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By: CPL Date: 3/22/22

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

RECEIVED  
 FEB 25 2021

Date Received 12/23/21

API # 27-031-90313

County Washoe

Permit Number 1522  
 FOR DIVISION USE ONLY

**GEOHERMAL RESOURCE DEVELOPMENT PERMIT APPLICATION**

Name or Corporate/Business Name ORNI 36 LLC

Nevada SOS Business ID Number NV20201879091

Street Address 6140 Plumas Street

City Reno State NV Zip Code 89509

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

(If applicant is a corporation, show state and date of incorporation; if a partnership, list names of partners.)

This application is for a  Domestic well  Commercial well  Industrial well

Other, specify:  Observation well  Thermal Gradient well  Re-entry

**Note:** Re-entry includes workover, deepening, or plugging back operations.

Applicant is:  Land Owner  Lease Holder

Well Name: 25B-21

Lease Name/No: NVN-42707 Split Estate?  Yes  No

Land Type:  Federal (BLM, USFS, etc.)  Private  State

Location of Well:

Domestic: Street: \_\_\_\_\_

City: \_\_\_\_\_ County: \_\_\_\_\_

**Commercial and Industrial:**

NW \_\_\_\_\_ ¼ of, SW \_\_\_\_\_ ¼ in Section 21

Township 29N, Range 23E

UTM Northing 4471324 N; UTM Easting 295405 E (NAD83 Datum)

County Washoe

(If applicable, give street address below.)

Street: 1.0 miles SSW of San Emidio Power Plant

City: 15.0 miles SSW of Empire Nevada

State: NV Zip: \_\_\_\_\_

Operator's Name: USG Nevada LLC  
Address: 6140 Plumas Street  
City, St Zip: Reno NV 89509

Drilling Contractor's Name: Geodrill  
Address: 6140 Plumas St  
City, St Zip: Reno, NV 89509

Rotary Rig Description: Full-size, mud-rotary geothermal rig

Hole Size: 20 inch Casing Size: 16 inch Weight/Gauge: 84 lb/ft

Estimated Well Head Temperature: 320 F

Size of BOP:  2000 psi  3000 psi  5000 psi

Planned Use of Geothermal Resource:  
electricity production

Planned Disposal of Spent Geothermal Fluid:  
re-injected into geothermal resource

Type and Amount of Bond: BLM nationwide Bond \$250,000  
(Exempt for Domestic Class)

Bond Issued by: Bank of America Serial No. NVB000284

Geothermal Project Area (if applicable) San Emidio

The Source of the Proposed Geothermal Resource is:  
San Emidio geothermal system

(List name of hot spring, geologic formation(s) or other source )

Total Depth to be drilled: 3,000 ft

Drilling will commence on or before: February 2022

Signature of Applicant/Agent: Mark Hanneman  
Date: 12/14/2021

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 domestic geothermal 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 : Cortney Luxford.....[cluxford@minerals.nv.gov](mailto:cluxford@minerals.nv.gov)  
and  
Valerie Kneefel.....[vkneefel@minerals.nv.gov](mailto:vkneefel@minerals.nv.gov)

7. Additional Conditions/Comments

A.	
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.

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**PERMIT APPROVAL**

Approved 3/22/2022 with the conditions noted above.  
Date

Permit Number ~~1522~~ 1522



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



**STEVE SISOLAK**  
Governor

STATE OF NEVADA  
COMMISSION ON MINERAL RESOURCES  
**DIVISION OF MINERALS**  
400 W. King Street, Suite 106  
Carson City, Nevada 89703  
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<http://minerals.nv.gov/>



**MICHAEL VISHER**  
Administrator

Las Vegas Office: 375 E. Warm Springs Rd, Ste 205, Las Vegas, NV 89119  
Phone: (702) 486-4343; Fax: (702) 486-4345

**GEOHERMAL CONDITIONS OF APPROVAL  
FOR PRODUCTION OR OBSERVATION WELL DRILLING PERMIT**

**Operator: ORNI 36 LLC**  
**Lease Name: NVN-42707**  
**Well: 25B-21**

A COPY OF THESE CONDITIONS OF APPROVAL MUST BE FURNISHED  
TO YOUR FIELD REPRESENTATIVE TO ENSURE COMPLIANCE

Communications with the Division shall be directed to:

Cortney Luxford, Fluid Minerals Program Manager

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

Michael Visher, Division Administrator

Office 775-684-7044      Email [mvisher@minerals.nv.gov](mailto:mvisher@minerals.nv.gov)  
Cell 775-721-7625  
Fax 775-684-7052

Dustin Holcomb, Field Specialist - Geologist

Office 775-684-7046      Email [dholcomb@minerals.nv.gov](mailto:dholcomb@minerals.nv.gov)  
Cell 775-721-2726  
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)

**Nigel Bain; Large-Scale Mining**  
**Robert Felder; Exploration and Development**  
**Randy Griffin; Small-Scale Mining and Prospecting**

**Commission on Mineral Resources**

Josh Nordquist, Chairman; *Geothermal Resources*

**Stephanie Hallinan; Large-Scale Mining**  
**Art Henderson; Oil and Gas**  
**Mary Korpi; Public at Large**

Cell 775-223-1359

Fax 775-861-6711

Matthew Wokosin, Petroleum Engineering Technician

Office 760-384-5453 Email [mwokosin@blm.gov](mailto:mwokosin@blm.gov)

Cell 760-977-6937

Alexander Jensen, Geothermal Program Lead

Office 775-861-6564 Email [aajensen@blm.gov](mailto:aajensen@blm.gov)

Cell 775-560-2191

**YOUR APPLICATION TO DRILL THE ORNI 25B-21 PRODUCTION 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, a high resolution CBL may be required if the cement does not reach surface, or if the cementing of the casing appears to be 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. The top of the surface casing will be a minimum of 24 inches above the cellar floor, or ground level if a cellar is not present. Surface casing will be as high as possible around intermediate casing with excess, tapered cement so water does not pool on top of cement. At the completion of the well, the drilling pad is to be contoured in a manner that drains water away from the cellar, or surface casing if a cellar is not present.

5. Change in Plans - NAC 534A.540 (3) specifies the operator will submit a sundry for permission for a change in construction of the well bore. Verbal permission may be granted to a sundry notice due to an urgency of a particular matter.
6. Surface Casing - NAC 534A.260 (1) (c) (1) requires that surface casing be sufficient to protect freshwater aquifers and cemented to a depth not less than 10% of the proposed total depth of well, unless approved as part of the original permit. The cementing of casing strings shall be done using the standard procedure of inside casing displacement or stab-in method unless other methods are approved prior to the cementing procedure.
7. Blowout Prevention Equipment (BOPE) – NAC 534A.270 requires the operator to take all precautions necessary to keep wells under control and operating safely at all times. BOPE must be installed on the surface casing and maintained in good operating conditions at all times. BOPE must meet the specifications of API Standard 53 and have a rating for pressure greater than the maximum anticipated pressure at the wellhead. BOPE initial pressure tests should adhere to the recommended pressure test practices as outlined in Table 1 of API Standard 53, unless otherwise approved. The Division must be notified not less than 24 hours before conducting a BOPE pressure test. Stable low and high test pressures shall be maintained for at least 5 minutes. Pressure data and supporting information must be submitted to the Division as soon as practicable after the conclusion of the test.
8. Perform casing shoe pressure test on all casing shoes that are not cemented to surface with full cement returns as determined by the Division. – A successful casing shoe pressure test, must be performed before drilling deeper. The Division does not want the formation or cement to be fractured or broken down during the test. The purpose of this test is to ensure the integrity of the cement job by showing the area below and around the casing shoe will hold pressure. The operator is to drill out no further than five feet out of the casing shoe, and then pressure up to approximately 10% below the known or estimated fracture gradient for a minimum of 30 minutes. In order to pass a casing shoe pressure test 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 casing shoe pressure test, a cement squeeze job must be performed below the casing shoe. A successful casing shoe pressure test must be performed before drilling deeper. The following formula is to be used for the applied surface pressure calculation:

Calculate the downhole pressure for a specified or targeted pressure gradient

Specified Pressure Gradient {(psi/ft) x vertical depth (ft)} = Pressure G (psi)

Calculate the downhole pressure due to the current mud in the hole  
Mud Density (ppg) x vertical depth (ft) x 0.052 = Pressure M (psi)

Calculate the surface pressure required to test formation or shoe to a specified gradient

Pressure G - Pressure M = Required Surface Pressure (psi)

Example of Formation Integrity Test at 20" Surface Casing Shoe:

Casing Shoe at 271 ft (TVD)

Mud Weight- 9.0 ppg

Specified Pressure Gradient to test casing the 20" shoe - 0.6 psi/ft

Pressure G = 0.6 psi/ft x 271ft = 162.6 psi

Pressure M = 9.0 ppg x 271 ft x 0.052 = 126.8 psi

Required Surface Pressure = Pressure G - Pressure M = 162.6 - 126.8 = 35.8 psi

9. 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. Direction surveys must be performed at least every 250 feet in the directionally drilled portion of the wellbore. The operator is advised that cased-hole logging for the evaluation of cement bonding and hydraulic seal may also be required as part of the well completion. The cased-hole logging technique(s) utilized by the operator must be able to give conclusive results regarding the initial quality of cement bonding and hydraulic seal.
10. NAC 534A.280 Measurements of temperature requirement for mud cooling equipment. (NRS 513.063, 534A.090)
  1. The temperature of the mud that is returned up the well bore must be observed continuously by the operator during the drilling of the well whenever temperatures of the drilling fluids at the surface reach 125°F. These temperatures must be entered into the well log after each joint of pipe has been drilled.
  2. Mud cooling equipment is required when the flow line temperature reaches 125°F.
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. Samples – NAC 534A.310 requires samples of cuttings or splits of core 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 total depth, unless otherwise approved in the permit.
- a. TWO separate sets of cuttings, and one split of core, 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:nbmg@unr.edu).
  - b. EACH SET of cuttings is to consist of at least 15 milliliters of cuttings per sampling interval that must be cleaned, dried, and placed into 3"x5" sample envelopes. The envelopes are to be placed in order by interval into common drill cutting boxes with approximate dimensions of 3"x5"x20". The envelopes are to be identified by the Division permit number, well name/number as noted on the Geothermal Resource Development Permit Application, and interval.
  - c. The samples 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.
  - d. NOTE: the samples are not to be sent to the Division of Minerals, rather they should be sent directly to the NBMG. **The samples are due within 30 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 - The Nevada Division of Minerals will be included on the daily morning operational report distribution list during the drilling/completion of the well, starting on spud date and through date of drill rig release, or date of completion rig and/or completion equipment release, whichever occurs last. The operational morning report is to be emailed to Cortney Luxford ([cluxford@minerals.nv.gov](mailto:cluxford@minerals.nv.gov)) and Valerie Kneefel ([vkneefel@minerals.nv.gov](mailto:vkneefel@minerals.nv.gov)). The operational morning reports will include date of report, the spud date, casing information such as size, grade, weight, hole size, setting depth, and as needed, the amount and type of cement used, top of cement, depth of cementing tools, casing test method, as well as lithological descriptions of section drilled; intervals perforated, tested, acidized, fractured and results obtained; and the dates all work was performed.



15. 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 the cessation of drilling (rig release date).
16. 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.
17. Survey Plat - NAC534A.205 requires a certified plat of the location by a professional land surveyor of the well must be filed with the Division of Minerals within **60 days** of completion of the construction of the well.
18. 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).
19. 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.
20. 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.
21. Well head protection and cellar design – Cellar design must prohibit soil and water contact with casing and well head components, as well as prevention of 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/water](http://ndep.nv.gov/water).
22. 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. 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.**
23. The Operator shall ensure proper centering of the casing strings for new wells with downhole centralizers as well as centering the top of the casing with the drilling rig

during and immediately after cement is put in place. The Operator must also ensure that the number and depths of casing centralizers are recorded in a contemporaneous log during the installation of the casing strings.

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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 if the sundry notice has not already been filed. 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.