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

FACT SHEET

Nevada UIC Permit Requirements for Geothermal Projects

- NEW – As of October 1, 2010, UIC Form U230 must be used and submitted with all water samples collected for UIC requirements or purposes. The UIC Program will not be able to use any data that is not accompanied by completed Form U230.

- This is guidance to all geothermal operators for new and existing projects.

- UIC permits for geothermal projects covers two water pollution control discharges

  1. Nevada underground injection control requirements for injection into a well; and
  2. Nevada water pollution control discharges to ground water

- This guidance discusses these discharges and how the discharges relate to the UIC permit that will be issued for the project.

As of January 2008, a Permit to Drill for an injection well is only required from the Nevada Division of Minerals. A separate construction permit is not required from the UIC program.

An UIC permit from NDEP is required for injection authorization.

1. This permit must be applied for and issued before authorization to inject can occur from NDEP.
2. An UIC application must be submitted to NDEP at least 120 days prior to injection occurring.
3. Final injection authorization will be issued after the permit is issued and a completed Injection Well Completion Report is submitted to NDEP.
4. NOTE: Short-term injection tests up to 30 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 injection into a well.

B. <u>UIC Required Actions for Injection Wells:</u>

1. <u>Static Temperature Survey</u> - 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 loses just below casing shoe. Test may satisfy if no loss, however, loss below shoe does not demonstrate loss to formation or up 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 – (These items will be evaluated during application and approval process.)

Injection String Casing Point – if casing point is shallower than the target in drilling program, ensure 1) the zone below the shoe is within the geothermal reservoir, or suitable injection zone; and 2) documentation is included in the completion report showing the "new" casing point and demonstration of suitable zone for injection.

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. A plan shall be submitted with the injection well completion report describing what measures might be needed during and after injection well construction to ensure surface and downhole corrosion shall not take place 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

For each well, a completion report with the following is due **30 days prior** to authorization being given:

1. Well as-built schematic
2. Daily drilling reports
3. Cementing records
4. Latitude/Longitude of wellhead
5. Deviation records
6. Static temperature survey(s)
7. Copies of all E-logs
8. Photos of wellhead showing cathodic protection methods
9. Photos of wellhead or pipeline showing temperature, pressure and flow rate gauges
10. Document signage has been posted for the well at the wellhead location
11. 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 are permitted by the Nevada Division of Minerals
    2) Drilling sumps that will be used for the life of the well shall be constructed in accordance with discharge basins as described below.
    3) Flow testing to drilling sumps is limited to 30 days under NDOM approval. Discharge beyond 30 days to any basin requires an UIC Permit or NDEP Temporary Discharge Permit.
    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, you must obtain separate approval.

B. Discharges to Basins
   1) Basins for the purposes of receiving geothermal and other plant water shall constructed to safely manage water, and prevent surface and ground water contamination
   2) Minimum requirements for geothermal storage basins:
      a. Discharge basins shall be lined to prevent water infiltration, unless item B.2.b below is completed.
      b. Lining of discharge basins shall be waived if it can clearly be demonstrated ground water degradation shall not occur based on quality of water discharged and leaching of soil salts shall not occur. Operator must evaluate at a minimum
         a. Discharge quality and flow rates shall be established,
         b. Ground water table and gradient shall be determined,
         c. Ground water quality at the water table shall be determined; monitoring wells may be required.
      c. Interior embankments shall be no steeper than 3:1 (hor:vert)
      d. Minimum freeboard for basins less than 1 acre: 2 feet, greater than 1 acre: 3 feet.
      e. Shall not be locate within 100-year flood plain without reasonable accommodations, and account for 25-year, 24 hour 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 in such a manner that they do not present a 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 additives shall be added to the geothermal fluids prior to injection or disposal without prior written approval by the Division.
   6) Samples of water discharged to surface basins shall be sampled (at the outfall into the basin, not from the water in the basin) at least once during discharge. If discharge lasts more than three (3) days, a second water sample shall be taken at the outfall into the basin.

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. NEW – 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 for the constituents listed in UIC Sample List 2 attached to this permit.

5. All analysis under UIC permits are required to 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

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

C. Monitoring & Reporting

The Operator shall submit a well completion report to the Bureau of Water Pollution Control / UIC Program of the Division of Environmental Protection prior to final authorization to inject (after UIC permit is issued).

SUBMIT TO:
Nevada Division of Environmental Protection
Bureau of Water Pollution Control
UIC Program
901 South Stewart Street, Suite 4001
Carson City, Nevada 89701