1. BLM District Office: Winnemucca District Office

2. Name of Project Lead: Raquel Minky

3. Project Title: AltaRock Seismic Survey


5. Project Description:

AltaRock Energy Inc. (AltaRock) has been funded by the U.S. Department of Energy (DOE) under the American Recovery and Reinvestment Act to develop exploration methods for Engineered Geothermal Systems (EGS) through the integration of geophysical, geological, and geochemical data sets. The project area is centralized around Dixie Valley, Nevada. This location was chosen by AltaRock due to the highly characterized nature of the geothermal resource of Dixie Valley with respect to the public domain database in the Basin and Range Province of the western United States.

The strategy of the proposed project would be to develop statistically valid, baseline models using existing public domain geosciences information in the project area. Additionally, the proposed project would use data collected by the seismic survey to improve the conceptual model coverage and resolution, and would generate an enhanced geothermal resource conceptual model. The basic project area would encompass lands managed by the Humboldt River Field Office, Stillwater Field Office, and the Mount Lewis Field Office. The dimensions of the proposed survey would encompass a 31 mile by 31 mile project area. Separate Notice of Intents were sent out to each field office for the proposed survey areas within each districts boundary. This proposed Seismic Survey would be only analyzed for portions of the survey within the Humboldt River Field Offices boundary.

The seismic survey would consist of 10 broadband seismometers deployed in two separate campaigns, referred to as primary and secondary. During the primary campaign 7 stations (A04, A09, A10, A15, A16, A17 & A21) would be deployed, and during the secondary campaign 3 stations (B17, B18, & B19) would be deployed. The seismometers would be placed below surface at a depth of up to 3 feet using hand tools. Up to two people per site would be present during the installation of the seismic equipment. Each seismic deployment campaign would be expected to be three months in duration, or six months for the total deployment. Meaning seismic stations would remain in place up to 3 months total for each campaign. Data would be retrieved from the data loggers monthly.

Seismic station installation would include the use of Trillium broadband seismometers on miniature tripods (used for seismometer leveling) located on either existing ground or small concrete pads (1-2 inches thick) for enhanced leveling capability. A seismometer and its
protective installation case would be placed in a shallow hole approximately 6 to 8 inches in diameter and 6 to 12 inches in depth. Once placed in the shallow hole the seismometer and the installation case would be back-filled with native material and the completion would be flush with the natural surface. Cables from the seismometer would be placed in PVC running a few inches below the surface to a weatherproof container containing the digitizer and the battery to operate the seismometer. The weatherproof containers would be secured above ground on 2 by 0.08 meter galvanized pipes that would stand about 5 feet. Solar panels, about 12-15 inches by 1-2 feet would be attached to the weatherproof containers. Seismic data would then be recorded on a 16 GB compact flash drive and would be retrieved once a month.

Access to survey stations would be by 4-wheel drive, ATV, or hiking. Additionally, to address concerns over existing traditional cultural properties with the project area, no survey locations would be located within T. 25 N., R. 35 E., sections 22, 23, 24, 25, 26, and 27.

Project dimensions seismic station seismometers would be 6-8 inch diameter x 6-12 inches in depth (.34 square feet max). Acreage: 0.0005 acres per station, 0.005 acres total

Will the project result in new surface disturbance? Yes

Has the project area been previously disturbed? Yes. Approximately 2%, there are existing roads in the area.

6. Legal Description:  
T. 25 N., R. 36 E., sec. 21;  
T. 25 N., R. 37 E., sec. 21;  
T. 25 N., R. 38 E., sec. 28;  
T. 25 N., R. 39 E., sec. 28;  
T. 26 N., R. 36 E., sec. 21;  
T. 26 N., R. 37 E., sec. 36;  
T. 26 N., R. 38 E., sec. 19;  
T. 27 N., R. 35 E., sec. 23;  
T. 27 N., R. 36 E., sec. 34;  

USGS 24k Quad name: Cain Mountain, Fencemaker Pass, Fisher Canyon, Hole in The Wall, Logan Peak, McKinney Pass, Sou Hot Springs, & West of McKinney Pass  
100k map name: Fish Creek Mountains, Edward Creek Valley, & Lovelock  
Land Status: BLM

7. See Attached Maps

8. To be completed by Cultural Resource Specialist (CR):  
Area of Potential Effect:  
APE Acreage: 0.005  
Records Check:  
Records Examined: CR2-3112, CR2-3092

Revised 04/10
Results: While there are NRHP eligible sites in the vicinity, the placement of these stations will not occur in any of them. Some of the stations are being placed in areas where a Class III survey has not been done.

Inventory Type Needed:
None
Categorical Exemption (Number 3)
Reconnaissance
Class I
Class II
Class III
Architectural

Rationale for Inventory Type determination: Total ground disturbance for the placement of the seismographs will be less than 1 square meter for all 7 stations.

Tribal Notification/Consultation Needs: none
Rationale: These are temporary structures and fall under categorical exclusions.
Tribe(s) to be contacted:

Public Notification Needs: none
Rationale: These are temporary structures and fall under categorical exclusions.
Person(s), group(s) to be contacted:

CRS Approval: Mark E. Hall
Date: 12/14/2010

Field or other appropriate Manager Concurrence:

Date: 12/14/10

Revised 04/10
Part I: Plan Conformance Review

The proposed Action is subject to the:
[x] Paradise-Denio Management Framework Plan
[x] Sonoma-Gerlach Management Framework Plan
[ ] Black Rock Desert-High Rock Canyon Emigrant Trails NCA and Associated Wilderness and Other Contiguous Lands in Nevada RMP

(The Proposed Action has been reviewed for conformance with this plan (43 CFR 1610.5, BLM Manual 1617.3).

Part II: NEPA Review

Categorical Exclusion Review: This Proposed Action qualifies as a categorical exclusion under:

[x] 43 CFR 46.210 DOI Implementation of NEPA of 1969, Listing of Departmental Categorical Exclusions (formerly 516 DM2 Appendix I) (e) Nondestructive data collection, inventory (including field, aerial, and satellite surveying and mapping), study, research, and monitoring activities.

[x] 516 DM11.9, (BLM) (B) Oil, Gas and Geothermal Energy (6) Approval of Notices of Intent to conduct geophysical exploration of oil, gas, or geothermal, pursuant to 43 CFR 3150 or 3250, when no temporary or new road construction is proposed.

ESA and BLM Sensitive Status Species

<table>
<thead>
<tr>
<th>Evaluation Criteria</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Are species listed under the Endangered Species Act likely to occur in the project area? If yes, list the species in Table 1 below. Verify with USFWS or use approved list.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Are BLM NV Sensitive Species, based upon the current IM, likely to occur in the project area? If yes, list the species in the Table 1 below.</td>
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Table 1. Special Status Species that may occur in the project area:

<table>
<thead>
<tr>
<th>ESA</th>
<th>BLM</th>
<th>Common (Scientific) Name</th>
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<th>Mitigation for BLM Sensitive Species (Attach ESA Section 7 Compliance to Form)</th>
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<tr>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐ Yes</td>
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<tr>
<td>☐</td>
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<th>Mitigation for BLM Sensitive Species (Attach ESA Section 7 Compliance to Form)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>✗</td>
<td>Pallid Bat (<em>Antrozous pallidus</em>) Townsend’s big-eared bat (<em>Corynorhinus townsendii</em>) Myotis spp., other bat species</td>
<td>✗ Yes</td>
<td>Please see attached document</td>
</tr>
<tr>
<td></td>
<td>✗</td>
<td>Dark kangaroo mouse (<em>Microdipodops megacephalus</em>) Pale kangaroo mouse (<em>Microdipodops pallidus</em>)</td>
<td>✗ Yes</td>
<td>Please see attached document</td>
</tr>
<tr>
<td></td>
<td>✗</td>
<td>Pinyon Jay (<em>Gymnorhinus cyancephalus</em>) Gray Vireo (<em>vireo vicinior</em>)</td>
<td>✗ Yes</td>
<td>Please see attached document</td>
</tr>
</tbody>
</table>

Revised 04/10
Table 2 Migratory Bird Treaty Act Consideration

<table>
<thead>
<tr>
<th>Potential MBTA Species w/in the Project Area Common (Scientific) Name</th>
<th>May Be Affected?</th>
<th>Proposed Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gray flycatcher (Epidotax wrightii)</td>
<td>☒ Yes</td>
<td>Species listed in this document are representative, but not exclusive of migratory birds typically associated with the habitats. With the application of the attached mitigation measures and stipulations, the proposed project will not negatively affect these species. Please note: These mitigation measures are more restrictive than the standard terms and conditions.</td>
</tr>
<tr>
<td>Black-chinned sparrow (Spizella aurogularis)</td>
<td>☐ No</td>
<td>There are a variety of topographical features in the area which provide habitat for many migratory species. The applicant needs to be particularly aware of the potential for ground-nesting birds and raptors.</td>
</tr>
<tr>
<td>Virginia's warbler (Vermivora virginiae)</td>
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<tr>
<td>Green-tailed towhee (Pipilo chlorurus)</td>
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<td>White-throated swift (Aeronauts saxatilis)</td>
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<td>Prairie Falcon (Falco mexicanus)</td>
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<tr>
<td>Common poorwill (Phalaenoptilus nuttalii)</td>
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<tr>
<td>Sage sparrow (Amphispiza belli)</td>
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<tr>
<td>Black-throated sparrow (Amphispiza bilineata)</td>
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<tr>
<td>Brewer's blackbird (Euphagus cyanoccephalus)</td>
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<td>Canyon wren (Catherpes mexicanus)</td>
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<tr>
<td>Rock wren (Salpinctes obsoletus)</td>
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<tr>
<td>Western meadowlark (Sturnella neglecta)</td>
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<tr>
<td>American avocet (Recurvirostra americana)</td>
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<tr>
<td>Calliope hummingbird (Stellula calliope)</td>
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<tr>
<td>Red-tailed hawk (Buteo jamaicensis)</td>
<td></td>
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</tr>
</tbody>
</table>
The Proposed Action has been reviewed to determine if any exceptions described in 43 CFR 46.215 Categorical Exclusions: Extraordinary Circumstances (See attached page)

Mitigation Measures/Remarks: (if there are any applicable mitigation measures, including any standard stipulations, conditions of approval, terms of conditions, etc. that would be attached to the permit, state "See Attached" and attach a copy to the CX.)

---

Part III: DECISION: I have reviewed this plan conformance and NEPA compliance record and have determined that the proposed project is in conformance with the approved land use plan and that no other environmental analysis is required. It is my decision to implement the project, as described, with the mitigation measures identified above.

Remarks reserved for authorized officer:

Authorized Official: [Signature] Date: 1·20·11

Administrative Review or Appeal Opportunities
See 43 CFR 4.401(a) Part 4 for general rules relating to procedures and practice involving appeals.

Revised 04/10
Threatened and Endangered Species

The variety of topography, soil composition, and vegetation in the project area results in a diversity of habitat supporting many plants and animals, including those with special status designation. The nature of the proposed project is not significantly invasive. Awareness of plants and animals in the area should alleviate any adverse effects the proposed project could have on the habitat and the plants and animals within it. The applicant must make ground crews aware of the existence or potential existence of special status species and the appropriate measures to take if they are encountered.

1. Because of the burrowing, nesting and other utilization of plants by wildlife species found in this area, vehicular traffic should be restricted to currently established roads or two-tracks. ATVs are allowed for the establishment and removal of seismic stations, but stations will be accessed by foot-traffic for station monitoring.

2. Greater Sage-grouse (GSG) (*Centrocercus urophasianus*): The proposed seismic stations are surrounded by Population Management Units (PMU) for Greater sage-grouse. Ground crews should be made aware of the potential for GSG and directed to avoid disturbing the birds. Points A16, A10, A17 are within the boundaries of PMUs. If GSG or their nests are observed within a 300’ radius of the proposed seismic station site, installation of the station must be delayed until the GSG are no longer present. Brooding months are generally from April to August. Ground crews should be particularly alert to any nests or chicks during this time frame. Winter use months are generally October-March.

3. Bighorn Sheep (*Ovis canadensis*): There is a large expanse of land identified as occupied Bighorn sheep habitat that intersects the project area. (Please see attached map) Points A16, A09, and A04 are within this area. Traffic through this area and survey activities should be minimized during the lambing season, approximately May 1- June 1. Sightings and coordinates (NAD 83, approximate coordinates are acceptable) need be reported to the BLM biologist.

4. Pygmy Rabbits (*Brachylagus idahoensis*): Pygmy rabbits have been documented as being in the area. Ground crews should be instructed in pygmy rabbit burrow identification. Create alternate routes to seismic stations as needed to avoid pygmy rabbit burrows. Seismic stations must be located a minimum of 150’ from a burrow complex to avoid disturbance and/or destruction.
5. Bats: Federally protected and BLM sensitive bat species have been found in this area. There are numerous abandoned mines scattered throughout the project area providing refuge and some species of bats also use dense shrubs as roosting sites. Avoid any mines or adits. Avoid any disturbance to bats.

6. Raptors: Numerous raptors have been documented as nesting/being in this area. Minimize time spent conducting survey activities in areas where nests are found or breeding behavior is observed.

7. Pale kangaroo mouse (*Microdipodops pallidus*), Dark kangaroo mouse (*Microdipodops megacephalus*): Kangaroo mice normally block the entrance to their burrows during the day. Ground crews should be instructed to avoid areas of freshly turned soil as this may indicate an active burrow even though no burrow opening is found. Create alternate routes to seismic stations as needed to avoid burrows.

8. Lahontan Beardtongue (*Penstemon palmeri var. macranthus*), windloving buckwheat (*Eriogonum anemophilum*): Ground crews should be instructed in the identification of these two plants and avoid destruction or disturbance. GPS (NAD 83) coordinates need to be taken and forwarded to the BLM biologist if either of these two species is located.

9. Migratory birds: Due to the variety of habitat, a diversity of migratory birds is found in the project area. Prior to any planned disturbance in potential migratory bird nesting habitat from April 1 to July 31 (the approximate nesting season for the majority of migratory birds in that area), a field survey for migratory birds, their nests, eggs, or young should be performed, in order to prevent violation of the Migratory Bird Treaty Act (MBTA). If installation or removal of the seismic stations must take place during this time frame, the BLM biologist must be given notice at least 10 work days prior to the activity. This survey should be performed no more than 10 days and no less than 1 day prior to the proposed activity. If reproductive behaviors are observed, (courtship displays, mating, nest construction, etc.) nests, eggs, or young are found all disturbance activities will stop and the BLM biologist will be notified. In consultation with the BLM biologist, the project will either be delayed until the birds have completed their nesting and brood rearing activities, or the project will be re-designed (disturbance buffer zones established) so as to not harm migratory birds, their nests, eggs, or young and to prevent alteration of reproductive and brood rearing behavior.

10. Burrowing owls (*Athene cunicularia*): This area could support burrowing owls. Ground crews should be instructed in the identification of burrows. Seismic stations must be located a minimum of 150’ from a burrow to avoid disturbance and/or destruction. Create alternate routes to seismic stations as needed to avoid owl burrows.

11. Mule deer (*Odocoileus hemionus*): Mule deer do not have special status designation. However, there is a large expanse of land identified as year ‘round, occupied mule deer habitat that intersects the project area. (Please see attached map) Points A16, A10 and
A09 are within this area and point A04 is adjacent to it. Traffic through this area and survey activities should be minimized during the fawning season, approximately mid-May–July.

Nancy Spencer-Morris
BLM Wildlife Biologist
775-623-1563
The Bureau of Land Management (BLM) requires this form or other BLM approved forms to be prepared and filed in triplicate with requisite attachments. The BLM must approve this permit prior to any lease operations.

<table>
<thead>
<tr>
<th>Field</th>
<th>Response</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a Well Type</td>
<td>☑ Production</td>
<td></td>
</tr>
<tr>
<td>1b Wall Status</td>
<td>Not Applicable</td>
<td></td>
</tr>
<tr>
<td>2 Name of Lessee/Operator</td>
<td>Operator is AltaRock Energy Inc.</td>
<td></td>
</tr>
<tr>
<td>3 Address of Lessee/Operator</td>
<td>2320 Markship Way, Suite 200, Sausalito, California 94965</td>
<td></td>
</tr>
<tr>
<td>4 Location of Well or Facility</td>
<td>This is for a geothermal exploration passive seismic survey. Figure 1 provides the revised surface locations. These stations have been revised so that they are in proximty to a road to minimize surface disturbance.</td>
<td></td>
</tr>
<tr>
<td>5 Type of Work</td>
<td>☑ Change Plans</td>
<td>☑ Convert to Injection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>☑ Fracture Test</td>
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<tr>
<td></td>
<td></td>
<td>☑ Shoot or Acidize</td>
</tr>
<tr>
<td></td>
<td></td>
<td>☑ Repair Well</td>
</tr>
</tbody>
</table>

15 Describe Proposed Operations (Use this space for well activities only. See instructions for current well conditions on page 2.)

Sundry Notice - Attachment 1

16 Describe Proposed Operations (Use this space for activities other than well work.)

17 I hereby certify that the foregoing is true and correct.

Signed: [Signature]

Title: VP Resource

Date: 08/23/2011

Approved by: [Signature]

Title: FM

Date: SEP 14 2011

(Continued on page 2)
Proposed Operations

Table 1 provides lat-long coordinates for the original (for comparative purposes) and revised seismic station locations. Figure 1 shows the original and revised locations.

The seismic installation will require (1) seismometer placement in a 36” diameter by 42” deep hole, (2) a 6” tall by 4” diameter plastic container, (3) a 8” diameter by 6” tall cement cylinder onto which the seismometer is set, (4) a small tracked vehicle (a small bobcat) to dig holes where hand digging is not sufficient or effective, (5) placement of the weatherproof box on two 7 ft by 3” galvanized pipes laid horizontally on the ground and having the solar panels mounted onto the weatherproof box instead as originally planned on the vertical poles, and (6) a 0.5-inch plastic conduit for the cable that connects the seismometer to the digitizer in the weatherproof box.

Additionally, we will have a trailer hitched to a 4-wheel drive SUV to move the bobcat and (2) SUVs. Water will be brought in a 5-gallon container for the concrete.