Underground Natural Gas Storage Regulation in Illinois

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Mahomet Aquifer Task Force
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Regulating the Illinois Oil & Gas Industry

• Background on IDNR Office of Oil and Gas Resource Management

• Underground Natural Gas Storage
  • Background
  • State Authority Over Storage Wells
  • Pre-2016 Federal Regulation
  • Natural Gas Storage Incidents
  • PHMSA Partnership
  • State Legislation

• Q&A
Oil and Gas Resource Management

Office of Oil and Gas Resource Management

- Formerly the Division of Oil and Gas under the Office of Mines and Minerals
- Became separate Office in 2013
• State of Illinois has had a program regulating the oil and gas industry since 1939
• Since 1853, approximately 155,000 oil, gas, and injection wells have been drilled in Illinois
Approximately 23,000 active oil and gas production wells, 6,500 Class II injection wells and 1,186 gas storage wells in operation.

Approximately 1,500 operators.

Production in 40 of the 102 counties.

Underground Natural Gas Storage in 24 Counties.

Illinois State Geological Survey
https://www.isgs.illinois.edu/outreach/geology-resources/oil-fields-illinois
Oil and Gas Resource Management

- Authority from Two Statutes:
  - Illinois Oil and Gas Act, 225 ILCS 725
  - Hydraulic Fracturing Regulatory Act, 225 ILCS 732
Oil and Gas Resource Management

Main Areas of Regulation

- Permitting
- Plugging and Restoration Program
- Compliance
- Enforcement
Oil and Gas Resource Management

- 3 Districts
- Field Manager
- 2 District Managers
- 12 Inspectors
- Conducted over 30,000 Inspections in 2017
- Ensure that Operators Comply with Oil and Gas Act and Regulations
- Issue Violations for Non-Compliance
Gas Storage Reservoir Types in the U.S.

Depleted Fields
- Also called: Oil/gas reservoirs
- Mature reservoirs

Salt Formations
- Not in Illinois

Depleted Aquifers
- Saline Aquifers
- Preferred term: Saline Reservoirs

Underground Storage by the Numbers in the U.S.

- 128 Operators
- 415 storage fields
  - 50% intrastate/50% interstate
  - About 80% reservoirs, 10% aquifers, and 10% salt caverns
- 4,800 BCF working capacity
- 17,000 wells
- Illinois:
  - 4th most storage facilities
  - 6th most working gas capacity

Gas Storage

Natural Gas Quick Facts: Illinois

• No significant natural gas resource in the state
• 80% of homes use natural gas as primary heating fuel (IEA, 2009) and demand varies through time
• Key transportation hub for natural gas: 18 interstate pipelines, 2 market centers

• 24 active underground gas storage sites (1 active site within the Mahomet Sole Source Aquifer boundary)
• Illinois has the greatest amount of natural gas storage capacity in saline aquifer formations in the nation (~780 billion cubic feet, Bcf)
Gas Storage by the Numbers in Illinois

- **24 Active Sites in 24 counties:**
  - **19 Intra**/5 Interstate (+14 inactive/abandoned)
  - 55% (21) saline aquifer
  - 45% (17) depleted field
- **1186 Active Gas Storage Wells (+464 plugged and abandoned)**
  - 71% (839) saline aquifer
  - 29% (347) depleted field
- Top 5 counties with the most wells (green = in Mahomet aquifer 15-County planning region):
  - Kankakee 14% (162)
  - Champaign 13% (153)
  - LaSalle 11% (134)
  - Livingston 10% (119)
  - McLean 9% (104)

Gas Storage Fields within the Footprint of Mahomet Sole Source Aquifer

Map source: Prairie Research Institute (2018)
Sec. 1.1. **Waste** as defined by this Act is prohibited.
"Waste" means "physical waste" as that term is generally understood in the oil and gas industry, including:

1. the locating, drilling and producing of any oil or gas well or wells drilled contrary to the valid order, rules and regulations adopted by the Department under the provisions of this Act.

2. permitting the migration of oil, gas, or water from the stratum in which it is found, into other strata, thereby ultimately resulting in the loss of recoverable oil, gas or both;

4. the unreasonable damage to underground, fresh or mineral water supply, workable coal seams, or other mineral deposits in the operations for the discovery, development, production, or handling of oil and gas;

5. the unnecessary or excessive surface loss or destruction of oil or gas resulting from evaporation, seepage, leakage or fire, especially such loss or destruction incident to or resulting from the escape of gas into the open air in excessive or unreasonable amounts;

6. permitting unnecessary fire hazards;

7. permitting unnecessary damage to or destruction of the surface, soil, animal, fish or aquatic life or property from oil or gas operations.
Sec. 6. The Department shall have the authority to conduct hearings and to make such reasonable rules as may be necessary from time to time in the proper administration and enforcement of this Act, including the adoption of rules and the holding of hearings for the following purposes:

(1) **To require the drilling, casing and plugging of wells to be done in such a manner as to prevent the migration of oil or gas from one stratum to another; to prevent the intrusion of water into oil, gas or coal strata; to prevent the pollution of fresh water supplies by oil, gas or salt water.**

(2) **To require** the person desiring or proposing to drill, deepen or convert any well...**for input, withdrawal, or observation in connection with the storage of natural gas or other liquid or gaseous hydrocarbons before commencing the drilling, deepening or conversion of any such well, to make application to the Department upon such form as the Department may prescribe and to comply with the provisions of this Section. The drilling, deepening or conversion of any well is hereby prohibited until such application is made and the applicant is issued a permit therefor as provided by this Act...**

(15) **To prohibit waste,** as defined in this Act.
Pre-2016 Federal Regulation of Pipeline and Underground Natural Gas Storage Facilities

- U.S. Department of Transportation (DOT) regulates natural gas pipelines under the Natural Gas Pipeline Safety Act (NGPSA), 49 U.S.C.A. § 601 et seq.

- The USDOT Pipeline Hazardous Materials Safety Administration (PHMSA) has jurisdiction over the safety of interstate natural gas pipeline facilities and may delegate authority over intrastate facilities to State Partners.

  - Interstate Gas Pipeline Facilities:
    - Used to transport gas and are subject to the Federal Energy Regulatory Commission (FERC) certification under the Natural Gas Act (15 U.S.C.A. 717 et seq.)
  
  - Intrastate Gas Pipeline Facilities:
    - Used to transport gas within a State not subject to the jurisdiction of FERC.
    - Certified by a state commission such as the Illinois Commerce Commission.
    - Intrastate facilities may receive gas from interstate commerce (comes from out of state), as long as any gas so received is consumed within the State.
Pre-2016 Federal Regulation of Underground Natural Gas Storage Facilities

- The Illinois Commerce Commission is a State Partner with the USDOT and performs safety inspections of the State’s intrastate pipeline infrastructure. PHMSA and FERC retain jurisdiction over interstate pipeline facilities.

- Prior to 2016, the U.S. DOT rules did not classify underground natural gas storage facilities as “pipeline facilities” subject to the NGPSA. Therefore, U.S. DOT rules were not applied to the downhole (wellhead and below) portion of underground natural gas storage facilities. Neither PHMSA nor the ICC inspected the gas storage wells at the State’s gas storage facilities.

- IDNR Well Inspectors inspected gas storage wells under the authority granted by the Oil and Gas Act.
  - Visual inspections of the wellheads to look for leaks or other noncompliant conditions.
PHMSA’s Mission

“To protect people and the environment by advancing the safe transportation of energy and other hazardous materials that are essential to our daily lives. To do this, the agency establishes national policy, sets and enforces standards, educates, and conducts research to prevent incidents. We also prepare the public and first responders to reduce consequences if an incident does occur.”

Source: https://www.phmsa.dot.gov/about-phmsa/phmsas-mission
Office of Pipeline Safety

- Responsible for carrying out a national program to ensure the safe, reliable, and environmentally-sound operation of the nation’s natural gas and hazardous liquid pipeline transportation system.
- Illinois located in the Central Region
- Central Regional Office is based in Kansas City

Source: https://www.phmsa.dot.gov/about-phmsa/offices/central-region
Recent Incidents Leading Up to Increased Federal Regulation of Underground Natural Gas Storage Facilities

- 2001: Hutchinson, KS Incident (Yaggy Field)
- 2004: Moss Bluff, TX Incident
- July 2015: API RP 1170
- September 2015: API RP 1171
- October 2015 to February 2016: Porter Ranch CA Incident (Aliso Canyon)
- July 2016: PIPES Act of 2016
- December 2016: PHMSA Interim Final Rule

Source: https://primis.phmsa.dot.gov/ung/incidents.htm
2001: Hutchinson, KS Incident (Yaggy Field)

- On January 17 and 18, 2001, an accident occurred at the Yaggy underground natural gas storage field.
- Natural gas was stored in underground salt caverns.
- Gas leaked from the storage field well production casing, migrated approximately nine miles underground, and then traveled to the surface through old brine, or salt wells, in the Hutchinson, Kansas area.
- This led to a series of gas explosions in Hutchinson, Kansas. An explosion in downtown Hutchinson destroyed two businesses, damaged 26 other businesses, and killed two persons in a mobile home park.
- Approximately 143 million cubic feet of natural gas leaked from the storage field.

Source: https://primis.phmsa.dot.gov/ung/incidents.htm
2004: Moss Bluff, TX Incident

- On August 19, 2004, the Moss Bluff storage facility located in Liberty County, Texas, had a well control incident and natural gas fire at Cavern #1.
- Moss Bluff storage facility was comprised of three separated underground salt caverns.
- Accident was caused by a separation of the 8 and 5/8-inch well string inside the cavern; a breach of the 8-inch brine piping above ground; and the separation of the wellhead assembly above the cavern.
- Over a period of six and one-half days, approximately 6 billion cubic feet of natural gas was released from the cavern and burned. The fire eventually self-extinguished, and late on August 26, 2004, installation of a blowout prevention valve was completed, effectively placing the well back under control.

Source: https://primis.phmsa.dot.gov/ung/incidents.htm

October 2015 to February 2016: Porter Ranch, CA Incident (Aliso Canyon)

- On October 23, 2015, an underground natural gas storage well at a depleted field in Porter Ranch, California, failed. The failure resulted in a sustained and uncontrolled natural gas leak.
- It is estimated that approximately 5 billion cubic feet of methane were released directly to atmosphere.
- 5,000 households (families) in the Porter Ranch area had to be relocated. California Governor Jerry Brown declared the Aliso Canyon incident a state emergency.
- After repeated unsuccessful attempts to contain the leak, a relief well was drilled to plug the leaking well.
- The Aliso Canyon underground storage field can store up to 86 billion cubic feet of natural gas. It has 115 storage wells and is the second largest storage facility of its kind in the United States. The well was drilled in 1953 and was later converted to a natural gas storage well in 1972.

Source: [https://primis.phmsa.dot.gov/ung/incidents.htm](https://primis.phmsa.dot.gov/ung/incidents.htm)

Source: [https://www.edf.org/climate/methane-progress-california](https://www.edf.org/climate/methane-progress-california)
API RP 1170 and 1171

• Mission

“to promote safety across the industry globally and to influence public policy in support of a strong, viable U.S. oil and natural gas industry.”

• Standards

“For more than 90 years, API has led the development of petroleum, natural gas and petrochemical equipment and operating standards. These represent the industry’s collective wisdom on everything from drill bits to environmental protection and embrace proven, sound engineering and operating practices and safe, interchangeable equipment and materials. **API maintains nearly 700 standards and recommended practices. Many have been incorporated into state and federal regulations and they are also the most widely cited standards by the international regulatory community.”

Source: [http://www.api.org/about](http://www.api.org/about)
API RP 1170 and 1171

- Circa 2012, the API began development of recommended practices for underground natural gas storage facilities. Based on input from many industry stakeholders, including regulators such as PHMSA, FERC, and five state regulatory agencies. In 2015, they published the following RPs:

  - **July 2015:** API RP 1170, *Design and Operation of Solution-mined Salt Caverns Used for Natural Gas Storage*, provides the functional recommendations for salt cavern facilities use for natural gas storage service and covers facility geomechanical assessments, cavern well design and drilling, and solution mining techniques and operations including monitoring and maintenance practices.

  - **September 2015:** API RP 1171, *Functional Integrity of Natural Gas Storage in Depleted Hydrocarbon Reservoirs and Aquifer Reservoirs*, applies to natural gas storage in depleted oil and gas reservoirs and aquifer reservoirs. It focuses on storage well, reservoir and fluid management for functional integrity in design, construction, operation, monitoring, maintenance, and documented practices.
PIPES Act of 2016

The United States has the most expansive network of energy pipelines in the world:

- 2.6 million miles of pipelines
- transport 64 percent of the energy commodities consumed in the country

The PHMSA regulates the safety of pipeline facilities at the federal level.

Federal authority for PHMSA’s pipeline safety program expired in 2015.

In June of 2016, Congress passed the Protecting our Infrastructure of Pipelines and Enhancing Safety (PIPES) Act of 2016 to extend PHMSA’s pipeline safety program through 2019.
Among other things, Section 12 of the PIPES Act required PHMSA to set federal minimum safety standards for underground natural gas storage facilities, and allows states to go above those standards for intrastate facilities:

49 U.S.C.A. § 60141

(a) MINIMUM SAFETY STANDARDS.—Not later than 2 years after the date of enactment of the PIPES Act of 2016, the Secretary, in consultation with the heads of other relevant Federal agencies, shall issue minimum safety standards for underground natural gas storage facilities.

*   *   *

(c) FEDERAL-STATE COOPERATION.—The Secretary may authorize a State authority (including a municipality) to participate in the oversight of underground natural gas storage facilities in the same manner as provided in sections 60105 and 60106.

*   *   *

(e) PREEMPTION.—A State authority may adopt additional or more stringent safety standards for intrastate underground natural gas storage facilities if such standards are compatible with the minimum standards prescribed under this section.
PHMSA Interim Final Rule

On December 19, 2016, PHMSA published in the Federal Register an interim final rule (IFR) that revises the Federal pipeline safety regulations to address critical safety issues related to downhole facilities, including wells, wellbore tubing, casing, and wellheads, at underground natural gas storage facilities.

- Responds to Section 12 of the PIPES Act of 2016
- Incorporates by reference API RPs 1170 and 1171
- Applies to downhole facilities associated with the storage of natural gas.
PHMSA Interim Final Rule

Incorporation of API RP 1171

- RP 1171 contains 11 Sections
  - Sections 1-7 apply to New or Rebuilt Facilities
  - Sections 8-11 apply to Existing Facilities
- RP 1171 included 124 mandatory “Shall” requirements and 258 discretionary “Should” requirements
- The IFR required underground natural gas storage facility operators to treat all “Should” statements as mandatory.
PHMSA Interim Final Rule

Incorporation of API RP 1171 (cont.)

• After publishing the IFR, PHMSA continues work toward adoption of a “final” Final Rule.

• On June 20, 2017, PHMSA published a notice in the Federal Register (82 FR 28224) announcing changes to implementation of certain provisions of the IFR.

• In the interim and until one year after the adoption of a final rule, PHMSA will not issue enforcement citations for
  • Failure to meet provisions that are non-mandatory in API RPs 1170 and 1171
  • Non-compliance with the requirement to justify and document deviations from the non-mandatory provisions
IDNR Partnership with PHMSA


- IDNR submitted application for PHMSA 2018 Underground Natural Gas Storage Grant under 49 USCA § 60106

- IDNR Received certification effective January 1, 2018
IDNR Partnership with PHMSA

- ICC retains jurisdiction over pipeline portion of underground natural gas storage facilities.
- IDNR has safety inspection authority from the wellhead down.

PHMSA Inspection Program

• PHMSA Underground Natural Gas Storage Safety Program Training commenced in April/May.
  • 2 IDNR staff members certified.
  • 2 more scheduled for class in July

• Under 49 USCA § 60106 certification, IDNR has inspection authority, but is required to refer all enforcement to PHMSA.

• IDNR staff will conduct safety inspections according to PHMSA procedures.
PHMSA reviewed API RP 1171 to determine all “Shall” statements. Staff then developed inspection questions and protocol to evaluate whether a underground natural gas storage facility is in compliance with mandatory requirements of RP 1171. The questions are meant to determine whether the operator has properly implemented and incorporated the mandatory requirements by reviewing facility procedures and records. The mandatory requirements regulate the following sections of RP 1171:

- Section 8: Risk Management for Gas Storage Operations
- Section 9: Integrity Demonstration, Verification, and Monitoring Practices
- Section 10: Site Security and Safety, Site Inspections, and Emergency Preparedness and Response
- Section 11: Procedures and Training

There are also questions related to sections within 49 CRF § 191 not directly related to the API RPS and questions from the Underground Natural Gas Storage FAQ found here: https://primis.phmsa.dot.gov/ung/faqs.htm
Section 8: Risk Management for Gas Storage Operations

8.2 Risk Management

REQUIREMENT: The operator shall develop, implement, and document a program to manage risk that includes data collection, identification of potential threats and hazards to the storage operation, risk analysis including estimation of the likelihood of occurrence of events related to each threat, the likelihood of occurrence and potential severity of the consequences of such events, and the preventive, mitigative, and monitoring processes to reduce the likelihood of occurrence and/or the likelihood and severity of consequences, and a periodic review and reassessment of the processes.

8.2 Procedure Question

Question 1. Please describe how the risk management program includes elements from API RP 1171 section 8.2.

- Data collection
- Identification of potential threats and hazards
- Risk analysis including estimation of the likelihood of occurrence of events related to each threat
- The likelihood of occurrence and potential severity of the consequences of such events
- The preventive, mitigative, and monitoring processes to reduce the likelihood of occurrence and/or the likelihood and severity of consequences
- A periodic review and reassessment of the processes

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Section 8: Risk Management for Gas Storage Operations

Mandatory Sections within API RP 1171:

- 8.2 Risk Management Program
- 8.3 Data Collection and Integration
- 8.4 Threat and Hazard Identification and Analysis
- 8.5 Risk Assessment
- 8.6 Preventative and Mitigative Measures
- 8.7 Periodic Review and Reassessment
- 8.8 Recordkeeping
Section 9: Integrity Demonstration, Verification, and Monitoring Practices

Mandatory Sections within API RP 1171:

- 9.2 Overview
- 9.3 Well Integrity Demonstration, Verification, and Monitoring
- 9.8 Recordkeeping
Section 10: Site Security and Safety, Site Inspections, and Emergency Preparedness and Response

Mandatory Sections within API RP 1171:

- 10.3 Ingress and Egress
- 10.4 Signage
- 10.6 Emergency Preparedness/Emergency Response
Section 11: Procedures and Training

Mandatory Sections within API RP 1171:

- 11.2 Procedures
- 11.3 Operations and Maintenance
- 11.4 Emergency Plans
- 11.7 Interaction with Control Room
- 11.9 Safety and Environmental Programs
- 11.11 Management of Change
- 11.12 Training
- 11.13 Records
FAQs and Other Mandatory Sections

Mandatory Sections not related to API RP 1171:

- § 191.15 Transmission systems; gathering systems; liquefied natural gas facilities; and underground natural gas storage facilities: Incident report.
- § 191.17 Transmission systems; gathering systems; liquefied natural gas facilities; and underground natural gas storage facilities: Annual report.
- § 191.22 National Registry of Pipeline and LNG operators.
- § 191.23 Reporting safety-related conditions.
- § 192.12 Underground Gas Storage
- FAQ 22
- FAQ 27
More Stringent State Rules

49 U.S.C.A § 60141(e):

A State authority may adopt additional or more stringent safety standards for intrastate underground natural gas storage facilities if such standards are compatible with the minimum standards prescribed under this section.
SB2706: Underground Natural Gas Storage Safety Act

SB2706 would create the Illinois Underground Natural Gas Storage Safety Act.

• Act would incorporate sections of 49 U.S.C.A. 601 et seq. and 49 CFR 191 and 192 pertinent to underground natural gas storage facilities.
• Memorialize the IGA between IDNR and ICC granting IDNR authority over downhole portion of underground natural gas storage facilities.
• Allow IDNR to adopt rules
• Allows IDNR to apply for certification under 49 U.S.C.A. 60105.
  • IDNR would have enforcement authority. No more referrals to PHMSA
HB4746: Incident Reporting and Annual Inspections

- Passed on May 31, 2018 and awaiting Governor’s signature
- Amends the Oil and Gas Act
  - Makes changes applicable to gas storage operators located within the footprint of a Sole Source Aquifer as designated by the US environmental Protection Agency in 2015.
HB4746: Incident Reporting and Annual Inspections

Creates Section 7.5:

- Requires operator to immediately notify the following parties located within 5 miles of the boundaries of a “natural gas incident:”
  - IEMA
  - All emergency service agencies serving the area
  - All owners and operators of PWS, CWS and non-CWS
- Requires notice to the following parties, “as soon as practically possible:”
  - all private residents, owners and operators of private water systems, or businesses, including agricultural operations, located within one and a half miles of the boundaries of the natural gas incident.
- Requires IDNR to amend rules establishing the minimum criteria for an unintended release of natural gas that would constitute an “incident.”
- Creates continuous and ongoing obligation to further notify affected parties if boundaries change.
HB4746: Incident Reporting and Annual Inspections

Creates Section 7.6:

• Requires IDNR to conduct inspections at all gas storage fields lying on the footprint of a Sole Source Aquifer to ensure that there are no infrastructure deficiencies or failures that could pose any harm to public health.
• Requires the owner of the gas storage field to cover the costs of the annual inspection.
Questions?

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