impact.

Direct impacts to paleontological resources concern the physical destruction of fossils usually by human caused ground disturbance. Indirect impacts to paleontological resources typically concern loss of resources due to theft and vandalism due to increased public access to paleontologically sensitive areas. Cumulative impacts to paleontological resources concern the incremental loss to society as a whole of these non-renewable resources.

The goal of paleontological mitigation is to reduce adverse impacts to a less than significant level by salvaging scientifically important fossil remains and associated data and housing them permanently in a natural history museum. Direct adverse impacts can be successfully mitigated by physically removing scientifically important fossils from the path of construction either during pre-construction paleontological survey or by monitoring of construction excavations. Indirect impacts are more difficult to mitigate, and typically involve limiting access to scientifically important fossils through a combination of law enforcement, protective enclosures, and land access to restrictions.

12.0 Construction Mitigation Recommendations

Based on the results of the analysis, the following mitigation recommendations are made:

- 1) Project construction is the only phase of Project operations that has the potential to results in direct adverse effects to subsurface fossils as the result of surface disturbance, although increased access to the area by the general public and Project personnel may result in greater indirect effects to surface fossils that erode onto the surface in the future. Prior to construction, all Project personnel involved with ground disturbing operations should undergo training to be taught to recognize the presence of fossils in construction excavations.
- 2) All areas mapped as PFYC Class 1 (intrusive igneous rocks) and Class 2 (Holocene alluvium and terrace deposits) are recommended for paleontological clearance because these deposits have little potential for producing in-situ fossils. These deposits comprise approximately 11,361.32 acres of the total Project area. Note that these deposits may contain fossils at depth because deeper sediments may be Pleistocene in age. Because the thickness of the Holocene alluvium and terrace deposits is highly variable and is not precisely known, it is recommended that construction personnel working in these areas notify the BLM Authorized Officer immediately should any potential fossils be encountered.

- 3) Four Latrania Formation fossil localities were documented during the field survey. If construction-related disturbance intersects with these localities, they should be spot-check monitored during construction in order to check for the presence of more complete and better preserved (scientifically significant) fossils. If present, a census collection of these fossils should be collected.
- 4) All of the Palm Spring Formation fossil localities should be avoided by construction-related ground disturbance, and these are located in two larger areas that are also recommended for avoidance by project-related surface disturbance because of the high density of fossil localities recorded in these areas during the field survey (see Figure 5). Based on the Project Proposed Action, these avoidance areas are currently not located within the area of potential effect, but it is recommended that they be avoided by future surface disturbing actions in order to preserve the fossils in their native geologic context for the benefit of future scientific research efforts.
- 5) Prior to construction, all Project personnel should be briefed on the types of paleontological resources that they could encounter during construction as part of the workers environmental and safety training.
- 6) During construction and during future Project operations, the BLM Authorized Officer should be notified immediately if any fossils are encountered by construction or other Project personnel.
- 7) A mitigation monitoring plan for paleontological resources should be prepared based on the results of this report in conjunction with the final selected Project alternative. This plan should specify procedures and protocols in the event of fossil discoveries, specific monitoring locations, and should be prepared according to BLM guidelines H8270-1 (BLM, 1998) and IM 2009-011 (BLM, 2008).
- 8) All fossils collected during construction must be transferred to a paleontological repository that meets federal DM-411 curation standards.

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Appendix A: Records Search Results



DEPARTMENT OF PARKS AND RECREATION
Colorado Desert District Stout Research Center
Anza-Borrego Desert State Park
200 Palm Canyon Drive
Borrego Springs, California 92004

Ruth Coleman, Director

Jennifer Kelley
Paleo Solutions
2035 Placentia Avenue, Unit D
Costa Mesa, California 92627

Dear Ms Kelley,

03 July 2010

As per your request 28 June 2010, a search of the archival records, collections database and GIS data at the Colorado Desert District Stout Research Center (DSRC) for paleontological resources on lands within one mile of the proposed Ocotillo Wells Express wind farm project (Ocotillo Express 2009) was conducted 02 July 2010. No paleontological sites adjacent to or within this area were found on record.

As far as I am aware no paleontological surveys have been performed and/or reported for this area. However, geological formations known to be paleontologically sensitive that yield significant remains in Anza-Borrego Desert State Park (ABDSP) crop out within the project area (Division of Mines and Geology 1962, Ocotillo Express 2009).

Most of the project foot print seems to be underlain by Quaternary alluvium. Such sediments, usually with no known paleontologic signature at the surface, may yield significant fossils at shallow depths. For example, Quaternary alluvium in Diamond Valley, Riverside County, of similar lithology and depositional setting to that in the project area, was found contain very abundant and highly significant Pleistocene vertebrate remains (Springer et al. 2009). Given these findings, the sensitivity of Quaternary alluvium locally may be high, and it can not be assumed that such deposits do not contain significant fossil remains.

Although, most of the site is underlain by Quaternary alluvial deposits, geological mapping includes outcrops of Oligo-Miocene volcanics of the Alverson Formation (*Tv* on the Ocotillo Express geologic map) and sandstones and conglomerates probably of the Split Mountain Group or Red Rock Formation (*Mc* on the Ocotillo Express geologic map) within the project area. Such deposits are generally considered unfossiliferous. However, sediments interbedded with the Alverson volcanics within the Volcanic Hills (ABDSP) <15 km northwest of the project area, and mapped geologically as *Tv* (Division of Mines and Geology 1962), yield significant vertebrate remains and fossil woods (DSRC archives).

Given the potential of encountering significant fossils, it is recommended that a paleontological survey be preformed, that a qualified paleontological monitor be present

during all excavations or grading into *Tv* and Quaternary alluvial deposits, and that the Society of Vertebrate Paleontology (1995) mitigation standards be followed.

Three hours were spent in this endeavor by two District staff that bill at \$70.00 per hour, for a total expense of \$210.00. Please make a payment, via check to the *Anza-Borrego Foundation Paleontology* account, mailed to this office. The Foundation is a 501c-3 (33-0334338) non-profit organization. If you have any further questions concerning these findings, please feel free to contact me at 1-760-767-4974 or <gjefferson@parks.ca.gov>.

Sincerely,



George T. Jefferson

Colorado Desert District Paleontologist
Associate State Archaeologist

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7 August 2010

Paleo Solutions, Inc.
2035 Placentia Avenue, Suite D
Costa Mesa, CA 92627

Attn: Geraldine L. Aron, Principal

re: Paleontological resources for the proposed Ocotillo Wind Express Project, near Ocotillo, Imperial County, project area

Dear Geraldine:

I have conducted a thorough search of our paleontology collection records for the locality and specimen data for the proposed Ocotillo Wind Express Project, near Ocotillo, Imperial County, project area as outlined on the portions of the Carrizo Mountain, Painted Gorge, In-Ko-Pah Gorge, and Coyote Wells USGS topographic quadrangle maps that Jennifer Kelly sent to me via e-mail to me on 28 June 2010. We do not have any vertebrate fossil localities that lie within the project boundaries, but we do have localities nearby from the same sedimentary deposits that occur within the proposed project areas.

In the very southwestern portion of the proposed project areas there are exposures of plutonic igneous rocks as well as exposures of extrusive igneous rocks of the Alverson Canyon Volcanics. These rocks, of course, will be devoid of recognizable vertebrate fossils. In the southwestern portion of the southeastern parcel of the proposed project areas south-southwest of Ocotillo there are exposures of the late Miocene Split Mountain Formation. The Split Mountain Formation is primarily composed of coarse grained sediments that are not conducive to producing significant vertebrate fossils and we have no vertebrate fossil localities properly assigned to the Split Mountain Formation.

In the very northeastern portion of the proposed project areas there may be exposures of the marine Pliocene Imperial Formation, and this rock unit may underlie the younger Palm Spring Formation exposed elsewhere in the proposed project areas. Our closest vertebrate fossil locality from the Imperial Formation is LACM 1403, situated just north of the proposed project area in Fossil Canyon, that produced a fossil specimen of camel, Camelidae, in association with fossil snails and molluscs. Our next closest fossil vertebrate locality from the Imperial Formation is LACM (CIT) 472, situated almost due north of the eastern boundary of the proposed project areas in the lower reaches of Painted Gorge, that produced the holotype specimen (a specimen that serves as the basis for describing a species new to science) of the fossil sea lion *Valenictus imperialensis*

described by E. D. Mitchell in 1961 (A new walrus from the Imperial Pliocene of southern California; with notes on odobenid and otariid humeri. Contributions in Science, Natural History Museum of Los Angeles County, 44:1-28).

Scattered throughout the proposed project areas there are exposures of the Plio-Pleistocene deposits of the Palm Spring Formation. Our closest vertebrate fossil localities from the Palm Spring Formation are LACM 1718 and 4098-4100, situated just south of due east of the southern margin of the proposed project areas in the Yuha Basin southeast of Yuha Wash, that produced fossil specimens of cat, *Felis*, camel, *Titanotylopus*, and horse, *Equus*. We have an enormous number of vertebrate fossil localities from the Palm Spring Formation, but they are concentrated in the Carrizo Badlands quite to the northwest of the proposed project area.

Most of the proposed project areas, however, have surficial deposits composed of younger Quaternary Alluvium, either as fan deposits from the more elevated terrain or as fluvial deposits from the drainages and particularly from Palm Canyon Wash, or older Quaternary terrace deposits. The younger Quaternary deposits typically do not contain significant vertebrate fossils, at least in the uppermost layers, and we have no vertebrate fossils localities anywhere nearby from such deposits. Our closest vertebrate fossil locality from the older Quaternary deposits is LACM 1719, situated east-southeast of the proposed project areas west of Calexico and Mount Signal, that produced a specimen of horse, Equidae.

Excavations in the igneous rocks exposed in the southwestern portions of the proposed project area will not uncover any fossils. Excavations in the coarse deposits of the Split Mountain Formation exposed in the southeastern parcel of the proposed project areas are unlikely to uncover significant vertebrate fossils. Shallow excavations in the younger Quaternary Alluvium exposed in much of the proposed project areas are also unlikely to uncover significant vertebrate fossils. Deeper excavations in those latter areas that extend down into older deposits, however, may well encounter significant vertebrate fossils. Any excavations in the Palm Spring Formation deposits, or deeper excavations that might extend down into the Imperial formation deposits, have a good chance of uncovering significant to highly significant fossil vertebrate remains. Any substantial excavations in the relatively fine-grained sedimentary deposits in the proposed project areas, therefore, should be monitored closely to quickly and professionally recover any fossil remains discovered while not impeding development. Any fossils recovered during mitigation should be deposited in an accredited and permanent scientific institution for the benefit of current and future generations.

This records search covers only the vertebrate paleontology records of the Natural History Museum of Los Angeles County. It is not intended to be a thorough paleontological survey of the proposed project area covering other institutional records, a literature survey, or any potential on-site survey.

Sincerely,



Samuel A. McLeod, Ph.D.
Vertebrate Paleontology

enclosure: invoice



SAN DIEGO NATURAL HISTORY MUSEUM

BALBOA PARK - SAN DIEGO SOCIETY OF NATURAL HISTORY - ESTABLISHED 1874

6 July 2010

Jennifer Kelly
Paleo Solutions
2035 Placentia Ave, Unit D
Costa Mesa, CA 92627

RE: Paleontological record search; Ocotillo Wind Express Project

Dear Ms. Kelly:

This letter presents the results of a paleontological record search conducted for the Ocotillo Wind Express Project. This development project area is approximately 41,000 acres in size and includes two sites; both are in southwestern Imperial County along Interstate 8 and south of the Coyote Mountains. The larger and western most of the two sites is located north of the east bound lanes of Interstate 8, east of the Imperial County/San Diego County border, south of the Coyote Mountains, and northwest of the town of Ocotillo. The smaller and eastern most of the two sites is south of Interstate 8 and Ocotillo, and northeast of Davies Valley. The sedimentary rocks underlying the project site have been mapped by Dibblee (2008) and Morton (1971) as the Holocene-age (< 10,000 years old) alluvium, Holocene to late Pleistocene-age (~500,000 years old to present) older alluvium, Pliocene/Pleistocene age (approximately 1 to 4 million years old) Palm Spring Formation, late Miocene-age (5 – 6 million years old) Split Mountain Formation, and early Miocene-age (14 – 22 million years old) Alverson Volcanics).

The San Diego Natural History Museum has 3 fossil localities within a one-mile radius of the project site (see attached map). One of the localities occurs within non-marine, sedimentary deposits of the Alverson Volcanics. This locality produced fossils of terrestrial vertebrates (e.g., rodents). Two of the localities occur within marine sandstones of the Latrania Formation, Imperial Group (Imperial Formation by Dibblee and Morton). These localities are not believed to crop out within the project boundaries. Although San Diego Natural History Museum fossil localities have not been discovered in other units underlying the project area, there is a potential for fossil discoveries. Older alluvium, Palm Spring Formation, and the Split Mountain Formation have been known to produce terrestrial vertebrates in the Coyote Mountains and the Vallecito-Fish Creek badlands of southern Anza-Borrego Desert State Park.

Grading activities associated with the proposed Ocotillo Wind Express Project have the potential to impact sedimentary deposits of the older alluvium, Palm Spring Formation, Split Mountain Formation, and Alverson Volcanics. Based on the records of fossil discoveries in the region, Deméré and Walsh (1993) have assigned the older alluvium, the Split Mountain Formation, and the Alverson Volcanics to have a moderate paleontological sensitivity, while the

Palm Spring Formation to have a high paleontological sensitivity. Any fossils recovered from the exposures made at the project site are likely to be scientifically significant we would recommend the implementation of a full paleontological mitigation program.

If you have any questions concerning these findings please feel free to contact me at 619-255-0310 or krandall@sdnhm.org.

Sincerely,



Kesler A. Randall
Collections Manager, Fossil Vertebrates
Department of Paleontology

Literature Cited:

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Appendix B: Copy of BLM Paleontological Resource Use Permits



United States Department of the Interior



BUREAU OF LAND MANAGEMENT
California State Office
2800 Cottage Way, Suite W1834
Sacramento, CA 95825
www.ca.blm.gov

MAY 13 2010

In Reply Refer To:
8151 (CA930)P

Ms. Geraldine Aron
Paleo Solutions, Inc.
2035 Placentia Avenue, Suite D
Costa Mesa CA 92627

Dear Ms. Aron:

The Bureau of Land Management (BLM) is pleased to issue a 3-year Scientific Paleontological Collecting Permit (CA-10-00-006P) to Paleo Solutions, Inc., for use on Public Lands managed by the California BLM, as specified in your permit. This permit is issued under the authority of the Federal Land Management Policy Act (FLMPA) and the Antiquities Act of 1906. Keep a copy with you at all times in the field.

This permit authorizes the permit holders to conduct and collect paleontological resources pertaining to both scientific research and commercial projects. BLM would like to emphasize a few points. First, this permit assigns to your firm the responsibility to submit reports and other documents in a timely fashion and such submittal will be a major point of review of your firm's performance under this permit. Second, you are required to contact the appropriate Field Office to obtain a Field Use Authorization before you begin any fieldwork. Please allow the Field Office sufficient lead-time to process your application for a Field Use Authorization. The Field Office may impose additional conditions and stipulations at that time. Third, please be mindful that it is your firm's responsibility to ensure assignment of supervisory field personnel (crew chiefs) to projects that have at least 4-months local experience and who otherwise meet the standards of the BLM.

Our office is enclosing a map of California BLM Field Offices with phone numbers of cultural heritage staff (a similar map can also be viewed at <http://www.ca.blm.gov/fieldoffices.html>) and a copy of your permit with attached National special permit conditions. BLM draws your attention to these stipulations and encourages you to read and understand them. Please sign page 5, as indicated, and **return a copy of this signature page to the California BLM State Office within 30 days of your receipt of the permit.**

Should you have any questions, please call me at (916) 978-4648.

Sincerely,

Dr. Charlotte Hunter
State Archaeologist

Enclosures



United States Department of the Interior

PERMIT FOR PALEONTOLOGICAL INVESTIGATIONS

To conduct archeological work on Department of the Interior lands and Indian lands under the authority of:

- The Archaeological Resources Protection Act of 1979 (16 U.S.C. 470aa-mm) and its regulations (43 CFR 7).
- The Antiquities Act of 1906 (P.L. 59-209; 34 Stat. 225, 16 U.S.C. 431-433) and its regulations (43 CFR 3).
- Supplemental regulations (25 CFR 262) pertaining to Indian lands.
- Bureau-specific statutory and/or regulatory authority: Federal Land Policy and Management Act of 1976 (Public Law 94-570), and Section 302 of Public Law 94-4579

Please use this number when referring to this permit

No.: CA-10-00-0006P

1. Permit issued to Paleo Solutions Inc.		2. Under application dated March 24, 2010	
3. Address 2035 Placentia Ave, Suite D Costa Mesa, CA 92627		4. Telephone number(s) 562.818.7713	
		5. E-mail address(es) geraldine@paleosolutions.com	
6. Name of Permit Administrator Geraldine Aron Telephone number(s): Email address(es):		7. Name of Principal Investigator(s) Geraldine Aron, Paul Murphey Telephone number(s): Email address(es):	
8. Name of Field Director(s) authorized to carry out field projects Geraldine Aron, Scott Armstrong, Jeff Hathaway		Telephone number(s): Email address(es):	
9. Activity authorized Survey and Recordation			
10. On lands described as follows All lands administered by the California Desert District of the Bureau of Land Management			
11. During the duration of the project From May 1, 2010 To April 30, 2013			
12. Name and address of the curatorial facility in which collections, records, data, photographs, and other documents resulting from work under this permit shall be deposited for permanent preservation on behalf of the United States Government. San Diego Natural History Museum, P.O. Box 121390, San Diego, CA 92112			
13. Permittee is required to observe the listed standard permit conditions and the special permit conditions attached to this permit.			
14. Signature and title of approving official 			15. Date 5/14/10

15. Standard Permit Conditions

- a. This permit is subject to all applicable provisions of 43 CFR Part 3, 43 CFR 7, and 25 CFR 262, and applicable departmental and bureau policies and procedures, which are made a part hereof.
- b. The permittee and this permit are subject to all other Federal, State, and local laws and regulations applicable to the public lands and resources.
- c. This permit shall not be exclusive in character, and shall not affect the ability of the land managing bureau to use, lease or permit the use of lands subject to this permit for any purpose.
- d. This permit may not be assigned.
- e. This permit may be suspended or terminated for breach of any condition or for management purposes at the discretion of the approving official, upon written notice.
- f. This permit is issued for the term specified in 11 above.
- g. Permits issued for a duration of more than one year must be reviewed annually by the agency official and the permittee.
- h. The permittee shall obtain all other required permit(s) to conduct the specified project.
- i. Archeological project design, literature review, development of the regional historic context framework, site evaluation, and recommendations for subsequent investigations must be developed with direct involvement of an archeologist who meets the Secretary of the Interior's Standards for Archeology and Historic Preservation; fieldwork must be generally overseen by an individual who meets the Secretary of the Interior's Standards for Archeology and Historic Preservation.
- j. Permittee shall immediately request that the approving official (14. above) make a modification to accommodate any change in an essential condition of the permit, including individuals named and the nature, location, purpose, and time of authorized work, and shall without delay notify the approving official of any other changes affecting the permit or regarding information submitted as part of the application for the permit. Failure to do so may result in permit suspension or revocation.
- k. Permittee may request permit extension, in writing, at any time prior to expiration of the term of the permit, specifying a limited, definite amount of time required to complete permitted work.
- l. Any correspondence about this permit or work conducted under its authority must cite the permit number. Any publication of results of work conducted under the authority of this permit must cite the approving bureau and the permit number.
- m. Permittee shall submit a copy of any published journal article and any published or unpublished report, paper, and manuscript resulting from the permitted work (apart from those required in items q. and s., below), to the approving official and the appropriate official of the approved curatorial facility (item 12 above).
- n. Prior to beginning any fieldwork under the authority of this permit, the permittee, following the affected bureau's policies and procedures, shall contact the field office manager responsible for administering the lands involved to obtain further instructions.
- o. Permittee may request a review, in writing to the official concerned, of any disputed decision regarding inclusion of specific terms and conditions or the modification, suspension, or revocation of this permit, setting out reasons for believing that the decision should be reconsidered.
- p. Permittee shall not be released from requirements of this permit until all outstanding obligations have been satisfied, whether or not the term of the permit has expired. Permittee may be subject to civil penalties for violation of any term or condition of this permit.

15. Standard Permit Conditions (continued)

- q. Permittee shall submit a preliminary report to the approving official within a timeframe established by the approving official, which shall be no later than 6 weeks after the completion of any episode of fieldwork, setting out what was done, how it was done, by whom, specifically where, and with what results, including maps, GPS data, an approved site form for each newly recorded archeological site, and the permittee's professional recommendations, as results require. If other than 6 weeks, the timeframe shall be specified in Special Permit Condition p. Depending on the scope, duration, and nature of the work, the approving official may require progress reports, during or after the fieldwork period or both, and as specified in Special Permit Condition r.
- r. Permittee shall submit a clean, edited draft final report to the agency official for review to insure conformance with standards, guidelines, regulations, and all stipulations of the permit. The schedule for submitting the draft shall be determined by the agency official.
- s. Permittee shall submit a final report to the approving official not later than 180 days after completion of fieldwork. Where a fieldwork episode involved only minor work and/or minor findings, a final report may be submitted in place of the preliminary report. If the size or nature of fieldwork merits, the approving official may authorize a longer timeframe for the submission of the final report as specified in Special Permit Condition q.
- t. Two copies of the final report, a completed NTIS Report Documentation Page (SF-298), available at <http://www.ntis.gov/pdf/rdpform.pdf>, and a completed NADB-Reports Citation Form, available at http://www.cr.nps.gov/aad/tools/nadbform_update.doc, will be submitted to the office issuing the permit.
- u. The permittee agrees to keep the specific location of sensitive resources confidential. Sensitive resources include threatened species, endangered species, and rare species, archeological sites, caves, fossil sites, minerals, commercially valuable resources, and sacred ceremonial sites.
- v. Permittee shall deposit all artifacts, samples and collections, as applicable, and original or clear copies of all records, data, photographs, and other documents, resulting from work conducted under this permit, with the curatorial facility named in item 12, above, not later than 90 days after the date the final report is submitted to the approving official. Not later than 180 days after the final report is submitted, permittee shall provide the approving official with a catalog and evaluation of all materials deposited with the curatorial facility, including the facility's accession and/or catalog numbers.
- w. Permittee shall provide the approving official with a confirmation that museum collections described in v. above were deposited with the approved curatorial facility, signed by an authorized curatorial facility official, stating the date materials were deposited, and the type, number and condition of the collected museum objects deposited at the facility.
- x. Permittee shall not publish, without the approving official's prior permission, any locational or other identifying archeological site information that could compromise the Government's protection and management of archeological sites.
- y. For excavations, permittee shall consult the OSHA excavation standards which are contained in 29 CFR §1926.650, §1926.651 and §1926.652. For questions regarding these standards contact the local area OSHA office, OSHA at 1-800-321-OSHA, or the OSHA website at <http://www.osha.gov>.
- z. Special permit conditions attached to this permit are made a part hereof.

16. Special Permit Conditions

- a. Permittee shall allow the approving official and bureau field officials, or their representatives, full access to the work area specified in this permit at any time the permittee is in the field, for purposes of examining the work area and any recovered materials and related records.
- b. Permittee shall cease work upon discovering any human remains and shall immediately notify the approving official or bureau field official. Work in the vicinity of the discovery may not resume until the authorized official has given permission.
- c. Permittee shall backfill all subsurface test exposures and excavation units as soon as possible after recording the results, and shall restore them as closely as reasonable to the original contour.
- d. Permittee shall not use mechanized equipment in designated, proposed, or potential wilderness areas unless authorized by the agency official or a designee in additional specific conditions associated with this permit.
- e. Permittee shall take precautions to protect livestock, wildlife, the public, or other users of the public lands from accidental injury in any excavation unit.
- f. Permittee shall not conduct any flint knapping or lithic replication experiments at any archeological site, aboriginal quarry source, or non-site location that might be mistaken for an archeological site as a result of such experiments.
- g. Permittee shall perform the fieldwork authorized in this permit in a way that does not impede or interfere with other legitimate uses of the public lands, except when the authorized officer specifically provides otherwise.
- h. Permittee shall restrict vehicular activity to existing roads and trails unless the authorized officer provides otherwise.
- i. Permittee shall keep disturbance to the minimum area consistent with the nature and purpose of the fieldwork.
- j. Permittee shall not cut or otherwise damage living trees unless the authorized officer gives permission.
- k. Permittee shall take precautions at all times to prevent wildfire. Permittee shall be held responsible for suppression costs for any fires on public lands caused by the permittee's negligence. Permittee may not burn debris without the authorized officer's specific permission.
- l. Permittee shall conduct all operations in such a manner as to prevent or minimize scarring and erosion of the land, pollution of the water resources, and damage to the watershed.
- m. Permittee shall not disturb resource management facilities within the permit area, such as fences, reservoirs, and other improvements, without the authorized officer's approval. Where disturbance is necessary, permittee shall return the facility to its prior condition, as determined by the authorized officer.
- n. Permittee shall remove temporary stakes and/or flagging, which the permittee has installed, upon completion of fieldwork.
- o. Permittee shall clean all camp and work areas before leaving the permit area. Permittee shall take precautions to prevent littering or pollution on public lands, waterways, and adjoining properties. Refuse shall be carried out and deposited in approved disposal areas.
- p. Permittee shall submit the preliminary report within _____ days/weeks of completion of any episode of fieldwork..
- q. Permittee shall submit the final report within _____ days/weeks/months after completion of fieldwork..
- r. Permittee shall submit progress reports every _____ months over the duration of the project.
- s. California special permit conditions are attached.

Special Permit Conditions Continuation Sheet: California Conditions

- a. Work under this permit is limited to specific service approved for each permit. This may consist of non-collection survey, limited testing to determine site content and limits or extensive testing emergency excavation and/or salvage projects. Testing/ excavation projects may be conducted under the authority of this permit only upon completion of ARPA consultation with Native American Groups and written approval from the Bureau for such work. (CARIDAPs for the purpose of the identification of archaeological resources are authorized under a FLPMA/ARPA Permit).
- b. Permittees shall verbally and subsequently in writing contact the appropriate BLM Field Manager prior to the beginning of each of his field operations (with follow-up written notification) to inform the BLM of specific work to be conducted. At this time, the BLM Field Manager may impose additional stipulation as deemed necessary to provide for the protection and management of resource values in the general site or project area.
- c. All cultural artifacts and other related materials such as notes, photographs, etc., acquired under the provisions of this permit remain the property of the United States Government and may be recalled at any time for the use of the Department of the interior or other agencies of the Federal Government. Cultural materials collected under the provisions of this permit must be curated at a repository approved by the BLM. Curation shall be at a local qualified repository, if feasible, and an approved curation facility shall be designated prior to all field projects. An itemized list of all materials with accession numbers, curated at the repository will be submitted to the State Office and to the appropriate Field Office within 180 days of the completion of individual field projects. A copy of a receipt from the curation facility must be submitted with the list or catalogue.
- d. Permittees shall acquire a primary number from the appropriate Information Center for each cultural resource documented while undertaking work authorized by this permit.
- e. The BLM Field Manager or authorized representative may require a monthly letter progress report outlining what was accomplished. This report, if required, is due by the fifth day of the following month, unless different arrangements are approved.
- f. The individual(s) in direct charge must be academically qualified and possess adequate field experience. At least two weeks prior to initiation field work, the permittees must provide the BLM Field Manager with the vitae of individuals proposed to be in direct charge if not approved at the time of permit issuance. A list of field crew members should be submitted at the same time. Only the individual(s) listed in Item No. 8 of the permit is/are authorized to be in direct charge of field work conducted under this permit.
- g. The person(s) in direct charge of field work, shall be on site at all times when work is in progress. Failure to comply with permit stipulations will result in removal of subject's name(s) from the approved list of person-in-direct-charge.
- h. Care should be exercised to avoid directly or indirectly increasing access or potential vandalism to sensitive sites.
- i. All National Permit Stipulations are binding. The authority for issuing permits in the Bureau of Land Management rests solely with the State Director as Delegated by the Secretary of the Interior and all further delegation is prohibited by Secretarial Order. No Modification of National Permit Conditions 8 or 9 or of the California Special Permit Conditions may occur except by written decision of the State Director.
- j. The Bureau of Land Management shall be cited in any report of work done under this permit, including publications such as books, news articles and scientific publications, as well as oral reports, films, television programs, and presentations in other media.

By signing below, I, the Principal Investigator, acknowledge that I have read and understand the Permit for Archeological Investigations and agree to its terms and conditions as evidenced by my signature below and initiation of work or other activities under the authority of this permit.

Signature and title:



Date:

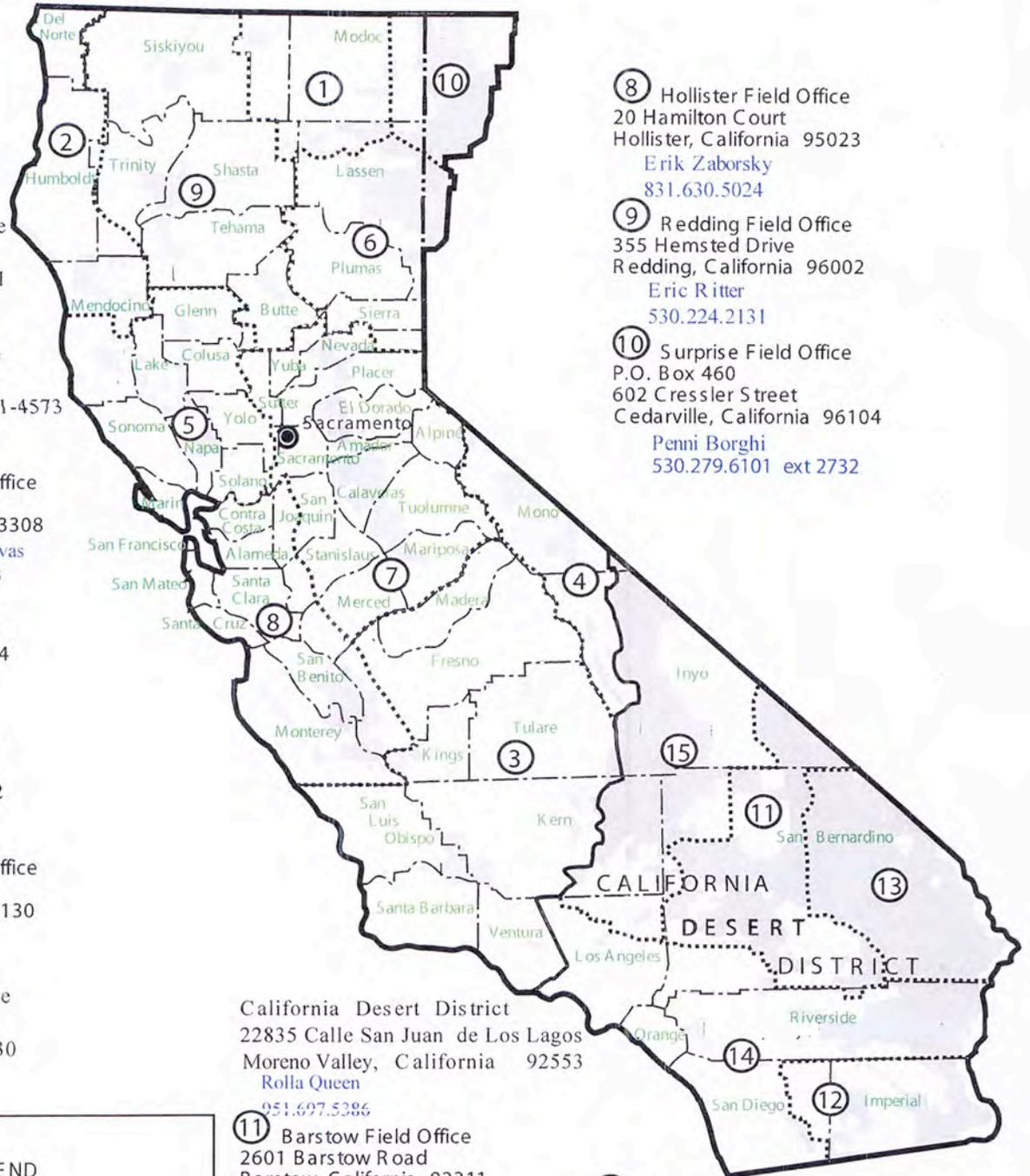
5/15/10

Paperwork Reduction Act and Estimated Burden Statement: This information is being collected pursuant to 16 U.S.C. 470cc and 470mm, to provide the necessary facts to enable the Federal land manager (1) to evaluate the applicant's professional qualifications and organizational capability to conduct the proposed archeological work; (2) to determine whether the proposed work would be in the public interest; (3) to verify the adequacy of arrangements for permanent curatorial preservation, as United States property, of specimens and records resulting from the proposed work; (4) to ensure that the proposed activities would not be inconsistent with any management plan applicable to the public lands involved; (5) to provide the necessary information needed to complete the Secretary's Report to Congress on Federal Archeology Programs; and (6) to allow the National Park Service to evaluate Federal archeological protection programs and assess compliance with the Archaeological Resources Protection Act of 1979 (16 U.S.C. 470). Submission of the information is required before the applicant may enjoy the benefit of using publicly owned archeological resources. To conduct such activities without a permit is punishable by felony-level criminal penalties, civil penalties, and forfeiture of property. A federal agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a valid OMB control number. Public reporting for this collection of information is estimated to average one hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Departmental Consulting Archeologist; NPS; 1849 C Street, NW (2275); Washington, DC 20240-0001.

Bureau of Land Management California Jurisdictions



California State Office, 2800 Cottage Way, Suite W-1834, Sacramento, California 95825
 State Archaeologist 916.978.4648 Gina Jorgenson 916.978.4665



① Alturas Field Office
 708 W. 12th Street
 Alturas, California 96101
 David Scott
 530.233.7932

② Arcata Field Office
 1695 Heindon Road
 Arcata, California 95521-4573
 David Johnson
 707.825.2320

③ Bakersfield Field Office
 3801 Pegasus Ave.
 Bakersfield, California 93308
 Tamera Whitley/Kim Cuevas
 661.391.6147/661.391.6123

④ Bishop Field Office
 351 Pacu Lane, Ste. 100
 Bishop, California 93514
 Kirk Halford
 760.872.5030

⑤ Ukiah Field Office
 2550 N. State Street
 Ukiah, California 95482
 Chris Lloyd
 707.468.4075

⑥ Eagle Lake Field Office
 2950 Riverside Drive
 Susanville, California 96130
 Sharynn-Marie Blood
 530.257.0456

⑦ Folsom Field Office
 63 Natoma Street
 Folsom, California 95630
 James Barnes
 916.985.4474

⑧ Hollister Field Office
 20 Hamilton Court
 Hollister, California 95023
 Erik Zaborsky
 831.630.5024

⑨ Redding Field Office
 355 Hemsted Drive
 Redding, California 96002
 Eric Ritter
 530.224.2131

⑩ Surprise Field Office
 P.O. Box 460
 602 Cressler Street
 Cedarville, California 96104
 Penni Borghi
 530.279.6101 ext 2732

California Desert District
 22835 Calle San Juan de Los Lagos
 Moreno Valley, California 92553
 Rolla Queen
 951.697.5386

⑪ Barstow Field Office
 2601 Barstow Road
 Barstow, California 92311
 James Shearer
 760.252.6034

⑫ El Centro Field Office
 1661 S. 4th Street
 El Centro, California 92243
 Carrie Simmons
 760.337.4437

⑬ Needles Field Office
 101 West Spikes Road
 Needles, California 92363
 Sally Murray 760.326.7014

⑭ Palm Springs-South Coast Field Office
 690 W. Garnet Avenue
 North Palm Springs, California 92258
 Wanda Raschkow
 760.251.4824/951.697.

⑮ Ridgecrest Field Office
 300 S. Richmond Road
 Ridgecrest, California 93555
 Donald Storm
 760.384.5422

LEGEND

-  PUBLIC LANDS
-  DISTRICT BOUNDARY
-  FIELD OFFICE BOUNDARIES
-  STATE OFFICE



United States Department of the Interior
FIELDWORK REQUEST AND AUTHORIZATION
PALEONTOLOGICAL INVESTIGATIONS

DI Form 1991
 (BLM Rev July 2005)
 OMB No. 1024-0037

**Authorization to conduct Paleontological studies on public lands managed by the
 Bureau of Land Management under the authority of:**

- The Antiquities Act of 1906 (P.L. 59-209; 34 Stat. 225, 16 U.S.C. 431-433) and its regulations (43 CFR 3).
 Bureau-specific statutory and/or regulatory authority: Federal Land Policy
 and Management Act of 1976 (Public Law 94-570), and Section 302 of Public Law 94-4579

Please use this number when referring to this permit

No.: _____

1. Applicant (Business/Firm) and BLM State Permit Number Paleo Solutions Inc.; Permit# CA-10-00-006P		2. Application date: 12/1/2010	
3. Address 2035 Placentcia Ave, Suite D Costa Mesa, CA 92627		4. Telephone number(s) 562-818-7713	
		5. E-mail address(es) geraldine@paleosolutions.com	
6. Name of Permit Administrator Geraldine Aron Telephone number(s): 562-818-7713 Email address(es): geraldine@paleosolutions.com		7. Name of Principal Investigator(s) Geraldine Aron Telephone number(s): 562-818-7713 Email address(es): geraldine@paleosolutions.com	
8. Name of Field Director(s) authorized to carry out field projects Geraldine Aron and Scott Armstrong		Telephone number(s): 562-818-7713 and 949-813-1240 Email address(es): geraldine@paleosolutions.com and scott@paleosolutions.com	
9. Nature of paleontological fieldwork proposed: <input checked="" type="checkbox"/> Survey and limited surface collection. <input type="checkbox"/> Excavation Briefly describe: Paleo Solutions will survey with limited surface collections all areas mapped as PFYC Class 3a,3b, and 5 which comprise 3632 acres of the project. The entire project encompasses approximately 15,000 acres.			
10. Location of proposed work (attach topographic map copy with project boundaries) See attached map			
11. Dates of proposed work: From: 12/15/2010 To: 3/15/2011			
12. Name and address of the curatorial facility in which collections, records, data, photographs, and other documents resulting from work under this permit shall be deposited for permanent preservation on behalf of the United States Government. San Diego Natural History Museum			
13. Permittee is required to observe the listed standard permit conditions and the special permit conditions attached to this permit			
14. Signature and title of applicant: 			15. Date 12/6/10
16. Signature and title of approving official:			17. Date

18. Standard Permit Conditions

- a. This permit is subject to all applicable provisions of 43 CFR Part 3, 43 CFR 7, and 25 CFR 262, and applicable departmental and bureau policies and procedures, which are made a part hereof.
- b. The permittee and this permit are subject to all other Federal, State, and local laws and regulations applicable to the public lands and resources.
- c. This permit shall not be exclusive in character, and shall not affect the ability of the land managing bureau to use, lease or permit the use of lands subject to this permit for any purpose.
- d. This permit may not be assigned.
- e. This permit may be suspended or terminated for breach of any condition or for management purposes at the discretion of the approving official, upon written notice.
- f. This permit is issued for the term specified in 11 above.
- g. Permits issued for a duration of more than one year must be reviewed annually by the agency official and the permittee.
- h. The permittee shall obtain all other required permit(s) to conduct the specified project.
- i. Permittee shall immediately request that the approving official (14. above) make a modification to accommodate any change in an essential condition of the permit, including individuals named and the nature, location, purpose, and time of authorized work, and shall without delay notify the approving official of any other changes affecting the permit or regarding information submitted as part of the application for the permit. Failure to do so may result in permit suspension or revocation.
- j. Permittee may request permit extension, in writing, at any time prior to expiration of the term of the permit, specifying a limited, definite amount of time required to complete permitted work.
- k. Any correspondence about this permit or work conducted under its authority must cite the permit number. Any publication of results of work conducted under the authority of this permit must cite the approving bureau and the permit number.
- l. Permittee shall submit a copy of any published journal article and any published or unpublished report, paper, and manuscript resulting from the permitted work (apart from those required in items q. and s., below), to the approving official and the appropriate official of the approved curatorial facility (item 12 above).
- m. Permittee may request a review, in writing to the official concerned, of any disputed decision regarding inclusion of specific terms and conditions or the modification, suspension, or revocation of this permit, setting out reasons for believing that the decision should be reconsidered.
- n. Permittee shall not be released from requirements of this permit until all outstanding obligations have been satisfied, whether or not the term of the permit has expired. Permittee may be subject to civil penalties for violation of any term or condition of this permit.

15. Standard Permit Conditions (continued)

- o. Permittee shall submit a preliminary report to the approving official within a timeframe established by the approving official, which shall be no later than 6 weeks after the completion of any episode of fieldwork, setting out what was done, how it was done, by whom, specifically where, and with what results, including maps, GPS data, and the permittee's professional recommendations, as results require. If other than 6 weeks, the timeframe shall be specified in Special Permit Condition p. Depending on the scope, duration, and nature of the work, the approving official may require progress reports, during or after the fieldwork period or both, and as specified in Special Permit Condition r.
- p. Permittee shall submit a clean, edited draft final report to the agency official for review to insure conformance with standards, guidelines, regulations, and all stipulations of the permit. The schedule for submitting the draft shall be determined by the agency official.
- q. Permittee shall submit a final report to the approving official not later than 180 days after completion of fieldwork. Where a fieldwork episode involved only minor work and/or minor findings, a final report may be submitted in place of the preliminary report. If the size or nature of fieldwork merits, the approving official may authorize a longer timeframe for the submission of the final report as specified in Special Permit Condition q.
- r. Two copies of the final report, a completed NTIS Report Documentation Page (SF-298), available at <http://www.ntis.gov/pdf/rdpform.pdf>, will be submitted to the office issuing the permit.
- s. The permittee agrees to keep the specific location of sensitive resources confidential. Sensitive resources include threatened species, endangered species, and rare species, archeological sites, caves, fossil sites, minerals, commercially valuable resources, and sacred ceremonial sites.
- t. Permittee shall deposit all artifacts, samples and collections, as applicable, and original or clear copies of all records, data, photographs, and other documents, resulting from work conducted under this permit, with the curatorial facility named in item 12, above, not later than 90 days after the date the final report is submitted to the approving official. Not later than 180 days after the final report is submitted, permittee shall provide the approving official with a catalog and evaluation of all materials deposited with the curatorial facility, including the facility's accession and/or catalog numbers.
- u. Permittee shall provide the approving official with a confirmation that museum collections described in t. above were deposited with the approved curatorial facility, signed by an authorized curatorial facility official, stating the date materials were deposited, and the type, number and condition of the collected museum objects deposited at the facility.
- v. Permittee shall not publish, without the approving official's prior permission, any locational or other identifying site information that could compromise the Government's protection and management of the site.
- w. For excavations, permittee shall consult the OSHA excavation standards which are contained in 29 CFR §1926.650, §1926.651 and §1926.652. For questions regarding these standards contact the local area OSHA office, OSHA at 1-800-321-OSHA, or the OSHA website at <http://www.osha.gov>.
- x. Special permit conditions attached to this permit are made a part hereof.

16. Special Permit Conditions

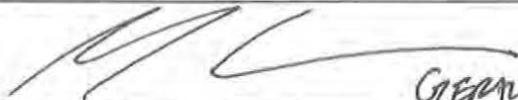
- a. Permittee shall allow the approving official and bureau field officials, or their representatives, full access to the work area specified in this permit at any time the permittee is in the field, for purposes of examining the work area and any recovered materials and related records.
- b. Permittee shall cease work upon discovering any human remains and shall immediately notify the approving official or bureau field official. Work in the vicinity of the discovery may not resume until the authorized official has given permission.
- c. Permittee shall backfill all subsurface test exposures and excavation units as soon as possible after recording the results, and shall restore them as closely as reasonable to the original contour.
- d. Permittee shall not use mechanized equipment in designated, proposed, or potential wilderness areas unless authorized by the agency official or a designee in additional specific conditions associated with this permit.
- e. Permittee shall take precautions to protect livestock, wildlife, the public, or other users of the public lands from accidental injury in any excavation unit.
- f. Permittee shall perform the fieldwork authorized in this permit in a way that does not impede or interfere with other legitimate uses of the public lands, except when the authorized officer specifically provides otherwise.
- h. Permittee shall restrict vehicular activity to existing roads and trails unless the authorized officer provides otherwise.
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- j. Permittee shall not cut or otherwise damage living trees unless the authorized officer gives permission.
- k. Permittee shall take precautions at all times to prevent wildfire. Permittee shall be held responsible for suppression costs for any fires on public lands caused by the permittee's negligence. Permittee may not burn debris without the authorized officer's specific permission.
- l. Permittee shall conduct all operations in such a manner as to prevent or minimize scarring and erosion of the land, pollution of the water resources, and damage to the watershed.
- m. Permittee shall not disturb resource management facilities within the permit area, such as fences, reservoirs, and other improvements, without the authorized officer's approval. Where disturbance is necessary, permittee shall return the facility to its prior condition, as determined by the authorized officer.
- n. Permittee shall remove temporary stakes and/or flagging, which the permittee has installed, upon completion of fieldwork.
- o. Permittee shall clean all camp and work areas before leaving the permit area. Permittee shall take precautions to prevent littering or pollution on public lands, waterways, and adjoining properties. Refuse shall be carried out and deposited in approved disposal areas.
- p. Permittee shall submit the preliminary report within _____ days/weeks of completion of any episode of fieldwork..
- q. Permittee shall submit the final report within _____ days/weeks/months after completion of fieldwork..
- r. Permittee shall submit progress reports every _____ months over the duration of the project.
- s. California special permit conditions are attached.

Special Permit Conditions Continuation Sheet: California Conditions

- a. Work under this permit is limited to specific service approved for each permit. This may consist of non-collection survey, limited testing to determine site content and limits or extensive testing emergency excavation and/or salvage projects
- b. Permittees shall verbally and subsequently in writing contact the appropriate BLM Field Manager prior to the beginning of each of his field operations (with follow-up written notification) to inform the BLM of specific work to be conducted. At this time, the BLM Field Manager may impose additional stipulation as deemed necessary to provide for the protection and management of resource values in the general site or project area.
- c. All cultural artifacts and other related materials such as notes, photographs, etc., acquired under the provisions of this permit remain the property of the United States Government and may be recalled at any time for the use of the Department of the Interior or other agencies of the Federal Government. Cultural materials collected under the provisions of this permit must be curated at a repository approved by the BLM. Curation shall be at a local qualified repository, if feasible, and an approved curation facility shall be designated prior to all field projects. An itemized list of all materials with accession numbers, curated at the repository will be submitted to the State Office and to the appropriate Field Office within 180 days of the completion of individual field projects. A copy of a receipt from the curation facility must be submitted with the list or catalogue.
- d. Permittees shall acquire a primary number from the appropriate Information Center for each cultural resource documented while undertaking work authorized by this permit.
- e. The BLM Field Manager or authorized representative may require a monthly letter progress report outlining what was accomplished. This report, if required, is due by the fifth day of the following month, unless different arrangements are approved.
- f. The individual(s) in direct charge must be academically qualified and possess adequate field experience. At least two weeks prior to initiation field work, the permittees must provide the BLM Field Manager with the vitae of individuals proposed to be in direct charge if not approved at the time of permit issuance. A list of field crew members should be submitted at the same time. Only the individual(s) listed in Item No. 8 of the permit is/are authorized to be in direct charge of field work conducted under this permit.
- g. The person(s) in direct charge of field work, shall be on site at all times when work is in progress. Failure to comply with permit stipulations will result in removal of subject's name(s) from the approved list of person-in-direct-charge.
- h. Care should be exercised to avoid directly or indirectly increasing access or potential vandalism to sensitive sites.
- i. All National Permit Stipulations are binding. The authority for issuing permits in the Bureau of Land Management rests solely with the State Director as Delegated by the Secretary of the Interior and all further delegation is prohibited by Secretarial Order. No Modification of National Permit Conditions 8 or 9 or of the California Special Permit Conditions may occur except by written decision of the State Director.
- j. The Bureau of Land Management shall be cited in any report of work done under this permit, including publications such as books, news articles and scientific publications, as well as oral reports, films, television programs, and presentations in other media.

By signing below, I, the Principal Investigator, acknowledge that I have read and understand the Permit for Paleontological Investigations and agree to its terms and conditions as evidenced by my signature below and initiation of work or other activities under the authority of this permit.

Signature and title:



GERALDINE ARON, PRINCIPAL INVESTIGATOR

Date:

1/4/6/10

Paperwork Reduction Act and Estimated Burden Statement: This information is being collected pursuant to 16 U.S.C. 470cc and 470mm, to provide the necessary facts to enable the Federal land manager (1) to evaluate the applicant's professional qualifications and organizational capability to conduct the proposed archeological work; (2) to determine whether the proposed work would be in the public interest; (3) to verify the adequacy of arrangements for permanent curatorial preservation, as United States property, of specimens and records resulting from the proposed work; (4) to ensure that the proposed activities would not be inconsistent with any management plan applicable to the public lands involved; (5) to provide the necessary information needed to complete the Secretary's Report to Congress on Federal Archeology Programs; and (6) to allow the National Park Service to evaluate Federal archeological protection programs and assess compliance with the Archaeological Resources Protection Act of 1979 (16 U.S.C. 470). Submission of the information is required before the applicant may enjoy the benefit of using publicly owned archeological resources. To conduct such activities without a permit is punishable by felony-level criminal penalties, civil penalties, and forfeiture of property. A federal agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a valid OMB control number. Public reporting for this collection of information is estimated to average one hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Departmental Consulting Archeologist; NPS; 1849 C Street, NW (2275); Washington, DC 20240-0001.

Paleontological Resources Research Design and Survey Strategy for the Ocotillo Wind Express Project, Imperial County, California.

1. Project Description/Introduction

Pattern Energy, through Ocotillo Express LLC (OE LLC), proposes to construct, operate, maintain and decommission a 561 megawatt (MW) wind generation facility on approximately 14,980 acres in the Ocotillo Express wind project area (Figure 1). OE LLC acquired from Greenhunter, another developer, its rights to approximately 5,915 acres of BLM administered Lands and OE LLC also acquired from its affiliate Wind Development Contract Co. its application for an additional 8,878 acres of adjacent BLM administered lands. OE LLC also has entered into an agreement with the owner of approximately 26 acres of private land near the center of the wind project area for wind monitoring. The three separate parcels are consolidated into a single 561 MW wind project in this Plan of Development.

The proposed action consists of the construction, operation, maintenance and decommissioning of wind turbine generators and associated facilities necessary to successfully generate up to 561 MW in Imperial County west of Ocotillo, California. The project will be constructed in two phases: Phase I will comprise 130 2.3 MW wind turbine generators with a total nameplate capacity of 299 MW, and Phase II will comprise 114 wind turbine generators with a total nameplate capacity of 262.2 MW (nameplate capacity is the full rated capacity of a wind turbine generator).

Surface disturbing activities may cause direct adverse impacts to paleontological resources through the damage or destruction of fossils; or loss of valuable scientific information by the disturbance of the stratigraphic context in which fossils are found. Indirect adverse impacts may be created by increased accessibility to important paleontological resources leading to looting or vandalism (BLM H-8270-1; BLM IM 2009-011). Paleo Solutions has been retained by Aspen Environmental Group to identify and analyze possible effects to significant paleontological resources within the study area for the Ocotillo Wind Express Project. The direct effects of all proposed surface disturbing activities and the indirect effects of increased public access and land tenure adjustments will be considered in the analysis. The paleontological assessment will include an initial analysis of existing data in order to determine whether further analysis will be necessary.

All paleontological work will be conducted in consultation with Carrie Simmons, BLM Archaeologist in the El Centro Field Office. The BLM Authorized Officer and/or Project Leader will also be consulted on all final paleontological resource decisions.

2. Analysis of Existing Data (*completed*)

Prior to the commencement of field survey, an analysis of existing data will determine the presence of paleontologically sensitive bedrock and younger surficial sedimentary deposits within the study area that may contain scientifically significant paleontological resources. If the background research indicates that fossil-bearing geologic units are present within the study area, a field survey will be recommended.

The analysis of existing data will be based on the Potential Fossil Yield Classification System (PFYC). It will also include a review of published (and if applicable, unpublished) literature on the paleontology of the geologic units within the Project area, a museum and agency fossil locality record search conducted at the San Diego Natural History Museum, Anza-Borrego Desert State Park (if available), and the BLM, and a review of published geologic mapping at the smallest available scale. Aerial photos with geology overlaid will be analyzed in order to determine the locations of potentially fossil-bearing rock strata and surficial sediments. The results of the background research and analysis of existing data will be included in a paleontological assessment report, and will include specific research questions and standardized items to be addressed. The parameters in the assessment will be designed to identify conditions for which a field survey will be recommended. Note that depending upon the project schedule, the results of the background research could be provided in the survey report after completion of the field survey.

If the results of the analysis of existing data analysis indicate that the Project area contains only low sensitivity geologic formations (PFYC Class 1/2), and no scientifically important fossil localities are known to occur within the Project area, the results of the research will be compiled in a paleontological assessment report, and no additional paleontological analysis will be recommended. In this instance, a standard stipulation that construction work must cease and the BLM must be notified immediately should any unexpected fossil discoveries be made by construction workers. The type of work planned for specific locations within the Project area will also be analyzed. For example, if a specific project involves weed spraying and/or minor surface activities that will not impact fossils, or if fossil-bearing rocks occur at a greater depth than the planned depth of construction disturbance, paleontological surveys and monitoring would not be necessary. Areas with moderate (PFYC Class 3) or high/very high (PFYC Class 4/5) paleontological sensitivity with surface exposures of bedrock will be recommended for inclusion in a pedestrian survey that should be completed prior to construction (BLM IM 2008-009; IM 2009-011). Where the locations of paleontologically sensitive rocks and sediments intersect with areas of proposed surface disturbance, a paleontological survey should be conducted in order to provide surface clearance for the project, and to assist with the development of construction mitigation recommendations, which could include monitoring in high sensitivity areas/geologic formations. The survey will identify resources that may be exposed on the surface, and help possibly avoid adverse impacts. Avoidance of resources is a preferred mitigation strategy if it is feasible. However, avoidance areas can only be identified by conducting a field survey. If avoidance is not feasible, surface fossils should be collected and the fossil sites included in any monitoring plan for locations where ground disturbance of paleontologically sensitive geologic units is appropriate.

Recommendations Based on Results of the Analysis of Existing Data (excerpted from confidential paleontological assessment technical report):

- 1) All areas mapped as PFYC Class 1 (intrusive igneous rocks) and Class 2 (Holocene alluvium and terrace deposits) are recommended for immediate paleontological clearance because these deposits have little potential for producing in-situ fossils. These deposits comprise approximately 10,134 acres of the total Project area. Note that these deposits may contain fossils at depth because deeper sediments may be Pleistocene in age. Because the thickness of the Holocene alluvium and terrace deposits is highly variable and is not precisely known, it is recommended that construction personnel working in these areas notify the BLM Authorized Officer immediately should any subsurface bones or other potential fossils be encountered.
- 2) Areas mapped as PFYC Class 3a, 3b, and 5 (Alverson Formation, Latrania Formation, Split Mountain Formation, Palm Spring Formation, and Older alluvium) have a moderate

or unknown to very high potential for producing scientifically important fossil remains, and should be subject to a 100% pre-construction pedestrian inventory focused on areas with good exposures (i.e. unvegetated and not covered by soil, slopewash, etc.). Based on the geologic map, these deposits comprise approximately 3,632 acres of the Project area.

- 3) All scientifically significant fossil localities discovered during the paleontological inventory that are located in areas that intersect Project infrastructure should be mitigated (fossils documented and collected) prior to surface disturbance. The fossils should be prepared to the point of curation housed in a BLM approved museum (meets federal DM-411 curation standards). The BLM should provide instruction as to whether fossils should be inventoried initially and collected later, or collected at the time of discovery. Note that very large fossils, or other localities that require more than one day to document and salvage, will be recommended for avoidance or additional mitigation in consultation with the BLM.
- 4) The results of the paleontological inventory should be detailed in a Paleontological Survey Report that follows BLM reporting guidelines (BLM Manual and Handbook 8270-1, BLM IM 2009-011). This report should include construction mitigation recommendations based on the results of the paleontological survey. Preliminarily, construction monitoring of Project excavations in the Alverson Formation (sedimentary facies only), Split Mountain Formation, Palm Spring Formation, and Older Alluvium will be recommended based on the known potential for these rock units to contain scientifically significant fossil remains.
- 5) During construction and during future Project operations, the BLM Authorized Officer should be notified immediately if any fossils are encountered by construction or other Project personnel.

3. Field Survey Strategy (modified from original research design based on analysis of existing data).

In consultation with BLM, a field survey of paleontologically sensitive locations within the study area will be conducted under BLM permit CA-10-00-006P (expires 4/20/2013). The survey will occur in areas where scientifically significant fossils can be expected to occur within the boundary and immediate vicinity of the anticipated disturbance, or where the probability of encountering fossils is unknown. Conducting a survey prior to construction is desirable from a planning perspective because it provides the option of avoiding impacts to fossil localities by moving the locations of planned project infrastructure.

The field survey will be completed by two groups of paleontologists, for a total of four to five crew members. The paleontologists will complete a 100% pedestrian block survey of all potentially fossiliferous bedrock outcrops and exposures of surficial sediments that occur on PFYC Class 3, 4, or 5 formations. Areas with low sensitivity will not be surveyed. All field personnel will meet the BLM's qualification requirements as listed in Appendix A of the Guidelines for Assessment and Mitigation of Potential Impacts to Paleontological Resources (BLM H-8270-1; BLM IM 2009-011). The Paleo Solutions Principal Investigators (Geraldine Aron and Paul Murphey), and the Field Director (Scott Armstrong) will accompany the paleontological field crew (Maria Espinoza, Jennifer Kelly, Jeff Hathaway, Mark Deering, Joey Raum, Daniel Lara and Jessica Tibor) during all field survey activities. Two to three field crew members will be accompanying the Principal Investigators and Field Director at anyone time during survey. All field personnel will adhere to proper safety procedures including checking in and out the BLM, staying hydrated, emergency field contact information, and other standard safety practices.

The field survey is anticipated to take a maximum of eight working days to complete based on the analysis of existing data, which indicates that the Project area contains 3,640 acres of paleontologically sensitive geologic formations. Approximately 0.75 square miles will be surveyed per day. The survey will include documentation of the surficial geology of each quarter-quarter section surveyed. Previously recorded fossil localities are normally re-visited and re-evaluated during the course of a paleontological survey. However, the analysis of existing data has indicated that no previously recorded fossil localities occur within the project area. All new fossil localities will be stratigraphically positioned. Data will be collected using GPS receivers. Field data recorded will include types of fossils discovered, location in UTM coordinates (NAD 83 datum), field identifications (taxonomic and morphological), rock type, stratigraphic position, depositional environment and taphonomic observations. Per Charlotte T. Hunter's (BLM California State Office DPO, Archaeologist/Paleontologist/Tribal Relations) request, our field staff will georeference any rock art observed or located in the field while surveying for paleontological resources. The survey results will be documented in a final paleontological survey report that will include recommended construction mitigation measures as appropriate. The report will follow BLM guidelines (BLM H-8270-1; BLM IM 2009-011).

All fossils observed during the field survey will be recorded. All isolated scientifically significant fossils will be collected at the time of discovery. Very large fossils, or large concentrations of fossils, will be documented but left in place, and recommended for avoidance by the project if feasible. Fossils that are very poorly preserved and unidentifiable, or are otherwise considered to be non-significant, will not be collected. Following completion of the survey, all fossils collected will be prepared in Paleo Solutions' paleontological laboratory, identified, analyzed, and curated at the San Diego Natural History Museum (SDNHM). Paleo Solutions has obtained a curation agreement for this project from the SDNHM.

4. Reporting Strategy

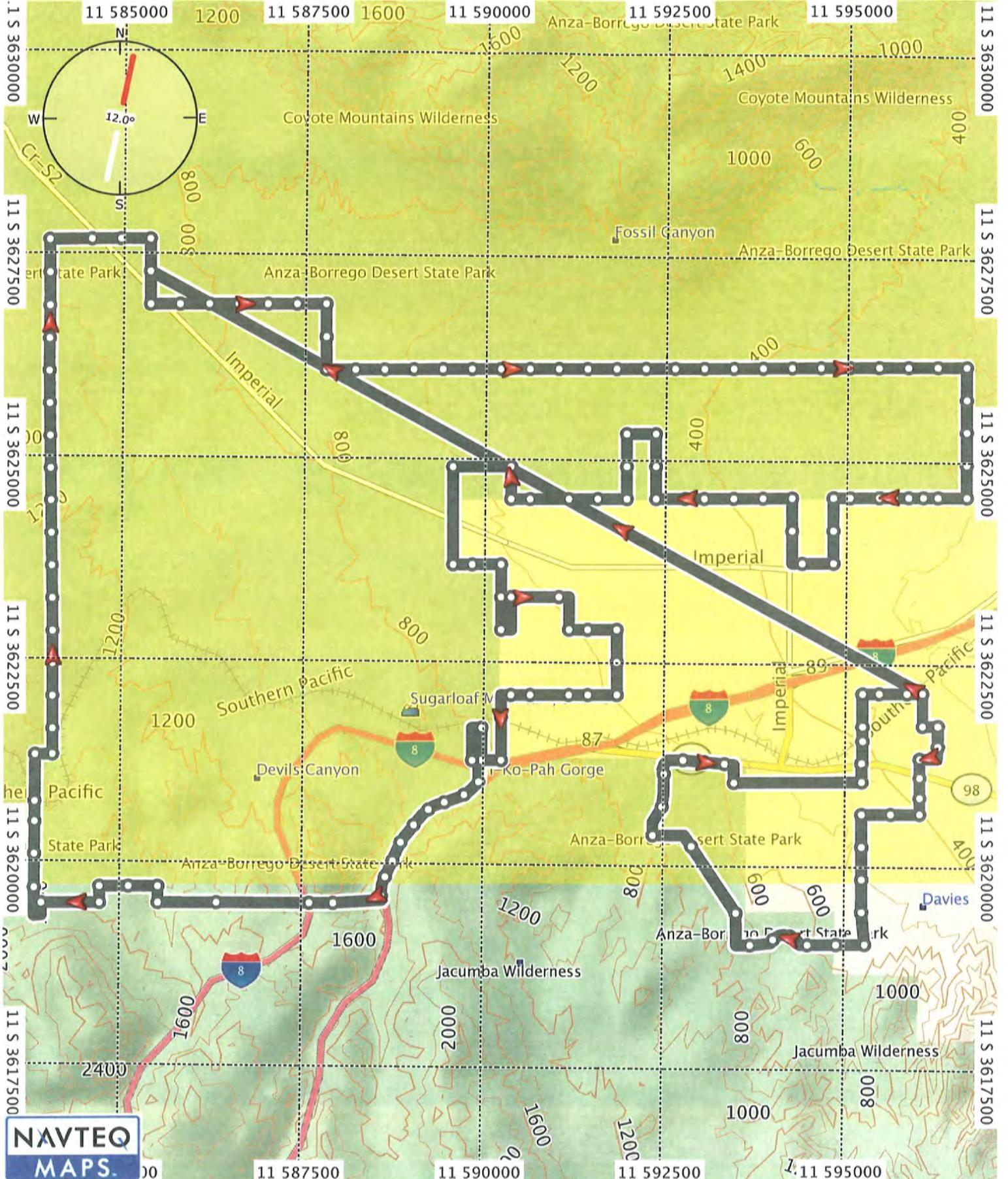
As stated above, the field survey results will be documented in a final paleontological survey report that will include recommended construction mitigation measures as appropriate (following BLM H-8270-1; BLM IM 2009-011). The report will be submitted to the BLM for agency review. BLM Locality Forms will be included in the report. All fossil localities will be plotted on a U.S.G.S 7.5' minute Topographic Quadrangle. Locality data in these reports are considered sensitive and will not be included in public documents. Because this is a relatively large paleontological project, the report and fossil curation schedule must be developed and approved by the BLM. Following agency review, a copy of the report, along with field maps and data, will be delivered along with any fossils collected (prepared to the point of identification and curation) to the San Diego Natural History Museum. The results of the final report will provide guidance for the future management of paleontological resources within the project area.

The final survey report will address the following considerations:

- 1) Whether adverse effects at individual fossil localities cannot be avoided.
- 2) Whether the adverse effects can be avoided by altering the location or scope of the project (or individual components).
- 3) Whether the impacts can be mitigated through development of special stipulations such as requiring on-site monitoring; mitigation to protect paleontological resources will be determined on a case-by-case basis. Monitoring may also be required as part of an overall mitigation for a project which was developed during NEPA process, or upon the discovery of paleontological resources during project activities. A monitoring plan will be in progress and completed prior to construction if monitoring

is recommended. The monitoring plan indicates the treatments recommended for the area of the proposed disturbance and must minimally address the following.

- 4) Whether field surveys determined the presence or absence of significant paleontological resources.
- 5) Whether fossil localities discovered would be excavated/removed prior to the commencement of construction. This would only be necessary for larger and more complex sites that could not be readily collected to provide paleontological clearance during the field survey.



NAVTEQ
MAPS

Topo U.S. 24K West
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Garmin Ltd. or its Subsidiaries
1995-2009.

0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 mi

Track

GARMIN

Appendix C: Curation Agreement Letters



DEPARTMENT OF PARKS AND RECREATION

Colorado Desert District Stout Research Center
Anza-Borrego Desert State Park
200 Palm Canyon Drive
Borrego Springs, California 92004

Ruth Coleman, *Director*

Geraldine Aron
President
Paleo Solutions Inc.
2035 Placentia Ave, Suite D
Costa Mesa, CA 92627

Dear Geraldine Aron,

20 January 2011

The Colorado Desert Stout Research Center (DSRC) is a professional, permanent repository for paleontologic resources collected from private, State and Federal lands. The DSRC is part of the Department of Parks and Recreation (DPR) state-wide museum system and is compliant with the DPR *Museum Collections Management Handbook* (2000) directives. Additionally, the DSRC upholds professional museum standards and is in accord with the Federal Department of the Interior's *Museum Management Handbook D 411* (2009).

Our institution will accept and professionally curate paleontologic collections and accompanying samples, records, electronic data, maps, photographs, field notes, and other documents derived from professional standard paleontologic work conducted by Paleo Solutions Inc. This repository letter is written specifically for paleontologic materials recovered during the Ocotillo Express Wind project. The DSRC further agrees to assume permanent curatorial responsibility for such materials owned by and on behalf of the Bureau of Land Management (*Interagency Cooperative Agreement* 1994).

Sincerely,

George T. Jefferson
Associate State Archaeologist, District Paleontologist



SAN DIEGO NATURAL HISTORY MUSEUM
BALBOA PARK - SAN DIEGO SOCIETY OF NATURAL HISTORY - ESTABLISHED 1874

28 April 2010

Ms. Geraldine Aron
Paleo Solutions, Inc.
2035 Placentia Avenue, Suite D
Costa Mesa, CA 92627

RE: Repository for Paleontological Collections

Dear Ms. Aron:

The Department of Paleontology at the San Diego Natural History Museum agrees to be the repository for paleontological specimens collected on BLM administered land by Paleo Solutions, Inc. It is my understanding that the areas covered by the requested permit include the Ocotillo Wind Express project site and the Sunrise Powerlink project alignment.

If you have any additional questions, please feel free to contact me at 619-255-0232 or tdemere@sdnhm.org.

Sincerely,

Thomas A. Deméré, Ph.D.
Curator, Department of Paleontology
San Diego Natural History Museum

Appendix D: BLM Repository Receipt Form

Bureau of Land Management
(State/District/Field Office)

Address
City, State, Zip Code

BLM Verification of Collections (completed by BLM)	
BLM Official:	
Date Received:	

REPOSITORY RECEIPT FOR COLLECTIONS

Artifacts and specimens recovered from BLM-administered lands are Federal property, and must be managed in a manner consistent with Federal stewardship responsibilities for museum collections. Cultural or paleontological resource permits for collecting activities require that the permittee arrange for curation of artifacts and specimens in an appropriate repository. Collections must be deposited in a repository for curation within one year of completion of the permitted project, unless alternate arrangements have been approved by the BLM permitting official.

This Deposition of Museum Collections Confirmation and Inventory form is required as a condition of the permit and must be completed for all museum collections originating from BLM administered lands, with the associated documentation, to ensure collections are deposited in an appropriate curatorial facility. A receiving document generated by the repository may be substituted if it contains the same information as this form.

Instructions

1. All information requested on this form must be completed by the permittee and repository officials.
2. Permittees must provide an itemized inventory of the objects, lots, samples, and associated documentation to be deposited attached to this statement. The inventory must include site or locality designation, number of units per material type according to BLM and the repository standards. A complete collection includes:
 - All artifacts, specimens, and environmental materials collected with provenience data
 - All survey or excavation records and logs
 - All maps showing locations and boundaries
 - All valid photographs, negatives, and slides
 - All analysis records, and copies of all reports and publications
3. A repository official must acknowledge receipt of the collection. Before signing, the repository official should compare the inventory to the actual objects and records being deposited.
4. If the permittee and the Repository Official are the same individual, an additional Repository Official must be signatory to this form.
5. After this form has been signed by the repository official, the original form with the collection inventory must be submitted the BLM State Archaeologist by the permittee.
6. Upon submission to BLM, the BLM official may contact the repository to verify the inventory of collections deposited by the permittee.

Permittee Information

Permit Number: CA-10-00-006P Project Name and Number: BLM Ocotillo Wind Express
Permittee Name: Geraldine L. Aron
Address: 2035 Placentia Ave Suite D
City, State Zip Code: Costa Mesa, CA 92627
Telephone Number: 562-818-7713

Certification of Collection Deposition in Repository by Permittee

I, Geraldine L. Aron (Permittee) certify that Colorado Desert District Stout Research Center (name of repository) has on this date, 3/25/2011, accepted the collections of objects, lots, samples, and associated documentation described on the attached inventory.

Signature: 

Date: 4/7/11

Complete or Partial Deposit (check one)

I certify that the inventory represents all materials and associated documentation from the work performed under this permit (complete deposit).

I certify that this represents a portion of the materials and associated documentation. The attached sheet lists what materials are not yet deposited, the reason they are not deposited at this time and when they are expected to be deposited (partial deposit).

Curation Facility Information

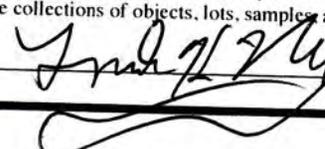
Repository Name: Anza Borrego Desert State Park, Colorado Desert District Stout Research Center
Address: 200 Palm Canyon Drive
City, State Zip Code: Borrego Springs, CA 92004
Telephone Number: (760) 767-4974

Official Authorizing Receipt (name and title): Lyndon K. Murray

Accession Number Assigned by the Repository: CDDSRC DOES NOT USE ACCESSION NUMBERS - EACH SPECIMEN CATALOGUED SEPARATELY SEE SPECIMEN CATALOGUE NUMBERS

Receipt of Collection Statement by Repository Official

I, LYNDON K. MURRAY (Repository Official) certify that the STOUT RESEARCH CENTER (name of facility) has on this date, 4/7/11, accepted the collections of objects, lots, samples, and associated documentation described on the attached inventory from GERALDINE L. ARON (permittee).

Signature: 

Date: 07 APR 2011

Bureau of Land Management

COLLECTION INVENTORY FORM

Permit Number: CA-10-00-006P
Repository Name: Colorado Desert District Stout Research Center
Repository Accession Number: _____

Discipline: _____ **Archaeology**
 (check one) **Paleontology**

Site or Locality Number	Catalog Numbers or Field Specimen Numbers	Material Type	Quantity	Unit Type object, bag, cubic feet, linear feet, other (specify)	Comments
3465	V8885	Bone	1	Object/bone	20101228MER-05
3465	V8886	Bone	1	Object/bone	20101228MER-05
3466	V8887	Bone	1	Object/bone	20101228GLA-1
3466	V8888	Bone	1	Object/bone	20101228GLA-1
3466	V8889	Bone	2	Object/bone	20101228GLA-1
3466	V8890	Bone	1	Object/bone	20101228GLA-1
3466	V8891	Bone	4	Object/bone	20101228GLA-1
3466	V8892	Bone	4	Object/bone	20101228GLA-1
3466	V8893	Bone	1	Object/bone	20101228GLA-1
3467	V8894	Bone	2	Object/bone	20101229PCM-1
3467	V8895	Bone	4	Object/bone	20101229PCM-1
3467	V8896	Bone	2	Object/bone	20101229PCM-1
3467	V8897	Bone	1	Object/bone	20101229PCM-1
3467	V8898	Bone	1	Object/bone	20101229PCM-1
3467	V8899	Bone	1	Object/bone	20101229PCM-1
3467	V8900	Bone	1	Object/bone	20101229PCM-1
		TOTAL ITEMS:	16	Objects	

**Appendix E: Confidential. BLM Fossil Locality Forms, Fossil
Locality Maps, Fossil Locality Photos**



Figure 1. Closeup of 20101222MER-1, pectinidae.



Figure 2. Closeup of 20101222MER-1 ostrea.



Figure 3. Overview of 20101222MER-1 locality, view to the east.



Figure 1. Closeup of 20101222MER-2 pecten shell.



Figure 2. Closeup of 20101222MER-2 ostrea shell.



Figure 3. Closeup of 20101222MER-2 gastropod interior mold.



Figure 4. Overview of localities 20101222MER-1 and 20101222MER-2, facing east.



Figure 1. Closeup of 20101222MER-3, long bone shaft fragment.



Figure 2. Overview of locality 20101222MER-3, facing southwest.



Figure 1. Closeup of 20101222MER-4, mammalian long bone shaft fragments.



Figure 2. Overview of site 20101222MER-4, view southwest.



Figure 1. Closeup of 20101227JH-1 mammalian bone fragment.

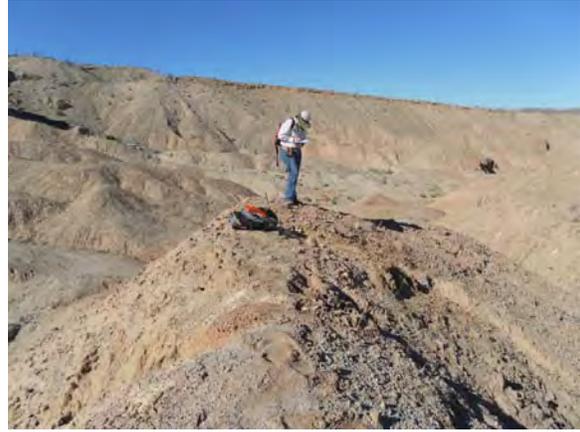


Figure 2. Overview of site 20101227JH-1, view west.



Figure 1. Closeup of 20101227JH-2, 2 mammalian long bone shaft fragments.



Figure 2. Overview of site 20201227JH-2, view east.



Figure 1. Closeup of 20101227JH-3, testudines carapace fragment.



Figure 2. Overview of site 20201227JH-3, view north.



Figure 1. Closeup of 20101227MER-1 testudines carapace fragment.



Figure 2. Overview of locality 20101227MER-1, view northwest.



Figure 1. Closeup of 20101227MER-2, aves bones.

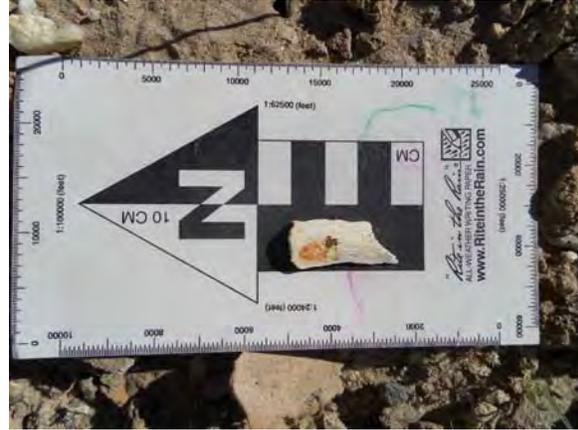


Figure 2. Closeup of 20101227MER-2, mammalian bone fragments.



Figure 3. Overview of locality 20101227MER-2, facing east.



Figure 1. Overview of 20101227MER-3 locality, facing southwest.



Figure 1. Closeup of 20101227SRA-1, 2 mammalian long bone shaft fragments.



Figure 2. Overview of 20101227SRA-1, view to the west.



Figure 1. Closeup of 20101227GLA-1, 1 mammalian bone fragments.



Figure 2. Overview of 20101227GLA-1, view to the northwest.



Figure 1. Closeup of testudines costal fragment from site 20101227GLA-2a.



Figure 2. Closeup of testudinae shell fragments from site 20101227GLA-2a.



Figure 3. Overview of site 20101227GLA-2a, facing south.



Figure 1. Closeup of mammalian bone fragment from site 20101227GLA-2b.



Figure 1. Overview of site 20101228MRD-1, view to the west-northwest.



Figure 1. Closeup of lagomorpha bone fragments from locality 20101228MRD-2.



Figure 2. Overview of locality 20101228MRD-02, facing east-northeast.



Figure 1. Closeup of mammalian humerus fragments from locality 20101228PCM-1.



Figure 2. Overview of locality 20101228PCM-1, facing east-northeast.



Figure 1. Closeup view of 2 mammalian vertebral centrum from locality 20101228MER-01.



Figure 2. Closeup of testudines shell fragments and unidentified bone from locality 20101228MER-1.



Figure 3. Closeup of mammalian bone fragments from locality 20101228MER-1.



Figure 4. Overview of locality 20101228MER-1, facing southeast.



Figure 1. Closeup view of 2 testudines carapace fragments from locality 20101228MER-2.



Figure 2. Closeup testudines shell fragment and unidentified mammalian bone from locality 20101228MER-2.



Figure 3. Overview of locality 20101228MER-2, facing west-southwest.

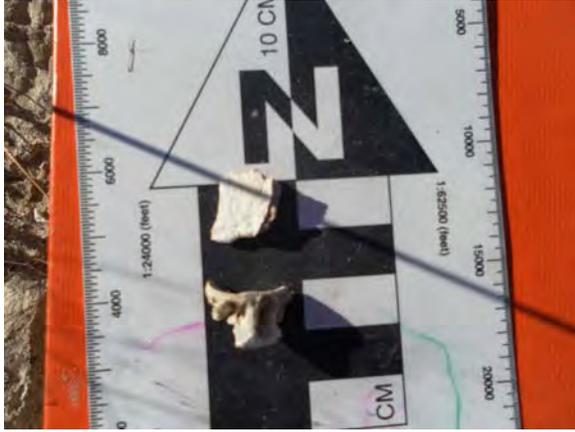


Figure 1. Closeup of osteichthyes vertebra and unidentified mammalian bone fragment from locality 20101228MER-3. .



Figure 2. Overview of locality 20101228MER-2, facing east-northeast.



Figure 1. Closeup view of artiodactylae distal 1st phalanx, from locality 20101228MER-5.



Figure 2. Closeup view of artiodactylae distal 1st phalanx, from locality 20101228MER-5.



Figure 3. Closeup view of unfused vertebral centrum, from locality 20101228MER-5.



Figure 4. Overview of locality 20101228MER-5, view north-northwest.



Figure 1. Closeup view, mammalian phalanx from locality 20101228GLA-1..



Figure 2. Closeup view of mammalian tarsal bone from locality 20101228GLA-1.



Figure 3. Closeup view of unfused vertebral centrum, from locality 20101228GLA-1.



Figure 4. Overview of locality 20101228GLA-1, view north.



Figure 1. Closeup view, mammalian humerus fragment from locality 20101228GLA-3.



Figure 2. Closeup view of mammalian ischium fragment from locality 20101228GLA-3.



Figure 3. Closeup view of marginal carapace fragment from testudines, from locality 20101228GLA-3.



Figure 4. Overview of locality 20101228GLA-3, view southwest.



Figure 1. Closeup view, artiodactylae tooth fragment from locality 20101228GLA-9.



Figure 2. Closeup view of a testudinae carapace fragment with preserved sutures, from locality 20101228GLA-9.

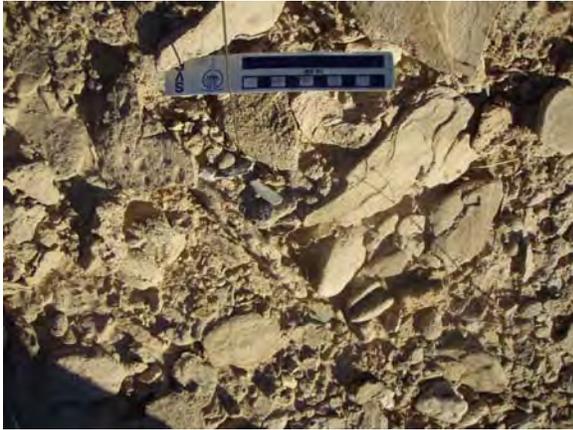


Figure 3. Closeup view of mammalian bone fragments, from locality 20101228GLA-9.



Figure 4. Overview of locality 20101228GLA-9, view down.



Figure 1. Closeup view, two partial plastron scutes of testudinae from locality 20101229MER-1.



Figure 2. Overview of locality 20201229MER-1, view north.



Figure 1. Closeup view, two partial plastron fragments of testudinae, and 7 mammalian bone fragments from locality 20101229PCM-1.



Figure 2. Overview of locality 20201229PCM-1, view northeast.



Figure 1. Closeup view, mammalian femur fragment from locality 20101229PCM-2.



Figure 2. Closeup view of aves undetermined bone fragment from locality 20101229PCM-2.



Figure 3. Closeup view of fragment from testudines, from locality 20101229PCM-2.



Figure 4. Overview of locality 20201229PCM-2, view southeast.



Figure 1. Closeup view, testudines carapace fragment from locality 20101229JH-1.

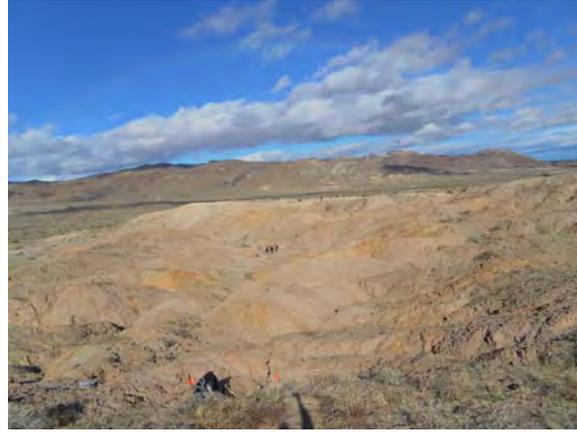


Figure 2. Overview of locality 20101229JH-1, facing north.



Figure 1. Closeup view, mammalian bone fragments from locality 20101229JH-2.



Figure 2. Closeup view of testudines carapace fragment from locality 20101229JH-2.

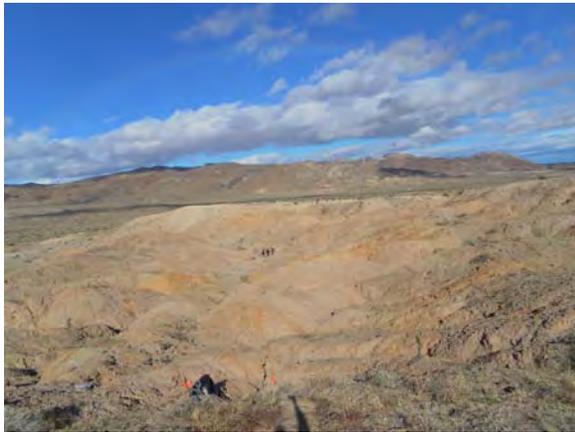


Figure 3. Overview of locality 20101229JH-2, facing north.