



**Nevada Division of Environmental Protection**

Bureau of Water Pollution Control

**Underground Injection Control Program**

901 S. Stewart St Ste 4001

Carson City Nevada 89701

Ph: 775-687-9418 Fx: 775-687-4684

**UNEV Permit Application Form U202**

**APPLICATION ATTACHMENTS – Class 2, 3, or 5 Geothermal Wells**

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Attachments are required to be submitted with all UNEV permit applications. Be sure you choose the appropriate “Attachments” Form from the list below that applies to the type of well you will be using. Go to <http://ndep.nv.gov/bwpc/forms/html#uic> if you need to obtain one of these other forms.

- I. Form U201 – CLASS 5 (types not listed below)
  - II. Form U202 – CLASS 2, CLASS 3, or CLASS 5 GEOTHERMAL
  - III. Form U203 – CLASS 5 REMEDIATION or TRACER TESTING
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**IF APPLICATION IS FOR AN UIC GENERAL PERMIT, STOP HERE** – do not provide the attachments below. Instead, attach the specific Notice of Intent (NOI) for that general permit.

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**Application Attachments for Class 2, 3 or Class 5 Geothermal Injection Wells**

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Read the instructions for preparing the attachments carefully and refer to the regulations (NAC 445A.867). The ability to process your application for a permit depends heavily on the completeness and accuracy of the attachments. Attachments shall be submitted with UIC permit applications for Class 2, 3, and 5 wells, including Oil and Natural Gas Production (disposal, enhanced recovery, and storage), Solution Mining (In-Situ Production for uranium and metals, and fossil fuel recovery, etc.), and geothermal pursuant to NAC 445A.867.

**Attachments**

**A. MAPS OF WELLS/AREA AND AREA OF REVIEW (AOR)** - Submit the following maps:

- a. Injection well map - a topographic map, extending at least one mile (see AOR Methods below) beyond the project/property boundaries, showing all existing and proposed injection well(s) or if locations of injection wells are not know – highlight the sections in the project area for which a permit is sought and the applicable area of review.

- b. Second map showing area of review, the map must show the following:

All wells and other relevant features including producing wells, injection wells, abandoned wells, dry holes, surface bodies of water, springs, mines (surface and subsurface), quarries, water wells, public water supply systems, and other pertinent surface features, including residences, roads, faults (if known or suspected), etc. The map must show all intake and discharge structures and all hazardous waste, treatment, storage, or disposal facilities.

- c. Third map showing distribution system from producing wells – through surface facilities (e.g. processing units, treatment works, power plant, etc.) to injection wells; include pumps, valves, manifolds, all system monitoring points.
- d. Fourth map showing property boundaries and land ownership (public or private - include land

# Nevada UIC Application Form U202 – Attachments (Cont.)

owners name)

**AREA OF REVIEW (AOR) METHODS** - The area of review shall be a fixed radius of 1 mile from the well bore unless the use of an equation is approved in advance by the Director. If alternative method is pre-approved by the Director, give the method(s) and the calculations used to determine the size of the area of review (fixed radius or equation).

## FOR RENEWAL

*Please review the original and subsequent renewal applications, and update the maps of wells and AOR. Identify any changes or new work performed over the last 5 years that is different than in the original application, please summarize in this renewal application.*

## **B. DESCRIPTION, MAPS AND CROSS SECTIONS OF REGIONAL GROUND WATER –**

1. Submit a description of the hydrology in the area, including geologic name/units where any ground water could be found, and depth to top and bottom of all aquifers.
2. Submit maps and cross sections indicating the vertical limits of all aquifers within the area of review, their position relative to the injection formation and the direction of water movement, where known, in every aquifer. Include depth to groundwater, groundwater flow direction/rate, and hydraulic conductivity.

**A baseline water analysis of the receiving groundwater (zone of injection) of the injection wells must be submitted with the application.** The applicant may wish to provide more than one sample to adequately characterize the receiving groundwater for baseline purposes. It is the responsibility of the applicant to determine background water quality conditions (physical and chemical) in the region immediately surrounding the injection wells, and determine current baseline water quality in the ground/surface water above the injection zone(s) and of the receiving groundwater. Determination of baseline and background conditions may require multiple sampling points and/or dates. Keep in mind baselines values in the application may be reflected in permit limitations in the UIC permit, so the more background data an applicant uses, the better actual conditions will be represented.

The sample(s) must be analyzed for inorganics (UIC Extended Sample List 2), other relevant constituents may also be required, such as total petroleum hydrocarbons. This sampling must be completed for each new injection well constructed based on the zone of injection.

## FOR RENEWAL

*Please review the original application, and identify any changes or new work performed over the last 5 years that is different than in the original application, please summarize and provide new maps and cross sections in the renewal application.*

## **C. DESCRIPTION, MAPS AND CROSS SECTIONS OF GEOLOGIC STRUCTURE OF AREA -**

Submit maps and cross sections detailing the geologic structure of the local area (including the lithology of the injection zone and confining intervals thickness, depths and fracture pressure) and generalized maps and cross sections illustrating the regional geologic setting.

## FOR RENEWAL

*Please review the original application, and identify any changes or new work performed over the last 5 years that is different than in the original application, please summarize and provide new maps and cross sections in the renewal application.*

## Nevada UIC Application Form U202 – Attachments (Cont.)

- D. CORRECTIVE ACTION PLAN AND WELL DATA** - Submit a tabulation of data reasonably available from public records or otherwise known to the applicant on all wells within the area of review, including those in the map required in the Maps Section, which penetrates the proposed injection zone. Such data shall include the following:

A description of each well's type, construction, date drilled, location, depth, record of plugging and/or completion, and any additional information the Director may require. Include the corrective action proposed to be taken by the applicant under NAC 445A.899.

**FOR RENEWAL**

*Provide information on any wells modified or constructed within the AOR since the last renewal or original application. Submit any details needed for corrective action on these or other wells.*

- E. FORMATION TESTING PROGRAM** - For Class 2 and geothermal Class 5 wells, the testing program must be designed to obtain data on fluid pressure, estimated fracture pressure, physical and chemical characteristics of the injection zone.

For Class 3 wells the program must be designed to obtain data on fluid pressure, fracture pressure, and physical and chemical characteristics of the formation fluids if the formation is naturally water bearing. Only fracture pressure is required if the formation is not water bearing.

**FOR RENEWAL**

*Please review the original application, and identify any changes or new work performed over the last 5 years that is different than in the original application, please summarize in the renewal application.*

- F. CONSTRUCTION PROCEDURES and DETAILS** - Discuss the injection well construction procedures to be utilized. This should include details of what type of rig will be used to drill well, the casing and cementing program, logging procedures, deviation checks, and the drilling, testing, cuttings and coring programs, proposed annulus fluid, and final completion details including liner hangers, tubing and packer configuration, etc. Submit preliminary schematic or other appropriate drawings of the surface and subsurface construction details of the well. As a reminder, mechanical integrity testing must be conducted during construction of wells – see Attachment H.

As part of injection well construction, a plan for corrosion prevention of the casing string and tubing (if used) is required to be submitted. The corrosion prevention shall show how steps will be taken to ensure casing/tubing does not corrode near surface or at depth during the life of the well. The well cellar(s) shall be constructed to prevent water from collecting around the injection well casing and measures shall be taken to . Also, describe how well construction will prevent casing corrosion at depth.

Also required with all applications is a schematic of the complete surface/subsurface conveyance system, including all process/treatment systems, additive ports, valves and gauges, pumps, etc.

**FOR RENEWAL**

*Submit a current schematic for each injection well constructed. Include a list of workovers on each well, with type and date of work. Please review the original application, and identify any changes to construction procedures proposed and/or new work performed over the last 5 years that is different than in the original application, please summarize in the renewal application.*

- G. INTERNAL and EXTERNAL MECHANICAL INTEGRITY** – Provide details on how MITs will be conducted on all injection wells during construction. An internal and external test must be conducted on each injection well. Usually, a casing pressure test is conducted on the intermediate or production casing

## Nevada UIC Application Form U202 – Attachments (Cont.)

string to show internal integrity; and a cement bond/variable density logs must be run to demonstrate external integrity. Other tests to show integrity must be pre-approved along with the drilling program. Results of any mechanical integrity testing shall be submitted, including description of test, date performed, and name of Division representative witnessing test.

### FOR RENEWAL

*Please provide MIT results over the last 5 years, and discuss any issues and/or corrections that needed to be addressed. Provide a schedule and description of the next round of MITs.*

- H. INJECTION PROCEDURES** - Describe the proposed injection procedures including all pumps, water storage tanks, surge tanks, etc. Provide the make/model and operating parameters (e.g. maximum pump rate and pressure) of the injection pumps that will be used. For high volume injection wells, data on fracture pressure is required.

### FOR RENEWAL

*Please review the original application, and identify any changes or new work performed over the last 5 years that is different than in the original application, please summarize in the renewal application.*

- I. OPERATING DATA and MONITORING PROGRAM** - Submit the following proposed operating data for each well proposed under the application:
- average and maximum daily rate and volume of the fluids to be injected;
  - average and maximum injection pressure;
  - nature of annulus fluid, if used; and
  - source and analysis of the physical and chemical characteristics of the injection fluid.

If a manifold monitoring program is utilized, pursuant to CFR §146.23(b) (5), describe the program and compare it to individual well monitoring.

The chemical analysis shall be for UIC Sample List 2. Other constituents may be required by UIC staff depending on the project.

**Submit details for monitoring and sampling injected or discharge water from all sources after operations begin. Provide details and schematics on gauges, meters, sampling ports, etc. and all their locations.**

### FOR RENEWAL

*Please review the original application, and identify any changes or new work performed over the last 5 years that is different than in the original application, please summarize in the renewal application.*

- J. CHANGES and FATE IN INJECTED FLUID** - Discuss expected changes in pressure, chemistry, native fluid displacement, potential for receiving aquifer degradation and direction of movement of injected fluid. Describe in detail what chemicals will be used for any purpose, including corrosion, scale inhibition, separation of oil/water, etc. Provide product sheets for each chemical.

### FOR RENEWAL

*Please review monitoring data of the life of the permit along with the original application to discuss what observations can be made regarding the chemistry of injected fluid and receiving ground water; and identify any changes or new work performed over the last 5 years that is different than in the original application, please summarize in the renewal application.*

- K. OPERATIONS AND MAINTENANCE (O&M) MANUAL: SAMPLING (QA/QC) &**

## Nevada UIC Application Form U202 – Attachments (Cont.)

**CONTINGENCY PLAN** – A basic O&M practices shall be submitted as part of the UIC application package. The manual should include standard sampling and quality assurance/quality control (QA/QC) practices for field sampling (including use of UIC Form U230); discussion of standard routine operating instructions and maintenance procedures of all water-related conveyance equipment, including component of water cooling towers, if used. Outline contingency plans to cope with all shut-ins or well failures, so as to prevent migration of fluids to the surface. The contingency plan should include provisions for reporting violations and a statement assuring injection will cease in the event of a well failure or if the receiving water is degraded.

FOR RENEWAL

*Please update the manual to reflect current conditions and activities at the time of renewal. If an O&M Manual has never been submitted for a permitted well/facility, a manual will be required at the time of the next renewal.*

### L. GROUNDWATER MONITORING PLAN (all geothermal projects, Class 2 as required)

Discuss the planned monitoring program. This should be thorough, including maps showing the number and location of monitoring wells with depths and screened intervals as appropriate and a discussion of monitoring devices, sampling frequency, and parameters measured.

FOR RENEWAL

*Please review the original and previous application, and identify any changes or new work performed over the last 5 years that is different than in the original application, please summarize in the renewal application.*

### M. STIMULATION and/or AUGMENTATION PROGRAMS - Outline and provide details on any proposed formation stimulation, aquifer augmentation and/or well stimulation programs. These should be listed in the O&M Manual and details provide on how they will be maintained and monitored.

FOR RENEWAL

*Please review the original and previous application, and identify any changes or new work performed over the last 5 years that is different than in the original application, please summarize in the renewal application.*

### N. PLUGGING COST ESTIMATE AND PLAN - Submit a current **Cost Estimate** and **Plan** to plug all wells once they become abandoned pursuant to NAC 445A.923 through 925. First: (1) describe the type, number, and placement (including the elevation of the top and bottom) of plugs to be used; (2) describe the type, grade, and quantity of cement to be used; and (3) describe the method to be used to place plugs, including the method used to place the well in a state of static equilibrium prior to placement of the plugs; Second, based on 1, 2, and 3 above, provide a cost estimate of materials, equipment and labor for plugging and abandonment of the well. ~~Also for a Class 3 well that underlies or is in an exempted aquifer, demonstrate adequate protection of USDW's.~~

FOR RENEWAL

*Please review the previous application, and update the cost estimate and plugging plan. Be sure to note any changes in well completion in any existing wells that needs to be addressed in plugging plan.*

### ~~O. DESCRIPTION OF BUSINESS - Give a brief description of the nature of the business.~~

FOR RENEWAL

~~*No action required, unless necessary.*~~