EPA ACTION PLAN FOR CLASS VI GEOLOGIC SEQUESTRATION PERMITTING

February 18, 2020
EPA – REGION 7 SUMMARY OF THE CLASS VI PROGRAM PERMITTING PROCESS FOR THE WELLINGTON/BEREXCO GS PROJECT AND LESSONS LEARNED
Class VI Permit Application: Required Elements

40 CFR 146.82(a) and (c)

- Site characterization (geologic) information
  - Maps/cross sections, structure, lithology, faults/fractures, geochemistry, hydrology/hydrogeology, USDWs, seismic history
- AoR delineation (details submitted via the Input Advisor) and proposed (and final) corrective action
- GS Project Plans
  - AoR and Corrective Action, Testing and Monitoring, Well Plugging, Post-injection Site Care (PISC) and Site Closure, Emergency and Remedial Response
- Proposed (and final) well construction/specifications
- Proposed (and final) operating plan and pre-injection testing plan
- Financial responsibility demonstration (i.e., cost estimates and instruments)
- Injection depth waiver application and aquifer exemption expansion (if necessary)
Class VI Permitting: Stages

1. Pre-Construction
   - Site Characterization
   - AoR Modeling
   - Financial Responsibility
   - Injection Well Construction Plans
   - Proposed Operating Data and Pre-Injection Testing
   - Proposed Project Plans
   - Injection Depth Waivers
   - Permit Writing

2. Pre-Injection
   - Finalize Site Characterization
   - Finalize AoR and Corrective Action Status
   - Injection Well Construction
   - Finalize Project Plans
   - Finalize Financial Responsibility
   - Verify Appropriateness of Injection Depth Waivers
   - Authorize Operation

3. Injection
   - Operating Data
   - Testing and Monitoring
   - AoR Reevaluation
   - Project Plan Updates
   - Financial Responsibility Updates
   - Emergency and Remedial Response
   - Enforcement and Compliance
   - Permit Modification

4. Post-Injection
   - Injection Well Plugging
   - Post-Injection Site Monitoring
   - Emergency and Remedial Response
   - Project Plan and Financial Responsibility Updates
   - Non-endangerment Demonstrations
   - Site Closure

- Permit application received
- Authorization to inject
- Permit to construct
- Injection ceases
Class VI Permitting: Process

Class VI Permit Application Submission

Completeness Review
- Permitting team
- Completeness review of permit application materials

Technical Review and Decision Making
- Technical review
- EJ determination and consultations
- Permit condition development
- Communications development
- Regulatory coordination

Finalization
- Draft permit
- Management briefings
- Signatures
- Public hearing
- Public comments
- Final permit to construct

• Technical review of permit application information

Site Characterization Data
Proposed Operational Information
Proposed Well Construction

Testing and Monitoring Plan
Financial Responsibility Demonstration
PISC and Site Closure Plan
Injection Well Plugging Plan
Emergency and Remedial Response Plan
Wellington/Berexco GS Project Generalized Timeline

- KGS project to evaluate CO2-EOR in Mississippian and Arbuckle oil reservoirs and saline aquifer sequestration in southern Kansas funded by DOE (12/08/2009)
- Discussions between EPA and DOE/KGS about this project (02/24/2011)
- Well KGS 1-28 completed to a total depth of 5250’ BGS into the Arbuckle Formation (08/24/2011)
- KGS/Berexco Wellington small scale geologic sequestration testing funded by DOE (10/01/2011)
- Contact by KGS with EPA about permitting a geologic sequestration well (11/10/2011)
- Discussions between KGS/Berexco and EPA about application and what the contents should cover (11/10/2011 through 02/02/2012)
• Draft of the C6 permit application provided by KGS to DOE and Berexco for review (10/10/2013)
• EPA questions KGS about status of project and if they will be submitting an application (02/20/2014)
• Permit application sent to EPA (06/10/2014)
• Initial review of application by EPA and face-to-face meetings/conference calls/emails between EPA and KGS/Berexco to correct deficiencies in application (07/14/2014 through 07/25/2017)
• DOE pulls funding (09/04/2017)
• Request to EPA from KGS/Berexco to withdrawal permit application (03/20/2018)
• Withdrawal request approved by EPA (03/21/2018)
AoR and Corrective Action Milestones - Berexco/KGS Class VI Permit Application

**Initial AoR submission**
- Sept. 27, 2014

**AoR module submissions and responses to questions**
- Mar. 4 - 11, 2015
- May 5 - Jun. 11, 2015

**Presentation describing revisions to modeling approach (not a submission)**
- Nov. 9, 2015

**Revised AoR module submission**
- Apr. 5, 2016
- May 18, 2016

**Att. B for ORC review**
- Mar. 24, 2017

**RAI Table 1: AoR and Corrective Action**
- Dec. 19, 2014

**Follow-up questions for AoR submissions**
- Jun. 17, 2015

**Follow-up questions for AoR submissions**
- Apr. 17, 2015

**Jul. – Sept. 2016 AoR Communications (AoR model evaluation)**
- RAI #10: Clarification on model domain (structured/unstructured grid) and check runs, July 1, 2016
- Revised AoR module submissions, Jul. 15 and 20, 2016
- RAI #12: Clarification of porosity data, Sept. 8, 2016
- RAI #12 response, Sept. 20, 2016

- RAI #14 response, Jan. 10, 2017
- RAI #19: Att. B sent to Berexco/KGS, Jan. 20, 2017
- RAI #23: Description of well search per 40 CFR 146.84(c)(2), Feb. 6, 2017
- RAI #19 response, Feb. 23, 2017
- RAI #23 response, Mar. 3, 2017
- RAI #25: Revised Att. B sent to Berexco, Mar. 9, 2017
- RAI #25 response, Mar. 10, 2017

**RAI #5: Evaluation of Dec. 2016 AoR submissions**
- Jan. 26, 2016

**RAI #8: Follow-up questions from Apr. 2016 AoR submission**
- Apr. 29, 2016

**RAI #14: Results of AoR evaluation**
- Dec. 20, 2016

---

* In response to the questions sent 6/17/15, Berexco/KGS chose to revise their entire modeling approach.
Testing & Monitoring Milestones - Berexco/KGS Class VI Permit Application

Presentation on project status (not a submission)
Jan. 15, 2015

Presentation on T&M strategy (not a submission)
May 15, 2015

Revised T&M strategy
Jun. 1, 2015

Responses to RAI tables
Feb. 27 - Mar. 4, 2015

Proposed seismicity monitoring activities
Jun. 27-29, 2015

Presentation on seismicity monitoring issues/activities (not a submission)
Jan. 20, 2016

RAI #6
Mar. 22, 2016

RAI #8 response
May 12, 2016

RAI #11 response
Aug. 3, 2016

RAI #20 response
Feb. 7, 2016

Follow-up questions
Apr. 13, 2015

Follow-up questions
Jul. 7, 2015

Follow-up questions
May 11, 2015

RAI #4: Follow-up fault and seismicity questions
Jan. 25, 2016

RAI #8: Revised draft Att. C
Apr. 29, 2016

RAI #11: Request to update QASP to reflect final T&M strategy
Jul. 20, 2016

RAI #20: Att. C and QASP to Berexco/KGS
Jan. 20, 2017

--- Att. C and QASP finalization ---

RAI Table 2: Ground Water/Plume/Pressure-Front Monitoring
Dec. 19, 2014

RAI Table 3: Other Testing and Monitoring

**Legend:**

Blue text = Berexco/KGS actions

Green text = EPA actions

*The draft plan included placeholders and clarifying questions for items that had not yet been addressed by Berexco/KGS.*
Lessons Learned

• Read the guidance documents related to GS projects that EPA has created.

• As an applicant, give yourself an adequate lead time in your project for permit processing and expect the process to be no shorter than one year from the time an application is submitted to a final determination (think in terms of Class I HW and not Class II D).

• Communication is key - As an applicant, talk with EPA prior to working on the permit submission or drilling a well and EPA should be talking with the applicant both prior to and during the course of the permitting process.

• Don’t assume, ask.

• Providing draft portions of the application for EPA to review and comment on prior to formal submission of the complete final application would have made the final permitting process go smoother and faster.
Lessons Learned Continued

• The GS Data Tool improved on the process but a checklist of what needs to be included in a complete permit application would be a good thing to have.

• Documentation of conclusions reached by the applicant is essential (just trust me doesn’t work when going out for public notification).

• Having the State Geological Survey partnered with the applicant made validation of statements related to the geology/hydrology more time consuming and difficult.

• Bottom line is that this is more than likely a learning process for both the EPA Region and the applicant, patience on both sides is key.
First Step in a GS Project

• If you plan on pursuing a GS project, talk to EPA or the delegated program manager **before** either submitting an application or drilling a well!
Roadblocks to Project Success

• Financial responsibility requirements
• Pore space ownership/competition
• Induced Seismicity
• Disposal versus storage
• Easements/Right of way/Eminent domain
• Long term ownership of the CO2 and liability after the project is done
• Public Perception (Not Under My Back Yard)
FUTURE OF CLASS VI PERMITTING
Removing Barriers

Efficiency Improvements

• Increase timeliness
• Improve processes
• Enhance transparency
• Facilitate coordination
• Manage resources responsibly

Adaptive strategies

Proactive responses
Modern systems
Streamlined approaches
Efficient resource use
EPA TRAINING AND DATA TOOLS TO ASSIST REGIONS AND STATES FOR CLASS VI PROGRAMS
• As mentioned in the Monday presentation we are in the process of developing training modules in Captivate format to provide UIC program background and program implementation information

• Both EPA and the States are seeing senior staff leaving due to retirements so there needs to be a way to consolidate program expertise, document it, and store it in an accessible format for training new staff as they come into the program

• The first three modules developed in 2019 should be posted in FEDTALENT by late February/early March with more modules to follow throughout the year
Underground Injection Control

Introduction to UIC Permitting

Reviewing Local Geologic Data

- Key terms
- General Information on UIC permitting
- Geological data submitted
- Links between geology and USDW protection
EPA Assistance on Financial Assurance

• Prompted by discussions with EPA Regional Program managers, OGWDW engaged with OA/OP/OFA to enlist contractor support to prepare training related to Class II and Class VI FR

• FR Captivate training being developed between OGWDW and OFA with the support of IEC, Inc., known for its past FR experience working with the UIC Program

• Potential release of this module in FY 2020 should help expedite Class VI permitting
The GS Data Tool (GSDT)

- GSDT: A centralized, web-based data system which receives, stores, and manages Class VI data. GSDT was originally designed for UIC Class VI Direct Implementation Programs.

- The GSDT satisfies the Class VI rule requirement at 40 CFR 146.91(e) indicating that the o/o of Class VI wells must submit GS project data directly to EPA in an electronic format approved by EPA.

- Requirement applies whether a project is in a Class VI DI or Primacy State; GSDT is the only electronic system that has been designed for Class VI and GS projects (so far).

- Class VI well permit applications are made through the GSDT.
GSDT Continued

• Independently, EPA is updating the GSDT to potentially accommodate State Class VI programs by making the system less EPA-centric

• EPA is working closely with Pacific Northwest National Lab who originally developed this system for GS pilot project information gathering

• The revised GSDT may be made available as early as this year and in absence of other electronic reporting systems will be available to all who wish to adopt this system for their Class VI programs

• Website: Epa.gov/class-vi-wells-used-geologic-sequestration-co2#GSDT
THANK YOU!