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DIVISION OF MINERALS

STATE OF NEVADA  
COMMISSION ON MINERAL RESOURCES  
**DIVISION OF MINERALS**  
400 W. King Street, Suite 106  
Carson City, Nevada 89703  
(775) 684-7040 | Fax (775) 684-7052  
http://minerals.nv.gov

Date Received	
API Number	27-001-90531
County	Churchill
Permit Number	1414
FOR DIVISION USE ONLY	

**GEOHERMAL INJECTION WELL PERMIT APPLICATION**

The applicant  
ORNI 43 LLC

Name (or Corporate/Business Name)

Street Address 6225 Neil Road  
 City Reno State NV Zip Code 89511  
 Telephone 775-336-0172  
 Email ksnyder@ormat.com

hereby makes application for a geothermal development permit, State of Nevada, Division of Minerals.

Applicant is:  Land Owner  Lease Holder  
 Well Name: 24(34)-22  
 Lease Name/No: N-86897 Split Estate?  Yes  No  
 Land Type:  Federal (BLM, USFS, etc.)  Private  State  
 Type and Amount of Bond: \$450,000 BLM Nationwide bond, \$75,000 NDOM Statewide bond  
 (Exempt for Domestic Class)

Bond Issued by: B of A  
Serial No. \_\_\_\_\_

Well Location: SW 1/4, NW 1/4, Section 22,

Township 21N, Range 38E, County Churchill.

UTM Northing 4391787 N; UTM Easting 440318 E (NAD83 Datum)

Operator's:  
 Name: ORNI 43 LLC  
 Address: 6225 Neil Road  
 City, St Zip: Reno, NV 89511

Drilling Contractor's:  
 Name: Geodrill  
 Address: 4782 Hwy 111  
 City, St Zip: Brawley, CA 92227  
 Telephone: 775-356-9029

Hole Size: 17-1/2" Casing Size: 13-3/8" Weight/Gauge: 68 lb/ft K-55 BT&C

Size of BOP:  2000 psi  3000 psi  5000 psi

Rotary Description:

Identify or locate the sources of the fluids which will be injected:

Tungsten geothermal resource via production wells

Estimated average daily volume of fluids injected 6,000,000 gallons.

Maximum daily volume of fluids injected 10,000,000 gallons.

Estimated maximum injected pressure 300 psi, temperature 264 °F

List proposed metering equipment, pipelines and safety devices that will be used to prevent accidental pollution:

The usual pipelines and instrumentation will be used: ultrasonic or orifice flow meter, pressure and temperature gauges and transmitters, isolation and check valves.

Total Depth to be Drilled: 4,000 ft.

Drilling will Commence On: 2/1/2017

Is this well location under an Underground Injection Permit?

If so, provide NDEP Permit number UNEV \_\_\_\_\_

I certify this information to be true, correct, and complete and that no pertinent matter inquired about in this application has been omitted.

Signature of Applicant/Agent: \_\_\_\_\_



Print Name: Kyle Snyder

Date: 1/5/2017

Please attach a detailed drilling program including the following information:

1. Well design schematic; casing and mud programs; potential water supply; drilling rig to be used and pad layout; blow out prevention equipment diagram and testing program; directional drilling information if applicable; map of location and access roads. Additional information may be required upon review.
2. The required fee per NAC 534A 210 or 534A.212.

**CONDITIONS OF PERMIT**

1. All permittees must comply with appropriate sections of the Geothermal Rules and Regulations of the Division of Minerals and with applicable rules and regulations of other local, state, and federal agencies.
2. During the drilling of geothermal injection wells, all water strata above the geothermal horizon being used must be sealed or separated in order to prevent their contents from passing into other strata.
3. All fresh water and water of value or possible value for other beneficial uses must be confined to their respective strata and be adequately protected by methods approved by the Division. Precautions must be taken in drilling and abandoning wells to guard against any loss of fresh water from the strata in which it occurs, and the contamination of any fresh water by objectionable water.
4. The operator of any well must shut off and exclude all water from any geothermal resource-bearing stratum to the satisfaction of the Division.
5. See attached Conditions of Approval.
6. Please send daily drilling reports to : Lowell Price.....[lprice@minerals.nv.gov](mailto:lprice@minerals.nv.gov)  
and  
Linda Wells.....[lwells@minerals.nv.gov](mailto:lwells@minerals.nv.gov)
7. Additional Conditions/Comments

A.	<i>Under Project Area Permit 1293.</i>
B.	
C.	

This permit does not extend the permittee the right of ingress and egress on public, private or corporate lands.

The issuance of this permit does not waive the requirements that the permit holder obtain other permits from State, Federal, and local agencies.

**PERMIT APPROVAL**

Approved 2/2/2017 with the conditions noted above.  
Date

Permit Number 1414

  
\_\_\_\_\_  
Deputy Administrator  
Division of Minerals



**BRIAN SANDOVAL**  
Governor

STATE OF NEVADA  
COMMISSION ON MINERAL RESOURCES  
**DIVISION OF MINERALS**  
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<http://minerals.nv.gov/>



**RICHARD PERRY**  
Administrator

Las Vegas Office: 2030 E. Flamingo Rd. #220, Las Vegas, NV 89119  
Phone: (702) 486-4343; Fax: (702) 486-4345

## **GEOHERMAL CONDITIONS OF APPROVAL FOR INJECTION WELL DRILLING PERMIT**

Submit forms and correspondence to: Nevada Division of Minerals  
400 W. King Street, #106  
Carson City, NV 89703

Communications with the Division shall be directed to:

Lowell Price, Oil, Gas and Geothermal Program Manager

Office 775-684-7045      Email [lprice@minerals.nv.us](mailto:lprice@minerals.nv.us)  
Cell 775-721-1774  
Fax 775-684-7052

Rich Perry, Division Administrator

Office 775-684-7047      Email [rmperry@minerals.nv.gov](mailto:rmperry@minerals.nv.gov)  
Cell 775-721-0282  
Fax 775-684-7052

Voicemail is available on all cell phones and office phones. Please leave a message if you are unable to speak to someone and we will return your call as quickly as possible.

By provision of the current Memorandum of Understanding between NDOM and BLM, you may contact the following individuals for information or approvals. Approvals under the MOU apply to Fee and Federal lease locations.

John Menghini, Fluid Minerals Team, Petroleum Engineer, Reno

Office 775-861-6573      Email [john\\_menghini@blm.gov](mailto:john_menghini@blm.gov)  
Cell 775-223-1359  
Fax 775-861-6711

YOUR APPLICATION TO DRILL THE TUNGSTEN MOUNTAIN 24(34)-22 INJECTION WELL IS  
APPROVED SUBJECT TO THE FOLLOWING PERMIT CONDITIONS

1. These conditions and the minimum Blow Out Prevention Equipment (BOPE) requirements shall be posted at the well site and read by all company personnel associated with the subject well.
2. The operator shall give notification at least 48 hours prior to spudding, drill stem testing, or production or injection testing operations. 24 Hours notification is required prior to the testing of casing or BOPE. These notifications may be by telephone or email. Please refer to the contacts list on page one of this notice.
3. If the cementing mix for the lead cement in this program includes a 10 lb/sk of Spherelite, a spherical additive for reducing density of cement mix, and a high resolution CBL may be required if the cement does not reach surface, or if the cementing of the casing appears inadequate. This additive has been found to interfere with normal cement bond logging (CBL). The product manufacturer has stated that good logging may be achieved with a high resolution CBL. This log can be more expensive and difficult to schedule. The operator is here notified that if this mix is used and a CBL is required by the regulatory agencies, a high resolution logging may also be required if the CBL is found to be inadequate in the evaluation of the cement behind casing, unless an alternative satisfactory method of confirming cement bonding is approved by the regulatory agencies.
4. **Well Cellars - For corrosion prevention, the cellar must be engineered, constructed, and/or maintained, to preclude standing water from long-term contact with the casing or wellbore assembly.**
5. **Change in Plans** - NAC 534A.540 (3) (g) specifies the operator will submit a sundry for permission for change of drilling plans. Verbal permission may be granted. Subsequent sundry form submission is required. Please refer to attached Sundry Notice Requirements.
6. **Surface Casing** - NAC 534A.260 (3) requires that surface casing be sufficient to protect fresh water aquifers and not less than 10% of the proposed total depth or well or minimum 50 feet. The cementing of casing strings shall be done using the standard procedure of inside casing displacement or tab-in methods, unless other methods are approved prior to the cementing procedure.
7. **Cementing** - NAC 534A.260 (3, 4, 5) requires surface and intermediate casing to be cemented to surface. If one hundred percent (100%) returns are not obtained during the cementing operation, or if the cement falls back in the annulus, a top cement job shall be required, unless another cement program has been approved.
8. **Formation Integrity Test (FIT) at all casing shoes** - A successful FIT, or casing shoe pressure test, must be performed before drilling deeper. The operator is to pressure up to approximately 10% below the known or estimated fracture gradient for a minimum of 30 minutes. In order to pass an FIT there can be no more than a 10% pressure loss over the course of the minimum 30 minute test. In the event of a failed FIT, a cement squeeze job must be performed below the casing shoe. A successful FIT must be performed before drilling deeper.
9. **BOPE** - After surface casing is set, all wells shall be equipped with at least the minimum required Blow Out Prevention Equipment, unless otherwise approved. BOPE should be in accordance with good established oil field practice with adequate kill lines and good working order. NAC 534A.260

(5) requires BOPE to be tested at least 750 psi for 30 minutes with <10% pressure loss or as approved by the Division.

10. **Directional Drilling** - NAC 534A.360 requires directional surveys (inclination and azimuth) to be run on any well permitted directionally drilled well. Division conditions of approval further require directional survey (inclination and azimuth) where the inclination exceeds 5 degrees or the projected bottom hole location would be 100 feet or less from the lease boundary, unless otherwise approved by the Division of Minerals.

11. **Hydrogen Sulfide** - If hydrogen sulfide is encountered well must be shut-in until measured amounts are determined. Values of hydrogen sulfide encountered must be reported to the Division of Minerals.

12. **Air/Aerated Drilling Operations** - For air/aerated drilling operations, the following equipment shall be utilized: banjo box (or equivalent), and a staked down blooie line directed to the reserve pit with a minimum distance of 100 feet.

13. **Cuttings** – *NAC 534A.310 requires samples of cuttings shall be collected and submitted to the Nevada Bureau of Mines and Geology (NBMG). Division conditions of approval further require a minimum of 30-foot intervals from surface to the surface casing point and require 10-foot intervals from the surface casing shoe to total depth.*

*TWO separate sets of cuttings are to be sent prepaid to the Great Basin Science Sample and Records Library, Nevada Bureau of Mines and Geology, 2175 Raggio Parkway, Reno, Nevada 89512. For more information phone 775-682-8766 or e-mail [nbmg@unr.edu](mailto:nbmgs@unr.edu).*

*EACH SET is to consist of a least 15 milliliters of cuttings per sampling interval that must be cleaned, dried, and placed into 3"x 5" sample envelopes. The envelopes are to be placed in order by interval into common drill cutting boxes with the approximate dimensions of 3"x5"x20". The envelopes are to be identified by Division permit number, well name/number as noted on the Geothermal Resource Development Permit Application (Kettleman number alone will suffice if given), and interval.*

*The sets are to be PROPERLY IDENTIFIED as follows: Each box is to have legibly written on one end the name of the operator and well as noted on the Geothermal Resource Development Permit Application, Division permit number, total interval (missing intervals noted), and set number.*

*NOTE: the cuttings are not to be sent to the Division of Minerals. The cuttings are due within 15 days of completion of the well. The operator will be responsible for the cost of any further handling of your samples by the NBMG required to meet the standards set out in this permit condition.*

14. **Drilling Reports** - A minimum of one drilling report shall be submitted to the Division of Minerals each week during drilling operations, notifying the Division of the drilling process. The Division of Minerals requests daily drilling reports. These reports may be submitted via mail, fax or email.

15. **Cementing Reports** – Injection well drillers must collect and submit the cementing reports provided by the service company. These will be required when applying for an Underground Injection Permit.

16. **Static Temperature Survey** – This test should be performed after the well has thermally stabilized.

- 17. **Well Completion Report** - NAC 534.550 (1) (a) requires a well completion form to be filed with the Division of Minerals within 30 days of completion of well or cessation of drilling.
- 18. **Logging** - NAC 534A.350 requires two copies of all well logs run, including lithological and electrical, neutron-gamma or similar, to be filed with the Division. Computed results in LAS format must also be submitted to the Division for each electric log run. Electronic files are to be provided on CD Rom. These logs are to be submitted within 60 days of the completion of the well.
- 19. **Survey Plat** - NAC534A.205 requires a certified plat of the location of the well by a professional land surveyor must be filed with the Division of Minerals within 30 days of completion of the construction of the well.
- 20. **Emergency Notification** - In the event of a serious accident, blow out, spill or fire, immediately notify the Division of Minerals (see page one for contact information).
- 21. **Spills** - Spills or accidental discharge of hydrocarbons in excess of 25 gallons must be reported to the Nevada Division of Environmental Protection at 1-888-331-6337.
- 22. **Plugging** - NAC 534A.540 require all plugging and abandonment programs to be approved prior to commencing plugging and abandonment work. Verbal approval may be given. Subsequent submission of forms is required.
- 23. **UIC Requirements** – Operators must refer to NDEP Underground Injection Control information publications which can be accessed at [http://ndep.nv.gov/bwpc/renewable\\_uic07.htm](http://ndep.nv.gov/bwpc/renewable_uic07.htm) These documents will provide you with guidance for collection of data during the drilling progress which will be required for submission with an application for an Underground Injection Permit.
- 24. **Well head protection and cellar design** – Cellar design must prohibit soil contact with the casing and well head components and standing water around same. If water chemistry indicates corrosion precautions and / or cathodic protection may be necessary. The operator must be prepared to document water chemistry and protective measures taken to permit injection into the well via a UIC permit. For further information contact NDEP Bureau of Water Pollution Control 775-687-9418 or visit the Bureau’s website [ndep.nv.gov](http://ndep.nv.gov)
- 25. **Injection Testing and Stimulation Programs** – Programs must have prior approval from the Division. Completion Reports must be accompanied by the appropriate checklist of information regarding these programs.
- 26. **Plugging** - NAC 534A.540 require all plugging and abandonment programs to be approved prior to commencing plugging and abandonment work. Verbal approval may be given. Subsequent submission of forms is required with 30 days of completion of plugging operations.
- 27. **The enclosed Abandoned Mines brochure shall be posted at the well site alongside the Conditions of Approval and the Minimum Blow Out Prevention Equipment Requirements and read by all company personnel associated with the subject well.**
- 28. **The operator shall inform all drilling personnel and contractors associated with the drilling of the well of potential dangers, including bodily injury, associated with the exploration of abandoned mine workings, as well as the disturbance of possible bat habitats.**

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SUNDRY NOTICES  
OIL, GAS AND GEOTHERMAL

Verbal approval for the following work may be given by the Division:

1. Any emergency work necessary to prevent or control blow outs or other situations with significant potential to result in injury to the crew or damage to the environment or resource.
2. Any kick-offs necessary to by-pass bad hole or fish left in hole.
3. Changes in casing points due to bad hole.
4. Deepening, attempting to encounter resource.
5. Necessary well work to keep geothermal power plants operating.
6. Drilling equipment failure.
7. Squeeze or plug backs to prevent any injected geothermal or oil field waters from contaminating other water zones.

The operator is required to file a written sundry notice with the division subsequent to verbal approval. Verbal approvals will not be given for any work that can be planned in advance, such as acidizing, changes in casing points or completion, etc., reentry of a well, remedial work, production or injection testing.