Legal and Technical Dynamics of Carbon Capture, Utilization, and Storage

October 13, 2023
Landscape Discussion on Energy Law and Policy in the Rockies

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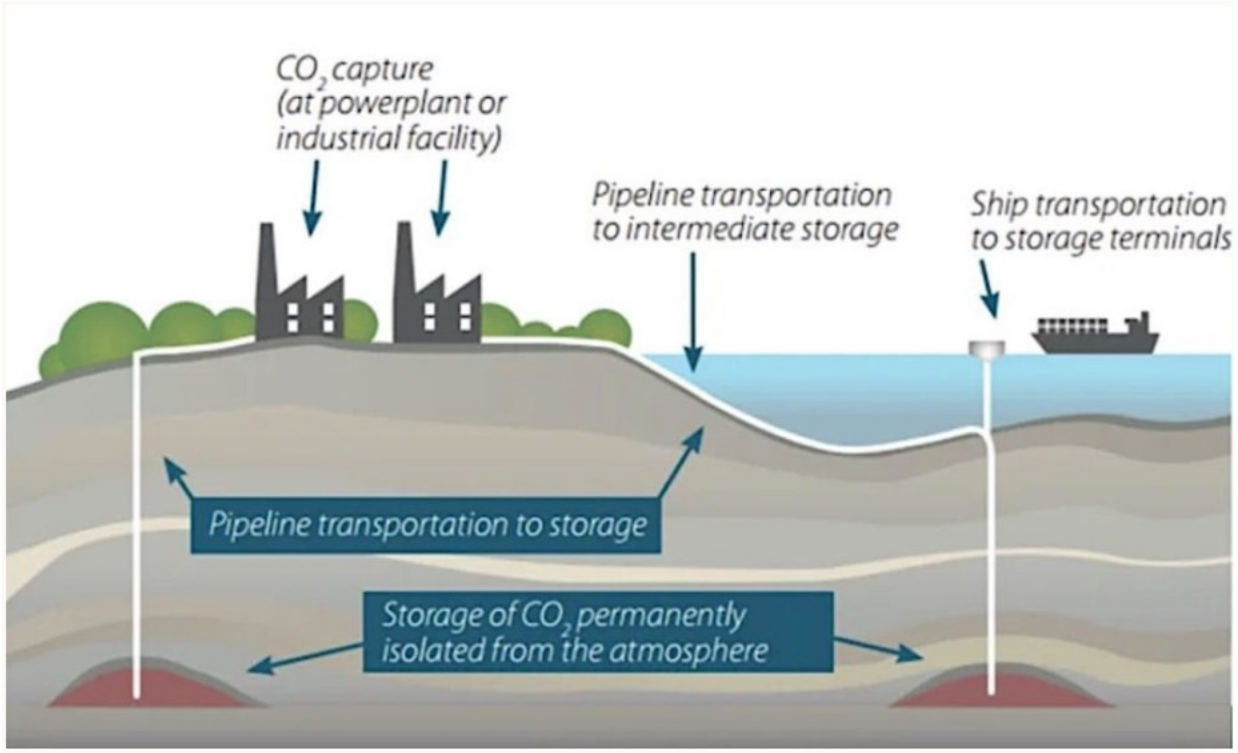
WHAT IS CCUS?

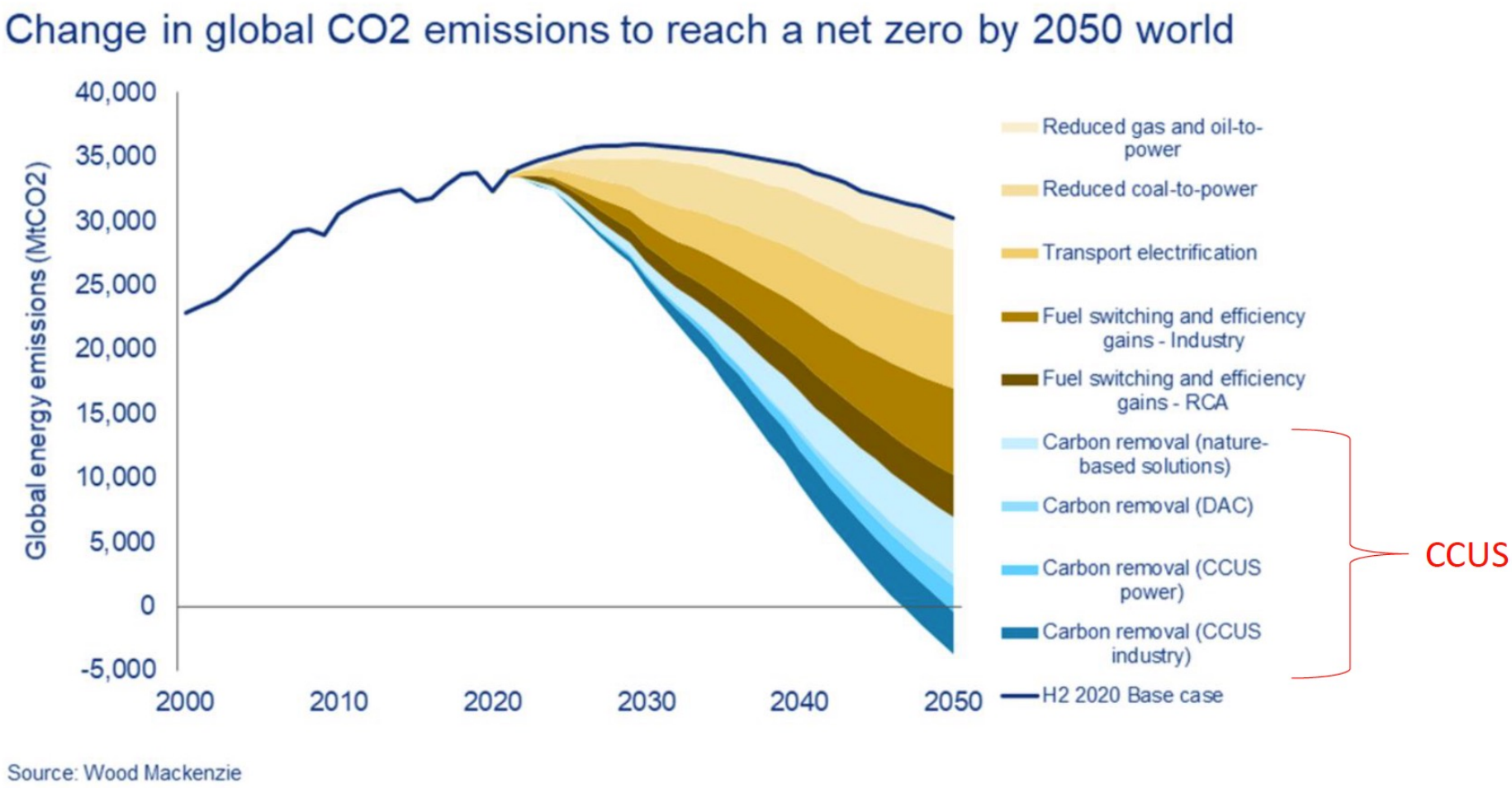
Carbon Capture and Storage (CCUS)

- Objective: the Long-term Storage of Anthropogenic CO_2 in Subsurface Reservoirs
- Multidisciplinary challenge, requiring specialists in Geology, Engineering, Environmental Sciences, Economics, Business, Regulation and Policy, Education, and Outreach
- Rigorous permitting requirements to ensure long-term safety, financial responsibility, and containment.
- 3 stages: capture, transport, and storage or utilization



Carbon capture and storage. CCSP

WHY CCUS?



Source: Wood Mackenzie

COMMERCIAL DRIVERS: 45Q AND VOLUNTARY CREDIT MARKETS

45Q provides a tax incentive to encourage utilization and storage of CO_2, expanding demand and markets for pore space.

- Requires "Secure Geological Storage" of "Qualified Carbon Oxide"
  - Not limited to injection or saline storage
    - Captured at industrial source;
    - Would otherwise be released;
    - Disposed of in Secure Geological Storage
  - Volume
    - Calculated based on lifecycle analysis of GHG emissions
    - Measured at source and verified at point of injection
- Credits for DAC, geologic storage ($60/ton), and CO_2-EOR or utilization ($85/ton)
- Encourages use of anthropogenic CO_2 through higher credit
  - Qualified Carbon Oxide from industrial sources
- Storage Operators may also monetize carbon removals in voluntary markets

PUBLIC INVESTMENT IN R&D

Advanced Fossil Energy
Loan Guarantees

LPO
Loan Programs Office

Technology Spotlight: Carbon Capture, Utilization, and Storage

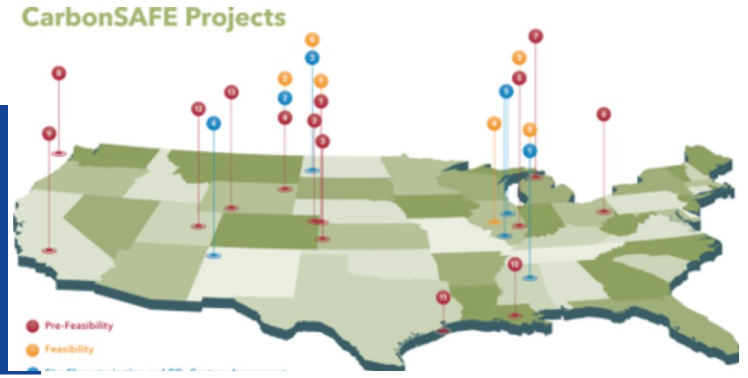
Through its Title 17 Innovative En
Loan Guarantee Program, LPO ca
finance carbon capture, utilizatio
storage (CCUS) projects at comm
scale with $8.5 billion of available
guarantees.

Cluster 4: Digital, Industry and Space

Policy, strategy, how to apply and work programmes.

Front-End Engineering and Design Program Out Activities Under Carbon Capture Tech Program 962 Of Environmental Protection Agency (Sec 40303)

Commission invests €3 billion in innovative clean tech projects to deliver on REPowerEU and accelerate Europe's energy independence from Russian fossil fuels



CAPTURE: A QUALIFIED CARBON OXIDE

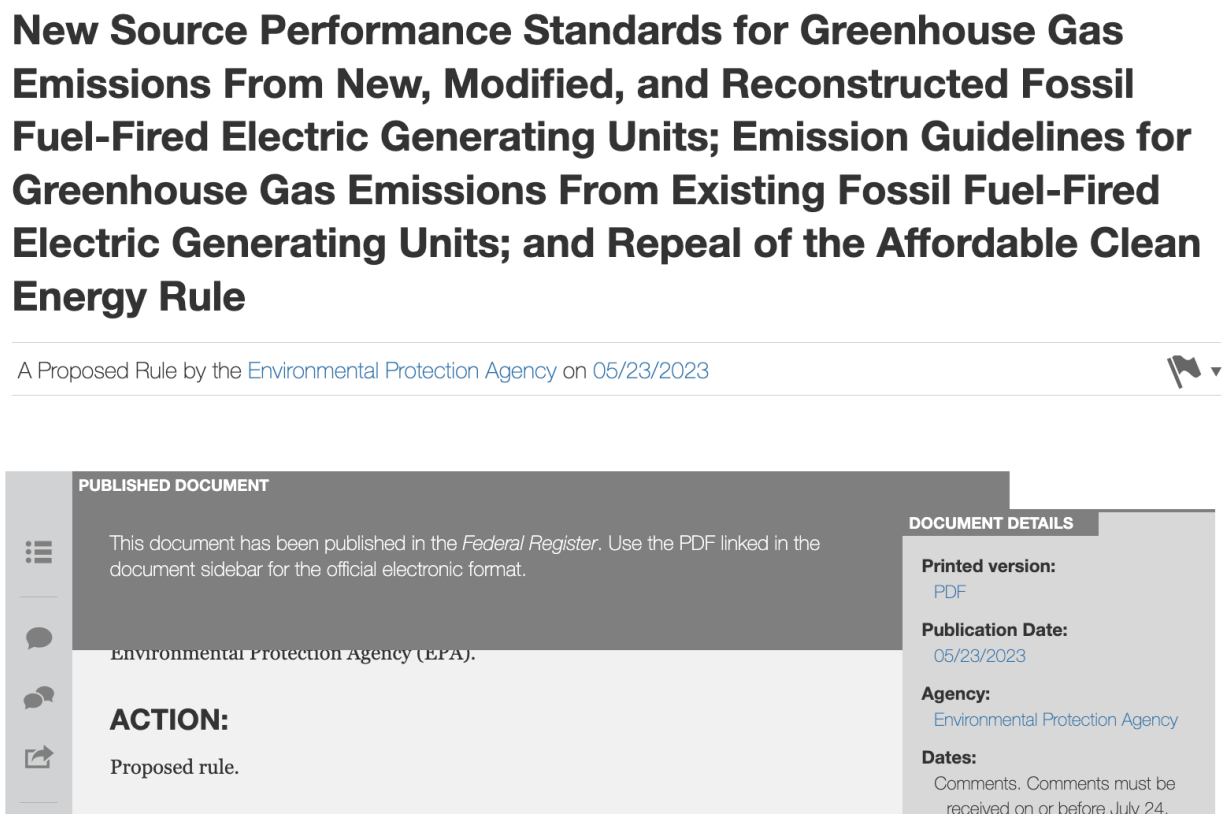
Section 45Q(c)(1) defines "qualified carbon oxide" as—

- any carbon dioxide that is **captured from an industrial source** by carbon capture equipment **that would otherwise be released into the atmosphere** as an industrial emission of greenhouse gas or lead to such release, **and is measured at the source of capture and verified at the point of disposal**, injection, or utilization;
- in the case of a direct air capture facility, **any carbon dioxide that is captured directly from the ambient air, and is measured at the source of capture and verified at the point of disposal**, injection, or utilization.

Section 45Q(c)(2) provides that the term "qualified carbon oxide" **includes the initial deposit of captured carbon oxide used as a tertiary injectant** but does not include carbon oxide that is recaptured, recycled, and re-injected as part of the enhanced oil and natural gas recovery process.

CAPTURE: A BEST SYSTEM OF EMISSIONS REDUCTION?

"For base load units, the EPA is proposing two pathways as potential BSER—(1**) the use of CCS to achieve a 90 percent capture of GHG emissions by 2035** and (2) the co-firing of 30 percent (by volume) low-GHG hydrogen by 2032, and ramping up to 96 percent by volume low-GHG hydrogen by 2038."



New Source Performance Standards for Greenhouse Gas Emissions From New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions From Existing Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule

A Proposed Rule by the Environmental Protection Agency on 05/23/2023

PUBLISHED DOCUMENT

This document has been published in the *Federal Register*. Use the PDF linked in the document sidebar for the official electronic format.

Environmental Protection Agency (EPA).

ACTION:

Proposed rule.

DOCUMENT DETAILS

Printed version:
PDF

Publication Date:
05/23/2023

Agency:
Environmental Protection Agency

Dates:
Comments. Comments must be received on or before July 24.

TRANSPORTATION: CO2 PIPELINES

Energy | Sustainable Markets | Fuel | Grid & Infrastructure | Renewable Fuels

Summit Carbon Solutions denied permit for carbon dioxide pipeline

By **Leah Douglas**

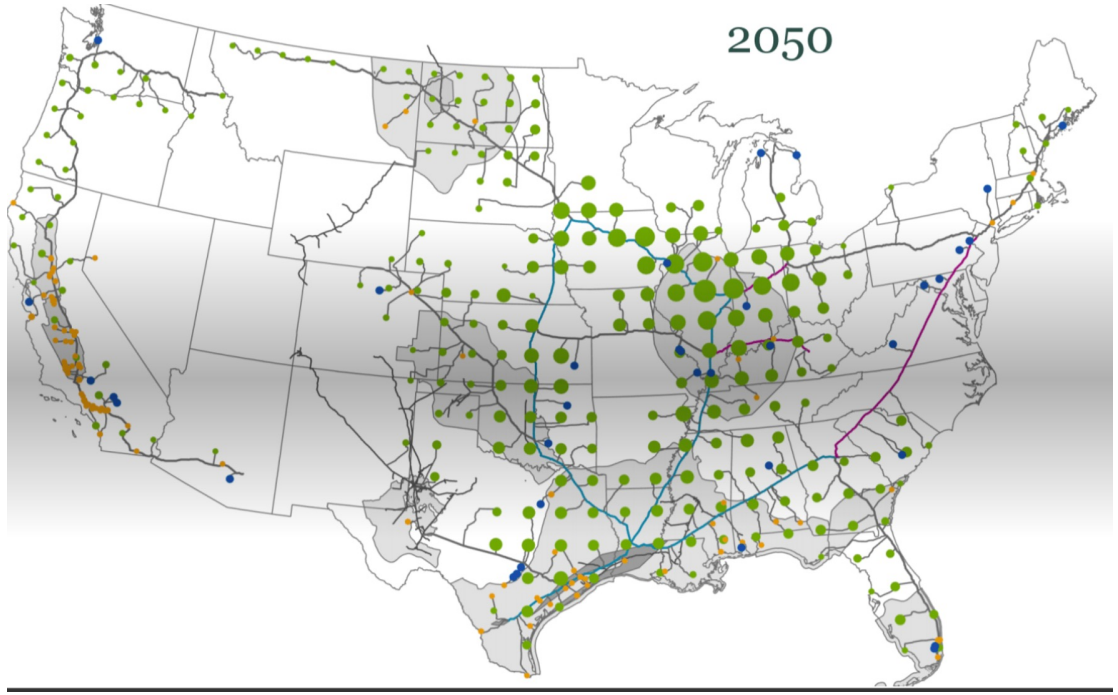
September 11, 2023 11:44 AM MDT · Updated a month ago

Companies

Summit Carbon Solutions, Llc — Follow

Sept 11 (Reuters) - South Dakota's Public Utilities Commission on Monday denied a permit application from Iowa-based Summit Carbon Solutions to build 495 miles (796 km) of pipeline through the state to transport captured carbon dioxide from ethanol plants to an underground storage site.

The three-member commission voted unanimously to deny the company's application on what was set to be the first day of three weeks of evidentiary hearings on the project.



117. Pipeline Safety – Safety of Carbon Dioxide Pipelines

Popular Title: Carbon Dioxide Pipelines
RIN 2137-AF60
Stage: NPRM

Abstract: This Proposed rulemaking would amend PHMSA's Pipeline Safety Regulations (49 CFR parts 190-199) to adopt revisions that would enhance the safe transportation of carbon dioxide by pipelines to accommodate an anticipated increase in the number of carbon dioxide pipelines and volume of carbon dioxide transported. Also, this proposed rulemaking would include requirements related to emergency preparedness and response for carbon dioxide.

Dates for NPRM:

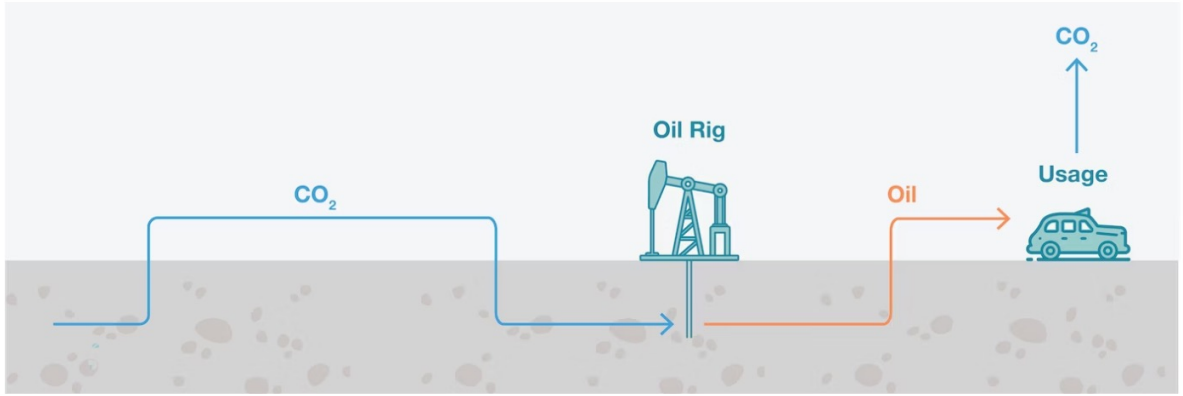
Action	Publication Date	FR Cite
NPRM	10/00/2024	

Frontier Signs $53M In Carbon Offtake Agreements With Charm Industrial

by **Violet George** · May 19, 2023 · 2 minute read

UTILIZATION: EOR, CARBON-BASED PRODUCTS, AND SYNTHETIC FUELS

- EOR Injections are permitted under Class II
- MRV Plans approved under Subpart UU
- Operator may expand the areal extent of existing aquifer exemptions to allow for geologic sequestration under 40 CFR 146.4



(5) UTILIZATION OF QUALIFIED CARBON OXIDE

(A) In general

For purposes of this section, utilization of qualified carbon oxide means—

(i) the fixation of such qualified carbon oxide through photosynthesis or chemosynthesis, such as through the growing of algae or bacteria,

(ii) the chemical conversion of such qualified carbon oxide to a material or chemical compound in which such qualified carbon oxide is securely stored, or

(iii) the use of such qualified carbon oxide for any other purpose for which a commercial market exists (with the exception of use as a tertiary injectant in a qualified enhanced oil or natural gas recovery project), as determined by the Secretary.

GEOLOGIC STORAGE: PORE SPACE ACQUISITION

Ownership of Pore Space

WYO. STAT. ANN. § 34-1-152

Pore space unitization for geologic storage

WYO. STAT. ANN. § 35-11-313 to 316

Ownership of Injected Substances

WYO. STAT. ANN. § 34-1-153

June 1, 2023 **BOARD MATTER D – 12**

ACTION:	**CONSIDER APPLICATION FOR SPECIAL USE LEASE**
AUTHORITY:	**W.S. § 36-5-114; Board of Land Commissioners' Rules andRegulations, Chapter 5, Section 3**
Type of Use:	Carbon Dioxide (CO2) Storage in Subsurface Pore Space
Lease No.:	SU-1093
Applicant:	Tallgrass High Plains Carbon Storage, LLC
County:	Laramie
Acres:	± 8,115

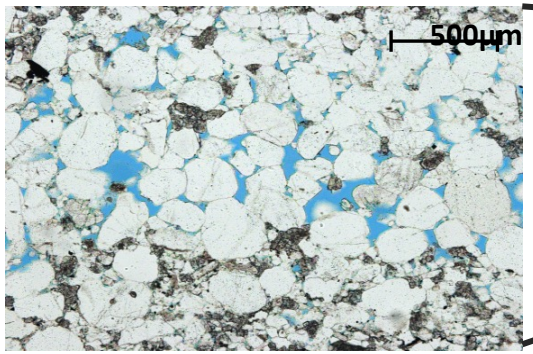
February 27, 2023 **BOARD MATTER D – 1**

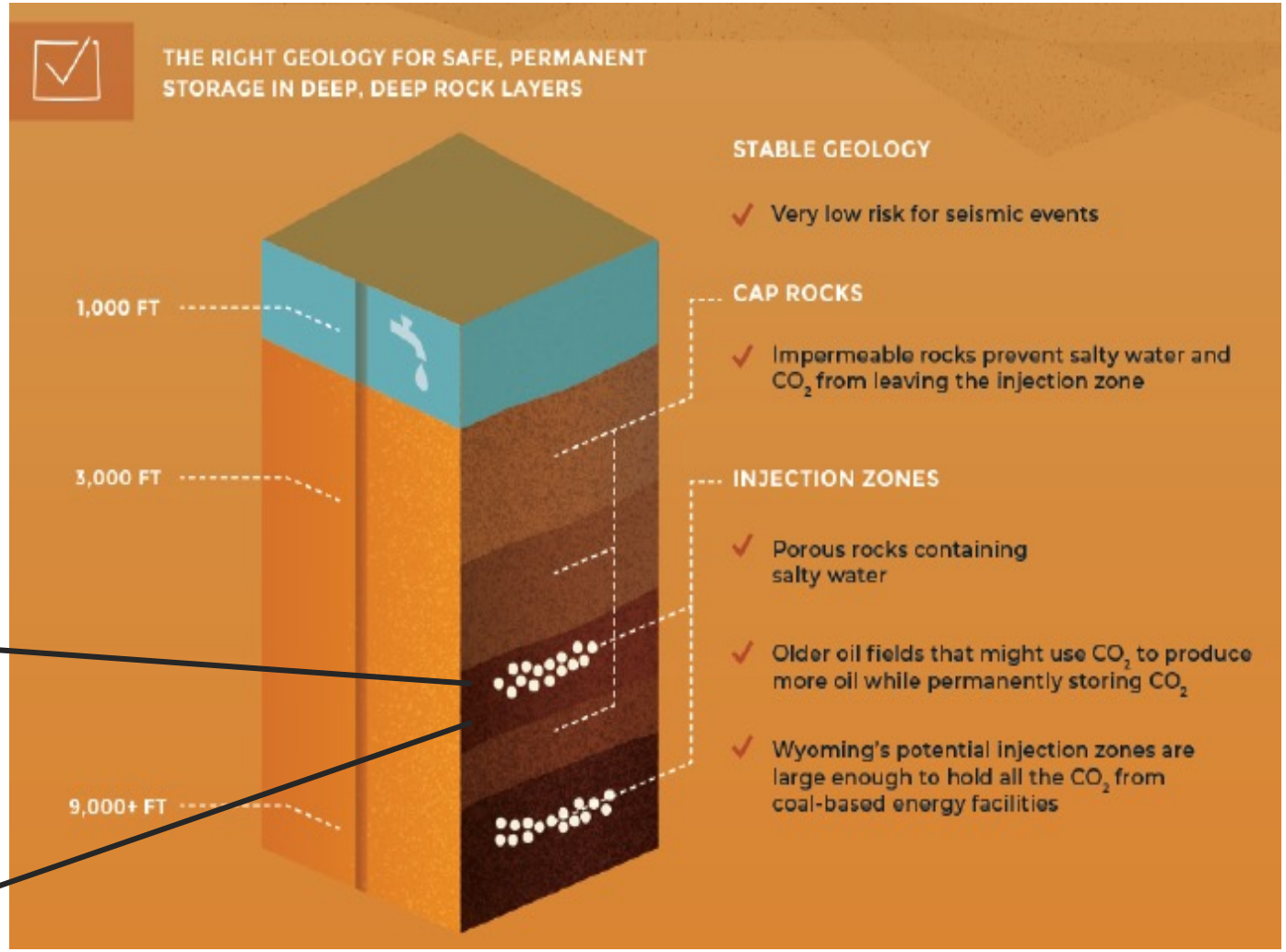
ACTION:	**CONSIDER APPLICATION FOR SPECIAL USE LEASE**
AUTHORITY:	**W.S. § 36-5-114; Board of Land Commissioners' Rules andRegulations, Chapter 5, Section 3**
Type of Use:	Carbon Dioxide (CO2) Storage in Subsurface Pore Space
Lease No.:	SU-1085
Applicant:	Pond Field, LLC
Counties:	Lincoln, Sweetwater, and Uinta
Acres:	± 6,720

GEOLOGIC STORAGE: SITE CHARACTERIZATION

- Baseline groundwater assessment
- Aquifer characterization/Salinity
- Frac Pressure Gradients
- Anthropogenic Risks (Legacy Wells, Mineral Estates)
- Geologic Risks (Faults, Pressures, Compartmentalization)
- Heterogeneity and Scale

WYO. STAT. ANN. § 30-5-110





GEOLOGIC STORAGE: PERMITTING

Wyoming Underground Injection Control Program; Class VI Primacy

A Rule by the Environmental Protection Agency on 10/09/2020

PUBLISHED DOCUMENT

AGENCY:

Environmental Protection Agency (EPA).

ACTION:

Final rule.

SUMMARY:

The Environmental Protection Agency (EPA or Agency) is hereby approving an application from the State of Wyoming under the Safe Drinking Water Act (SDWA) to implement an underground injection control (UIC) program for Class VI injection wells to protect underground sources of drinking water located within the state, except within Indian lands. EPA will continue to administer all well classes within Indian lands. Class VI wells are used for the underground injection of carbon dioxide into deep subsurface rock formations for long-term storage.

DOCUMENT DETAILS

Printed version:
PDF

Publication Date:
10/09/2020

Agency:
Environmental Protection Agency

Dates:
This final rule is effective on October 9, 2020. The Director of the Federal Register approved this incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51 on October 9, 2020.

Effective Date:
10/09/2020

Document Type:
Rule

1.0 Facility Information

i) Reporter number: 523107
The AGI wells report under the Shute Creek Treating Facility (SCTF) Greenhouse Gas Reporting Program Identification number, which is: 523107.

ii) Underground Injection Control (UIC) Permit Class: Class II
The Wyoming Oil and Gas Conservation Commission (WOGCC) regulates oil and gas activities in Wyoming. Both AGI wells in LaBarge are classified as UIC Class II wells.

iii) UIC injection well identification numbers:

Well Name	AGI 2-18	AGI 3-14
Well Identification Number	4902321687	4902321674

ExxonMobil Shute Creek Treating Facility
Subpart RR Monitoring, Reporting and Verification Plan

MONITORING AND VERIFICATION

E. Testing and Monitoring Requirements

The owner or operator of a Class VI well must prepare, maintain, and comply with a testing and monitoring plan to verify that the geologic sequestration project is operating as permitted and is not endangering USDWs. The testing and monitoring plan must be submitted with the permit application, for WQD Administrator approval, and must include a description of how the owner or operator will meet the requirements of this section, including accessing sites for all necessary monitoring and testing during the life of the project.

Testing and monitoring associated with geologic sequestration projects must include the information identified in WQRR Chapter 24, Section 14.

V. STATE COMPLIANCE MONITORING PROGRAM

All Class VI permits are required to have a provision that requires the permittee to allow the WQD Administrator, or an authorized representative of the WQD Administrator, upon the presentation of credentials, during normal working hours, to enter the premises where a regulated facility is located, or where records are kept under the conditions of this permit, and inspect the discharge and related facilities, review and copy reports and records required by the permit, collect fluid samples for analysis, measure and record water levels, and perform any other function authorized by law or regulation.

A. Plan Review

The WDEQ will verify that the storage facility construction, completion, operation, maintenance, and closure procedures are performed according to approved plans and specifications, and meet all permit or regulatory requirements. Verification of Class VI injection well activities is accomplished by reviewing appropriate plans and reports, performing on-site inspections, responding to complaints, and, where necessary, referring noncompliance to the enforcement

40 CFR § 98.448 - Geologic sequestration monitoring, reporting, and verification (MRV) plan.

CFR | Table of Popular Names

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§ 98.448 Geologic sequestration monitoring, reporting, and verification (MRV) plan.

(a) ***Contents of MRV plan.*** You must develop and submit to the Administrator a proposed MRV plan for monitoring, reporting, and verification of geologic sequestration at your facility. Your proposed MRV plan must contain the following components:

(1) Delineation of the maximum monitoring area and the active monitoring areas. The first period for your active monitoring area will begin from the date determined in your MRV plan through the date at which the plan calls for the first expansion of the monitoring area. The length of each monitoring period can be any time interval chosen by you that is greater than 1 year.

LIABILITY

34-1-153. Ownership of material injected into geologic sequestration sites; liability for holding interests related to a sequestration site or giving consent to allow geologic sequestration activities.

(a) All carbon dioxide, and other substances injected incidental to the injection of carbon dioxide, injected into any geologic sequestration site for the purpose of geologic sequestration shall be presumed to be owned by the injector of such material subject to W.S. 35-11-318 and 35-11-319 and all rights, benefits, burdens and liabilities of such ownership shall belong to the injector. This presumption may be rebutted by a person claiming contrary ownership by a preponderance of the evidence in an action to establish ownership.

(b) Except as provided in W.S. 35-11-318 and 35-11-319, no owner of pore space, other person holding any right to control pore space or other surface or subsurface interest holder, shall be liable for the effects of injecting carbon dioxide for geologic sequestration purposes, or for the effects of injecting other substances for the purpose of geologic sequestration which substances are injected incidental to the injection of carbon dioxide, solely by virtue of their interest or by their having given consent to the injection.

35-11-319. Certificate of project completion; release; transfer of title and custody.

(a) After all carbon dioxide injections underground or into pore space are completed as provided by a permit issued under W.S. 35-11-313 and upon application by the injector holding title to the carbon dioxide under W.S. 35-11-318, the department may issue a certificate of project completion. The department shall only issue a certificate upon satisfaction of the conditions imposed under subsections (b), (c) and (d) of this section and after providing public notice of the application, an opportunity for public comment and a public hearing on the application.

(b) A certificate of project completion shall not be issued until at least twenty (20) years after carbon dioxide injections end.

(c) A certificate of project completion shall not be issued until the injector with title to the carbon dioxide establishes to the satisfaction of the department that:

(i) The injector is in full compliance with all laws governing the injection and storage of the carbon dioxide;

(ii) The injector has addressed any pending claims regarding the injection and storage of the carbon dioxide;

(iii) The underground place or pore space where the carbon dioxide was injected or stored is expected to no longer expand vertically or horizontally and poses no threat to human health, human safety, the environment or underground sources of drinking water;