

**Attachment to Form 3200-9**  
**Notice of Intent to Conduct Geothermal Resource Exploration Operations**  
***Geothermal Temperature Gradient Well Drilling – Desert Queen***  
***June 20, 2012***

For drilling temperature gradient wells, describe your drilling and completion procedures, and include, for each well or for several wells you propose to drill in an area of geologic and environmental similarity:

- (1) A detailed description of the equipment, materials, and procedures you will use;  
The contractors (Wellsco) have a Schramm 130 available, with a rating of 7,000 ft. Final thermal gradient well only requires 1.5 inches in diameter to allow for temperature measurements, so the hole size noted below is anticipated to be a maximum. Surface casing diameter will be determined on a case-by-case basis depending on anticipated drilling conditions, and the 8.5" size noted below is expected to be a maximum. Drill bits to be used are standard tri-cone bits.

To begin the drilling operations Wellsco will mobilize drilling equipment to the well site and rig up. The cellar, mud pits, and water tanks will be set at the well site. All casing, cement, mud, BOPE, etc. will be located at the location before starting drilling operations.

We plan to drill a 8 1/2" surface hole to +/- 250' with air/mud. A 7" Surface casing will be run to +/- 250'. Surface casing will be set with Class C cement. The well will then be drilled with a 6 1/8" hole to approximately 1,000' with mud/air mud.

- (2) The depth of each well;  
Each well completed will be  $\leq 1000$  ft.
- (3) The casing and cementing program;  
The Casing and Cementing Program will be of industry standard design. The standard procedure for welding of the casing head to the casing for all geothermal wells follows the API standard 6A (fourteenth Edition, March 1983). Also, see (1) above.
- (4) The circulation media (mud, air, foam, etc.);  
The boreholes will be drilled with a rotary bit with air if possible, and circulating drilling mud if necessary. Steel tanks will store the mud during circulation and drilling.  
The mud program, if needed and presented below is a guideline only. Actual well conditions encountered during drilling will dictate the final type and rheological properties of any drilling fluid used. The following rheological conditions should be maintained while using a dispersed mud system:

*Dispersed Mud:*

Weight 8.7 - 8.9 ppg

pH 9.5 - 10.5

Funnel viscosity 35 - 38 seconds

Plastic viscosity 10 - 15 cp

Yield point 3 - 10 lbs/100 sq. ft.

10 min Gel 10 lbs/100 sq. ft.

If needed, a gel-based mud will be used for drilling, to improve rate of penetration and well cleanup, based on the observed drilling conditions.

(5) A description of the logs that you will run;

Temperature, caliper, EM induction & gamma, Sonic, and the Electric tool (with 16" & 64", temp, gamma, Spontaneous Potential, single point, lateral).

(6) A description and diagram of the blowout prevention equipment you will use during each phase of drilling;

Temperatures and pressures requiring a blowout prevention system are not expected to be encountered. However, if such conditions are warranted, Welsco has blowout prevention equipment (BOP) that is of industry standard and consists of a 3,000 lbs double gate ram preventer, or equivalent design.

(7) The expected depth and thickness of fresh water zones;

Due to the limited information currently available at the areas of interest, and need for the current gradient drilling to obtain such information, the depth of the fresh water zones is unknown, but appropriate surface casings will be cemented in place to isolate shallow water zones.

(8) Anticipated lost circulation zones;

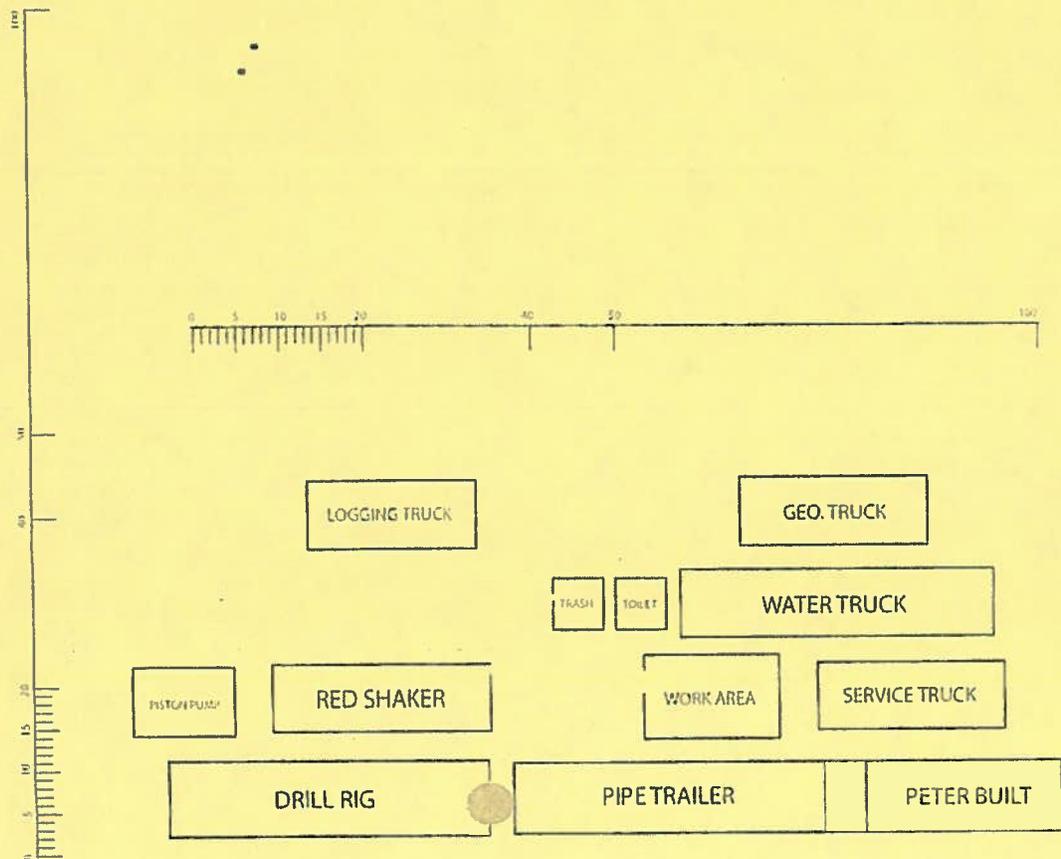
None known. This is a new area with limited previous information. The gradient well(s) proposed are intended to provide this new, in addition to other, information.

(9) Anticipated temperature gradient in the area;

Desert Queen -  $>100^{\circ}\text{C}/\text{km}$  - Estimated gradient based on nearby Desert Peak Strat 3 well that reached  $104^{\circ}\text{C}$  by 425m depth, and Desert Peak 52 that reached  $89^{\circ}\text{C}$  by 173m. We, therefore, expect gradient temperatures to exceed  $100^{\circ}\text{C}/\text{km}$ .

(10) Well site layout and design;

An example well layout follows. This, or a very similar, footprint will be designed at the site resulting in minimal disturbance as required by BLM.



(11) Existing and planned access roads or ancillary facilities; and

Existing roads will be used and there are no planned new constructions.

(12) Your source of drill pad and road building material and water supply.

No new material is needed for the well pad or the access roads. Water supply will be determined once final well site locations are approved and selected.

(d) Show evidence of bond coverage (see §3251.15);

Multiple sites are provided here as options for gradient drilling targets. Only one or two sites will be selected for actual drilling operations (based on approved clearances), and bonds will be posted on those selected sites once approved by BLM.

(e) Estimate how much surface disturbance your exploration may cause;

100 by 100 ft for the drill pad and ancillary equipment per hole drilled (see previous diagram), resulting in minimal disturbance.

(f) Describe the proposed measures you will take to protect the environment and other resources;

The following recommended operating procedures will help prevent undue or unnecessary degradation during exploration activities:

1. Springs and seeps will be avoided by maintaining a distance of 400 feet or more.

2. Drill holes are to be backfilled and plugged according to State of Nevada Regulations NAC 534.360 to 534.450 (NRS 534.020, 534.110) once testing operations have ceased.
  3. Existing main roads used as access to project area that are substantially damaged by operations will be repaired to the condition existing prior to operations.
  4. Pursuant to 43 CFR 8365. 1-1 (b)(3), draining of sewage or petroleum products, or dumping of refuse or waste other than wash water from any trailer or other vehicle, except in places or receptacles provided for that purpose, is prohibited.
  5. Operations shall not knowingly disturb, alter, injure, or destroy any scientifically important paleontological remains; or any historical or archaeological sites, structure, building or object, or cave related site on public lands. When the operator discovers any previously unidentified cultural, paleontological, or cave related resource that might be altered or destroyed by the operations, the discovery shall be left intact and reported to the appropriate BLM Field Office (BLM Authorized Officer), which shall evaluate the discoveries, and take action to protect, remove or preserve the resource within 30 working days (43 CFR 3809.420).
  6. Pursuant to 43 CFR 10.4(g), the operator shall notify the BLM Authorized Officer, by telephone with written continuation, immediately upon the discovery of human remains, funeral objects, sacred objects, or objects of cultural patrimony (as defined in 43 CFR 10.2). Further pursuant to 43 CFR 10.4(c) and (d), the operator shall immediately stop all activities in the vicinity of the discovery and protect it for 30 days or until notified to proceed by the BLM Authorized Officer.
13. Operators are responsible for the spread of noxious weeds caused by operations on the public lands. Operators are advised to be familiar with noxious weeds in the operating area and to take measures to avoid contributing to the spread of noxious weeds.

(g) Describe methods to reclaim the surface.

The contractor will reclaim the surface per specifications noted in the permit Conditions of Approval.

(h) Include all other information BLM may require.

Available upon request.

14. Maps showing the locations of wells, land use, land ownership, roads, aerial view, etc. of the proposed drill sties for consideration at the Desert Queen site in the Winnemucca BLM District Office's area of responsibility are located in the attached excel file (and hard copy here): Note, at most one or two wells will be drilled at the site subject to approval by the Winnemucca District Office.

In the Excel sheet (and printed on signed document), three maps appear for the general area (with more than one proposed gradient well location for consideration) and are presented below as noted in A, B, C.

A. shows roads, transmission, faults (if present), thermal features, land use (pink is BLM) and proposed well locations.

B. Shows crop land/vegetation distribution relative to drill hole locations.

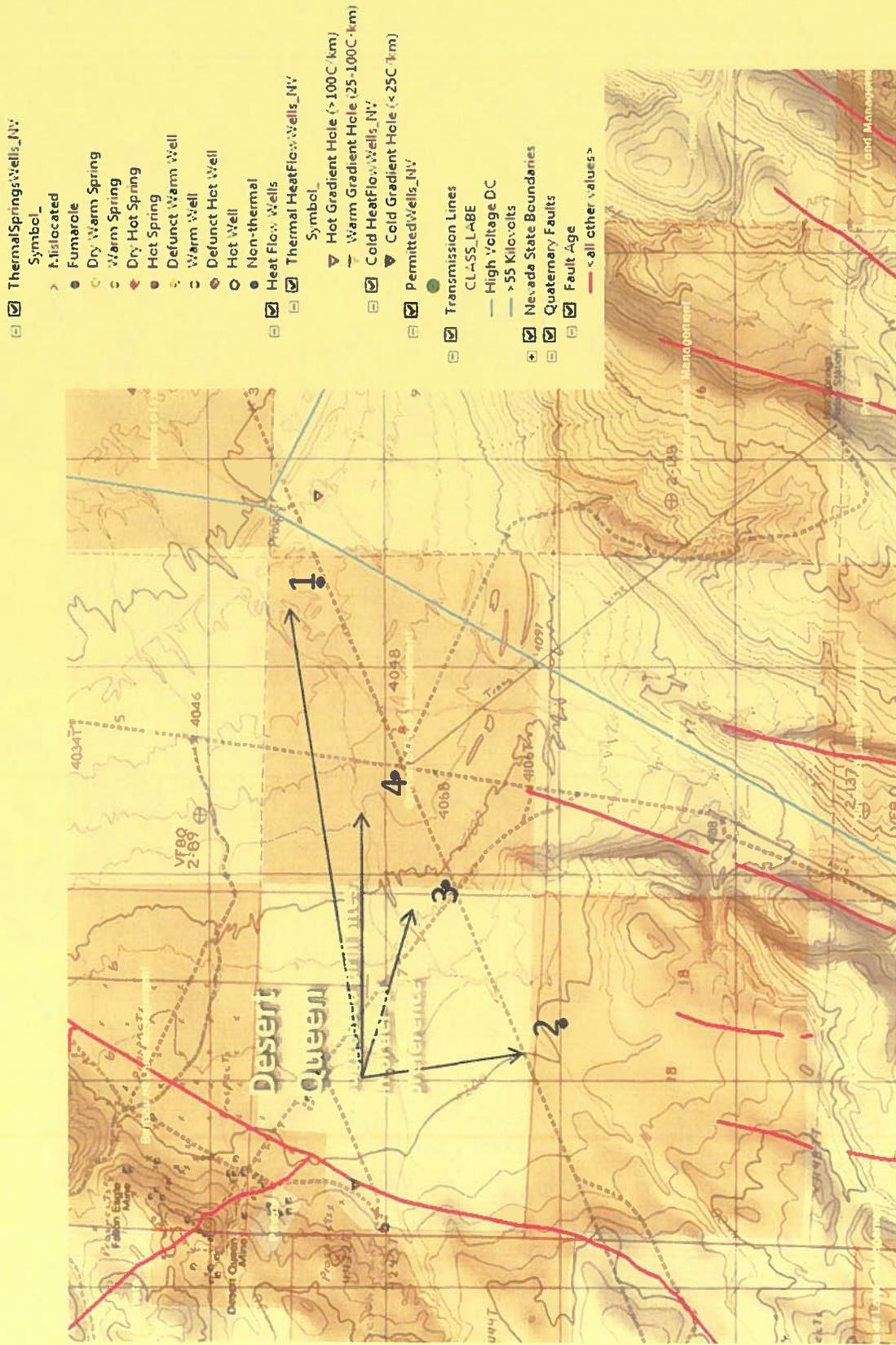
C. Shows aerial photo view of the site with blow-up images of each proposed drill site.

Three maps appear (page down):

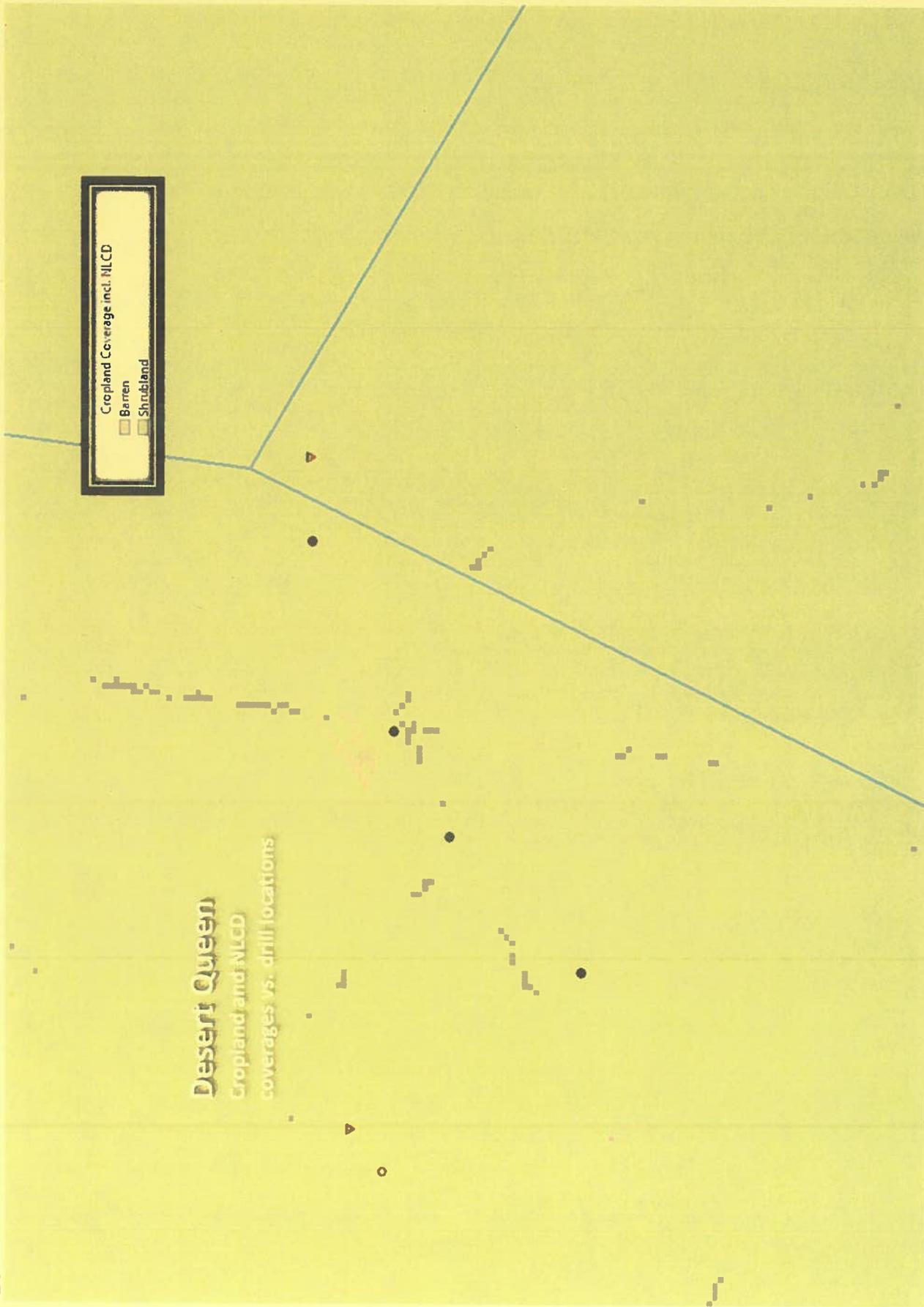
A. shows roads, transmission, faults (if present), thermal features, land use (pink is BLM) and proposed well locations.

B. Shows crop land/vegetation distribution relative to drill hole locations.

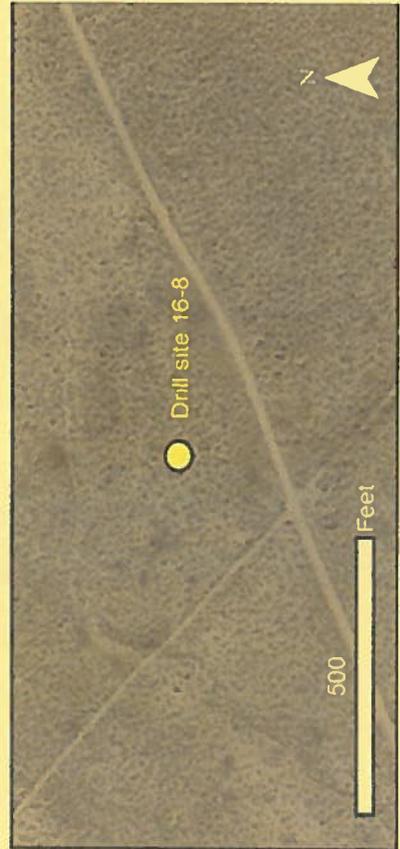
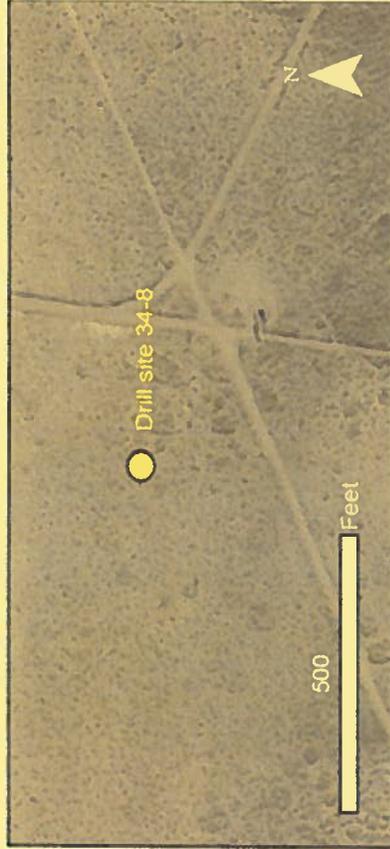
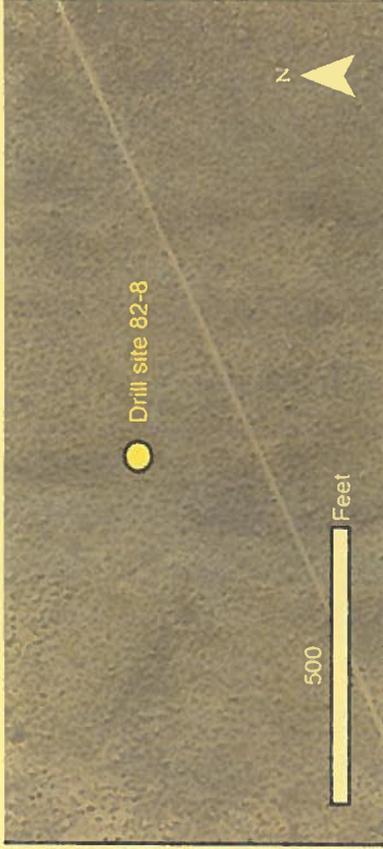
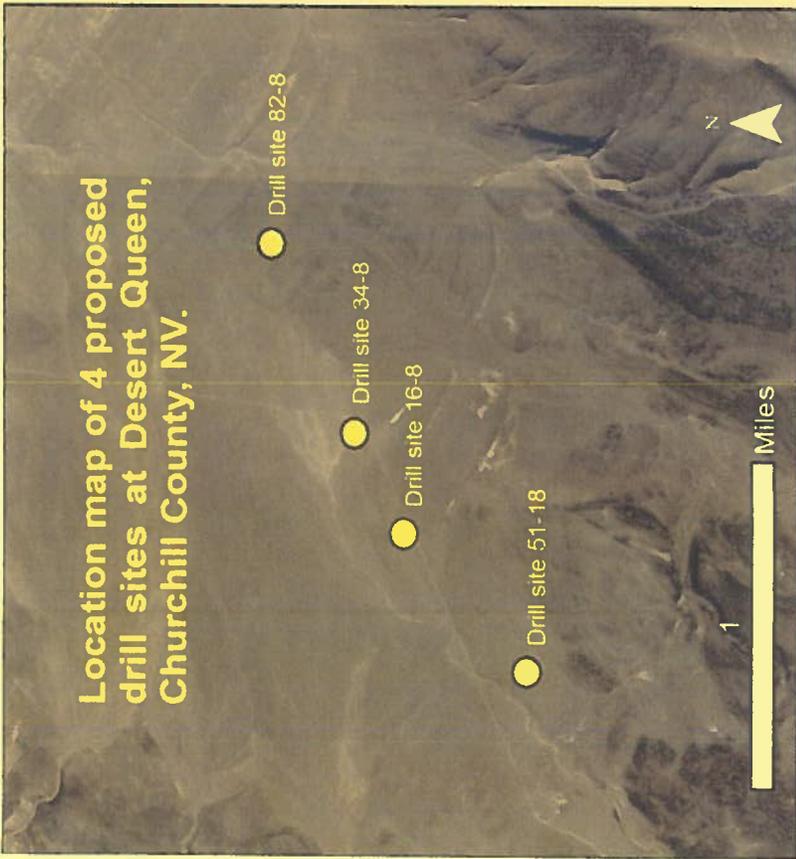
C. Shows aerial photo view of the overall site plus blow-up images of each potential drill site.



B.



C.



**Conditions of Approval**  
**Winnemucca District (WD) Humboldt River Field Office (HRFO)**  
**NBMG, Geothermal Temperature Gradient Well Drilling Project**

- A. Terms and conditions derived from H-3150-1 – Onshore oil and Gas Geophysical Exploration Surface Management Requirements.
1. The operator shall contact the Field/District Office at least 48 hours prior to the start of the project to schedule a pre-work conference. The crew supervisor and additional crew chiefs (if needed) will attend the pre-work conference to discuss the terms and conditions for this operation.
  2. The operator's representative will attend a meeting with the BLM to discuss cultural artifacts and potential penalties for tampering with cultural artifacts. The meeting can be held as part of the pre-work conference.
  3. Existing routes and trails will be used to the maximum extent possible... Attempts to traverse irregular, soft, or steep slopes and terrain by all vehicles and equipment shall be kept to a minimum to avoid excessive rutting, soil erosion, excessive crushing of vegetation, and excessive visual impacts. Vehicular travel... will be kept to a minimum and be in a zigzag pattern between source points to reduce straight line disturbances. This procedure does not apply to vehicles following trails or roads.
  4. Vehicular travel shall be suspended when ground conditions are wet enough to cause rutting or other noticeable surface deformation and severe compaction. As a general rule, if vehicles or other project equipment create ruts in excess of four inches deep when traveling cross-country over wet soils, the soil shall be deemed too wet for vehicular use.
  5. The staging area(s) shall be kept clean and free of litter. Appropriate human waste facilities will be provided and properly maintained. Such waste facilities shall be removed from the site upon completion of the project.
  6. Roads will NOT be constructed for geophysical projects authorized under a categorical exclusion.
  7. Operators of vehicles and equipment shall be responsible for not damaging fences and keeping gates as found. As a last resort, should a fence be cut for access, that fence must be repaired to former or better condition, after equipment has passed through.
  8. Shot holes will be backfilled and plugged... Any cuttings resulting from shot hole drilling and not used in backfilling the shot hole will be scattered about the immediate area to blend with natural terrain and reduce visual impacts.
  9. Geophysical equipment may encounter congested areas with trees requiring one or more trees to be removed and or limbed. If such action is needed then the tree(s)

and or limb(s) shall be less than eight (8) inches at diameter breast height (dbh) or at the base of the branch. Trees to be cut or limbed which are located adjacent to public roads, communities and or public facilities shall be immediately cut into smaller pieces so that it is not aesthetically displeasing and dispersed within the immediate vicinity.

10. Any and all tire tracks one hundred feet (100'), leading away from an established dirt or two track road situated on public lands, will be hand raked to blend into the surrounding soil surface.
11. If soil is disturbed to the extent that erosion is likely or visual impacts are readily apparent, the disturbed areas will be rehabilitated utilizing the following techniques: Ruts and vehicle tracks will be filled with soil and/or obliterated by either hand raking or similar method. When completing this work, care will be taken to minimize disturbance to surrounding lands that have not been disturbed. All areas where rehabilitation work is accomplished will be reseeded with the seed mixtures provided by the BLM (attached).

The seeded area should be hand raked to assure the seed is covered with approximately  $\frac{1}{4}$  to  $\frac{1}{2}$  inch of soil. This seeding should be accomplished during the late fall, in October or November, before moisture conditions become prohibitive. The seed shall be certified, pure live seed, and seed tags must be available if requested by the authorized officer. Certified weed free seed is to be used to rehabilitate disturbed land.

12. If any unanticipated prehistoric or historic archaeological sites or paleontological sites are encountered during the geophysical work, the work shall stop and the appropriate BLM archaeologist at the Field/District Office will be contacted. If a site is found, it will be recorded. The BLM will assume responsibility for evaluation and determination of significance, related to the historical or archaeological site. All known cultural resources sites will be avoided. Collection of any cultural or paleontological artifacts, bones or fossils from Federal lands is specifically prohibited.
13. Visible migratory bird nests will be avoided and not disturbed.
14. All equipment will be power washed prior to entering Federal lands to help mitigate the spread of noxious plants.
15. When fire conditions reach high, the helicopter, vehicles, and equipment will carry water, shovels, and other fire-fighting equipment to extinguish any fires that are accidentally started by the seismic operations.
16. If oil, lubricants and other petroleum or man-made products are accidentally spilled onto the ground surface, the BLM will be contacted and provided specific information about the spill and/or leak. Spills or leaks will be cleaned from the soil and any contaminated material will be bio-remediated or disposed of at an authorized landfill.

17. All flagging, lath, pin flags, and similar materials used in the seismic project will be removed from public land and disposed of at an authorized landfill.
18. All Applicant-Committed Environmental Protection Measures documented in the applicant's NOI in addition to the NOI terms and conditions will be complied with, and in addition to, these Standard Terms and Conditions as well any additional Conditions of Approval Identified by the BLM Field Office.

B. Additional Conditions of Approval Identified by the BLM Field Office

1. A Class III Cultural Survey is needed prior to any permitted activities to occur.
2. Consultation letters must be sent by authorized officer at WDO HRFO BLM to the affected tribes prior to any permitted activities.
3. It is the responsibility of the Applicant to notify the BLM project lead (Philip D'Amo, 775-623-1567, [pdamo@blm.gov](mailto:pdamo@blm.gov)) and the biologist (Nancy Spencer-Morris, 775-623-1563, [nmorris@blm.gov](mailto:nmorris@blm.gov)) of the proposed disturbance and survey dates.
4. Land Clearing or other surface disturbance associated with the proposed action would be conducted outside of the migratory avian breeding season, (March 1- August 31) whenever feasible, to avoid potential destruction of active bird nests. Nests are considered active if they contain eggs or young or if evidence of reproductive behavior (i.e. mated pairs, courtship displays, territorial defense, carrying nesting materials, transporting food, etc.) is observed (Migratory Bird Treaty Act 1918). When surface disturbance must be created during the migratory avian breeding season (March 1- August 31), **a survey performed by a BLM approved biologist following BLM approved methodologies** would be conducted for active nests. This survey would be conducted no more than ten (10) days prior to and no less than three (3) days prior to proposed disturbance activities. The results of the survey must be submitted to and approved by the BLM biologist prior to any surface disturbance. If active nests are located, disturbance activities may be postponed, a protective buffer may be established, or other appropriate protective measures would be instituted to avoid disturbance to the nest or reproductive behaviors until the nests are no longer active. The start and end dates of the seasonal restriction may be based upon site specific information such as species, elevation and weather patterns which affect breeding chronology. The Applicant must notify the BLM biologist a minimum of five (5) working days prior to the proposed survey date to allow time for survey coordination.
5. Vehicular traffic should be restricted to currently established roads or two-tracks.

## RECLAMATION SEED LIST

### Saltshrub Seed Mix

### Lowest Elevations 3800ft to 4200ft

Species	PLS lbs/Acre	Bulk lbs/Acre	PLS/sq. ft	Variety
Fourwing saltbrush	3	5	4	
Shadscale	3	5	4	
Forage kochia	0.5	0.75	4	Immigrant
Crested wheatgrass	2.5	3	12	Hycrest
Black greasewood	<u>0.5</u>	<u>1</u>	<u>3</u>	
<b>Totals</b>	<b>9.5</b>	<b>14.75</b>	<b>27</b>	

For Crested wheatgrass you may use Hycrest, Nordan, or Siberian varieties

### Moderate Elevation Seed Mix

### Elevations 4200ft to 5000ft

Species	PLS lbs/Acre	Bulk lbs/Acre	PLS/sq. ft	Variety
Fourwing saltbrush	3	5	4	
Shadscale	3	5	4	
Forage kochia	0.5	0.75	4	Immigrant
Crested wheatgrass	2.5	3	12	Hycrest
Indian ricegrass	<u>1</u>	<u>1.25</u>	<u>4</u>	
<b>Totals</b>	<b>10</b>	<b>15</b>	<b>28</b>	

For Crested wheatgrass you may use Hycrest, Nordan, or Siberian varieties

### Midslope Seed Mix

### Elevations 4500ft to 6000ft

Species	PLS lbs/Acre	Bulk lbs/Acre	PLS/sq. ft	Variety
Fourwing saltbrush	3	5	4	
Blue flax	0.5	0.75	4	Appar
Alfalfa	1.8	2	10	Ladak
Forage kochia	0.5	0.75	4	Immigrant
Crested wheatgrass	<u>2.5</u>	<u>3</u>	<u>12</u>	Hycrest
<b>Totals</b>	<b>8.3</b>	<b>11.5</b>	<b>34</b>	

For Crested wheatgrass you may use Hycrest, Nordan, or Siberian varieties

### Mountain Seed Mix

### Elevations over 6000ft

Species	PLS lbs/Acre	Bulk lbs/Acre	PLS/sq. ft	Variety
Basin wildrye	2.5	3	7	Magmar
Thickspike wheatgrass	2.5	3	10	Critana
Bluebunch wheatgrass	2.5	3	15	Secar
Blue flax	0.5	0.75	4	Appar
Palmer-penstemon	0.5	0.75	6	Palmer
Fourwing saltbrush	<u>2</u>	<u>3</u>	<u>3</u>	
<b>Totals</b>	<b>10.5</b>	<b>13.5</b>	<b>45</b>	

If Bluebunch wheatgrass is unavailable a crested wheatgrass could be used, varieties are Nordan, Siberian, or Hycrest.

PLS = Pure Live Seed