

Underground Injection Control as a Leachate Solution

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1

How is a UIC facility regulated?

The Underground Injection Control Program

The UIC program is established under the Safe Drinking Water Act (SDWA) and the federal regulations for the UIC program are found in Title 40 of the CFR, starting in Part 144. States may be delegated these programs by the US EPA:

Class I, III, V and VI to MS Department of Environmental Quality (MSDEQ)

Class II to MS Oil and Gas Board (MSOGB)

- ▶ Class I wells are used to inject hazardous and non-hazardous wastes into deep, isolated rock formations.
- ▶ Class II wells are used exclusively to inject fluids associated with oil and natural gas production.
- ▶ Class III wells are used to inject fluids to dissolve and extract minerals.
- ▶ Class IV wells are shallow wells used to inject hazardous or radioactive wastes into or above a geologic formation that contains a USDW.
- ▶ Class V wells are used to inject non-hazardous fluids underground. Most Class V wells are used to dispose of wastes into or above underground sources of drinking water.
- ▶ Class VI wells are wells used for injection of carbon dioxide (CO₂) into underground subsurface rock formations for long-term storage, or geologic sequestration.

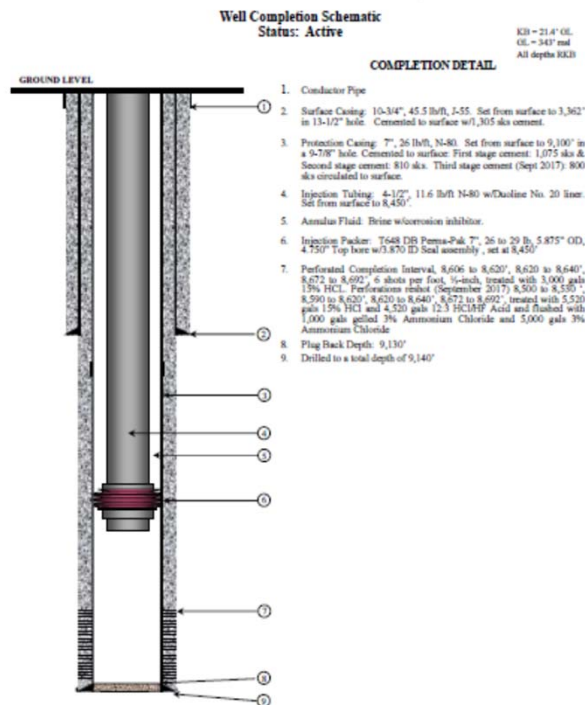
2

General Considerations

- ▶ Suitable geology is crucial and aids greatly in the generators liability protection
- ▶ Leachate may require blending with other waste fluids to aid in maintaining geologic formation pore space and suitability
- ▶ Filtering down to 5 micron or less is recommended to maintain formation characteristics but not required by the generator (done at well injection)
- ▶ Reasonable trucking distances to waste streams, landfills and disposal facilities
- ▶ Depending on waste streams facilities maybe regulated and permitted by more than one agency across most states.
- ▶ Many states have prohibitions against Commercial UIC disposal for Haz Wastes
- ▶ EPA has identified UIC disposal as a preferred option for PFAS liquid waste streams

3

UIC Wells require many layers of protections



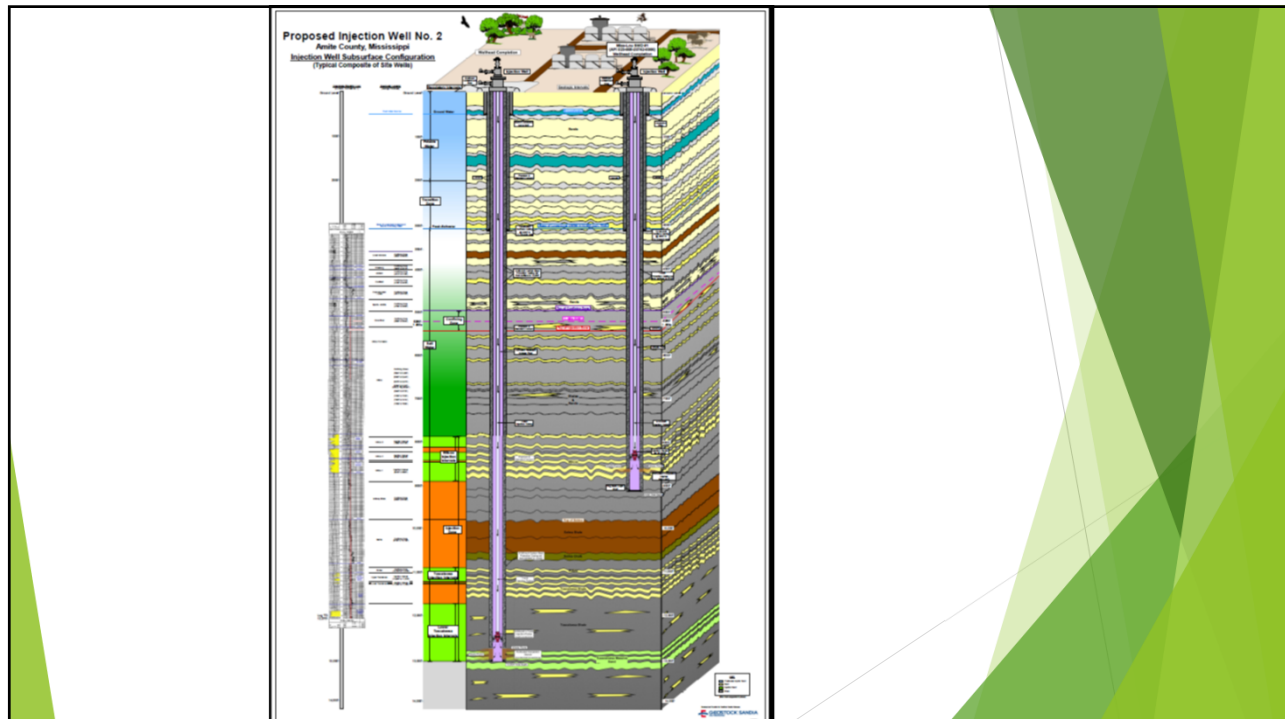
4

Area Protections and Specifics

The Primary purpose of the UIC program is to protect Underground Sources of Drinking Water (USDW).

- ▶ Typically water exceeding 10,000 mg/L of TDS is not considered USDW
- ▶ Water with 10,000 mg/l Total Dissolved Solids is encountered at varying depths across the US. Generally in MS the USDW may be 3,000 feet or deeper.
- ▶ You can expect suitable injection zones from 5,000 to 15,000 feet, so well construction is not cheap nor quick.
- ▶ Groundwater monitoring of multiple aquifers
- ▶ Very strict well casing requirements (fully cement back to the surface, back side pressure monitoring, etc)

5



6

Design and Permitting

- ▶ Most UIC permits are for 10 year period with renewal options.
- ▶ Facility design will need to consider continuous flow and wastewater characteristics monitoring per its UIC permit
- ▶ UIC Permit will include routine monitoring conditions, recordkeeping, and financial assurance requirements
- ▶ Area groundwater monitoring will be required
- ▶ UIC Wells have annual leak detection and other integrity testing

7

Permitted Wastewaters

- ▶ What is Class I nonhazardous municipal landfill leachate wastes
 - ▶ Landfill leachate is formed when rainwater infiltrates and percolates through the landfill. As it does it dissolves and picks up many of the characteristics of the wastes it comes into contact
 - ▶ Landfill leachate is high in organic and inorganic concentrations which make it conducive to biological growth which can be quite challenging
 - ▶ Landfill leachate can be highly corrosive
 - ▶ Landfill leachate can be highly odorous

These combination of characteristics must be taken into account in the design of the facility, feasibility testing and potential blending and filtering operations.

8

Suitable for PFOA waste streams

- ▶ From EPA's web page, "Deep underground injection of these types of wastewaters in deep geologic formations isolated from sources of drinking water prevents soil and water contamination."
- ▶ In Dec 2020, EPA released interim Guidance on Destroying and Disposing of PFAS and PFAS containing materials.

<https://www.epa.gov/newsreleases/epa-releases-interim-guidance-destroying-and-disposing-certain-pfas-and-pfas-containing>

9

EPA Interim Guidance, Dec 2020

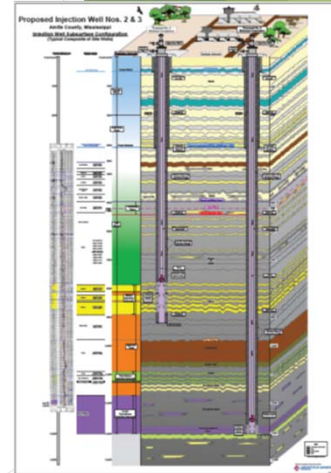
▶ Overview of Recommendations

- ▶ The interim guidance tentatively recommends four approaches to PFAS disposal "in the order of lower uncertainty to higher uncertainty," i.e., from most to least certain to prevent PFAS from entering the environment.^[4] The first of these technically is not a disposal method at all, but rather a catch-all approach, as follows: "interim storage... until research reduces the uncertainties associated with other options."^[5] The guidance document, however, does not discuss "interim storage" methods in any detail; it merely recommends "following manufacturers' recommended best management practices as well as in accordance with any relevant industry, federal, state, or local requirements or guidelines."^[6]
- ▶ The second approach is the use of underground injection wells, specifically the deep injection wells classified as "Class I" under the EPA's underground injection control program.^[7] The interim guidance only recommends this approach for "liquid-phase waste streams," however.^[8]

10

Parting Comments

- ▶ Landfill leachate disposal will become more problematic in the future with more limits on options
- ▶ PFAS considerations will further complicate the matter
- ▶ The EPA preferred methodology for PFAS liquid wastes of UIC disposal is available
- ▶ New UIC permits are costly and very time consuming
- ▶ Plan now for at a minimum for the next 5 - 10 years.



11

QUESTIONS

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12