Paleontological Monitoring Plan for the New York Canyon Utilization and Interconnect Project, Pershing and Churchill Counties, Nevada

Paleontological Use Permit #N-90758

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1
INTRODUCTION

1.1 PROJECT BACKGROUND

At the request of Environmental Management and Planning Solutions, Inc. (EMPSi) and on behalf of the Bureau of Land Management (BLM) Winnemucca District Office and Humboldt River Field Office (FO), Applied EarthWorks, Inc. (Æ) has been retained to prepare a Paleontological Monitoring Plan (Plan) for the TGP Dixie Development Company's (TGP) New York Canyon Utilization and Interconnect Project (Project) located in Pershing and Churchill counties, Nevada. In accordance with state-wide Potential Fossil Yield Classification (PFYC) data and the initial paleontological assessment (Spaulding 2011), portions of the Project area are determined to traverse areas known to have a high paleontological resource potential. In the event that a Project will potentially impact significant nonrenewable paleontological resources, the BLM requires that a paleontological monitoring program be developed and implemented during the construction phase. This Plan was prepared pursuant to these requirements.

1.2 PROJECT LOCATION AND DESCRIPTION

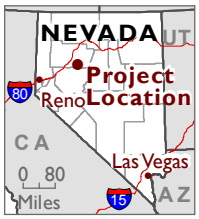
TGP is proposing to construct, operate, and maintain an overhead 230 kilovolt (kV) gen-tie (Proposed Action) in a newly proposed right-of-way (ROW) originating at one of three proposed geothermal power plant sites. The proposed gen-tie, at 26 miles (mi) in length, would tie into the NV Energy power grid at the Oreana Substation near Lovelock, Nevada. The gen-tie would consist of a single 230-kV circuit on H-Frame or three-pole wooden structures. Structure heights would be up to 85 feet (ft) tall, and the span would be between 600 ft and 800 ft depending on the terrain. The easternmost portion of the route, traversing Antelope Valley, is located strictly on BLM-managed lands. From the edge of the Humboldt Range and for the remaining portion of the route toward the Oreana substation, land ownership along the route is largely in a checkerboard pattern, with approximately half of the lands being BLM-managed public lands, and the other half being privately owned.

An alternative gen-tie route (Alternative 1) replaces the gen-tie from the Proposed Action and adds the need for the construction of a substation. The Alternative 1 gen-tie would run directly north up Buena Vista Valley to interconnect with the existing NV Energy Tracy-to-Valmy 345-kV transmission line. The gen-tie route under Alternative 1 would be 24 mi long, 2 mi shorter than the 26-mi long Proposed Action gen-tie route. Land ownership along the route is nearly all in a checkerboard pattern, with slightly more than half of the lands being BLM-managed, and slightly less than half being privately owned. The Alternative 1 gen-tie would cross between 10.5 and 11 mi of private land, with the exact length varying depending on the selected power plant location. Temporary ground disturbance would be 8 acres (ac) less under Alternative 1 as compared with the Proposed Action, but the long-term disturbance would be 4 ac more. See Figure 1 for the Project location.

Overview of Proposed Action and Alternative 1

- Proposed Gen-Tie
- Proposed Tie Line Options
- Alternative Gen-Tie Route
- Alternative Tie Line Options
- Existing or proposed substation
- Geothermal lease area
- Project area
- Candidate power plant
- Project access road
- Existing 345 kV transmission line
- Interstate
- 100 ft contour lines (on topo)
- Township and range
- County boundary

Surface Ownership
- Bureau of Land Management
- Private



Source: BLM 2012, TGP 2011, USGS 1:250K Lovelock and Reno 1962 and Winnemucca 1971

1.3 REGULATORY CONTEXT

Paleontological resources (i.e., fossils) are considered nonrenewable scientific resources because once destroyed, they cannot be replaced. As such, paleontological resources are afforded protection under the various federal laws and regulations including the Antiquities Act of 1906, the Federal-Aid Highway Act of 1935, the National Environmental Policy Act (NEPA) of 1969, the Federal Land Policy and Management Act of 1976, and Title 43 of the Code of Federal Regulations, among others. Additionally, the Paleontological Resources Protection Act (PRPA) was recently enacted as a result of the passage of the Omnibus Public Lands Management Act of 2009. The PRPA requires federal land management agencies to manage and protect paleontological resources and affirms the authority of existing policies already in place.

Federal laws and regulations apply only when projects are located on federal lands or federally managed lands, or when they are federally funded. This Project is located in part on BLM-managed lands, and federal laws will apply. The BLM has set forth guidelines for the management of paleontological resources in BLM Instruction Memorandum (IM) No. 2009-011 (2008) and Handbook (H) 8270 (BLM 1998a) and H-8270-1 (BLM 1998b). This Plan complies with these guidelines as well as professional standards set forth by the Society of Vertebrate Paleontology (SVP) (2010).

1.4 PURPOSE OF THE PLAN

The purpose of this Plan is to establish mitigation monitoring and discovery procedures for any paleontological resources encountered as a result of ground-disturbing activities during construction of the Project. The Plan will outline paleontological tasks to be completed such as pre-construction worker's training, construction monitoring, fossil and data collection, laboratory procedures, museum curation, and reporting. By implementing this Plan, no adverse effects to paleontological resources would occur as a result of the Project in accordance to NEPA. Procedures outlined in this Plan also meet the requirements of PRPA and all other federal laws mentioned above.

2
PALEONTOLOGICAL SIGNIFICANCE AND RESOURCE CLASSIFICATION

2.1 SIGNIFICANCE CRITERIA

Paleontological resources are the evidence of once-living organisms as preserved in the rock record. They include both the fossilized remains of ancient plants and animals and the traces thereof (e.g., trackways, imprints, burrows, etc.). In general, fossils are considered to be older than recorded human history or greater than 5,000 years old and are typically preserved in sedimentary rocks. Although rare, fossils can also be preserved in volcanic rocks and low-grade metamorphic rocks under certain conditions (SVP 2010).

Paleontological resources can provide important taphonomic, taxonomic, phylogenetic, paleoecologic, stratigraphic, or biochronological data. These data are important because they are used to examine evolutionary relationships, provide insight on the development of and interaction between biological communities, establish time scales for geologic studies, and for many other scientific purposes (Scott and Springer 2003; SVP 2010).

The BLM (2008) defines a significant paleontological resource as follows:

> Any paleontological resource that is considered to be of scientific interest, including most vertebrate fossil remains and traces, and certain rare or unusual invertebrate and plant fossils. A significant paleontological resource is considered to be scientifically important because it is a rare or previously unknown species, it is of high quality and well-preserved, it preserves a previously unknown anatomical or other characteristic, provides new information about the history of life on earth, or has identified educational or recreational value. Paleontological resources that may be considered to not have paleontological significant 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 [BLM 2008:1-18].

2.2 POTENTIAL FOSSIL YIELD CLASSIFICATION

Geologic units are considered to be "sensitive" if they are known to contain significant nonrenewable paleontological resources anywhere in their extent. The area of sensitivity is typically defined as the entire rock unit (formation or member thereof) and not limited to areas where surface fossils may be exposed. Using baseline information gathered during a paleontological resource assessment, the sensitivity of the geologic unit(s) underlying a project area can be assigned to one of five classifications defined by the BLM (2008). The criteria for each sensitivity classification, and the corresponding mitigation recommendations, are provided below.

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.

3
GEOLOGY AND PALEONTOLOGY OF THE PROJECT AREA

In order to ascertain whether or not a particular project area has the potential to contain significant fossil resources at the subsurface, it is necessary to review relevant scientific literature and geologic mapping to determine the geology and stratigraphy of the area. For this Project, a preliminary paleontological assessment was performed by CH2M Hill (Spaulding 2011). Using geologic mapping by Wallace and others (1969) and Johnson (1977), as well as various other available publications and records, Spaulding (2011) identified the geologic units within the Project area and ranked them according to the PFYC system. The results of Spaulding's analysis are discussed in the following sections and summarized in Table 3-1 below.

3.1 PROPOSED ACTION

For the Proposed Action, Spaulding (2011) identifies six geologic units within the ROW including sedimentary deposits ranging in age from the Triassic (252 million years ago [Ma]) period to the Quaternary (2.6 Ma to Recent) period. Only one of these units, the middle Triassic (247 Ma to 237 Ma) Prida Formation, was determined to have a high paleontological resource potential (PFYC Class 5) based on available literature and museum records. The Prida Formation has yielded abundant scientifically significant vertebrate fossils in the past, including cartilaginous and bony fishes as well as numerous ichthyosaur specimens. The formation has also yielded some of the most abundant and continuous sequences of Middle Triassic conodonts currently known (Ritter 1989, Spaulding 2011).

3.2 ALTERNATIVE 1

For Alternative 1, Spaulding identifies the following two geologic units within the ROW: (1) Quaternary age alluvial fans, and (2) Pleistocene age (2.6 Ma to 10,000 years before present) Lake Lahontan deposits in the Buena Vista Valley. Whereas the young alluvial fans do not typically yield intact fossil specimens, the Lake Lahontan deposits have proven to yield scientifically significant vertebrates and were assigned a PFYC Class 4 (Spaulding 2011). These lake deposits underlie the southern portions of Alternative 1 and may underlie a portion of the remainder of the route at an unknown depth.

Table 3-1
***Geologic Units in the Project Area and Their Potential Fossil Yield Classification**

Geologic Unit	Typical Fossils	** PFYC Ranking
Proposed Action		
Antelope Valley Alluvial Fans	None	Class 2
Igneous Rock Units	None	Class 1
Auld Lang Syne Group (includes Dun Glenn and Grass Valley Formations)	Unspecified, but rare	Class 3b
Prida Formation	Fish, reptiles, conodonts	Class 5
Miocene/Pliocene Conglomerate	Unknown	Class 3b
Upper Valley Alluvial Fans	None	Class 2
Alternative 1		
Alluvial Fans	None	Class 2
Lake Lahontan Deposits of the Buena Vista Valley	Mammals, fish, and invertebrates	Class 4

* Taken directly from Spaulding (2011). Not verified by the current author.
**PFYC rankings were based solely on desktop analysis and no fieldwork was conducted to corroborate the classifications.

3.3 PROJECT AREA PFYC

The BLM maintains paleontologic and geologic data from various sources including U.S. Geological Survey data, Nevada Bureau of Mines data, documented paleontological localities, and data obtained by various mining companies. Using this collective data, the BLM has created a confidential state-wide PFYC map for planning purposes (personal communication with Mark Hall). According to the map, approximately 3.5 mi of the Proposed Action ROW is underlain by PFYC Class 4a units and Alternative 1's ROW is entirely underlain by PFYC Class 3 units.

As discussed above, Spaulding ranks the Proposed Action ROW a PFYC ranging from Class 1 to 5 and ranks the Alternative 1 ROW a Class 2 and 4. Spaulding's report provides no corresponding maps to compare to BLM data and the geologic units that correspond to the BLM's statewide PFYC map are unspecified. Therefore, the lack of equivalence between Spaulding's analysis and the BLM's data can either be attributed to the use of discrepant geologic data or the inconsistent designation of PFYC rankings of the same geologic units. Regardless, while the BLM PFYC data was compiled at least in part by information obtained from the field, the accuracy of published or unpublished geologic mapping of the Project area will need to be verified by a pre-construction field survey.

4
MONITORING PLAN

4.1 PRE-CONSTRUCTION FIELD SURVEY

Prior to any ground-disturbing activities, a pedestrian field survey of the Project traversing BLM lands will be conducted by the approved Principal Investigator (PI) or an approved Field Agent. The purpose of the field survey will be to visually inspect the ground surface for exposed fossils or traces thereof and to evaluate geologic exposures for their potential to contain preserved fossil material at the subsurface. All areas underlain by geologic units determined by the BLM to have a PFYC Class 4 or higher will be intensively surveyed. Particular attention will be paid to rock outcrops both inside and in the vicinity of the Project area and any areas where geologic sediments are well exposed within 200 ft of the Project area ROW, or less distance upon approval (BLM 2008). Areas underlain by geologic units determined to have a PFYC Class 1 or 2 will not require a field survey. Units determined to have a PFYC Class 3 will not require a field survey (personal communication with Mark Hall).

All fossil occurrences observed during the course of fieldwork, significant or not, should be adequately documented and recorded at the time of discovery in accordance to procedures outlined in IM 2009-011 (BLM 2008). The data collected for each fossil occurrence, at minimum should include the following information: Universal Transverse Mercator (UTM) coordinates, approximate elevation, description of taxa, lithologic description, and stratigraphic context (if known). In addition, each locality should be photographically documented with a digital camera.

If feasible, all significant or potentially significant fossils will be collected at the time they are observed in the field with prior consent of the BLM. This is because if left exposed to the elements, fossil materials are subject to erosion and weathering. If the fossil discovery is too large to collect during the survey (e.g., a whale skeleton or bone bed) and requires a large-scale salvage effort, then it will be documented and a mitigation strategy will be devised in consultation with the Project proponent and the BLM. An alternative mitigation such as avoidance and re-routing of the Project alignment in the vicinity of the discovery is an option; however, the re-route should be far enough away such that access roads do not lead directly to the fossil discovery site. If avoidance is the selected mitigation, then the discovery must be stabilized and buried as necessary, and appropriate measures taken to reduce human-caused or natural adverse effects (i.e., erosion) (BLM 2008).

Following the field survey, the PI will prepare and submit a report of findings within 30 days that includes further recommendations such as where paleontological monitoring should occur during Project construction. The BLM will review the report for adequacy within 10 working days of receipt. Should the BLM identify any deficiencies, the PI will have five working days to make the requested revisions and re-submit the report for final approval.

4.2 WORKER EDUCATION TRAINING

Prior to the start of construction monitoring, all onsite personnel will be briefed regarding the types of fossils that could be found in the Project area and the procedures to follow should

paleontological resources be encountered. The training will also include a discussion of applicable laws and penalties for removal or disturbance of fossils materials found onsite. It will provide instruction to workers for procedures to follow in the event of a fossil discovery, including reporting procedures and will provide contact information for the onsite monitor(s) and PI. This training will be accomplished at the pre-construction kick-off meeting and will be conducted by the PI or Field Agent. The presentation may be videotaped for use during future trainings of additional onsite personnel.

4.3 MONITORING LOCATIONS

Exact monitoring locations will be identified based on the results of a pre-construction field survey of the Project area and in consultation with the local BLM FO. In general, monitoring will be required for all ground-disturbing activities impacting native materials in areas underlain by geologic units ranked PFYC Class 4 or higher, anticipated to be approximately 3.5 linear miles. Full-time monitoring is not generally required in Project areas underlain by geologic units with a ranking of PFYC Class 1 or 2. In some circumstances, spot checking may be required for Project areas underlain by geologic units determined to have a PFYC Class 3. Project areas that will require paleontological monitoring or spot checking may be altered at any time at the discretion of the BLM and in consultation with the PI. The Project proponent must notify the PI at least 72 hours in advance of ground-disturbing activities that may impact paleontologically sensitive geologic units.

4.4 MONITORING PROCEDURES

Monitoring will consist of the visual inspection of excavated or graded areas, trench sidewalls, and spoils piles. In the event that a paleontological resource is discovered, the monitor will temporarily divert the construction equipment around the find until it is assessed for scientific significance. A buffer of at least 50 ft around the discovery will be maintained for safety. A temporary construction exclusion zone, consisting of lath and flagging tape, will be erected around the discovery. Construction activities can occur outside of the 50-ft buffer from the discovery if it is safe to do so. The size of the buffer may be increased or decreased once the monitor adequately explores the discovery to determine its size and significance.

4.4.1 Fossil Discovery and Salvage

In the event of a fossil discovery, the monitor will immediately report the find to the Construction Supervisor and the PI, who will in turn immediately notify the BLM. The monitor will have the authority to temporarily halt ground disturbances in the area immediately surrounding the find. If necessary, additional monitors will be deployed to the Project area to assist with data collection and fossil extraction in order to expedite the fossil recovery process and prevent or minimize construction delays. In most cases, a delay will not exceed two hours. If a fossil discovery cannot be collected and adequately documented within that timeframe, then the BLM must authorize a longer work stoppage.

If considered scientifically significant, the monitor will collect the fossil specimen(s) and associated data. For this Project, the BLM criteria of scientific significance will be used to make this determination in the field. In general, small unidentifiable vertebrate fossils will not be

collected and only well-preserved or representative invertebrates or plants will be salvaged. At each fossil locality, the monitor will document UTM coordinates, describe the encasing sediments in detail, record stratigraphic context and fossil orientation, and photo document the fossil(s). The fossil(s) will then be collected and placed in bags or trays for transport to an equipped paleontology laboratory. Matrix samples may also be collected at the discretion of the PI for subsequent laboratory studies (i.e., microfossil analysis). Immediately following fossil collection, the temporary construction exclusion zone will be removed and the monitor or PI will notify the Construction Supervisor that grading activities may resume in the area of the find.

4.4.2 Microfossil Screening

At the discretion of the PI and with concurrence from the BLM authorized officer, the monitor will screen sediments to check for the presence of microvertebrates if they are believed to be present. A test sample may also be collected when any identifiable macro-vertebrate fossils are discovered. Test samples will be collected utilizing 5-gallon buckets and screened through hand sieves constructed from stainless steel mesh. If microvertebrate fossils are encountered during the test screening, then bulk matrix samples will be taken for processing offsite. For each fossiliferous horizon or paleosol, a standard sample (4.0 cubic yards/meter or 6,000 pounds) will be collected for subsequent wet-screening per SVP guidelines (2010). All samples will be accompanied by pertinent geologic and stratigraphic information recorded on a field collection tag. Data will include the following: project name/project number, sample number and date, geologic formation (and unit, if applicable) and age, lithologic description, stratigraphic data, UTM's and elevation, other locational data (e.g., milepost marker or structure number).

4.5 EQUIPMENT AND SUPPLIES

The paleontological monitor will have a handheld global positioning systems (GPS) unit, a digital camera, and tool kit that contains specimen containers, matrix bags, field labels, tools (shovel, pick, awls, chisels, dental picks, pin vises, brushes, etc.), chemical preservatives (e.g., Vinac), and plaster. The monitor will also have fluorescent flagging tape and survey stakes to delineate temporary construction exclusion zones. For microfossil screening, the monitor will have hand sieves, 5-gallon buckets, and an eye loupe. At all times, the monitor will wear the appropriate personal protective equipment (PPE) in compliance with the onsite contractor PPE work rules including a hard hat, heavy footwear, sleeved shirt, long pants, and a high-visibility safety vest.

4.6 LABORATORY WORK

Upon completion of fieldwork, all significant fossil specimens will be prepared to a point ready for curation in a paleontology laboratory. Preparation will include the careful removal of excess matrix from fossil materials using manual devices such as dental picks or pin vises, or for harder materials a pneumatic air scribe may be used. For microfossil screening, chemicals such as detergents or weak acids may be used to further break down the matrix so that it can be picked for fossils under a microscope. All fossil specimens will be stabilized with glues and consolidants as needed and repaired, as necessary. Especially fragile specimens may need a support cradle constructed out of specialty plaster. Microvertebrates may require pin-mounting, a process by which the specimen is mounted using glue or wax onto a pinhead that is embedded in

a cork and stored in a glass vial. Following laboratory preparation, all fossils specimens will be identified to the lowest taxonomic level, cataloged, and inventoried into an electronic database.

4.7 REPORTING

All paleontological work will be reported daily on a monitoring record form and additional data recorded in waterproof field notebooks. At minimum, information on the form will include areas monitored, monitor name(s), and a summary of monitoring activities. A weekly summary of paleontological activities will be prepared by the PI and transmitted via electronic mail to the Construction Supervisor. A monthly progress report will also be prepared and submitted to the Construction Supervisor and BLM, and will include a summary of fieldwork and laboratory activities.

At the completion of all Project-related ground disturbances in sensitive geologic formations, a Paleontological Monitoring Report will be prepared. The report will describe the results of the paleontological monitoring program and include a summary of the field and laboratory methods, an overview of the Project area geology and paleontology, a list of taxa recovered (if any), an analysis of fossils recovered (if any) and their scientific significance, and recommendations. Pertinent information and data related to each fossil discovery will be recorded on BLM fossil locality form 8270-3 and included as a confidential appendix. Each locality form will be accompanied by a 1:24,000 scale map depicting its location. The report will be submitted to the BLM and designated repository within 30 days following completion of fieldwork. If requested, the Project proponent will be provided a copy of the report without any confidential information (i.e., BLM locality forms).

4.8 MUSEUM CURATION

Upon completion of laboratory preparation and fossil identification all fossils collected from BLM lands will be delivered to an accredited repository such as the Nevada State Museum for permanent curation and storage no more than 60 days after all fieldwork is completed. The fossil specimens will be accompanied by field notes, photographs, locality data, a signed deed of gift from the land owner if found on private lands, and a copy of the final monitoring report. The cost of curation and permanent storage is assessed by the repository and is the responsibility of the Project proponent.

5
KEY PERSONNEL

Æ's Paleontology Program Manager Jessica DeBusk prepared this Plan. DeBusk has more than 10 years of professional experience as a consulting paleontologist and is the approved PI on BLM Permit #N-90758. She meets and exceeds the definition of a qualified professional paleontologist set forth by the BLM (2008) and SVP (2010). Aubrey Bonde, Ph.D. provided a quality assurance review of this Plan. Bonde is also listed on permit #N-90758 and has more than 12 years of experience conducting paleontological investigations throughout Nevada, Maryland, South Dakota, and Florida. One or more qualified and permitted Field Agents or monitors will be responsible for the day to day implementation of this Plan and will work under the direction of a qualified and permitted PI. All paleontological personnel must be listed on a valid permit and approved by the local BLM FO prior to conducting fieldwork. In addition to meeting the BLM's experience and education requirements, all paleontological personnel will receive any pertinent safety and environmental awareness training prior to conducting fieldwork.

6
PERMIT REQUIREMENTS

All paleontological work conducted on BLM lands must be conducted under a valid Paleontological Use Permit issued by the State Office, and will require a Fieldwork Authorization by the local FO. The BLM issues two types of paleontological permits: a Survey and Limited Surface Collection Permit and an Excavation Permit. Generally, most paleontological mitigation activities (i.e., survey or construction monitoring) are authorized under a Survey and Limited Surface Collection Permit. Should the recovery of vertebrate fossil material exceed surface disturbance of more than 1-square meter and require the use of mechanical tools, then an Excavation Permit would be required. It may take 30 or more days from the date of application for a permit to be issued. If an Excavation Permit is required, then the BLM may require additional review time and the application should be submitted at least 60 days prior to the anticipated fieldwork. Paleontological resources collected under a BLM-issued permit must be curated in an approved repository such as the Nevada State Museum, reasonably accessible to researchers for scientific study and educational purposes, and requires a long-term curation agreement.

7
PROJECT JOB SAFETY POLICY

The safety of all paleontological field personnel working on the Project during construction is of the utmost importance. In addition to any Health and Safety Plan put into place by onsite contractors, the following Safe Work Practices will be strictly adhered to at the construction sites:

- Field personnel shall wear appropriate personal protective equipment, including:
    - A hard hat and protective, heavy footwear;
    - Shirt and long pants; and
    - High-visibility fluorescent colored safety vest;
- All field personnel exposed to excessive noise from heavy equipment, chain saws, jack hammers, grinders, or any other loud noises shall wear ear protection;
- All field personnel shall wear safety glasses and face shields during all operations involving chemicals, grinding, chipping, or any other operation that could lead to eye or face injuries;
- Field personnel shall park personal vehicles in designated parking areas only;
- Field personnel shall keep alert around moving equipment and establish eye contact with equipment operator(s) before entering the work operation;
- No field personnel will park directly behind equipment, and shall stay at a safe distance away from equipment operations;
- Field personnel shall obey all traffic regulations while driving on the job site, and remain cognizant that heavy equipment always has the right-of way;
- Field personnel shall have access to a first aid kit and shall know how to use it properly;
- Field personnel shall have access to fire extinguishers and know how to operate them;
- Field personnel shall know the location(s) and phone number(s) of the medical treatment facilities nearest to the construction site;
- No person will enter a trench deeper than five feet unless it has been shored or sloped properly according Occupational Safety and Health Administration (OSHA) Standards; and
- Field personnel will report to the Construction Supervisor any observed unsafe act or condition.

8
REFERENCES CITED

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1998a General Procedural Guidance for Paleontological Resource Management Manual H-8270.

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