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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 05/15/22
API Number 27-031-90316
County Washoe
Permit Number 1532
FOR DIVISION USE ONLY

GEOTHERMAL INJECTION WELL PERMIT APPLICATION

The applicant
USG Nevada LLC (Ormat)
Name (or Corporate/Business Name)

Street Address 6140 Plumas Street
City Reno State NV Zip Code 89519
Telephone (775) 356-9029
Email mhanneman@ormat.com
hereby makes application for a geothermal development permit, State of Nevada, Division of Minerals.

Applicant is: ☐ Land Owner ☒ Lease Holder
Well Name: 52-4
Lease Name/No: NVN-98636 Split Estate? ☐ Yes ☒ No
Land Type: ☒ Federal (BLM, USFS, etc.) ☐ Private ☐ State
Type and Amount of Bond: Statewide Surety $100,000
(Exempt for Domestic Class)

Bond Issued by: BofA
Serial Number: NVB000284

Well Location: NW ¼ of, NE ¼, Section 04,
Township 29N, Range 23E, County Washoe.

UTM Northing 4476621 N; UTM Easting 296094 E (NAD83 Datum)

Operator's:
Name: USG Nevada LLC
Address: 6140 Plumas St
City, St Zip: Reno, NV 89519

Drilling Contractor's:
Name: Hydro Resources
Address: 1575 Delucchi Ln
City, St Zip: Reno, NV 89502
Telephone: (775) 329-2083

Hole Size: 22" Casing Size: 14" Weight/Gauge: HSLA Roscoe Moss

Size of BOP: ☐ 2000 psi ☐ 3000 psi ☐ 5000 psi

Rotary Description:

A rotary reverse-circulation drilling rig with associated equipment will be rigged up and a 30-in. hole drilled to approximately ±60 ft. Casing (24-in.) will be cemented in place to surface. After cementing the casing to surface, a 22-in. hole will be drilled to approximately ±1000 ft and 14-in. casing installed to a total depth of approximately 1000 ft. The well will be completed with a gravel pack.

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

Production wells for the North Valley geothermal power plant

Estimated average daily volume of fluids injected 1,440,000 gallons.

Maximum daily volume of fluids injected 2,160,000 gallons.

Estimated maximum injected pressure 10-14 psig psi, temperature 140 °F

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

See attached drilling program

Total Depth to be Drilled: 1000'

Drilling will Commence On: June 2022

Is this well location under an Underground Injection Permit?

If so, provide NDEP Permit number UNEV No

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: Mark Hanneman

Print Name: Mark Hanneman

Date: 3/29/2022

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 : Cortney Luxford.....cluxford@minerals.nv.gov**
   and
   Valerie Kneefel.....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.

PERMIT APPROVAL

Approved 6/30/2022 with the conditions noted above.
Date

Permit Number 1532

Administrator
Division of Minerals

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STEVE SISOLAK
Governor

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

MICHAEL VISHER
Administrator

GEOTHERMAL CONDITIONS OF APPROVAL FOR INJECTION WELL DRILLING PERMIT 1532

Submit forms and correspondence to: Nevada Division of Minerals
400 West King Street
Suite 106
Carson City, NV 89703

Communications with the Division shall be directed to:

Lowell Price, Fluid Minerals Program Manager
Office 775-684-7045 Email lprice@minerals.nv.gov
Cell 775-721-1774
Fax 775-684-7052

Michael Visher, Division Administrator
Office 775-684-7044 Email 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
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
Cell 775-223-1359
Fax 775-861-6711

Alexander Jensen, Acting Branch Chief, Reno
Office 775-861-6564 Email aajensen@blm.gov
Cell 775-560-2191

Fax 775-861-6711

Michael Erickson, PET, Reno
Office 775-861-6641 Email merickson@blm.gov
Cell 775-686-8351
Fax 775-861-6711

YOUR APPLICATION TO DRILL THE **SAN EMIDIO 52-4** INJECTION WELL, PERMIT XXXX, 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) (g) specifies the operator will submit a sundry for permission for change of drilling plans. Verbal permission may be granted to a sundry notice due to an urgency of a particular matter.

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 of well, or a minimum 50 feet, whichever is greater. 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. If unconventional cement formulations are used, there must be a cased-hole logging technique available to determine the adequacy of cement bonding and hydraulic seal for the particular unconventional cement product used.

8. BOPE - After surface casing is set, all wells shall be equipped with at least the minimum required Blowout Prevention Equipment (BOPE), unless otherwise approved. NAC 534A.260 (5) requires BOPE to be tested to at least 500 psig for 30 minutes with <10% pressure loss or as approved by the Division. BOPE should be in accordance with good established oil field practice with adequate kill lines and good working order.

9. Perform casing shoe pressure test at all casing shoes – 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

10. Injection liner – If an injection liner is utilized the liner hanger must be located at least 100 feet above the surface or intermediate casing shoe.

11. 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.

12. 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.

13. 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.

14. 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.

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.

15. Drilling Reports - A minimum of one drilling report shall be submitted to the Division of Minerals each day during drilling operations, notifying the Division of the drilling process. These reports may be submitted via email or fax.

16. 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).

17. 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.

18. 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.

19. 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).

20. 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.

21. 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.

22. 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 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.

23. 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.

24. 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.

25. **The enclosed Abandoned Mines brochure shall be posted at the well site alongside the Conditions of Approval and the Minimum Blowout 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.**

26. 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.

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.