

CLASS II – SALTWATER DISPOSAL, ENHANCED RECOVERY, & ANNULAR DISPOSAL WELLS

*(This discussion is provided as a companion to the **Class II- Saltwater Disposal, Enhanced Recovery, and Annular Disposal Wells** PowerPoint slide presentation.)*

SALTWATER DISPOSAL WELLS (CONVERSIONS)

FORM UIC 2-SWD CONVERSION

(SLIDE NOS. 4-14)

- The UIC-2 SWD Conversion Application (Application) was revised in December 2011. Eventually all UIC forms will be revised and updated.
- The following sample Application will illustrate each component of the revised Class II SWD Conversion Application and how to successfully complete the form.
- A saltwater disposal well conversion application is being used during this presentation as an example since applications to convert wells for use as saltwater disposal wells are more complicated in nature than Class II SWD Applications to drill new wells.
- Upon receipt of the original Application submittal, an Initial Application Review letter will be sent to the Operator or Authorized Agent noting the assigned Application Number, missing or incorrect information and acknowledgement of fee payment.
- Complete and submit two (2) copies of Form MD-10-R-A (Pink Card) with original signatures and include them with the Application.
- A certified plat is required to be submitted with the Application. Verify that the information on the certified plat matches information on the Pink Card.
- Information from the Pink Card must match Application Item numbers 1 – 18.

ATTACHMENT 1 - PUBLIC NOTICE

(SLIDE NOS. 15-17)

FOR SWD WELLS ASSOCIATED WITH OIL AND GAS PRODUCTION

- At least 15 days prior to filing an Application (but no more than 6 months prior), a notice of the Application must be published in the legal advertisement section of the official state journal, The Advocate (in Baton Rouge).
- The Advocate will send the operator a notarized Proof of Publication.
- The Operator will be billed by The Advocate for the publication.
- If the Proof of Publication has not been received when the Application is sent to the Injection and Mining Division (IMD), it may be sent later provided that you write the Application Number and Attachment 1 on the Proof of Publication. The Attachment number(s) should be written on the lower right corner of each page of any revisions or additional submittals.

FOR SWD WELLS ASSOCIATED WITH SALT CAVERN PROJECTS

- If the proposed SWD well is associated with any type of SALT CAVERN PROJECT, then the applicant must publish a notice that an application has been filed with the Office of Conservation within 30 days of the receipt of the Initial Application Review letter.
- The notice must be published one time in the legal advertisement section of the official state journal, The Advocate (in Baton Rouge), and the official journal of the parish in which the proposed activity is to occur.
- The Operator will be billed by each journal for the publication.
- The notarized Proof of Publication sent to the Operator must be labeled Attachment 1, and must be submitted to the Injection and Mining Division (IMD) upon receipt by the applicant.
- The Application number should be written on the upper right corner of each page of any revisions or submittals.
- The Attachment number should be written on the lower right corner of each page of any revisions or submittals.

ATTACHMENT 2 - LOCATION PLAT

(SLIDE NOS. 18-19)

- The IMD has issued an Intra-Office Policy Statement, Policy No. IMD-GS-10 (Policy), regarding Location Plat Requirements. All location plats submitted with this Application must meet the requirements of the Policy.
- The Policy can be downloaded from the DNR website: Go to www.dnr.louisiana.gov, click on the Conservation tab at the top of the page >> click on Injection and Mining (under Divisions at the bottom of the page) >> click on IMD-GS-09 (under the Injection and Mining Policy Statements tab at the bottom of the page).
- The Location Plat, Attachment 2 and the Area of Review Map, Attachment 6A can be combined and submitted as one document if the scale is such that all wells are clearly labeled and legible.
- Items 13-22 of the Application should be completed using the Location Plat and current well location information.

ATTACHMENT 3 - WELL HISTORY AND WORK RESUME REPORTS

(SLIDE NOS. 20-24)

- A photocopy of each Well History and Work Resume Report (Form WH-1) that has previously been filed with the Office of Conservation for the well being converted must be labeled Attachment 3 and included as part of the Application.
- If the well is currently constructed in a manner that is contradictory to information in SONRIS then the Well History Reports, driller's logs, cement tickets or other information substantiating the well's current configuration should be included in the Application.
- The Current Wellbore Schematic, Attachment 4A must reflect information in SONRIS and previous WH-1s.

ATTACHMENT 4 - WELLHEAD DIAGRAM, WELL SCHEMATIC(S) AND WORK PROGNOSIS

(SLIDE NO. 25)

The application must include the following:

Attachment 4A – Current Wellbore Schematic

Attachment 4B – Wellhead Diagram

Attachment 4C – Proposed Wellbore Schematic

Attachment 4D – Work Prognosis

ATTACHMENT 4A - CURRENT WELLBORE SCHEMATIC

(SLIDE NOS. 26-27)

This schematic should reflect the current configuration of the well including all sidetracks.

It must also reflect information reported on all Well History and Work Resume Reports (Form WH-1) included as part of Attachment 3 of this application, driller's logs, cement tickets or other information substantiating the well's current configuration.

Ensure that all information provided on the schematic corresponds to information found in SONRIS. If the well was drilled horizontally, please indicate it as such on the existing wellbore schematic.

At a minimum, the following information must be included on the Current Wellbore Schematic:

- **All casing strings**
Diameter, Weight (per foot), Depth set (top and bottom)
- **Hole (drill bit) diameters**
- **Cement Specifications**
Type or Class, Yield (cu.ft/sack), Number of sacks, Top of cement in each string of casing.
- **Existing cement squeeze(s), if any**
Type or class, Yield (cu.ft/sack), Number of sacks, Top of cement.
- **Tubing**
Diameter, Type or material, Top and bottom Depths
- **Packer**
Type, Depth set
- **Existing production perforated, open-hole, or screened interval**
Top, Bottom
- **Depths**
Total Depth, Plugged-back depth

ATTACHMENT 4B - PROPOSED WELLHEAD SCHEMATIC

(SLIDE NOS. 28-29)

This schematic should, at a minimum, include the following surface equipment:

- Well head
- Pressure gauges
- Flow line diameters at wellhead

- Monitoring equipment, if used

The Wellhead Schematic (Attachment 4B) and the Proposed Schematic (Attachment 4C) can be combined if both are legible otherwise a separate schematic should be submitted.

ATTACHMENT 4C - PROPOSED WELLBORE SCHEMATIC

(SLIDE NOS. 30-31)

Proposed Wellbore Schematic should include all of the details provided in the Proposed Well Construction Information section of the Application Item numbers 23 – 38.

If the well was drilled horizontally, please indicate it as such on the proposed wellbore schematic.

Ensure that all information provided on the Proposed Wellbore Schematic reflects the current wellbore configuration as well as the proposed method to convert the well ensuring that details on the schematic correlate to the procedure outlined in the Work Prognosis, Attachment 4D.

The Proposed Wellbore Schematic -Attachment 4C should include the following:

- **All casing strings (including any proposed new strings of casing)**
Diameter, Weight (per foot), Depth set (top and bottom)
- **Hole (drill bit) diameters**
- **Cement Specifications**
Type or Class, Yield (cu.ft/sack), Number of sacks, Top of cement in each string of casing (Indicate whether calculated, logged, or to be logged)
- **Proposed plugging procedure**
Of the abandoned producing interval and the proposed injection zone
- **Proposed cement squeeze(s), if any**
Type or Class, Yield (cu.ft/sack), Number of sacks, Top of cement (Indicate whether calculated or logged)
- **Injection tubing**
Diameter, Type or material, Top and bottom Depths
- **Packer**
Type, Depth set
- **Proposed injection zone**
Top, Bottom

- **Proposed initial perforated, open-hole, or screened interval**

Top, Bottom

- **Depths**

Total Depth, Plugged-back depth

ATTACHMENT 4D- WORK PROGNOSIS

(SLIDE NO. 32-33)

- The Work Prognosis should describe the sequence of work to be performed and include (but is not limited to) the following:
 - Running any required Electric Logs (e-logs) for sidetracks, deepening the well, etc.
 - Sufficient plugs must be used to adequately isolate each perforated producing pool from one another.
 - Any new string of casing or liner that is cemented in an existing well must be pressure tested before drilling out the casing shoe and reported on the Affidavit of Test of Casing in Well (Form CSG-T).
 - Prove Isolation of the Proposed Injection Zone, ie block squeeze and run a CBL.
 - Perforating the Proposed Injection Zone
 - The packer must be set at a depth that is deeper than the cement in the wellbore that is bonded to the first confining shale formation immediately above the proposed injection zone.
 - A Mechanical Integrity Pressure Test (MIPT) must be performed under the supervision of the appropriate Conservation Enforcement Specialist (CES).
 - If required—an inspector-witnessed Static Fluid Level (SFL), or running a Radioactive Tracer Survey (RTS), Temperature Log or similar log capable of detecting fluid movement between the well casing and borehole.
 - Injectivity Test
 - Proper plug back procedure

PROPOSED INJECTION INTERVAL INFORMATION

(SLIDE NO. 34)

This section consists of:

- **Top and Bottom of the Proposed Injection Zone**
*(The **Injection Zone** is defined as a geologic formation, group of formations or part of a formation receiving fluids through a well.)*
- **Top and Bottom of the Proposed Injection Interval**
*(The **Injection Interval** is that part of the injection zone in which the well is screened, or in which the fluid is otherwise directly emplaced. It is also referred to as the perforated interval, open-hole interval or the screened interval.)*
- **Injection Formation Name**
- **Proposed Method of Injection**

RULES OF THUMB FOR ESTABLISHING THE PROPOSED INJECTION ZONE

(SLIDE NO. 35)

- 100 feet of net shale must exist between the top of the proposed injection zone and the base of the base of the USDW.
- 100 feet of net shale must exist between the proposed injection zone and any productive intervals.
- A sufficient shale must confine the top and bottom of the proposed injection zone. As a rule of thumb, IMD defines a sufficient shale as approximately 30 feet thick.
- Multiple sands can be permitted:
 - ▶ The proposed injection zone may contain more than one sand unit, provided that the base of 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 only applying for a Work Permit (Form UIC-17).

ESTABLISHING THE PROPOSED INJECTION ZONE

(SLIDE NO. 36)

- Establish the base of the USDW.
- Select a proposed top and bottom of zone with sufficient confining shales.
- Check for 100 feet of net shale separation between the base of the USDW and the top of the proposed zone.
- Check for 100 feet of net shale separation from productive intervals.

REVIEW OF INTERPRETING THE USDW ON ELECTRIC LOGS

(SLIDE NOS. 37-42)

- USDW means an aquifer or its portion:

- ▶ which supplies any public water system; or
- ▶ which contains a sufficient quantity of ground water to supply a public water system; and
 - currently supplies drinking water for human consumption; or
 - contains fewer than 10,000 mg/l total dissolved solids; and which is not an exempted aquifer.
- The base of the USDW can be determined from the deep induction curve, generally the dotted curve, on the e-log. Resistivity changes with temperature and depth, therefore the guidelines below are used to approximate the lowermost USDW in sands at the following depths:
 - ▶ Ground surface to 1,000 feet: 3 ohms or higher is considered USDW;
 - ▶ 1,000 feet to 2,000 feet: 2 ½ ohms or higher is considered USDW; and
 - ▶ 2,000 feet and deeper: 2 ohms or higher is considered USDW.
- The base of the USDW is typically established at the base of the sand unit that contains the lowermost USDW. Clay or shale intervals with resistivities higher than those listed above are not considered USDW.
- If the log of the well proposed for conversion shows the base of the USDW, mark the depth of the base of the USDW on the log and label the log as Attachment 5A.
- If the e-log of the proposed well does not show the base of the USDW, then the applicant should expand the search to the e-logs of the closest wells to the proposed well until an e-log is located that shows the base of the USDW. Once an e-log is found, mark the depth of the base of the USDW and label the log as Attachment 5A and include as part of the Application.

DETERMINING THE PROPOSED INJECTION INTERVAL

(SLIDE NOS. 43-44)

- Applicants should conduct a search of available e-logs in the project area to identify the closest well with an e-log that shows the top and bottom of the proposed injection zone.
- Begin by looking at the log of the well proposed for conversion. If the log of the well proposed for conversion shows the proposed injection zone, mark the depths of the top and bottom of the proposed injection zone on the log and label it as Attachment 5B.
- If the e-log of the proposed well does not show the top and bottom of the proposed injection zone, then the applicant should expand the search to the e-logs of the closest

wells to the proposed well until an e-log is located that shows the proposed injection zone.

- It may be necessary to submit more than one e-log to show both the top and bottom of the proposed injection zone, if both do not occur on the same log. One e-log may show the top of the injection zone, but not the bottom; and, another e-log may show the bottom of the proposed injection zone, but not the top.
- If more than one log is required to be submitted, mark the depth of the top or bottom of the proposed injection zone and the proposed completion interval (initial perforations, screen or open hole). Label the log(s) as Attachment 5B and include them as part of the Application.

PRODUCTIVE INTERVAL SEARCH

(SLIDE NOS. 47-57)

- Why is this needed? Injection into a productive zone is prohibited unless authorized by the Commissioner per LAC 43:XIX.303.D
- An injection zone of multiple sands may be permitted provided that the sands capable of hydrocarbon production are isolated. Please conduct a one-mile radius search from the proposed well location to locate productive wells.
- If productive wells are located within a one-mile radius, evidence of at least 100 feet of net shale between the proposed injection zone and any productive intervals must be provided.

CEMENT BOND LOG (CBL)

(SLIDE NO. 58)

- Sufficient external cement isolation is required as per the requirements of LAC XIX.43:419 and should prevent upward fluid migration.
- The applicant must submit any available CBLs of the proposed well to demonstrate that the annulus between the injection casing and the wellbore has sufficient cement isolation of the proposed injection zone.
- If a CBL was performed prior to submission of the Application, please submit a copy with the Application and label it as Attachment 5C.
- When the CBL is performed on the well, it must show a minimum continuous interval of 60% bonded cement between the injection casing and the wellbore, which is bonded to the first confining shale formation immediately above the proposed injection zone and indicate evidence of cement at or below the bottom of the proposed injection zone.

- The Cement Bond Log (CBL) Interpretation Guide must be used in order to determine the minimum continuous interval of bonded cement that is required to isolate the proposed injection zone. The CBL Interpretation Guide is located on the DNR website at the following link:
 - ▶ http://dnr.louisiana.gov/assets/OC/im_div/CBL_Guidelines_and_Interpretation_Guide.pdf
- If the CBL does not prove cement isolation of the proposed injection zone, the IMD will require perforating and squeezing cement above and or below the zone and subsequent logging.

ATTACHMENT 5 – LOGS

(SLIDE NOS. 59-66)

- Logs must be provided to indicate the base of the lowermost USDW, the proposed injection zone, and prove cement isolation.
- The Application must include electric logs (e-logs), preferably with a one or two inch scale, that show the proposed injection zone, the base of the USDW and, if available, a Cement Bond Log.
- Mark each log with the Serial Number of the well, and ensure that it includes the header and at least 1,000 feet below the bottom of the proposed injection zone. (Photocopies of the logs are acceptable).
- An e-log of the well itself, if available, should always be included as part of the Application.

PROPOSED INJECTION INTERVAL (ITEMS 39 – 42)

(SLIDE NO. 67)

This Section should match information marked on Attachment 5B (Electric Logs) and consists of:

- Top and Bottom of the Proposed Injection Zone
- Top and Bottom of the Proposed Injection Interval
- Injection Formation Name
- Proposed Method of Injection

PRESSURE CALCULATION DATA (ITEMS 43 – 46)

(SLIDE NO. 68)

- Injection Rate in Barrels per Minute
- Injection Fluid Expected Temperature
- Injection Formation Properties (Porosity and Permeability)
- MASIP Calculation Basis:
 - Eaton’s Fracture Gradient Chart, Louisiana Gulf Coast
 - Step rate fall off test
 - Based on the fracture gradient of the confining formation

MASIP CALCULATION BASIS

(SLIDE NOS. 69-70)

EATON’S FRACTURE GRADIENT CHART, LOUISIANA GULF COAST

The MASIP will be calculated not to exceed 90% of the fracture pressure of the injection zone as predicted by Ben Eaton’s 9 pounds per gallon (ppg) pore pressure curve. The specific gravity (weight) of the injection fluid is required to complete the calculation.

STEP RATE -FALL OFF TEST

A Fall Off Test is a pressure transient test that consists of shutting in an injection well and measuring the pressure fall off. It is impacted by the magnitude, length, and rate fluctuations of the injection period. A properly conducted Step Rate and/or Fall Off Test can prove bottom hole fracture pressure. Falloff testing analysis can also provide transmissibility, skin factor, and well flowing and static pressures. Contact an Engineer with this Division for guidelines pertaining to step rate fall off tests.

FRACTURE GRADIENT OF THE CONFINING FORMATION

Under the directive of Intra-Office Policy Statement No. IMD-GS-09, the MASIP can be calculated by limiting the pressure at the depth of injection to 75% of the pressure needed to fracture the confining formation. The Policy Statement requires the applicant comply with additional control measures to assure protection of the lowermost USDW. The following information must be provided:

- Geomechanical data of the confining zone above the proposed injection zone

CLASS II- SALTWATER DISPOSAL, ENHANCED RECOVERY, & ANNULAR DISPOSAL WELLS

- An area of review (AOR) of one-half mile must be conducted
- If the top of the proposed injection zone is within 1,000 feet of the base of the USDW, the MASIP cannot exceed 0.25 psi/ft.
- The surface casing must be set at least 100 feet below the base of the USDW.
- A Groundwater Monitoring plan complete with a monitor well will be required.

APPLICATION ITEM NOS. 47-49

(SLIDE NO. 71)

Item numbers 47 through 49 request additional information relevant to the permitting process. A checklist has been added to the Application to ensure all Attachments are included.

APPLICATION ITEM NO. 50

(SLIDE NO. 72)

Item number 50 must be completed by an Agent or Contact person authorized to act for the Operator and is designated to receive correspondence regarding the Application. The Operator's signature authorizes this Agent or Contact to speak with the IMD on the Operator's behalf.

APPLICATION ITEM NOS. 51-54

(SLIDE NO. 73)

Item numbers 51 through 54 must be completed by and contain a signature from an associate of the Operating Company which is: an Officer, Manager, General Partner, Proprietor, Operator of the Well or a direct employee in a decision-making role. A Consulting Agent's signature is not acceptable in this section of the form.

CHECK LIST

(SLIDE NO. 74)

The Check List will be found in all the revised forms. By checking each item, the applicant is indicating that each item has been included with the Application.

CLASS II- SALTWATER DISPOSAL, ENHANCED RECOVERY, & ANNULAR DISPOSAL WELLS

PLEASE CHECK EACH BOX THAT CORRESPONDS TO ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS APPLICATION	
<input type="checkbox"/> FILING FEE <input type="checkbox"/> ATTACHMENT 1 – PUBLIC NOTICE <input type="checkbox"/> ATTACHMENT 2 – LOCATION PLAT <input type="checkbox"/> ATTACHMENT 3 – WELL HISTORY & WORK RESUME REPORT ATTACHMENT 4 – WELLHEAD DIAGRAM, WELL SCHEMATIC(S) AND WORK PROGNOSIS <input type="checkbox"/> 4A - CURRENT WELLBORE SCHEMATIC <input type="checkbox"/> 4B - PROPOSED WELLHEAD DIAGRAM <input type="checkbox"/> 4C - PROPOSED WELLBORE SCHEMATIC <input type="checkbox"/> 4D - WORK PROGNOSIS ATTACHMENT 5 – LOGS <input type="checkbox"/> 5A - ELECTRIC LOG FOR THE BASE OF THE USDW (W/ ORDER, IF APPLICABLE) <input type="checkbox"/> 5B – LOG(S) OF THE INJECTION ZONE & INJECTION PERFORATIONS (W/ ORDER, IF APPLICABLE) <input type="checkbox"/> 5C – CEMENT BOND LOG (CBL)	ATTACHMENT 6 – AREA OF REVIEW (AOR) <input type="checkbox"/> 6A- AREA OF REVIEW MAP <input type="checkbox"/> 6B- AREA OF REVIEW WELL LIST <input type="checkbox"/> 6C- FRESHWATER WELL LIST OF UNREGISTERED WELLS <input type="checkbox"/> 6D- SONRIS PRINTOUT OF REGISTERED WATER WELLS <input type="checkbox"/> 6E- FRESHWATER LABORATORY ANALYSES <input type="checkbox"/> ATTACHMENT 7 – FACILITY DIAGRAM ATTACHMENT 8 – INJECTION FLUID SOURCE <input type="checkbox"/> 8A - INJECTION FLUID SOURCE LIST <input type="checkbox"/> 8B - INJECTION FLUID SOURCE ANALYSES ATTACHMENT 9 – MASIP CALCULATION REQUEST <input type="checkbox"/> 9A – PROCEDURE TO DETERMINE GEOMECHANICAL DATA <input type="checkbox"/> 9B – GROUNDWATER MONITORING PLAN <input type="checkbox"/> DUPLICATE COPY OF THE APPLICATION

ADDITIONAL ATTACHMENTS INCLUDED WITH THIS APPLICATION

(SLIDE NO. 75)

ATTACHMENT 6 – AREA OF REVIEW (AOR)

ATTACHMENT 6A -AREA OF REVIEW MAP

(SLIDE NO. 76)

The AOR map must identify, within a 1,320 ft radius of the proposed injection well, the locations of the following:

- The proposed injection well
- All producing wells
- All injection wells
- All shut-in wells
- All plugged and abandoned wells
- All dry holes
- All source water wells (for enhanced recovery)
- All freshwater wells unless plotted on the certified plat

ATTACHMENT 6B -AREA OF REVIEW WELL LIST

(SLIDE NO. 77)

- Searching SONRIS for wells in the DNR database; and
- Researching field maps and company files

ATTACHMENT 6C -FRESHWATER WELL LIST

(SLIDE NOS. 78-79)

- The Freshwater Well List, Attachment 6C must identify any unregistered freshwater wells within the AOR. A diligent search must be attempted to locate any unregistered freshwater wells within the AOR of the proposed injection well. The search must include:
 - ▶ Conducting a foot-search of the ¼ mile AOR to identify any unregistered freshwater wells in the field; and
 - ▶ Researching company files for unregistered Rig Supply wells.
- IMD will not accept printouts of the DNR SONRIS database search, Attachment 6D in lieu of the Freshwater Well List of Unregistered Wells, Attachment 6C.
- All wells listed on the Freshwater Well List, Attachment 6C must be plotted on the Area of Review Map, Attachment 6A, the Location Plat, Attachment 2 or both.

ATTACHMENT 6D -SONRIS DATABASE PRINTOUT OF DNR REGISTERED WATER WELLS

(SLIDE NOS. 80-85)

- A printout of the SONRIS database search for DNR registered water wells within the AOR must be included as part of the Application and labeled as Attachment 6D.
 - ▶ To search the SONRIS database, go to www.dnr.louisiana.gov, click on SONRIS (logo on the upper left side of the page) >> Data Access (on the upper left side of the page) >> Lite (immediately below Data Access) >> Water Wells by Latitude Longitude (under Ground Water Information at the bottom left of the page).
 - ▶ To search for registered water wells in the AOR of the proposed well, enter the Latitude and Longitude (NAD 83) of the proposed injection well and a search radius of 1,320 feet. All wells listed on the SONRIS Database Printout of DNR Registered Water Wells, Attachment 6D must be plotted on the Area of Review Map, Attachment 6A, the Location Plat, Attachment 2, or both.
- Please label the printout Attachment 6D and include as part of the Application.

ATTACHMENT 6E -FRESHWATER LABORATORY ANALYSES

(SLIDE NOS. 86-88)

- Laboratory analyses of a water sample from each unplugged freshwater well must be provided. Bailers or surface pumps with tubing should be used to sample the wells that no longer have pumps.

- A written explanation must be submitted for all unplugged wells on the Freshwater Well List, Attachment 6C and SONRIS printout, Attachment 6D that are not sampled.
- The laboratory analyses must be signed originals from a Louisiana Department of Environmental Quality (LDEQ), Louisiana Environmental Laboratory Accreditation Program (LELAP) accredited laboratory. The analysis sheet(s) must identify the freshwater well sampled, and, at a minimum, include measurements of Chlorides (mg/l) and Total Dissolved Solids (mg/l). A PDF list of Accredited Laboratories can be found on the LDEQ website, www.deq.louisiana.gov, under: Divisions >> Public Participation and Permit Support >> Louisiana Laboratory Accreditation Program (scroll down to the Accredited Laboratories link).
- Please label the analysis sheet(s) Attachment 6E and include as part of the Application.
- Please ensure that the Sample Name or Sample Id on the chain-of-custody submitted to the laboratory identifies the location from which the sample was collected and can be correlated to a freshwater well name or DNR number listed on the Freshwater Well list, Attachment 6C or the SONRIS Database Printout of DNR Registered Water Wells, Attachment 6D. This is usually the sample name or sample ID that also appears on the laboratory report.

ATTACHMENT 7 - FACILITY DIAGRAM

(SLIDE NO. 89)

A surface facility diagram must be included as part of the Application and labeled as Attachment 7. The diagram should be drawn to scale (or reasonably close) and should show the following where applicable:

- Proposed well
- Tanks
- Pits
- Containment levees
- Flow lines entering and leaving the facility
- Rig supply well
- Producing wells if located within the area shown
- Pertinent buildings
- Landmarks and other significant structures or features

ATTACHMENT 8 – INJECTION FLUID SOURCE

ATTACHMENT 8A -INJECTION FLUID SOURCE LIST (SLIDE NOS. 90-91)

- The Injection Fluid Source List must include each well that will contribute fluid to the proposed injection well and should only include wells of which the applicant is the registered operator-of-record. Applicants must complete the Injection Fluid Source List that is included in the Form UIC-2 SWD Conversion Application package labeled as Attachment 8A. Printouts of the SONRIS database search in lieu of the Injection Fluid Source List, Attachment 8A will not be accepted. Please include Attachment 8A as part of the Application package.
- Once a well is permitted for SWD, the operator can apply to add additional wells to their fluid source list to include wells produced by a different operator by submitting a Form UIC-13 Community Saltwater Disposal System Initial Notification.

ATTACHMENT 8B – INJECTION FLUID SOURCE ANALYSES (SLIDE NOS. 92-100)

- Laboratory analyses of a representative sample of the fluid to be injected in the proposed well should be included as part of the Application. The laboratory analyses must be signed originals from a LDEQ LELAP accredited laboratory. A PDF list of Accredited Laboratories can be found on the LDEQ website, www.deq.louisiana.gov, under Divisions >> Public Participation and Permit Support >> Laboratory Accreditation (scroll down to the Accredited Laboratories link).
- The analysis sheet(s) must indicate the source of the sample and at a minimum include measurements of:
 - ▶ Chlorides (mg/l)
 - ▶ Density (g/cc or ppg) or Specific gravity
 - ▶ Total Dissolved Solids (mg/l)
 - ▶ Temperature of sample when specific gravity was measured
- The Sample Name or Sample ID on the analyses sheet(s) should identify the location point where the sample was collected and must correlate to a well(s) on the Injection Fluid Source List, Attachment 8A.
- If the sample location is a tank battery or common gathering point, then a signed written statement will be needed to associate the fluid source wells with the sample location.

- If the fluid source well(s) are not currently producing water, the applicant should submit a signed written statement agreeing to the submittal of the laboratory analyses as soon as fluid is available.
- The Approval-to-Construct letter for this well can be issued without the analyses; however, the Permit-to-Inject will not be issued until the analyses have been received by this Office.
- Please label the analyses Attachment 8B or if no fluid is available, label the written statement stating such as Attachment 8B and include as part of the Application.

ENHANCED RECOVERY (ER) WELLS

FORM UIC 2-ER

(SLIDE NOS. 120-124)

- 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 (ER) project, signed by the Commissioner of Conservation must exist before a permit can be issued for an ER well.
- ER 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.
- A Checklist for Attachments to be included in an ER Application has been added to the form and differs slightly.
- A copy of the Order creating the Secondary Recovery or Enhanced Recovery (ER) project, signed by the Commissioner of Conservation must be submitted with the ER Application.

ANNULAR DISPOSAL WELLS

FORM UIC-9

(SLIDE NOS. 125-129)

- To qualify for Annular Disposal, economic hardship must be proven

CLASS II- SALTWATER DISPOSAL, ENHANCED RECOVERY, & ANNULAR DISPOSAL WELLS

- The intent for annular disposal is for marginal wells where disposal costs would be prohibitive.
- Annular Class II permits are only valid for 12 months and must be renewed annually.
- Only water from the well itself can be disposed into an annular disposal well.
- There must be a minimum of 100 feet of net shale between the base of the USDW and the surface casing shoe.
- Production reported on the UIC-9 will be compared to production reported to the Production Audit Division during the review process.
- An MIPT cannot be performed on an Annular Injection Well. Wells of this type are tested by means of Radioactive Tracer Survey (RTS) only.

COMMUNITY SALTWATER DISPOSAL (SWD) WELLS

COMMUNITY VS. COMMERCIAL

(SLIDE NOS. 130-131)

COMMUNITY DISPOSAL WELL

Saltwater disposal well within an oil or gas field which is operated by one operator of record for disposal of E&P Waste fluids and used by other operators of record in the same field or adjacent fields for noncommercial disposal of their produced water

- Such operators share in the costs of operating the well/system
- Specifies definition of “adjacent fields”

COMMERCIAL SALTWATER DISPOSAL WELL

A legally permitted E&P Waste storage, treatment and/or disposal facility which receives, treats, reclaims, stores, and/or disposes of E&P Waste for a fee or other consideration

FORM UIC-13: COMMUNITY SWD SYSTEM APPLICATION

(SLIDE NO. 132)

INSTRUCTIONS

- Complete the Operator and Well information
- Include a Fluid Source List that includes the operator of record’s well(s) and other operator’s well(s)
- Certification by Operator

COMMUNITY DISPOSAL WELL WORKING AGREEMENT

Agreement must contain:

- Non-profit and non-commercial statement
- Pro-rata share of the disposal well's operating expenses
- Pro-rata share calculated and billed monthly
- [PRO-RATA SHARE] = [TOTAL MONTHLY MAINTENANCE EXPENSES] x [(BBLs DISPOSED BY OTHER OPERATORS EACH MONTH) / (TOTAL BBLs OF SALTWATER DISPOSED OF IN THE SAME MONTH)]

COMMERCIAL WELLS

FORM UIC-2 COM SWD

(SLIDE NOS. 133-136)

- A Commercial Class II Disposal Well is a legally permitted Exploration and Production (E&P) Waste storage, treatment and/or disposal facility which receives, treats, reclaims, stores, and/or disposes of E&P Waste for a fee or other consideration.
- Commercial Saltwater Disposal Wells have the same permitting process as the UIC 2 SWD with the following exceptions:
 - ▶ A representative sample of the fluid proposed to be injected must be submitted with the application.
 - ▶ The operator must provide North – South / East – West geologic cross sections across a 2 mile radius with the Application.
 - ▶ The AOR is ¼ mile. If a deficient well is located within the ¼ mile AOR, corrective action will be necessary.
 - ▶ The MASIP can be calculated based on the fracture gradient of the injection formation or based on the fracture gradient of the confining formation. The AOR becomes ½ mile if the MASIP is to be based on the fracture gradient of the confining formation (IMD-GS-09).
 - ▶ A closure plan for plugging and abandoning the well and a cost estimate to implement the closure plan must be.

Example Attachments

PL PETROLEUM
LABORATORIES, INC.

109 Cleveland Street
Houma, Louisiana 70363
985-868-4820

Company: JOE BALL, LLC
P.O. BOX 94275
BATON ROUGE, LA 70804

Report Date: 07/20/11

Lab No: HSQ-0252
Regulatory

Location: MP 46

Attn: JOE BALL

LELAP Certificate #:01969

Water Analysis

MP 46 / SWD
Sample Date: 07/17/11

Parameter - units	Results
Chloride - mg/l	33,364
Total Dissolved Solids - mg/l	64,300
Specific Gravity @ 60 °F	1.0379
Temperature - °F	73



109 Cleveland Street
Houma, LA 70363
(985) 868-4820

**PETROLEUM
LABORATORIES, INC.**
CHAIN OF CUSTODY



333 E. Kaliste Saloom Rd.
Lafayette, LA 70508
(337) 234-7414

Company Joe Ball, LLC				Analysis Requested				FOR OFFICE USE ONLY			
Phone Number (225) 342-5515				Chlorides				CONDITION OF SAMPLES UPON RECEIPT AT LAB			
Field / Sample Point Block 3				TDS				PLI LAB NUMBER			
<input checked="" type="checkbox"/> Regulatory <input type="checkbox"/> Non-Regulatory Sample Location / Identification				Specific Gravity				PH - s.u.			
<input checked="" type="checkbox"/> Comp <input type="checkbox"/> Grab Date Time				Temp.				Temp - °C			
<input type="checkbox"/> Regulatory <input type="checkbox"/> Non-Regulatory Sample Location / Identification				Matrix				Preservation			
W = Water S = Soil O = Other SL = Sludge S = Soil P = Plastic S = Sterilized V = 40 mL Vial G = Glass V = 40 mL Vial 1 = 1 Liter 4 = 4 oz. 6 = 6 oz. 8 = 8 oz. 16 = 16 oz.				Bottle				Size			
W 1 P MP-46				Number of Containers				Analysis Requested			
7/17/11 10:00am				Date Time				Date Time			
1. Relinquished By: <i>Laurence Bland</i> 3. Relinquished By: 5. Relinquished By:				Date: 7/18/11 Time: 9:00 am Date: Time: Date: Time:				Date: Time: Date: 7/18/11 Time: 9:01 am			
2. Received By: 4. Received By: 6. Received for Laboratory: <i>Tina Farquy</i>				Invoice To: Data Results To: Joseph S. Ball, Jr. (225) 342-5515				Sample Remarks:			
Turn-Around Time Normal Service <input checked="" type="checkbox"/> 3 - 5 Days Rush Service <input type="checkbox"/> 24 Hrs. <input type="checkbox"/> 48 Hrs.				White = Lab Copy Yellow = Return with Lab Report Pink = Client Copy							

Practice Assignment

THE PRACTICE ASSIGNMENT HANDOUT INCLUDES THE FOLLOWING:

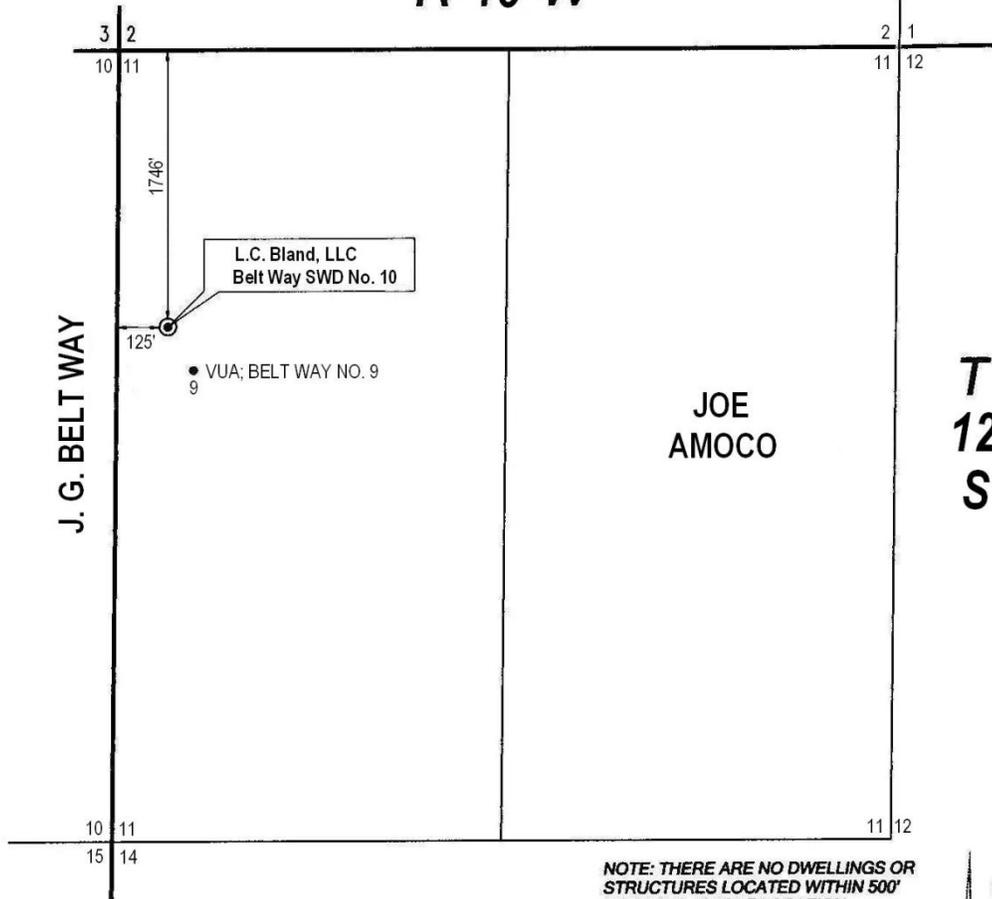
- UIC-2 SWD CONVERSION APPLICATION FORM
- PINK CARD
- LOCATION PLAT
- EXISTING SCHEMATIC
- PROPOSED SCHEMATIC AND
- WELL HISTORY AND WORK RESUME REPORT

THE FOLLOWING ASSUMPTIONS SHOULD BE MADE:

- THE API NUMBER IS 17023881900000
- YOU ARE THE AGENT
- ALL ATTACHMENTS ARE INCLUDED
- THE INJECTION RATE IS:
NORMAL: .07 BPM MAXIMUM: .2 BPM
- THE INJECTION FLUID TEMPERATURE IS:
SUMMER: 100°F WINTER: 90°F
- INJECTION FORMATION PROPERTIES ARE:
POROSITY: 32% PERMEABILITY: 1500 MD
THESE PROPERTIES WERE OBTAINED BY ESTIMATION
- THE MASIP IS TO BE CALCULATED BY THE DEFAULT METHOD
- THE CONTINGENCY PLAN IS TO HAUL WATER TO A COMMERCIAL FACULTY
- THIS WELL IS NOT LOCATED ON FEDERAL OR STATE LAND
- ASSUME INITIAL INJECTION WILL OCCUR IN THE LOWERMOST SAND OF THE PROPOSED INJECTION ZONE.



R-10-W



WELL LOCATION PLAT

OPERATOR: L.C. Bland, LLC
 WELL NAME: Belt Way SWD Well No. 10
 SN 777777

LOCATION:
 1,746' F.N.L. AND 125' F.W.L. OF SECTION 11,
 TOWNSHIP 12 SOUTH, RANGE 10 WEST,
 CAMERON PARISH, LOUISIANA.

WELL COORDINATES:

LAT = 30 01' 58.87" (NAD27)
 LONG = 93 20' 18.04" (NAD27)
 LAT = 30 01' 59.61" (NAD83)
 LONG = 93 20' 18.61" (NAD83)
 X = 1365580.01
 Y = 502417.14 (STATE PLANE NAD27)
 X = 2646377.48 (STATE PLANE NAD83)
 Y = 563126.00
 GROUND ELEVATION: FEET NAVD 88
 (COMPUTED USING GEIOD09)

SCALE: 1" = 500'
 DATE: 10/30/2011
 DRAWN: MISS PIGGY
 FILE NAME: C:\CAD\98460-2

LEGEND

- = EXISTING WELL
- ⊙ = PROPOSED SWD

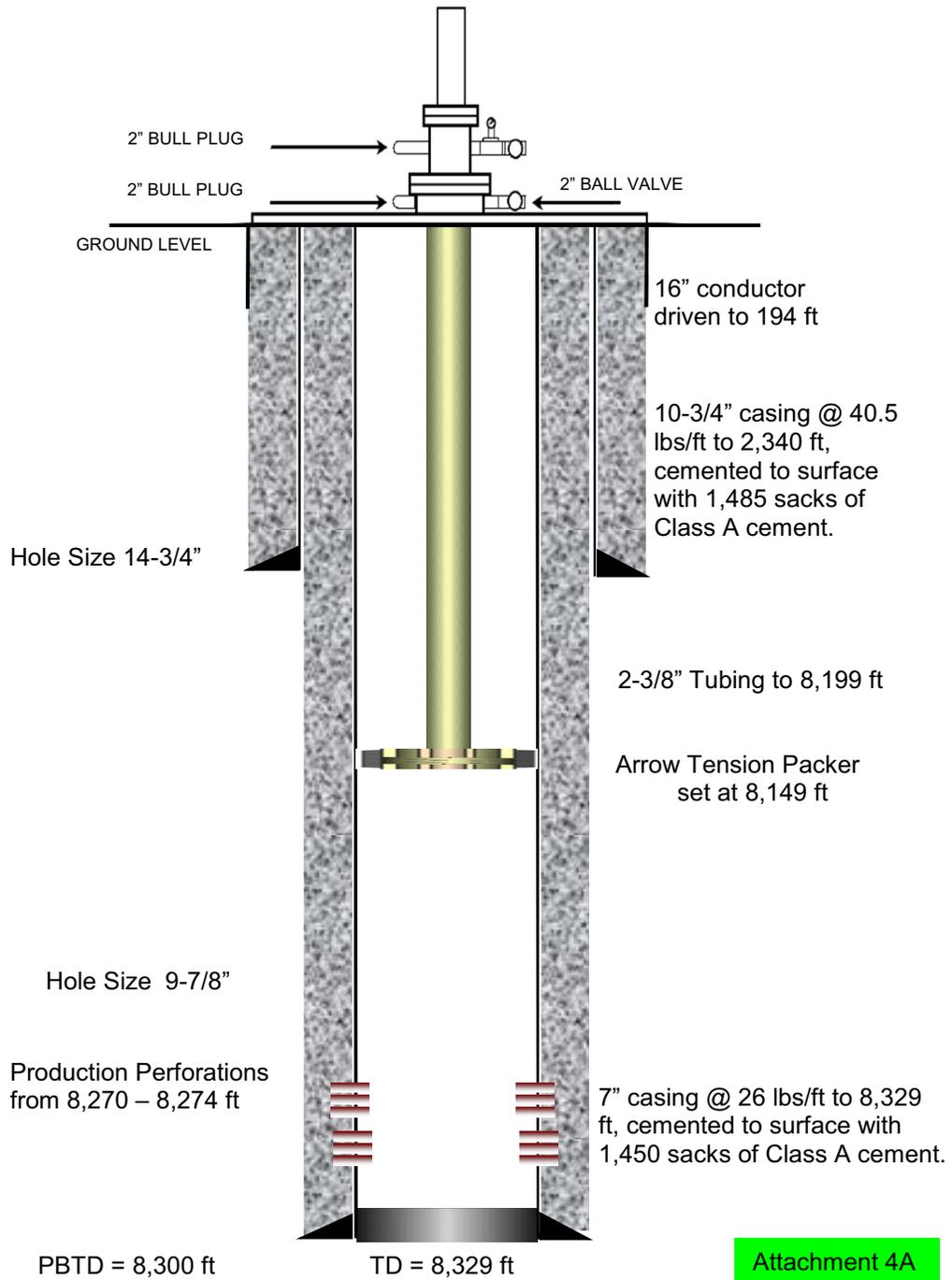


I KERMIT THE FROG, PROFESSIONAL LAND SURVEYOR, CERTIFY THAT THE WELL LOCATION DEPICTED AND DESCRIBED IN THIS PLAT WAS STAKED AND SURVEYED IN THE FIELD BY ME OR UNDER MY DIRECTION WITH ACCURACY AND PRECISION TO THE NEAREST FOOT ON THE 30th DAY OF OCTOBER, 2010. I HAVE PROPERLY EXAMINED THE SURVEY AND PLAT AND HAVE DETERMINED THAT IT MEETS THE MINIMUM STANDARDS OF PRACTICE FOR LAND SURVEYING IN THE STATE OF LOUISIANA.

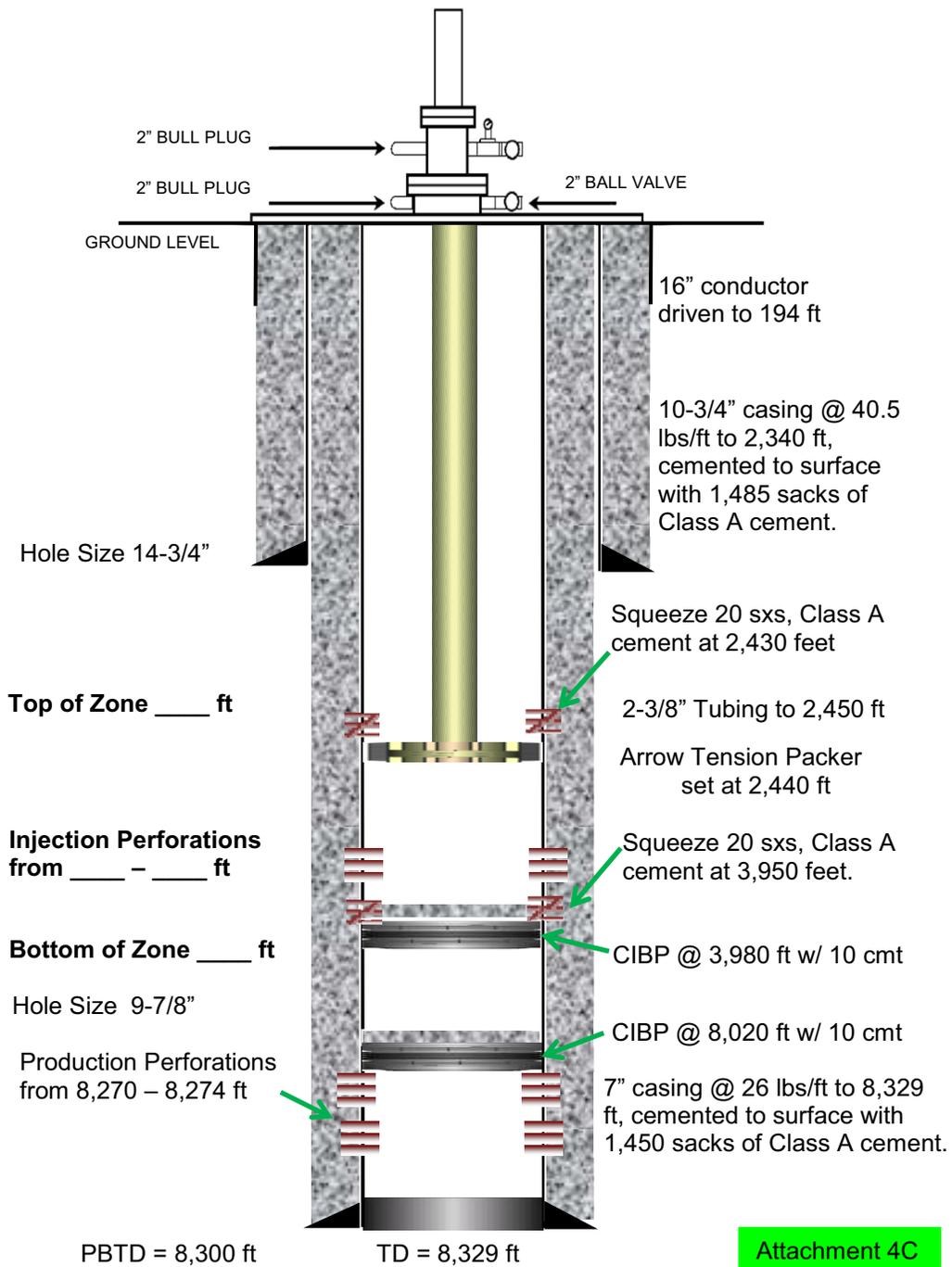


Kermit the Frog P.L.S. # XYZ

Current Wellbore Schematic



Proposed Wellbore Schematic



Attachment 4C

STATE OF LOUISIANA DNR-OFFICE OF CONSERVATION
APPLICATION TO AMEND PERMIT TO DRILL FOR MINERALS

TYPE ONLY

FORM MD-10-R-A

AMENDMENT ACTION:

- PARISH
- FIELD
- OPER
- LSE-UN
- UN-LSE
- UN-UN
- LSE-LSE
- WELL NO.
- LOCN
- SWD

SERIAL NO. 777777 EFF DATE OF CHANGE: _____ MONTH _____ DAY _____ YEAR _____

PARISH CAMERON

FIELD DEATH STAR BAYOU

OPERATOR L. C. BLAND, LLC

ADDRESS 3561 LIGHT SABER WAY
ASTEROID CITY, LA 70999

WELL NAME BELT WAY SWD No. 010

LOCATION Sec 011 T 12S R 10W
1746' FNL AND 125' FWL OF SECTION 11, T12S, R10W

CODE NOS.
12
9999
L999

SIGNATURE: Laurencee Bland PHONE NO. _____

WELL NAME VUA; BELT WAY No. 010

OPERATOR L.C. BLAND, LLC

BY Laurencee Bland PHONE NO. _____
FORMER OPERATOR REPRESENTATIVE (TYPE NAME)

SIGNATURE _____ F'MR PSH/FIELD _____

- CURRENT PRODUCT
- OIL:
 - GAS:
 - OTHER:

COMPLETION ZONE _____ ORDER(S) _____

APPROVED BY _____ DATE _____
DISTRICT MANAGER

APPROVED BY _____ DATE _____
ISSUING AUTHORITY

REV. 3/2005



OFFICE OF CONSERVATION
WELL HISTORY AND WORK RESUME REPORT

FIELD • Death Star Bayou
SERIAL NUMBER • 777777
PRODUCING INTERVAL (INJECTION PERFORATIONS) • 8270' - 8274'
RESERVOIR (INJECTION ZONE) Solo

Three type-written copies of this report must be filed with the District Office of the Office of Conservation in which the well is located within twenty (20) days of the date of completion. NOTE: If not properly completed and signed, this report will be returned.

CHECK APPROPRIATE BOXES <input type="checkbox"/> NEW WELL <input type="checkbox"/> RECOMPLETION <input type="checkbox"/> P & A	<input type="checkbox"/> 31 INACTIVE DRY HOLE FUT. UTIL. <input type="checkbox"/> 32 INACTIVE DRY HOLE NO FUT. UTIL. <input type="checkbox"/> 36 INACTIVE WAITING ON PIPELINE <input type="checkbox"/> 37 INACTIVE WAITING ON MARKET	PRODUCT <input type="checkbox"/> OIL <input type="checkbox"/> GAS <input type="checkbox"/> OTHER	IF RECOMPLETION <input type="checkbox"/> SAME RESERVOIR <input type="checkbox"/> DIFFERENT RESERVOIR	DATE COMP., RECOMP., OR P&A (MM/DD/YYYY) • 06/28/1988
---	---	---	--	--

OPERATOR • L.C. Bland, L.L.C.	CODE • L999	ADDRESS (ADDRESS, CITY, STATE, ZIP CODE) • 3561 Light Saber Way Asteroid City, LA 70999
----------------------------------	----------------	--

WELL NAME • VUA; Beltway	WELL NO. • 010
-----------------------------	-------------------

PARISH • Cameron	• SEC 011 TWP. 12S RGE. 10W	DATE PERMIT ISSUED (MM/DD/YYYY) • 01/01/1988
---------------------	-----------------------------	---

DATE SPUDDED 02/01/1988	DATE READY TO PRODUCE* 06/28/1988	TOTAL DEPTH (FT.) • 8329'	PBTD (FT.) • 8300'
----------------------------	--------------------------------------	------------------------------	-----------------------

GROUND ELEVATION (FT.) 150.3	CASING HEAD FLANGE ELEVATION (FT.) 150.3	DISTANCE FROM RKB TO CHF (FT.) 7.5'
---------------------------------	---	--

DATE WELL TURNED ON TANKS	SINGLE, DUAL, OR TRIPLE COMPLETION? Single	NOTE: IF THIS IS A MULTIPLE COMPLETION, FURNISH A SEPARATE REPORT FOR EACH COMPLETION.
---------------------------	---	--

WELL WAS DIRECTIONALLY DRILLED? <input type="checkbox"/> YES <input type="checkbox"/> NO	WAS DIRECTIONAL SURVEY MADE? <input type="checkbox"/> YES <input type="checkbox"/> NO	WERE 3 COPIES FILED WITH THE OFFICE OF CONSERVATION? <input type="checkbox"/> YES <input type="checkbox"/> NO	DATE FILED
---	--	--	------------

TYPE OF ELECTRICAL OR OTHER LOGS RUN (CIRCLE LOGS FILED WITH OFFICE OF CONSERVATION) Dual Induction	DATE FILED 07/01/1988
--	--------------------------

CASING, LINER AND TUBING RECORD

CASING SIZE	HOLE SIZE	CASING WEIGHT	DEPTH SET		SACKS OF CEMENT	TEST PRESSURE	HOURS UNDER PRESSURE	DATE TESTED (MM/DD/YYYY)	NAME OF TEST WITNESS - STATE IF CONSERVATION AGENT OR OFFSET OPERATOR
			FROM	TO					
16		52.4	0	194	0	0	0		
10 3/4	14 3/4	40.5	0	2340	1485	1000	3.0	02/18/1988	L. Skywalker
7	9 7/8	26	0	8329	1450	500	1.0	06/20/1988	L. Skywalker

TUBING SIZE: • 2 3/8"	DEPTH OF TUBING (FT.): • 8199'	DEPTH OF PACKER(S) (FT.): • 8149'
-----------------------	--------------------------------	-----------------------------------

INITIAL COMPLETION OR RE-COMPLETION DATA

INITIAL PRODUCTION BOPD	GAS VOLUME MCF/DAY	GOR CF/BBL	CHOKE SIZE /64"	PRODUCING METHOD
FLOWING TUBING PRESSURE psig	SHUT-IN TUBING PRESSURE psig	CASING PRESSURE	WATER PRODUCTION BPD	BS&W %
GRAVITY *API @ 60°F	BHP (SHUT-IN) psig	COMPANY REPRESENTATIVE		DATE GAUGED

PLUG AND ABANDON (P & A) DATA

CASING SIZE	AMOUNT PULLED	CEMENT PLUGS				DATE WORK PERFORMED (MM/DD/YYYY)	NAME OF TEST WITNESS - STATE IF CONSERVATION AGENT OR OFFSET OPERATOR
		FROM	TO	SACKS	HOW PLACED		

* CERTIFICATE: I, the undersigned, state: That I am employed by L. C. Bland, L.L.C. and that I am authorized to make this report, and that this report was prepared under my supervision and direction and that all facts stated herein are true, correct and complete to the best of my knowledge.

• Signature: Laurence Bland • Title: Owner

* Date well is equipped to produce, but due to no available market, no pipe line connection, etc; the well has been shut-in.

• WORK RESUME

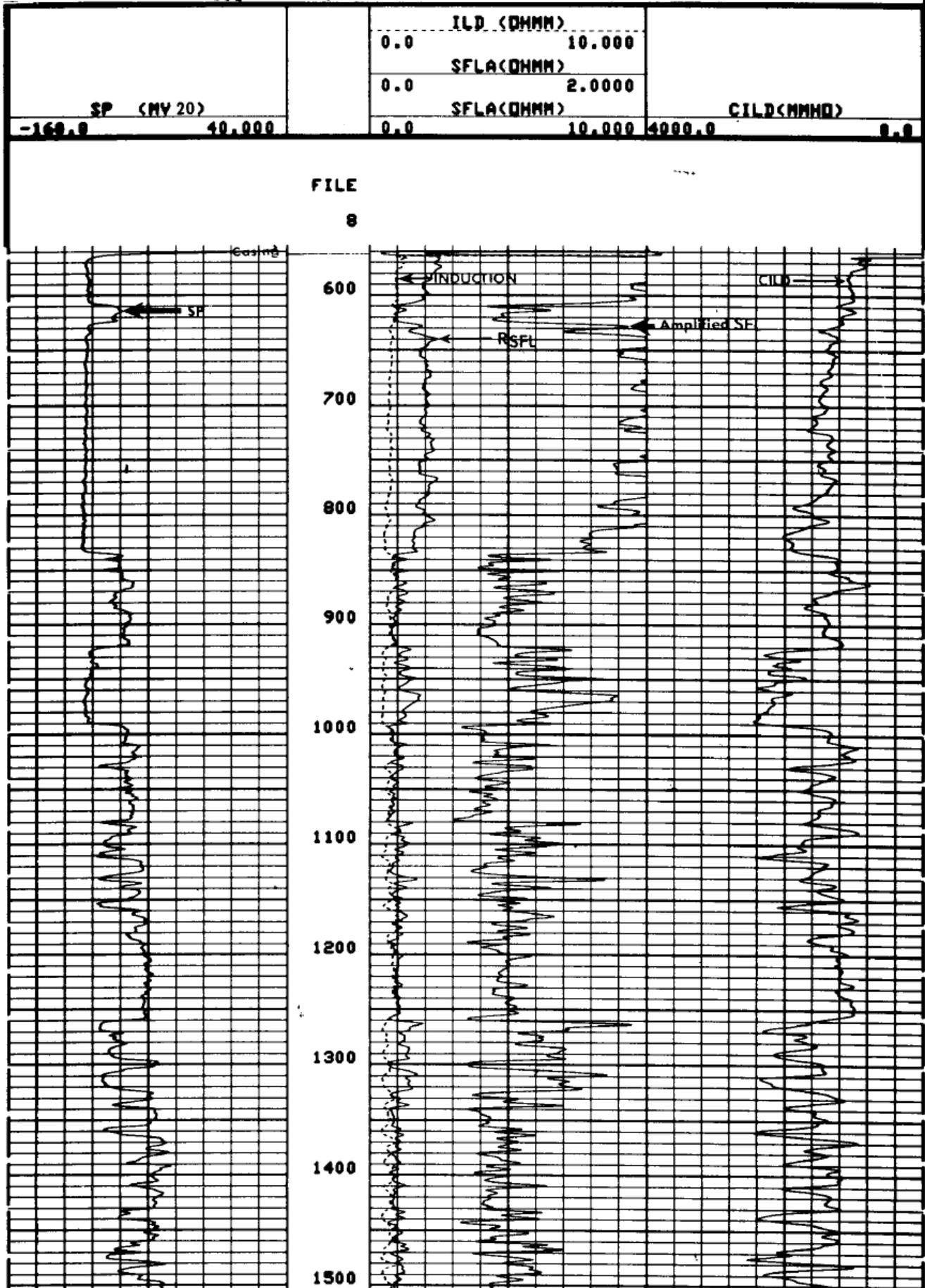
List below all work performed under Office of Conservation Work Permits while drilling and completing well.

WORK PERMIT NO.	DATE WORK PERFORMED (MM/DD/YYYY)	SERVICE COMPANY	DESCRIPTION OF WORK
L#3333-06	02/01/88	L & L	Spud well. 16" csg driven to refusal. Drilled to 2340'. Ran 10 3/4" csg (40.5#/ft) to 2340'. Cemented with 1485 sks. cement, Class A. Pressure tested to 1000 psi.
	02/26/1988	L & L	Drilled to 8329'. Ran dual induction log. Ran 7" csg (26#/ft) to 8329'. Cemented with 1450 sks. cement, Class A. Pressure tested to 500 psi.
	06/28/1988	J & W	Perforated for production 8270' - 8274'. Set Packer at 8149'. EOT 8199'.

List below all important Paleofaunal or Geological Formation tops, Cap Rock and Salt Overhang bottoms.

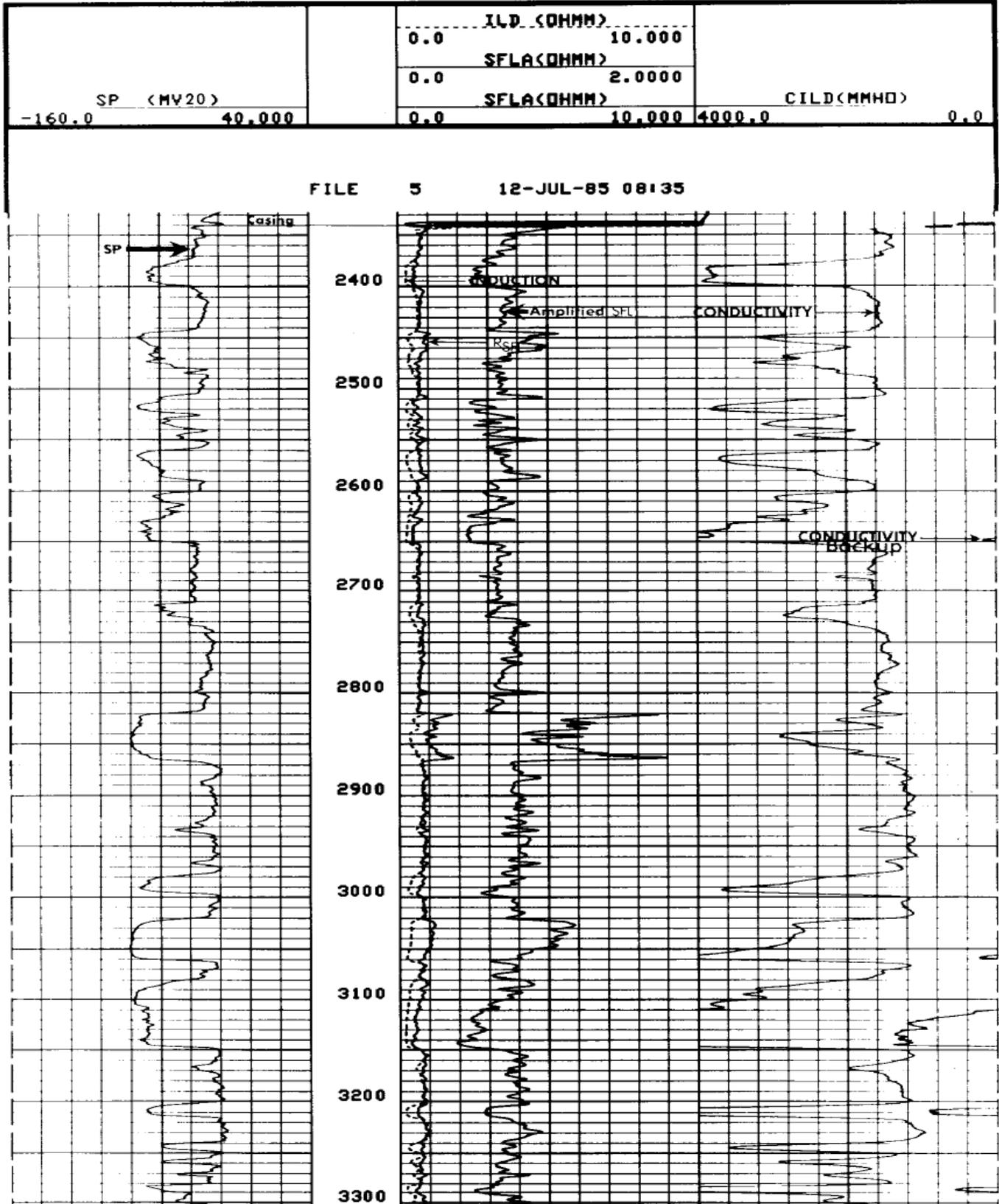
FORMATION	DEPTH	FORMATION	DEPTH

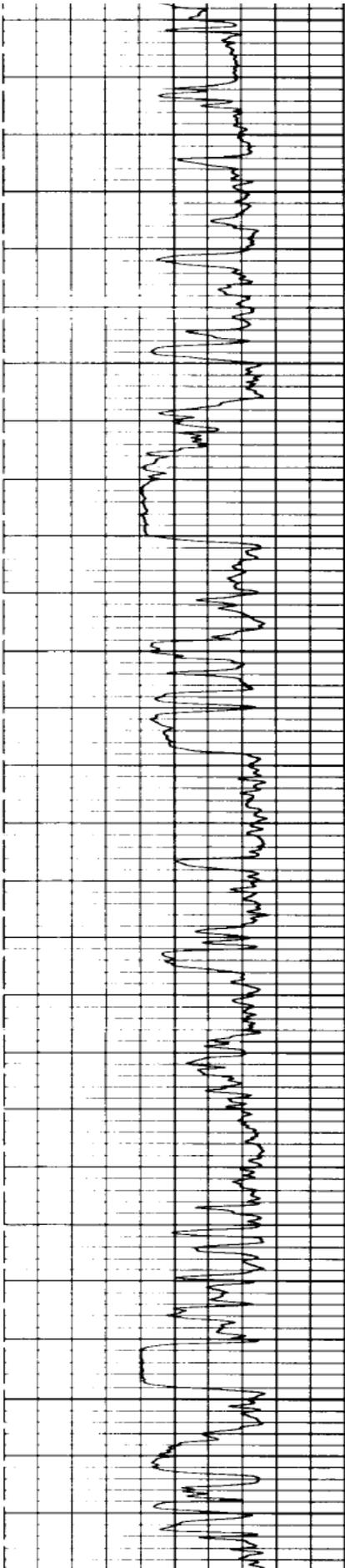
USDW LOG ~ 1,965 feet away



Mark the Proposed Injection Zone and Proposed Perforations

- Find and mark the Top of Zone between the shoe of the surface casing and 2,600 feet
- Find and mark the Bottom of Zone between 3,800 and 4,000 feet





3300
3400
3500
3600
3700
3800
3900
4000
4100
4200
4300
4400
4500
4600

