Nevada Division of Environmental Protection
Bureau of Water Pollution Control
Underground Injection Control Program

FACT SHEET

Nevada UIC Permit Requirements for Geothermal Projects

- UIC form U230 must be filled out and submitted with all water samples collected for UIC requirements or purposes; data unaccompanied by a completed U230 cannot be utilized
- This is guidance to all geothermal operators for new and existing projects
- UIC permits for new geothermal projects only cover UIC discharges

As of January 2008, a Permit to Drill from the Nevada Division of Minerals (NDOM) fulfills the UIC program requirement to obtain a permit to drill an injection well.

A UIC permit from NDEP serves as authorization to inject into any injection well listed on the permit (barring exceptions documented in this fact sheet):

1. For authorization to inject: the UIC permit application must be submitted, and the UIC permit issued
2. A UIC application must be submitted to NDEP at least **180** days prior to injection.
3. An Injection Well Completion Report must be submitted for any newly drilled, repaired, or idle/inactive (and recently MI-tested) injection well that is included in an application for first-time issuance of a UIC permit from NDEP
4. For applications to modify (whether or not concurrently with an application for permit renewal) an existing UIC permit to reflect the addition of a newly drilled, repaired, or idle/inactive (and recently MI-tested) injection well located within the Area of Review defined in the most recently approved application for first-time issuance, renewal, or modification of a UIC permit: submit an Injection Well Completion Report within 30 days following well completion
5. If the injection well is not located within the Area of Review defined in the most recently approved application, contact the UIC Program in the BWPC Permits Branch to discuss the AOR and associated permitting requirements
6. NOTE: Injection up to 7 days can be approved by the NDOM.

Part 1 – Injection Well Construction Requirements and Completion Report

A. The following are required pursuant to NAC 445A.908, and other 445A regulations.

NOTE: Failure to properly record, document, and submit the necessary information will lead to denial of an application for a first-time issuance, renewal, or modification of a UIC permit.

B. UIC Required Actions for Injection Wells:

1. Static Temperature Survey - all injection wells require a static temperature survey to be conducted after the well has been completed (survey shall be run after the well has been flowed and has had time to stabilize from drilling, testing, etc. for at least 72 hours or other NDEP-approved time).

2. Mechanical Integrity Testing

- The operator shall plan for and determine the maximum allowable injection pressure based on the last string of cemented casing (Per NAC 445A.911.1 – The pressure for injection at the wellhead of an injection well must not exceed that which is calculated to initiate new fractures or propagate existing fractures in the zone for injection or the confining formation between the zone for injection and underground sources of drinking water.)
- The operator is required to demonstrate internal and external integrity of the injection well during construction. The following items are required to be completed, documented and submitted with the Injection Well Completion Report.

a. Part 1 – Internal Integrity
   - **i. During Construction**
   - ii. Casing pressure test – use chart recorder and provide charts
     1. Intermediate casing string
     2. Liner laps require testing as well
     3. (can be conducted with BOPE pressure testing)
   - iii. Optional - Casing/cement evaluation tools (sonic, ultrasonic, etc)
   - **iv. Operational Testing**
   - **v.** Casing pressure test with packer
   - **vi.** Temperature and spinner logs
   - **vii.** Sonic/ultrasonic casing/cement evaluation logs
   - **viii.** Casing evaluation logs for internal/external corrosion

b. Part 2 – External Integrity
   - **i. During Construction**
   - ii. Cementing Records – required for all wells (appropriate calculation and placement methods shall be listed in drilling program)
   - iii. Shoe/formation integrity test after last cemented string of casing (drill out 5 – 10 feet below shoe and run test – DO NOT FRACTURE FORMATION)
   - iv. Optional - Cement Bond/Variable Density Log
   - v. Optional - Other methods that have received prior written approval from NDEP
   - vi. NOTE: additional testing may be required under the issued UIC permit (e.g. surveys after 1-2 years of operation)
   - vii. **Operational Testing**
   - viii. Radioactive survey (where allowed by State Health)
   - ix. Noise log (note: minimum noise at surface around wellhead)
   - x. Time-interval static temperature survey (e.g. 12/24 hour), (note this test depends on background temperature profile of well.)
   - xi. Temperature & spinner log may satisfy requirement on some wells depending on well environment and design. It will need to close measure for losses immediately below the casing shoe. Test may satisfy if no loss, however, loss below shoe does not demonstrate loss to the surrounding formation or upward behind casing. More testing would then be required.

Compile and submit a **MIT Summary Report** of the above tests and logs, which contains the following information:

1. A list of all internal and external integrity tests conducted for each well with date and time of each test, and the depths covered;
2. A discussion of the intent of the test(s) – what would the test show? And what zones and casing features were focused on.
3. What company conducted the test(s), and who oversaw/witnessed the test(s) for the operator and state;
4. Conditions of the injection well(s) prior to the test (e.g. static, drilling, injecting at #### gpm, etc.);
5. Conditions of the well(s) during the test(s), such as, operating conditions of the well, water level, changes in status/conditions of the well during the test, anomalies witnessed prior to or during the test, gauge calibration and condition for any gauges used, etc.;
6. **Interpretation and conclusions of the test results stating whether each well meets the internal and external regulatory requirements in UIC regulations. This part should be done in conjunction with the service company.**

C. UIC Considerations for Injection Wells – (items evaluated during application review process.)

Injection String Casing Point – If the casing point is shallower than the target in the drilling program, the operator must ensure that (1) the zone below the shoe is within the same reservoir from which the source fluid (geothermal "brine") was extracted by the production well(s); and that (2) the completion report includes documentation showing the "new" casing point in addition to data from hydrogeologic monitoring and modeling demonstrating that the zones for injection and production occupy the same formation/reservoir/aquifer.

Wellhead Design and Site Location

- Wellhead must be equipped above the ground or above cellar bottom with valves for the observation of pressure for each annular opening of the well, temperature and flow rate. Pressure gauge shall be at the wellhead or as close as physically possible.
- Wellhead shall have valves that are protected and operational during the life of the well.
- Well Signage – all injection wells shall have at a minimum a sign with the well name/number, operator's name and phone, well location.

D. Corrosion Prevention Plan

1. The submitted plan must provide documentation required for the Injection Well Completion Report, describing measures that might needed to be taken during and after injection well to prevent surface and downhole corrosion during the life of the well (NAC 445A.908 "..The casing and cement used in the construction of each injection well must be designed to endure for the life expectancy of the well). The plan may include measures that will be evaluated. NOTE: Failure to employ corrosion prevention measures may require more frequent casing integrity evaluation (MITs)
2. Standard requirements:
   a. Injection casing string shall not be in contact with soil.
   b. Injection casing string shall be sealed or configured to prevent "standing" water from coming in contact with string.
   c. In areas where shallow boiling zones occur, the annular space between the intermediate and injection casing string shall be sealed at surface, and if necessary, a "gas cap" applied to this annular space.

E. Completion Report (NAC 445A. 909)
http://ndep.nv.gov/bwpc/docs/uic_%20frorm_checklist_class2_geothermal_injection_wells.pdf

To request the addition of an injection well—located within the Area of Review defined in the most recently approved application for first-time issuance, renewal, or modification of a UIC permit—to an existing UIC permit, a completion report with the following documentation is due within 30 days after drilling completion *and* 30 days before reissuance of the permit, modified to reflect addition of the requested injection well(s):

1. As-built well schematic
2. Daily drilling reports
3. Cementing record
4. Public Land Survey System coordinates (Township, Range, Section, Quarter-quarter section)
5. Geospatial location of wellhead, including UTM and Latitude/Longitude (with projection or geoid)
6. Deviation records
7. Static temperature survey(s)
8. Copies of all E-logs
9. Photos of wellhead showing cathodic protection methods
10. Photos of wellhead or pipeline showing temperature, pressure and flow rate gauges
11. Document signage has been posted for the well at the wellhead location
12. Water sample results from injection zone(s)
    a. See Part 3 and UIC Sample List 2 for sampling requirements
    b. (if multiple injection zones in different "formation" within the same wellbore, contact NDEP staff to discuss if each zone would need to be tested)

Note: if **confidentiality** is being requested, ensure every page is stamped indicating so. Not all records can be held confidential, so please indicate your reasoning for the request to justify for our review.

Part 2 – Discharge of Produced or Plant Water

A. Discharges to Drilling Sumps
   1) Drilling sumps (reserve basins) are permitted by the NDOM
   2) Drilling sumps that will be used during the life of the well must be constructed in accordance with discharge basins, as described below.
   3) Discharge (to drilling sumps) associated with flow testing is limited to **7** days under a permit from NDOM; discharge to any basin beyond **7** days requires the appropriate water pollution control discharge permit from the NDEP Bureau of Water Pollution Control
   4) Discharges outside of these basins or other containment devices require specific NDEP approval; ***authorization to discharge into a basin does not authorize discharge outside the basin, for which an operator must obtain a separate water pollution control discharge permit***

B. Discharges to Basins
   1) Basins receiving geothermal and other plant water must be designed and constructed to safely manage water and prevent contamination of surface and ground water
   2) Minimum requirements for geothermal storage basins include the following:
      a. Discharge basins shall be lined to prevent infiltration of water, unless the requirement in item B.2.b (below) has been satisfied
      b. Lining of discharge basins shall be waived if it can be demonstrated that ground water degradation will not occur due to lesser water quality of the discharged fluid and/or leaching of soil salts. A waiver of the basin liner requirement requires evaluation of the following:

1. Water quality and flow rates of discharge
2. Elevation and gradient of water table
3. Ground water quality at/below the water table (monitoring well(s) may be required)

c. Interior embankments shall be no steeper than 3:1 (horizontal : vertical)
d. Minimum freeboard (based on basin area): 2 ft for <1 ac or 3ft for 1 ac
e. Shall not be located within 100-yr floodplain without reasonable accommodations, and account for 25-yr, 24-hr storm events. Protection measures shall be in place as needed
f. Discharge and overflow locations shall be constructed to prevent erosion and washout

3) Geothermal fluids shall be disposed of in such a manner as to not present any hazard to livestock, wildlife, or the beneficial use of the waters of the State. ***All surface basins shall be fenced off and maintained in proper manner at all times as to not allow wildlife or livestock to be endangered by these constructed devices or the water within them. If any wildlife is trapped or found dead in basins, the Nevada Department of Wildlife shall be contacted immediately.***
4) All supplies of water for livestock shall demonstrate approval to NDEP from the Nevada Department of Agriculture.
5) No chemical amendments shall be added to injectate (or precursor fluids – i.e., produced brine and plant effluent) prior to injection or disposal without prior written an approved chemical use authorization request (Division-signed form U240)
6) Samples of water discharged to surface basins shall be collected (at the outfall into the basin, not from the water in the basin) at least once during discharges lasting ≤3 days; a second must be collected for discharges lasting >3 days

Part 3 – Sampling Requirements

A. The following sampling requirements are required for all production and injection wells, and shall be filed with NDEP as part of the UIC application.
   1. As of October 1, 2010, UIC Form U230 must be used and submitted with all water samples.
   2. Samples shall be taken following construction of all production and injection wells. Sample shall be taken after well has been flowed to clean drilling mud from well.
   3. Samples shall be taken after the well has been flowed for a period of time to ensure drilling fluids have been flushed from the wellbore, and the water is representative of the geothermal reservoir.
   4. Geothermal water shall be sampled and analyzed for the constituents listed in ***UIC Sample List 2, at minimum*** – ***NDEP may require monitoring of additional analytes***
   5. All analyses conducted in fulfillment of UIC permit conditions or application requirements must be performed by a State of Nevada Certified Laboratory (List can be found at http://ndep.nv.gov/bwqp/lab/labservice.htm)
   6. All sampling reports shall include the following information with submitted to NDEP:
      a. Time and Date of Sample
      b. Sample location (provide the exact location taken)
      c. Sampler name and affiliation
      d. Name of laboratory conducting analysis (must be state certified)
      e. Chain of Custody sheet
      f. Indicate if sample was field filtered or not

FACT SHEET

Part 4 – Standard Requirements

A. All solid, toxic or hazardous waste shall be disposed in accordance with the rules and regulations of this Division. All spills and releases shall be reported as required by Nevada Revised Statutes. The use of any other additive(s) requires written authorization from the Division prior to injection. All spills of refined products shall be cleaned up immediately; soil removed and properly disposed of per local, state and federal rules. (This applies to any location on project site). Report spill of greater than 25 gallons or 3 cu yds impacted to NDEP at 1-888-331-6337 (in-state number) For questions on reporting, call 775-687-9368

B. All facilities encompassed by this permit shall conform to the plans and specifications filed with the Division of Environmental Protection and shall be maintained in good working order at all times. Standard drilling materials are approved for use on all wells; however, use of any non-standard or toxic chemical must be submitted to NDEP for review

Addition of a well located within the Area of Review defined in the most recently approved application for first-time issuance, renewal, or modification of a UIC permit requires submission of an injection well completion report to the UIC program in the NDEP Bureau of Water Pollution Control for review within 30 days after completion of the well, and **30 days before** the permit is reissued following modification to reflect authorization to inject into the requested well(s)

C. Monitoring & Reporting:
Operator must submit an Injection Well Completion Report to the Nevada UIC Program in the NDEP–BWPC to request addition of a well to an existing permit

SUBMIT TO:
Nevada Division of Environmental Protection
BWPC | Permits Branch
UIC Program
901 S. Stewart Street, Suite 4001
Carson City, Nevada 89701