



Permitting UIC Class II Hydrocarbon Storage Wells, Class III Solution-Mining Wells, & Class V Storage Wells



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Louisiana Department of Natural Resources



Office of Mineral
Resources

Office of
Conservation

Office of Coastal
Management

Pipelines
Division

Environmental
Division

Geological
Oil and Gas

Engineering
Regulatory

Engineering
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and Mining

Underground Injection Control (UIC) Program

The 1974 Safe Drinking Water Act (SDWA) established national UIC Program under the EPA and charged them to:

- Establish Technical Regulations for UIC Program
- Define the Underground Source of Drinking Water (USDW)
- Establish Injection Well Classifications

The Louisiana Office of Conservation was granted primacy of the UIC program in 1982.



Injection Well Class Types

Class I	Industrial (Hazardous & Non-Hazardous) or Municipal Waste
Class II	Oil & Gas Related (SWD, EOR, Storage)
Class III	Solution Mining (Caverns)
Class IV	Hazardous Waste above or into USDW
Class V	Non-hydrocarbon storage caverns (as well as other misc. injection wells)
Class VI	Carbon Sequestration

**In 1984, the EPA banned the use of Class IV injection wells*



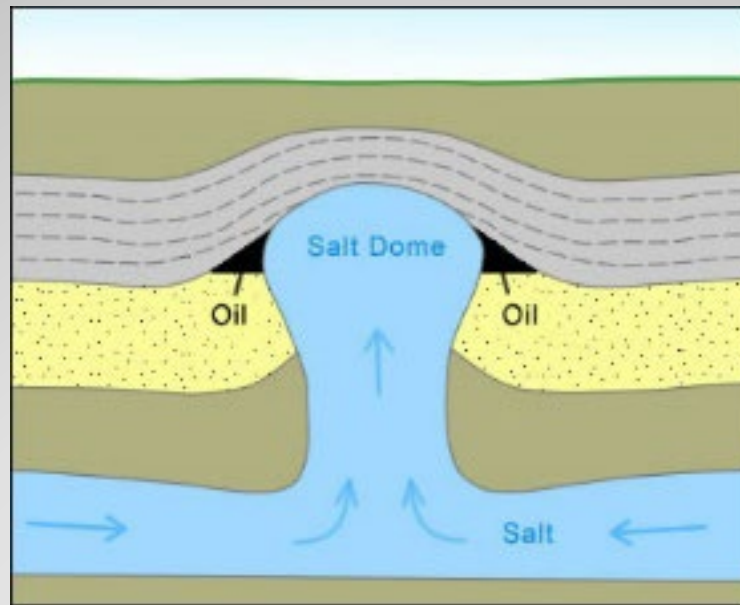
IMD Regulations

Louisiana Administrative Code	Statewide Order	Subject or Regulation
LAC 43:XVII.103 Chapter 1	Statewide Order No. 29-N-1, Chapter 1	Class I Non-Hazardous Waste Injection
LAC 43:XVII Chapter 2	Statewide Order No. 29-N-2, Chapter 2	Class I Hazardous Waste Injection
LAC 43:XIX Chapter 4	Statewide Order No. 29-B, Chapter 4	Class II Injection/Disposal Well Regulations
LAC 43:XIX Chapter 3	Statewide Order No. 29-B, Chapter 3	Onsite storage, treatment and disposal of oilfield waste. Primarily oilfield pit regulations, but also has some general requirements for Class II disposal wells
LAC 43:XVII Chapter 3	Statewide Order No. 29-M, Chapter 3	Class II Hydrocarbon Storage in Salt Dome Cavities
LAC 43:XVII Chapter 33	Statewide Order No. 29-M-3, Chapter 33	Class III Solution-Mining Injection Wells
LAC 43:XVII Chapter 36	Statewide Order No. 29-N-6, Chapter 36	Class VI Geologic Sequestration of Carbon Dioxide
LAC 43:XVII.103 Chapter 1	Statewide Order No. 29-N-1, Chapter 1	Class V Injection Wells not included in Class I, II, III, IV or VI
LAC 43:XVII Chapter 37	Statewide Order No. 29-M-5, Chapter 37	* Class V Storage Wells in Solution-Mined Salt Dome Cavities (Hydrogen, Helium, Ammonia, etc.)

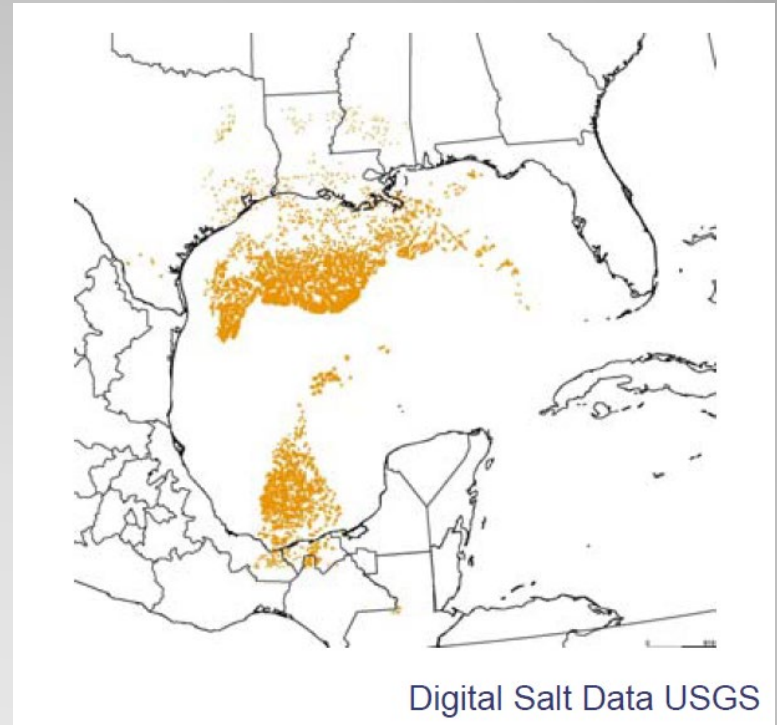
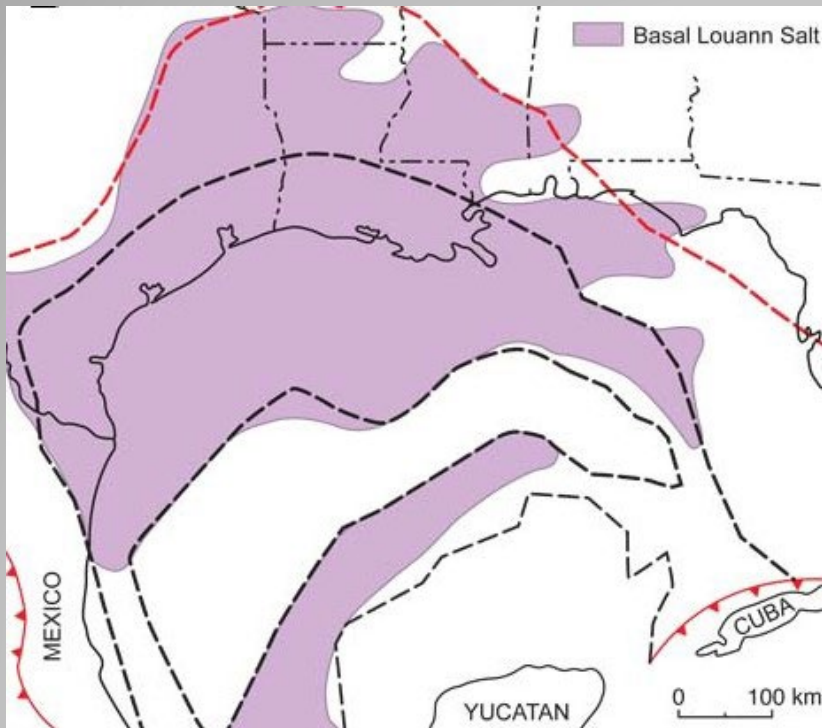


*recently submitted to Louisiana State Register and awaiting promulgation.

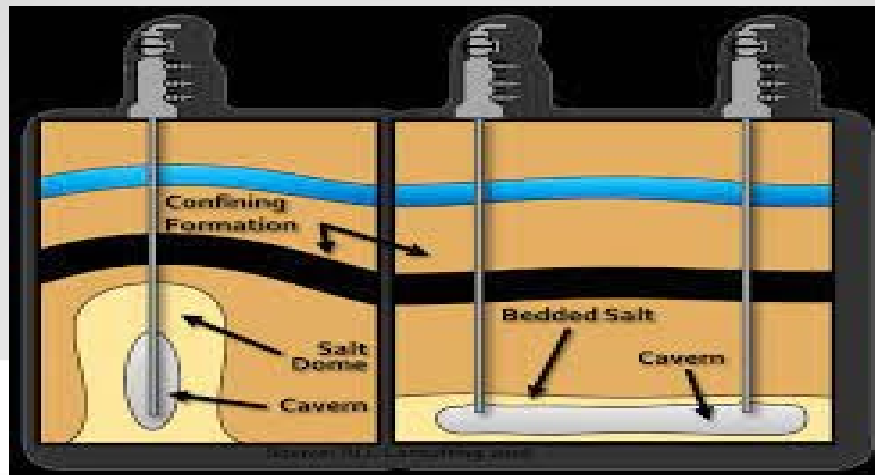
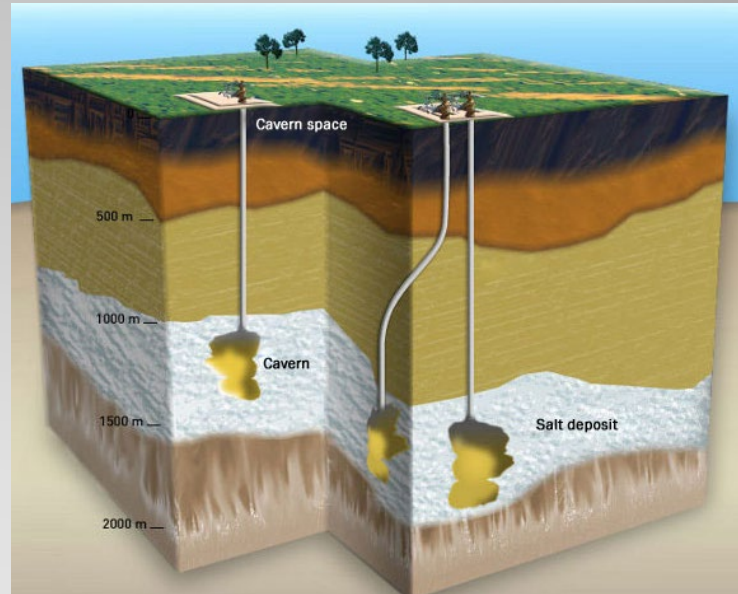
What is a Salt Dome?

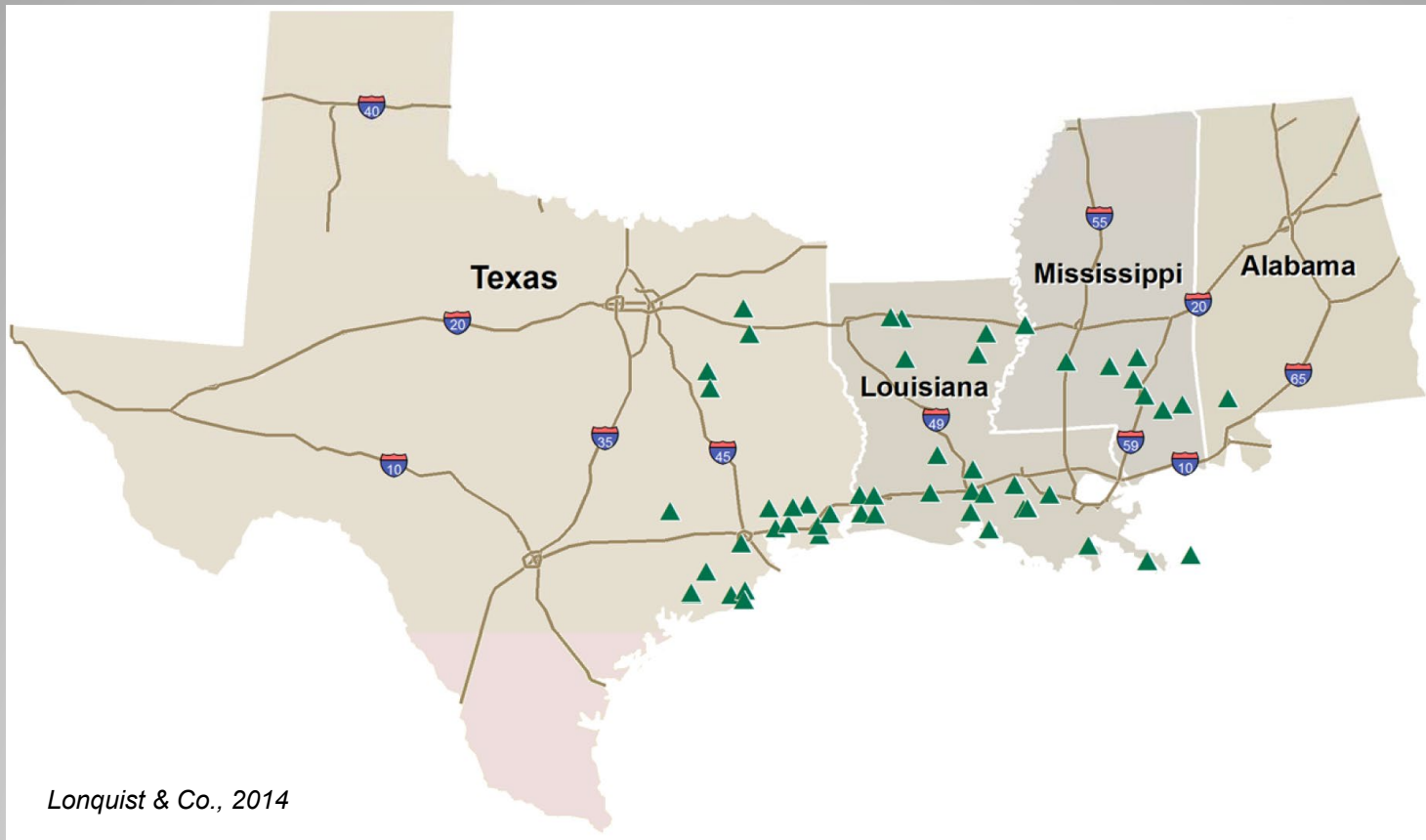


The Louann Salt



Domal vs Bedded Salt

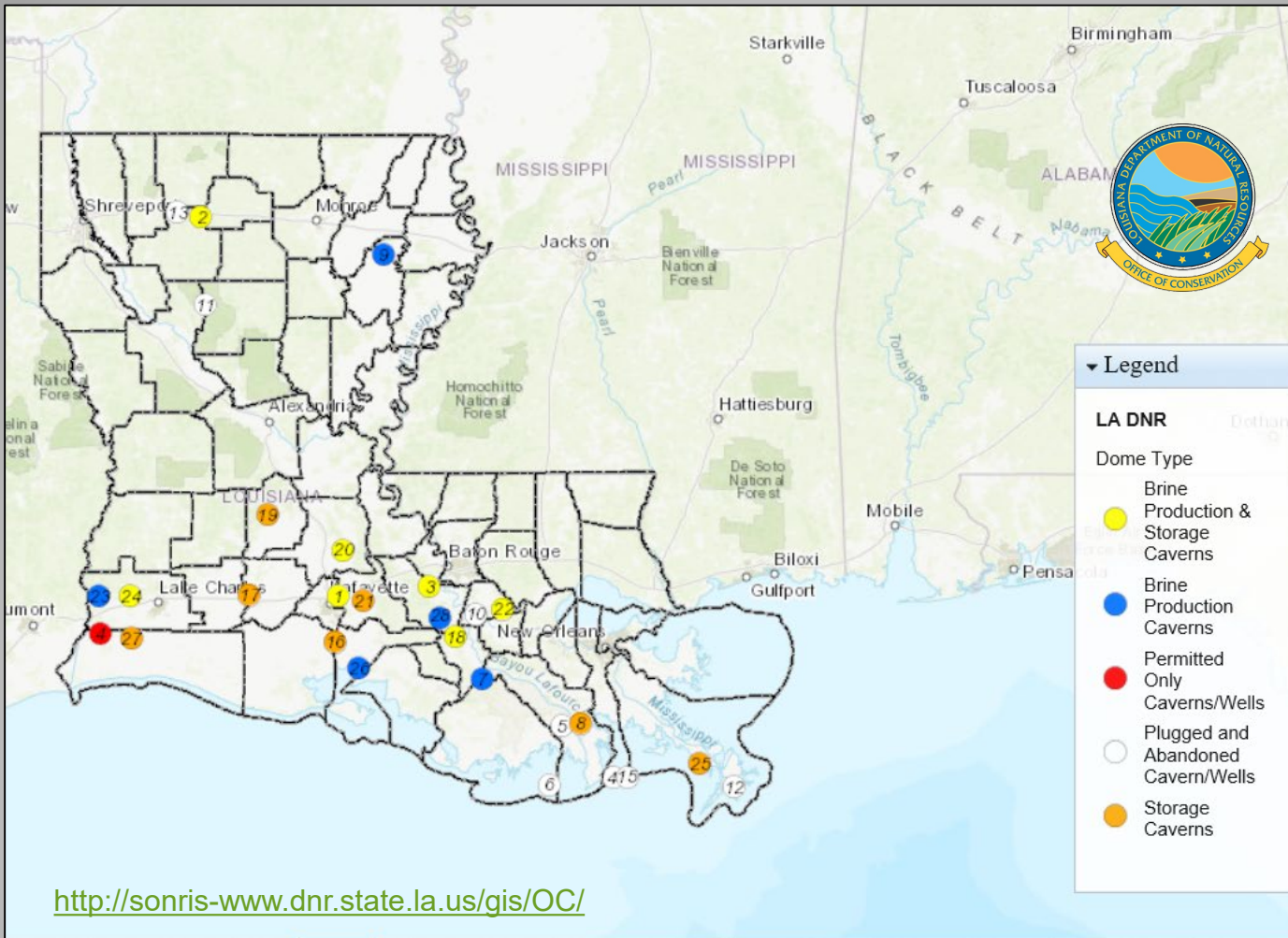




Lonquist & Co., 2014

Cavern facilities along the U.S. Gulf Coast

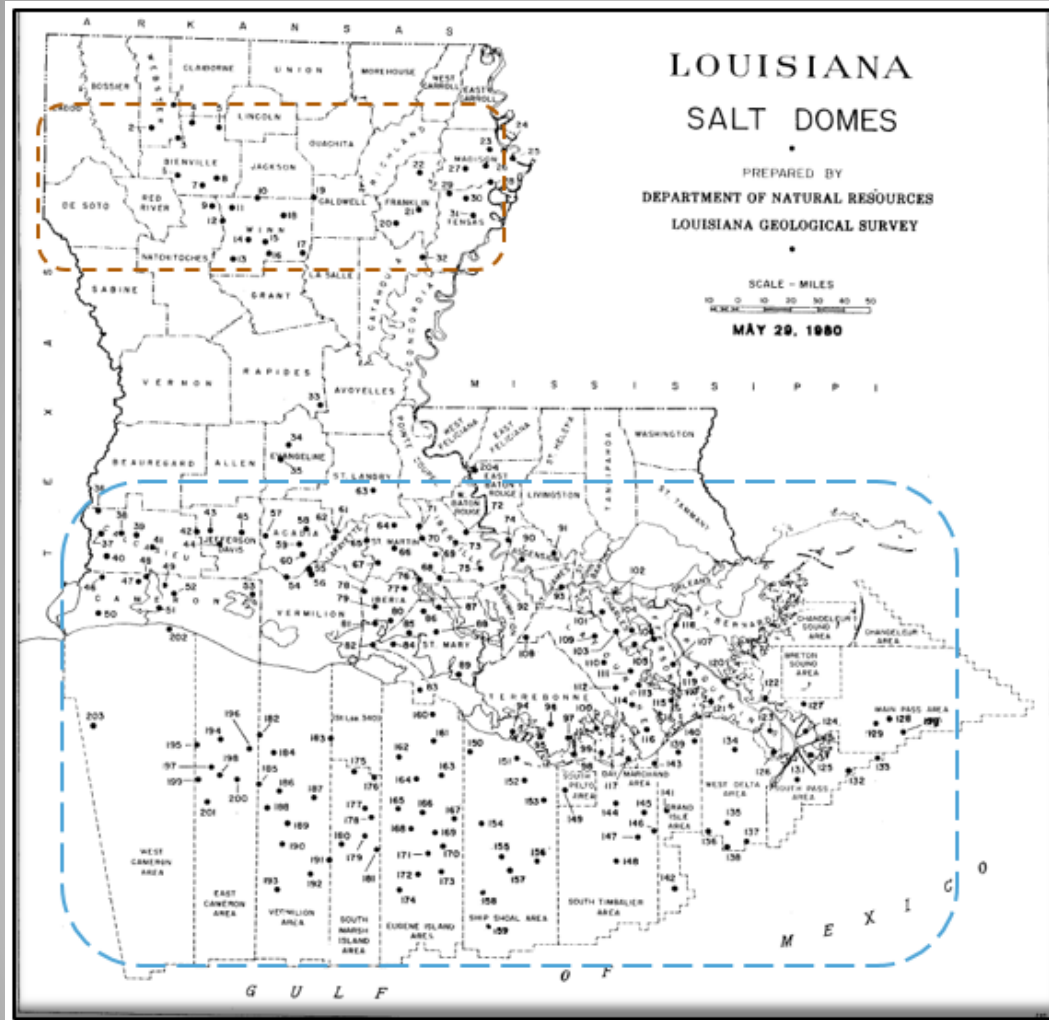




- Salt Domes**
- 1 ANSE LA BUTTE
 - 2 ARCADIA DOME
 - 3 BAYOU CHOCTAW
 - 4 BLACK BAYOU
 - 5 BULLY CAMP
 - 6 CAILLOU ISLAND
 - 7 CHACHAHOULA
 - 8 CLOVELLY
 - 9 CROWVILLE
 - 10 DARROW
 - 11 DRAKES
 - 12 GARDEN ISLAND BAY
 - 13 GIBSLAND
 - 14 GRAND ISLE BLOCK 16
 - 15 GRAND ISLE BLOCK 18
 - 16 JEFFERSON ISLAND
 - 17 JENNINGS
 - 18 NAPOLEONVILLE
 - 19 PINE PRAIRIE
 - 20 PORT BARRE
 - 21 SECTION 28
 - 22 SORRENTO
 - 23 STARKS
 - 24 SULPHUR MINES
 - 25 VENICE
 - 26 WEEKS ISLAND
 - 27 WEST HACKBERRY
 - 28 WHITE CASTLE

Historically active and currently active salt dome facilities in Louisiana

Louisiana Salt Domes



In Louisiana, there are at least 200 known or identified salt domes.

Louisiana has two salt basins, the North Louisiana Salt Basin and the Gulf Coast Salt Basin.

Louisiana currently has 20 “active” salt domes, meaning there are salt caverns with active permits.

419 individual entries into caverns with active permits in Louisiana.



Presentation Outline:

- I. Overview of all UIC Class Types for Salt Cavern Wells
- II. Application submittal and 1st Part Review process for Class III & Class II wells to acquire the permit to construct
- III. Application submittal and 2nd Part Review process for Class III & Class II wells to obtain permit to inject
- IV. Application Review Timing
 - Dual (streamlined) permitting & Area Permits
 - Expedited Permits
- V. Class V Storage Wells and Permitting
 - Class V Re-permitting requirement
- VI. 5-year Compliance Update
- VII. UIC Forms and Guidance



Part I:
Overview of UIC Class Types for
Salt Cavern Wells



UIC Class Types for Salt Caverns

	Revisions Effective 9/20/2022	*Revisions Effective 9/20/2022*	*Effective Date 9/20/2022*
	Class II Hydrocarbon Storage Wells (HSW)	Class III Solution- Mining Wells	Class V Storage in Salt Caverns
Statewide Order:	29-M (Subpart 3)	29-M-3 (Subpart 5)	29-M-5 (Subpart 7)
	LAC 43:XVII.301 Chapter 3	LAC 43:XVII.3301 Chapter 33	LAC 43:XVII.3701 Chapter 37
Application Form:	Form UIC-2 HSW	Form UIC-3 BR	<i>TBD</i>

The Application should only refer to the regulations of the specific Class of well for which you are applying.



*Part II:
UIC Application Submittal &
Review Process
(1st Part Review)*

PERMIT TO CONSTRUCT



1st Part Review: Application Review Process for an Approval to Construct

Operator mails to IMD:

- Application Form (2)
- Application Attachments (16-17 attachments per application)
- Shape file (if applying for area permit)
- Applicable Fees
- Proof of Publication(s)
- Electronic Copy of Application



Application Processed:

IMD Notifies operator of:

- Application Number
- Missing/Incorrect Information
- Receipt of Fees



Geologic Review
(next slide)



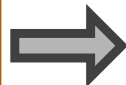
1st Part Review: Application Review Process for Approval to Construct (cont'd)

The Geological Review encompasses:

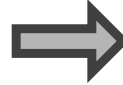
- Administrative Information
- Survey Location Plat Review (IMD GS-10)
- AOR Map and Lists (freshwater wells and penetrations into the salt)
- Freshwater & Fluid Source Analyses
- Openhole Well Log Review (USDW, Caprock, TOS)
- Site Assessment (regional and local geology)
- Geologic Mapping (structure maps, cross-sections, interpretations)
- Geophysical Methods (if used)
- Technical Report and Well History
 - Salt tectonics and the history of salt movement
 - Salt Coring Plan
 - Leaching Program and Cavern Design
 - Spacing Requirements
- Subsidence Plan
- Adjacent Landowners List & Map
- IT Decision Questions



**Drafts
Geological
Notice of
Deficiencies
(NOD)**



**Passes
application
and draft NOD
to engineer for
review**



**Engineering Review
(next slide)**



1st Part Review: Application Review Process for Approval to Construct (cont'd)

The **Engineering Review** encompasses:

- Administrative Information
- ¼ Mile AOR Review (Maps and Lists)
 - Deficient Well Search
 - All well types in AOR (water wells, O&G, injection wells, etc.)
 - Well History & Construction Information
- Wellhead and Wellbore Schematics
- Work Prognosis & Drilling Plan
- Cement Isolation
- Minimum of (2) cemented casing strings into the salt stock
- Operating Requirements
- Corrective Action Plans (if applicable)
- Facility Diagram
- Safety Plans (vapor detection, alarms, valves and flowlines, etc.)
- Financial Assurance Review
- Closure and Post-Closure Plans
- Monitoring Requirements



Notice of
Deficiencies
(NOD)



All Deficiencies
Addressed by
Operator/Consultant



Possible Public
Hearing & Approval
to Construct



1st Part Review: Application Review Process for Approval to Construct (cont'd)

If converting from a Class III (solution-mining well) to Class II (hydrocarbon storage well), the application review process is very similar to a new drill, solution-mining well application.

These are the *typical* additional items needed for a Class II-HSW conversion application:

- Form UIC-2 HSW
- As-drilled survey plat
- Geomechanical evaluation and modeling (using salt core from the well to be converted)
- New Notice of Intent for conversion, if not already previously advertised (per regulations)
- Mechanical Integrity Test (MIT) Results & Report
- Sonar caliper survey report including tilted upshots of the cavern roof
- Casing Inspection logs
- As-built wellbore schematic & wellhead schematic
- Previous UIC-WH1(s) showing wells work history
- Work prognosis
- Updated safety plan
- Top of salt structure map and structural cross-sections (N-S, E-W)
- Re-evaluation of cavern spacing requirements



If an application goes to Public Hearing...

- An administratively complete copy of the application package must be prepared and made available for public review by the operator.
- Public hearing fee must be paid by the operator.
- There must be a **30-day** public notice published in the local and state journals by the operator.
- The public hearing notice shall be mailed by the operator to any interested parties as well as adjacent landowners and operators.



*Part III:
UIC Application Submittal &
Review Process
(2nd Part Review)*

PERMIT TO INJECT



Part 2: Final Review for Permit-to-Inject

NEW CLASS III WELL

Operator mails to IMD:

- One (1) Original Signed & Two (2) Copies of Form UIC-WH1
- As built wellbore schematic
- As drilled survey plat*
- Directional survey
- One (1) Copy of the Electric Logs
- One (1) Copy of all cased hole logs (CBL, CIL, temp logs, etc.)
- For each casing string: Form CSG-TSC with charted pressures, temperature logs, cementing reports, pipe tally, open hole caliper logs, etc.

CONVERTING TO CLASS II HSW

Operator mails to IMD:

- One (1) Original Signed & Two (2) Copies of Form UIC-WH1
- For new casings: Form CSG-TSC, CBL, CIL, temp logs, cement reports, etc.
- As built wellbore schematic



Once the entire completion package is received by IMD, the geological and engineering review begins.

**the certified as drilled survey plat and a certified copy of the IMD Order must be filed with Mortgage and Conveyance at the Parish in which the well is located.*



Part 2: Final Review for Permit-to-Inject

Geologic Review:

1. Review Form WH-1 and Open Hole Logs to Confirm:

- Top of Salt & Caprock
- Appropriate Cavern Interval
- Base of USDW

2. Review any other required geophysical logs or methods;

3. Review the salt core description report and/or geomechanical core report (which ever is applicable);

4. Review Surveyed As-Drilled Location Plat



Notice of Deficiencies (NOD)



Engineering Review



Part 2: Final Review for Permit-to-Inject

Engineering Review:

1. Review Form WH-1 and completion documents to confirm:

- Was the work performed consistent with what was proposed?
- Proper wellbore construction/configuration
 - Surface casing through USDW
 - Two cemented strings into salt
 - Adequate cement isolation
 - Attempt should have been made to cement each casing to surface
- Appropriate pressure testing of each cemented casing and casing shoe

2. Adequate financial security in place

3. Documents filed with Parish Clerk of Court

- Mortgage & Conveyance:
 - Certified (by land surveyor) as-drilled survey plat
 - Certified (by IMD) copy of the Order (Permit-to-Construct) with exhibits/attachments



Notice of Deficiencies (NOD)



Permit to Inject



Part IV:
UIC Cavern Application Review
Timing



Application Review Timing:

- For applications reviewed during regular office hours, a full review from start to finish can take approximately 1 to 2 years (on average) for both new drills and conversion applications.
 - This timing varies with several factors:
 - (1) the content quality of submitted application(s),
 - (2) extent of existing cavern queue,
 - (3) workload and availability of IMD staff,
 - (4) the turn-around time on NOD responses from operator/consultant, and
 - (5) whether a public hearing is required or not.



Are there options to streamline the process?

IMD allows operators to **dually permit** any proposed caverns. For example, if you want a storage cavern you must create a solution-mined cavern first, IMD can review both applications simultaneously (if properly submitted)!

Area-wide permits are utilized when the operator wants to drill multiple cavern wells at the same facility with little turn around time.

The review process is the same, with the exception of a larger area-of-review (extends $\frac{1}{4}$ mile from proposed area boundary and not single well).



So, how can you get your permit even faster?

- GET IT **EXPEDITED!**

- La. Revised Statute 30:4(Q) allows authorized staff to review expedited permits outside of customary work hours while being paid time and one-half.
- Applicants setup and pay into an escrow account. Expedited permitting fees are held in escrow while staff work on the permit requests. This escrow fund, established specifically for expediting permitting, serves as the financial source from which overtime compensation is paid. Thus, the monies expended neither pose a financial liability nor directly impact the budget for Office of Conservation.
- Once the permitting process is complete, any remaining escrow balance is released to the applicant.
- Expedited permitting is strictly performed by applicable staff during overtime hours, so as not to negatively impact non-expedited permitting conducted during regular business hours.
- The expedited program has helped cut our standing cavern review queue from 24 permits awaiting review to just five (as of 7-1-2022)
 - A typical permit application is several hundred pages long and requires 300-500 man hours of review.



Part V:
Class V Storage Caverns



Class V Storage Caverns

Statewide Order 29-M-5, will allow for the storage of compressed air, ammonia, hydrogen, and other noble gases within solution-mined salt caverns in Louisiana.

- These regulations are expected to be effective on September 20, 2022.
 - 5-year cavern compliance update is still required.
 - Class V Storage wells must be re-permitted every 10-years.
 - A notable difference from Class II-HSW caverns is the well construction (i.e. casing types, cement types, and wellhead components) due to compatibility with the stored product(s).



*Part VI:
Cavern Compliance Update*



Cavern Compliance Update:

- **For all existing caverns, the next cavern compliance update will be due in 2025.**
- **The 2025 cavern compliance update will have very similar requirements as the 2020 cavern compliance update.**
 - Mapping & Cross-sections in regards to spacing requirements;
 - Financial Security;
 - Variance Request(s);
 - Affidavit
- **Will be required every 5-years, thereafter.**



*Part VII:
UIC Forms and IMD Guidance*



IMD Forms for Caverns

- **Form UIC–2 HSW:** *Application form for Cavern Conversion to Hydrocarbon Storage*
- **Form UIC–3 BR:** *Application form for a new solution-mining cavern*
- **Form UIC–4:** *Class-II Hydrocarbon Storage Inspection Form (for CES use only)*
- **Form UIC–4c:** *Salt Cavern Safety Inspection Form (for operator use only)*
- **Form UIC–7:** *Injection Well Inspection Form – MIT (for CES use only)*
- **Form UIC–17:** *Injection Well Work Permit*
- **Form UIC–38:** *Class-III Brine Well Inspection Form (for CES use only)*
- **Form UIC–50:** *Salt Cavern Weekly Monitoring Log & Summary Report (submitted quarterly)*
- **Form UIC–P&A (Don't need UIC-WH-1 with this!):** *Injection Well Plug and Abandonment Report – revised in 2012 – PDF format*
- **Form UIC–WH1:** *Well History & Work Resume Report for Injection Wells*
- **Form CSG-TSC:** *Affidavit of Casing Test for Salt Cavern Wells*
- **Form IMD-1:** *Request for Expedited Review*

***New Class V Storage Application Form coming soon!**

Applicable Salt Cavern Well Internet Links:

- **DNR Regulations**
<http://www.dnr.louisiana.gov> >> **Conservation >> Rules and Rulemaking/Fees**
- **Downloadable DNR Application Forms**
<http://www.dnr.louisiana.gov> >> **Conservation >> Forms >> Injection & Mining Division**
- **DNR Online Public Database Access (SONRIS)**
<http://www.dnr.louisiana.gov> >> **SONRIS** (orange box on left side of page) >> **Data Access >> Injection Information (under “Conservation”)**
- **DNR Scanned Documents (SONRIS)**
<http://www.dnr.louisiana.gov> >> **SONRIS >> Document Access >> Permitting >> UIC Well File Historic**
- **Great Information!!! UIC Permitting Workshop Outlines & Presentations**
<http://www.dnr.louisiana.gov> >> **Conservation >> Divisions >> Injection & Mining**

Internet Links (Cont'd)

- **Geological Cross-Section Standards for Salt Caverns**

http://www.dnr.louisiana.gov/assets/OC/im_div/Salt_Cavern_Stuff/GuidanceforCrossSectionsrev10_30_2018.pdf

- **Structure Map Standards for Caverns**

http://www.dnr.louisiana.gov/assets/OC/im_div/Salt_Cavern_Stuff/GuidanceforCavernStructureMapsrev10_30_2018.pdf

- **SONRIS Registered Water Well Database**

<http://www.dnr.louisiana.gov> >> **SONRIS** (orange box on left side of page) >> **Data Access** >> **Ground Water Information** (under “**Conservation**”) >> **Water Wells by** <several options>

- **LDEQ LELAP Accredited Laboratories**

<http://www.deq.louisiana.gov> >> **Divisions** >> **Public Participation and Permit Support** >> **Louisiana Laboratory Accreditation Program** >> **Accredited Laboratories** >> **LELAP Accredited Labs*** (scroll down the list of Accredited Laboratories or you can export to an Excel spreadsheet)

- **Location/As-Drilled Survey Plat Requirements**

http://www.dnr.louisiana.gov/assets/OC/im_div/uic_sec/imd-gs-10.pdf

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