

Thursday, March 20, 2014

Air & Climate Forecast: March 2014

Agenda

- Sierra Club challenge to PSD permit for failing to require Carbon Capture & Sequestration (CCS) at new olefins unit in Baytown, Texas
- New RCRA Rule on Carbon Capture and Sequestration (CCS)
- EPA's draft guidance that could impose Class VI well requirements on EOR

Sierra Club Challenge to PSD Permit for Failing to Require Carbon Capture & Sequestration (CCS) at New Olefins Unit in Baytown, Texas

Presented by Julie Hatcher

PSD Permitting: “At A Glance”

- Prevention of Significant Deterioration (PSD)
 - Permitting obligation
 - Triggered prior to construction or modification
 - Of a “major source” of “air pollutants”
- Through PSD permitting process -- which includes public notice and comment opportunity and the ability for commenters with standing to challenge the final permit – EPA develops a final permit that requires the source to apply **Best Available Control Technology (BACT) for each air pollutant**
- BACT entails a 5-step analysis (see next 2 slides)
- **EPA’s statutory interpretation -- now under review by SCOTUS in *UARG v. EPA* – renders greenhouse gases (GHGs) an air pollutant subject to PSD permitting**

Definition of BACT

“. . . an emission limitation based on the maximum degree of reduction of each pollutant . . . achievable for such facility through application of production processes and available methods, systems, and techniques, including fuel cleaning, clean fuels, or treatment or innovative fuel combustion techniques for control of each such pollutant“.

5 Steps of BACT Analysis

1. Establishment of the “class or category of source”
2. Determination of “achieved in practice levels”
3. Evaluation of control measures and implementing rules and regulations contained in State Implementation Plans (SIPs)
4. Identification of control technologies that are more stringent than what has been “achieved in practice”
5. The determination of BACT

Exxon Mobil Baytown PSD Permit for GHGs (No. PSD-TX-102982-GHG)

- Issued by EPA Region VI on November 25, 2013 for new ethylene production unit at ExxonMobil's Baytown Olefins Plant in Baytown, Texas
- Establishes separate carbon dioxide equivalent ("CO₂e") BACT emission limitations for carbon dioxide, methane and nitrogen dioxide
- Requires the following measures to achieve these BACT emission limitations:
 - Use of low-carbon fuel in the furnaces and the duct burner;
 - Furnace stack temperature limit to monitor energy efficient operations
 - Thermal efficiency limit to monitor energy efficient operation of the duct burner
 - Use of flare gas recovery

Sierra Club Challenge

- Petitioned EPA's Environmental Appeals Board (EAB) for review of Baytown PSD permit
- Sierra Club – which filed extensive comments during the permitting process – objects to permit on several grounds, but most notably, for its failure to require Carbon Capture & Sequestration (CCS)
- Standard for EPA Environmental Appeals Board review:
 - Is EPA Region VI's response to Sierra Club's comments is “clearly erroneous”?
 - Did EPA Region VI fail to exercise its “considered judgment”?

Issues Raised By Sierra Club

- Whether the Region clearly erred by rejecting CCS as economically infeasible based on a comparison to total project costs instead of a cost-effectiveness analysis. ***And, even if not clear error, whether the Board should grant review to correct an important misapplication of its prior authority implementing BACT for greenhouse gas emissions.***
- Whether the Region clearly erred by failing to adequately explain its decision to reject CCS as economically infeasible because the record lacks a design basis and other details necessary to evaluate costs of CCS. ***And, even if not clear error, whether the Board should review this issue because the level of detail required in cost-effectiveness analyses has important policy implication for implementing BACT for greenhouse gas emissions.***

Issues Raised By Sierra Club

- Whether the Region clearly erred by not following the methodology required by the NSR Manual and Control Cost Manual for CCS in Step-4 of the BACT analysis. ***And, even if not clear error, whether the Board should review this issue because it has important policy implication for implementing BACT for greenhouse gas emissions.***
- Whether the Region clearly erred by conflating two separate emission streams for the proposed CCS control in Step-4 of the BACT analysis. ***And, even if not clear error, whether the Board should review this issue because it has important policy implication for implementing BACT for greenhouse gas emissions.***

Sierra Club's "Ask"

Sierra Club is not requesting that the Board pre-determine whether CCS is BACT for the Baytown facility. Rather, the Board should grant review of this petition to consider the rationale and support for the Region's BACT analysis of CCS and remand the permit with instructions to perform a full and appropriate cost-effectiveness analysis. The record as it stands now is wholly inadequate to reject CCS as BACT. ***Eliminating the most effective technically feasible BACT technology*** is a high bar because the adverse impacts provisions in the top-down BACT analysis are intended only as a safety valve for when impacts unique to the facility make application of a technology inapplicable to that specific facility.

Cost Prohibitive versus Cost Effectiveness

- In its BACT Step 4 economic analysis, Region VI examined total cost of CCS as a percentage of the total cost of the project and determined that CCS is cost prohibitive
 - Estimated “total capital expenses of constructing a carbon capture system” were \$735.4 million, which would increase “the cost of the project by more than 25 percent”
- Sierra Club claims cost effectiveness should have been the standard, BUT: ExxonMobil calculated
 - a cost effectiveness for CCS of over \$253/ton CO₂e
 - an annualized capital and operating cost of \$205 million to capture, compress, and transport 90% of the CO₂ generated by the proposed project, as well as a total capital cost of \$735.4 million (According to ExxonMobil, these costs do not account for an additional \$460 million in estimated pipeline infrastructure costs to transport CO₂ to non-commercial storage facilities should closer, commercial options not be available.)

Tip Of The Iceberg . . .



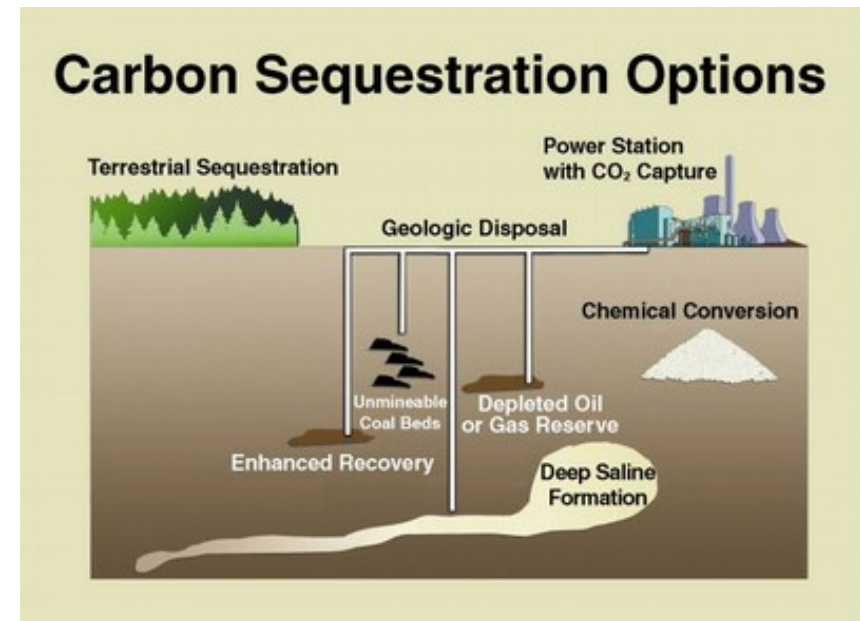
New RCRA Rule on Carbon Capture and Sequestration (CCS)

Presented by Marc Campopiano

What is Carbon Capture and Sequestration (CCS)?

CCS involves:

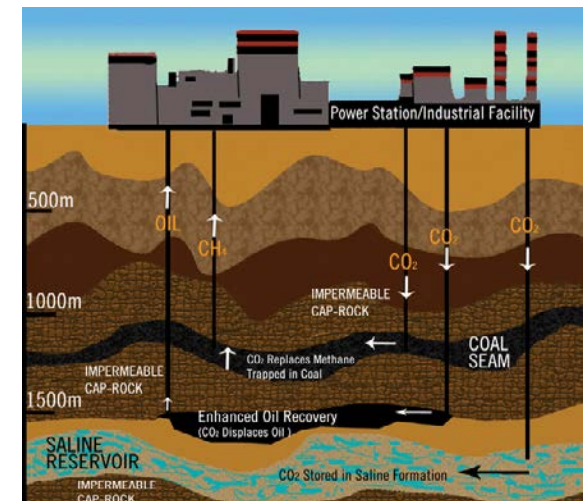
- *Capturing* CO₂ from stationary source
- *Transporting* the CO₂ to a sequestration site
- *Sequestering* CO₂, typically in underground formations



Source: <http://www.globalccsinstitute.com/ccs/what-is-ccs>, <http://meic.org/issues/montana-coal-facts/coal-plants-in-montana/carbon-capture-and-sequestration-in-montana/>

Is It New?

- CCS primarily involves using *existing* and *proven* technologies in new ways
- For example, a CCS project may involve:
 - Power plant
 - CO₂ capture
 - CO₂ transport (via pipeline)
 - sequestration via underground sequestration
 - enhanced oil recovery (EOR)
 - ancillary products, such as urea fertilizer
- Unique aspects of CCS projects primarily involve matters of scale and delivering product in cost-competitive manner.



Why CCS?

- CCS can help reduce CO₂ emissions associated with major industrial sources, such as coal-fired power plants.
- CCS can facilitate continued reliance on carbon-intensive industrial sources while advancing climate change policies.
- Vast potential for CCS to capture CO₂: As much as 3,600 billion tons of CO₂ could be stored in the U.S. and Canada, while large stationary sources produce about 13 billion tons of CO₂ each year

Source: <http://www.epa.gov/climatechange/ccs/index.htm>,
<http://www.globalccsinstitute.com/ccs/FAQs/frequently-asked-questions/>,
<http://science.howstuffworks.com/environmental/green-science/carbon-capture.htm>



CCS Regulatory Framework

- Clean Air Act
 - New Source Review permit
 - New Source Performance Standard (NSPS)
- Safe Drinking Water Act (injection well permits)
 - Required for injection wells that may impact water supplies
 - Class II or VI well permit (see below)
- National Environmental Policy Act (NEPA)
 - Federal lead agencies must generally consider the effects of climate change
 - State-equivalents to NEPA (e.g., California Environmental Quality Act (CEQA))
- State and local permits
 - States may have separate permitting requirements for large industrial sources, such as power plants (e.g., California Energy Commission)

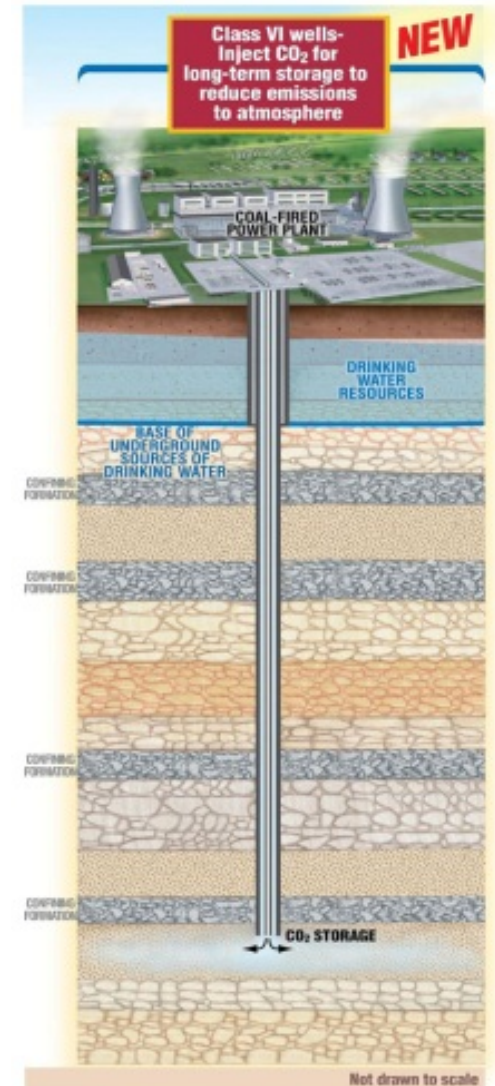


Source: <http://www.epa.gov/carbonpollutionstandard/pdfs/20120327proposalRIA.pdf>,
<http://yosemite.epa.gov/opa/admpress.nsf/79c090e81f0578738525781f0043619b/9b4e8033d7e641d9852579ce005ae957!OpenDocument> , <http://www.epa.gov/carbonpollutionstandard/pdfs/20120327factsheet.pdf>

CCS Regulatory Framework

- Safe Drinking Water Act: Which Class?
- Class VI:
 - New EPA class designed for CCS
 - Criteria for Class VI wells, include use of materials compatible with geologic sequestration, broad monitoring, and financial responsibility requirements
 - No states have been delegated Class VI permitting authority
- Class II
 - Allows Enhanced Oil Recovery (EOR)
 - Industry has used CO₂ EOR for many years
 - CO₂ EOR allows further extraction of oil from fields that are otherwise exhausted

Source: <http://water.epa.gov/type/groundwater/uic/class6/gclass6wells.cfm>



Resource Conservation and Recovery Act (RCRA)

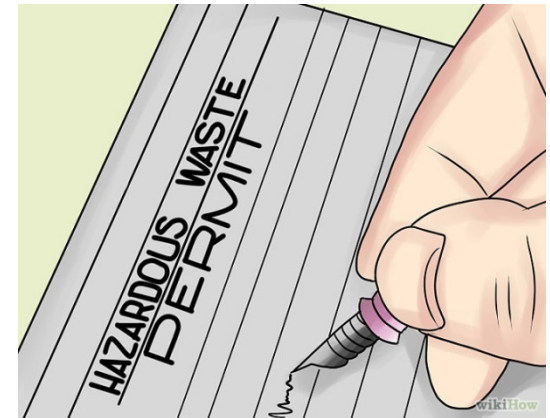
- Regulates the management and disposal of municipal and industrial solid waste.
- Three main programs:
 - Solid Waste
 - Hazardous Waste – “cradle to grave”
 - Underground Storage Tanks



Source: <http://www.epa.gov/osw/inforesources/pubs/orientat/rom1.pdf>

Need for Rulemaking

- Is any form of injected CO₂ is regulated by RCRA?
- EPA undertook this rulemaking to provide regulatory clarity for geologic sequestration projects using Class VI wells.
- Proposed rule published in August 2011
 - Stakeholders raised concerns that proposed rule could create de-facto classification of CO₂ streams as a solid waste even when used as a valuable commodity for EOR



Final Rule

- EPA excludes CO₂ streams from the definition of hazardous wastes, provided that the streams are:
 - (1) Transported in compliance with DOT requirements;
 - (2) Injected into Class VI wells in compliance with applicable requirements;
 - (3) Not mixed or co-injected with any other hazardous wastes; and
 - (4) Certified by the generators and Class VI well operators claiming the exclusion that the conditions of the exclusion were met.



Source: 79 Fed. Reg. 350, *Hazardous Waste Management System: Conditional Exclusion for Carbon Dioxide (CO₂) Streams in Geologic Sequestration Activities* (Jan. 3, 2014)

Final Rule

- EPA determined that CO₂ injected into Class VI wells for the purpose of geologic sequestration meets the definition of a “discarded material” under RCRA because the CO₂ is being injected for “the express purpose of isolating the CO₂ so that it does not return to the atmosphere.”
- EPA found that “a supercritical CO₂ stream is a solid waste when it is to be discarded through abandonment by disposing of the material in an UIC Class VI well.”



Final Rule

- EPA recognized that even if some injected CO₂ could be classified as a RCRA solid waste, injected CO₂ as a class should not be impliedly considered a *hazardous waste*.
- EPA noted that some hazardous waste characteristics were unlikely to apply to most injected CO₂.
- EPA intended the RCRA exemption to give regulated parties the option to rely on the exemption to avoid the potential implications of RCRA applicability.



Final Rule

- EPA reiterated that the Final Rule did not change the regulatory status of CO₂ injected into wells *other* than Class VI wells.
- Although EPA did not address whether CO₂ injected in Class II wells for EOR could be considered a RCRA solid waste, EPA noted:
 - “[I]the interest of public transparency and in light of the several public comments on this issue... ***should CO₂ be used for its intended purpose as it is injected into UIC Class II wells for the purpose of [EOR], it is EPA’s expectation that such an injection process would not generally be a waste management activity.***”



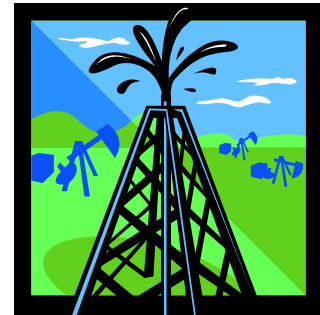
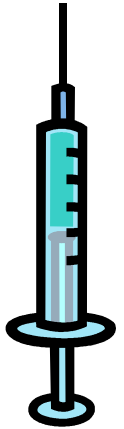
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EPA's Draft Guidance that Could Impose Class VI Well Requirements on EOR

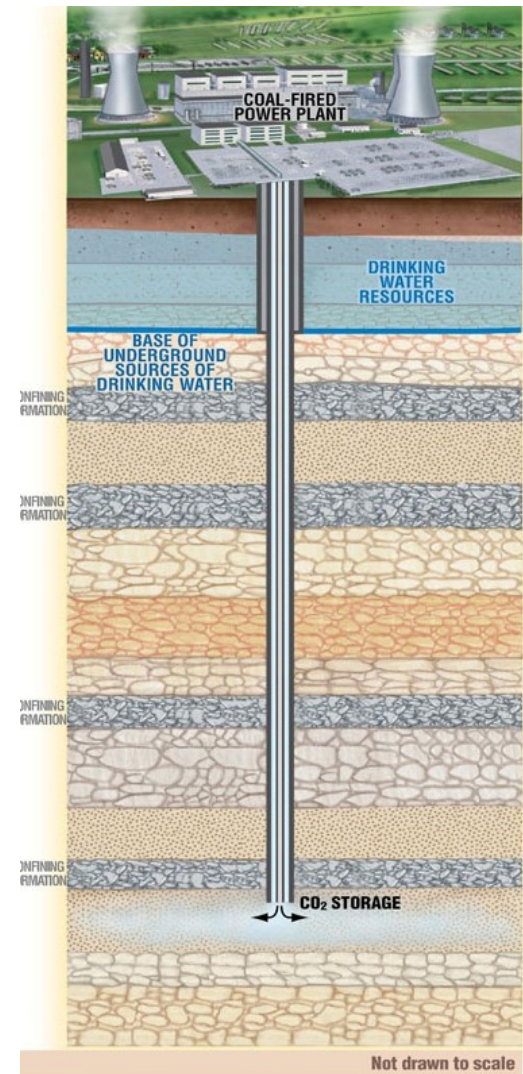
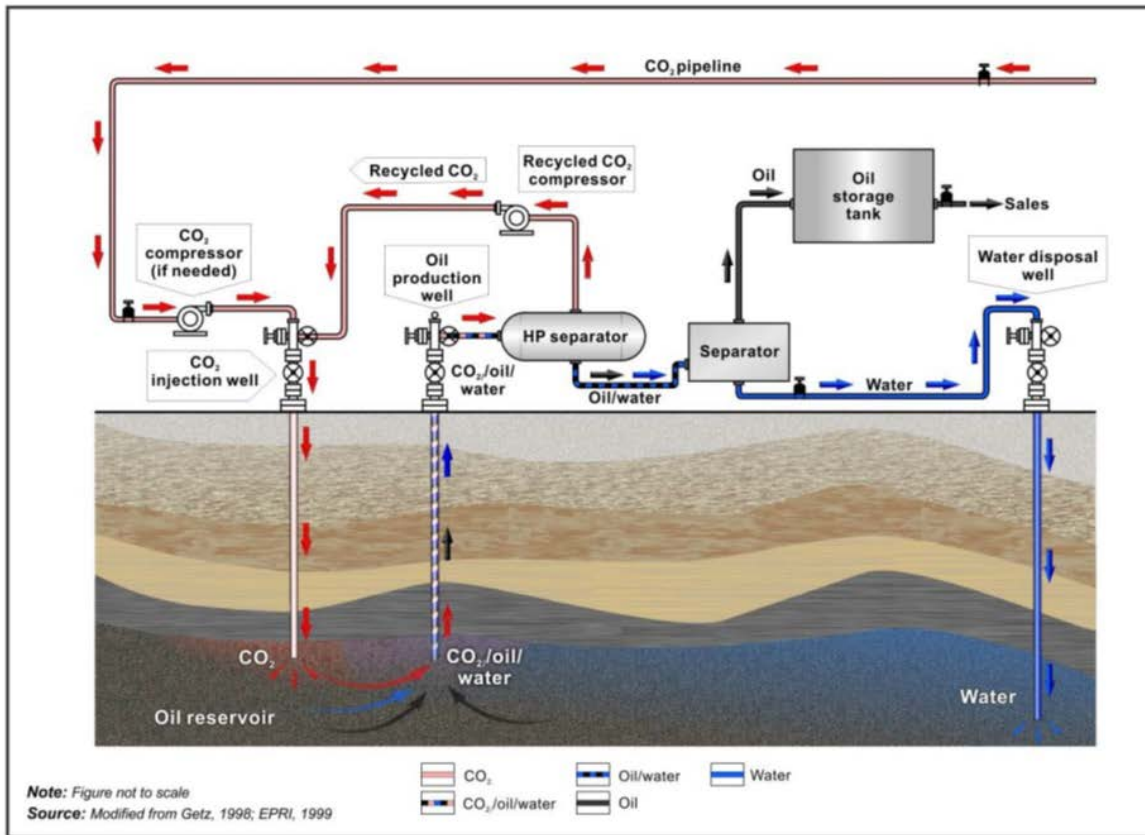
Presented by Joshua T. Bledsoe

Underground Injection Control (UIC) Program

- Driven by Safe Drinking Water Act, not Clean Air Act
- Responsible for establishing regulations for the construction, operation, permitting and closure of injection wells via which fluids are placed underground
- EPA's regulations (40 CFR Parts 144 through 148) establish six classes of injection wells, based on injection activity and fluids
 - Class II – Enhanced Oil/Gas Recovery (ER)
 - Goal of Injection of CO₂ = Increasing or Enhancing production
 - Class VI – Geologic Sequestration (GS)
 - Goal of Injection of CO₂ = Long-term storage of CO₂



Class II Well and Class VI Well



Need for Guidance

- Some CO₂ is sequestered during ER
- UIC Program requires owners/operators that are injecting CO₂ for the “primary purpose” of long-term storage into an oil and gas reservoir to apply for and obtain a Class VI permit when there is an “increased risk” of endangerment to underground sources of drinking water (USDW), compared to Class II operations. 40 CFR § 144.19(a).
- Class VI requirements are much more burdensome
 - Construction
 - Operation and Mechanical Integrity
 - Reporting
 - Well Plugging
 - Post-Injection Site Care and Closure (PISC)
 - Posting Financial Instruments
 - Long-term Liability



Draft UIC Program Guidance on Transitioning Class II Wells to Class VI Wells, EPA-816-P-13-004 (December 2013)

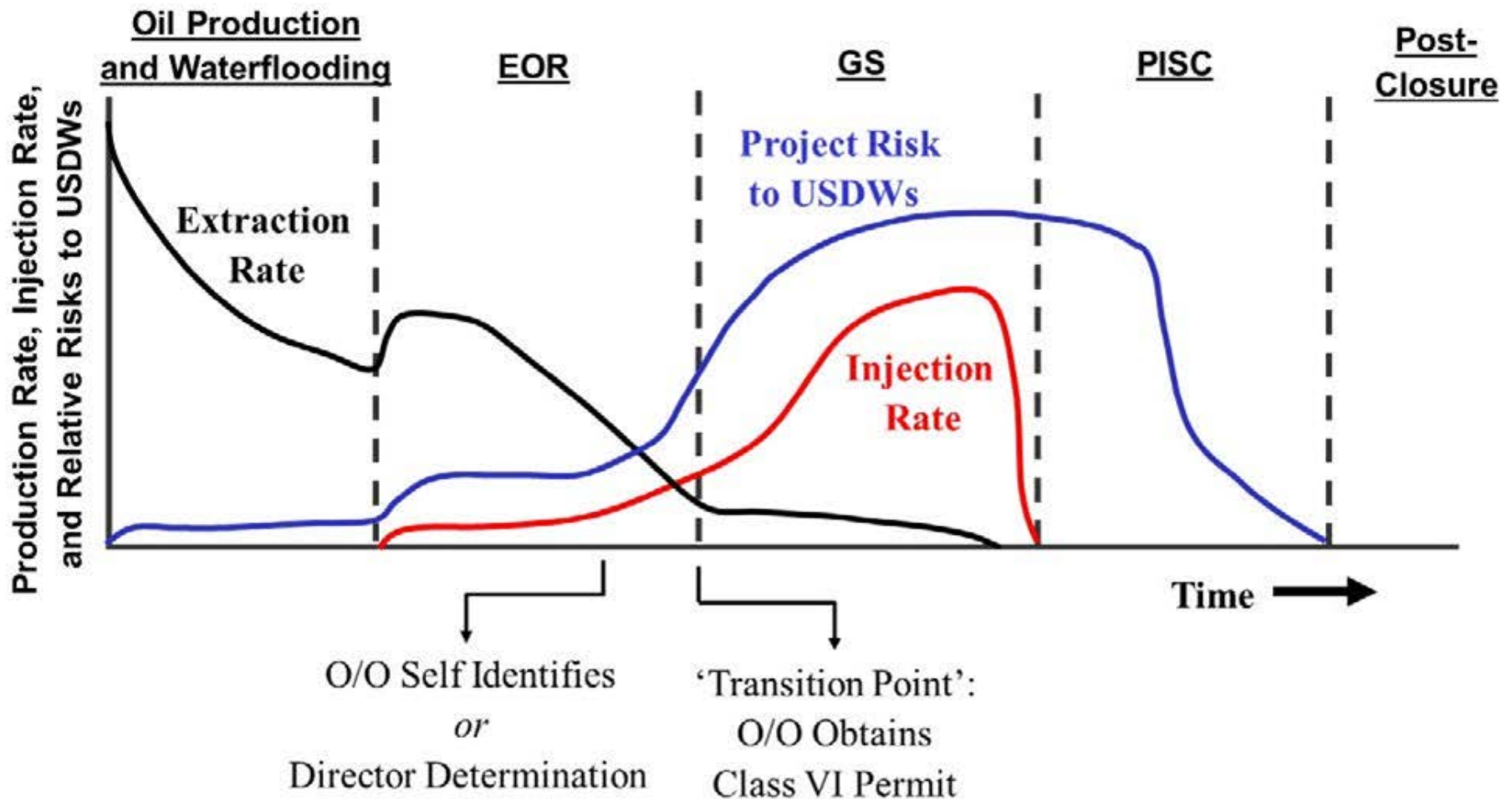
- Two-prong test exists to determine if transition is required:
 - (1) **Is the “primary purpose” of the carbon dioxide injection geologic sequestration?** If no, then a Class II permit may continue to be used. If yes,
 - (2) **Is there an increased risk to USDWs compared to Class II operations?** If no, then a Class II permit may continue to be used. If yes, then a Class VI permit is required.
- Factors:
 - Increase in reservoir pressure;
 - Increase in carbon dioxide injection rates;
 - Decrease in reservoir production rates;
 - Distance between injection zone and USDWs;
 - Suitability of Class II [Area of Review] AoR delineation;
 - Quality of abandoned well plugs;
 - Anticipated recovery of injected carbon dioxide at cessation of injection;
 - Source and properties of injected carbon dioxide; and
 - Additional factors determined by the UIC Program Director.



EPA Bias for Transition

- EPA envisions that the “primary purpose” of all ER operations that intend for injected carbon dioxide to remain underground (as opposed to being extracted for reuse in another location) eventually will transition from production to GS
 - “If the anticipated plan for the end of the project changes from recovery of carbon dioxide [for use at another ER project] to maximizing carbon dioxide storage, this indicates that the primary purpose of the project is GS. Given this, risks to USDWs will remain after injection ceases, and therefore, post-injection monitoring and site care should be required. For these reasons, a Class VI permit may be required.”
 - EPA “believes that if the business model for a well or group of wells changes from an ER-focused activity to one that maximizes carbon dioxide injection volumes and permanent storage, then the risk of endangerment to USDWs is likely to increase and such wells may need to be re-permitted as Class VI wells”

Hypothetical EOR to GS Project



Implications of Guidance

- While UIC program is focused on the protection of USDW and not development of Carbon Capture and Sequestration (CCS), the Draft Guidance impacts:
 - ER Owners and Operators
 - Electricity Generating Units (EGUs)
 - Mining Companies (primarily coal)
- Clean Air Act section 111(b) – New Source Performance Standards for GHGs. 79 Fed. Reg. 4439 (Jan. 28, 2014)
 - 1,000 or 1,100 lbs CO₂/MWh, depending power plant size
 - EPA relies on ability of EGUs to use ER as storage option to facilitate compliance as selling captured CO₂ to ER operators would offset some costs of installing capture on an EGU
 - Integrated Gasification Combined Cycle (IGCC) coal plants would need to do CCS
 - UIC Class II + Subpart RR GHG Reporting = GS



Issues to Track

- Ramifications for both NSPS for GHGs and CCS Projects
 - “ER operators have made it clear that they will not purchase captured CO₂ from EGUs if it would require a transition from UIC Class II to Class VI.”
 - Comment Letter (Feb. 28, 2014) on Draft Guidance by Edison Electric Institute, American Coalition for Clean Coal Energy, the National Mining Association, and the Coal Utilization Research Council
 - EGUs that need GS credit will need CO₂ ER offtaker to perform Subpart RR GHG Reporting
 - Subpart RR requires EPA approval of “MRV” Plan, which can be judicially challenged
- Prevention of Significant Deterioration (PSD) Best Available Control Technology (BACT) determinations
 - NSPS is “BACT floor”
- Increasing Importance of “Aquifer Exemptions”
 - Affects Prong 2 of transition test (risk to USDWs)
 - Could lead to weird results vis-à-vis EPA’s RCRA non-hazardous waste determination for CCS
 - If injecting CO₂ into exempt aquifer, then use of Class II is appropriate; however, CO₂ could be a “waste” since RCRA exemption limited to Class VI

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Questions

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