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# Underground Injection Control (UIC) Program Facts & History

Bill Bryson  
Kansas Geological Survey

Bob Van Voorhees  
Underground Injection Technology Council

# Overview of Underground Injection History

## Early Injection

- Injection for the extraction of salt starts in China in A.D. 300 and in France in the 9th century.

## 1930s

- The first documented project for the disposal of oil field brine (salt water produced along with oil and gas) into the originating formation began in Texas.
- Enhancing the recovery of oil by injecting water or other fluids into a formation to extract additional oil and gas begins

## 1940s

- Oil refineries begin to inject liquid wastes.

## 1950s

- Chemical companies begin injecting industrial waste into deep wells.
- Many states establish regulations for the disposal of brine.

## 1960s

- Deep well injection in Colorado causes earthquakes.
- First documented cases of contamination of potential drinking water sources.



# 1970s

- Waste spilling out of an abandoned oil well is traced to an injection well used by a paper mill some distance away.
- Congress passes Safe Drinking Water Act (SDWA), in 1974 giving EPA authority to set national standards to control underground injection and protect underground sources of drinking water.
- EPA develops rationale for implementing the SDWA UIC Program and drafts regulations using 12 member state workgroup in 1976-1977.



# UIC PROGRAM OVERVIEW

- 1974 Safe Drinking Water Act, (amended '86 and '96)
  - EPA developed UIC regulations to set program standards
  - Included State Primacy provision (OK was first in 1982)
- 1983 UIPC (now GWPC) formed to assist states in implementing the UIC program
- UIC remains primary Federal GW protection program
- Program state funding entrenched at \$10.5 million after 1988. Original funding at 8.5 million.
- Underground Injection has been the subject of debate, law suits, legislation, environmental group opposition, and pervasive public misunderstanding
- Underground Injection is used to isolate more than 50% of the liquid hazardous waste and much of the nonhazardous industrial liquid waste generated in the US



# ROLE OF UIPC (GWPC)

- UIPC was originally selected as the name at EPA's encouragement to stress that the primary set of timely issues involved state primacy for UIC Classes I-V.
- UIPC formed Standing Committees for Mechanical Integrity, Education and Training, Industry, State and Federal Affairs and Research.
- In 1988, these committees were restructured into Divisions for Class I,II, III, and V. E&T and State&Fed. Affairs were retained. The UIPC Research Foundation was formed.
- In 1992, the name of the organization was changed from UIPC to GWPC to reflect the primary mission was to protect ground water in all states and to provide a forum for discussion of water pro



# UIC Program Guidance and Technical Support

- EPA has produced more than 84 draft and final UIC program guidance documents, additional technical memoranda and guidance documents
- GWPC has been instrumental in facilitating and providing state input
  - Development of Guidance for Class II definition of significant non-compliance (SNC)
  - Development of Guidance for implementing HWDIR
  - Development of Guidance 81 for Class I SNC
- UIC National Technical Workgroup provides forum for addressing technical UIC issues
  - GWPC instrumental in obtaining and coordinating state participation in the NTW to improve federal-state partnership in administering UIC program
- GWPC has also provide state and multi-stakeholder consensus recommendations for Program improvements



# Work for States with Congress

- Leader on issues:
  - HF related issues
  - CO2 Class VI reg. development
    - State needs assessment
    - Advocate for UIC program resource needs
    - Assist States: VI primacy process
  - Inform States regarding issues:
    - UIC program reauthorization
    - UIC funding formula (reformulation)
  - ASR



# 1980s

- Federal UIC regulations are promulgated to define five classes of injection wells and set minimum standards for state programs to meet to receive primary enforcement responsibility (primacy) for the UIC Program.
- Congress amends the SDWA in 1980 to allow existing oil and gas programs to regulate, under Section 1425 provided they are effective in preventing endangerment of USDWs and include traditional UIC Program components such as oversight, reporting, and enforcement.
- Congress passes the Hazardous and Solid Waste Amendments (HSWA) to the Resource Conservation and Recovery Act (RCRA), requiring additional regulations and demonstrations for deep well injection of hazardous waste. EPA added construction and technological requirements for these wells, and the regulations require that each well operator qualify for a “no migration exemption” by demonstrating that the hazardous waste will not migrate from the injection zone for at least 10,000 years or will be rendered non-hazardous by natural processes.



# 1990s

- EPA issues an Administrative Order requiring the 10 major oil companies to close shallow motor vehicle waste disposal wells at their facilities (Class V).
- Responding to initiatives by environmental groups, EPA develops a Class V management strategy that results in the Class V Rule (targeting Motor Vehicle Waste Disposal Wells and Large-Capacity Cesspools) and publishes the Class V Underground Injection Control Study (an evaluation of the remaining well types).
- The first international symposium on deep injection is held in Berkeley, California.



# 2000 to 2005

- A rule to address Class I Municipal Wells in Florida was finalized.
- EPA determined that, based on existing information, no additional regulations for Class V wells are needed. Instead the agency develops a management plan to address any potential endangerment.
- The Energy Policy Act passed by Congress in 2005 amended SDWA to exclude hydraulic fracturing fluids (except diesel fuel) related to energy production from regulation under the UIC program. However, States may choose to regulate hydraulic fracturing.



# 2005 to the present

- EPA published its Study to Evaluate the Impacts to USDWs by Hydraulic Fracturing of Coalbed Methane Reservoirs.
- The UIC Program addresses challenges from new uses of injection wells:
  - Limiting carbon dioxide emissions through geologic sequestration
  - Managing treatment residuals from drinking water treatment plants
  - Increasing drinking water storage options through aquifer storage and recovery wells.
- In 2010, EPA finalized regulations for the Geologic Sequestration (GS) of carbon dioxide (CO<sub>2</sub>) using the existing UIC Program regulatory framework modified with criteria and standards specific to GS, thus creating a new class of wells – Class VI.



# UIC Developments Involving GWPC

- RBDMS (early to mid-1990's)
- Class IH HWDIR RegNeg
- Response to Congressional and GAO studies
- 2007 Ground Water Report to the Nation (UIC chapter)
- Litigation – Hydraulic Fracturing (Alabama), TNRCC
- Guidance document development
- Class VI Rule development
- FracFocus
- Work for States with Congress
- TRI Program
- Land Disposal Program Flexibility Act and UIC Class I Risk Assessment
- Support States in UIC National Technical Workgroup
- State needs assessments – Class V & Class VI



# Risk Based Data Management System (RBDMS)

- 1990 developed to assist states with data management – first DOE grant
- 1993 installed in pilot states
- 1994-present expanded to more than 22 state agencies
- 1999 RBDMS receives DOE Energy 100 Award
- 2008-present: expanding to ecommerce applications
- Future of RBDMS (state data & program management)
  - Will be directed by RBDMS states
  - E-permitting, reporting and data access
  - Annual RBDMS training and report
  - HF and CO<sub>2</sub> geosequestration
  - Class I, II, V
- <http://rbdmsonline.org/GWPC/>



# Regulatory Negotiation for Class IH Wells

- HSWA banned land disposal (including injection) of hazardous waste unless EPA determined method protects human health and environment
- GWPC and states encourage retention of Class I wells and use of multi-stakeholder regulatory negotiation to develop regulatory approach
- EPA Reg Neg conducted 1986-87 with states, environmental NGOs and industry –
  - GWPC coordinated state UIC agencies
  - UITC coordinated industry participation
- Effectively provided the foundation for the 1988 HWDIR regulations and Class IH no migration demonstrations to further protect USDWs



# Assurance of HWDIR Effectiveness and Class IH Well Safety

- Questions raised following implementation of the HWDIR rules and no migration demonstrations
- Congressional investigation by House Energy and Commerce Committee
- Study requested and conducted by Government Accountability Office (GAO)
- EPA Headquarters, Regions and State agencies required to respond
  - GWPC assisted in coordinating state responses
  - UITC coordinated industry response
- HWDIR land ban program found to be operating effectively – recommendations limited to increased enforcement of exemption conditions



## Potential HWDIR Expansion to Class I Nonhaz Wells Injecting Decharacterized RCRA Wastes

- EPA decided injection of wastes no longer having hazardous characteristics need not comply with the HWDIR regulations and demonstrations
- US Court of Appeals for DC Circuit overturned this result and directed EPA to expand HWDIR
- Congress enacted Land Disposal Flexibility Act of 1996 to exclude these wells from HWDIR and directed EPA to conduct risk assessment
- GWPC was instrumental in providing and coordinating state support for this legislation
- EPA Class I well risk assessment has provided seminal confirmation of safety and effectiveness



# Improvement in Toxics Release Inventory (TRI) Reporting for Class I Injection Wells:

- EPA recognition of stricter regulation of Class I wells
- EPA recognition of safety and effectiveness
- EPA recognition of lower risk
- Publication of separate reporting tables excluding Class I underground injection
- Separate reporting for Class I injection onsite
- Separate reporting for Class I injection offsite
- Specific recognition that Class I injection is “contained disposal”



# Class II Program Enhancements

- Initial development of UIC regulatory framework recognized historical leadership role of states and need to optimize retention of state regulatory frameworks – led to enactment of section 1425
- GWPC has compiled a Class II regulatory history
- GWPC led state participation in the multi-stakeholder mid course review of the Class II program
- GWPC coordinates Class II program peer reviews



# Class VI Rule Development

- EPA initiated development of a regulatory framework for geologic sequestration (GS) of carbon dioxide through:
  - Building on DOE Regional Carbon Sequestration Partnerships
  - Technical Workshops on GS – 2005 – 2008
  - Stakeholder workshops 2007 – 2008
- GWPC initiated multi-stakeholder CCS work group
  - Comprehensive discussions of technical and regulatory issues
  - Provided recommendations prior to proposed rule
  - Submitted specific recommendations on draft rule



# FracFocus

- Partnership with IOGCC
- State – Environmental NGO – Industry multi-stakeholder collaboration
- Initial design and rapid deployment
- Achieving credibility and acceptance
- More than 200 companies have registered over 15,000 well sites through FracFocus
- Learning from feedback (both positive and negative)
- Maintaining the collaborative efforts
- Developing and deploying improvements
- Currently eight states use FracFocus for official state chemical disclosure



# UIC Into the Future

- Class V geothermal: an expanding source of alternative energy
- Class V: used for aquifer management
  - Aquifer storage and recovery
  - saltwater intrusion, etc.
  - Who would have thought that UIC would be so instrumental in the Water Quantity arena?
- Class V: used for Air injection
- Class IV: sequestration of carbon dioxide
- **What's next???**



# GWPC Has Been Instrumental In The Success And Evolution Of The UIC Program

- 1983 UIPC chartered (assist state implement UIC programs)
- 1986 Class II definition of Significant non-Compliance.
- 1986 FACA - Class I Hazardous Waste Reg Neg.
- 1987 National Geothermal Conference
- 1987 Mechanical Integrity Committee: MIT Training
- 1988 UIPC Division structure was established (I, II, III, & V)
- 1988 Research Foundation chartered
- 1989 UIC Class II Mid-Course Evaluation process
- 1989 State UIC Peer Reviews began
- 1990 Assistance to state with data management (RBDMS was born), first DOE grant
- 1991 Education & Training Committee:
  - Class I Operator Training (w/ revisions, taught annually)
  - Intro to UIC brochure included several revisions



# GWPC ACCOMPLISHMENTS

- 1992 EPA involves GWPC in detailed Class V well classification and analysis
- 1993 Launched web site (UIC library; links to State and Fed. UIC agency sites)
- 1993 RBDMS installed in pilot states
- 1994 Dialogue over TRI reporting began (strong debate for over a decade)
- 1995 First Annual GWPC UIC Conference (continuing annually)
- 1996 Regulatory dialogue over Hydraulic Fracturing began (and still going)
- 1999 Class V Rule (brochures, conference sessions, video, etc.)
- 1999 RBDMS: Energy 100 Award
- 2005 Energy Policy Act excludes HF from UIC (GWPC involved)



# GWPC ACCOMPLISHMENTS

- 2006 GWPC participated in development of UIC guidance for CCS experiments
- 2007 Ground Water Report to the Nation (included UIC chapter)
- 2007-present GWPC involvement in the development of the Class VI regulation
- 2008 Congressional Water Caucus briefings
- 2008-present: RBDMS expanding to electronic commerce applications
- 2009 - present: FracFocus for public disclosure of hydraulic fracturing fluids
- GWPC has held positions; passed Board resolutions and made presentations on a national stages to educate Congress, media, Federal agencies, environmental groups, industry, etc.
- GWPC is the voice and face of the state UIC program and the state-federal partnership

