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, i.e. 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:

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**UIC WORK PERMITTING WORKSHOP**

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- **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: 2½ 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:


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)

- 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

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
- 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.
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

- Searching SONRIS for wells in the DNR database; and
- Researching field maps and company files
ATTACHMENT 6C - FRESHWATER WELL LIST

- 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

- 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

- 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.

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
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
- \[
  [\text{Pro-rata share}] = \frac{[\text{Total monthly maintenance expenses}]}{[\text{BBLS disposed by other operators each month}]} \times \frac{[\text{TOTAL BBLS OF SALTWATER DISPOSED OF IN THE SAME MONTH}]}{}
\]

COMMERCIAL WELLS

FORM UIC-2 COM SWD

- 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
<table>
<thead>
<tr>
<th>OPERATOR CODE</th>
<th>WELL NAME &amp; NO.</th>
<th>SERIAL NUMBER</th>
<th>FIELD CODE</th>
<th>FORMATION</th>
<th>TOTAL DEPTH (FT.)</th>
<th>PERFORATED OR COMPLETED INTERVAL (FT.)</th>
</tr>
</thead>
<tbody>
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<td>J123</td>
<td>BA BB RA SUA; SL 16587</td>
<td>777766</td>
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</tr>
</tbody>
</table>
## Water Analysis

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

<table>
<thead>
<tr>
<th>Parameter - units</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloride - mg/l</td>
<td>33,364</td>
</tr>
<tr>
<td>Total Dissolved Solids - mg/l</td>
<td>64,300</td>
</tr>
<tr>
<td>Specific Gravity @ 60 °F</td>
<td>1.0379</td>
</tr>
<tr>
<td>Temperature - °F</td>
<td>73</td>
</tr>
<tr>
<td>Date</td>
<td>Time</td>
</tr>
<tr>
<td>---------</td>
<td>--------</td>
</tr>
<tr>
<td>7/17/11</td>
<td>10:00 am</td>
</tr>
</tbody>
</table>

**Sample Remarks:**

- Chlorides
- Specific Gravity
- Temp.

**Analysis Results To:**

- Tina Fanguy

**Invoice To:**

- White = Lab Copy
- Yellow = Return with Lab Report
- Pink = Client Copy

**Sample Remarks:**

- 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.
**OPERATOR INFORMATION**

The information in boxes 1-12 must match the Form MD-10-R-A or MD-10-R-A-1

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>1. OPERATOR NAME</td>
<td>2. OPERATOR CODE</td>
</tr>
<tr>
<td>3. OPERATOR MAILING ADDRESS</td>
<td>4. CITY</td>
</tr>
<tr>
<td>5. STATE</td>
<td>6. ZIP CODE</td>
</tr>
<tr>
<td>7. TELEPHONE NUMBER</td>
<td>8. FAX NUMBER</td>
</tr>
<tr>
<td>9. EMAIL ADDRESS</td>
<td>10. PROPOSED WELL NAME AND NUMBER</td>
</tr>
<tr>
<td>11. API NUMBER</td>
<td>12. SERIAL NUMBER</td>
</tr>
</tbody>
</table>

**WELL INFORMATION**

The information in boxes 13-22 must match the current Location Plat (Attachment 2) exactly.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>18. LOCATION DESCRIPTION</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PROPOSED WELL CONSTRUCTION INFORMATION**

The information in boxes 23-38 must match the information reported on Attachment 4C (Proposed Wellbore Schematic) and Attachment 4D (Work Prognosis).

<p>| | | | | | |</p>
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<thead>
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</thead>
<tbody>
<tr>
<td>23. CASING SIZE (IN.)</td>
<td>24. HOLE SIZE (IN.)</td>
<td>25. CASING WEIGHT</td>
<td>26. DEPTH SET</td>
<td>27. SACKS CEMENT</td>
<td>28. CEMENT CLASS or YIELD (CU.FT./SACK)</td>
</tr>
<tr>
<td>30. TUBING TYPE</td>
<td>31. TUBING SIZE (IN.)</td>
<td>32. TUBING DEPTH (FT.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33. PACKER</td>
<td>34. MAKE</td>
<td>35. MODEL</td>
<td>36. DEPTH SET (FT.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>37. PLUGGED-BACK DEPTH (FT.)</td>
<td>38. TOTAL DEPTH OF WELL (FT.)</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**PROPOSED INJECTION INTERVAL INFORMATION**

The information in boxes 39 and 42 should come from the electric log of the well to be permitted or the closest offset well that was logged across the proposed injection zone. If the top and bottom of the zone are not shown on the same log, two different logs can be used. Copies of the log(s) must be attached and labeled as Attachment 5B.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>39. INJECTION ZONE (FT)</td>
<td>40. PERFORATED/OPEN-HOLE INTERVAL WITHIN ZONE (FT)</td>
</tr>
<tr>
<td>TOP</td>
<td>BOTTOM</td>
</tr>
<tr>
<td>41. INJECTION FORMATION NAME</td>
<td>42. INJECTION THROUGH:</td>
</tr>
<tr>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

88
### PRESSURE CALCULATION DATA

**43. INJECTION RATE (BARRELS/MINUTE):**

| Normal (BPM) | Maximum (BPM) |

**44. INJECTION FLUID EXPECTED TEMPERATURE (°F):**

| Summer (°F) | Winter (°F) |

**45. INJECTION FORMATION PROPERTIES:**

| Porosity (%) | Permeability (Millidarcys) | How were the properties attained: |

**46. HOW WOULD YOU PREFER THE INJECTION AND MINING DIVISION CALCULATE THE MAXIMUM ALLOWABLE SURFACE INJECTION PRESSURE (MASIP) FOR THIS WELL:**

- Based on Eaton’s Fracture Gradient Chart, Louisiana Gulf Coast
- Based on the Fracture Gradient of the Injection Formation (Step-Rate / Fall Off Test, Sonic Log or Other Acceptable Log)
- Based on the Fracture Gradient of the Confining Formation (For Guidance Refer to Attachment 9, MASIP Calculation Request in the Instructions)


### OTHER INFORMATION

**47. DESCRIBE CONTINGENCY PLANS FOR SALTWATER DISPOSAL WHEN THE WELL IS DOWN:**

**48. IS THE PROPOSED WELL LOCATED ON INDIAN LANDS OR OTHER LANDS OWNED BY OR UNDER THE JURISDICTION OR PROTECTION OF THE FEDERAL GOVERNMENT?**

- Yes
- No

**49. IS THE PROPOSED WELL LOCATED ON STATE WATER BOTTOMS OR OTHER LANDS OWNED BY OR UNDER JURISDICTION OF THE STATE?**

- Yes
- No

**PLEASE ENSURE THAT ALL APPLICABLE ATTACHMENTS BELOW ARE INCLUDED WITH THIS APPLICATION**

- Filing Fee
- Attachment 1 – Public Notice
- Attachment 2 – Location Plat
- Attachment 3 – Well History & Work Resume Report
- Attachment 4 – Wellhead Diagram, Well Schematic(s) and Work Prognosis
  - 4A - Current Wellbore Schematic
  - 4B - Proposed Wellhead Diagram
  - 4C - Proposed Wellbore Schematic
  - 4D - Work Prognosis
- Attachment 5 – Logs
  - 5A - Electric Log for the Base of the USDW (w/ Order, if applicable)
  - 5B – Log(s) of the Injection Zone & Injection Perforations (w/ Order, if applicable)
  - 5C – Cement Bond Log (CBL)
- Attachment 6 – Area of Review (AOR)
  - 6A- Area of Review Map
  - 6B- Area of Review Well List
  - 6C- Freshwater Well List of Unregistered Wells
  - 6D- Sonris Printout of Registered Water Wells
  - 6E- Freshwater Laboratory Analyses
- Attachment 7 – Facility Diagram
- Attachment 8 – Injection Fluid Source
  - 8A - Injection Fluid Source List
  - 8B - Injection Fluid Source Analyses
- Attachment 9 – MASIP Calculation Request
  - 9A- Procedure to Determine Geomechanical Data
  - 9B – Groundwater Monitoring Plan
- Duplicate Copy of the Application

### AUTHORIZED AGENT

50. AGENT OR CONTACT AUTHORIZED TO ACT FOR THE OPERATOR DURING PROCESSING OF THIS APPLICATION.

The signature of the operator certifying this application will authorize this agent or contact to submit additional information as requested and to give oral statements in support of this application during the application review process. Any correspondence (including notices of deficiencies) generated during the review process of this application will be sent to whomever is listed in this box. The final written decision on this application will be sent to the operator noted in Box 1 of this form.

**NAME:**

**COMPANY:**

**ADDRESS:**

**PHONE:**

**EMAIL:**

### CERTIFICATION BY OPERATOR

The signature below must be obtained from a duly appointed employee of the operating company.

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my personal knowledge or inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment (LSA-RS 30:17).

**51. NAME (PRINT)**

**52. TITLE (PRINT)**

**53. SIGNATURE**

**54. DATE**
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 (STATE PLANE NAD27)
Y = 502417.14 (STATE PLANE NAD83)
X = 2646377.48 (STATE PLANE NAD83)
Y = 563125.00 (STATE PLANE NAD83)
GROUND ELEVATION = FEET NAVD 88
(COMPUTED USING GEIOD09)

SCALE: 1" = 500'
DATE: 10/30/2011
DRAWN: MISS PIGGY
FILE NAME: C:\CAD06\600-2

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
PROFESSIONAL LAND SURVEYOR
P.O. BOX 3457
DALLAS, TX 75206
(214) 771-7557
EMAIL: FMCF@KERMITTHEFROGMAP.COM

STATE OF LOUISIANA
REG. NO. XYZ
REGISTERED PROFESSIONAL
LAND SURVEYOR

Kermit the Frog P.L.S. # XYZ
Current Wellbore Schematic

- **2” BULL PLUG**
- **2” BULL PLUG**
- **2” BALL VALVE**
- **GROUND LEVEL**

**16” conductor driven to 194 ft**

**10-3/4” casing @ 40.5 lbs/ft to 2,340 ft, cemented to surface with 1,485 sacks of Class A cement.**

**Hole Size 14-3/4”**

**2-3/8” Tubing to 8,199 ft**

**Arrow Tension Packer set at 8,149 ft**

**Hole Size 9-7/8”**

**Production Perforations from 8,270 – 8,274 ft**

**7” casing @ 26 lbs/ft to 8,329 ft, cemented to surface with 1,450 sacks of Class A cement.**

**PBTD = 8,300 ft**

**TD = 8,329 ft**

Attachment 4A
Proposed Wellbore Schematic

2” BALL VALVE
2” BULL PLUG
2” BULL PLUG
GROUND LEVEL

16” conductor driven to 194 ft
10-3/4” casing @ 40.5 lbs/ft to 2,340 ft, cemented to surface with 1,485 sacks of Class A cement.

Hole Size 14-3/4”
Top of Zone ____ ft
Injection Perforations from ____ – ____ ft
Bottom of Zone ____ ft
Hole Size 9-7/8”
Production Perforations from 8,270 – 8,274 ft

PBTD = 8,300 ft
TD = 8,329 ft

Squeeze 20 sxs, Class A cement at 2,430 feet
2-3/8” Tubing to 2,450 ft
Arrow Tension Packer set at 2,440 ft
Squeeze 20 sxs, Class A cement at 3,950 feet.

CIBP @ 3,980 ft w/ 10 cmt
CIBP @ 8,020 ft w/ 10 cmt
7” casing @ 26 lbs/ft to 8,329 ft, cemented to surface with 1,450 sacks of Class A cement.

Attachment 4C
STATE OF LOUISIANA DNR-OFFICE OF CONSERVATION
APPLICATION TO AMEND PERMIT TO DRILL FOR MINERALS

SERIAL NO. 777777

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

SIGNATURE: Laurence Bland
PHONE NO.
WELL NAME VUA: BELT WAY
OPERATOR L. C. BLAND, LLC
SIGNATURE: Laurence Bland
PHONE NO.

REV. 3/2005
Three typewritten copies of this report must be filled 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.

**OFFICE OF CONSERVATION**

**WELL HISTORY AND WORK RESUMES REPORT**

**FIELD:** Death Star Bayou

**SERIAL NUMBER:** 777777

**PRODUCING INTERVAL (INJECTION PERFORATIONS):**
6270'-6274'

**REZERVOIR (INJECTION ZONE):** Solo

**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

**DATE SPUEDS:** 02/01/1988

**DATE READY TO PRODUCE:** 06/28/1988

**TOTAL DEPTH (FT.):** 8320'

**GROUND ELEVATION (FT.):** 150.3

**CASING HEAD ELEVATION (FT.):** 150.3

**DISTANCE FROM NBS TO CRH (FT.):** 7.5'

**DATE WELF TURNED ON TANKS:**

**SINGLE, DUAL, OR TRIPLE COMPLETION:**

**Well Was Directionally Drilled:**

**Was Directional Survey Made:**

**COMPLETE REPORTS WITH THE OFFICE OF CONSERVATION:**

**TYPE OF ELECTRICAL OR OTHER LOGS RUN (CIRCLE LOGS FILED WITH OFFICE OF CONSERVATION):**

**DATE FILED:** 07/01/1988

**CASING, LINER AND TUBING RECORD**

<table>
<thead>
<tr>
<th>CASING SIZE</th>
<th>HOLE SIZE</th>
<th>CASINGWEIGHT</th>
<th>DEPTH SET FROM</th>
<th>TO</th>
<th>SACKS OF CEMENT</th>
<th>TEST PRESSURE</th>
<th>HOURS UNDER PRESSURE</th>
<th>DATE TESTED</th>
<th>NAME OF TEST WITNESS: STATE IF CONSERVATION AGENT OR OFFSET OPERATOR</th>
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<tbody>
<tr>
<td>16</td>
<td>52.4</td>
<td>0</td>
<td>194</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>02/16/1988</td>
<td>L Skywalker</td>
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<tr>
<td>10 3/4</td>
<td>14 3/4</td>
<td>40.5</td>
<td>0</td>
<td>2340</td>
<td>1485</td>
<td>1000</td>
<td>3.0</td>
<td>06/20/1988</td>
<td>L Skywalker</td>
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<tr>
<td>7</td>
<td>9 7/8</td>
<td>26</td>
<td>0</td>
<td>8329</td>
<td>1450</td>
<td>500</td>
<td>1.0</td>
<td>06/20/1988</td>
<td>L Skywalker</td>
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</tbody>
</table>

**TUBING SIZE:** 2 3/8'

**DEPTH OF TUBING (FT.):** 8199'

**DEPTH OF PACKER(s) (FT.):** 8149'

**INITIAL COMPLETION OR RE-COMPLETION DATA**

<table>
<thead>
<tr>
<th>INITIAL PRODUCTION</th>
<th>GAS VOLUME MBTDAY</th>
<th>GOR</th>
<th>CF/MMB</th>
<th>CHOKE SIZE (psi)</th>
<th>PRODUCING METHOD</th>
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<tr>
<td>BOPD</td>
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<tr>
<td>FLOWING TUBING PRESSURE (psi)</td>
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<tr>
<td>SHUT-IN TUBING PRESSURE (psi)</td>
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<tr>
<td>GRAVITY &quot;API @ 65&quot;</td>
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<tr>
<td>COMPANY REPRESENTATIVE</td>
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<tr>
<td>DATE GAUGED</td>
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</table>

**DATE LOADED**

**PLUG AND ABANDON (P&A) DATA**

<table>
<thead>
<tr>
<th>CASING SIZE</th>
<th>AMOUNT PULLED</th>
<th>CEMENT PLUGS FROM</th>
<th>TO</th>
<th>SACKS</th>
<th>HOURS PLACED</th>
</tr>
</thead>
</table>

**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:** Lawrence 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.

<table>
<thead>
<tr>
<th>WORK PERMIT NO.</th>
<th>DATE WORK PERFORMED (MM/DD/YYYY)</th>
<th>SERVICE COMPANY</th>
<th>DESCRIPTION OF WORK</th>
</tr>
</thead>
<tbody>
<tr>
<td>L#3333-06</td>
<td>02/01/88</td>
<td>L &amp; L</td>
<td>Spud well, 15&quot; csg driven to refusal. Drilled to 2340'. Ran 10 3/4&quot; csg (40.5#/ft) to 2340'. Cemented with 1450 sks. cement, Class A. Pressure tested to 1000 psi.</td>
</tr>
<tr>
<td></td>
<td>02/26/1988</td>
<td>L &amp; L</td>
<td>Drilled to 8329'. Ran dual induction log. Ran 7&quot; csg (26#/ft) to 8329'. Cemented with 1450 sks. cement, Class A. Pressure tested to 500 psi.</td>
</tr>
<tr>
<td></td>
<td>06/28/1988</td>
<td>J &amp; W</td>
<td>Perforated for production 8272'- 8274'. Set Packer at 8149'. EOT 8199'.</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>FORMATION</th>
<th>DEPTH</th>
</tr>
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<tbody>
<tr>
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</tbody>
</table>

95
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