

CO2 SEQUESTRATION: KANSAS RULES AND REGULATIONS

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KCC-Conservation Division

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Carbon Dioxide Storage

Introduction

Sequestration vs. Enhanced Oil Recovery, (EPA Class VI vs. Class II Injection Wells)

House Bill 2419 passed in the 2007 legislative session. (Statutes 55-1636 thru 55-1640)

HB 2419 directed the KCC to adopt rules and regulations establishing:

Requirements, procedures, and standards for the safe and secure injection of carbon dioxide and maintenance of underground storage of carbon dioxide.

Specifically, the rules must address:

1. Site selection criteria,
2. Design and development,
3. Operation criteria,
4. Casing requirements,
5. Monitoring and measurement requirements,
6. Safety requirements,
7. Closure and abandonment requirements,
8. Financial assurance, and
9. Long-term monitoring.

House Bill 2419 also provided for income tax reductions and property tax exemptions for carbon dioxide capture, sequestration or utilization machinery and equipment.

Methodology

Conservation Division created a workgroup in June of 2007 consisting of representatives from:

- KCC-administrative, legal, UIC, porosity gas storage and pipeline safety departments
- Kansas Geological Survey
- Utility Companies
- Kansas Department of Health and Environment-Underground Injection Department
- USEPA-Region VII

The Group primarily worked from: the Conservation Division's Natural Gas Porosity Storage Regulations, the Interstate Oil and Gas Compact Commission's "Carbon Dioxide Storage Model Regulations", and the Conservation Division's Class II well regulations.

Staff took two out-of-state field trips to CO₂ enhanced oil recovery injection projects, participated in EPA workshops and attended various technical workshops.

States & Provinces Currently Developing Regulatory Systems Using IOGCC Model Legislation & Regulations

-California

-Indiana

-Kansas

-Michigan

-Montana

-New Mexico

-New York

-North Dakota

-Oklahoma

-Texas

-Washington

-Alberta

-British Columbia

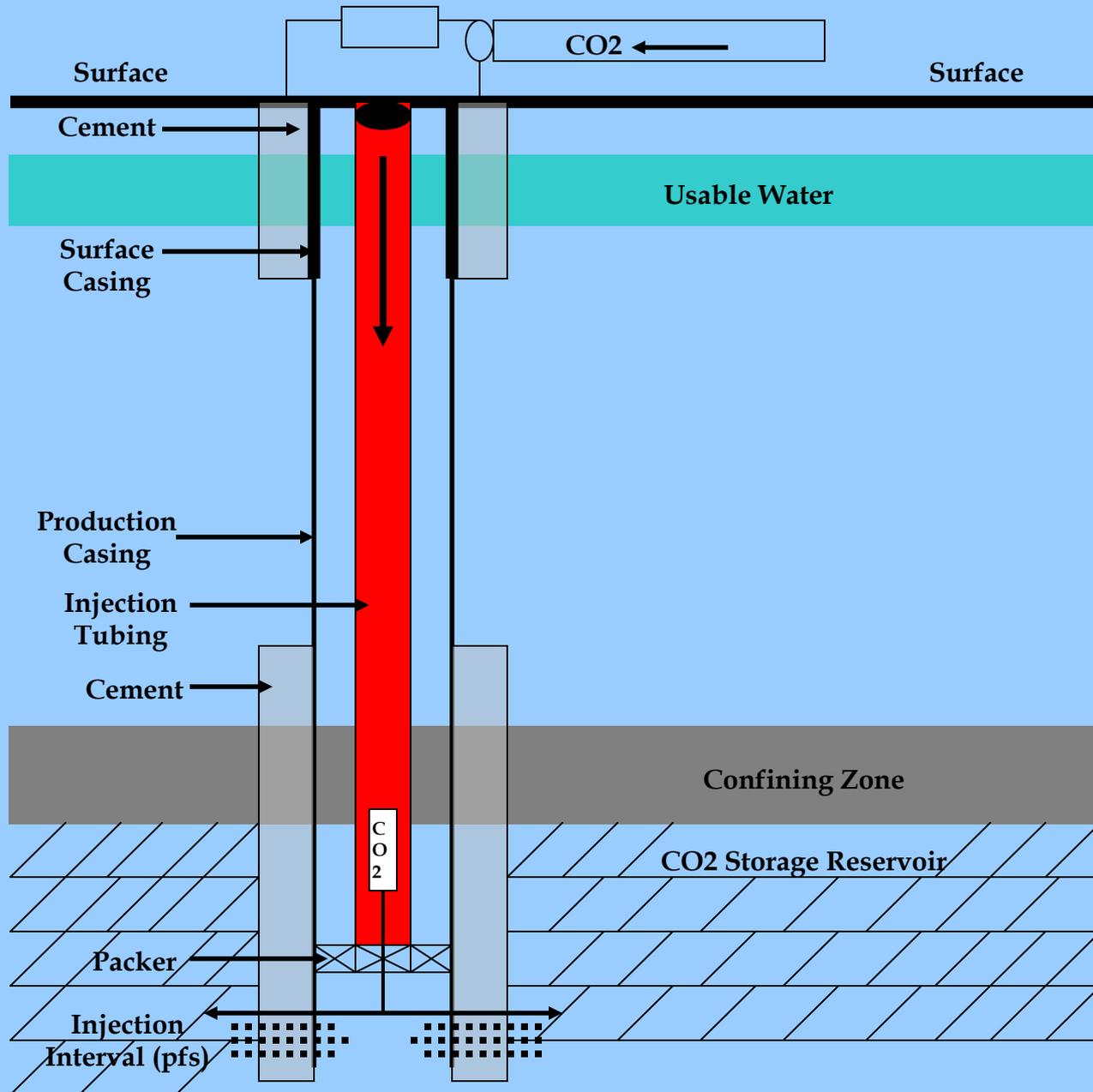
-Nova Scotia

-Saskatchewan

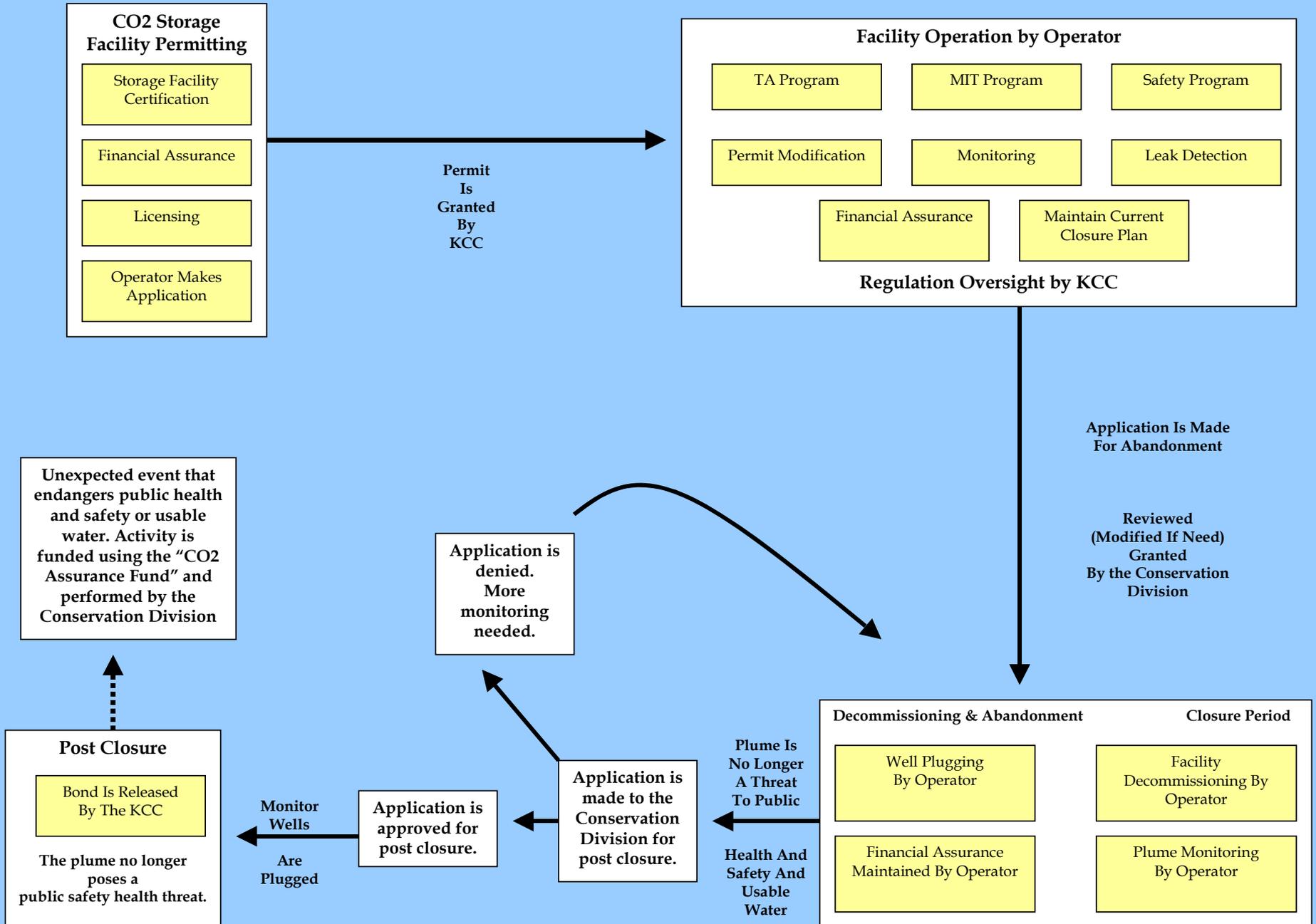
States Which Have Enacted CO2 Storage Legislation

- Illinois
- Kansas (regulations pending)
- Ohio
- Utah
- Washington (final rules adopted June 19, 2008)
- West Virginia
- Wyoming

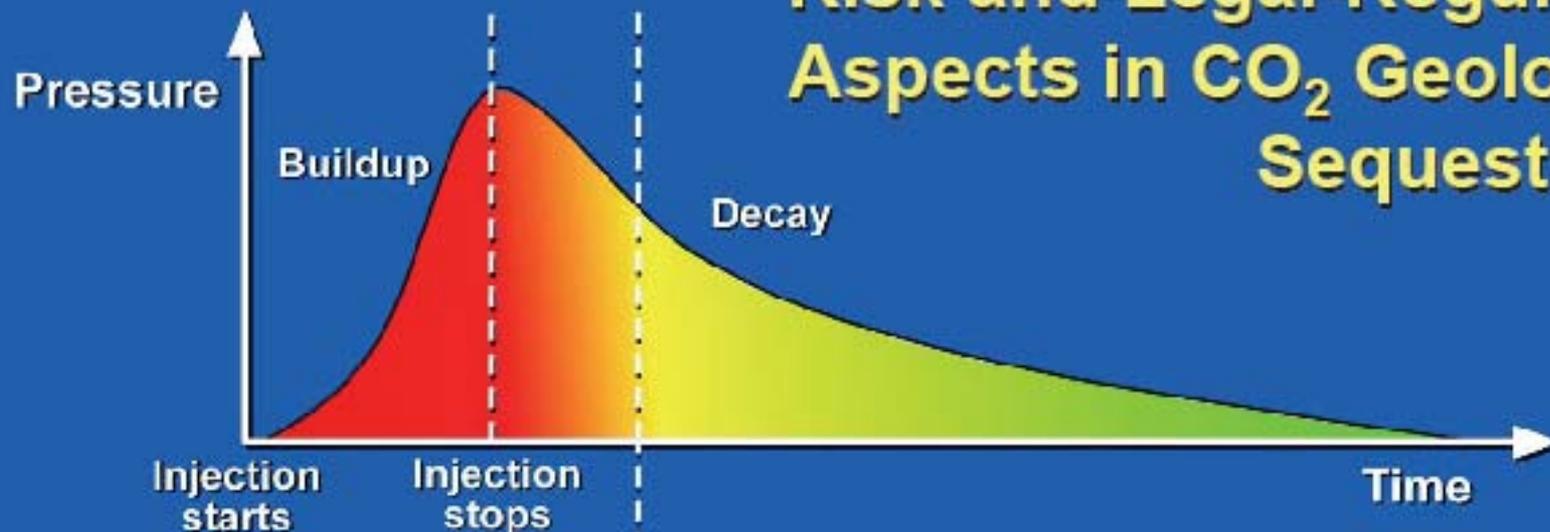
IDEALIZED DIAGRAM OF A CO2 INJECTION WELL



KCC REGULATORY ACTIVITIES FOR CO2 STORAGE



Relation between Pressure Behavior, Risk and Legal-Regulatory Aspects in CO₂ Geological Sequestration



Operational Period	Active	Closure	Post-Closure
Trapping Mechanism Dominance	Primary	Increasingly Secondary	
Risk	Increasing	Decreasing	
Monitoring Frequency & Resolution	High	Targeted	Decreasing
Liability	Operator and /or Emitter		State Agency

Serious Volume Issues

- 2 x 750 MW Reference Plant
 - Supercritical Pulverized Coal
 - Annual CO₂ Output: 10 Million Tons
 - Assume 30-Foot Thick **Coal Seam**

10 Year Output: 48 Mi² (approx. 7x7 miles)

50 Year Output: 241 Mi² (approx. 15x15 miles)

Serious Volume Issues

- 2 x 750 MW Reference Plant
 - Supercritical Pulverized Coal
 - Annual CO₂ Output: 10 Million Tons
 - Assume 300-Foot Thick **Sandstone Stratum** at 4,000 Ft. TD

10 Year Output: 177 Mi² (approx. 13x13 miles)

50 Year Output: 885 Mi² (approx. 30x30 miles)

SUMMARY OF REQUIREMENTS FOR CO2 STORAGE

Storage facility operating permit

Description (geologic) and properties of reservoir

Shape and size of reservoir

Computer modeling of long-term movement of CO2 and displaced brine

Evaluation of penetrations

Plan for monitoring usable water and soils

Evaluation of potential migration pathways

Proposed storage operator has the rights to put the CO2 in that formation

Notice in Kansas Register, local county paper and Wichita Eagle

Closure plan

How the storage facility plans to close and monitor the facility

Storage facility safety plan

Establishes communications with local emergency groups

Provisions for operators to amend their permit

Provisions to transfer the permit to another entity

Licensed operator requiring financial assurance

Provisions for the commission to modify suspend or cancel a permit

SUMMARY OF REQUIREMENTS FOR CO2 STORAGE

(cont.)

Well Construction Requirements

Cementing

Casing, Tubing and Packer, which are resistant to CO2 and high pressure

Internal mechanical testing every 2 years

External mechanical testing every 4 years

Leak Detectors

Down-hole shut off valves

ID signs

Facility Requirements

Monitoring plan for usable water, soil and first porous zone above reservoir

Pre-testing of usable zone to establish base line CO2

Provisions for emergencies

Provisions for illegal entry

Storage safety plan

List of contractor available to respond to emergencies

Financial assurance

ID signs

SUMMARY OF REQUIREMENTS FOR CO2 STORAGE

(cont.)

Facility requirements; continued

Supervisory control and data acquisition system required, continuously monitors pressure, volume and can shut down system automatically

Quarterly reporting of volumes and pressures

Injectate sample tested for CO2 purity monthly

A map filed annually that illustrates the horizontal extent of the CO2 plume

Annual review of emergency procedures

Safety Inspections

Leak detector testing

Provisions for protest to permit or amendment

Provisions for operator to transfer permit to another licensed operator

Storage facility operator reporting of leak, potential leak and loss of containment

Provisions for temporary abandonment of wells

Provisions for temporary abandonment of storage facility

SUMMARY OF REQUIREMENTS FOR CO2 STORAGE

(cont.)

Notice for decommission and abandonment of facility

Post closure of facility and release of operators assurance bond

Notice of plugging facility wells with staff oversight and witnessing

Fees for permits and operating

5 cents per ton (2 cents to fund the program and 3 cents for state assurance fund)

Penalties as assessed by the Commission

Provisions for drilling through a CO2 storage field

Funding for KCC to Administer Program

Application
Fees for Permit
Filings and
Amendments

Per Well
Annual Fee

Annual
Licensing Fee

2¢ / Ton
CO₂ Injected

Funding for Remediation/Monitoring

Operating and Closure Phase

Operators are
responsible for paying
for the expenses related
to the activity for their
facility.

Forfeited Bonds from
Insolvent CO₂ Storage
Facility Operators

Post-Closure Phase

CO₂ ASSURANCE FUND

Funded by a 3¢/ton
charge for injected CO₂

Administered by the KCC

Comparison of KCC & EPA Proposed Regulations

TOPIC	KCC	EPA PROPOSED RULE
DEFINITIONS	Additional Containment zones-concept not used	Additional Containment zones-required, not defined and poorly described
DEFINITIONS	Requirement- geochemistry evaluation to predict CO2 rock reactions on storage reservoir Required- measure pre-injection CO2 levels in adjacent formations	Term- "Geochemical data" sampling is not defined. No list of constituents to test for.
OPERATING REQUIREMENTS	Max.- Injection pressure 75% of fracture pressure.	Max.-None specified, but no stimulus treatment greater than 90% of frac-pressure.
OPERATING REQUIREMENTS	Production casing cementing 500' above injection zone (82-3-1106)	Cemented continuously bottom to top. Very difficult in many areas of the state. Remedial work sacrifices the integrity of the well.
OPERATING REQUIREMENTS	Internal MIT- every two years compared with a Class II well, which is every five years.	Internal MIT- Continuous monitoring with automated shut-down if variance detected.
OPERATING REQUIREMENTS	External MIT - every four years	External MIT - every year (more stringent than a Class I well)
OPERATING REQUIREMENTS	Tracer material added to injectate- None required. CO2 in and of itself can be used.	Tracers- Proposed rules ask for comment on the use of tracers.
SCOPE OF RULE	Storage facility permits which public health safety and environment.	SDWA based well permits.
LONG-TERM LIABILITY	State assumes responsibility with funding for post closure.	Owner/operator remains responsible throughout.

Schedule Of Future Work

- **Develop a Memorandum of Agreement with KDHE for administration of the program in accordance with our agreement with EPA.**
- **The regulations are currently at the Attorney General's office for approval.**
- **Publish the regulations in Kansas Register followed by a 60 day waiting period for public comment.**
- **Rules & Regulations presented to the Joint Legislative Committee on Rules & Regulations.**
- **Public hearing before the Commission.**
- **Commission Administration Meeting to adopt regulations.**
- **Publish final regulations adopted by the Commission, Regulations are effective 15 days after publication.**



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