

Class II – Salt Water Disposal and Enhanced Oil Recovery Wells

Presented by

Cody Todd & Addie Roberts, Petroleum Engineers

Injection and Mining Division



Wednesday, July 20, 2022

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 Administrative

Injection and Mining



Presentation Outline

- I. The Underground Injection Control (UIC) Program
- II. UIC Application Process
- III. UIC Application Guidance
- IV. Forms
- V. Useful Links
- VI. Contact Information
- VII. Questions



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

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



Regulations

- * The basic regulations of the Office of Conservation are a series of documents called Statewide Orders. These Orders form the backbone of the regulatory scheme and provide structure for operational requirements. The regulations are lawfully codified in the Louisiana Administrative Code and are prefixed by the letters LAC

Louisiana Administrative Code	Statewide Order	Subject or Regulation
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:XIX.Chapter 4	Statewide Order No. 29-B, Chapter 4	General regulations for a Class II produced fluids disposal well
LAC 43:XIX.Chapter 5	Statewide Order No. 29-B, Chapter 5	Regulations specific to commercial oilfield waste facilities



Injection Well Class Types

Class I	Industrial (Hazardous & Non-Hazardous) or Municipal Waste
Class II	Oil & Gas Related (<i>SWD, EOR, Storage</i>)
Class III	Solution Mining (Caverns)
Class IV	Hazardous Waste above or into USDW
Class V	Wells not covered under the remaining classifications
Class VI	Carbon Sequestration





United States
Environmental Protection
Agency
Office of Water
(4606)
Washington, DC 20460

EPA 816-H-10-001
November 2010
<http://water.epa.gov/drink>

Safe Drinking Water Act

Underground Injection Control (UIC) Program

Protecting Public Health and Drinking Water Resources

Class I wells-
Isolate hazardous,
industrial and municipal
wastes through
deep injection



Class II wells-
Inject oil and gas
production fluids



Class III wells-
Minimize
environmental impacts
from solution mining
operations



Class IV wells-
Banned under all
scenarios except as part of
authorized hazardous
waste cleanup
activities

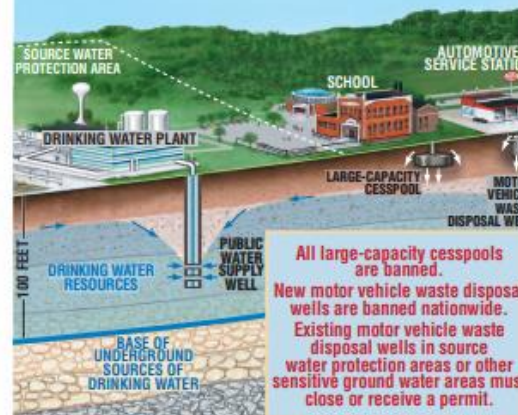


Class V wells-
Manage the shallow injection
of all other fluids to prevent
contamination of drinking water resources



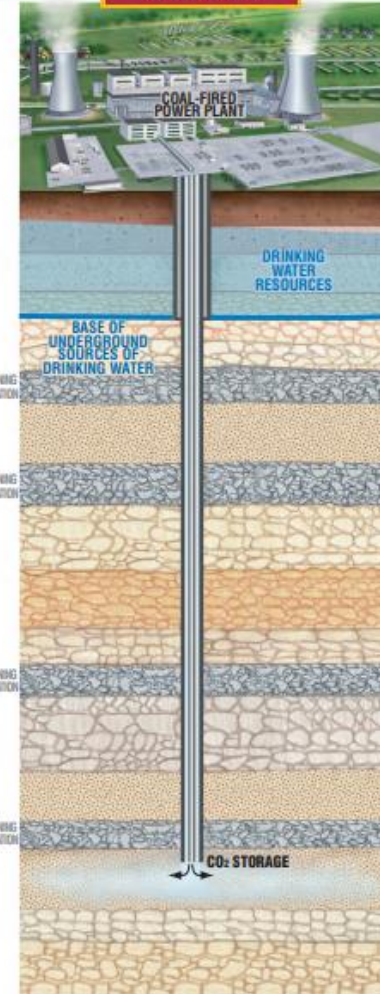
In your community, there may be industrial waste disposal wells, storm water drainage wells, large-capacity septic systems, and other Class V wells. They are regulated and are not allowed to endanger drinking water resources.

Class V wells continued



All large-capacity cesspools are banned. New motor vehicle waste disposal wells are banned nationwide. Existing motor vehicle waste disposal wells in source water protection areas or other sensitive ground water areas must close or receive a permit.

Class VI wells-
Inject CO₂ for
long-term storage to
reduce emissions to
atmosphere



Source: US Environmental Protection Agency
http://water.epa.gov/type/groundwater/uic/wells_drawings.cfm



Injection wells in Louisiana

As of fiscal year 2021

Total Wells	4570
Class I	34
Class II	3425
Class III	81
Class IV	0
Class V	1030
Class VI	0...yet



Salt Water Disposal (SWD) Wells

- * Class II Classification (injects oil and gas production fluids)

- * Different Types:

- * New Drill SWD – Form UIC-2

- * Conversion SWD – Form UIC-2

- * Commercial SWD – Form UIC-2 COM

- * Community SWD – Form UIC-2

- * Enhanced Recovery – Form UIC-2 EOR

- * 3 – 5 month review process for New Drill/Conversion SWD Applications

- * Expedited 4- 6 week review time



Majority of Class II Wells & today's focus



Get it even faster!

- 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 (\$1,500 minimum). 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.



OFFICE OF CONSERVATION

MAILING ADDRESS
OFFICE OF CONSERVATION
P.O. BOX 94275-CAPITOL STATION
BATON ROUGE, LA 70804-9275

IMD-1 Request for Expedited Review		<i>(For Office Use Only)</i> DATE STAMP	
<input type="checkbox"/> UNDERGROUND INJECTION CONTROL PROGRAM <input type="checkbox"/> SURFACE MINING PROGRAM: PERMIT NO. _____			
OPERATOR NAME		OPERATOR CODE	
OPERATOR MAILING ADDRESS		CITY	STATE
		ZIP CODE	
CONTACT NAME	CONTACT TELEPHONE NUMBER	CONTACT EMAIL ADDRESS	
Well Data			
APPLICATION/PERMIT TYPE <small>(CHECK THE APPROPRIATE BOX)</small>			
<input type="checkbox"/> CLASS I	<input type="checkbox"/> CLASS II SWD	<input type="checkbox"/> CLASS II EOR	<input type="checkbox"/> CLASS II STORAGE
<input type="checkbox"/> CLASS II SWD COM	<input type="checkbox"/> CLASS III	<input type="checkbox"/> CLASS V	<input type="checkbox"/> WORK PERMIT
<input type="checkbox"/> OTHER _____			
WELL NAME AND NUMBER		SERIAL NUMBER	
APPLICATION/PERMIT NUMBER		CAVERN CODE	
FIELD NAME	FIELD NUMBER	SEC	TWN
			RNG
PARISH NAME		PARISH CODE	
Description of Expedited Review Request			
DATE PERMIT APPLICATION SUBMITTED TO IMD			
REQUESTED DATE FOR PERMIT ISSUANCE			
MAXIMUM AMOUNT APPLICANT IS WILLING TO PAY			
PRINT NAME		PRINT TITLE	
SIGNATURE		DATE	
OFFICE USE ONLY:			
ESTIMATED # HOURS TO COMPLETE REVIEW		COMMENTS:	
ESTIMATED COST			
ESTIMATED DATE OF COMPLETION			
SUFFICIENT WORK FORCE AVAILABLE?			
IF NOT, EXPECTED DATE PERSONNEL AVAILABLE FOR REVIEW			
DOES APPLICANT HAVE OUTSTANDING FEES OR PENALTIES?		YES	NO



UIC-2 Application Process



UIC-2 Attachments

Attachment 1	Location Plat
Attachment 2	Area of Review
Attachment 3	Facility Diagram
Attachment 4A, 4B, 4C, 4D	Current Wellbore Schematic (Conversion), Wellhead Diagram, Proposed Wellbore Schematic, Work Prognosis
Attachment 5	Sources of Produced Water List
Attachment 6	Fluid Source Analysis
Attachment 7	Electric Logs
Attachment 8	Public Notice
Attachment 9 (Conversions)	Work History Resume (Historical WH1s)



Part 1: Review Process

Operator mails to IMD:

- Application Form (Paper Copy)
- Attachments (Paper Copy)
- MD-10-R-A (pink card) (conversion only)
- Fees
- Proof of publication



Application Processed

IMD Notifies operator of:

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



Geologic Review

- Location Plat Review
- Water/Fluid Source Analysis
- USDW and Well Log Review
- Injection Zone Isolation
- Productive Zone Protection
- Proximity to Salt Domes

Notice of
Deficiencies
(NOD)



Part 1: Review Process (Continued)

Att. 1 Area of Review (Engineering)

¼ Mile AOR:

- Wells in AOR
- Well Construction Information
- Proximity to Texas/In Coastal Zone/Cross Lake Watershed

Engineering Review

- Deficient Well Search
- Well Schematic and Work Prog
- MASIP Calculation
- Cement Calculations

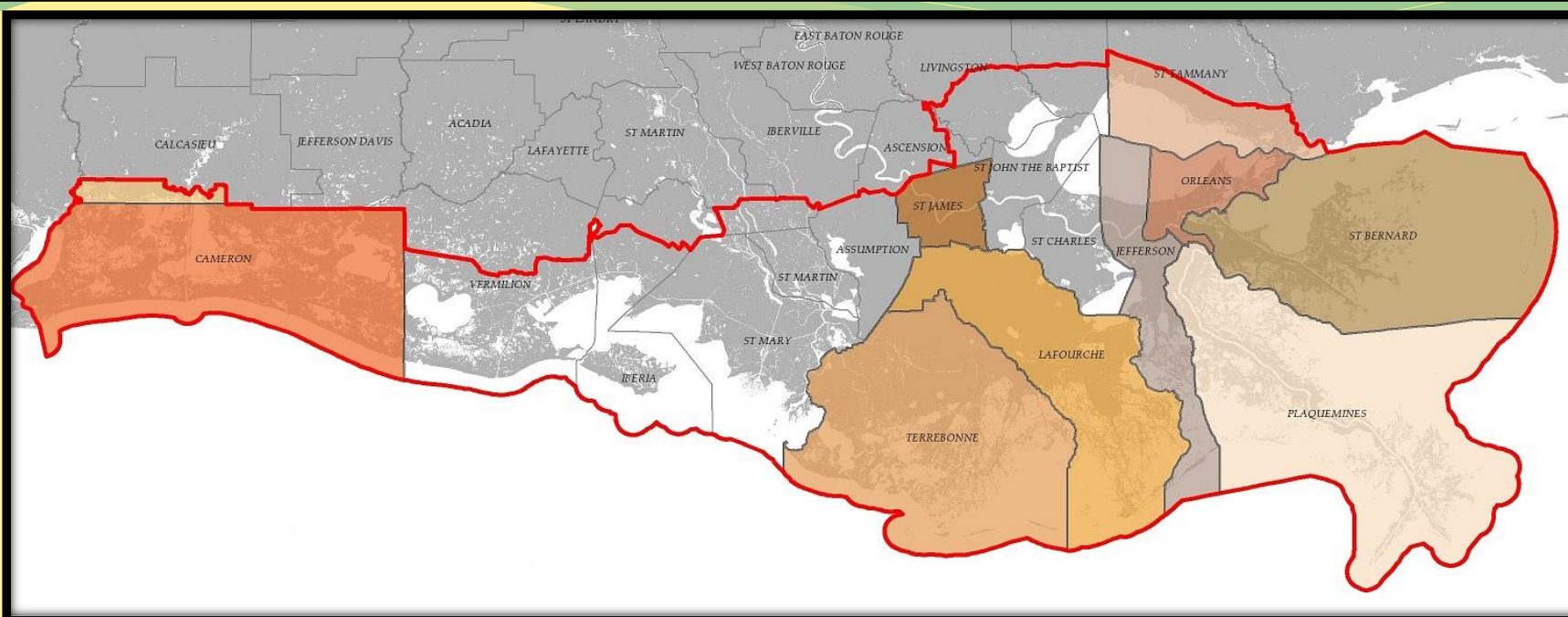
Notice of Deficiencies (NOD)

All Deficiencies Addressed
=
Approval To Construct Granted

Unable to Address Deficiencies
=
Letter of Denial Issued



Louisiana Coastal Zone & Cross Lake Watershed



SONRIS → GIS → Boundaries → Check the State Coastal Zone Boundary

SONRIS → GIS → Oil/Gas → Check the Cross Lake Watershed





SONRIS^{NG} Interactive Maps - Oil/Gas

Louisiana Department of Natural Resources

Pan Map



Table of Contents

- Oil/Gas
- Mineral Resources
- Coastal Management
- Environmental
- LA CPRA
- Water Wells
- Surface Water
- Boundaries
- Reference Layers



Zoom: 1:3250000
51.29 MILES



Part 2: Final Review for Permit-to-Inject

* NEW SWD WELL

Operator mails to IMD:

- One (1) Original Signed Form UIC-WH1
- Two (2) Copies of Signed Form UIC-WH1
- Two (2) Copy of the Electric Log(s)
 - 1 Hardcopy 1 Digital
- Two (2) Copy of the Cement Bond Log (CBL)
 - 1 Hardcopy 1 Digital
- Form CSG-T for Each Casing String
- ENG-16 if necessary

* CONVERTED SWD WELL

Operator mails to IMD:

- One (1) Original Signed Form UIC-WH1
- Two (2) Copies of Signed Form UIC-WH1
- Two (2) Copies of the Cement Bond Log (CBL)
 - 1 Hardcopy 1 Digital
- Form CSG-T for Each Casing String
- ENG-16 if necessary



Geologic Review

Review Form WH-1 and confirm:

- Approved Zone
- Perforation Depths
- Base of USDW



Notice of
Deficiencies
(NOD)



Part 2: Final Review for Permit-to-Inject (Cont.)

Engineering Review

Review Form WH-1/CBL and confirm:

- Casing Depths
- Perforation Depths
- Cement Review (TOC) & Calculations
- Plugged back Depth/Total Depth
- Tubing and Packer Depths
- Check/Recalculate MASIP
- Confirm CES witnessed MIPT Conducted
- Financial Security

Notice of
Deficiencies
(NOD)

All Deficiencies Addressed
--
Approval To Inject Granted

Unable to Address Deficiencies
--
Letter of Denial Issued



Financial Security

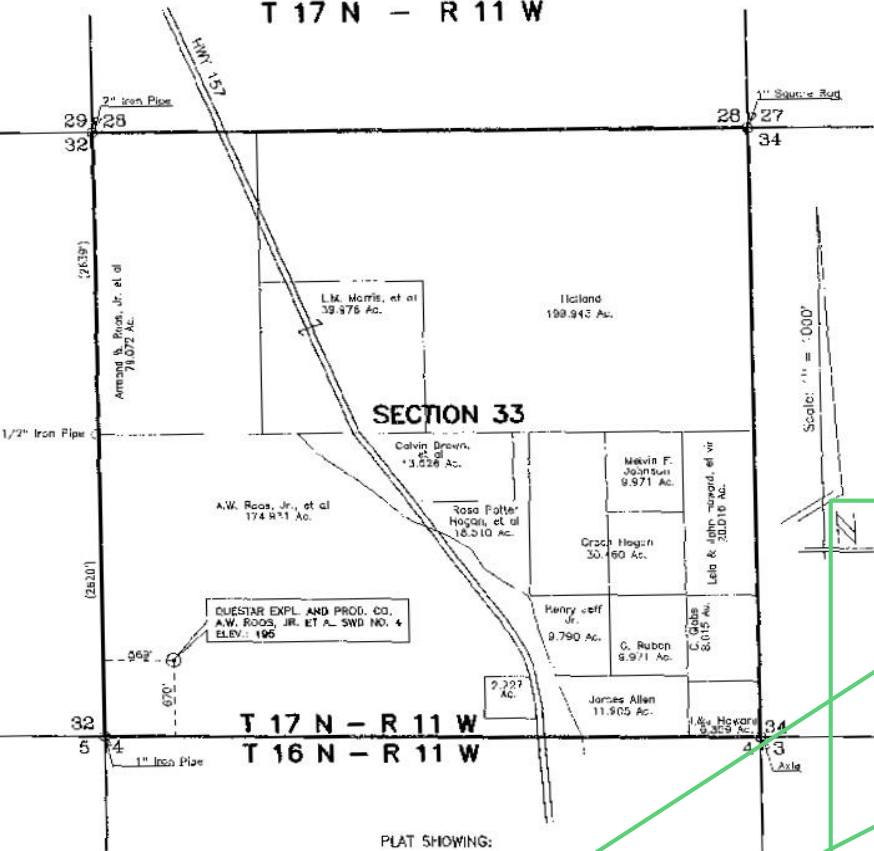
FOOTAGE			
<u>Depth</u>	<u>Land Locations</u>	<u>Water - Coastal</u>	<u>Water - Offshore</u>
<u>≤ 3,000 ft.</u>	<u>\$2/ft.</u>	<u>\$8/ft.</u>	<u>\$12/ft.</u>
<u>3,001 - 10,000 ft.</u>	<u>\$5/ft.</u>	<u>\$8/ft.</u>	<u>\$12/ft.</u>
<u>≥ 10,001 ft.</u>	<u>\$4/ft.</u>	<u>\$8/ft.</u>	<u>\$12/ft.</u>
BLANKET ← After August 12, 2016			
<u>Number of wells</u>	<u>Land Locations</u>	<u>Water - Coastal</u>	<u>Water - Offshore</u>
<u>≤ 10</u>	<u>\$50,000</u>	<u>\$250,000</u>	<u>\$500,000</u>
<u>11-99</u>	<u>\$250,000</u>	<u>\$1,250,000</u>	<u>\$2,500,000</u>
<u>> 100</u>	<u>\$500,000</u>	<u>\$2,500,000</u>	<u>\$5,000,000</u>



UIC Application Guidance



T 17 N - R 11 W



PLAT SHOWING:
PROPOSED WELL LOCATION
QUESTAR EXPL. AND PROD. CO.
A.W. ROOS, JR. ET AL SWD NO. 4

Located 569 feet from the West line and 670 feet from the South line of SECTION 33, T 17 N - R 11 W, BOSSIER PARISH, LOUISIANA.

I, Mark H. Patheal do hereby certify that the above described well location was staked on the ground, under my supervision, as shown herein.

SITUATED: 8.3 Miles South of Natchitoches, Louisiana.

Latitude: 32°24'42.247"
 Longitude: 93°30'27.626"
 N=14839220.804
 E=x=14860237.04
 (NAD 27 - LOUISIANA NORTH)

Latitude: 32°24'42.632"
 Longitude: 93°30'28.263"
 N=14839220.853
 E=x=14860237.472
 (NAD 83 - LOUISIANA NORTH)

This statement must be on all plats:

NOTE: THIS SURVEY MEETS THE MINIMAL REQUIREMENTS FOR THE STATE OF LOUISIANA WITH RESPECT TO THE LOCATION COORDINATE BEING ACCURATE WITHIN A SURVEYER.



MARK H. PATHEAL, P.S. 4608
 ARK-LA-TEX SURVEYING CO., INC.
 305 W. Rusk, Marshall, Tx.
 (903) 938 9938

Scale: 1" = 1000'
 Date: 04/21/08
 Ground Elev.: 195'
 Job No.: 27640



SALTWATER DISPOSAL WELL PERMIT APPLICATION
 OFFICE OF CONSERVATION
 INJECTION & MINING DIVISION
 P.O. BOX 94275
 BATON ROUGE, LA 70804-9275

UIC-2 SWD PLEASE READ APPLICATION PROCEDURES TYPE ONLY

1. APPLICATION TO: DRILL NEW SWD WELL RE-DRILL FOR SALTWATER DISPOSAL (SN: _____)
 CONVERT TO SWD WELL RE-PERMIT SWD WELL

2. OPERATOR'S NAME AND ADDRESS: _____ 3. OPERATOR CODE: _____
 ()

4. PHONE: _____ FAX: _____
 EMAIL: _____

WELL INFORMATION

5. PROPOSED WELL NAME AND NUMBER: _____ 6. SERIAL NO. (CONVERSION & RE-PERMIT ONLY) _____

7. FIELD: _____ 8. PARISH: _____ 9. SEC. _____ TWP. _____ RNG. _____

10. LEGAL LOCATION DESCRIPTION (FROM LOCATION PLAT): _____

11. LOCATION COORDINATES: GEOGRAPHIC COORDINATE SYSTEM (NAD27) STATE PLANE COORDINATES (LAMBERT, NAD 27)
 LATITUDE: _____ ° _____ MIN _____ SEC NORTH ZONE SOUTH ZONE
 LONGITUDE: _____ ° _____ MIN _____ SEC X: _____ Y: _____

WELL CONSTRUCTION INFORMATION

12. CASING SIZE (IN.)	HOLE SIZE (IN.)	CASING WEIGHT	DEPTH SET		SACKS CEMENT	TYPE CEMENT	TOP OF CEMENT
			TOP (FT.)	BOTTOM (FT.)			

13. TUBING: STEEL OTHER (IDENTIFY) _____ SIZE: _____ DEPTH: _____ FT.

14. PACKER: TENSIONAL PERMANENT COMPRESSIONAL MAKE: _____ MODEL: _____ DEPTH SET: _____ FT.

15. PLUGGED-BACK DEPTH: _____ FT. 16. DRILLED-OUT DEPTH: _____ FT. 17. TOTAL DEPTH OF WELL: _____ FT.

OFFICE OF CONSERVATION
 INJECTION & MINING DIVISION

1

UIC-2 SWD APPLICATION
 REV. 1/07



Injection and Mining Location Plat Requirements

Policy No. IMD-GS-10

Effective November 1, 2010

<http://www.dnr.louisiana.gov> >>

Conservation >> Divisions >> Injection & Mining >> IMD-GS-10 (under "Injection & Mining Policy Statements")

"I, [insert license name], Professional Land Surveyor, certify that the well location depicted and described in this plat [staked or located] and surveyed in the field by me or under my direction with accuracy and precision to the nearest foot. I have properly examined this plat and have determined that it complies with the existing local Louisiana codes, and has been properly site adapted to use in this area."

***NOTE: Policy No. IMD-GS-10 requires that the location must be surveyed on the ground with measurements that are accurate to the nearest foot.



Underground Source of Drinking Water (USDW)

* EPA Definition of USDW

- * Supplies any public water system; OR
- * Contains a quantity of ground water sufficient to supply a public water system; AND
- * Contains fewer than 10,000 mg/l Total Dissolved Solids (TDS) and is not an exempted aquifer (prior to 1981, the Office of Conservation used 3,000 mg/l TDS as the base of the freshwater).

* One-Mile Search from the Proposed Well Location

Locate the closest well with an e-log and approximate the base of the USDW in sands at the following depths:

- * Ground surface to 1,000 feet: 3 ohms or greater is considered USDW
- * 1,000 feet to 2,000 feet: 2 ½ ohms or greater is considered USDW
- * 2,000 feet and deeper: 2 ohms or greater is considered USDW

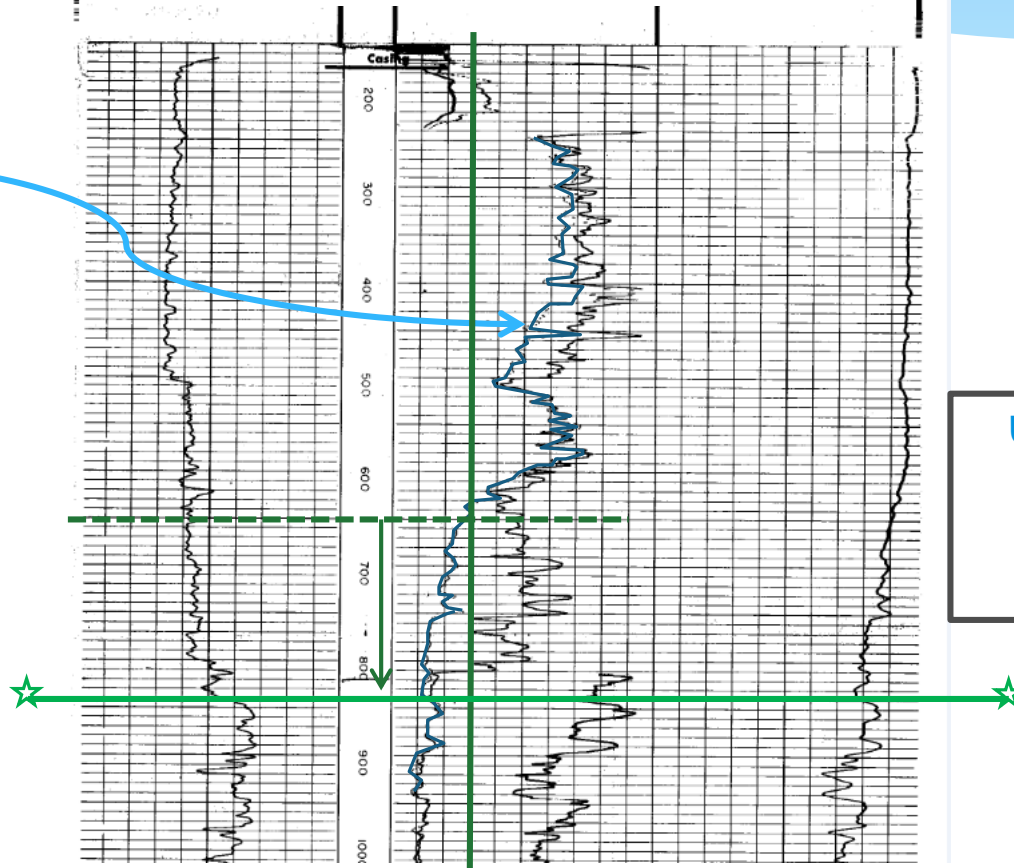
* 100 Feet of Net Shale Must Exist Between the Top of Zone and the Base of the USDW



Finding the USDW

SPONTANEOUS-POTENTIAL millivolts	DEPTHS	RESISTIVITY ohms. m ² /m	CONDUCTIVITY millimhos/m = $\frac{1000}{\text{ohms. m}^2/\text{m}}$
	0	16" NORMAL	1000 INDUCTION
	0		4000
	0	INDUCTION	8000
	0		4000

Be sure to look at the deep resistivity curve



USDW must be at base of sand unit with an isolating shale below.





Access Data

SONRIS Data Portal

Oil, gas, and injection well information, state land leasing, ground water information, and more at your finger tips.

GIS Access

Retrieve information using interactive, geographically oriented map capabilities and select from a variety of layers of backgrounds.

Document Access

Millions of documents in various formats readily available for view and print.

Data Subscription Service

Get a monthly download of all the data for integration into your databases and applications.

Submit Applications/Reports

Online Oil/Gas Well Log Submission

Electronically submit your oil/gas well log information.

Online Production Reporting

Electronically report oil and gas production and transportation related monthly reports.

Online Royalty Reporting

Submit mineral royalty reports online.

Online UIC Reporting

Submit UIC-10 and UIC-24 reports electronically or upload files to IMD.

Online Surface Water

Apply for and track surface water applications online.

Well Test/Inactive Report Submission

Submit your Well Test/Inactive Report electronically.

Online OR1 Submission

Submit your OR1 application electronically.

Invoice Payments

Pay invoices online using your invoice number and the provided security code.

Tract Nominations

Submit your nominations, attachments, and payment electronically.

Need Help?

Contact Us

Click here to view phone directory and contact information.

FAQ

Click here to view SONRIS frequently asked questions and learn more about Sonris.com

Useful SONRIS Documents

Research guides, past presentations on accessing data and reporting, and more!



Codes and Definitions

Well Information

Blackbooks - Field Order Index	
Financial Security - Wells	
Offshore Wells by Parish	
Operator History by Well	
Orphan Well Inspection	
Orphan Wells by Parish	
Permitted Wells by Date/Parish	
Well Casings	
Well Count for Field by Organization	
Well Count for Organization by Field	
Well History (All Records)	
Well History by Operator	
Well Information	
Well Information Details by Operator (OJC)	
Well Logs	
Wells (Excluding Well Status 03,28,29,30)	
Wells and USDW by Coordinates	
Wells by API Number	
Wells by Field ID	
Wells by Organization Name	
Wells by Parish	
Wells by Section, Township, and Range	
Wells by Serial Number	

Injection and Mining

Class I Manifest	
Class II SWD Wells Annual Volumes All Fields by Year	
Historic UIC 10 Annual Disposal/Injection Well Monitoring Report	
Injection Wells Application	
Injection Wells by Parish	
Injection Wells Test/Inspection Information	
Injection Wells USDW/Official MASIP	
Salt Dome Cavern Well Sonar/MIT by Serial Number	
Salt/Sulfur/Brine Summary, Historic	
UIC 10 Annual Disposal/Injection Well Monitoring Report	
UIC 23 Approvals to Transport E&P Waste to Commercial Facilities or Transfer Stations	
UIC 24 Class I Quarterly Reports	
UIC 33/34 Class III Daily Logs	
UIC Detailed Report of Wells in a Defined AOR	
USDW Area Information	

Office of Conservation - Wells and USDW by Coordinates

Report Parameters

X Coordinate

Y Coordinate

Coord. System

- OR -

Well Serial Num

Radius (ft)

Include USDW in search

- 200
- 400
- 600...

Results



Area of Review & Area of Review List

- * **The AOR search must include:**

- * Conducting a foot-search of the AOR to identify any wells in the field;
- * Searching SONRIS for wells in the DNR database; **AND**
- * Researching field maps and company files.

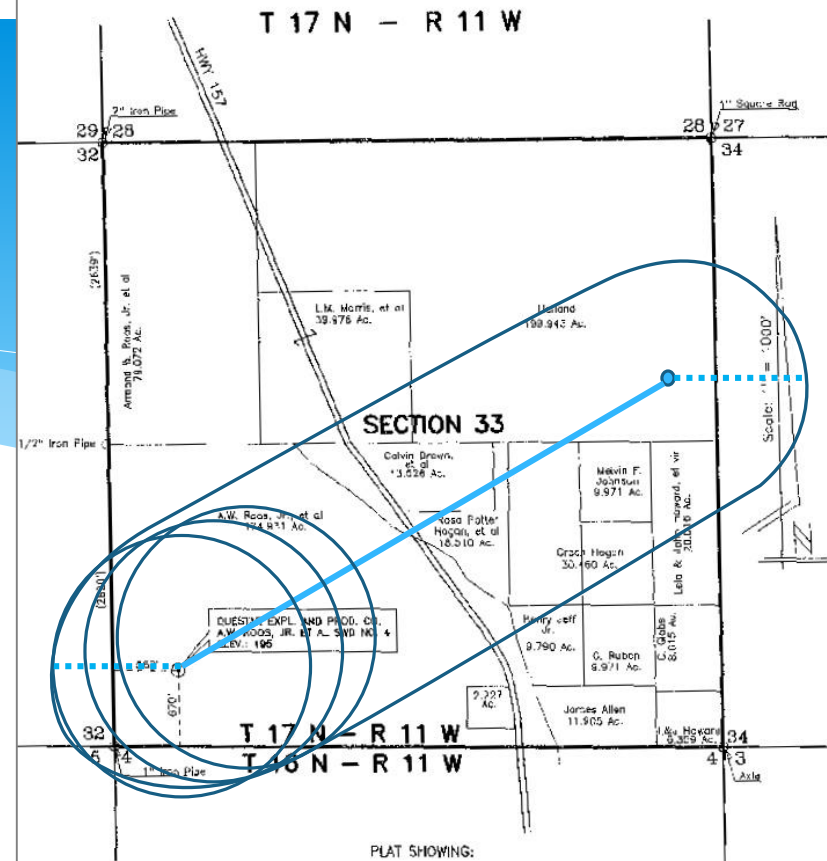
- * **Applicants must complete the AOR Well List that is included in the Form UIC-2 SWD Application package or create an AOR List with only the requested information.**

- * **Adequate cement in an offset well is defined as:**

- * A surface casing set through and cemented above the base of the USDW;
- * A cemented long string whose calculated top of cement is above the proposed injection zone; **OR**
- * A well with an open-hole plug set between the base of the USDW and the proposed injection zone.



AOR in Directional Wells



PLAT SHOWING:
PROPOSED WELL LOCATION
QUESTAR EXPL. AND PROD. CO.
A.W. ROOS, JR. ET AL SWD NO. 4

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SITUATED: 8.3 Miles South of Houghton, Louisiana.

LATITUDE: 32°24'42.247"
 LONGITUDE: 63°30'27.620"
 N-TW=83240.904
 E-X=168040.704
 (NAD 27 - LOUISIANA NORTH)

LAST. DE: 52°24'42.632"
 LONGITUDE: 03°30'28.263"
 N-Y=896929.853
 E-W=238367.472
 (NAD 83 - LOUISIANA NORTH)

this statement must be on all plats:

NOTE: THIS SURVEY MEETS THE MINIMUM REQUIREMENTS FOR THE STATE OF LOUISIANA WITH RESPECT TO THE LOCATION COORDINATE BEING ACCURATE WITHIN A SURVEY METER.



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 ARK-LA-TEX SURVEYING CO., INC.
 305 W. Rusk, Marshall, Tx.
 (903) 938-9638

Scale: 1" = 1000'
 Date: 04/21/08
 Ground Elev.: 195'
 Job No.: 27640



Injection Fluid Source List & Analyses

- * **The Injection Fluid Source List should include:**

- * Each well that will contribute fluid to the proposed injection well
- * Only wells that are operated by the applicant.

- * **Applicants must complete the Injection Fluid Source List that is included in the Form UIC-2 SWD Application package or create an Injection Fluid Source Well List with only the requested information.**

- * **Laboratory analyses must include:**

- * Signed originals from a LDEQ LELAP accredited laboratory;
- * Measurements of **Chloride** (mg/l), **Specific Gravity** or **Density** (g/cc or ppg), **Total Dissolved Solids** (mg/l), and the **Temperature** when the specific gravity was measured; **AND**
- * Sample name(s) *that correlates to the well(s)* on the Injection Fluid Source List.

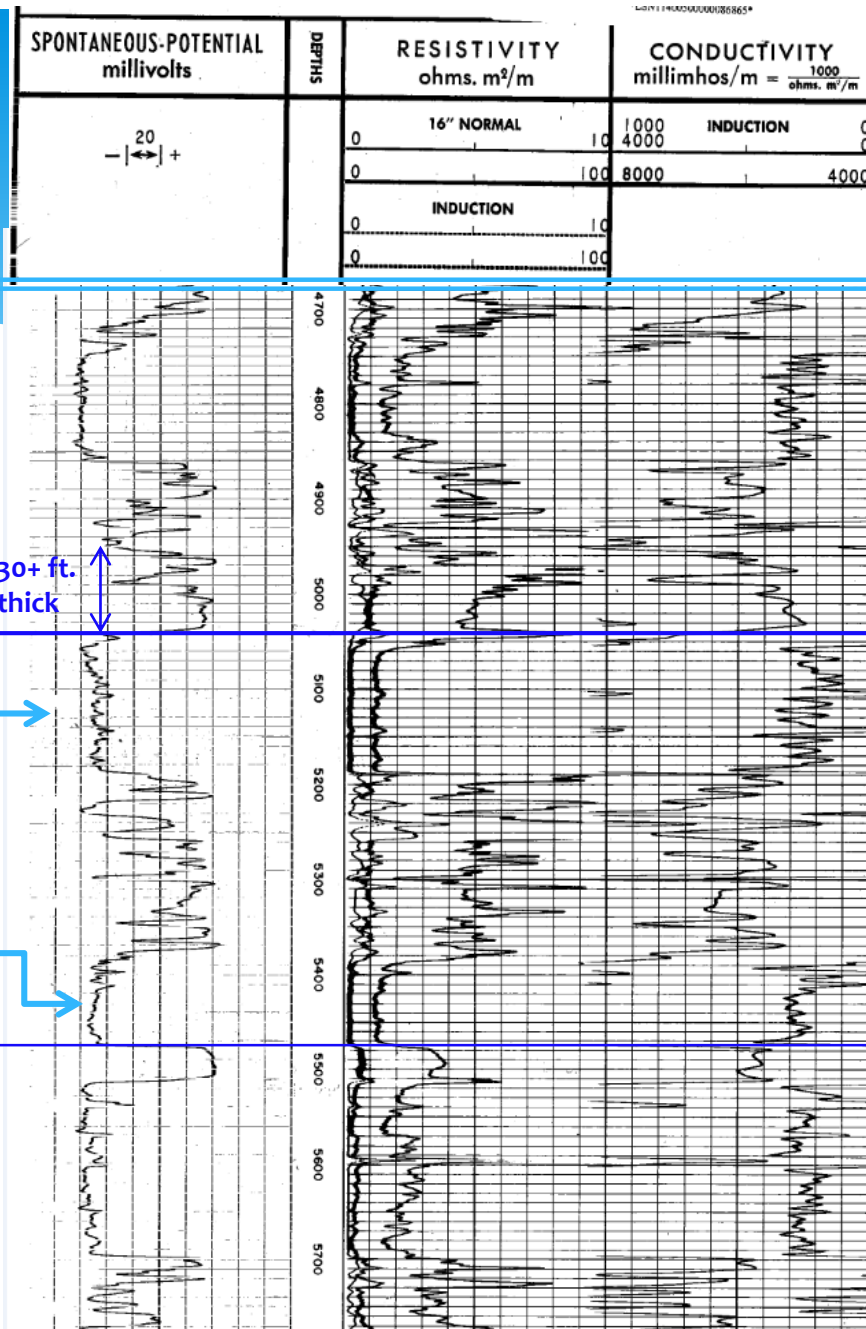


Establishing an Injection Zone

- * **100 Feet of Net Shale Must Exist Between the Injection Zone and Productive Intervals**
 - * Conduct a one-mile search from the proposed well location
 - * Correlate e-logs of productive wells to the e-log of the proposed well
 - * Ensure 100 feet of net shale
 - * < 100 feet leads to enhanced geologic review
- * **Sufficient Shale Must Confine the Top and Bottom of Zone**
 - * Rule-of-Thumb: Look for 30 foot continuous shale interval
- * **Permitting Multiple Sands**
 - * The proposed injection zone may contain more than one sand unit, provided that the USDW and productive intervals are isolated
 - * Permitting a zone of multiple sand units will allow for future perforations within the permitted injection zone by applying for a work permit (Form UIC-17)



Establishing the Injection Zone



30+ ft.
thick

TOZ ✓

The Injection Zone
Can Include More
Than One Sand

BOZ ✓



Well Design

* Surface Casing

- * Regulations: Must be set below the base of the USDW
- * IMD policy: Must be set at least 100 feet below the base of the USDW

* Packer

- * Regulations: The packer may not be set more than 150 feet above the top of the proposed injection zone; **AND**
- * IMD policy: Set the packer deeper than the bottom of the minimum required continuous interval of 60% bonded cement in the first continuous confining shale formation immediately above the approved injection zone

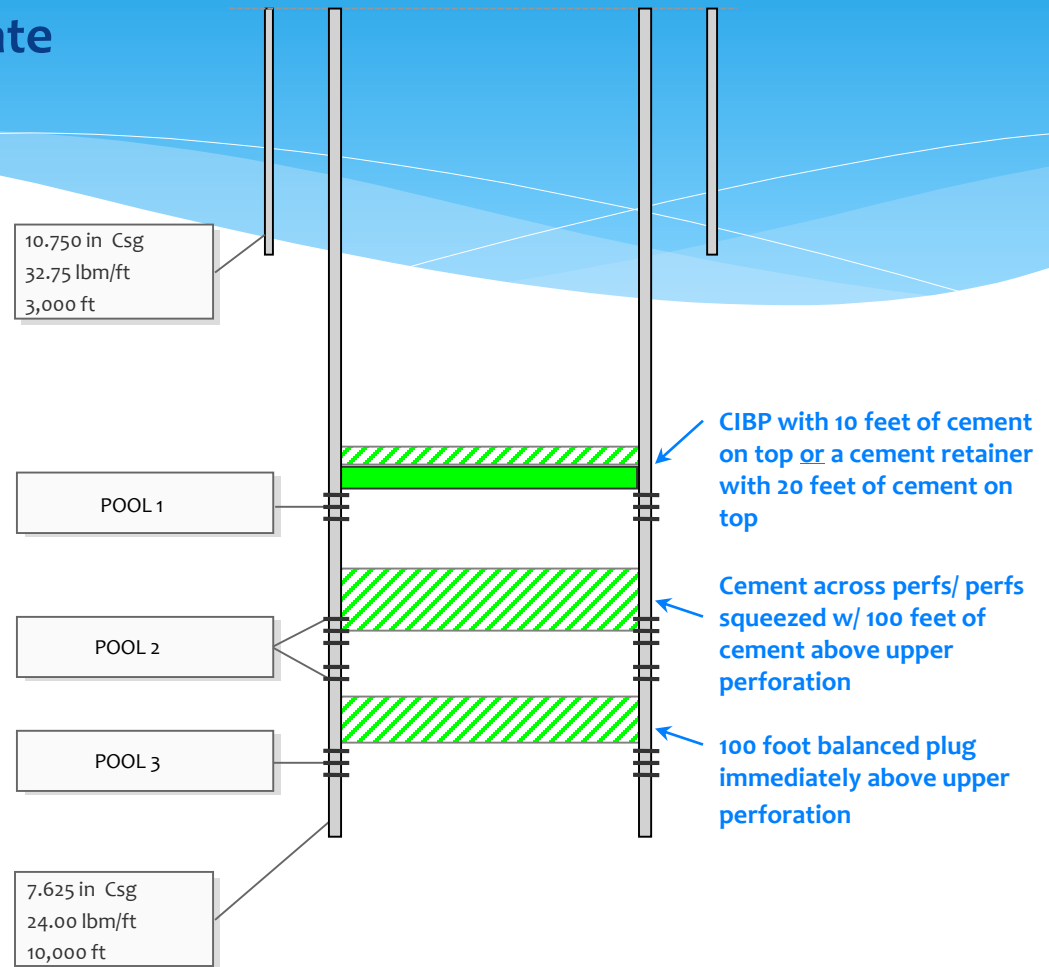
* Cement Isolation

- * Must be confirmed by Cement Bond Log (CBL)
- * CBL must show 60% ($\leq 10\text{mv}$) bonded cement to first isolating shale formation
- * Amount of bonded cement depends on casing size (e.g. 7-5/8" csg \rightarrow 12 feet)



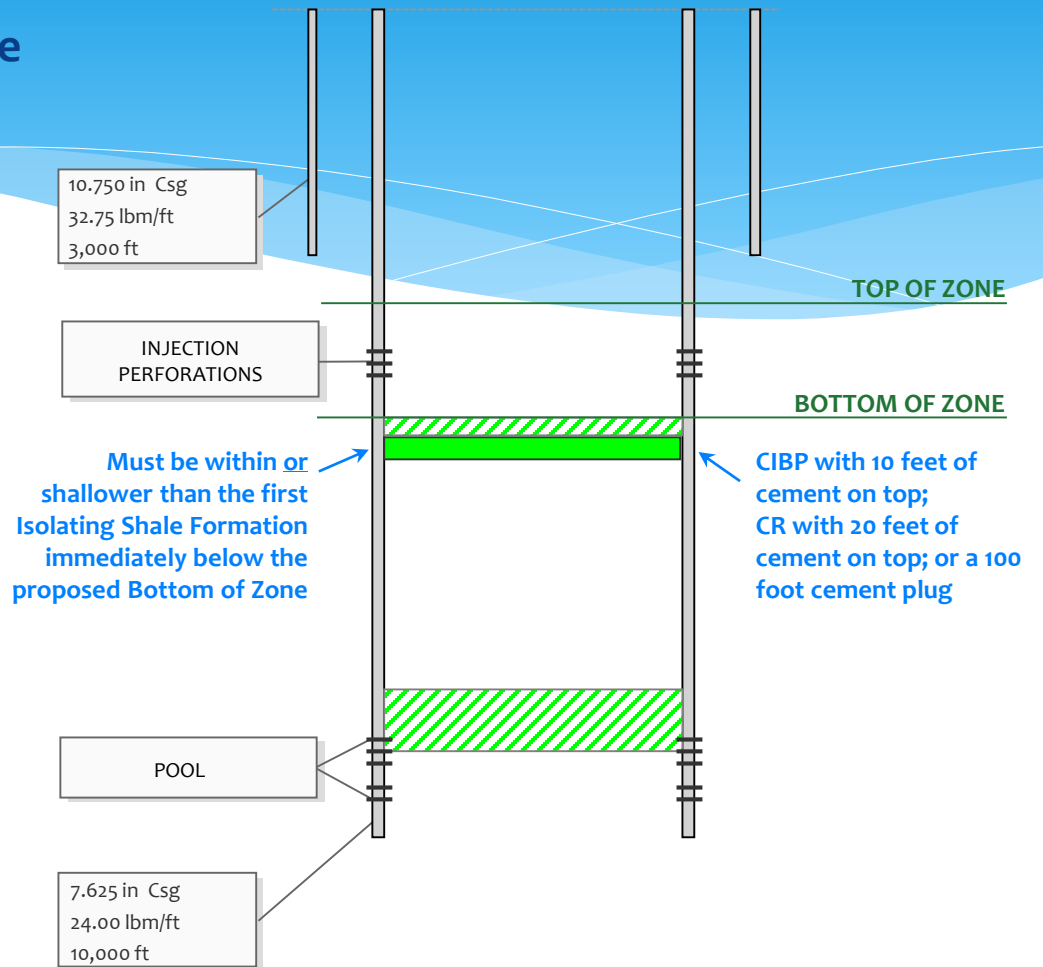
Well Design (Cont'd)

- Examples of Plugs to Isolate Productive Pools



Well Design (Cont'd)

- Plug to Isolate Bottom of Zone



Work Prog

New Drill Wells: Must record reservoir pressure and submit to IMD after perforating and prior to injecting

- *Bottomhole Pressure Gauge

- *Static Fluid Level



Logging the Well

- * Provide Open-Hole E-Logs of the USDW and the Proposed Injection Zone

New-Drill Wells

- * Must run open-hole e-log (dual induction or triple combo) of the injection zone; **AND**
- * If USDW cannot be identified from offset well within ¼-mile, must run open-hole e-log from total depth to surface before running surface casing; **OR**
- * If USDW can be identified from offset well within ¼-mile, only need to run open-hole e-log from total depth THROUGH THE BASE OF the surface casing shoe.

Conversions or New Drills

- * Must submit an open-hole e-log (dual induction or triple combo) from the well itself or from the closest well within a 1-mile AOR, that shows:
 - * USDW
 - * Proposed Injection Zone
- * May be shown on separate e-logs



Logging the Well (Cont'd)

- * **Provide Cased-Hole Logs to prove no fluid migration behind Long String:**

Applicants must submit (or propose to run):

- * Cement Bond Log (CBL)* – detects cement by measuring the loss of acoustic energy as it passes through casing. We do not accept pipe-inside-of-pipe.
- * Radioactive Tracer Survey (RTS)** – detects RA “tagged” fluid movement through channels while on injection. Can also be used to detect height of stimulation.
- * Temperature Log** – able to locate top of cement outside larger heavier casings and also detect channels and height of stimulation due to acidizing/fracturing.
- * Oxygen Activation Log** – detects channels by identifying movement of water.
- * Other Acceptable Tests**

* = required. ** = may be required.

Guideline for running CBLs and RTSs:

- * <http://www.dnr.louisiana.gov> >> **Conservation** >> **Forms** >> **Injection & Mining Division**



Cement Bond Logs

- CBLs are required to be run on all new drills, conversions, and zone changes
- IMD cannot accept “pipe-in-pipe” CBL
- Minimum interval of continuous 60% bonded cement in a continuous confining shale
- Rule of Thumb: <10mV on amplitude curve for x-amount of feet

Cement Bond Log
Interpretation Guide

Casing Size	Weight	Travel Time μ-sec	Free Pipe Signal	Class H Cement		Interval for Isolation
				3000 psi 100% cmt	60% bond cut off	
4 1/2"	9.5	254	81 mv	0.2 mv	2.3 mv	5 feet
	11.6			0.6mv	4.6 mv	
	13.5			1.0 mv	7.0 mv	
5"	15.0	258	76 mv	0.9 mv	5.5 mv	5 feet
	18.0			2.2 mv	10.0 mv	
	21.0			3.6 mv	15.0 mv	
5 1/2"	15.5	269	72 mv	0.7 mv	4.8 mv	6 feet
	17.0			1.0 mv	5.0 mv	
	20.0			2.1 mv	9.0 mv	
	23.0			3.5 mv	13.0 mv	
7"	23.0	269	62 mv	1.0 mv	5.5 mv	11 feet
	25.0			1.7 mv	7.5 mv	
	29.0			2.4 mv	9.3 mv	
	32.0			3.3 mv	13.0 mv	
	35.0			4.0 mv	14.0 mv	
	38.0			5.0 mv	15.0 mv	
40.0	6.0 mv	17.0 mv				
7 5/8"	26.4	302	59 mv	1.1 mv	5.5 mv	12 feet
	29.7			1.8 mv	7.5 mv	
	33.7			2.6 mv	10.0 mv	
	39.0			3.5 mv	13.0 mv	
9 5/8"	40.0	332	51 mv	1.8 mv	6.6 mv	15 feet
	43.5			2.2 mv	8.5 mv	
	47.0			2.7 mv	9.0 mv	
	53.5			4.0 mv	12.0 mv	
10 3/4"	40.5	352	46 mv	1.2 mv	5.1 mv	18 feet
	45.5			1.8 mv	6.5 mv	
	48.0			2.1 mv	7.6 mv	
	51.0			2.5 mv	8.0 mv	
	54.0			2.7 mv	8.4 mv	
	55.5			2.8 mv	8.8 mv	



CBL EXAMPLE

USDW: 300ft

Surface Casing: 16" (84 #/ft) @ 500 ft

Long String: 10-3/4" (40.5 #/ft) @ 2000 ft

Proposed Zone: 1276 – 1326 ft

How many feet of isolating cement do we need for:

TOZ: ?

BOZ: ?

Where would you call the bottom of the required cement interval?

Where is the shallowest allowed packer depth?



Open-Hole Log scale:



Wednesday, July 20, 2022

SELF-POTENTIAL millivolts	DEPTHS	RESISTIVITY -ohms. m ² /m.	RESISTIVITY -ohms. m ² /m.	
- 30 +	0	5	100	
	0	50	100	
	AMP.	1	NORM.	2
	0	5	10	1
	0	50	100	1

TOZ @ 1275 ft

BOZ @ 1326 ft



Recall this CBL Interpretation Guide:

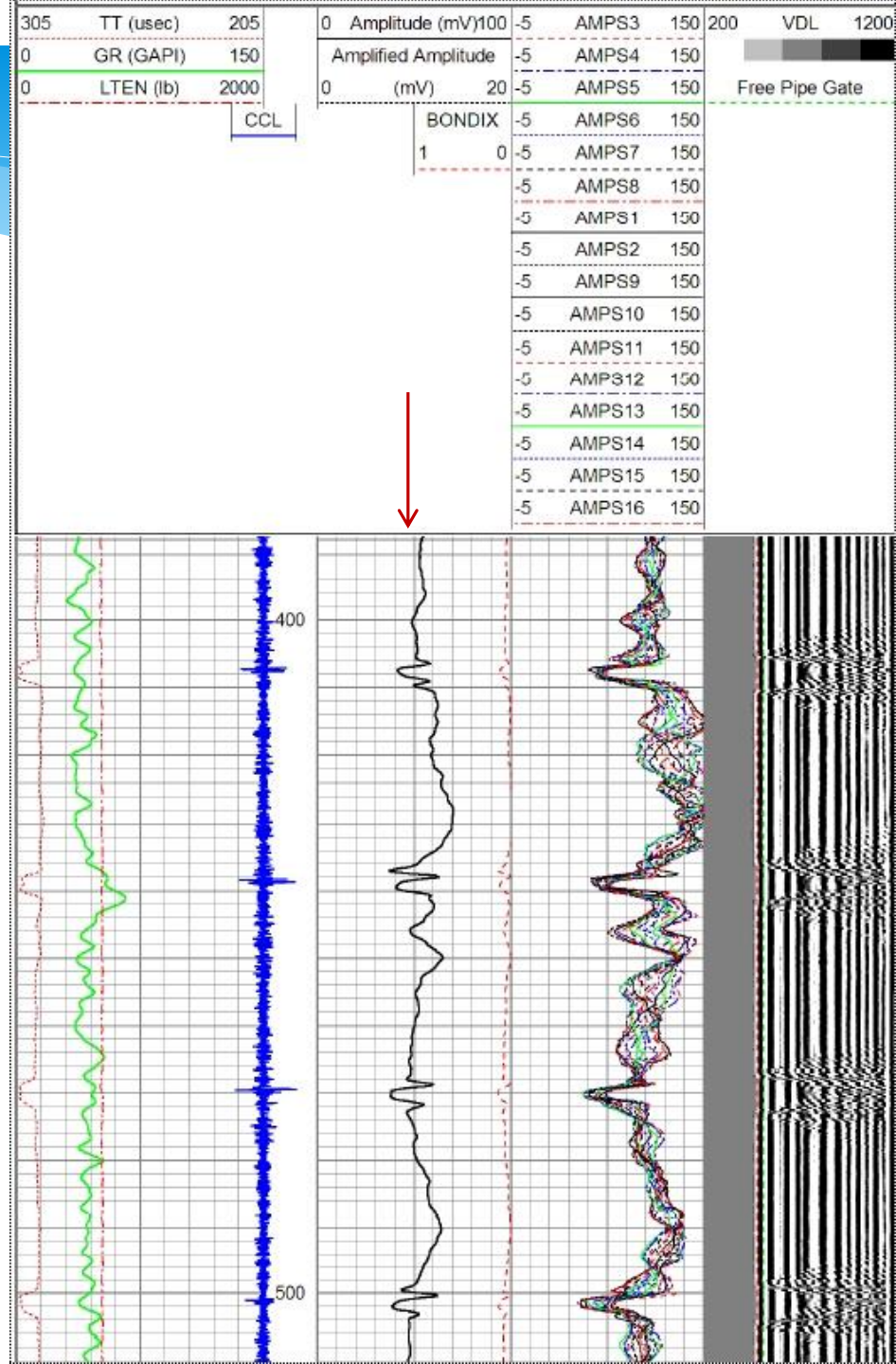
Cement Bond Log
Interpretation Guide

Casing Size	Weight	Travel Time μ -sec	Free Pipe Signal	Class H Cement		Interval for Isolation
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	32.0			3.3 mv	13.0 mv	
	35.0			4.0 mv	14.0 mv	
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9 5/8"	40.0	332	51 mv	1.8 mv	6.8 mv	15 feet
	43.5			2.2 mv	8.5 mv	
	47.0			2.7 mv	9.0 mv	
	53.5			4.0 mv	12.0 mv	
10 3/4"	43.5	352	46 mv	1.2 mv	5.1 mv	18 feet
	45.5			1.8 mv	6.5 mv	
	48.0			2.1 mv	7.6 mv	
	51.0			2.5 mv	8.0 mv	
	54.0			2.7 mv	8.4 mv	
	55.5			2.8 mv	8.8 mv	



FREE PIPE SECTION – verifies tool is calibrated:

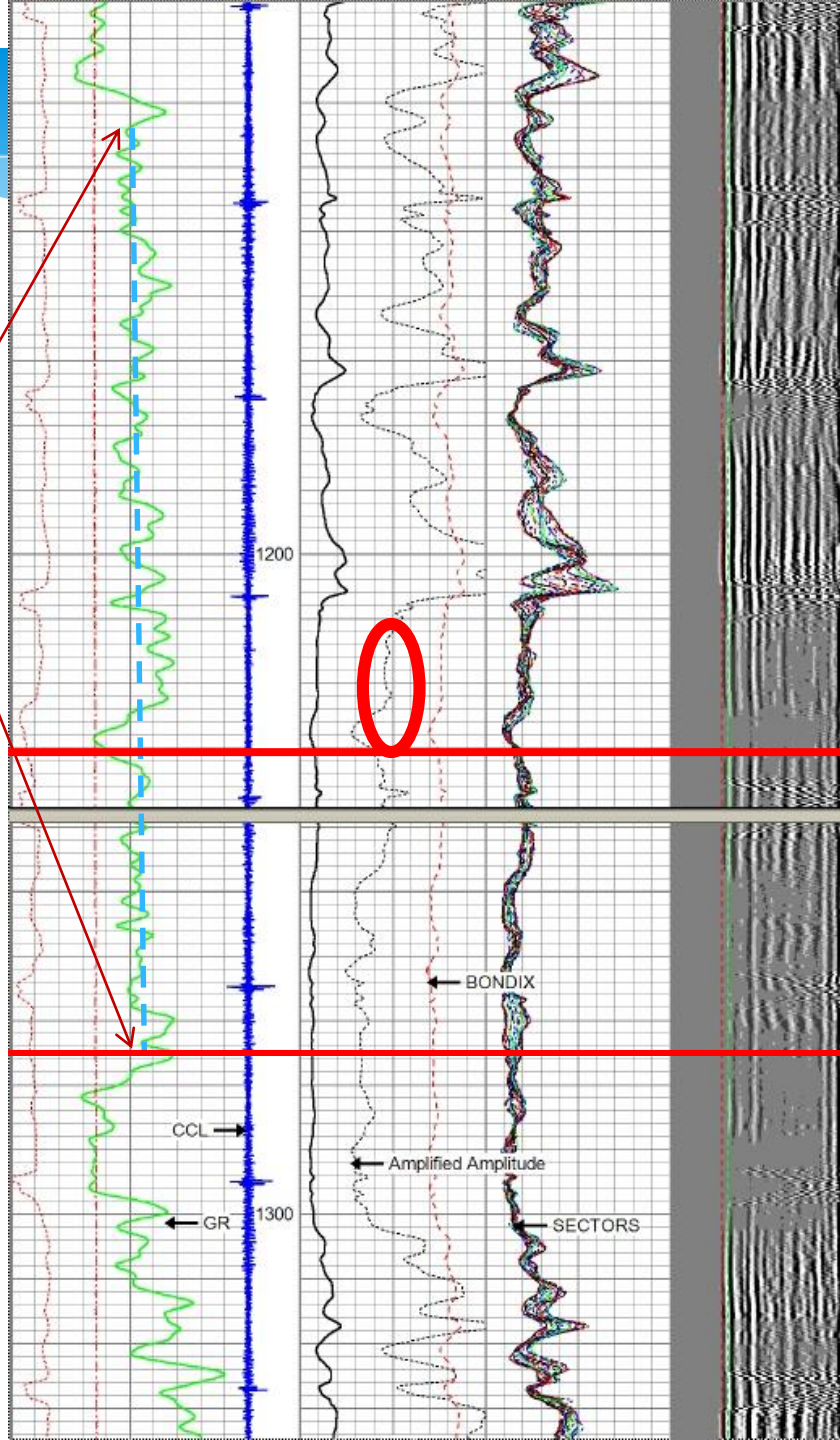
48mV is considered “free pipe”
(meaning no cement behind the
pipe) for a 10-3/4” casing.



Continuous confining shale: 1134' – 1275'

Start at top of shale and work your way down until you hit the required 18' of continuous cement (<10mV)

***** PACKER MUST BE SET AT OR BELOW 1230' *****



TOC @ 1230'

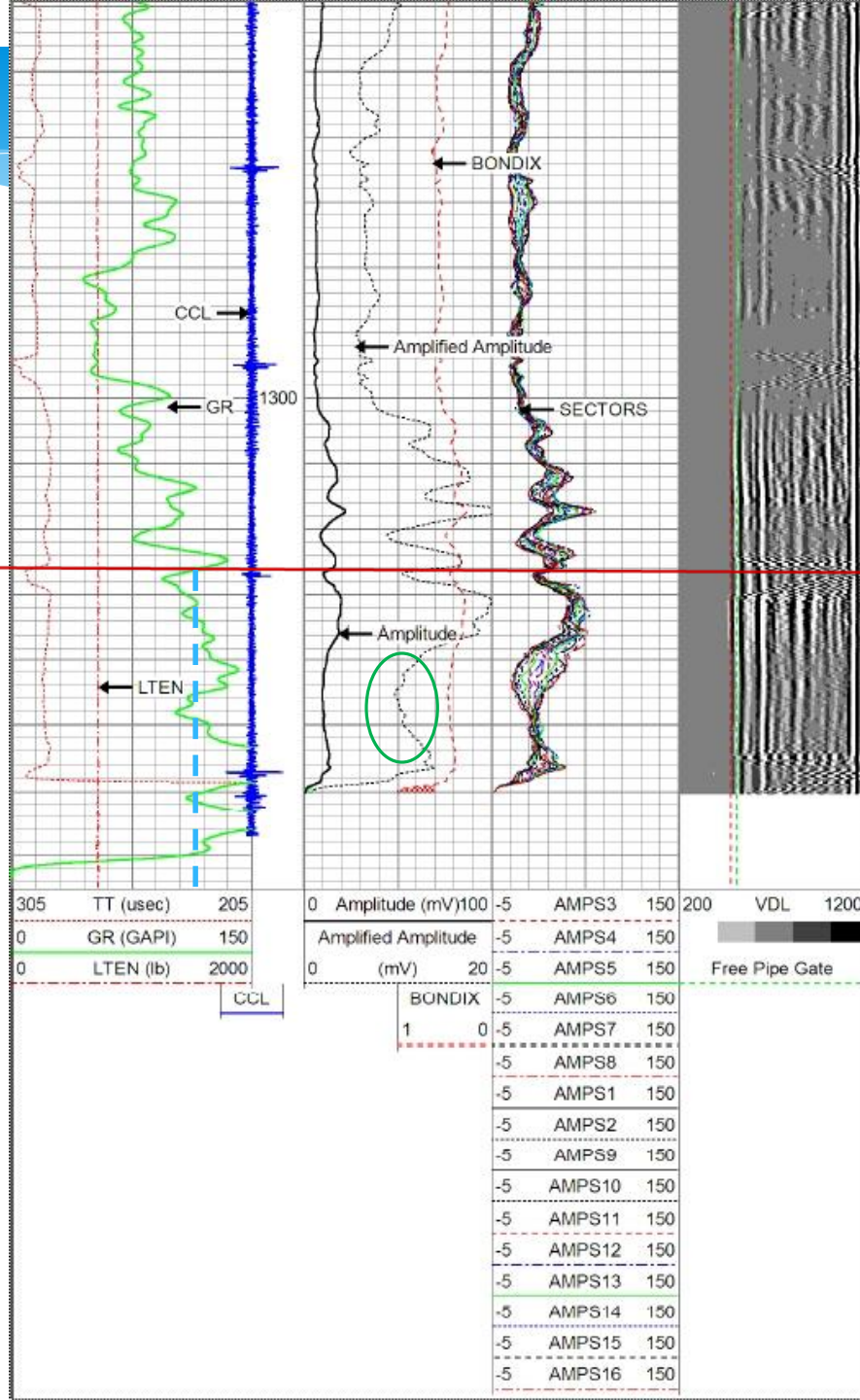
TOZ @ 1275 ft



Bottom of Zone (BOZ) is at 1326 feet:

BOZ @ 1326 ft

There is “evidence of cement” at the BOZ – i.e. not “free pipe”.



Proof of Publication

- * **SWD Well associated with Oil and Gas Production**
 - * Must be published for at least 15 days before application can be approved
 - * Notice only in State Journal, *The Advocate*
 - * Submit original notarized copy of Proof of Publication with application
 - * Check accuracy of **Serial Number; Well Name and Number; Sec/Twn/Rng; Operator Name and Address; Operator Code; Field Name and Field Code.**



Form UIC-2 SWD Signature

Application must contain a signature from an associate of the Operating Company:

- * Officer
- * Manager
- * General Partner
- * Proprietor
- * Operator of the Well
- * Direct Employee in decision-making role

- * **Agent or Contact authorized to act for Operator**
 - * Operator must designate who receives correspondence regarding the application.
 - * Operator will receive all correspondence. Authorized agent will only be cc'd if the box is selected.



Forms

Applicable to SWD Wells



IMD Forms

Form UIC-5

Injection Well Integrity Affidavit

* Form UIC-7

Injection Well Inspection Form– MIT (for CES use only)

* Form UIC-10

Annual Disposal / Injection Well Monitoring Report – [Online Reporting via SONRIS](#)

* Form UIC-13

Community Saltwater Disposal System Initial Notification

* Form UIC-17

Injection Well Work Permit

* Form UIC-32

Application to Change Disposal/Injection Zone



IMD Forms

Form UIC-P&A (Don't need UIC-WH-1 with this!)

Injection Well Plug and Abandonment Report

* **Form UIC-WH1**

Well History & Work Resume Report for Injection Wells

* **Form IMD-1**

Request for Expedited Review

* **Form CSG-T**

Affidavit of Test of Casing in Well



Engineering Division Forms

- * **Form MD-10-R (yellow card)** – no longer necessary for new-drill SWD wells
Application for Permit to Drill for Minerals
- * **Form MD-10-R-A-1 (pink sheet)** – required for conversions
Application to Amend Permit to Drill for Minerals for a Single Well
- * **Form MD-10-R-AO (blue sheet)**
Optional Application to Amend Operator for Multiple Wells Only
- * **Form WH-1**
Well History and Work Resume Report
- * **Form P&A**
Plug and Abandon Report



Enhanced Recovery Wells

Use Form UIC-2 EOR

The application process is the same as with Class II UIC-2 SWDs except for the following:

- An Order creating a Secondary Recovery or Enhanced Recovery (EOR) project, signed by the Commissioner of Conservation must exist before a permit can be issued for an ER well.
- EOR projects and Orders associated with them are under the jurisdiction of the Engineering and Geological Divisions of Conservation.
- Pilot projects must first have approval through the Engineering and Geological Divisions of Conservation before the Injection and Mining Division can approve the permit



Internet Links

Applicable to SWD Wells



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 Portal >> 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)

SONRIS Registered Water Well Database

<http://www.dnr.louisiana.gov> >> **SONRIS** (orange box on left side of page) >> **SONRIS Data Portal** >> **Groundwater Well Information** >> **Water Wells by** <several options>

* LDEQ LELAP Accredited Laboratories

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



Application Fees for IMD effective AUGUST 1, 2015

*Fees can be found in **LAC 43:XIX Chapter 7, aka Statewide Order No. 29-R.***



IMD FEES FY 18-19

UIC-42R

Work Resume Report for Class V Remediation Well

20 \$ 252

UIC-42S

Work Resume Report for Class V Subsidence Well

Description:		Rev Code	Fee
SUBMITTED ON UIC-1 FORM	Application for Class I Commercial Well	05	\$ 1,264
	Additional Wells (must put on separate invoice)		\$ 631
UIC-1	Application for Class I Non-Commercial Well	20	\$ 252
UIC-2 SWD COM	Application for Class II Commercial Well	05	\$ 631
	Additional Wells (must put on separate invoice)		\$ 314
UIC-2 SWD	SWD NEW WELL	20	\$ 252
UIC-2 EOR	EOR (If a conversion, check notes before invoicing)		
UIC-2 MASIP		U7	\$ 300
UIC-2 SWD	SWD Conversion (Total Charge is \$378=\$252 + \$126)	20 & 27	\$ 378
UIC-2 HSW	Application for Class II Hydrocarbon Storage Well	20	\$ 252
UIC-3 BR	Application for Class III Solution Mining Well	20	\$ 252
UIC-9	Annular Saltwater Disposal	20	\$ 252
UIC-13	Community Saltwater Disposal System Initial Notification	U4	\$ 125
UIC-14	Subsurface Disposal of Reserve Pit Fluids	44	\$ 252
UIC-17	Application for Work Permit	U5	\$ 125
UIC-25	Application for Class V Well	20	\$ 252
UIC-25R	Class V Remediation Area Permit Application	U8	\$ 250
UIC-25S	Class V Subsidence Control Area Permit Application		
	Request for Variance to Class V Well Permitting/Class V Waiver Request*		
UIC-30	Work Permit to Plug & Abandon Utilized for NORM disposal	U6	\$ 500
UIC-32	Application for Change of Zone	46	\$ 126

Request to Modify Well Permit (ask Kellie before invoicing)	U7	\$ 300
Changes to operating conditions, e.g. MASIP, UIC-2 MASIP		
Application for Exception to 29-B for Class II Injection Well (ask Kellie before invoicing)	U0	\$ 504
Waiver, Exception, Exemption, etc. (Not HSWs)		
Witnessed Verification of Mechanical Integrity Tests (MIT)	U9	\$ 250
Application to Amend Permit (per well)		
Extension Requests	27	\$ 126
MD-10-R-A-1, MD-10-R-AO e.g. change operator, well name, etc.		
Application for Surface Mining Permit	10	\$ 2,212
Application for Surface Mining Exploration Permit	EP	\$ 65
Application for Surface Mining Development Operations Permit	DP	\$ 94
Surface Mining Civil Penalties	25	Varies
Application for Public Hearing	13	\$ 755
UIC Violations & Fines	15	Varies





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Richard P. Ieyoub
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Office of Conservation

Forms, Reports & Documents

This page contains links to various Office of Conservation documents of interest to the public, including data, forms, reports, publications, newsletters, and other items.

Forms Assistance >>

The Office of Conservation has begun to incorporate some forms that can be Filled-in, Saved & Printed using Adobe Reader. Look for the **NEW** symbol in the table below for forms that have been converted to this format. Please refer to the Forms Assistance page for guidance in using these forms.

- ▶ [Forms - Home](#)
- ▶ [Engineering Division](#)
- ▶ [Environmental Division](#)
- ▶ [Geological Division](#)
- ▶ [Injection & Mining Division](#)
- ▶ [Pipeline Division](#)

Thank you!

QUESTIONS?

Cody Todd – Cody.Todd@LA.gov

Addie Roberts – Addie.Roberts@LA.gov

Wednesday, July 20, 2022

