EPA fact sheet underground injection control

Aquifer Recharge and Aquifer Storage and Recovery Wells
Class V - Injection Well Information for Authorization

The Underground Injection Control (UIC) Program, created under the authority of the Safe Drinking Water Act (SDWA), is a preventative program aimed at protecting existing and future underground sources of drinking water (USDWs). Class V wells, which are typically shallow wells or disposal systems that discharge fluids into the subsurface, can be authorized to inject by rule or permit. Class V wells that have the potential for ground water contamination or degradation are usually permitted. Those that do not have a potential to contribute to contamination or degradation of ground water are usually rule authorized, once inventory information has been submitted according to the requirements of 40 CFR 144.26. In addition to the inventory requirements, EPA may, under the authority of 40 CFR 144.27, require the owner or operator of any well authorized by rule to submit additional information to determine if injection activity could endanger a USDW. Rule Authorized wells do not require public notice or further monitoring of injection activities.

Artificial aquifer recharge (AR) is the enhancement of natural ground water supplies using man-made conveyances such as infiltration basins or injection wells and is subject to Class V regulation.

Aquifer storage and recovery (ASR) is a specific type of AR for augmenting ground water resources and recovering the water in the future for various uses. While an AR well is used only to replenish the water in an aquifer, ASR wells are used to achieve two objectives: (1) storing water in the ground; and (2) recovering the stored water either using the same well or by pairing injection wells with recovery wells located on the same wellfield.

The EPA will use the following information provided by an applicant to evaluate: 1) the impact a Class V injection well used for AR or ASR would have on the local hydrogeologic system; 2) potential for USDW contamination; and 3) whether a permit, rather than a **rule authorization**, is needed.

Contact Information

Identify the following:

- Property owner of the facility. Include an email, physical and mailing address, phone, and fax numbers.
- Operator of facility including an email, physical and mailing address, phone, and fax numbers.
- Responsible party for the operation, maintenance, and closure of the injection system including an email, physical and mailing address, phone and fax numbers.
- The name of the operator of the recovering facility including Public Water System (PWS) Identification number, an email, physical and mailing address, and phone numbers.
- Contact persons representing any other state or local agencies that have an interest in the site; include an email, physical and mailing address and phone number.

Project Description

- Describe the well(s) and/or project area location.
- Discuss the project plan. Identify the source of injectate, describe the injection procedures, injection rate, volume, pressure, and other operating conditions.
- Include a completion diagram showing the construction plans for the proposed injection well(s) and other well(s) located within the Area of Review.
- Provide a brief description of contingency plans for treating the well(s) to prevent or remediate bacteriological or mineral buildup in the well, which could affect the injection operation.
- Describe the proposed ongoing monitoring program, including tracking of injectate volume, proposed for the operation.
- Any planned workover activities (acidization, fracturing, etc.) to be done on the well prior to injection after the final permit is issued.

Injectate Specific Data

- Identify the injection source (raw water) prior to treatment. For example, sources collected downstream of waste water and/or reclaimed water discharged to surface water.
- Describe the beneficial use(s) of the water and who/what are the intended recipients of the water.
- Provide laboratory data results for the treated injectate water source analyzed using Attachment – Aquifer Recharge and Aquifer Storage and Recovery Baseline Parameter List, presented as tabular data (also submit an electronic copy in a useable electronic format such as an Excel spreadsheet or CSV). Specify the sampling location.
- Provide a detailed description of the planned treatment train (identify each step) prior to injection for the injectate proposed, such as filtering to remove particulates which might plug the receiving formation. Disclose the chemicals that may be used in each stage of the treatment process.

Receiving Formation & Recovered Water Specific Data

- Name the intended receiving formation(s).
- Provide laboratory data results for the receiving aquifer water sample(s) analyzed using Attachment – Aquifer Recharge and Aquifer Storage and Recovery Baseline Parameter List, presented as tabular data (also submit an electronic copy in a useable electronic format such as an Excel spreadsheet or CSV). Specify the sampling location.
- Provide the receiving aquifer characteristics including groundwater flow rates and gradient, if available.
- Describe the proposed treatment to be used by any PWS recovering water from this aquifer to meet the National Primary Drinking Water Regulations.
- Provide the location and a description of any PWS drinking water wells or springs which will be recovering water from this aquifer (may be marked on a topographic map indicating proposed injection wells, nearby surface water bodies, and locations of recovery wells at the recovering PWS, as well as identify PWS identification number and name of the next two closest PWSs).
- Identify whether the recovered water will be regulated and treated as groundwater under

the direct influence of surface water.

- Confirm that recovered water is expected to meet current drinking water standards. Otherwise, identify expected exceedances.

NDMA Data Request

- If available, provide any UCMR data or other N-Nitrosodimethylamine (NDMA) testing data collected during treatment or at the completion of treatment. Include data from finished water for NDMA precursors/indicators: ammonia; total nitrogen; natural organic matter, purgeable Total Organic Carbon (TOC) analyzable by Ion Chromatography; ranitidine (RNTD); Trimethylamine; Minocycline (MNCL); and SMTR (Sumatription); nitrate and nitrite.
- If injectate is treated water, confirm if it contains chlorinated compounds and if chloramines are used in the treatment process.

Hydrogeology & Area of Review

- Provide a description of the intended receiving formation(s).
- Describe the hydrogeology of the area. Discuss the hydrogeology, location, depth, and current use (if any) of the receiving formation(s).
- Describe the overlying and underlying aquifers that could be impacted.
- Discuss transmissivity, storage coefficient, hydraulic conductivity, saturated thickness.
- Provide information from drawdown tests and specific capacity information.
- Describe any known surface water-subsurface water interactions, which may be affected by injection activities.
- Identify the public and private wells within one mile of the project area.
- Identify which formation(s) all wells in the area are completed into. Only provide this information for all wells completed into the receiving formation and for all wells which may be impacted by injection activities (i.e., wells completed into any overlying or underlying formation which is hydraulically connected to the proposed injection zone).
- Determine the aerial extent of the aquifer(s) (i.e. fill-up volume) that would be impacted by the proposed injection based on the proposed injection volumes and rates.
- Identify all outcrops of the formation to receive injectate and any potential to create artificial springs.
- Identify mechanisms which will increase the volume of ground water infiltration into nearby surface water bodies, in relations to the proposed AR/ASR activities.
- Identify all erosional intersections between the proposed injection formation and potentially affected surface water drainage systems.
- Provide map of the site location (1:24,000 topographic map or similar).
- If injection is into an alluvial aquifer, provide locations of surface water bodies, such as rivers, streams, and lakes, within one mile of the injection site (may substitute topographic map).
- Identify presence of any ground water contamination plumes near the project area that could affect or be affected by injection activity.
- Describe how the injection rate was determined and provide data results, if available

Impacts Analysis

- Describe the impacts of injection activities on the aquifers (both injection zone and surrounding aquifers).
- Discuss the effect of injection activities on surrounding wells.
- Demonstrate the compatibility of injected water on the receiving formation(s), plot the major anions and cations from the above analyses of the injectate, the receiving formation fluids, and mixed fluids on a trilinear diagram or Piper diagram. Provide a brief assessment of the results.
- Identify any potential mineralogical constituents in the receiving formation that might be mobilized as a result of injection activities. Provide chemical analysis of core, sampling, if available.
- Describe the effect of injectate on the water-bearing formation and the groundwater: reaction products or by-products that are anticipated.
- Provide any previous bench scale testing results performed to evaluate potential impacts from injection activities, if available.
- Evaluate the results of samples from the receiving formation and results from column leachate tests simulating the chemical conditions of injection activities, if available.

Future Testing

Once the EPA reviews the above information, a decision will be made whether to authorize the proposed project by rule or permit. Additional information may be required in accordance with 40 CFR 144.27 and/or based on EPA's UIC Permit Application form 7520-6. A Pilot Cycle Test will be required to evaluate impacts of injection activities.

Send information to:

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