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Illinois Storage Corridor

CarbonSAFE Phase III

Policy, Regulatory, Legal and Permitting Characteristics
Subtask 5.5

Technical Report

Authors:
John Koenig, Christopher Korose, and Carl Carman

University of Illinois Urbana-Champaign
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Principal Investigator:
Dr. Roland Okwen
Illinois State Geological Survey
615 E Peabody Drive
Champaign, IL 61820, 7406

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Illinois State Geological Survey
PRAIRIE RESEARCH INSTITUTE

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EXECUTIVE SUMMARY

The Illinois Storage Corridor (ISC) project aims to advance the commercial development and implementation of carbon capture and storage (CCS) technologies within a region in Illinois of suitable geology for carbon dioxide (CO_2) storage in deep saline aquifers. The project partners have annual emissions greater than 6.5 million tonnes per year; storage hubs are being explored at two sites, one near the One Earth Energy facility in east-central Illinois, and one near the Prairie State Generating Company campus in southwest Illinois. To implement the technology, legal, policy, and economic considerations must be explored. [1]

The United States Environmental Protection Agency (US EPA) administers the Underground Injection Control (UIC) program and is responsible for issuing Class VI permits to construct and operate CO_2 injection wells, i.e., a UIC Class VI well permit is required to inject CO_2 into the subsurface for geologic sequestration. The largest consideration of the Class VI well requirements is to protect underground sources of drinking water (USDWs). Additionally discussed are considerations for Class VI permits relating to public engagement.

Besides permitting, property rights to storage sites, subsurface pore spaces, and areas for pipeline transportation must be secured. Pore space rights is still a novel concept being explored and not yet addressed by the Illinois legislature. It is believed that surface property rights are required for the subsurface pore space below, so long as there is not a separated mineral estate in the subsurface. Illinois legislature has addressed securing rights-of-way for CO_2 transportation, allowing for easements and the exercise of eminent domain to secure such rights.

Economically, the incentives for CCS are ever-expanding. Recently, the federal government broadened the availability and increased the dollar-amounts for the § 45Q tax credits for geological storage of carbon oxides. Congress has also authorized the Advanced Industrial Facilities Development Program which allocates billions of dollars in funds to installing technology at industrial facilities to reduce greenhouse gas emissions. On the state level, Illinois has had its own incentives for CCS projects since 2009 and expanded its emission-related goals again in 2021. The law enacted in 2021 specifically creates a commission to explore implementing CCS at Prairie State Generating Company, a partner on the Illinois Storage Corridor project.

The Illinois SAFE CCS Act (Public Act 103-0651), enacted in July 2024, establishes a comprehensive regulatory framework for carbon capture and storage projects that supplements US EPA requirements. The Act assigns regulatory authority to Illinois EPA, Illinois (DNR), and the Illinois Commerce Commission, with key provisions including: pore space rights tied to surface estates with integration possible at 75% agreement; CO_2 pipeline safety requirements pending (PHMSA) rule updates; and rigorous permitting requiring no net increase in criteria pollutants and demonstration that capture-related Green House Gas emissions do not exceed total CO_2 captured. Critical requirements include 30-year minimum post-injection monitoring, continuous financial assurance, $25 million insurance coverage, and immediate provision of alternate water supplies if groundwater is contaminated. The Act prohibits using captured CO_2 for enhanced oil recovery, establishes dedicated funding mechanisms including a long-term trust fund, and mandates emergency responder training and public participation throughout permitting.

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INTRODUCTION

The Illinois Storage Corridor project aims to accelerate the commercial deployment of carbon capture and storage (CCS) within the project area, a region with proven geologic storage performance and numerous industrial carbon sources. The project seeks to develop two onshore storage hubs: one near the One Earth Energy (OEE) facility in north-central Illinois, and another near the Prairie State Generating Company (PSGC) campus in south-central Illinois. Both facilities' management are project partners, committed to implementing the technology, each having independently initiated work on CCS projects at the respective sites.

To achieve the project goals, regulations, property rights, and economic incentives must be considered before receiving permits and constructing the storage facility. Notably, project operators must consider the regulatory framework of the United States Environmental Protection Agency (US EPA) Underground Injection Control (UIC) Class VI injection well permit. This report aims to evaluate these three areas in relation to CCS within the Illinois Storage Corridor project region.

CLASS VI REQUIREMENTS

The Safe Drinking Water Act's UIC program is the largest regulatory influence on the injection of CO_2 into deep saline reservoirs. The UIC Class VI permit is issued for wells specifically used to inject CO_2 for geologic sequestration (EPA, 2023). The Safe Drinking Water Act is designed to protect underground sources of drinking water. Permit applicants must meet a list of requirements and criteria to be issued a UIC Class VI permit. The permit application process takes multiple months and addresses the siting, construction, operation, testing, monitoring, and closure of the injection well; in addition, the application must address the buoyancy, subsurface mobility, and corrosivity of the injected CO_2 in the presence of water, and the anticipated CO_2 injection volumes (EPA, 2023). The US EPA requires extensive site characterization, operational, monitoring, financial, and reporting information to be submitted during the permit application process.

Illinois does not have primacy over the issuance of Class VI permits; as a result, the state has adopted the federal UIC Class VI well permitting regulations (Hemrich, 2021). Illinois derived the statutory language from the Code of Federal Regulations, 40 CFR 146.81 *et seq*., codifying it in the state code (Ill. Admin. Code, 2022). The United States EPA and the Illinois EPA administer the Class VI well program.

As an example of the Class VI permitting process, a preliminary UIC permitting plan has been attached (see Appendix) which provides a general outline of tasks, timelines, and information needed to prepare a US EPA Class VI permit application for a storage site for the Illinois Storage Corridor CarbonSAFE Phase III project.

Groundwater Protection

As authorized by the Safe Drinking Water Act, the UIC Program permitting requires protections for groundwater. In the context of CO_2 injection for geologic sequestration, protection of underground sources of drinking water (USDW) is paramount. This is achieved through geological characterization and validation of the storage complex site reservoir and seal integrity, and through successful UIC Class VI well permitting and proper injection well construction (Korose et al., 2018). Importantly, special attention must be paid to the identification of the lowermost USDW to

inform modeling and delineation of the Area of Review (Korose et al., 2022; 40 CFR 146.82).

A USDW is an aquifer in whole or part that supplies (or may supply) a public water system or contains fewer than 10,000 milligrams/liter of Total Dissolved Solids (EPA, 2023). An assessment of the lowermost USDWs within the Area of Review (AoR) must be performed prior to receiving a permit for a Class VI well. Additionally, as part of securing financial responsibility instruments for the Class VI permit, the instruments must be sufficient to address any endangerment of the USDWs within the Area of Review (40 CFR 146.85).

For each of the two Illinois Storage Corridor project sites, the likely lowermost USDW has been identified as the basis for delineating the AoR for Class VI permit preparation.

At the OEE site, where injection is planned in the Cambrian Mt. Simon Sandstone, the likely lowermost USDW has been identified in the St. Peter Sandstone which is present from 2,217 to 2,449 feet (676 to 746 meters) deep and lies approximately 1,492 feet (455 meters) above the Eau Clair Formation, which is the primary seal. Only one well partially penetrates the seal within the OEE Area of Review, which would help to contain any potential well remediation costs.

For the PSGC site, where injection is planned in the Ordovician St. Peter and Everton Sandstones, the likely lowermost USDW in the area has been identified as the upper Pennsylvanian sandstones present within 500 feet (152 meters) below the ground surface and lying over 2,000 feet (610 meters) above the Maquoketa Group, which is the primary seal. Due to the generally shallower injection and confining units at the PSGC site, and the significant oil and gas drilling throughout the Area of Review, potential well remediation at this site may require more attention and resources.

Public Notice and Engagement

Under the enumerated Class VI rules, public notice and participation are required for a proposed Class VI injection well permit (EPA, 2011. *See also* 40 CFR 124.10). As noted in this document's UIC Class VI Permit Plan (see Appendix), the project proponent must be prepared to respond to technical questions and comments from US EPA, and the permit applicant will respond to questions and comments from the public received during the public review period (Korose et al., 2022).

As stated in the EPA's Quick Reference Guide for Public Participation (2011):

> While owners or operators submitting a Class VI permit application do not have specific requirements for public involvement, they may choose to work with the UIC Program Director during the development and execution of a public participation plan for their Class VI permit application (especially in providing background information on the proposed Class VI injection well(s)). The owner or operator may choose to inform the public about the proposed Class VI injection well(s) to solicit community input and to help facilitate increased community acceptance of the proposed Class VI injection well(s).

From Korose, 2022:

> For the case of a Class VI CO_2 injection well (or a Class I waste injection well) permit, the public notice requirements under the UIC program include that the EPA issue notice of the draft permit preparation to key stakeholders and open a public comment period of not less than 30 days. The EPA would also provide at least 30-days' advance notice and hold a

public hearing regarding the permit application if a hearing is specifically requested by the public.

The EPA compiles and responds to all public comments on the permit application. Following a public hearing, there would then be another comment period and subsequent responses from the EPA. Pending no major permit modifications or appeals (which would necessitate other comments/responses), the permit requestor should generally plan for 3-4 months to be dedicated solely to the public notice and comment periods, including a potential public hearing.

PROPERTY RIGHTS

The geologic storage of CO_2 requires an immense amount of space – both on the surface and subsurface. The UIC Class VI requirements and guidelines do not directly address the property rights associated with CO_2 sequestration (Hemrich, 2021). Rather, real property rights in the United States are a matter of state law.[1]

Pore Space Ownership[1]

While property rights are a state-level governance, neither Illinois case law nor legislation has yet addressed the property rights associated with obtaining title to or control over subsurface pore spaces. Case law in Illinois demonstrates that the owner of land is entitled to the surface land and all that is below it, unless it is a mineral estate. Mineral estates may be legally severed from the surface area (Hemrich, 2021). Notably, Illinois has recognized that "oil and gas are classified as minerals, that term not being confined to metallic substances" (Hemrich, 2021).

While legislation has been directed towards property rights regarding CO_2 pipeline construction, discussed below, Illinois has not directly legislated for pore space property rights. The Illinois Professional Land Surveyor Act provided that land surveyed shall be "any portion of the volume of the earth's surface, subsurface, or airspace involving the lengths and direction of boundary lines, areas, parts of platted parcels or the contours of the earth's surface, subsurface, or airspace" (225 ILCS 330/5, 2019). Without other legislation, the existing laws suggest that real property title carries rights in the subsurface, unless it is an existing separated mineral estate.

Previous carbon capture and storage (CCS) projects in Illinois have had project operators owning the surface-area of the AoR, which provided pore-space rights for those injections. Additionally, previous studies of those projects suggest that the operator would need to secure subsurface rights from neighboring landowners to ensure control over the subsurface plume (Koenig, 2020).

In a similar CCS project in Indiana, the project operator identified a singular owner of the subsurface rights but had not yet entered into any contractual agreements with the owner (Koenig, 2021 and Korose et al., 2018). Indiana has enacted laws addressing the subsurface rights for that project, providing the option to seek state eminent domain to secure the subsurface rights. As previously noted, Illinois does not have any such law on the books; but the identification of surrounding surface and subsurface property owners is analogous – and contractual agreements with the property owners must be secured.

Pipeline Rights-of-Way[1]

In 2011, Illinois passed the Carbon Dioxide Transportation and Sequestration Act. The legislative purpose addressed the pipeline transportation of CO_2 for sequestration, and enhanced oil recovery. The law declared CCS to be of public use and service, in the public interest, and a benefit to the welfare of Illinois and the people of Illinois (220 ILCS 75/5, 2011). As a public use good, the state, through the Illinois Commerce Commission, can exercise its power of eminent domain to secure an easement for the construction of a CO_2 pipeline (220 ILCS 75/20, 2011). The act provides that the CO_2 is "produced by a clean coal facility, by a clean coal synthetic natural gas (SNG) facility, or by any other source that will result in the reduction of carbon dioxide emissions from that source" (220 ILCS 75/15, 2011). All procedures to grant eminent domain shall be in accordance with the Illinois Eminent Domain Act (220 ILCS 75/25, 2011).

Pipeline rights-of-way can also be achieved through contracting with landowners' private easements to install the pipelines. However, due to the locations of the One Earth Energy and Prairie State Generating Company sites on suitable geology, pipeline transportation across other landowners' property can be minimized or eliminated.

POLICIES TOWARDS ECONOMICS

§ 45Q Broadened by Inflation Reduction Act

Since 2008, the federal government has offered the Internal Revenue Code § 45Q tax credits on a dollar amount-per-tonne basis (26 U.S.C. § 45Q, 2022). The tax credit's value was expanded first in the Bipartisan Budget Act of 2018, and most recently in the Inflation Reduction Act (IRA) of 2022. The IRA increased the amount-per-tonne from $50 to $85 for carbon oxides used solely for geologic sequestration from industrial and power-generation sources. Additionally, the credit for carbon oxide utilized (i.e., enhanced oil recovery) prior to sequestration increased from $35 to $60 per tonne of carbon oxide from industrial and power generation sources. Further, the IRA increased the § 45Q amounts for carbon oxides sourced via direct air capture (DAC). For sequestered carbon oxides sourced via DAC, the credit increased from $50 to $180 per tonne; utilized carbon oxide credit increased from $50 to $130 per tonne (IRA, 2022). It must be noted that to realize the full tax credit value, IRA's prevailing wage and apprenticeship requirements must be met. If the requirements are not met, only 20% of the value per tonne is realized by the taxpayer (Gibson Dunn, 2022).

The § 45Q tax credit can be realized for 12 years after the carbon capture equipment is placed into service. Prior to the enactment of the IRA, the construction start date for the project must have been prior to January 1, 2026. IRA extended the construction deadline to January 1, 2033. The tax credit will be inflation adjusted on a per tonne basis beginning in 2027, indexed for a base year 2025 (IRA, 2022).

The IRA additionally broadened the facilities which qualify as sources for the § 45Q credits. Previously, power-generation facilities had to capture 500,000 tonnes per annum to qualify for the credit, the minimum has been lowered to 18,750 tonnes per year. However, power-generation facilities must have a capture designed for 75% of CO_2 per electricity-generating unit (CATF, 2022). For non-power-generation industrial facilities, the minimum tonnes captured decreased from 100,000 tonnes to 12,500 tonnes. In addition, the DAC minimum captured decreased from 100,000 tonnes captured per year to 1,000 tonnes.

Beyond increasing the dollar amount per tonne and expanding the number of qualifying facilities, the IRA reformed how the tax credit can be received. Previously, § 45Q was non-transferrable and non-refundable to the taxpayers. The IRA now allows the credit to be both transferable and refundable (Gibson Dunn, 2022). Carbon capture developers may receive a direct cash payment of the tax credits as a tax refund. For-profit taxpayer entities may receive the direct payment for 5-years after the carbon capture equipment is placed into service. Tax-exempt entities (e.g., states, municipalities, Tribes, cooperatives) can realize the direct payment option for all 12-years of realizing the credit after the carbon capture equipment is placed into service. Since Prairie State Generating Company is a municipality-owned power plant, the § 45Q expansion to allow for direct cash payments to non-profit entities greatly increases the economic incentive to implement CCS, now allowing for a cash in-flow.

The IRA allows for the § 45Q tax credit to be transferred from the carbon capture project developer to other tax-paying entities (CATF, 2022). Previously, only owners of the carbon capture project could receive the (then non-refundable) § 45Q credits. IRA allows for the developer to transfer all or any portion of § 45Q credits received to a third-party tax-paying entity in exchange for cash. This expansion of the credit will allow for a marketplace of tax credit investors to take advantage of § 45Q credits without equity in a CCS project. The original recipient of the § 45Q credits will not be taxed on the cash received in exchange for the credits. The credits can be transferred during any portion of the 12-year window, even for the entire time.

Advanced Industrial Facilities Deployment Program

Authorized by the Inflation Reduction Act, the Advanced Industrial Facilities Deployment Program budgets $5.812 billion for implementation of carbon reducing technology on industrial facilities (IRA, 2022). The money will be awarded on a competitive basis administered by the Department of Energy's Office of Clean Energy Demonstrations. Industrial facilities targeted by this program are iron, steel, aluminum, concrete, glass, paper, ceramics, chemical, and any other energy intensive facilities as determined by the DOE (IRA, 2022). The funding awarded will take the form of grants, loans, rebate, or cooperative agreement. All forms of financing would provide a government backed funding that could be used to install CCS technology in non-energy industrial facilities with high carbon emissions.

Within the Illinois Storage Corridor region, there are many industrial sources with greater than 100,000 tonnes of CO_2 emissions annually (Koenig, 2022). Specifically, there is one agricultural processing plant: Tate & Lyle (Decatur, IL), emitting 726,533 tonnes annually. There is one cement plant in the greater region: Illinois Cement Co. (La Salle, IL) with 683,115 tonnes emitted annually. There are four ethanol plants: Archer Daniels Midland (ADM) (Decatur, IL) with 4,462,580 tonnes; ADM (Peoria, IL) with 653,582 tonnes; Pacific Ethanol Pekin (Pekin, IL) with 331,344 tonnes; and project partner One Earth Energy (Gibson City, IL) with 170,202 tonnes of annual emissions (Lu, 2020). The iron and steel industry is the largest industrial source of CO_2 emissions (Koenig, 2022). To the north of the Illinois Storage Corridor region is US Steel (Granite City, IL) which has 1,876,400 annual tonnes of CO_2 emissions (Lu, 2020).

Federal CIFIA Loan Program

The Infrastructure Investment and Jobs Act (IIJA) of 2021 authorized $2.1 billion to the U.S. DOE through fiscal year 2026 for funding low-interest federal loans and grants for CO_2 transportation projects, including CO_2 pipeline construction, through the Carbon Dioxide Transportation

Infrastructure and Innovation (CIFIA) Program (DOE, 2022). The U.S. DOE will receive $600 million each in years 2022 and 2023; then $300 million each for years 2024 through 2026 (Greenberg, 2022). The program is designed to support CCS and direct air capture deployment by providing financing for projects that build shared CO_2 transportation infrastructure (DOE, 2022).

CIFIA loans may be used for eligible project costs, development-phase activities, construction and procurement activities, land acquisition, capitalized interest, and associated transaction costs (Greenberg, 2022). The loans are available for up to 80% of anticipated project costs for up to 35 years after project completion or until the end of the project's useful life, whichever is earlier. (Greenberg, 2022).

Illinois State-Level Incentives

The Illinois Clean Coal Portfolio Standard (CCPS) of 2009 was the first state law in the United States that established electricity generation goals dependent on CCS technology. The Illinois CCPS provides tax benefits for new-construction coal-fired power plants built between 2009 and 2015 that must capture and store 50% of CO_2 emissions; plants built in 2016-2017 must capture 70% of CO_2, and 90% of CO_2 emissions must be captured and sequestered for any coal-fired power plant built after 2017. Additionally, the law sets a state-wide goal that 25% of electricity used in Illinois is to come from plants with CCS implemented by 2025. Further, no coal-fired power plants built after 2009 can emit more air pollutants than that of natural gas power plants in the State of Illinois (CCPS, 2009). Currently, no coal-fired power plants in the state qualify for the incentives—with zero power generation units in Illinois actively utilizing CCS technology.

Illinois also currently has the Renewable Energy Resources and Coal Technology Development Assistance Charge, which provides funding to the Coal Technology Development Assistance Fund to support the capture and storage of emissions produced by coal combustion and CCS research. This program is scheduled to end on December 31, 2025 (Greenberg, 2022).

Additionally, Illinois has elevated its carbon emissions goal by passing the Climate and Equitable Jobs Act in 2021, which aims the state to move to 100% clean energy by 2050 (State of Illinois, 2021). The act requires that municipal coal-fired power plants be 100% net-zero carbon by the end of 2045. The first deadline for emissions reduction for the coal-fired power plants is to have reduced current emissions by 45% by January 1, 2035. If that emissions deadline is not met by December 31, 2035, then the power plant must retire one or more units to meet the emissions reduction. The act also establishes a Nonprofit Electric Generation Task Force to specifically investigate implementing CCS technology at Prairie State Generating Company. The task force is required to have one representative from the Prairie Research Institute (CEJA, 2021). The governor is also authorized via the act to establish a commission on market-based carbon solutions, which may further incentivize implementation of CCS technology through a cap-and-trade style program. The state has a history and continued commitment to reducing emissions and favoring CCS to achieve its goals with a focus already on a project partner source.

ILLINOIS SAFE CCS ACT

"Through Illinois Public Act 102-0341 [Illinois Public Act 102-0341], the Illinois General Assembly directed the Prairie Research Institute (PRI) at the University of Illinois Urbana-Champaign, in consultation with an intergovernmental advisory committee, to file an objective, science-based report on the potential for carbon capture, utilization, and storage as a climate

mitigation technology throughout Illinois" (Greenberg, 2022). The resulting Carbon Capture, Utilization, and Storage in Illinois report and the law and policy supplement were used by Illinois legislators in part to develop the Illinois Safety and Aid for the Environment in Carbon Capture and Sequestration Act, or SAFE CCS Act, (Illinois Public Act 103-0651; Senate Bill 1289) which was enacted on July 18th, 2024.

The SAFE CCS Act establishes requirements for the development and operation of CCS projects and their infrastructure in Illinois in addition to those of the US EPA's UIC Program. Illinois EPA, Illinois DNR, and the Illinois Commerce Commission (ICC) were asked to develop the regulatory framework which remains in progress (Illinois Public Act 103-0651). This section covers (1) definitions provided by the IL SAFE CCS Act, (2) pore space and surface rights, (3) CO_2 pipelines, (3) CCS activities and site closure, and (4) other considerations, including but not limited to, emergency response training and funding and groundwater protection and monitoring.

SAFE CCS Act Definitions

The SAFE CCS Act defined pore space, pore space owner, and sequestration facility.

Pore space: the portion of "geologic media that contains gas or fluid, including, but not limited to, oil or water, and that can be used to store carbon dioxide."

Pore space owner: the person who has title to a pore space.

Sequestration facility: the carbon dioxide sequestration reservoir, underground equipment, including, but not limited to, well penetrations, and surface facilities and equipment used or proposed to be used in a geologic storage operation. "Sequestration facility" includes each injection well and equipment used to connect the surface facility and equipment to the carbon dioxide sequestration reservoir and underground equipment. "Sequestration facility" does not include pipelines used to transport carbon dioxide to a storage site.

Pore space and surface rights

The title to pore space is tied to the surface estate and is conveyed with the surface estate. While the title to pore space cannot be severed from the surface estate, the right to use pore space may be granted via an easement or lease. Operators may enter surface property without prior notice only in emergencies that pose an immediate risk to human health, the environment, or infrastructure. An affected pore space owner is entitled to reasonable compensation from the operator for damages resulting from accessing their surface property for permitting activities, including damage to crops, property, and the productive capability of soil. If CO_2 migration is detected in the pore space of an unincluded owner, the operator must notify them, and they can petition for inclusion and receive compensation. Affected landowners are entitled to fully funded medical monitoring if a significant CO_2 leak occurs from the facility.

If universal agreement is not reached, the operator may petition the Illinois Department of Natural Resources for integration, provided the operator has secured rights for at least 75% of the pore space involved. The petition must include details on ownership and define sequestration capacity per unit surface area overlying the proposed facility. Nonconsenting owners must receive just compensation equal to or greater than the average payment package given to similarly situated consenting owners in the preceding year, excluding initial incentives.

CO_2 Pipelines

The ICC must confirm that the pipeline complies with all applicable federal Pipeline and Hazardous Materials Safety Administration (PHMSA) safety rules before issuing a certificate of authority to construct and operate. The certificate must expressly grant the applicant the right to seek eminent domain authority under the Public Utilities Act. Operators must also create a risk-based assessment and chemical safety contingency plan using advanced modeling that accounts for factors like terrain and varying CO_2 release scenarios.

Annual operator fees are established for operators granted certificates of authority and for operators of legacy carbon dioxide pipelines. These fees cover administrative costs, mandatory emergency responder training, and necessary ICC and IEMA regulatory activities.

The ICC is prohibited from issuing certificates until the earlier of July 2026 or the final adoption of PHMSA's updated CO_2 pipeline safety rules (RIN 2137-AF60). Should PHMSA not adopt the final revisions by July 1, 2026, the ICC may still approve a certificate if the applicant has met all statutory requirements and complies with ICC-imposed public safety conditions compatible with federal standards

Activity and Closure

- The SAFE CCS Act also amends the Illinois Environmental Protection Act (415 ILCS 5/) and establishes a comprehensive sequestration permit program to be administered by the Illinois EPA (IEPA), which complements and extends federal Class VI requirements.
- For carbon capture projects at existing sources, the issuance of an air construction permit is contingent upon demonstrating that there will be no net increase in allowable potential annual criteria pollutant emissions or offering a satisfactory alternative demonstration if achieving this is technically infeasible.
- Applicants must also submit a Greenhouse Gas Inventory Analysis demonstrating that the total projected Green House Gas (GHG) emissions related to capturing the CO_2 (including emissions from the capture process, associated electricity usage, and operational increases) do not exceed the total amount of GHG captured over the project's proposed life.
- The IEPA is empowered to propose rules establishing minimum carbon capture efficiency rates for all projects. The permit application itself must include extensive documentation, such as maps of the activities and affected properties, copies of the federal Class VI application materials, and a report detailing baseline air and soil gas conditions at potentially impacted areas.
- Critical preparatory steps include drafting a comprehensive emergency response plan, which must be submitted to the Illinois Emergency Management Agency (IEMA) and the Office of Homeland Security before the application is submitted to the IEPA.
- The initial application requires a $60,000 fee, divided equally among the Water Resources Fund, the Emergency Planning and Training Fund, and the Carbon Dioxide Sequestration Administrative Fund.
- Furthermore, the Act mandates increased public participation through public notice of the application and draft permit, posting documents online, and providing opportunities for public hearings and comment.

- The Act imposes rigorous requirements for site closure and financial integrity. Operators must monitor the site during the post-injection site care (PISC) period for a minimum of 30 years after the cessation of CO_2 injection. Closure certification, issued by the IEPA, requires the operator to submit a closure certification compliant with 40 CFR 146.93 and provide a demonstration, supported by location-specific monitoring data, that no additional air or soil gas monitoring is needed to ensure the facility does not endanger groundwater or human health.
- Regarding financial stability, the owner or operator must continuously maintain financial assurance equal to or greater than the cost estimate for all monitoring, emergency response, remedial action, and closure activities, using approved mechanisms such as trust funds or surety bonds, naming the IEPA as the sole beneficiary. *Operators can utilize compliant copies of financial assurance required under 40 CFR 146.85 as an alternative.*
- Finally, the owner/operator must also maintain at least $25 million in insurance coverage to cover damages related to releases from the facility, keeping this insurance in force until the IEPA officially certifies the sequestration facility as closed.

Emergency response training and funding
The Illinois Emergency Management Agency (IEMA) and the Office of Homeland Security are assigned authority to develop and fund annual training and equipment support for local first responders concerning CO_2 pipelines and sequestration. Training includes identifying releases, communication protocols, evacuation, and CO_2 exposure symptoms, with materials and training required to be reviewed and updated at least every five years.

CCS-related funds
The Act creates the Carbon Dioxide Sequestration Administrative Fund, the Environmental Justice Grant Fund, the Water Resources Fund, and the Carbon Dioxide Sequestration Long-Term Trust Fund. The Long-Term Trust Fund covers costs for remedial/corrective action, monitoring if the operator abandons the facility, and compensating for personal or property damages caused by releases.

Land-use Studies
The Carbon Dioxide Transportation and Sequestration Act is amended to add a new Section 35, which specifically addresses the topic of "Land surveys and land use studies".

Groundwater monitoring
If monitoring indicates a source of drinking water is rendered unsafe to drink, the sequestration operator must provide an alternate supply of potable water within 24 hours. An alternate supply of water safe for other uses must be provided within 30 days and maintained until the original water is proven safe for both purposes.

EOR Application
The Act prohibits injecting captured CO_2 streams into Class II wells or Class VI wells converted from Class II wells specifically for Enhanced Oil Recovery (EOR). The sale or transport of captured CO_2 streams intended for EOR use is also explicitly prohibited.

Water Pollution

Operating a carbon sequestration activity is prohibited if it causes, threatens, or allows a carbon dioxide release that tends to cause water pollution in Illinois.

ENDNOTES

[1] This report was prepared in 2022. It was updated in 2025 to document significant policy changes regarding CCS in Illinois.

REFERENCES

Bipartisan Budget Act of 2018, BBA (2018), Pub. L. 115-123, 132 Stat. 162-168.

Carbon Capture, Utilization, and Sequestration (CCS) Guidance, 87 Fed. Reg. 8808 (Feb. 16, 2022).

Clean Air Task Force (CATF). (2022, August 19). Carbon Capture Provisions in the Inflation Reduction Act of 2022. https://www.catf.us/resource/carbon-capture-provisions-in-the-inflation-reduction-act-of-2022/.

Clean Coal Portfolio Standard Law (CCPS), Ill. Pub. Act 095-1027, 2009.

Climate and Equitable Jobs Act (CEJA), Ill. Pub. Act 102-0662, 2021.

EPA Criteria and Standards Applicable to Class VI Wells, 40 C.F.R. §146.81-95 (2023).

Gibson Dunn. (2022, August 16). The Inflation Reduction Act Includes Significant Benefits for the Carbon Capture Industry. https://www.gibsondunn.com/wp-content/uploads/2022/08/the-inflation-reduction-act-includes-significant-benefits-for-the-carbon-capture-industry.pdf.

Greenberg, S. and Sung, J. (2021, July 15). Stakeholder Analysis Report for CarbonSAFE Illinois – Macon County, Technical Report: DOE FE-2900381. U.S. Department of Energy.

Greenberg, S., Whittaker, S., and O'Brien, K. (2022). Carbon Capture, Utilization, and Storage in Illinois. Champaign, IL: Prairie Research Institute. https://hdl.handle.net/2142/116416.

Hemrich, V. (2021, April 30). Illinois CCS Law and Policy Review – Subtask 5.1, Topical Report: DOE-FE0029381. U.S. Department of Energy.

Ill. Admin. Code tit. 35, § 730.181-195 (2022).

Illinois General Assembly. (2025). *Senate Bill 1289: An Act concerning regulation* (104th Gen. Assemb., Reg. Sess.). https://www.ilga.gov/Legislation/BillStatus/FullText?GAID=18&DocNum=1289&DocTypeID=SB&LegId=0&SessionID=114

220 Ill. Comp. Stat. Ann. 75/ (2011).

225 Ill. Comp. Stat. Ann. 330/5 (2019).

Illinois Public Act 103-0651, 103rd Gen. Assem. (2024). https://www.ilga.gov/documents/legislation/publicacts/103/PDF/103-0651.pdf

Illinois Public Act 102-0341, 102nd Gen Assem. (2021). https://www.ilga.gov/documents/legislation/publicacts/102/PDF/102-0341.pdf

Industrial Economics (IEc). (2020) Preliminary Analysis to Inform the Business Plan for CCS. Appendix 1 to Koenig, J. (2020).

Inflation Reduction Act of 2022, IRA (2022), Pub. L. 117-169, 136 Stat. 1818.

Koenig, J. (2020, October 31). CCS Business Development Case Study – Subtask 4.1, Report, DOE-FE0029381. U.S. Department of Energy.

Koenig, J. (2021, September 30). Wabash CarbonSAFE: Business Environment Study - Subtask 5.1, Technical Report: DOE-FE0031626-4. U.S. Department of Energy.

Koenig, J. (2022). Integrated Regional Overview for Commercialization – Subtask 11.2, Report, DOE-FE0029381. U.S. Department of Energy.

Korose, C., Rupp, J., and Greenberg, S. (2018). Policy, Regulatory, Legal, and Permitting Case Study Subtask 3.2 – Topical Report: DOE-FE0029445-4. U.S. Department of Energy.

Korose, C., Koenig, J., and Blakley, C. (2022, January 31). Policy, Regulatory, Legal, and Permitting Evaluation – Task 6.0, Technical Report: DOE-FE0031626-6. U.S. Department of Energy.

Lu, Y., Lu, H., Nielsen, P. (2020, August 7). Modeling Assessment of Retrofitting Power Plants and Industrial Facilities for Carbon Capture and Storage in the Illinois Basin, Technical Report, DOE-FE0029381. U.S.

Department of Energy.

State of Illinois. (2021, September 15). Gov. Pritzker Signs Transformative Legislation Establishing Illinois as a National Leader on Climate Action. https://www.illinois.gov/news/press-release.23893.html#:~:text=The%20Climate%20and%20Equitable%20Jobs%20Act%20is%20a%20bold%2C%20nation,measures%2C%20and%20create%20jobs%20and.

26 U.S.C. § 45Q (2022).

US Department of Energy (DOE) (2022). CIFIA Program Guide: CIFIA Loans for Carbon Dioxide Transportation Infrastructure. U.S. Department of Energy, Office of Fossil Energy and Carbon Management, Loan Programs Office. https://www.energy.gov/sites/default/files/2022-10/LPO_CIFIA_Guidance_Document_FINAL_2022.10.05_0.pdf

US Environmental Protection Agency (EPA). (2011). Quick Reference Guide for Public Participation, available at: https://www.epa.gov/sites/production/files/2015-07/documents/uicquick-reference-guide_public-participation_final-508.pdf.

US Environmental Protection Agency (EPA). (2023). Class VI - Wells used for Geologic Sequestration of Carbon Dioxide. EPA. Accessed 2023, January 9. https://www.epa.gov/uic/class-vi-wells-used-geologic-sequestration-carbon-dioxide.

APPENDIX A

This Appendix is an adapted excerpt from the Illinois Storage Corridor UIC Class VI Permit Plan Technical Report, DE-FE-0031892-11. The preliminary draft of this plan, from which this segment was derived, was prepared and submitted to DOE on December 31, 2020.

PERMITTING TASKS, MILESTONES, AND TIMELINE

Pre-Permitting Activities (Budget Period (BP) 1)

This permitting plan is a project deliverable and provides an outline of tasks, timelines, and information needed to prepare UIC Class VI permit applications for each storage site. Meetings with regulators will be held as needed to review requirements for a Class VI permit as set forth in 40 CFR 146.82(a) and to review and concur on submittal requirements (e.g., electronic submittal formats). These meetings will also provide information to the regulatory agency on site characterization, methods to establish AoR, modeling, well construction, financial requirements, risks, communication and outreach, and permit schedule. Note that US EPA participated in the project kick-off meeting held on November 05, 2020.

UIC Class VI Permit Application (BP 1)

The permit applications will be prepared in accordance with Class VI guidance (described more fully in the following sections). Adhering to the regulatory guidance ensures that required technical and administrative aspects of the project are addressed, and that documentation is complete. Key sections of the permits include Site Characterization, AoR and Corrective Action, Financial Responsibility, Injection Well Construction, Pre-Operational Testing, Proposed Operating Conditions, Testing and Monitoring Plans, Injection Well Plugging, Post-Injection Site Care (PISC) and Site Closure, Emergency and Remedial Response, Demonstration of Containment, Public Participation, CO_2 source and chemical makeup of CO_2 Stream. The permit applications will be submitted to US EPA by the end of BP 1 – September 30, 2022.

Permit Application Revisions (BP 2)

BP 2 will provide the opportunity to respond to technical questions and comments from US EPA. Each permit applicant will also respond to questions and comments from the public received during the public review period. The permit applications will be revised as needed and resubmitted to US EPA. Upon approval, the permit applicants will receive a "Permit to Construct Class VI Underground Injection Well". The permits to construct are the project milestones for BP 2 (September 30, 2023).

General Timeline

Detailed timelines and schedules for milestones and deliverables have been developed for the overall project management planning. As noted above, the permit applications are due at the end of BP 1. During BP 2, the permits will be revised as needed and resubmitted to US EPA. A key project objective is to have Permits to Construct by the end of BP 2.

There are several critical path elements during BP 1 that must be completed to develop the UIC permit application submittals (Figure 4). These include—for each site—timely drilling and completion of a stratigraphic test well along with other testing and analysis to support site characterization, a site characterization report, and development of geologic and hydrogeologic models. Interim modeling results will be used to develop permit application components (preliminary AoR, monitoring planning, injection scenarios and conditions, injection well design, etc.). Frameworks for these permit components will be developed during the first year of BP 1. They will then be more fully developed and revised during the second year of BP 1 as work in each technical area is reported.

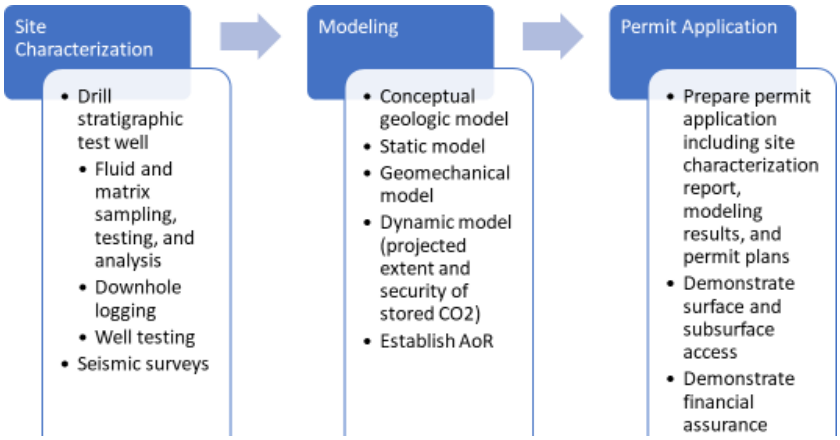

Figure 1. Site characterization and modeling needs in support of Class VI UIC permit application.

Portions of the permit application can be completed using preliminary site modeling as described above and with minimal technical input and will be developed throughout BP 1. These include the Emergency Response Plan, Post-Injection Site Care Plan, and Financial Responsibility sections.

COMPONENTS OF PERMIT APPLICATIONS

The Class VI Permit Applications will include six key components:

1. General administrative project and contact information— Facility name, location, mailing

address, etc.; operators' contact information; a brief summary of the proposed permitted activities, CO_2 source, quantity, etc.; and list of contacts for states, tribes and territories within the AoR.

2. Site Characterization Data—Fluid chemistry, geologic, and depth data on both the injection and confining zones and information on all USDWs in the area
3. Map(s)—showing the planned injection well location and preliminary AoR; location of the AoR boundary and all known artificial penetrations (wells, boreholes) that breach the injection or confining zones; known or suspected faults and fractures in the AoR; and other surface features such as waste site locations (landfills, cleanup sites), surface water features, springs, drinking water wells, mines, quarries, roads, buildings, property and political boundaries like townships, counties and state lines. Non-public site-specific data, such as information from the stratigraphic test wells and seismic surveys, will be included in the permit records and noted on the AoR map.
4. Tabulations—Wells in the AoR that penetrate the confining zone and/or the injection zone; location of wells on the AoR map including well record ID numbers; location (latitude/longitude); well type (oil gas, test); depth; deepest formation penetrated; completion date; status (active, inactive, plugged or unknown); and information about whether the well is in need of corrective action.
5. Project Plans that will eventually become a part of the permit to drill and operate the well (see following section).
6. Provision for financial responsibility—Requirements established in 40 CFR 146.85 and in US EPA guidance.

Additional discussion and details in the permit applications include well construction, proposed operating conditions, proposed well stimulation, and steps for conducting the injection operations. A summary of the formation testing program will also be provided.

PROJECT PLANS

Each permit application will include five project plans as described in US EPA general project plan development guidance. These plans include:

- **AoR and Corrective Action Plan**—Describes how the owner or operator intends to delineate the AoR for the Class VI injection well and ensure that all identified deficient artificial penetrations (wells that are improperly plugged or completed) will be addressed by corrective action techniques so that they will not become conduits for fluid movement into USDWs.
- **Testing and Monitoring Plan**—Describes how the owner or operator intends to perform all necessary testing and monitoring associated with the storage project, including injectate monitoring, performance of mechanical integrity tests (MITs), corrosion monitoring, tracking of CO_2 plume and area of elevated pressure, monitoring of geochemical changes above the confining zone, and--at the discretion of the UIC Program Director--surface, air, and/or soil gas monitoring for CO_2 fluctuations and any additional tests necessary to ensure USDW protection from endangerment.
- **Injection Well Plugging Plan**—Describes how, following cessation of injection, the owner or operator intends to plug the Class VI injection well using the appropriate materials and methods to ensure that the well will not become a conduit for fluid movement into USDWs in

the future. Information on plugging monitoring wells is provided in the UIC Program Class VI Well Plugging, Post-Injection Site Care, and Site Closure Guidance and the EPA Region V's "Guidance on Plugging and Abandoning Injection Wells."

- **Post-Injection Site Care (PISC) and Site Closure Plan**— Describes how the owner or operator intends to monitor the site after injection has ceased, to ensure that the CO_2 plume and pressure front are moving as predicted and USDWs are not endangered. PISC monitoring must continue until it can be demonstrated that the site poses no further endangerment to USDWs. The default duration for PISC, as stated in the 40 CFR 146.91(c) is 50 years.
- **Emergency and Remedial Response Plan**—Describes the actions that the owner or operator intends to take in the event of movement of the injectate or formation fluids in a manner that may cause danger to a USDW, including the appropriate people to contact.

The Geologic Sequestration Data Tool (GSDT) can assist the UIC Program in organizing and retaining the large volume of material related to permit application reviews and subsequent project oversight activities. The EPA developed the GSDT to:

- Facilitate compliance with the electronic reporting requirement of the Class VI Rule at 40 CFR 146.91(e), providing reporting modules by which permit applicants/owners or operators can submit required information in an approved electronic format, and
- Support permitting authorities in tracking and managing submissions associated with Class VI reporting, including support for evaluation and oversight activities over the duration of a Class VI project.

US EPA (permitting authority), and other team members (as needed), will have access to the GSDT, which allows them access to submitted materials. US EPA will have full access and will use the GSDT to support technical evaluations (including AoR delineation modeling), manage communications with owners or operators, and store all information related to the projects. The GSDT allows permitting authorities to review and manipulate information while preserving the integrity of the original submitted data. Permitting authority users are limited to read-only access unless they are assigned to a particular project; however, no users can modify the original, time-stamped files submitted by owners or operators.

Data management for the project and compliance with the GSDT is described in "Underground Injection Control (UIC) Program Class VI Well Recordkeeping, Reporting, and Data Management Guidance for Owners and Operators", available at https://www.epa.gov.

PERMIT APPLICATION OUTLINE

Permit applications at each site will follow a similar organization and format. Based on the program guidance, supporting material for the permit application submittal is outlined as follows:

1.0 Introduction

- 1.1 Project Overview
- 1.2 Required Administrative Information

2.0 Geology

- 2.1 Geology
- 2.2 Regional Geology
- 2.3 Major Stratigraphic Units

- 2.4 Site Geology
- 2.5 Injection Zone Water Chemistry
- 2.6 Geologic Structure
  - 2.6.1 Site Geologic Structure
  - 2.6.2 Geomechanical Information
  - 2.6.3 Karst
  - 2.6.4 Local Crustal Stress Conditions
  - 2.6.5 Elastic Moduli and Fracture Gradient
  - 2.6.6 Seismic History of Region
- 2.7 Regional Topography and Geomorphology
- 2.8 Site Surface Topography

3.0 Hydrogeology
- 3.1 Groundwater
- 3.2 USDWs
- 3.3 Deep Groundwater zones (e.g., injection formation, non-USDWs above injection zone)
- 3.4 Wells Within the Survey Area

4.0 Area of Review and Corrective Action Plan
- 4.1 Area of Review
  - 4.1.1 Description of Simulator
  - 4.1.2 Conceptual Model of AoR
  - 4.1.3 Numerical Model Implementation
  - 4.1.4 Representative Case Scenario Description
  - 4.1.5 Computational Model Results
  - 4.1.6 Method for Delineating the AoR from Model Results
  - 4.1.7 Delineation of the AoR
  - 4.1.8 Periodic Reevaluation of AoR
  - 4.1.9 Parameter Sensitivity and Uncertainty
- 4.2 Corrective Action
  - 4.2.1 Identification of Primary Confining Zone Penetrations
  - 4.2.2 Corrective Actions

5.0 Construction and Operations Plan
- 5.1 Operating Data
  - 5.1.1 Source of CO_2
  - 5.1.2 Chemical and Physical Characteristics of the CO_2 Stream
  - 5.1.3 Daily Rate and Volume and/or Mass and Total Anticipated Volume and/or Mass of the CO_2 StreamPressure and Temperature of CO_2 Delivered to the Storage Site
- 5.2 Well Design
  - 5.2.1 Average and Maximum Wellhead Injection Pressure
  - 5.2.2 Casing and Tubing Program
  - 5.2.3 Cementing Program
  - 5.2.4 Packer
  - 5.2.5 Annular Fluid
  - 5.2.6 Wellhead
  - 5.2.7 Perforation Plan
  - 5.2.8 Schematic of the Subsurface Construction Details of the Well

6.0 Financial Responsibility
- 6.1 Financial Requirements Compliance Approach
- 6.2 Injection construction, Maintenance, and Operations Cost Estimate

6.3 Identification and Discussion of Financial Instrument(s)

Other plans will follow the project templates provided in the GSDT. Each plan will include information such as:

- Testing and Monitoring Plan
  - Pre-Operational Formation Testing
    - Wireline Logging
    - Coring and Testing
    - Mechanical Integrity Testing
    - Stimulation Program
  - Proposed Groundwater Monitoring Well Network
    - Monitoring Activities and Program Summary
    - Groundwater Quality and Geochemistry Monitoring
    - Injection Zone Monitoring
  - CO_2 Injection Process Monitoring
  - Injection Well Testing and Monitoring
    - Pressure Fall-Off Testing
    - Mechanical Integrity Testing During Service Life of Well
    - Well Annulus Pressure Maintenance and Monitoring System
    - Injection Well Control and Alarm System
    - Monitoring, Verification, and Accounting
  - Testing and Monitoring Schedule
  - Monitoring Data Management
  - Testing and Monitoring Plan Maintenance
  - Quality Assurance and Surveillance Plan
- Injection Well Plugging Plan
  - Injection Well Tests
  - Tests or Measures for Determining Bottom-Hole Reservoir Pressure
  - Injection Well Testing to Ensure External Mechanical Integrity
  - Plugging Plan
- Post-Injection Site Care and Site Closure Plan
  - Computational Modeling for the Post-Injection Period
    - Pressure Differential
    - Predictions of CO_2 Migration During the Post-Injection Site Care Period
    - Predicted Extent of the CO_2 Plume at Site Closure
  - Post-Injection Monitoring Plan
    - Groundwater-Quality Monitoring
    - Carbon Dioxide Storage Zone and Pressure Monitoring
    - Seismic Methods for CO_2 Plume Tracking
    - Post-Injection Monitoring Locations, Methods, and Reporting Schedule
    - Monitoring Plan Review and Maintenance
  - Site Closure Plan
    - Surface Equipment Decommissioning
    - Monitoring Well Plugging
    - Site Restoration/Remedial Activities
    - Site Closure Reporting
- Class VI Emergency and Remedial Response Plan

- Identification of Potential Adverse Events
  - Resources or Infrastructure Potentially Affected
  - Emergency and Remedial Response Actions to Protect USDWs
  - Amending the Emergency and Remedial Response Plan
  - Staff Training and Exercise Procedures
  - Emergency Contacts
  - Communications with Adjacent Landowners and Emergency Response Personnel
  - Communications Plan and Emergency Notification Procedures