

# Advancing Class I Injection in a Time of Changing Pressures

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# Historic Foundation

# Historical Background for Class I Injection Wells

- Injection for disposal started by the petroleum industry in the 1930s
- Injection wells associated with oil and gas production were comprehensively regulated by state oil and gas agencies
- Since the early 1950s, injection wells have been used for fluids associated with industrial facilities.
- These injection wells also initially regulated by states

# Federal Regulation of Underground Injection

- The Federal Water Pollution Control Act Amendments in 1972 gave EPA control of waste discharges to surface waters.
- Some regulation and permitting of underground injection occurred under this statute, but authority was uncertain.
- No clear legal standards for regulating injection.
- The statute did require states to regulate injection wells as a prerequisite for federal funding of area-wide waste-treatment management for surface waters.
- Oil and gas injection operations were not covered.
- Safe Drinking Water Act (SDWA) passed in 1974 to provide national oversight for injection well regulation

# UIC Program Regulations

- EPA and states conducted detailed reviews of injection practices during the late 1970s to identify problems
- Initial UIC program regulations promulgated under the SDWA established minimum requirements for Class I disposal wells to address problems identified
  - Define underground sources of drinking water (USDW)
  - Require multiple layers of protection between injected fluid and USDWs
  - Require compatibility of well construction materials
- Majority of states obtained primacy to enforce

# Demonstrated Strengths

- Problems with injection wells identified pre-SDWA would have been prevented by the UIC regulations
- Challenge presented by the 1984 RCRA Amendments banning land disposal of hazardous wastes overcome when Class I injection found to be protective of human health and the environment and exempted from ban
- Congressional and GAO investigations of this exemption program upheld validity of findings and protectiveness of Class I injection
- Toxic release inventory (TRI) reporting of Class I injection as “release to the environment” triggered spurious media attacks ameliorated by EPA focusing the media on stringent regulation and absence of potential for actual exposure to injected wastes
- Court requirement for more stringent regulation of injected wastes rendered nonhazardous reversed by Congress and supported by EPA’s 2001 risk assessment and conclusion that “existing Class I UIC regulatory controls are strong, adequately protective, and provide an extremely low-risk option in managing the wastewaters of concern.”

# Key EPA Findings

- “Class I underground injection wells are safer than virtually all other waste disposal practices.” 1991
- “Injecting wastes in Class I wells is safer than burying them in landfills, storing them in tanks, or burning the waste in incinerators.” 1992
- Underground injection “reduces human exposure to organic and inorganic chemicals and heavy metals by removing them from the environment.” 1999
- Deep well injection “eliminates more than nine billion gallons of hazardous waste and a trillion gallons of oilfield waste from the environment each year.” 1999

# Class I UIC Program Status

- Sometime around 2000 EPA's Office of Ground Water and Drinking Water (OGWDW) observed that the UIC program – and especially for Class I deep wells – had become a “mature” program with little need for change
- “When wells are properly sited, constructed, and operated, underground injection is an effective and environmentally safe method to dispose of wastes.”  
2008

# Additional Class I Wells

- Electrical generating facilities have increasingly turned to Class I wells to dispose of wastes from on-site wet flue gas desulfurization (FGD) units
- Recent indications are that electrical generating facilities may consider Class I wells to dispose of liquid wastes from coal combustion residuals (CCR) landfills and surface impoundments
- Florida is experiencing increased use of Class I municipal wells from the banning of ocean discharge of treated effluent from POTWs
- Suggested for leachate and other residuals from facilities managing wastes containing per- and polyfluoroalkyl substances (PFAS) not removed by conventional water treatment methods
- Fertilizer manufacturing facilities whose wastes ceased to be excluded from hazardous waste status under the RCRA Bevill Amendment have moved to Class IH

# Class I Looking Forward

- Addressing induced seismicity concerns
- Paying attention to potential impacts of other wells
- Making program improvements

# Induced Seismicity

- Concerns over seismicity induced by underground injection wells have increased over the past decade from the operation primarily of Class II disposal wells in Ohio, Oklahoma, Arkansas and other places
- Class I wells have not recently been associated with incidents of induced seismicity, but the issue is being raised and needs to be addressed
- Class IH wells already have been required since 1988 to review seismicity potential and monitor for seismicity
- Recent permitting actions for Class I wells have included focusing on the potential for induced seismicity and including conditions requiring operational responses

# Potential Permit Impacts from Seismicity

Class I operators could potentially be affected by requirements to:

- Conduct more detailed reviews of seismic history at proposed injection well sites
- Monitor for seismicity during injection well operations
- Restrict injection pressures more than necessary to avoid potential fracturing of injection or confining zones (Class I operators in Kansas already are limited to gravity feed injection – i.e., no injection pumps)
- Restrict siting to avoid Class II operations

# Injection Well Interactions

- Interactions with Class II disposal wells have affected the operations of Class I facilities
- Impacts may come from wells many miles away
- Often the Class I well permits and Class II permits are issued by different agencies
- In some cases there have been 3 agencies involved
- Primary lesson is for operators to take steps to be aware of what is happening in surrounding areas, and especially within the same geological formations
- Secondary lesson is to improve notice provisions

# Regulatory Revision Recommendations

- Class I recommendations from a GWPC Work Group prepared in response to calls by previous Presidents for regulatory improvement
- Recommendations regarding UIC Class I, II, III and VI fluid movement requirements
- Recommendations from the Underground Injection Technology Council (UITC)
- Ongoing development of recommendations by the GWPC Class I Work Group

# Potential Improvements

- Modifying and updating technical requirements
- Clarifying various provisions in the regulations
- Providing more flexibility for timing of testing
- Clarifying nonendangerment requirements to facilitate risk assessment and management
- This could be achieved through an omnibus revision similar to what is done by some states

# Class IH Wells

No Migration Exemption Approvals

# No Migration Exemption Approvals

- Operators of Class I hazardous waste wells must obtain approval of a no migration exemption approval to continue injection hazardous wastes.
- As noted by GWPC, “Many of the petition renewals have stalled out in the Regional Offices due to a lack of resources.”
- “Some of the backlogs have had timeframes of up to 6 to 8 years to be reviewed after petition submittal.”
- Recent efforts by EPA and operators have brought progress, but more improvement is needed

# Number of Exemption Facilities

State	Facilities
Arkansas	3
Florida	(1)
Illinois	2
Indiana	1
Kansas	2
Louisiana	6
Michigan	3
Mississippi	1
Ohio	3
Texas	22
<b>Total</b>	<b>43</b>

# EPA Progress

- Recognizing and addressing priorities
- Developed UIC No Migration Petition Guidelines
- Developed petition crosswalk to ensure all required items are addressed and where they are addressed
- Earlier and more frequent communication to identify issues and request additional information
- Conference calls and meetings with operators to discuss the issues
- Accepting electronic submittals in place of hard copies
- Segmenting the process with initial submittal being a geologic interpretation and modeling strategy package
- Encouraging operators to keep demonstrations simple
- Requesting that reissuance requests highlight changes from the previous approval to focus EPA review

# EPA also Identified 8 Focus Items

## Items of Focus for Petition Review\*

- Local Geology (as related to the modeling setup)
- Model Input Parameters
- Injection History
- Pressure Buildup Models
- Cone of Influence
- Waste Plume Boundaries
- No Migration Demonstration
- Implementation and Compliance Section

\* Sections of the EPA Region 6 UIC Petition Application Guideline

# Progress by UITC and Operators

- UITC has recommended using the crosswalk to frame petitions and be prepared while the petition is generated.
- UITC has clarified with EPA that the crosswalk should not just list the page number where the information occurs, but should also explain how the information referenced satisfies each demonstration building block.
- UITC has encouraged more use of QA/QC procedures
- Operators have accepted EPA's encouragement to have a face-to-face working meeting prior to beginning the petition work.
- Together EPA and operators have begun using face-to-face working meetings to discuss and resolve significant issues.
- Extending the demonstration time horizons

# FY 2018 Completed Class IH No Migration Exemptions

1. Angus Chemical Company – Sterlington, LA
2. Equistar Chemicals, LP – Corpus Christi, TX
3. Innophos – Geismar, LA
4. Phillips 66 – Borger, TX
5. Texas Molecular Corpus Christi – Corpus Christi, TX
6. Texas Molecular Deer Park – Deer Park, TX
7. US Ecology Texas – Robstown, TX
8. Veolia North America – Port Arthur, TX

# Future Steps to Consider

- \* *Still more to process – 12 more facilities before 2025*
- Simplified renewal requirements that reduce submittal of information that has not changed or does not change;
- Reduction of frequency for specific annual tests;
- Extending the demonstration time horizons
  - Earliest demonstrations typically were for 10 or 20 years
  - More recent demonstrations have been for 25, 30 and 50 years
- Processing approval modifications rather than reissuances for operational changes within the longer demonstration horizons
- Greater reliance on primacy state permitting reviews
- State primacy for the exemption approval process

# Questions - Discussion