Disposal Wells and Shale Resource Development: A National Perspective

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INTRODUCTION

• Class II injection in U.S. oilfields since 1930s
• U.S. EPA estimates approximately 151,000 Class II injection wells in U.S. with about 80% used for enhanced oil recovery (EOR)
• Shale revolution shifting injection from EOR to disposal

Ohio Class II Well
(ODNR 2013)
Discussion Outline

• Risk Considerations
• Well Siting
• Well and Facility Permitting
• Well and Facility Design
• Well Drilling and Completion
• Operational Considerations
• Induced Seismicity
• Conclusions

Produced Water Disposal Facility (South Texas)
(ALL Consulting 2013)
Where We Have Been and Where We Are Going

• Historically, Class II injection wells have been used for EOR or disposal for the vast majority of water produced from oil or gas wells.

• The shale play’s major tool for produced and flowback water management will remain Class II wells.

Commercial SWD Facility Eagle Ford Shale Play, South Texas
(ALL Consulting 2014)
Risk Considerations

• The Bakken in North Dakota and Eagle Ford in south Texas have seen lightning strikes ignite hydrocarbons at brine disposal facilities.

• Several brine sites have had accidents resulting in injury and costly litigation.

Fire caused by lightning strike at saltwater disposal near Alexander, N.D., July 7, 2014 (AP Photo/Josh Wood)
Inherent Risks

• Maintaining mechanical integrity is essential.
• Failure to properly pre-treat produced or flowback water before injection in various shale plays reduces well storage capacity.
Inherent Risks (cont.)

• Public opposition should be a significant consideration when siting and permitting a Class II brine disposal facility.

• Seismic events in areas of shale development has increased public concern and fueled environmental groups and media opposition to hydraulic fracturing and Class II injection wells.
Well Siting Considerations

- Identify geologic formations with adequate disposal capacity.
- Evaluate structural geology of the area for potential faulting.
- Avoid locations where disposal will “water out” surrounding production and clustering that leads to well interference and reduced injection capacity.
- Avoid residential areas if at all possible.
- Locate well in areas with adequate road network.

Pre-construction planning with multiple disciplines is essential.
Well Siting Considerations (cont.)

• Injection facility sites can not always be in placed in low populated areas. Landowners and regulators must be prepared for opposition from community groups, national environmental groups, landowners and competitors. Being unprepared for opposition can derail permitting.

• ALL’s experience has been that acquiring land in lieu of leasing reduces future problems and is ultimately less costly.

Opposition comes in all forms.
(ODNR 2013)
Well and Facility Permitting

• Every oil and gas producing state has varying permitting requirements.
• Not fully understanding these can result in delays.
• ALL has seen permitting errors delay well permits for over a year.
• Public opposition and increased volumes of permit applications have also caused significant delays in permit issuance.
• State primacy versus a direct implementation program may cause permitting delays.
WELL DRILLING AND COMPLETION

Competent crews essential parts of successful drilling and completion work. (Source: ODNR, 2013)
Well-Designed Drilling and Completion Programs Are Essential

• Experienced drillers and professionals reduce overall costs and ensure quality work.
• Proper well completion during drilling and cementing eliminates injection formation contamination and damage.
• Good internal and external well integrity reduces well workovers.
• Correct cement type and additives with proper placement reduces the possibility of inadequate cement jobs that can lead to groundwater contamination or stray gas migration.
Surface Facility Design

Ohio Class II Facility
(ODNR 2006)

Eagle Ford Commercial SWD Facility, South Texas
(ALL Consulting 2014)
“Best in Class” Design Features

- Continuous monitoring of pressures and injection rate improves compliance and efficiencies.
- Chemical additive systems programs reduce tank, equipment and well failures.
- Capturing skim oil increases profitability.
- Adequate loading bays and traffic control reduces truckers from taking their loads to other facilities and reduces wait time and accidents.

Commercial Waste Facility, Eagle Ford Shale Area of South Texas
(All Consulting 2014)
“Best in Class” (cont.)

- Safety and grounding reduces fires and accidents
- Pre-Treatment and filtration reduces well workovers
- Baseline water sampling prior to well drilling and facility construction
- Proper handling of solid wastes and addressing TENORM or NORM issues are crucial for operational efficiency

Commercial Salt Water Disposal Well Facility, Eagle Ford Shale Area, South Texas (ALL Consulting 2012)
OPERATIONAL CONSIDERATIONS

Commercial Waste Facilities (Texas)
(All Consulting 2012)
Properly Run Operations

• Injection Pressures within Permitted Parameters Reduces:
  – Enforcement Actions
  – Injection Zone Damage
  – Contamination of Usable Water

• Preventive and routine maintenance of tanks, equipment, tubulars and injection zone are key.

• Spills and releases must be contained and cleaned up to avoid costly remedial work and possible litigation.

• Maintaining a complete safety plan at disposal facilities, especially at commercial sites having large amounts of traffic, is essential for worker and community safety.

Proper produced water tracking, handling and injection optimizes operations.
Induced Seismicity

- Concerns with induced seismicity from Class II disposal is a national issue.
- Many states have developed or are developing regulations to address the issue.
- Need to be proactive and start monitoring for seismicity in advance and during Class II injection operations.

(ODNR 2012)
CONCLUSIONS

• Well planned and properly constructed Class II disposal wells will continue to be the best practice for managing flowback and produced water in the shale plays.

• ALL does not see a significant lessening in opposition to Class II well siting and use.

• ALL also believes these wells will continue to become more rigorously regulated.

Commercial SWD Well, Eagle Ford Shale
South Texas
(ALL Consulting 2014)
Questions?

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