PECOS DISTRICT
DRILLING CONDITIONS OF APPROVAL

OPERATOR'S NAME:	Legacy Reserves Operating LP
LEASE NO.:	NMNM0006531A
WELL NAME & NO.:	Lea Unit 100H
SURFACE HOLE FOOTAGE:	140'/N & 1790'/E
BOTTOM HOLE FOOTAGE	2310'/N & 2210'/E
LOCATION:	Section 12, T.20 S., R.34 E., NMPM
COUNTY:	Lea County, New Mexico

Potash	◉ None	○ Secretary	○ R-111-P
Cave/Karst Potential	◉ Low	○ Medium	○ High
Variance	○ None	◉ Flex Hose	○ Other
Wellhead	◉ Conventional	○ Multibowl	
Other	☐ 4 String Area	☒ Capitan Reef	☐ WIPP

A. Hydrogen Sulfide

1. A Hydrogen Sulfide (H2S) Drilling Plan shall be activated 500 feet prior to drilling into the **Yates - Seven Rivers** formation. As a result, the Hydrogen Sulfide area must meet Onshore Order 6 requirements, which includes equipment and personnel/public protection items. If Hydrogen Sulfide is encountered, please provide measured values and formations to the BLM.

B. CASING

1. The **13 3/8** inch surface casing shall be set at approximately **1795** feet (a minimum of 25 feet into the Rustler Anhydrite and above the salt) and cemented to the surface.

    a. If cement does not circulate to the surface, the appropriate BLM office shall be notified and a temperature survey utilizing an electronic type temperature survey with surface log readout will be used or a cement bond log shall be run to verify the top of the cement. Temperature survey will be run a minimum of six hours after pumping cement and ideally between 8-10 hours after completing the cement job.

    b. Wait on cement (WOC) time for a primary cement job will be a minimum of **8 hours** or 500 pounds compressive strength, whichever is greater (This is to include the lead cement).

    c. Wait on cement (WOC) time for a remedial job will be a minimum of 4 hours after bringing cement to surface or 500 pounds compressive strength,

whichever is greater.

d. If cement falls back, remedial cementing will be done prior to drilling out that string.

2. The minimum required fill of cement behind the **9 5/8** inch intermediate casing is:

Option 1:

- Cement to surface. If cement does not circulate see B.1.a, c-d above. **Wait on cement (WOC) time for a primary cement job is to include the lead cement slurry due to Capitan Reef.**

Option 2:

Operator has proposed DV tool at depth of 3950', but will adjust cement proportionately if moved. DV tool shall be set a minimum of 50' below previous shoe and a minimum of 200' above current shoe. Operator shall submit sundry if DV tool depth cannot be set in this range. If an ECP is used, it is to be set a minimum of 50' below the shoe to provide cement across the shoe. If it cannot be set below the shoe, a CBL shall be run to verify cement coverage.

a. First stage to DV tool: Cement to circulate. If cement does not circulate off the DV tool, contact the appropriate BLM office before proceeding with second stage cement job.

b. Second stage above DV tool:
   - Cement to surface. If cement does not circulate, contact the appropriate BLM office. **Wait on cement (WOC) time for a primary cement job is to include the lead cement slurry due to Capitan Reef.**

Option 3:

Operator has proposed DV tool at depth of 3900' and 1900', but will adjust cement proportionately if moved. DV tool shall be set a minimum of 50' below previous shoe and a minimum of 200' above current shoe. Operator shall submit sundry if DV tool depth cannot be set in this range. If an ECP is used, it is to be set a minimum of 50' below the shoe to provide cement across the shoe. If it cannot be set below the shoe, a CBL shall be run to verify cement coverage.

a. First stage to DV tool: Cement to circulate. If cement does not circulate off the DV tool, contact the appropriate BLM office before proceeding with second stage cement job.

b. Second stage above DV tool:

- Cement to circulate. If cement does not circulate off the DV tool, contact the appropriate BLM office before proceeding with third stage cement job.

c. Third stage above DV tool:

- Cement to surface. If cement does not circulate, contact the appropriate BLM office. **Wait on cement (WOC) time for a primary cement job is to include the lead cement slurry due to Capitan Reef.**

❖ **Special Capitan Reef requirements.** If lost circulation (50% or greater) occurs below the Base of the Salt, the operator shall do the following:

- Switch to fresh water mud to protect the Capitan Reef and use fresh water mud until setting the intermediate casing. The appropriate BLM office is to be notified for a PET to witness the switch to fresh water.

- Daily drilling reports from the Base of the Salt to the setting of the intermediate casing are to be submitted to the BLM CFO engineering staff via e-mail by 0800 hours each morning. Any lost circulation encountered is to be recorded on these drilling reports. The daily drilling report should show mud volume per shift/tour. Failure to submit these reports will result in an Incidence of Non-Compliance being issued for failure to comply with the Conditions of Approval. If not already planned, the operator shall run a caliper survey for the intermediate well bore and submit to the appropriate BLM office.

3. The minimum required fill of cement behind the **7** inch intermediate liner is:

- Cement to top of liner. Operator shall provide method of verification.

Operator will utilize a 7" tie back casing and cement to surface.

4. The minimum required fill of cement behind the **4 1/2** inch production liner is:

- Cement should tie-back at least **100 feet** into previous string. Operator shall provide method of verification.

C. PRESSURE CONTROL

1. Variance approved to use flex line from BOP to choke manifold. Manufacturer's specification to be readily available. No external damage to flex line. Flex line to be installed as straight as possible (no hard bends).

2. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be **5000 (5M)** psi.

3. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the **9 5/8** inch intermediate casing shoe shall be **10,000 (10M)** psi. **Variance is approved to use a 5M Annular which shall be tested to 5000 psi.**

D. SPECIAL REQUIREMENT(S)

Commercial Well Determination

A commercial well determination will need to be submitted after production has been established for at least six months.

Unit Wells

The well sign for a unit well shall include the unit number in addition to the surface and bottom hole lease numbers. This also applies to participating area numbers. If a participating area has not been established, the operator can use the general unit designation, but will replace the unit number with the participating area number when the sign is replaced.

Waste Minimization Plan (WMP)

In the interest of resource development, submission of additional well gas capture development plan information is deferred but may be required by the BLM Authorized Officer at a later date.

MHH 09132018

GENERAL REQUIREMENTS

The BLM is to be notified in advance for a representative to witness:

a. Spudding well (minimum of 24 hours)
b. Setting and/or Cementing of all casing strings (minimum of 4 hours)
c. BOPE tests (minimum of 4 hours)

☒ Chaves and Roosevelt Counties
Call the Roswell Field Office, 2909 West Second St., Roswell NM 88201.
During office hours call (575) 627-0272.
After office hours call (575)

☒ Eddy County
Call the Carlsbad Field Office, 620 East Greene St., Carlsbad, NM 88220, (575) 361-2822

☒ Lea County
Call the Hobbs Field Station, 414 West Taylor, Hobbs NM 88240, (575) 393-3612

1. Unless the production casing has been run and cemented or the well has been properly plugged, the drilling rig shall not be removed from over the hole without prior approval.

   a. In the event the operator has proposed to drill multiple wells utilizing a skid/walking rig. Operator shall secure the wellbore on the current well, after installing and testing the wellhead, by installing a blind flange of like pressure rating to the wellhead and a pressure gauge that can be monitored while drilling is performed on the other well(s).
   b. When the operator proposes to set surface casing with Spudder Rig
      - Notify the BLM when moving in and removing the Spudder Rig.
      - Notify the BLM when moving in the 2nd Rig. Rig to be moved in within 90 days of notification that Spudder Rig has left the location.
      - BOP/BOPE test to be conducted per Onshore Oil and Gas Order No. 2 as soon as 2nd Rig is rigged up on well.

2. Floor controls are required for 3M or Greater systems. These controls will be on the rig floor, unobstructed, readily accessible to the driller and will be operational at all times during drilling and/or completion activities. Rig floor is defined as the area immediately around the rotary table; the area immediately above the substructure on which the draw works are located, this does not include the dog house or stairway area.

3. The record of the drilling rate along with the GR/N well log run from TD to surface (horizontal well – vertical portion of hole) shall be submitted to the BLM office as well as all other logs run on the borehole 30 days from completion. If available, a digital copy of the logs is to be submitted in addition to the paper copies. The Rustler top and top and bottom of Salt are to be recorded on the Completion Report.

A. CASING

1. Changes to the approved APD casing program need prior approval if the items substituted are of lesser grade or different casing size or are Non-API. The Operator can exchange the components of the proposal with that of superior strength (i.e. changing from J-55 to N-80, or from 36# to 40#). Changes to the approved cement program need prior approval if the altered cement plan has less volume or strength or if the changes are substantial (i.e. Multistage tool, ECP, etc.). The initial wellhead installed on the well will remain on the well with spools used as needed.

2. Wait on cement (WOC) for Potash Areas: After cementing but before commencing any tests, the casing string shall stand cemented under pressure until both of the following conditions have been met: 1) cement reaches a minimum compressive strength of 500 psi for all cement blends, 2) until cement has been in place at least 24 hours. WOC time will be recorded in the driller's log.

3. Wait on cement (WOC) for Water Basin: After cementing but before commencing any tests, the casing string shall stand cemented under pressure until both of the following conditions have been met: 1) cement reaches a minimum compressive strength of 500 psi at the shoe, 2) until cement has been in place at least 8 hours. WOC time will be recorded in the driller's log. See individual casing strings for details regarding lead cement slurry requirements.

4. Provide compressive strengths including hours to reach required 500 pounds compressive strength prior to cementing each casing string. Have well specific cement details onsite prior to pumping the cement for each casing string.

5. No pea gravel permitted for remedial or fall back remedial without prior authorization from the BLM engineer.

6. On that portion of any well approved for a 5M BOPE system or greater, a pressure integrity test of each casing shoe shall be performed. Formation at the shoe shall be tested to a minimum of the mud weight equivalent anticipated to control the formation pressure to the next casing depth or at total depth of the well. This test shall be performed before drilling more than 20 feet of new hole.

7. If hardband drill pipe is rotated inside casing, returns will be monitored for metal. If metal is found in samples, drill pipe will be pulled and rubber protectors which have a larger diameter than the tool joints of the drill pipe will be installed prior to continuing drilling operations.

8. Whenever a casing string is cemented in the R-111-P potash area, the NMOCD requirements shall be followed.

B. PRESSURE CONTROL

1. All blowout preventer (BOP) and related equipment (BOPE) shall comply with well control requirements as described in Onshore Oil and Gas Order No. 2 and API RP 53 Sec. 17.

2. If a variance is approved for a flexible hose to be installed from the BOP to the choke manifold, the following requirements apply: Check condition of flexible line from BOP to choke manifold, replace if exterior is damaged or if line fails test. Line to be as straight as possible with no hard bends and is to be anchored according to Manufacturer's requirements. The flexible hose can be exchanged with a hose of equal size and equal or greater pressure rating. Anchor requirements, specification sheet and hydrostatic pressure test certification matching the hose in service, to be onsite for review. These documents shall be posted in the company man's trailer and on the rig floor.

3. 5M or higher system requires an HCR valve, remote kill line and annular to match. The remote kill line is to be installed prior to testing the system and tested to stack pressure.

4. If the operator has proposed a multi-bowl wellhead assembly in the APD. The following requirements must be met:

    a. Wellhead shall be installed by manufacturer's representatives, submit documentation with subsequent sundry.
    b. If the welding is performed by a third party, the manufacturer's representative shall monitor the temperature to verify that it does not exceed the maximum temperature of the seal.
    c. Manufacturer representative shall install the test plug for the initial BOP test.
    d. Operator shall perform the intermediate casing integrity test to 70% of the casing burst. This will test the multi-bowl seals.
    e. If the cement does not circulate and one inch operations would have been possible with a standard wellhead, the well head shall be cut off, cementing operations performed and another wellhead installed.

5. The appropriate BLM office shall be notified a minimum of 4 hours in advance for a representative to witness the tests.

    a. In a water basin, for all casing strings utilizing slips, these are to be set as soon as the crew and rig are ready and any fallback cement remediation has been done. The casing cut-off and BOP installation can be initiated four hours after installing the slips, which will be approximately six hours after bumping the

plug. For those casing strings not using slips, the minimum wait time before cut-off is eight hours after bumping the plug. BOP/BOPE testing can begin after cut-off or once cement reaches 500 psi compressive strength (including lead when specified), whichever is greater. However, if the float does not hold, cut-off cannot be initiated until cement reaches 500 psi compressive strength (including lead when specified).

b. In potash areas, for all casing strings utilizing slips, these are to be set as soon as the crew and rig are ready and any fallback cement remediation has been done. For all casing strings, casing cut-off and BOP installation can be initiated at twelve hours after bumping the plug. However, **no tests** shall commence until the cement has had a minimum of 24 hours setup time.

c. The tests shall be done by an independent service company utilizing a test plug not a cup or J-packer. The operator also has the option of utilizing an independent tester to test without a plug (i.e. against the casing) pursuant to Onshore Order 2 with the pressure not to exceed 70% of the burst rating for the casing. Any test against the casing must meet the WOC time for water basin (8 hours) or potash (24 hours) or 500 pounds compressive strength, whichever is greater, prior to initiating the test (see casing segment as lead cement may be critical item).

d. The test shall be run on a 5000 psi chart for a 2-3M BOP/BOP, on a 10000 psi chart for a 5M BOP/BOPE and on a 15000 psi chart for a 10M BOP/BOPE. If a linear chart is used, it shall be a one hour chart. A circular chart shall have a maximum 2 hour clock. If a twelve hour or twenty-four hour chart is used, tester shall make a notation that it is run with a two hour clock.

e. The results of the test shall be reported to the appropriate BLM office.

f. All tests are required to be recorded on a calibrated test chart. A copy of the BOP/BOPE test chart and a copy of independent service company test will be submitted to the appropriate BLM office.

g. The BOP/BOPE test shall include a low pressure test from 250 to 300 psi. The test will be held for a minimum of 10 minutes if test is done with a test plug and 30 minutes without a test plug. This test shall be performed prior to the test at full stack pressure.

h. BOP/BOPE must be tested by an independent service company within 500 feet of the top of the Wolfcamp formation if the time between the setting of the intermediate casing and reaching this depth exceeds 20 days. This test does not exclude the test prior to drilling out the casing shoe as per Onshore Order No. 2.

C. DRILLING MUD

Mud system monitoring equipment, with derrick floor indicators and visual and audio alarms, shall be operating before drilling into the Wolfcamp formation, and shall be used until production casing is run and cemented.

D. WASTE MATERIAL AND FLUIDS

All waste (i.e. drilling fluids, trash, salts, chemicals, sewage, gray water, etc.) created as a result of drilling operations and completion operations shall be safely contained and disposed of properly at a waste disposal facility. No waste material or fluid shall be disposed of on the well location or surrounding area.

Porto-johns and trash containers will be on-location during fracturing operations or any other crew-intensive operations.

PECOS DISTRICT
SURFACE USE
CONDITIONS OF APPROVAL

OPERATOR'S NAME:	Legacy Reserve Operating LP
LEASE NO.:	NMNM0006531A
WELL NAME & NO.:	100H:LEA UNIT
SURFACE HOLE FOOTAGE:	140'/N & 1790'/E
BOTTOM HOLE FOOTAGE	2310'/N & 2210'/E
LOCATION:	T-20S, R-34E, S11. NMPM
COUNTY:	LEA, NM

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Standard Conditions of Approval (COA) apply to this APD. If any deviations to these standards exist or special COAs are required, the section with the deviation or requirement will be checked below.

I. GENERAL PROVISIONS

The approval of the Application For Permit To Drill (APD) is in compliance with all applicable laws and regulations: 43 Code of Federal Regulations 3160, the lease terms, Onshore Oil and Gas Orders, Notices To Lessees, New Mexico Oil Conservation Division (NMOCD) Rules, National Historical Preservation Act As Amended, and instructions and orders of the Authorized Officer. Any request for a variance shall be submitted to the Authorized Officer on Form 3160-5, Sundry Notices and Report on Wells.

II. PERMIT EXPIRATION

If the permit terminates prior to drilling and drilling cannot be commenced within 60 days after expiration, an operator is required to submit Form 3160-5, Sundry Notices and Reports on Wells, requesting surface reclamation requirements for any surface disturbance. However, if the operator will be able to initiate drilling within 60 days after the expiration of the permit, the operator must have set the conductor pipe in order to allow for an extension of 60 days beyond the expiration date of the APD. (Filing of a Sundry Notice is required for this 60 day extension.)

III. ARCHAEOLOGICAL, PALEONTOLOGY & HISTORICAL SITES

Any cultural and/or paleontological resource discovered by the operator or by any person working on the operator's behalf shall immediately report such findings to the Authorized Officer. The operator is fully accountable for the actions of their contractors and subcontractors. The operator shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the Authorized Officer. An evaluation of the discovery shall be made by the Authorized Officer to determine the appropriate actions that shall be required to prevent the loss of significant cultural or scientific values of the discovery. The operator shall be held responsible for the cost of the proper mitigation measures that the Authorized Officer assesses after consultation with the operator on the evaluation and decisions of the discovery. Any unauthorized collection or disturbance of cultural or paleontological resources may result in a shutdown order by the Authorized Officer.

IV. NOXIOUS WEEDS

The operator shall be held responsible if noxious weeds become established within the areas of operations. Weed control shall be required on the disturbed land where noxious weeds exist, which includes the roads, pads, associated pipeline corridor, and adjacent land affected by the establishment of weeds due to this action. The operator shall consult with the Authorized Officer for acceptable weed control methods, which include following EPA and BLM requirements and policies.

V. SPECIAL REQUIREMENT(S)

Timing Limitation Stipulation / Condition of Approval for lesser prairie-chicken: Oil and gas activities including 3-D geophysical exploration, and drilling will not be allowed in lesser prairie-chicken habitat during the period from March 1st through June 15th annually. During that period, other activities that produce noise or involve human activity, such as the maintenance of oil and gas facilities, pipeline, road, and well pad construction, will be allowed except between 3:00 am and 9:00 am. The 3:00 am to 9:00 am restriction will not apply to normal, around-the-clock operations, such as venting, flaring, or pumping, which do not require a human presence during this period. Additionally, no new drilling will be allowed within up to 200 meters of leks known at the time of permitting. Normal vehicle use on existing roads will not be restricted. Exhaust noise from pump jack engines must be muffled or otherwise controlled so as not to exceed 75 db measured at 30 feet from the source of the noise.

Timing Limitation Exceptions:
The Carlsbad Field Office will publish an annual map of where the LPC timing and noise stipulations and conditions of approval (Limitations) will apply for the identified year (between March 1 and June 15) based on the latest survey information. The LPC Timing Area map will identify areas which are Habitat Areas (HA), Isolated Population Area (IPA), and Primary Population Area (PPA). The LPC Timing Area map will also have an area in red crosshatch. The red crosshatch area is the only area where an operator is required to submit a request for exception to the LPC Limitations. If an operator is operating outside the red crosshatch area, the LPC Limitations do not apply for that year and an exception to LPC Limitations is not required.

Ground-level Abandoned Well Marker to avoid raptor perching: Upon the plugging and subsequent abandonment of the well, the well marker will be installed at ground level on a plate containing the pertinent information for the plugged well. For more installation details, contact the Carlsbad Field Office at 575-234-5972.

VI. CONSTRUCTION

A. NOTIFICATION

The BLM shall administer compliance and monitor construction of the access road and well pad. Notify the Carlsbad Field Office at (575) 234-5909 at least 3 working days prior to commencing construction of the access road and/or well pad.

When construction operations are being conducted on this well, the operator shall have the approved APD and Conditions of Approval (COA) on the well site and they shall be made available upon request by the Authorized Officer.

B. TOPSOIL

The operator shall strip the top portion of the soil (root zone) from the entire well pad area and stockpile the topsoil along the edge of the well pad as depicted in the APD. The root zone is typically six (6) inches in depth. All the stockpiled topsoil will be redistributed over the interim reclamation areas. Topsoil shall not be used for berming the pad or facilities. For final reclamation, the topsoil shall be spread over the entire pad area for seeding preparation.

Other subsoil (below six inches) stockpiles must be completely segregated from the topsoil stockpile. Large rocks or subsoil clods (not evident in the surrounding terrain) must be buried within the approved area for interim and final reclamation.

C. CLOSED LOOP SYSTEM

Tanks are required for drilling operations: No Pits.

The operator shall properly dispose of drilling contents at an authorized disposal site.

D. FEDERAL MINERAL MATERIALS PIT

Payment shall be made to the BLM prior to removal of any federal mineral materials. Call the Carlsbad Field Office at (575) 234-5972.

E. WELL PAD SURFACING

Surfacing of the well pad is not required.

If the operator elects to surface the well pad, the surfacing material may be required to be removed at the time of reclamation. The well pad shall be constructed in a manner which creates the smallest possible surface disturbance, consistent with safety and operational needs.

F. EXCLOSURE FENCING (CELLARS & PITS)

Exclosure Fencing
The operator will install and maintain exclosure fencing for all open well cellars to prevent access to public, livestock, and large forms of wildlife before and after drilling operations until the pit is free of fluids and the operator initiates backfilling. (For examples of exclosure fencing design, refer to BLM's Oil and Gas Gold Book, Exclosure Fence Illustrations, Figure 1, Page 18.)

G. ON LEASE ACCESS ROADS

Road Width
The access road shall have a driving surface that creates the smallest possible surface disturbance and does not exceed fourteen (14) feet in width. The maximum width of surface disturbance, when constructing the access road, shall not exceed twenty-five (25) feet.

Surfacing
Surfacing material is not required on the new access road driving surface. If the operator elects to surface the new access road or pad, the surfacing material may be required to be removed at the time of reclamation.

Where possible, no improvements should be made on the unsurfaced access road other than to remove vegetation as necessary, road irregularities, safety issues, or to fill low areas that may sustain standing water.

The Authorized Officer reserves the right to require surfacing of any portion of the access road at any time deemed necessary. Surfacing may be required in the event the road deteriorates, erodes, road traffic increases, or it is determined to be beneficial for future field development. The surfacing depth and type of material will be determined at the time of notification.

Crowning
Crowning shall be done on the access road driving surface. The road crown shall have a grade of approximately 2% (i.e., a 1" crown on a 14' wide road). The road shall conform to Figure 1; cross section and plans for typical road construction.

Ditching
Ditching shall be required on both sides of the road.

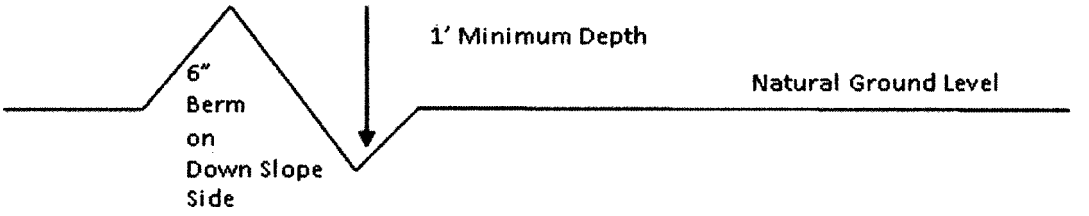
Turnouts
Vehicle turnouts shall be constructed on the road. Turnouts shall be intervisible with interval spacing distance less than 1000 feet. Turnouts shall conform to Figure 1; cross section and plans for typical road construction.

Drainage

Drainage control systems shall be constructed on the entire length of road (e.g. ditches, sidehill outsloping and insloping, lead-off ditches, culvert installation, and low water crossings).

A typical lead-off ditch has a minimum depth of 1 foot below and a berm of 6 inches above natural ground level. The berm shall be on the down-slope side of the lead-off ditch.

Cross Section of a Typical Lead-off Ditch



All lead-off ditches shall be graded to drain water with a 1 percent minimum to 3 percent maximum ditch slope. The spacing interval are variable for lead-off ditches and shall be determined according to the formula for spacing intervals of lead-off ditches, but may be amended depending upon existing soil types and centerline road slope (in %);

Formula for Spacing Interval of Lead-off Ditches

Example - On a 4% road slope that is 400 feet long, the water flow shall drain water into a lead-off ditch. Spacing interval shall be determined by the following formula:

400 foot road with 4% road slope: $\frac{400'}{4\%} + 100' = 200'$ lead-off ditch interval

Cattle guards

An appropriately sized cattle guard sufficient to carry out the project shall be installed and maintained at fence/road crossings. Any existing cattle guards on the access road route shall be repaired or replaced if they are damaged or have deteriorated beyond practical use. The operator shall be responsible for the condition of the existing cattle guards that are in place and are utilized during lease operations.

Fence Requirement

Where entry is granted across a fence line, the fence shall be braced and tied off on both sides of the passageway prior to cutting. Once the work is completed, the fence will be restored to its prior condition, or better. The operator shall notify the private surface landowner or the grazing allotment holder prior to crossing any fences.

Any damage to structures that provide water to livestock throughout the life of the well, caused by operations from the well site, must be immediately corrected by the operator. The operator must notify the BLM office (575-234-5972) and the private surface

landowner or the grazing allotment holder if any damage occurs to structures that provide water to livestock.

Public Access
Public access on this road shall not be restricted by the operator without specific written approval granted by the Authorized Officer.

Construction Steps

1. Salvage topsoil
2. Construct road
3. Redistribute topsoil
4. Revegetate slopes

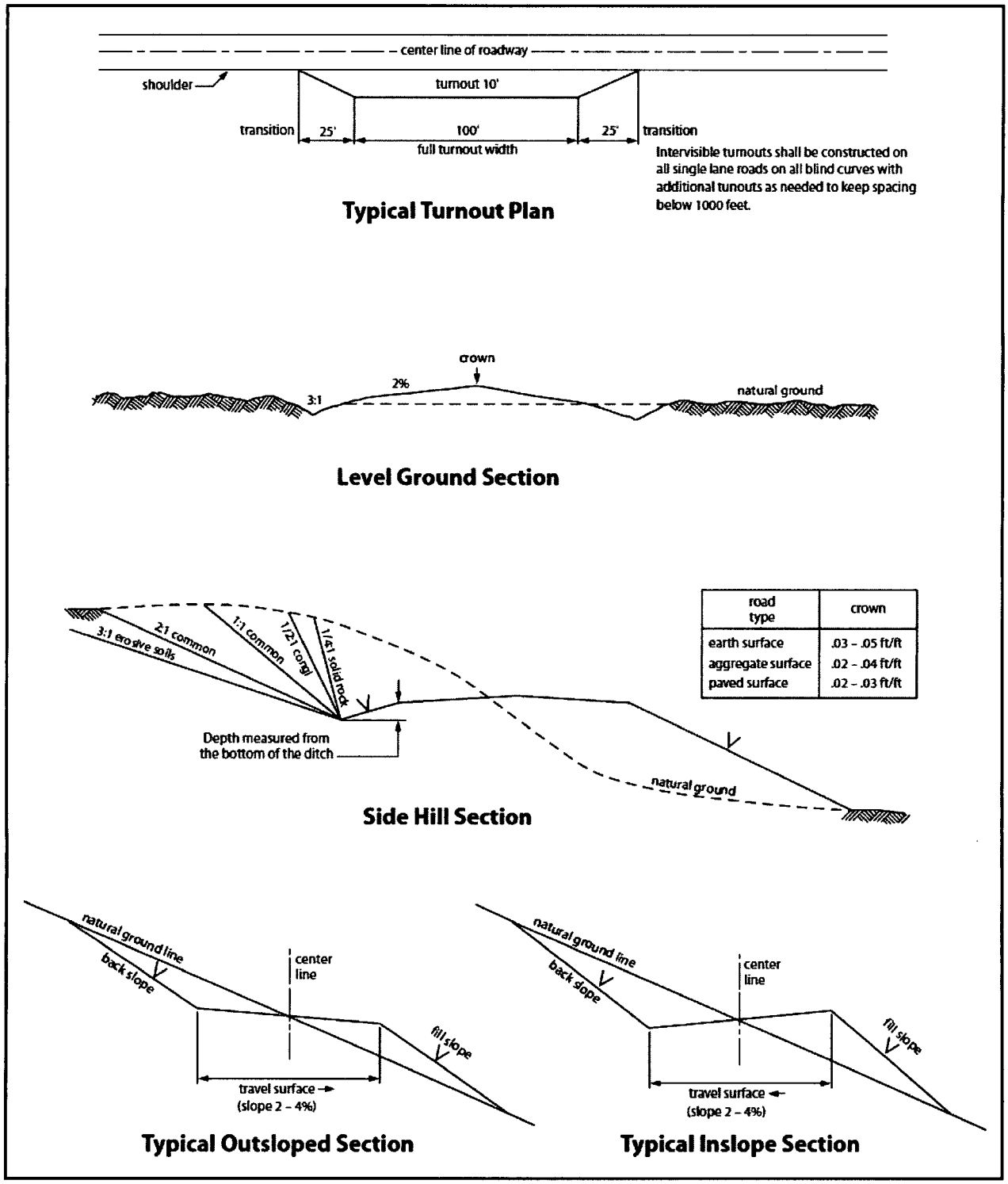


Figure 1. Cross-sections and plans for typical road sections representative of BLM resource or FS local and higher-class roads.

VII. PRODUCTION (POST DRILLING)

A. WELL STRUCTURES & FACILITIES

Placement of Production Facilities
Production facilities should be placed on the well pad to allow for maximum interim recontouring and revegetation of the well location.

Exclosure Netting (Open-top Tanks)
Immediately following active drilling or completion operations, the operator will take actions necessary to prevent wildlife and livestock access, including avian wildlife, to all open-topped tanks that contain or have the potential to contain salinity sufficient to cause harm to wildlife or livestock, hydrocarbons, or Resource Conservation and Recovery Act of 1976-exempt hazardous substances. At a minimum, the operator will net, screen, or cover open-topped tanks to exclude wildlife and livestock and prevent mortality. If the operator uses netting, the operator will cover and secure the open portion of the tank to prevent wildlife entry. The operator will net, screen, or cover the tanks until the operator removes the tanks from the location or the tanks no longer contain substances that could be harmful to wildlife or livestock. Use a maximum netting mesh size of 1 ½ inches. The netting must not be in contact with fluids and must not have holes or gaps.

Chemical and Fuel Secondary Containment and Exclosure Screening
The operator will prevent all hazardous, poisonous, flammable, and toxic substances from coming into contact with soil and water. At a minimum, the operator will install and maintain an impervious secondary containment system for any tank or barrel containing hazardous, poisonous, flammable, or toxic substances sufficient to contain the contents of the tank or barrel and any drips, leaks, and anticipated precipitation. The operator will dispose of fluids within the containment system that do not meet applicable state or U. S. Environmental Protection Agency livestock water standards in accordance with state law; the operator must not drain the fluids to the soil or ground. The operator will design, construct, and maintain all secondary containment systems to prevent wildlife and livestock exposure to harmful substances. At a minimum, the operator will install effective wildlife and livestock exclosure systems such as fencing, netting, expanded metal mesh, lids, and grate covers. Use a maximum netting mesh size of 1 ½ inches.

Open-Vent Exhaust Stack Exclosures
The operator will construct, modify, equip, and maintain all open-vent exhaust stacks on production equipment to prevent birds and bats from entering, and to discourage perching, roosting, and nesting. (*Recommended exclosure structures on open-vent exhaust stacks are in the shape of a cone.*) Production equipment includes, but may not be limited to, tanks, heater-treaters, separators, dehydrators, flare stacks, in-line units, and compressor mufflers.

Containment Structures

Proposed production facilities such as storage tanks and other vessels will have a secondary containment structure that is constructed to hold the capacity of 1.5 times the largest tank, plus freeboard to account for precipitation, unless more stringent protective requirements are deemed necessary.

VRM Facility Requirement
Painting Requirement
All above-ground structures including meter housing that are not subject to safety requirements shall be painted a flat non-reflective paint color, **Shale Green** from the BLM Standard Environmental Color Chart (CC-001: June 2008).

VIII. INTERIM RECLAMATION

During the life of the development, all disturbed areas not needed for active support of production operations should undergo interim reclamation in order to minimize the environmental impacts of development on other resources and uses.

Within six (6) months of well completion, operators should work with BLM surface management specialists (Jim Amos: 575-234-5909) to devise the best strategies to reduce the size of the location. Interim reclamation should allow for remedial well operations, as well as safe and efficient removal of oil and gas.

During reclamation, the removal of caliche is important to increasing the success of revegetating the site. Removed caliche that is free of contaminants may be used for road repairs, fire walls or for building other roads and locations. In order to operate the well or complete workover operations, it may be necessary to drive, park and operate on restored interim vegetation within the previously disturbed area. Disturbing revegetated areas for production or workover operations will be allowed. If there is significant disturbance and loss of vegetation, the area will need to be revegetated. Communicate with the appropriate BLM office for any exceptions/exemptions if needed.

All disturbed areas after they have been satisfactorily prepared need to be reseeded with the seed mixture provided below.

Upon completion of interim reclamation, the operator shall submit a Sundry Notices and Reports on Wells, Subsequent Report of Reclamation (Form 3160-5).

IX. FINAL ABANDONMENT & RECLAMATION

At final abandonment, well locations, production facilities, and access roads must undergo "final" reclamation so that the character and productivity of the land are restored.

Earthwork for final reclamation must be completed within six (6) months of well plugging. All pads, pits, facility locations and roads must be reclaimed to a satisfactory revegetated, safe, and stable condition, unless an agreement is made with the landowner or BLM to keep the road and/or pad intact.

After all disturbed areas have been satisfactorily prepared, these areas need to be revegetated with the seed mixture provided below. Seeding should be accomplished by drilling on the contour whenever practical or by other approved methods. Seeding may need to be repeated until revegetation is successful, as determined by the BLM.

Operators shall contact a BLM surface protection specialist prior to surface abandonment operations for site specific objectives (Jim Amos: 575-234-5909).

Ground-level Abandoned Well Marker to avoid raptor perching: Upon the plugging and subsequent abandonment of the well, the well marker will be installed at ground level on a plate containing the pertinent information for the plugged well.

Seed Mixture for LPC Sand/Shinnery Sites

The holder shall seed all disturbed areas with the seed mixture listed below. The seed mixture shall be planted in the amounts specified in pounds of pure live seed (PLS)* per acre. There shall be no primary or secondary noxious weeds in the seed mixture. Seed will be tested and the viability testing of seed will be done in accordance with State law(s) and within nine (9) months prior to purchase. Commercial seed will be either certified or registered seed. The seed container will be tagged in accordance with State law(s) and available for inspection by the authorized officer.

Seed will be planted using a drill equipped with a depth regulator to ensure proper depth of planting where drilling is possible. The seed mixture will be evenly and uniformly planted over the disturbed area (smaller/heavier seeds have a tendency to drop the bottom of the drill and are planted first). The holder shall take appropriate measures to ensure this does not occur. Where drilling is not possible, seed will be broadcast and the area shall be raked or chained to cover the seed. When broadcasting the seed, the pounds per acre are to be doubled. The seeding will be repeated until a satisfactory stand is established as determined by the authorized officer. Evaluation of growth will not be made before completion of at least one full growing season after seeding.

Species to be planted in pounds of pure live seed* per acre:

Species	lb/acre
Plains Bristlegrass	5lbs/A
Sand Bluestem	5lbs/A
Little Bluestem	3lbs/A
Big Bluestem	6lbs/A
Plains Coreopsis	2lbs/A
Sand Dropseed	1lbs/A

*Pounds of pure live seed:

Pounds of seed **x** percent purity **x** percent germination = pounds pure live seed

Legacy Reserves Operating LP

LPC: Conditions of Approval

Timing Limitation Stipulation/Condition of Approval for Lesser Prairie-Chicken: Oil and gas activities including 3-D geophysical exploration, and drilling will not be allowed in lesser prairie-chicken habitat during the period from March 1 through June 15 annually. During that period, other activities that produce noise or involve human activity, such as the maintenance of oil and gas facilities, geophysical exploration other than 3-D operations, and pipeline, road, and well pad construction, will be allowed except between 3:00 am and 9:00 am. The 3:00 am to 9:00 am restriction will not apply to normal, around-the-clock operations, such as venting, flaring, or pumping, which do not require a human presence during this period. Additionally, no new drilling will be allowed within up to 200 meters of leks known at the time of permitting. Normal vehicle use on existing roads will not be restricted. Exhaust noise from pump jack engines must be muffled or otherwise controlled so as not to exceed 75 db measured at 30 ft. from the source of the noise.

Upon abandonment, a low profile abandoned well marker will be installed to prevent raptor perching.

The proponent of the proposed action is a Participating Cooperator in the Candidate Conservation Agreement (CCA) for the lesser prairie-chicken (*Tympanuchus pallidicinctus*) and dunes sagebrush lizard (*Sceloporus arenicolus*).

The goal of the Bureau of Land Management (BLM), U.S. Fish and Wildlife Service (USFWS), Center of Excellence for Hazardous Materials Management (CEHMM) and the Participating Cooperator is to reduce and/or eliminate threats to the LPC. By agreeing to conduct the conservation measures described by the CCA, and contribute funding or providing in-kind services for conservation.

The Certificate of Participation (CP) associated with the CCA is voluntary between CEHMM, BLM, USFWS and the Participating Cooperator. Through the CP, the Participating Cooperator voluntarily commits to implement or fund specific conservation actions that will reduce and/or eliminate threats to the LPC. Funds contributed as part of the CP will be used to implement conservation measures and associated activities. The funds will be directed to the highest priority projects to restore or reclaim habitat at the sole discretion of BLM and USFWS.

The following Conservation Measures are to be accomplished in addition to those described in the CCA and Pecos District Special Status Species Resource Management Plan Amendment (RMPA):

1. To the extent determined by the BLM representative at the Plan of Development stage, all infrastructures supporting the development of a well (including roads, power lines, and pipelines) will be constructed within the same corridor.

2. On enrolled parcels that contain inactive wells, roads and/or facilities that are not reclaimed to current standards, the Participating Cooperator shall remediate and

reclaim their facilities within three years of executing this CP, unless the Cooperator can demonstrate they will put the facilities back to beneficial use for the enrolled parcel(s). If an extension is requested by the Cooperator, they shall submit a detailed plan (including dates) and receive BLM approval prior to the three year deadline. All remediation and reclamation shall be performed in accordance with BLM requirements and be approved in advance by the Authorized Officer.

3. Utilize alternative techniques to minimize new surface disturbance when required and as determined by the BLM representative at the Plan of Development stage.

4. Install fence markings along fences owned, controlled, or constructed by the Participating Cooperator that cross through occupied habitat within two miles of an active LPC lek.

5. Bury new powerlines that are within two (2) miles of LPC lek sites active at least once within the past 5 years (measured from the lek). The avoidance distance is subject to change based on new information received from peer reviewed science.

6. Bury new powerlines that are within one (1) mile of historic LPC lek sites where at least one LPC has been observed within the past three years (measured from the historic lek). The avoidance distance is subject to change based on new information received from peer reviewed science.

7. Management recommendations may be developed based on new information received from peer reviewed science to mitigate impacts from H_2S and/or the accumulation of sulfates in the soil related to production of gas containing H_2S on the LPC. Such management recommendations will be applied by the Participating Cooperator as Conservation Measures under this CP in suitable and occupied LPC habitat where peer-reviewed science has shown that H_2S levels threaten the LPC.

Seed Mixture for LPC Sand/Shinnery Sites

The holder shall seed all disturbed areas with the seed mixture listed below. The seed mixture shall be planted in the amounts specified in pounds of pure live seed (PLS)* per acre. There shall be no primary or secondary noxious weeds in the seed mixture. Seed will be tested and the viability testing of seed will be done in accordance with State law(s) and within nine (9) months prior to purchase. Commercial seed will be either certified or registered seed. The seed container will be tagged in accordance with State law(s) and available for inspection by the authorized officer.

Seed will be planted using a drill equipped with a depth regulator to ensure proper depth of planting where drilling is possible. The seed mixture will be evenly and uniformly planted over the disturbed area (smaller/heavier seeds have a tendency to drop the bottom of the drill and are planted first). The holder shall take appropriate measures to ensure this does not occur. Where drilling is not possible, seed will be broadcast and the area shall be raked or chained to cover the seed. When broadcasting the seed, the pounds per acre are to be doubled. The seeding will be repeated until a satisfactory stand is established as determined by the authorized officer. Evaluation of growth will not be made before completion of at least one full growing season after seeding.

Species to be planted in pounds of pure live seed* per acre:

Species	lb/acre
Plains Bristlegrass	5lbs/A
Sand Bluestem	5lbs/A
Little Bluestem	3lbs/A
Big Bluestem	6lbs/A
Plains Coreopsis	2lbs/A
Sand Dropseed	1lbs/A

*Pounds of pure live seed:

Pounds of seed **x** percent purity **x** percent germination = pounds pure live seed

Approval Date: 09/18/2018

DRILLING PROGRAM

Operator:
LEGACY RESERVES OPERATING LP

Project Name:
LEA UNIT 100H

Project Location:
Lea County, New Mexico

Prepared By:
Matt Dickson
Drilling Engineer

Submitted To:
Bureau of Land Management
Carlsbad Field Office

Please address inquiries, questions, scheduling of meetings and deficiency statements, if any, to Scott St. John and/or Monica Smith Griffin at the address shown below:

Reagan Smith Energy Solutions, Inc.
1219 Classen Drive
Oklahoma City, OK 73103
405-286-9326

sstjohn@rsenergysolutions.com msmith@rsenergysolutions.com

1.0 Drilling Program

1.1 Estimated Formation Tops

FORMATION	*TVD @ Surface Loc*	*TVD @ KB*	*TVD @ TD*
Rustler	1,700'	1,728'	1,728'
Yates	3,424'	3,452'	3,452'
Seven Rivers	3,809'	3,837'	3,837'
Queen	4,632'	4,660'	4,660'
Bell Canyon	5,588'	5,616'	5,616'
Cherry Canyon	6,471'	6,499'	6,499'
Brushy Canyon	7,107'	7,135'	7,135'
Bone Spring	8,191'	8,219'	8,219'
Avalon Shale	8,782'	8,810'	8,810'
1st BS	9,504'	9,532'	9,532'
2nd BS	10,041'	10,069'	10,069'
3rd BS	10,699'	10,727'	10,727'
Wolfcamp	11,009'	11,037'	11,085'
Upper Wolfcamp	11,212'	11,240'	11,300'

Target Formation and Total Depth:

The total depth of the proposed well is approximately 18,400' MD located in the Upper Wolfcamp.

According to New Mexico EMNRD 19.15.15.9 NMAC a well shall be located no closer than 330' feet to a boundary of the unit.

1.2 Estimated Depths of Anticipated Fresh Water, Oil, and Gas

Substance	**Depth**
Fresh Water	0' to 125'
Base of Treatable Water	125'
Hydrocarbons	8,191' to TD

1.2.2 State Water Protection Compliance

Bureau of Land Management requires surface casing to be set at a minimum of 25' into the Rustler Anhydrite and above the salt section. Operator proposes to set the surface casing at a depth of 1800' (measured from the surface) and use 13-3/8" casing.

Special Capitan Reef requirements
If lost circulation (50% or greater) occurs below the Base of the Salt, the operator shall switch to fresh water mud to protect the Capitan Reef and use fresh water mud until setting the intermediate casing. The appropriate BLM office is to be notified for a PET to witness the switch to fresh water.

1.3 Pressure Control Equipment

Ten thousand (10M) psi working pressure Blind Rams and Pipe Rams and a five thousand (5M) psi Annular Preventer will be installed on all casing. Three (3) chokes; two (2) hydraulic and one (1) manual, will be used.

A variance to the requirement of a rigid steel line connecting to the choke manifold is requested. Specifications for the flex hose are provided with BOP schematic in exhibit section.

A third party testing company will conduct pressure tests and record prior to drilling out below 13-3/8s" casing. The BOP, Choke, Choke Manifold, Top Drive Valves and Floor Safety Valves will be tested to 5000 psi prior to drilling below the 13-3/8s" surface casing shoe and to 100% of full working pressure (10,000 psi) prior to drilling below the 9-5/8s" intermediate casing shoe. The Annular Preventer will be tested to 2500 psi prior to drilling below the 13-3/8s" surface casing shoe and to 100% of working pressure (5,000 psi) prior to drilling below the 9-5/8" intermediate casing shoe.

In addition, the BOP equipment will be tested after any repairs to the equipment as well as drilling out below any casing string. Pipe rams, blind rams, and annular preventer will be activated on each trip, and weekly BOP drills will be held with each crew.

Floor Safety Valves that are full open and sized to fit Drill Pipe and Collars will be available on the rig floor in the open position when the Kelly is not in use.

1.4 Proposed Casing and Cementing Program

1.4.1 Proposed Casing Program

Interval	Depth	Size	Weight/ft	Grade	Thread	Condition	Hole size	Wash out factor	Cement Yield
Conductor	120'	20"	94.00#	H-40		New	26"		Grout
Surface	1,800'	13-3/8"	54.50#	J-55	BTC	New	17-1/2"	100	1.72/1.32 cu. Ft/sk
Intermediate	5,600'	9-5/8"	47#	HCL-80	BTC	New	12-1/4"	150	1.94/1.18 cu. Ft/sk
Intermediate Liner	10,700	7"	32.00#	P-110HC	BTC	New	8-1/2"	30	1.62 cu. Ft/sk
Production	18,500'	4-1/2"	13.5#	P-110	BTC	New	6"	30	1.34 cu. Ft/sk

Conductor: 20", H-40# line pipe to a depth of 120'.
Wall thickness of 0.250".

Surface Casing:

Top	Bottom	Size	Weight/ Ft	Grade	Thread	Collapse psi	Internal Yld psi	Body Yld Strength	Joint Strength
Surface	1,800'	13-3/8"	54.50	J-55	BTC	1130	2730	853,000	909,000

Intermediate Casing:

Top	Bottom	Size	Weight/Ft	Grade	Thread	Collapse psi	Internal Yld psi	Body Yld Strength	Joint Strength
Surface	5,600'	9-5/8"	47#	HCL-80	BTC	5,740	6,870	1,086,000	1,122,000

Intermediate Liner:

Top	Bottom	Size	Weight/Ft	Grade	Thread	Collapse psi	Internal Yld psi	Body Yld Strength	Joint Strength
Surface	10,700	7"	32#	P-110HC	BTC	11,890	12,450	1,025,000	1,053,000

Production Casing:

Top	Bottom	Size	Weight/Ft	Grade	Thread	Collapse psi	Internal Yld psi	Body Yld Strength	Joint Strength
10,200	18,443	4-1/2"	13.5#	P-110	BTC	10,690	12,420	422,000	443,000

1.4.2 Proposed Cement Program

Conductor: Grout to Surface (est. 8 cu. yds on backside)

13-3/8" Surface:

Surface Casing String	
LEAD	
Top of MD	0
Bottom of MD	1600
Cement Type	Class C
Additives	4%Bentonite, 0.4 pps Defoamer, 0.125 pps Cellophane, 9.102 H2O GPS
# of SKS	1300
Yield (ft3/sk)	1.72
Density (lbs/gal)	13.5
Volume (ft3)	2236
Excess (%)	100%
TAIL	
Top of MD	1600
Bottom of MD	1800
Cement Type	Class C Neat
Additives	6.304 H2O GPS
# of SKS	200
Yield (ft3/sk)	1.32
Density (lbs/gal)	14.8
Volume (ft3)	348
Excess (%)	60%

9-5/8" Intermediate (No DV Tool):

Intermediate Casing String	
LEAD	
Top of MD	0
Bottom of MD	5000
Cement Type	35:65 POZ-Class C
Additives	6% Bentonite, 0.5% Fluidloss, 0.15% Retarder, 0.4pps Defoamer, 10.542 H2O GPS
# of SKS	1700
Yield (ft3/sk)	1.94
Density (lbs/gal)	12.6
Volume (ft3)	3298
Excess (%)	180%
TAIL	
Top of MD	5000
Bottom of MD	5600
Cement Type	Class H
Additives	0.3% Fluidloss, 5.216 H2O GPS
# of SKS	350
Yield (ft3/sk)	1.18
Density (lbs/gal)	15.6
Volume (ft3)	413
Excess (%)	140%

9-5/8" Intermediate (With 1 DV Tool):

Intermediate Casing String	
***Stage 1**	
LEAD	
Top of MD	0
Bottom of MD	5000
Cement Type	35:65 POZ-Class C
Additives	6% Bentonite, 0.5% Fluidloss, 0.15% Retarder, 0.4pps Defoamer, 10.542 H2O GPS
# of SKS	1700
Yield (ft3/sk)	1.94
Density (lbs/gal)	12.6
Volume (ft3)	3298
Excess (%)	180%

TAIL	
Top of MD	500
Bottom of MD	5600
Cement Type	Class H
Additives	0.3% Fluidloss, 5.216 H2O GPS
# of SKS	350
Yield (ft3/sk)	1.18
Density (lbs/gal)	15.6
Volume (ft3)	413
Excess (%)	140%
***Stage 2**	
Stage Tool Depth	+/- 3900'
LEAD	
Top of MD	0
Bottom of MD	3500
Cement Type	35:65 POZ-Class C
Additives	6% Bentonite, 0.5% Fluidloss, 0.15% Retarder, 0.4pps Defoamer, 10.543 H2O GPS
# of SKS	1200
Yield (ft3/sk)	1.94
Density (lbs/gal)	12.6
Volume (ft3)	2328
Excess (%)	200%
TAIL	
Top of MD	3500
Bottom of MD	3900
Cement Type	Class H
Additives	0.3% Fluidloss, 5.216 H2O GPS
# of SKS	200
Yield (ft3/sk)	1.18
Density (lbs/gal)	15.6
Volume (ft3)	236
Excess (%)	100%

9-5/8" Intermediate (With 2 DV Tools):

Intermediate Casing String	
***Stage 1**	
LEAD	
Top of MD	0
Bottom of MD	5000
Cement Type	35:65 POZ-Class C
Additives	6% Bentonite, 0.5% Fluidloss, 0.15% Retarder, 0.4pps Defoamer, 10.542 H2O GPS
# of SKS	1700
Yield (ft3/sk)	1.94
Density (lbs/gal)	12.6
Volume (ft3)	3298
Excess (%)	180%
TAIL	
Top of MD	5000
Bottom of MD	5600
Cement Type	Class H
Additives	0.3% Fluidloss, 5.216 H2O GPS
# of SKS	350
Yield (ft3/sk)	1.18
Density (lbs/gal)	15.6
Volume (ft3)	413
Excess (%)	140%
***Stage 2**	
Stage Tool Depth	+/- 3900'
LEAD	
Top of MD	0
Bottom of MD	3500
Cement Type	35:65 POZ-Class C
Additives	6% Bentonite, 0.5% Fluidloss, 0.15% Retarder, 0.4pps Defoamer, 10.543 H2O GPS
# of SKS	1200
Yield (ft3/sk)	1.94
Density (lbs/gal)	12.6
Volume (ft3)	2328
Excess (%)	200%
TAIL	
Top of MD	3500
Bottom of MD	3900
Cement Type	Class H

Additives	0.3% Fluidloss, 5.216 H2O GPS
# of SKS	200
Yield (ft3/sk)	1.18
Density (lbs/gal)	15.6
Volume (ft3)	236
Excess (%)	100%
***Stage 3**	
Stage Tool Depth	+/- 1900'
TAIL	
Top of MD	0
Bottom of MD	1900
Cement Type	Class C Neat
Additives	6.304 H2O GPS
# of SKS	700
Yield (ft3/sk)	1.32
Density (lbs/gal)	14.8
Volume (ft3)	924
Excess (%)	30%

7" Intermediate Liner:

Intermediate Casing String	
Lead	
Top of MD	0
Bottom of MD	5300
Cement Type	Class H
Additives	0.2% Retarder, 6.3 H2O GPS
# of SKS	820
Yield (ft3/sk)	1.18
Density (lbs/gal)	15.6
Volume (ft3)	968
Excess (%)	15%
Tail	
Top of MD	5300
Bottom of MD	10,700
Cement Type	PVL
Additives	1.3% Salt, 5% Expanding Cement, 0.5% Fluidloss, 0.3% Retarder, 0.1% Antisettling, 0.4 pps Defoamer, 8.621 H2O GPS
# of SKS	550

Yield (ft3/sk)	1.62
Density (lbs/gal)	12.6
Volume (ft3)	891
Excess (%)	30%

4-1/2" Production Liner:

Production Casing String	
TAIL	
Top of MD	10,200
Bottom of MD	18,500
Cement Type	50:50 POZ-Class H
Additives	5% Salt, 2% Bentonite, 0.5% Fluidloss, 0.2% Retarder, 0.2% Dispersant, 0.4pps Defoamer, 6.088 H2O GPS
# of SKS	700
Yield (ft3/sk)	1.34
Density (lbs/gal)	14.2
Volume (ft3)	938
Excess (%)	30%

Cement volumes are based on bringing cement to surface on all strings and TOC to ~10,200' (top of liner) on production.

Operator reserves the right to change cement designs as hole conditions may warrant.

1.5 Proposed Mud Program

Top TVD	Bottom TVD	Type	Max Mud Weight for Hole Control Design	Viscosity (sec/qt)
SURFACE	1,800	Fresh Water	9.0	28-38
1800	5,600	Brine	10.0	28-30
5,600	10,700	Cut Brine	9.2	28-30
10,700	TD	OBM	11.0	55-65

The operator must include the minimum design criteria, including casing loading assumptions and corresponding safety factors for burst, collapse, and tensions (body yield, and joint strength).

1.6 Casing Design

1.6.1 Drilling Design Analysis

Interval	Max TVD (ft)	Anticipated Mud Weight (ppg)	Estimated Max Pore Pressure (psi)	Internal Yield Strength (psi)	Collapse Strength (psi)	Joint Strength (lbs)	Body Strength (lbs)	Burst Safety Factor (Min 1.25)	Collpase Safety Factor (Min 1.25)	Tensile Safety Factor (Min 1.6)
Surface	1,800	8.5	780	2,730	1,130	909,000	853,000	3.5	1.42	4.3
Interm.	5,600	10	2,420	6,870	5,740	1,122,000	1,086,000	1.34	1.97	2.99
Interm. Liner	10,700	9.0	4,730	12,450	11,890	1,053,000	1,025,000	1.98	2.31	2.31
Prod.	11,300	10.5	5,880	12,420	10,690	443,000	422,000	1.26	1.89	1.91

Surface Casing Design Notes:

- **Burst Design Assumptions: Calculations assume complete evacuation behind pipe.**
- **Collapse Design Assumptions: Calculations assume complete evacuation inside pipe.**
- **Tension Design Assumptions: Calculations include 100,000 lb. max over-pull and do not consider the effects of buoyancy, with string held in tension.**

Intermediate Casing Design Notes:

- **Burst Design Assumptions: Calculations assume a .7psi/ft shoe test, and 0.22 psi/ft gas gradient.**
- **Collapse Design Assumptions: Calculations assume complete evacuation inside pipe.**
- **Tension Design Assumptions: Calculations include 100,000 lb. max over-pull and do not consider the effects of buoyancy, with string held in tension.**

Intermediate Liner w/ Tie-Back Design Notes:

- **Burst Design Assumptions: Calculations assume a .7psi/ft shoe test, and 0.22 psi/ft gas gradient.**
- **Collapse Design Assumptions: Calculations assume complete evacuation inside pipe.**
- **Tension Design Assumptions: Calculations include 100,000 lb. max over-pull and do not consider the effects of buoyancy, with string held in tension.**

Production Design Notes:

- **Burst Design Assumptions: Calculations assume surface frac pressure of 9500 psi along with a fluid gradient of 0.49psi/ft, with an external force equivalent to 0.44 psi/ft.**
- **Collapse Design Assumptions: Calculations assume complete evacuation inside pipe.**
- **Tension Design Assumptions: Calculations include 100,000 lb. max over-pull and do not consider the effects of buoyancy, with string held in tension.**

*Notes:

1) Collapse DSF: If < 1.125 calculations are required.
2) Burst DSF: If < 1.0 calculations are required.
3) Body Tensile DSF: If < 1.6 (dry) or < 1.8 (buoyant) calculations are required.
4) Joint Tensile DSF: If < 1.6 (dry) or < 1.8 (buoyant) calculations are required.
5) Will an offset pressure variance request be requested to meet safety factors? Max. 0.22 psi/ft. Please indicate offset pressure variance requested.

Mud weight increases at shoe depths are for pressure control. Mud weight increases in the curve and lateral sections of the hole are for hole stability, not pressure control. Mud weight assumptions for casing load designs exceed anticipated maximum mud weight for balanced drilling in all hole sections. Expected mud weights in the Upper Wolfcamp Horizontal will be 0.5 to 1.0 ppg greater than formation pressure (i.e. overbalanced drilling.)

The Mud System will run as a closed loop system with PVT monitoring. All drill cuttings and liquid mud will be hauled to an approved NMOCD site for disposal or soiled farmed upon receiving appropriate approval.

1.7 Completion Program and Casing Design

Hydraulic fracturing will occur through the production casing. The burst design calculation assumes TOC at surface and therefore, the backside of the production casing is not evacuated. The maximum pumping pressure is 10,000 psi with a maximum proppant fluid weight of 9.5 ppg. The design safety factor for burst is 1.25.

Upon request, operator will provide proof of cement bonding by bond log. Operator is responsible for log interpretation and certification prior to frac treatment.

Upon request, operator will provide estimated fracture lengths, flowback storage, volumes of fluids and amount of sand to be used, and number of stages of frac procedure. Furthermore, a report of the annulus pressures before and after each stage of treatment may be requested by the BLM. The report may include chemical additives (other than proprietary), dissolved solids in frac fluid, and depth of perforations.

1.8 Evaluation Program

Required Testing, Logging, and Coring procedures noted below:

- Mud Logging/Gamma Ray/MWD.
- Cased hole CBL on production casing.

1.9 Downhole Conditions

Zones of possible lost circulation:	Capitan Reef
Zones of possible abnormal pressure:	Upper Wolfcamp
Maximum bottom hole temperature:	200° F
Maximum bottom hole pressure:	5,880 psi or less.

1.10 Overview of Drilling Procedure

- Drill 17.5" surface hole to 1,800'; run 13.375" casing to 1,800' and cement to surface; install 10M stack, set isolation plug and test BOPE and casing independently to regulatory requirements.
- Drill 12.25" intermediate hole to 5,600', run 9.625" casing and cement; set isolation plug and test BOPE and casing independently to regulatory requirements.

- Drill 8-1/2" intermediate hole to approximately 10,700' and run 7" liner with a tie-back sleeve, and cement to top of liner set at +/- 5,300'.
- Drill 6" production hole to +/- 18,500'; run 4.5" liner from TD to +/- 10,200' and cement per cement program and test.
- Run 7" tie-back string from +/- 5300' to surface and cement per cement program, circulate cement to surface.

1.11 Overview of Completion for Equipment Sizing

- A Sundry Notice will be submitted with the proposed completion procedure prior to the job.

DRILLING PROGRAM

Operator:
LEGACY RESERVES OPERATING LP

Project Name:
LEA UNIT 100H

Project Location:
Lea County, New Mexico

Prepared By:
Matt Dickson
Drilling Engineer

Submitted To:
Bureau of Land Management
Carlsbad Field Office

Please address inquiries, questions, scheduling of meetings and deficiency statements, if any, to Scott St. John and/or Monica Smith Griffin at the address shown below:

Reagan Smith Energy Solutions, Inc.
1219 Classen Drive
Oklahoma City, OK 73103
405-286-9326

sstjohn@rsenergysolutions.com msmith@rsenergysolutions.com

1.0 Drilling Program

1.1 Estimated Formation Tops

FORMATION	*TVD @ Surface Loc*	*TVD @ KB*	*TVD @ TD*
Rustler	1,700'	1,728'	1,728'
Yates	3,424'	3,452'	3,452'
Seven Rivers	3,809'	3,837'	3,837'
Queen	4,632'	4,660'	4,660'
Bell Canyon	5,588'	5,616'	5,616'
Cherry Canyon	6,471'	6,499'	6,499'
Brushy Canyon	7,107'	7,135'	7,135'
Bone Spring	8,191'	8,219'	8,219'
Avalon Shale	8,782'	8,810'	8,810'
1st BS	9,504'	9,532'	9,532'
2nd BS	10,041'	10,069'	10,069'
3rd BS	10,699'	10,727'	10,727'
Wolfcamp	11,009'	11,037'	11,085'
Upper Wolfcamp	11,212'	11,240'	11,300'

Target Formation and Total Depth:

The total depth of the proposed well is approximately 18,400' MD located in the Upper Wolfcamp.

According to New Mexico EMNRD 19.15.15.9 NMAC a well shall be located no closer than 330' feet to a boundary of the unit.

1.2 Estimated Depths of Anticipated Fresh Water, Oil, and Gas

Substance	**Depth**
Fresh Water	0' to 125'
Base of Treatable Water	125'
Hydrocarbons	8,191' to TD

1.2.2 State Water Protection Compliance

Bureau of Land Management requires surface casing to be set at a minimum of 25' into the Rustler Anhydrite and above the salt section. Operator proposes to set the surface casing at a depth of 1800' (measured from the surface) and use 13-3/8" casing.

Special Capitan Reef requirements
If lost circulation (50% or greater) occurs below the Base of the Salt, the operator shall switch to fresh water mud to protect the Capitan Reef and use fresh water mud until setting the intermediate casing. The appropriate BLM office is to be notified for a PET to witness the switch to fresh water.

1.3 Pressure Control Equipment

Ten thousand (10M) psi working pressure Blind Rams and Pipe Rams and a five thousand (5M) psi Annular Preventer will be installed on all casing. Three (3) chokes; two (2) hydraulic and one (1) manual, will be used.

A variance to the requirement of a rigid steel line connecting to the choke manifold is requested. Specifications for the flex hose are provided with BOP schematic in exhibit section.

A third party testing company will conduct pressure tests and record prior to drilling out below 13-3/8s" casing. The BOP, Choke, Choke Manifold, Top Drive Valves and Floor Safety Valves will be tested to 5000 psi prior to drilling below the 13-3/8s" surface casing shoe and to 100% of full working pressure (10,000 psi) prior to drilling below the 9-5/8s" intermediate casing shoe. The Annular Preventer will be tested to 2500 psi prior to drilling below the 13-3/8s" surface casing shoe and to 100% of working pressure (5,000 psi) prior to drilling below the 9-5/8" intermediate casing shoe.

In addition, the BOP equipment will be tested after any repairs to the equipment as well as drilling out below any casing string. Pipe rams, blind rams, and annular preventer will be activated on each trip, and weekly BOP drills will be held with each crew.

Floor Safety Valves that are full open and sized to fit Drill Pipe and Collars will be available on the rig floor in the open position when the Kelly is not in use.

1.4 Proposed Casing and Cementing Program

1.4.1 Proposed Casing Program

Interval	Depth	Size	Weight/ft	Grade	Thread	Condition	Hole size	Wash out factor	Cement Yield
Conductor	120'	20"	94.00#	H-40		New	26"		Grout
Surface	1,800'	13-3/8"	54.50#	J-55	BTC	New	17-1/2"	100	1.72/1.32 cu. Ft/sk
Intermediate	5,600'	9-5/8"	47#	HCL-80	BTC	New	12-1/4"	150	1.94/1.18 cu. Ft/sk
Intermediate Liner	10,700	7"	32.00#	P-110HC	BTC	New	8-1/2"	30	1.62 cu. Ft/sk
Production	18,500'	4-1/2"	13.5#	P-110	BTC	New	6"	30	1.34 cu. Ft/sk

Conductor: 20", H-40# line pipe to a depth of 120'.
Wall thickness of 0.250".

Surface Casing:

Top	Bottom	Size	Weight/ Ft	Grade	Thread	Collapse psi	Internal Yld psi	Body Yld Strength	Joint Strength
Surface	1,800'	13-3/8"	54.50	J-55	BTC	1130	2730	853,000	909,000

Intermediate Casing:

Top	Bottom	Size	Weight/Ft	Grade	Thread	Collapse psi	Internal Yld psi	Body Yld Strength	Joint Strength
Surface	5,600'	9-5/8"	47#	HCL-80	BTC	5,740	6,870	1,086,000	1,122,000

Intermediate Liner:

Top	Bottom	Size	Weight/Ft	Grade	Thread	Collapse psi	Internal Yld psi	Body Yld Strength	Joint Strength
Surface	10,700	7"	32#	P-110HC	BTC	11,890	12,450	1,025,000	1,053,000

Production Casing:

Top	Bottom	Size	Weight/Ft	Grade	Thread	Collapse psi	Internal Yld psi	Body Yld Strength	Joint Strength
10,200	18,443	4-1/2"	13.5#	P-110	BTC	10,690	12,420	422,000	443,000

1.4.2 Proposed Cement Program

Conductor: Grout to Surface (est. 8 cu. yds on backside)

13-3/8" Surface:

Surface Casing String	
LEAD	
Top of MD	0
Bottom of MD	1600
Cement Type	Class C
Additives	4%Bentonite, 0.4 pps Defoamer, 0.125 pps Cellophane, 9.102 H2O GPS
# of SKS	1300
Yield (ft3/sk)	1.72
Density (lbs/gal)	13.5
Volume (ft3)	2236
Excess (%)	100%
TAIL	
Top of MD	1600
Bottom of MD	1800
Cement Type	Class C Neat
Additives	6.304 H2O GPS
# of SKS	200
Yield (ft3/sk)	1.32
Density (lbs/gal)	14.8
Volume (ft3)	348
Excess (%)	60%

9-5/8" Intermediate (No DV Tool):

Intermediate Casing String	
LEAD	
Top of MD	0
Bottom of MD	5000
Cement Type	35:65 POZ-Class C
Additives	6% Bentonite, 0.5% Fluidloss, 0.15% Retarder, 0.4pps Defoamer, 10.542 H2O GPS
# of SKS	1700
Yield (ft3/sk)	1.94
Density (lbs/gal)	12.6
Volume (ft3)	3298
Excess (%)	180%
TAIL	
Top of MD	5000
Bottom of MD	5600
Cement Type	Class H
Additives	0.3% Fluidloss, 5.216 H2O GPS
# of SKS	350
Yield (ft3/sk)	1.18
Density (lbs/gal)	15.6
Volume (ft3)	413
Excess (%)	140%

9-5/8" Intermediate (With 1 DV Tool):

Intermediate Casing String	
***Stage 1**	
LEAD	
Top of MD	0
Bottom of MD	5000
Cement Type	35:65 POZ-Class C
Additives	6% Bentonite, 0.5% Fluidloss, 0.15% Retarder, 0.4pps Defoamer, 10.542 H2O GPS
# of SKS	1700
Yield (ft3/sk)	1.94
Density (lbs/gal)	12.6
Volume (ft3)	3298
Excess (%)	180%

TAIL	
Top of MD	500
Bottom of MD	5600
Cement Type	Class H
Additives	0.3% Fluidloss, 5.216 H2O GPS
# of SKS	350
Yield (ft3/sk)	1.18
Density (lbs/gal)	15.6
Volume (ft3)	413
Excess (%)	140%
***Stage 2**	
Stage Tool Depth	+/- 3900'
LEAD	
Top of MD	0
Bottom of MD	3500
Cement Type	35:65 POZ-Class C
Additives	6% Bentonite, 0.5% Fluidloss, 0.15% Retarder, 0.4pps Defoamer, 10.543 H2O GPS
# of SKS	1200
Yield (ft3/sk)	1.94
Density (lbs/gal)	12.6
Volume (ft3)	2328
Excess (%)	200%
TAIL	
Top of MD	3500
Bottom of MD	3900
Cement Type	Class H
Additives	0.3% Fluidloss, 5.216 H2O GPS
# of SKS	200
Yield (ft3/sk)	1.18
Density (lbs/gal)	15.6
Volume (ft3)	236
Excess (%)	100%

9-5/8" Intermediate (With 2 DV Tools):

Intermediate Casing String	
***Stage 1**	
LEAD	
Top of MD	0
Bottom of MD	5000
Cement Type	35:65 POZ-Class C
Additives	6% Bentonite, 0.5% Fluidloss, 0.15% Retarder, 0.4pps Defoamer, 10.542 H2O GPS
# of SKS	1700
Yield (ft3/sk)	1.94
Density (lbs/gal)	12.6
Volume (ft3)	3298
Excess (%)	180%
TAIL	
Top of MD	5000
Bottom of MD	5600
Cement Type	Class H
Additives	0.3% Fluidloss, 5.216 H2O GPS
# of SKS	350
Yield (ft3/sk)	1.18
Density (lbs/gal)	15.6
Volume (ft3)	413
Excess (%)	140%
***Stage 2**	
Stage Tool Depth	+/- 3900'
LEAD	
Top of MD	0
Bottom of MD	3500
Cement Type	35:65 POZ-Class C
Additives	6% Bentonite, 0.5% Fluidloss, 0.15% Retarder, 0.4pps Defoamer, 10.543 H2O GPS
# of SKS	1200
Yield (ft3/sk)	1.94
Density (lbs/gal)	12.6
Volume (ft3)	2328
Excess (%)	200%
TAIL	
Top of MD	3500
Bottom of MD	3900
Cement Type	Class H

Additives	0.3% Fluidloss, 5.216 H2O GPS
# of SKS	200
Yield (ft3/sk)	1.18
Density (lbs/gal)	15.6
Volume (ft3)	236
Excess (%)	100%
***Stage 3**	
Stage Tool Depth	+/- 1900'
TAIL	
Top of MD	0
Bottom of MD	1900
Cement Type	Class C Neat
Additives	6.304 H2O GPS
# of SKS	700
Yield (ft3/sk)	1.32
Density (lbs/gal)	14.8
Volume (ft3)	924
Excess (%)	30%

7" Intermediate Liner:

Intermediate Casing String	
Lead	
Top of MD	0
Bottom of MD	5300
Cement Type	Class H
Additives	0.2% Retarder, 6.3 H2O GPS
# of SKS	820
Yield (ft3/sk)	1.18
Density (lbs/gal)	15.6
Volume (ft3)	968
Excess (%)	15%
Tail	
Top of MD	5300
Bottom of MD	10,700
Cement Type	PVL
Additives	1.3% Salt, 5% Expanding Cement, 0.5% Fluidloss, 0.3% Retarder, 0.1% Antisettling, 0.4 pps Defoamer, 8.621 H2O GPS
# of SKS	550

Yield (ft3/sk)	1.62
Density (lbs/gal)	12.6
Volume (ft3)	891
Excess (%)	30%

4-1/2" Production Liner:

Production Casing String	
TAIL	
Top of MD	10,200
Bottom of MD	18,500
Cement Type	50:50 POZ-Class H
Additives	5% Salt, 2% Bentonite, 0.5% Fluidloss, 0.2% Retarder, 0.2% Dispersant, 0.4pps Defoamer, 6.088 H2O GPS
# of SKS	700
Yield (ft3/sk)	1.34
Density (lbs/gal)	14.2
Volume (ft3)	938
Excess (%)	30%

Cement volumes are based on bringing cement to surface on all strings and TOC to ~10,200' (top of liner) on production.

Operator reserves the right to change cement designs as hole conditions may warrant.

1.5 Proposed Mud Program

Top TVD	Bottom TVD	Type	Max Mud Weight for Hole Control Design	Viscosity (sec/qt)
SURFACE	1,800	Fresh Water	9.0	28-38
1800	5,600	Brine	10.0	28-30
5,600	10,700	Cut Brine	9.2	28-30
10,700	TD	OBM	11.0	55-65

The operator must include the minimum design criteria, including casing loading assumptions and corresponding safety factors for burst, collapse, and tensions (body yield, and joint strength).

1.6 Casing Design

1.6.1 Drilling Design Analysis

Interval	Max TVD (ft)	Anticipated Mud Weight (ppg)	Estimated Max Pore Pressure (psi)	Internal Yield Strength (psi)	Collapse Strength (psi)	Joint Strength (lbs)	Body Strength (lbs)	Burst Safety Factor (Min 1.25)	Collpase Safety Factor (Min 1.25)	Tensile Safety Factor (Min 1.6)
Surface	1,800	8.5	780	2,730	1,130	909,000	853,000	3.5	1.42	4.3
Interm.	5,600	10	2,420	6,870	5,740	1,122,000	1,086,000	1.34	1.97	2.99
Interm. Liner	10,700	9.0	4,730	12,450	11,890	1,053,000	1,025,000	1.98	2.31	2.31
Prod.	11,300	10.5	5,880	12,420	10,690	443,000	422,000	1.26	1.89	1.91

Surface Casing Design Notes:

- **Burst Design Assumptions: Calculations assume complete evacuation behind pipe.**
- **Collapse Design Assumptions: Calculations assume complete evacuation inside pipe.**
- **Tension Design Assumptions: Calculations include 100,000 lb. max over-pull and do not consider the effects of buoyancy, with string held in tension.**

Intermediate Casing Design Notes:

- **Burst Design Assumptions: Calculations assume a .7psi/ft shoe test, and 0.22 psi/ft gas gradient.**
- **Collapse Design Assumptions: Calculations assume complete evacuation inside pipe.**
- **Tension Design Assumptions: Calculations include 100,000 lb. max over-pull and do not consider the effects of buoyancy, with string held in tension.**

Intermediate Liner w/ Tie-Back Design Notes:

- **Burst Design Assumptions: Calculations assume a .7psi/ft shoe test, and 0.22 psi/ft gas gradient.**
- **Collapse Design Assumptions: Calculations assume complete evacuation inside pipe.**
- **Tension Design Assumptions: Calculations include 100,000 lb. max over-pull and do not consider the effects of buoyancy, with string held in tension.**

Production Design Notes:

- **Burst Design Assumptions: Calculations assume surface frac pressure of 9500 psi along with a fluid gradient of 0.49psi/ft, with an external force equivalent to 0.44 psi/ft.**
- **Collapse Design Assumptions: Calculations assume complete evacuation inside pipe.**
- **Tension Design Assumptions: Calculations include 100,000 lb. max over-pull and do not consider the effects of buoyancy, with string held in tension.**

*Notes:

1) Collapse DSF: If < 1.125 calculations are required.
2) Burst DSF: If < 1.0 calculations are required.
3) Body Tensile DSF: If < 1.6 (dry) or < 1.8 (buoyant) calculations are required.
4) Joint Tensile DSF: If < 1.6 (dry) or < 1.8 (buoyant) calculations are required.
5) Will an offset pressure variance request be requested to meet safety factors? Max. 0.22 psi/ft. Please indicate offset pressure variance requested.

Mud weight increases at shoe depths are for pressure control. Mud weight increases in the curve and lateral sections of the hole are for hole stability, not pressure control. Mud weight assumptions for casing load designs exceed anticipated maximum mud weight for balanced drilling in all hole sections. Expected mud weights in the Upper Wolfcamp Horizontal will be 0.5 to 1.0 ppg greater than formation pressure (i.e. overbalanced drilling.)

The Mud System will run as a closed loop system with PVT monitoring. All drill cuttings and liquid mud will be hauled to an approved NMOCD site for disposal or soiled farmed upon receiving appropriate approval.

1.7 Completion Program and Casing Design

Hydraulic fracturing will occur through the production casing. The burst design calculation assumes TOC at surface and therefore, the backside of the production casing is not evacuated. The maximum pumping pressure is 10,000 psi with a maximum proppant fluid weight of 9.5 ppg. The design safety factor for burst is 1.25.

Upon request, operator will provide proof of cement bonding by bond log. Operator is responsible for log interpretation and certification prior to frac treatment.

Upon request, operator will provide estimated fracture lengths, flowback storage, volumes of fluids and amount of sand to be used, and number of stages of frac procedure. Furthermore, a report of the annulus pressures before and after each stage of treatment may be requested by the BLM. The report may include chemical additives (other than proprietary), dissolved solids in frac fluid, and depth of perforations.

1.8 Evaluation Program

Required Testing, Logging, and Coring procedures noted below:

- Mud Logging/Gamma Ray/MWD.
- Cased hole CBL on production casing.

1.9 Downhole Conditions

Zones of possible lost circulation:	Capitan Reef
Zones of possible abnormal pressure:	Upper Wolfcamp
Maximum bottom hole temperature:	200° F
Maximum bottom hole pressure:	5,880 psi or less.

1.10 Overview of Drilling Procedure

- Drill 17.5" surface hole to 1,800'; run 13.375" casing to 1,800' and cement to surface; install 10M stack, set isolation plug and test BOPE and casing independently to regulatory requirements.
- Drill 12.25" intermediate hole to 5,600', run 9.625" casing and cement; set isolation plug and test BOPE and casing independently to regulatory requirements.

- Drill 8-1/2" intermediate hole to approximately 10,700' and run 7" liner with a tie-back sleeve, and cement to top of liner set at +/- 5,300'.
- Drill 6" production hole to +/- 18,500'; run 4.5" liner from TD to +/- 10,200' and cement per cement program and test.
- Run 7" tie-back string from +/- 5300' to surface and cement per cement program, circulate cement to surface.

1.11 Overview of Completion for Equipment Sizing

- A Sundry Notice will be submitted with the proposed completion procedure prior to the job.

DRILLING PROGRAM

Operator:
LEGACY RESERVES OPERATING LP

Project Name:
LEA UNIT 100H

Project Location:
Lea County, New Mexico

Prepared By:
Matt Dickson
Drilling Engineer

Submitted To:
Bureau of Land Management
Carlsbad Field Office

Please address inquiries, questions, scheduling of meetings and deficiency statements, if any, to Scott St. John and/or Monica Smith Griffin at the address shown below:

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In addition, the BOP equipment will be tested after any repairs to the equipment as well as drilling out below any casing string. Pipe rams, blind rams, and annular preventer will be activated on each trip, and weekly BOP drills will be held with each crew.

Floor Safety Valves that are full open and sized to fit Drill Pipe and Collars will be available on the rig floor in the open position when the Kelly is not in use.

1.4 Proposed Casing and Cementing Program

1.4.1 Proposed Casing Program

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Conductor	120'	20"	94.00#	H-40		New	26"		Grout
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Intermediate	5,600'	9-5/8"	47#	HCL-80	BTC	New	12-1/4"	150	1.94/1.18 cu. Ft/sk
Intermediate Liner	10,700	7"	32.00#	P-110HC	BTC	New	8-1/2"	30	1.62 cu. Ft/sk
Production	18,500'	4-1/2"	13.5#	P-110	BTC	New	6"	30	1.34 cu. Ft/sk

Conductor: 20", H-40# line pipe to a depth of 120'.
Wall thickness of 0.250".

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Surface	1,800'	13-3/8"	54.50	J-55	BTC	1130	2730	853,000	909,000

Intermediate Casing:

Top	Bottom	Size	Weight/Ft	Grade	Thread	Collapse psi	Internal Yld psi	Body Yld Strength	Joint Strength
Surface	5,600'	9-5/8"	47#	HCL-80	BTC	5,740	6,870	1,086,000	1,122,000

Intermediate Liner:

Top	Bottom	Size	Weight/Ft	Grade	Thread	Collapse psi	Internal Yld psi	Body Yld Strength	Joint Strength
Surface	10,700	7"	32#	P-110HC	BTC	11,890	12,450	1,025,000	1,053,000

Production Casing:

Top	Bottom	Size	Weight/Ft	Grade	Thread	Collapse psi	Internal Yld psi	Body Yld Strength	Joint Strength
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1.4.2 Proposed Cement Program

Conductor: Grout to Surface (est. 8 cu. yds on backside)

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Surface Casing String	
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Bottom of MD	1600
Cement Type	Class C
Additives	4%Bentonite, 0.4 pps Defoamer, 0.125 pps Cellophane, 9.102 H2O GPS
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# of SKS	200
Yield (ft3/sk)	1.32
Density (lbs/gal)	14.8
Volume (ft3)	348
Excess (%)	60%

9-5/8" Intermediate (No DV Tool):

Intermediate Casing String	
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Bottom of MD	5000
Cement Type	35:65 POZ-Class C
Additives	6% Bentonite, 0.5% Fluidloss, 0.15% Retarder, 0.4pps Defoamer, 10.542 H2O GPS
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Volume (ft3)	413
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9-5/8" Intermediate (With 1 DV Tool):

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# of SKS	350
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Density (lbs/gal)	15.6
Volume (ft3)	413
Excess (%)	140%
***Stage 2**	
Stage Tool Depth	+/- 3900'
LEAD	
Top of MD	0
Bottom of MD	3500
Cement Type	35:65 POZ-Class C
Additives	6% Bentonite, 0.5% Fluidloss, 0.15% Retarder, 0.4pps Defoamer, 10.543 H2O GPS
# of SKS	1200
Yield (ft3/sk)	1.94
Density (lbs/gal)	12.6
Volume (ft3)	2328
Excess (%)	200%
TAIL	
Top of MD	3500
Bottom of MD	3900
Cement Type	Class H
Additives	0.3% Fluidloss, 5.216 H2O GPS
# of SKS	200
Yield (ft3/sk)	1.18
Density (lbs/gal)	15.6
Volume (ft3)	236
Excess (%)	100%

9-5/8" Intermediate (With 2 DV Tools):

Intermediate Casing String	
***Stage 1**	
LEAD	
Top of MD	0
Bottom of MD	5000
Cement Type	35:65 POZ-Class C
Additives	6% Bentonite, 0.5% Fluidloss, 0.15% Retarder, 0.4pps Defoamer, 10.542 H2O GPS
# of SKS	1700
Yield (ft3/sk)	1.94
Density (lbs/gal)	12.6
Volume (ft3)	3298
Excess (%)	180%
TAIL	
Top of MD	5000
Bottom of MD	5600
Cement Type	Class H
Additives	0.3% Fluidloss, 5.216 H2O GPS
# of SKS	350
Yield (ft3/sk)	1.18
Density (lbs/gal)	15.6
Volume (ft3)	413
Excess (%)	140%
***Stage 2**	
Stage Tool Depth	+/- 3900'
LEAD	
Top of MD	0
Bottom of MD	3500
Cement Type	35:65 POZ-Class C
Additives	6% Bentonite, 0.5% Fluidloss, 0.15% Retarder, 0.4pps Defoamer, 10.543 H2O GPS
# of SKS	1200
Yield (ft3/sk)	1.94
Density (lbs/gal)	12.6
Volume (ft3)	2328
Excess (%)	200%
TAIL	
Top of MD	3500
Bottom of MD	3900
Cement Type	Class H

Additives	0.3% Fluidloss, 5.216 H2O GPS
# of SKS	200
Yield (ft3/sk)	1.18
Density (lbs/gal)	15.6
Volume (ft3)	236
Excess (%)	100%
***Stage 3**	
Stage Tool Depth	+/- 1900'
TAIL	
Top of MD	0
Bottom of MD	1900
Cement Type	Class C Neat
Additives	6.304 H2O GPS
# of SKS	700
Yield (ft3/sk)	1.32
Density (lbs/gal)	14.8
Volume (ft3)	924
Excess (%)	30%

7" Intermediate Liner:

Intermediate Casing String	
Lead	
Top of MD	0
Bottom of MD	5300
Cement Type	Class H
Additives	0.2% Retarder, 6.3 H2O GPS
# of SKS	820
Yield (ft3/sk)	1.18
Density (lbs/gal)	15.6
Volume (ft3)	968
Excess (%)	15%
Tail	
Top of MD	5300
Bottom of MD	10,700
Cement Type	PVL
Additives	1.3% Salt, 5% Expanding Cement, 0.5% Fluidloss, 0.3% Retarder, 0.1% Antisettling, 0.4 pps Defoamer, 8.621 H2O GPS
# of SKS	550

Yield (ft3/sk)	1.62
Density (lbs/gal)	12.6
Volume (ft3)	891
Excess (%)	30%

4-1/2" Production Liner:

Production Casing String	
TAIL	
Top of MD	10,200
Bottom of MD	18,500
Cement Type	50:50 POZ-Class H
Additives	5% Salt, 2% Bentonite, 0.5% Fluidloss, 0.2% Retarder, 0.2% Dispersant, 0.4pps Defoamer, 6.088 H2O GPS
# of SKS	700
Yield (ft3/sk)	1.34
Density (lbs/gal)	14.2
Volume (ft3)	938
Excess (%)	30%

Cement volumes are based on bringing cement to surface on all strings and TOC to ~10,200' (top of liner) on production.

Operator reserves the right to change cement designs as hole conditions may warrant.

1.5 Proposed Mud Program

Top TVD	Bottom TVD	Type	Max Mud Weight for Hole Control Design	Viscosity (sec/qt)
SURFACE	1,800	Fresh Water	9.0	28-38
1800	5,600	Brine	10.0	28-30
5,600	10,700	Cut Brine	9.2	28-30
10,700	TD	OBM	11.0	55-65

The operator must include the minimum design criteria, including casing loading assumptions and corresponding safety factors for burst, collapse, and tensions (body yield, and joint strength).

1.6 Casing Design

1.6.1 Drilling Design Analysis

Interval	Max TVD (ft)	Anticipated Mud Weight (ppg)	Estimated Max Pore Pressure (psi)	Internal Yield Strength (psi)	Collapse Strength (psi)	Joint Strength (lbs)	Body Strength (lbs)	Burst Safety Factor (Min 1.25)	Collpase Safety Factor (Min 1.25)	Tensile Safety Factor (Min 1.6)
Surface	1,800	8.5	780	2,730	1,130	909,000	853,000	3.5	1.42	4.3
Interm.	5,600	10	2,420	6,870	5,740	1,122,000	1,086,000	1.34	1.97	2.99
Interm. Liner	10,700	9.0	4,730	12,450	11,890	1,053,000	1,025,000	1.98	2.31	2.31
Prod.	11,300	10.5	5,880	12,420	10,690	443,000	422,000	1.26	1.89	1.91

Surface Casing Design Notes:

- **Burst Design Assumptions: Calculations assume complete evacuation behind pipe.**
- **Collapse Design Assumptions: Calculations assume complete evacuation inside pipe.**
- **Tension Design Assumptions: Calculations include 100,000 lb. max over-pull and do not consider the effects of buoyancy, with string held in tension.**

Intermediate Casing Design Notes:

- **Burst Design Assumptions: Calculations assume a .7psi/ft shoe test, and 0.22 psi/ft gas gradient.**
- **Collapse Design Assumptions: Calculations assume complete evacuation inside pipe.**
- **Tension Design Assumptions: Calculations include 100,000 lb. max over-pull and do not consider the effects of buoyancy, with string held in tension.**

Intermediate Liner w/ Tie-Back Design Notes:

- **Burst Design Assumptions: Calculations assume a .7psi/ft shoe test, and 0.22 psi/ft gas gradient.**
- **Collapse Design Assumptions: Calculations assume complete evacuation inside pipe.**
- **Tension Design Assumptions: Calculations include 100,000 lb. max over-pull and do not consider the effects of buoyancy, with string held in tension.**

Production Design Notes:

- **Burst Design Assumptions: Calculations assume surface frac pressure of 9500 psi along with a fluid gradient of 0.49psi/ft, with an external force equivalent to 0.44 psi/ft.**
- **Collapse Design Assumptions: Calculations assume complete evacuation inside pipe.**
- **Tension Design Assumptions: Calculations include 100,000 lb. max over-pull and do not consider the effects of buoyancy, with string held in tension.**

*Notes:

1) Collapse DSF: If < 1.125 calculations are required.
2) Burst DSF: If < 1.0 calculations are required.
3) Body Tensile DSF: If < 1.6 (dry) or < 1.8 (buoyant) calculations are required.
4) Joint Tensile DSF: If < 1.6 (dry) or < 1.8 (buoyant) calculations are required.
5) Will an offset pressure variance request be requested to meet safety factors? Max. 0.22 psi/ft. Please indicate offset pressure variance requested.

Mud weight increases at shoe depths are for pressure control. Mud weight increases in the curve and lateral sections of the hole are for hole stability, not pressure control. Mud weight assumptions for casing load designs exceed anticipated maximum mud weight for balanced drilling in all hole sections. Expected mud weights in the Upper Wolfcamp Horizontal will be 0.5 to 1.0 ppg greater than formation pressure (i.e. overbalanced drilling.)

The Mud System will run as a closed loop system with PVT monitoring. All drill cuttings and liquid mud will be hauled to an approved NMOCD site for disposal or soiled farmed upon receiving appropriate approval.

1.7 Completion Program and Casing Design

Hydraulic fracturing will occur through the production casing. The burst design calculation assumes TOC at surface and therefore, the backside of the production casing is not evacuated. The maximum pumping pressure is 10,000 psi with a maximum proppant fluid weight of 9.5 ppg. The design safety factor for burst is 1.25.

Upon request, operator will provide proof of cement bonding by bond log. Operator is responsible for log interpretation and certification prior to frac treatment.

Upon request, operator will provide estimated fracture lengths, flowback storage, volumes of fluids and amount of sand to be used, and number of stages of frac procedure. Furthermore, a report of the annulus pressures before and after each stage of treatment may be requested by the BLM. The report may include chemical additives (other than proprietary), dissolved solids in frac fluid, and depth of perforations.

1.8 Evaluation Program

Required Testing, Logging, and Coring procedures noted below:

- Mud Logging/Gamma Ray/MWD.
- Cased hole CBL on production casing.

1.9 Downhole Conditions

Zones of possible lost circulation:	Capitan Reef
Zones of possible abnormal pressure:	Upper Wolfcamp
Maximum bottom hole temperature:	200° F
Maximum bottom hole pressure:	5,880 psi or less.

1.10 Overview of Drilling Procedure

- Drill 17.5" surface hole to 1,800'; run 13.375" casing to 1,800' and cement to surface; install 10M stack, set isolation plug and test BOPE and casing independently to regulatory requirements.
- Drill 12.25" intermediate hole to 5,600', run 9.625" casing and cement; set isolation plug and test BOPE and casing independently to regulatory requirements.

- Drill 8-1/2" intermediate hole to approximately 10,700' and run 7" liner with a tie-back sleeve, and cement to top of liner set at +/- 5,300'.
- Drill 6" production hole to +/- 18,500'; run 4.5" liner from TD to +/- 10,200' and cement per cement program and test.
- Run 7" tie-back string from +/- 5300' to surface and cement per cement program, circulate cement to surface.

1.11 Overview of Completion for Equipment Sizing

- A Sundry Notice will be submitted with the proposed completion procedure prior to the job.

DRILLING PROGRAM

Operator:
LEGACY RESERVES OPERATING LP

Project Name:
LEA UNIT 100H

Project Location:
Lea County, New Mexico

Prepared By:
Matt Dickson
Drilling Engineer

Submitted To:
Bureau of Land Management
Carlsbad Field Office

Please address inquiries, questions, scheduling of meetings and deficiency statements, if any, to Scott St. John and/or Monica Smith Griffin at the address shown below:

Reagan Smith Energy Solutions, Inc.
1219 Classen Drive
Oklahoma City, OK 73103
405-286-9326

sstjohn@rsenergysolutions.com msmith@rsenergysolutions.com

1.0 Drilling Program

1.1 Estimated Formation Tops

FORMATION	*TVD @ Surface Loc*	*TVD @ KB*	*TVD @ TD*
Rustler	1,700'	1,728'	1,728'
Yates	3,424'	3,452'	3,452'
Seven Rivers	3,809'	3,837'	3,837'
Queen	4,632'	4,660'	4,660'
Bell Canyon	5,588'	5,616'	5,616'
Cherry Canyon	6,471'	6,499'	6,499'
Brushy Canyon	7,107'	7,135'	7,135'
Bone Spring	8,191'	8,219'	8,219'
Avalon Shale	8,782'	8,810'	8,810'
1st BS	9,504'	9,532'	9,532'
2nd BS	10,041'	10,069'	10,069'
3rd BS	10,699'	10,727'	10,727'
Wolfcamp	11,009'	11,037'	11,085'
Upper Wolfcamp	11,212'	11,240'	11,300'

Target Formation and Total Depth:

The total depth of the proposed well is approximately 18,400' MD located in the Upper Wolfcamp.

According to New Mexico EMNRD 19.15.15.9 NMAC a well shall be located no closer than 330' feet to a boundary of the unit.

1.2 Estimated Depths of Anticipated Fresh Water, Oil, and Gas

Substance	**Depth**
Fresh Water	0' to 125'
Base of Treatable Water	125'
Hydrocarbons	8,191' to TD

1.2.2 State Water Protection Compliance

Bureau of Land Management requires surface casing to be set at a minimum of 25' into the Rustler Anhydrite and above the salt section. Operator proposes to set the surface casing at a depth of 1800' (measured from the surface) and use 13-3/8" casing.

Special Capitan Reef requirements
If lost circulation (50% or greater) occurs below the Base of the Salt, the operator shall switch to fresh water mud to protect the Capitan Reef and use fresh water mud until setting the intermediate casing. The appropriate BLM office is to be notified for a PET to witness the switch to fresh water.

1.3 Pressure Control Equipment

Ten thousand (10M) psi working pressure Blind Rams and Pipe Rams and a five thousand (5M) psi Annular Preventer will be installed on all casing. Three (3) chokes; two (2) hydraulic and one (1) manual, will be used.

A variance to the requirement of a rigid steel line connecting to the choke manifold is requested. Specifications for the flex hose are provided with BOP schematic in exhibit section.

A third party testing company will conduct pressure tests and record prior to drilling out below 13-3/8s" casing. The BOP, Choke, Choke Manifold, Top Drive Valves and Floor Safety Valves will be tested to 5000 psi prior to drilling below the 13-3/8s" surface casing shoe and to 100% of full working pressure (10,000 psi) prior to drilling below the 9-5/8s" intermediate casing shoe. The Annular Preventer will be tested to 2500 psi prior to drilling below the 13-3/8s" surface casing shoe and to 100% of working pressure (5,000 psi) prior to drilling below the 9-5/8" intermediate casing shoe.

In addition, the BOP equipment will be tested after any repairs to the equipment as well as drilling out below any casing string. Pipe rams, blind rams, and annular preventer will be activated on each trip, and weekly BOP drills will be held with each crew.

Floor Safety Valves that are full open and sized to fit Drill Pipe and Collars will be available on the rig floor in the open position when the Kelly is not in use.

1.4 Proposed Casing and Cementing Program

1.4.1 Proposed Casing Program

Interval	Depth	Size	Weight/ft	Grade	Thread	Condition	Hole size	Wash out factor	Cement Yield
Conductor	120'	20"	94.00#	H-40		New	26"		Grout
Surface	1,800'	13-3/8"	54.50#	J-55	BTC	New	17-1/2"	100	1.72/1.32 cu. Ft/sk
Intermediate	5,600'	9-5/8"	47#	HCL-80	BTC	New	12-1/4"	150	1.94/1.18 cu. Ft/sk
Intermediate Liner	10,700	7"	32.00#	P-110HC	BTC	New	8-1/2"	30	1.62 cu. Ft/sk
Production	18,500'	4-1/2"	13.5#	P-110	BTC	New	6"	30	1.34 cu. Ft/sk

Conductor: 20", H-40# line pipe to a depth of 120'.
Wall thickness of 0.250".

Surface Casing:

Top	Bottom	Size	Weight/ Ft	Grade	Thread	Collapse psi	Internal Yld psi	Body Yld Strength	Joint Strength
Surface	1,800'	13-3/8"	54.50	J-55	BTC	1130	2730	853,000	909,000

Intermediate Casing:

Top	Bottom	Size	Weight/Ft	Grade	Thread	Collapse psi	Internal Yld psi	Body Yld Strength	Joint Strength
Surface	5,600'	9-5/8"	47#	HCL-80	BTC	5,740	6,870	1,086,000	1,122,000

Intermediate Liner:

Top	Bottom	Size	Weight/Ft	Grade	Thread	Collapse psi	Internal Yld psi	Body Yld Strength	Joint Strength
Surface	10,700	7"	32#	P-110HC	BTC	11,890	12,450	1,025,000	1,053,000

Production Casing:

Top	Bottom	Size	Weight/Ft	Grade	Thread	Collapse psi	Internal Yld psi	Body Yld Strength	Joint Strength
10,200	18,443	4-1/2"	13.5#	P-110	BTC	10,690	12,420	422,000	443,000

1.4.2 Proposed Cement Program

Conductor: Grout to Surface (est. 8 cu. yds on backside)

13-3/8" Surface:

Surface Casing String	
LEAD	
Top of MD	0
Bottom of MD	1600
Cement Type	Class C
Additives	4%Bentonite, 0.4 pps Defoamer, 0.125 pps Cellophane, 9.102 H2O GPS
# of SKS	1300
Yield (ft3/sk)	1.72
Density (lbs/gal)	13.5
Volume (ft3)	2236
Excess (%)	100%
TAIL	
Top of MD	1600
Bottom of MD	1800
Cement Type	Class C Neat
Additives	6.304 H2O GPS
# of SKS	200
Yield (ft3/sk)	1.32
Density (lbs/gal)	14.8
Volume (ft3)	348
Excess (%)	60%

9-5/8" Intermediate (No DV Tool):

Intermediate Casing String	
LEAD	
Top of MD	0
Bottom of MD	5000
Cement Type	35:65 POZ-Class C
Additives	6% Bentonite, 0.5% Fluidloss, 0.15% Retarder, 0.4pps Defoamer, 10.542 H2O GPS
# of SKS	1700
Yield (ft3/sk)	1.94
Density (lbs/gal)	12.6
Volume (ft3)	3298
Excess (%)	180%
TAIL	
Top of MD	5000
Bottom of MD	5600
Cement Type	Class H
Additives	0.3% Fluidloss, 5.216 H2O GPS
# of SKS	350
Yield (ft3/sk)	1.18
Density (lbs/gal)	15.6
Volume (ft3)	413
Excess (%)	140%

9-5/8" Intermediate (With 1 DV Tool):

Intermediate Casing String	
***Stage 1**	
LEAD	
Top of MD	0
Bottom of MD	5000
Cement Type	35:65 POZ-Class C
Additives	6% Bentonite, 0.5% Fluidloss, 0.15% Retarder, 0.4pps Defoamer, 10.542 H2O GPS
# of SKS	1700
Yield (ft3/sk)	1.94
Density (lbs/gal)	12.6
Volume (ft3)	3298
Excess (%)	180%

TAIL	
Top of MD	500
Bottom of MD	5600
Cement Type	Class H
Additives	0.3% Fluidloss, 5.216 H2O GPS
# of SKS	350
Yield (ft3/sk)	1.18
Density (lbs/gal)	15.6
Volume (ft3)	413
Excess (%)	140%
***Stage 2**	
Stage Tool Depth	+/- 3900'
LEAD	
Top of MD	0
Bottom of MD	3500
Cement Type	35:65 POZ-Class C
Additives	6% Bentonite, 0.5% Fluidloss, 0.15% Retarder, 0.4pps Defoamer, 10.543 H2O GPS
# of SKS	1200
Yield (ft3/sk)	1.94
Density (lbs/gal)	12.6
Volume (ft3)	2328
Excess (%)	200%
TAIL	
Top of MD	3500
Bottom of MD	3900
Cement Type	Class H
Additives	0.3% Fluidloss, 5.216 H2O GPS
# of SKS	200
Yield (ft3/sk)	1.18
Density (lbs/gal)	15.6
Volume (ft3)	236
Excess (%)	100%

9-5/8" Intermediate (With 2 DV Tools):

Intermediate Casing String	
***Stage 1**	
LEAD	
Top of MD	0
Bottom of MD	5000
Cement Type	35:65 POZ-Class C
Additives	6% Bentonite, 0.5% Fluidloss, 0.15% Retarder, 0.4pps Defoamer, 10.542 H2O GPS
# of SKS	1700
Yield (ft3/sk)	1.94
Density (lbs/gal)	12.6
Volume (ft3)	3298
Excess (%)	180%
TAIL	
Top of MD	5000
Bottom of MD	5600
Cement Type	Class H
Additives	0.3% Fluidloss, 5.216 H2O GPS
# of SKS	350
Yield (ft3/sk)	1.18
Density (lbs/gal)	15.6
Volume (ft3)	413
Excess (%)	140%
***Stage 2**	
Stage Tool Depth	+/- 3900'
LEAD	
Top of MD	0
Bottom of MD	3500
Cement Type	35:65 POZ-Class C
Additives	6% Bentonite, 0.5% Fluidloss, 0.15% Retarder, 0.4pps Defoamer, 10.543 H2O GPS
# of SKS	1200
Yield (ft3/sk)	1.94
Density (lbs/gal)	12.6
Volume (ft3)	2328
Excess (%)	200%
TAIL	
Top of MD	3500
Bottom of MD	3900
Cement Type	Class H

Additives	0.3% Fluidloss, 5.216 H2O GPS
# of SKS	200
Yield (ft3/sk)	1.18
Density (lbs/gal)	15.6
Volume (ft3)	236
Excess (%)	100%
***Stage 3**	
Stage Tool Depth	+/- 1900'
TAIL	
Top of MD	0
Bottom of MD	1900
Cement Type	Class C Neat
Additives	6.304 H2O GPS
# of SKS	700
Yield (ft3/sk)	1.32
Density (lbs/gal)	14.8
Volume (ft3)	924
Excess (%)	30%

7" Intermediate Liner:

Intermediate Casing String	
Lead	
Top of MD	0
Bottom of MD	5300
Cement Type	Class H
Additives	0.2% Retarder, 6.3 H2O GPS
# of SKS	820
Yield (ft3/sk)	1.18
Density (lbs/gal)	15.6
Volume (ft3)	968
Excess (%)	15%
Tail	
Top of MD	5300
Bottom of MD	10,700
Cement Type	PVL
Additives	1.3% Salt, 5% Expanding Cement, 0.5% Fluidloss, 0.3% Retarder, 0.1% Antisettling, 0.4 pps Defoamer, 8.621 H2O GPS
# of SKS	550

Yield (ft3/sk)	1.62
Density (lbs/gal)	12.6
Volume (ft3)	891
Excess (%)	30%

4-1/2" Production Liner:

Production Casing String	
TAIL	
Top of MD	10,200
Bottom of MD	18,500
Cement Type	50:50 POZ-Class H
Additives	5% Salt, 2% Bentonite, 0.5% Fluidloss, 0.2% Retarder, 0.2% Dispersant, 0.4pps Defoamer, 6.088 H2O GPS
# of SKS	700
Yield (ft3/sk)	1.34
Density (lbs/gal)	14.2
Volume (ft3)	938
Excess (%)	30%

Cement volumes are based on bringing cement to surface on all strings and TOC to ~10,200' (top of liner) on production.

Operator reserves the right to change cement designs as hole conditions may warrant.

1.5 Proposed Mud Program

Top TVD	Bottom TVD	Type	Max Mud Weight for Hole Control Design	Viscosity (sec/qt)
SURFACE	1,800	Fresh Water	9.0	28-38
1800	5,600	Brine	10.0	28-30
5,600	10,700	Cut Brine	9.2	28-30
10,700	TD	OBM	11.0	55-65

The operator must include the minimum design criteria, including casing loading assumptions and corresponding safety factors for burst, collapse, and tensions (body yield, and joint strength).

1.6 Casing Design

1.6.1 Drilling Design Analysis

Interval	Max TVD (ft)	Anticipated Mud Weight (ppg)	Estimated Max Pore Pressure (psi)	Internal Yield Strength (psi)	Collapse Strength (psi)	Joint Strength (lbs)	Body Strength (lbs)	Burst Safety Factor (Min 1.25)	Collpase Safety Factor (Min 1.25)	Tensile Safety Factor (Min 1.6)
Surface	1,800	8.5	780	2,730	1,130	909,000	853,000	3.5	1.42	4.3
Interm.	5,600	10	2,420	6,870	5,740	1,122,000	1,086,000	1.34	1.97	2.99
Interm. Liner	10,700	9.0	4,730	12,450	11,890	1,053,000	1,025,000	1.98	2.31	2.31
Prod.	11,300	10.5	5,880	12,420	10,690	443,000	422,000	1.26	1.89	1.91

Surface Casing Design Notes:

- **Burst Design Assumptions: Calculations assume complete evacuation behind pipe.**
- **Collapse Design Assumptions: Calculations assume complete evacuation inside pipe.**
- **Tension Design Assumptions: Calculations include 100,000 lb. max over-pull and do not consider the effects of buoyancy, with string held in tension.**

Intermediate Casing Design Notes:

- **Burst Design Assumptions: Calculations assume a .7psi/ft shoe test, and 0.22 psi/ft gas gradient.**
- **Collapse Design Assumptions: Calculations assume complete evacuation inside pipe.**
- **Tension Design Assumptions: Calculations include 100,000 lb. max over-pull and do not consider the effects of buoyancy, with string held in tension.**

Intermediate Liner w/ Tie-Back Design Notes:

- **Burst Design Assumptions: Calculations assume a .7psi/ft shoe test, and 0.22 psi/ft gas gradient.**
- **Collapse Design Assumptions: Calculations assume complete evacuation inside pipe.**
- **Tension Design Assumptions: Calculations include 100,000 lb. max over-pull and do not consider the effects of buoyancy, with string held in tension.**

Production Design Notes:

- **Burst Design Assumptions: Calculations assume surface frac pressure of 9500 psi along with a fluid gradient of 0.49psi/ft, with an external force equivalent to 0.44 psi/ft.**
- **Collapse Design Assumptions: Calculations assume complete evacuation inside pipe.**
- **Tension Design Assumptions: Calculations include 100,000 lb. max over-pull and do not consider the effects of buoyancy, with string held in tension.**

*Notes:

1) Collapse DSF: If < 1.125 calculations are required.
2) Burst DSF: If < 1.0 calculations are required.
3) Body Tensile DSF: If < 1.6 (dry) or < 1.8 (buoyant) calculations are required.
4) Joint Tensile DSF: If < 1.6 (dry) or < 1.8 (buoyant) calculations are required.
5) Will an offset pressure variance request be requested to meet safety factors? Max. 0.22 psi/ft. Please indicate offset pressure variance requested.

Mud weight increases at shoe depths are for pressure control. Mud weight increases in the curve and lateral sections of the hole are for hole stability, not pressure control. Mud weight assumptions for casing load designs exceed anticipated maximum mud weight for balanced drilling in all hole sections. Expected mud weights in the Upper Wolfcamp Horizontal will be 0.5 to 1.0 ppg greater than formation pressure (i.e. overbalanced drilling.)

The Mud System will run as a closed loop system with PVT monitoring. All drill cuttings and liquid mud will be hauled to an approved NMOCD site for disposal or soiled farmed upon receiving appropriate approval.

1.7 Completion Program and Casing Design

Hydraulic fracturing will occur through the production casing. The burst design calculation assumes TOC at surface and therefore, the backside of the production casing is not evacuated. The maximum pumping pressure is 10,000 psi with a maximum proppant fluid weight of 9.5 ppg. The design safety factor for burst is 1.25.

Upon request, operator will provide proof of cement bonding by bond log. Operator is responsible for log interpretation and certification prior to frac treatment.

Upon request, operator will provide estimated fracture lengths, flowback storage, volumes of fluids and amount of sand to be used, and number of stages of frac procedure. Furthermore, a report of the annulus pressures before and after each stage of treatment may be requested by the BLM. The report may include chemical additives (other than proprietary), dissolved solids in frac fluid, and depth of perforations.

1.8 Evaluation Program

Required Testing, Logging, and Coring procedures noted below:

- Mud Logging/Gamma Ray/MWD.
- Cased hole CBL on production casing.

1.9 Downhole Conditions

Zones of possible lost circulation:	Capitan Reef
Zones of possible abnormal pressure:	Upper Wolfcamp
Maximum bottom hole temperature:	200° F
Maximum bottom hole pressure:	5,880 psi or less.

1.10 Overview of Drilling Procedure

- Drill 17.5" surface hole to 1,800'; run 13.375" casing to 1,800' and cement to surface; install 10M stack, set isolation plug and test BOPE and casing independently to regulatory requirements.
- Drill 12.25" intermediate hole to 5,600', run 9.625" casing and cement; set isolation plug and test BOPE and casing independently to regulatory requirements.

- Drill 8-1/2" intermediate hole to approximately 10,700' and run 7" liner with a tie-back sleeve, and cement to top of liner set at +/- 5,300'.
- Drill 6" production hole to +/- 18,500'; run 4.5" liner from TD to +/- 10,200' and cement per cement program and test.
- Run 7" tie-back string from +/- 5300' to surface and cement per cement program, circulate cement to surface.

1.11 Overview of Completion for Equipment Sizing

- A Sundry Notice will be submitted with the proposed completion procedure prior to the job.

LEGACY RESERVES OPERATING, L. P.
HYDROGEN SULFIDE (H2S) CONTINGENCY PLAN
LEA UNIT 100H
Assumed 100 ppm ROE = 3000'

100 ppm H2S concentration shall trigger activation of this plan.

This is an open drilling site. H_2S monitoring equipment and emergency response equipment will be rigged up and in use when the company drills out from under surface casing. H_2S monitors, warning signs, wind indicators and flags will be in use.

A. All personnel shall receive proper H2S training in accordance with Onshore Order 6 III.C.3.a

B. Briefing Area: Two perpendicular areas will be designated by signs and readily accessible.

C. Required Emergency Equipment:
- Well control equipment
  a. Flare line 150' from wellhead to be ignited by flare gun.
  b. Choke manifold with a remotely operated choke.
  c. Mud/Gas Separator.

- Protective Equipment for essential personnel.
  Breathing apparatus:
  a. Rescue Packs (SCBA) – 1 unit shall be placed at each briefing area. 2 units shall be stored in the safety trailer.
  b. Work/Escape packs – 4 packs shall be stored on the rig floor with sufficient air hose not to restrict work activity.
  c. Emergency Escape Packs – 4 packs shall be stored in the doghouse for emergency evacuation.

  Auxiliary Rescue Equipment:
  a. Stretcher
  b. Two OSHA full body harness
  c. 100 ft. 5/8" OSHA approved rope
  d. One 20# class ABC fire extinguisher

- H2S detection and monitoring Equipment:
  The stationary detector with three sensors will be placed in the upper doghouse, set to visually alarm @ 10 ppm and audible @ 14 ppm. Calibrate a minimum of every 30 days or as needed. The sensors will be placed in the following places: Rig floor, Bell nipple, end of flare line or where well bore fluid is being discharged (Gas sample tubes will be stored in the safety trailer).

- Visual warning systems.
  a. One color code condition sign will be placed at the entrance to the site reflecting the possible conditions at the site.
  b. A colored condition flag will be on display, reflecting the current condition, at the drilling site.
  c. Two wind socks will be placed in strategic locations being visible from all angles.

- Mud Program:
  The mud program has been designated to minimize the volume of H2S circulated to surface. The operator will have the necessary mud products to minimize hazards while drilling in H2S bearing zones.

- Metallurgy:
  a. All drill strings, casings, tubing, wellhead, blowout preventer, drilling spool, kill lines, choke manifold and lines, shall be suitable for H2S service.
  b. All elastomers used for packing and seals shall be H2S trim.

- Communication:
  Communication will be via two way radio in emergency and company vehicles. Cell phones and land lines where available.

H_2S Operations

Though no H_2S is anticipated during the drilling operation, this contingency plan will provide for methods to ensure the well is kept under control in the event an H_2S reading of 100 ppm or more are encountered. Once personnel are safe and the proper protective gear is in place and on personnel, the operator and rig crew essential personnel will ensure the well is under control, suspend drilling operations and shut-in the well (unless pressure build up or other operational situations dictate suspending operations will prevent well control), increase the mud weight and circulate all gas from the hole utilizing the mud/gas separator downstream of the choke, the choke manifold and the emergency flare system located 150' from the well. Bring the mud system into compliance and the H_2S level below 10 ppm, then notify all emergency officers that drilling ahead is practical and safe.

Proceed with drilling ahead only after all provisions of Onshore Order 6, Section III.C. have been satisfied.

Ignition of Gas source

Should control of the well be considered lost and ignition considered, take care to protect against exposure to Sulfur Dioxide (SO_2). Intentional ignition must be coordinated with the

NMOCD and local officials. Additionally the NM State Police may become involved. NM State Police shall be the Incident Command on scene of any major release. Take care to protect downwind whenever this is an ignition of the gas.

Characteristics of H_2S and SO_2

Common Name	Chemical Formula	Specific Gravity	Threshold Limit	Hazardous Limit	Lethal Concentration
Hydrogen Sulfide	H_2S	1.189 Air = I	10 ppm	100 ppm/hr	600 ppm
Sulfur Dioxide	SO_2	2.21 Air = I	2 ppm	N/A	1000 ppm

Contacting Authorities

Legacy Reserves Operating's personnel must liaison with local and state agencies to ensure a proper response to a major release. Additionally, the OCD must be notified of the release as soon as possible but no later than 4 hours. Agencies will ask for information such as type and volume of release, wind direction, location of release, etc. Be prepared with all information available including directions to site. The following call list of essential and potential responders has been prepared for use during a release. Legacy's response must be in coordination with the State of New Mexico's "Hazardous Materials Emergency Response Plan" (HMER).

Emergency Assistance Telephone List

PUBLIC SAFETY:	***911 or***
Lea County Sheriff or Police	**(575) 396-3611**
Fire Department	**(575) 397-9308**
Hospital	**(575) 492-5000**
Ambulance	**911**
Department of Public Safety	**(392) 392-5588**
Oil Conservation Division	**(575) 748-1823**
New Mexico Energy, Minerals & Natural Resources Department	**(575) 748-1283**

LEGACY RESERVES OPERATING LP	
Legacy Reserves Operating LP	**Office: (432) 689-5200**
Drilling Manager:	**Office: (432) 689-5200**
Daniel Breeding	**Cell: (432) 853-1680**
Drilling Engineer:	**Office: (432) 689-5200**
Matthew Dickson	**Cell: (432) 212-5698**
Operations Manager:	**Office: (432) 689-5200**
Gregg Skelton	

Legacy Company Representative:	**Cell: (432) 631-8469**

DRILLING CONTRACTOR-McVAY

Tool Pusher:	
Olin Vaught	**Cell: (575) 631-7799**
Drilling Manager:	**Office: (575) 397-3311**
Michael McVay	**Cell: (575) 602-1839**

LEGACY SAFETY ***Hobbs (575) 393-7233***

EHS Coordinator:	
Field Operations Manager:	**Office: (432) 689-5200**
Randy Williams	**Cell: (432) 260-5566**
Field Safety Technician:	**Office: (432) 689-5200**
Randy Turner	**Cell: (432) 536-6473**

Evacuee Description:
Residents: THERE ARE NO RESIDENTS WITHIN 3000' ROE.

MOTIVE
DRILLING TECHNOLOGIES

Legacy Reserves

Lea County, NM (NAD83)
Lea
Lea Unit #100H

Original Wellbore

Plan: Plan 1

Standard Planning Report

20 March, 2018

LEGACY
RESERVES

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well Lea Unit #100H
Company:	Legacy Reserves	**TVD Reference:**	RKB @ 3683.0usft
Project:	Lea County, NM (NAD83)	**MD Reference:**	RKB @ 3683.0usft
Site:	Lea	**North Reference:**	Grid
Well:	Lea Unit #100H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Original Wellbore		
Design:	Plan 1		

Project	Lea County, NM (NAD83)
Map System:	US State Plane 1983
Geo Datum:	North American Datum 1983
Map Zone:	New Mexico Eastern Zone
System Datum:	Mean Sea Level

Site	Lea				
Site Position:		**Northing:**	567,587.00 usft	**Latitude:**	32° 33' 27.391 N
From:	Map	**Easting:**	797,256.10 usft	**Longitude:**	103° 30' 9.733 W
Position Uncertainty:	0.0 usft	**Slot Radius:**	13-3/16 "	**Grid Convergence:**	0.45 °

Well	Lea Unit #100H					
Well Position	**+N/-S**	13,361.9 usft	**Northing:**	580,948.89 usft	**Latitude:**	32° 35' 40.204 N
	+E/-W	-7,939.1 usft	**Easting:**	789,317.00 usft	**Longitude:**	103° 31' 41.308 W
Position Uncertainty		0.0 usft	**Wellhead Elevation:**	3,683.0 usft	**Ground Level:**	3,665.0 usft

Wellbore	Original Wellbore				
Magnetics	**Model Name**	**Sample Date**	**Declination (°)**	**Dip Angle (°)**	**Field Strength (nT)**
	HDGM	2/27/2018	6.73	60.60	48,251

Design	Plan 1				
Audit Notes:					
Version:		**Phase:**	PROTOTYPE	**Tie On Depth:**	0.0
Vertical Section:	**Depth From (TVD) (usft)**	**+N/-S (usft)**	**+E/-W (usft)**	**Direction (°)**	
	0.0	0.0	0.0	182.78	

Plan Sections

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,737.2	11.06	251.32	1,732.6	-22.7	-67.2	1.50	1.50	0.00	251.32	
3,301.0	11.06	251.32	3,267.4	-118.8	-351.3	0.00	0.00	0.00	0.00	
4,038.2	0.00	0.00	4,000.0	-141.5	-418.5	1.50	-1.50	0.00	180.00	
10,860.7	0.00	0.00	10,822.6	-141.5	-418.5	0.00	0.00	0.00	0.00	
11,610.7	90.00	179.56	11,300.0	-619.0	-414.8	12.00	12.00	0.00	179.56	
11,678.0	90.00	179.56	11,300.0	-686.2	-414.3	0.00	0.00	0.00	0.00	
18,443.2	90.00	179.56	11,300.0	-7,451.2	-361.9	0.00	0.00	0.00	0.00	BHL-100H

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Site:	Lea	**North Reference:**	Grid
Well:	Lea Unit #100H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Original Wellbore		
Design:	Plan 1		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	0.00
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	0.00
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00
1,100.0	1.50	251.32	1,100.0	-0.4	-1.2	0.5	1.50	1.50	0.00
1,200.0	3.00	251.32	1,199.9	-1.7	-5.0	1.9	1.50	1.50	0.00
1,300.0	4.50	251.32	1,299.7	-3.8	-11.2	4.3	1.50	1.50	0.00
1,400.0	6.00	251.32	1,399.3	-6.7	-19.8	7.7	1.50	1.50	0.00
1,500.0	7.50	251.32	1,498.6	-10.5	-31.0	12.0	1.50	1.50	0.00
1,600.0	9.00	251.32	1,597.5	-15.1	-44.5	17.2	1.50	1.50	0.00
1,700.0	10.50	251.32	1,696.1	-20.5	-60.6	23.4	1.50	1.50	0.00
1,737.2	11.06	251.32	1,732.6	-22.7	-67.2	25.9	1.50	1.50	0.00
1,800.0	11.06	251.32	1,794.3	-26.6	-78.6	30.4	0.00	0.00	0.00
1,900.0	11.06	251.32	1,892.4	-32.7	-96.8	37.4	0.00	0.00	0.00
2,000.0	11.06	251.32	1,990.6	-38.9	-114.9	44.4	0.00	0.00	0.00
2,100.0	11.06	251.32	2,088.7	-45.0	-133.1	51.4	0.00	0.00	0.00
2,200.0	11.06	251.32	2,186.8	-51.1	-151.3	58.4	0.00	0.00	0.00
2,300.0	11.06	251.32	2,285.0	-57.3	-169.4	65.4	0.00	0.00	0.00
2,400.0	11.06	251.32	2,383.1	-63.4	-187.6	72.5	0.00	0.00	0.00
2,500.0	11.06	251.32	2,481.3	-69.6	-205.8	79.5	0.00	0.00	0.00
2,600.0	11.06	251.32	2,579.4	-75.7	-224.0	86.5	0.00	0.00	0.00
2,700.0	11.06	251.32	2,677.6	-81.9	-242.1	93.5	0.00	0.00	0.00
2,800.0	11.06	251.32	2,775.7	-88.0	-260.3	100.5	0.00	0.00	0.00
2,900.0	11.06	251.32	2,873.8	-94.2	-278.5	107.5	0.00	0.00	0.00
3,000.0	11.06	251.32	2,972.0	-100.3	-296.6	114.6	0.00	0.00	0.00
3,100.0	11.06	251.32	3,070.1	-106.4	-314.8	121.6	0.00	0.00	0.00
3,200.0	11.06	251.32	3,168.3	-112.6	-333.0	128.6	0.00	0.00	0.00
3,301.0	11.06	251.32	3,267.4	-118.8	-351.3	135.7	0.00	0.00	0.00
3,400.0	9.57	251.32	3,364.8	-124.5	-368.1	142.2	1.50	-1.50	0.00
3,500.0	8.07	251.32	3,463.6	-129.4	-382.6	147.8	1.50	-1.50	0.00
3,600.0	6.57	251.32	3,562.8	-133.5	-394.7	152.5	1.50	-1.50	0.00
3,700.0	5.07	251.32	3,662.3	-136.7	-404.3	156.2	1.50	-1.50	0.00
3,800.0	3.57	251.32	3,762.0	-139.1	-411.5	158.9	1.50	-1.50	0.00
3,900.0	2.07	251.32	3,861.9	-140.7	-416.1	160.7	1.50	-1.50	0.00
4,000.0	0.57	251.32	3,961.8	-141.4	-418.3	161.6	1.50	-1.50	0.00
4,038.2	0.00	0.00	4,000.0	-141.5	-418.5	161.6	1.50	-1.50	0.00
4,100.0	0.00	0.00	4,061.8	-141.5	-418.5	161.6	0.00	0.00	0.00
4,200.0	0.00	0.00	4,161.8	-141.5	-418.5	161.6	0.00	0.00	0.00
4,300.0	0.00	0.00	4,261.8	-141.5	-418.5	161.6	0.00	0.00	0.00
4,400.0	0.00	0.00	4,361.8	-141.5	-418.5	161.6	0.00	0.00	0.00
4,500.0	0.00	0.00	4,461.8	-141.5	-418.5	161.6	0.00	0.00	0.00
4,600.0	0.00	0.00	4,561.8	-141.5	-418.5	161.6	0.00	0.00	0.00
4,700.0	0.00	0.00	4,661.8	-141.5	-418.5	161.6	0.00	0.00	0.00
4,800.0	0.00	0.00	4,761.8	-141.5	-418.5	161.6	0.00	0.00	0.00
4,900.0	0.00	0.00	4,861.8	-141.5	-418.5	161.6	0.00	0.00	0.00
5,000.0	0.00	0.00	4,961.8	-141.5	-418.5	161.6	0.00	0.00	0.00
5,100.0	0.00	0.00	5,061.8	-141.5	-418.5	161.6	0.00	0.00	0.00

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Site:	Lea	**North Reference:**	Grid
Well:	Lea Unit #100H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Original Wellbore		
Design:	Plan 1		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,200.0	0.00	0.00	5,161.8	-141.5	-418.5	161.6	0.00	0.00	0.00
5,300.0	0.00	0.00	5,261.8	-141.5	-418.5	161.6	0.00	0.00	0.00
5,400.0	0.00	0.00	5,361.8	-141.5	-418.5	161.6	0.00	0.00	0.00
5,500.0	0.00	0.00	5,461.8	-141.5	-418.5	161.6	0.00	0.00	0.00
5,600.0	0.00	0.00	5,561.8	-141.5	-418.5	161.6	0.00	0.00	0.00
5,700.0	0.00	0.00	5,661.8	-141.5	-418.5	161.6	0.00	0.00	0.00
5,800.0	0.00	0.00	5,761.8	-141.5	-418.5	161.6	0.00	0.00	0.00
5,900.0	0.00	0.00	5,861.8	-141.5	-418.5	161.6	0.00	0.00	0.00
6,000.0	0.00	0.00	5,961.8	-141.5	-418.5	161.6	0.00	0.00	0.00
6,100.0	0.00	0.00	6,061.8	-141.5	-418.5	161.6	0.00	0.00	0.00
6,200.0	0.00	0.00	6,161.8	-141.5	-418.5	161.6	0.00	0.00	0.00
6,300.0	0.00	0.00	6,261.8	-141.5	-418.5	161.6	0.00	0.00	0.00
6,400.0	0.00	0.00	6,361.8	-141.5	-418.5	161.6	0.00	0.00	0.00
6,500.0	0.00	0.00	6,461.8	-141.5	-418.5	161.6	0.00	0.00	0.00
6,600.0	0.00	0.00	6,561.8	-141.5	-418.5	161.6	0.00	0.00	0.00
6,700.0	0.00	0.00	6,661.8	-141.5	-418.5	161.6	0.00	0.00	0.00
6,800.0	0.00	0.00	6,761.8	-141.5	-418.5	161.6	0.00	0.00	0.00
6,900.0	0.00	0.00	6,861.8	-141.5	-418.5	161.6	0.00	0.00	0.00
7,000.0	0.00	0.00	6,961.8	-141.5	-418.5	161.6	0.00	0.00	0.00
7,100.0	0.00	0.00	7,061.8	-141.5	-418.5	161.6	0.00	0.00	0.00
7,200.0	0.00	0.00	7,161.8	-141.5	-418.5	161.6	0.00	0.00	0.00
7,300.0	0.00	0.00	7,261.8	-141.5	-418.5	161.6	0.00	0.00	0.00
7,400.0	0.00	0.00	7,361.8	-141.5	-418.5	161.6	0.00	0.00	0.00
7,500.0	0.00	0.00	7,461.8	-141.5	-418.5	161.6	0.00	0.00	0.00
7,600.0	0.00	0.00	7,561.8	-141.5	-418.5	161.6	0.00	0.00	0.00
7,700.0	0.00	0.00	7,661.8	-141.5	-418.5	161.6	0.00	0.00	0.00
7,800.0	0.00	0.00	7,761.8	-141.5	-418.5	161.6	0.00	0.00	0.00
7,900.0	0.00	0.00	7,861.8	-141.5	-418.5	161.6	0.00	0.00	0.00
8,000.0	0.00	0.00	7,961.8	-141.5	-418.5	161.6	0.00	0.00	0.00
8,100.0	0.00	0.00	8,061.8	-141.5	-418.5	161.6	0.00	0.00	0.00
8,200.0	0.00	0.00	8,161.8	-141.5	-418.5	161.6	0.00	0.00	0.00
8,300.0	0.00	0.00	8,261.8	-141.5	-418.5	161.6	0.00	0.00	0.00
8,400.0	0.00	0.00	8,361.8	-141.5	-418.5	161.6	0.00	0.00	0.00
8,500.0	0.00	0.00	8,461.8	-141.5	-418.5	161.6	0.00	0.00	0.00
8,600.0	0.00	0.00	8,561.8	-141.5	-418.5	161.6	0.00	0.00	0.00
8,700.0	0.00	0.00	8,661.8	-141.5	-418.5	161.6	0.00	0.00	0.00
8,800.0	0.00	0.00	8,761.8	-141.5	-418.5	161.6	0.00	0.00	0.00
8,900.0	0.00	0.00	8,861.8	-141.5	-418.5	161.6	0.00	0.00	0.00
9,000.0	0.00	0.00	8,961.8	-141.5	-418.5	161.6	0.00	0.00	0.00
9,100.0	0.00	0.00	9,061.8	-141.5	-418.5	161.6	0.00	0.00	0.00
9,200.0	0.00	0.00	9,161.8	-141.5	-418.5	161.6	0.00	0.00	0.00
9,300.0	0.00	0.00	9,261.8	-141.5	-418.5	161.6	0.00	0.00	0.00
9,400.0	0.00	0.00	9,361.8	-141.5	-418.5	161.6	0.00	0.00	0.00
9,500.0	0.00	0.00	9,461.8	-141.5	-418.5	161.6	0.00	0.00	0.00
9,600.0	0.00	0.00	9,561.8	-141.5	-418.5	161.6	0.00	0.00	0.00
9,700.0	0.00	0.00	9,661.8	-141.5	-418.5	161.6	0.00	0.00	0.00
9,800.0	0.00	0.00	9,761.8	-141.5	-418.5	161.6	0.00	0.00	0.00
9,900.0	0.00	0.00	9,861.8	-141.5	-418.5	161.6	0.00	0.00	0.00
10,000.0	0.00	0.00	9,961.8	-141.5	-418.5	161.6	0.00	0.00	0.00
10,100.0	0.00	0.00	10,061.8	-141.5	-418.5	161.6	0.00	0.00	0.00
10,200.0	0.00	0.00	10,161.8	-141.5	-418.5	161.6	0.00	0.00	0.00
10,300.0	0.00	0.00	10,261.8	-141.5	-418.5	161.6	0.00	0.00	0.00
10,400.0	0.00	0.00	10,361.8	-141.5	-418.5	161.6	0.00	0.00	0.00

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well Lea Unit #100H
Company:	Legacy Reserves	**TVD Reference:**	RKB @ 3683.0usft
Project:	Lea County, NM (NAD83)	**MD Reference:**	RKB @ 3683.0usft
Site:	Lea	**North Reference:**	Grid
Well:	Lea Unit #100H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Original Wellbore		
Design:	Plan 1		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
10,500.0	0.00	0.00	10,461.8	-141.5	-418.5	161.6	0.00	0.00	0.00
10,600.0	0.00	0.00	10,561.8	-141.5	-418.5	161.6	0.00	0.00	0.00
10,700.0	0.00	0.00	10,661.8	-141.5	-418.5	161.6	0.00	0.00	0.00
10,800.0	0.00	0.00	10,761.8	-141.5	-418.5	161.6	0.00	0.00	0.00
10,860.7	0.00	0.00	10,822.6	-141.5	-418.5	161.6	0.00	0.00	0.00
10,875.0	1.71	179.56	10,836.8	-141.7	-418.5	161.8	12.00	12.00	0.00
10,900.0	4.71	179.56	10,861.8	-143.1	-418.5	163.2	12.00	12.00	0.00
10,925.0	7.71	179.56	10,886.6	-145.8	-418.5	165.9	12.00	12.00	0.00
10,950.0	10.71	179.56	10,911.3	-149.8	-418.4	169.9	12.00	12.00	0.00
10,975.0	13.71	179.56	10,935.7	-155.1	-418.4	175.2	12.00	12.00	0.00
11,000.0	16.71	179.56	10,959.9	-161.7	-418.3	181.8	12.00	12.00	0.00
11,025.0	19.71	179.56	10,983.6	-169.5	-418.3	189.6	12.00	12.00	0.00
11,050.0	22.71	179.56	11,006.9	-178.5	-418.2	198.6	12.00	12.00	0.00
11,075.0	25.71	179.56	11,029.7	-188.8	-418.1	208.8	12.00	12.00	0.00
11,100.0	28.71	179.56	11,051.9	-200.2	-418.0	220.2	12.00	12.00	0.00
11,125.0	31.71	179.56	11,073.5	-212.8	-418.0	232.8	12.00	12.00	0.00
11,150.0	34.71	179.56	11,094.5	-226.5	-417.8	246.5	12.00	12.00	0.00
11,175.0	37.71	179.56	11,114.6	-241.2	-417.7	261.2	12.00	12.00	0.00
11,200.0	40.71	179.56	11,134.0	-257.0	-417.6	277.0	12.00	12.00	0.00
11,225.0	43.71	179.56	11,152.5	-273.8	-417.5	293.8	12.00	12.00	0.00
11,250.0	46.71	179.56	11,170.1	-291.6	-417.3	311.5	12.00	12.00	0.00
11,275.0	49.71	179.56	11,186.8	-310.2	-417.2	330.1	12.00	12.00	0.00
11,300.0	52.71	179.56	11,202.4	-329.7	-417.1	349.5	12.00	12.00	0.00
11,325.0	55.71	179.56	11,217.1	-350.0	-416.9	369.8	12.00	12.00	0.00
11,350.0	58.71	179.56	11,230.6	-371.0	-416.7	390.8	12.00	12.00	0.00
11,375.0	61.71	179.56	11,243.0	-392.7	-416.6	412.4	12.00	12.00	0.00
11,400.0	64.71	179.56	11,254.3	-415.0	-416.4	434.7	12.00	12.00	0.00
11,425.0	67.71	179.56	11,264.4	-437.9	-416.2	457.5	12.00	12.00	0.00
11,450.0	70.71	179.56	11,273.2	-461.2	-416.0	480.9	12.00	12.00	0.00
11,475.0	73.71	179.56	11,280.9	-485.0	-415.9	504.6	12.00	12.00	0.00
11,500.0	76.71	179.56	11,287.3	-509.2	-415.7	528.8	12.00	12.00	0.00
11,525.0	79.71	179.56	11,292.4	-533.7	-415.5	553.2	12.00	12.00	0.00
11,550.0	82.71	179.56	11,296.2	-558.4	-415.3	577.9	12.00	12.00	0.00
11,575.0	85.71	179.56	11,298.7	-583.2	-415.1	602.7	12.00	12.00	0.00
11,600.0	88.71	179.56	11,299.9	-608.2	-414.9	627.6	12.00	12.00	0.00
11,610.7	90.00	179.56	11,300.0	-619.0	-414.8	638.3	12.00	12.00	0.00
11,678.0	90.00	179.56	11,300.0	-686.2	-414.3	705.5	0.00	0.00	0.00
11,700.0	90.00	179.56	11,300.0	-708.2	-414.1	727.5	0.00	0.00	0.00
11,800.0	90.00	179.56	11,300.0	-808.2	-413.4	827.3	0.00	0.00	0.00
11,900.0	90.00	179.56	11,300.0	-908.2	-412.6	927.1	0.00	0.00	0.00
12,000.0	90.00	179.56	11,300.0	-1,008.2	-411.8	1,027.0	0.00	0.00	0.00
12,100.0	90.00	179.56	11,300.0	-1,108.2	-411.1	1,126.8	0.00	0.00	0.00
12,200.0	90.00	179.56	11,300.0	-1,208.2	-410.3	1,226.7	0.00	0.00	0.00
12,300.0	90.00	179.56	11,300.0	-1,308.2	-409.5	1,326.5	0.00	0.00	0.00
12,400.0	90.00	179.56	11,300.0	-1,408.2	-408.8	1,426.4	0.00	0.00	0.00
12,500.0	90.00	179.56	11,300.0	-1,508.2	-408.0	1,526.2	0.00	0.00	0.00
12,600.0	90.00	179.56	11,300.0	-1,608.2	-407.2	1,626.0	0.00	0.00	0.00
12,700.0	90.00	179.56	11,300.0	-1,708.2	-406.5	1,725.9	0.00	0.00	0.00
12,800.0	90.00	179.56	11,300.0	-1,808.2	-405.7	1,825.7	0.00	0.00	0.00
12,900.0	90.00	179.56	11,300.0	-1,908.2	-404.9	1,925.6	0.00	0.00	0.00
13,000.0	90.00	179.56	11,300.0	-2,008.2	-404.2	2,025.4	0.00	0.00	0.00
13,100.0	90.00	179.56	11,300.0	-2,108.2	-403.4	2,125.2	0.00	0.00	0.00
13,200.0	90.00	179.56	11,300.0	-2,208.2	-402.6	2,225.1	0.00	0.00	0.00

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well Lea Unit #100H
Company:	Legacy Reserves	**TVD Reference:**	RKB @ 3683.0usft
Project:	Lea County, NM (NAD83)	**MD Reference:**	RKB @ 3683.0usft
Site:	Lea	**North Reference:**	Grid
Well:	Lea Unit #100H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Original Wellbore		
Design:	Plan 1		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
13,300.0	90.00	179.56	11,300.0	-2,308.2	-401.9	2,324.9	0.00	0.00	0.00
13,400.0	90.00	179.56	11,300.0	-2,408.1	-401.1	2,424.8	0.00	0.00	0.00
13,500.0	90.00	179.56	11,300.0	-2,508.1	-400.3	2,524.6	0.00	0.00	0.00
13,600.0	90.00	179.56	11,300.0	-2,608.1	-399.6	2,624.5	0.00	0.00	0.00
13,700.0	90.00	179.56	11,300.0	-2,708.1	-398.8	2,724.3	0.00	0.00	0.00
13,800.0	90.00	179.56	11,300.0	-2,808.1	-398.0	2,824.1	0.00	0.00	0.00
13,900.0	90.00	179.56	11,300.0	-2,908.1	-397.3	2,924.0	0.00	0.00	0.00
14,000.0	90.00	179.56	11,300.0	-3,008.1	-396.5	3,023.8	0.00	0.00	0.00
14,100.0	90.00	179.56	11,300.0	-3,108.1	-395.7	3,123.7	0.00	0.00	0.00
14,200.0	90.00	179.56	11,300.0	-3,208.1	-394.9	3,223.5	0.00	0.00	0.00
14,300.0	90.00	179.56	11,300.0	-3,308.1	-394.2	3,323.4	0.00	0.00	0.00
14,400.0	90.00	179.56	11,300.0	-3,408.1	-393.4	3,423.2	0.00	0.00	0.00
14,500.0	90.00	179.56	11,300.0	-3,508.1	-392.6	3,523.0	0.00	0.00	0.00
14,600.0	90.00	179.56	11,300.0	-3,608.1	-391.9	3,622.9	0.00	0.00	0.00
14,700.0	90.00	179.56	11,300.0	-3,708.1	-391.1	3,722.7	0.00	0.00	0.00
14,800.0	90.00	179.56	11,300.0	-3,808.1	-390.3	3,822.6	0.00	0.00	0.00
14,900.0	90.00	179.56	11,300.0	-3,908.1	-389.6	3,922.4	0.00	0.00	0.00
15,000.0	90.00	179.56	11,300.0	-4,008.1	-388.8	4,022.2	0.00	0.00	0.00
15,100.0	90.00	179.56	11,300.0	-4,108.1	-388.0	4,122.1	0.00	0.00	0.00
15,200.0	90.00	179.56	11,300.0	-4,208.1	-387.3	4,221.9	0.00	0.00	0.00
15,300.0	90.00	179.56	11,300.0	-4,308.1	-386.5	4,321.8	0.00	0.00	0.00
15,400.0	90.00	179.56	11,300.0	-4,408.1	-385.7	4,421.6	0.00	0.00	0.00
15,500.0	90.00	179.56	11,300.0	-4,508.1	-385.0	4,521.5	0.00	0.00	0.00
15,600.0	90.00	179.56	11,300.0	-4,608.1	-384.2	4,621.3	0.00	0.00	0.00
15,700.0	90.00	179.56	11,300.0	-4,708.1	-383.4	4,721.1	0.00	0.00	0.00
15,800.0	90.00	179.56	11,300.0	-4,808.1	-382.7	4,821.0	0.00	0.00	0.00
15,900.0	90.00	179.56	11,300.0	-4,908.1	-381.9	4,920.8	0.00	0.00	0.00
16,000.0	90.00	179.56	11,300.0	-5,008.1	-381.1	5,020.7	0.00	0.00	0.00
16,100.0	90.00	179.56	11,300.0	-5,108.1	-380.4	5,120.5	0.00	0.00	0.00
16,200.0	90.00	179.56	11,300.0	-5,208.1	-379.6	5,220.3	0.00	0.00	0.00
16,300.0	90.00	179.56	11,300.0	-5,308.1	-378.8	5,320.2	0.00	0.00	0.00
16,400.0	90.00	179.56	11,300.0	-5,408.1	-378.1	5,420.0	0.00	0.00	0.00
16,500.0	90.00	179.56	11,300.0	-5,508.1	-377.3	5,519.9	0.00	0.00	0.00
16,600.0	90.00	179.56	11,300.0	-5,608.1	-376.5	5,619.7	0.00	0.00	0.00
16,700.0	90.00	179.56	11,300.0	-5,708.1	-375.7	5,719.6	0.00	0.00	0.00
16,800.0	90.00	179.56	11,300.0	-5,808.0	-375.0	5,819.4	0.00	0.00	0.00
16,900.0	90.00	179.56	11,300.0	-5,908.0	-374.2	5,919.2	0.00	0.00	0.00
17,000.0	90.00	179.56	11,300.0	-6,008.0	-373.4	6,019.1	0.00	0.00	0.00
17,100.0	90.00	179.56	11,300.0	-6,108.0	-372.7	6,118.9	0.00	0.00	0.00
17,200.0	90.00	179.56	11,300.0	-6,208.0	-371.9	6,218.8	0.00	0.00	0.00
17,300.0	90.00	179.56	11,300.0	-6,308.0	-371.1	6,318.6	0.00	0.00	0.00
17,400.0	90.00	179.56	11,300.0	-6,408.0	-370.4	6,418.5	0.00	0.00	0.00
17,500.0	90.00	179.56	11,300.0	-6,508.0	-369.6	6,518.3	0.00	0.00	0.00
17,600.0	90.00	179.56	11,300.0	-6,608.0	-368.8	6,618.1	0.00	0.00	0.00
17,700.0	90.00	179.56	11,300.0	-6,708.0	-368.1	6,718.0	0.00	0.00	0.00
17,800.0	90.00	179.56	11,300.0	-6,808.0	-367.3	6,817.8	0.00	0.00	0.00
17,900.0	90.00	179.56	11,300.0	-6,908.0	-366.5	6,917.7	0.00	0.00	0.00
18,000.0	90.00	179.56	11,300.0	-7,008.0	-365.8	7,017.5	0.00	0.00	0.00
18,100.0	90.00	179.56	11,300.0	-7,108.0	-365.0	7,117.3	0.00	0.00	0.00
18,200.0	90.00	179.56	11,300.0	-7,208.0	-364.2	7,217.2	0.00	0.00	0.00
18,300.0	90.00	179.56	11,300.0	-7,308.0	-363.5	7,317.0	0.00	0.00	0.00
18,400.0	90.00	179.56	11,300.0	-7,408.0	-362.7	7,416.9	0.00	0.00	0.00
18,443.2	90.00	179.56	11,300.0	-7,451.2	-361.9	7,460.0	0.00	0.00	0.00

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well Lea Unit #100H
Company:	Legacy Reserves	**TVD Reference:**	RKB @ 3683.0usft
Project:	Lea County, NM (NAD83)	**MD Reference:**	RKB @ 3683.0usft
Site:	Lea	**North Reference:**	Grid
Well:	Lea Unit #100H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Original Wellbore		
Design:	Plan 1		

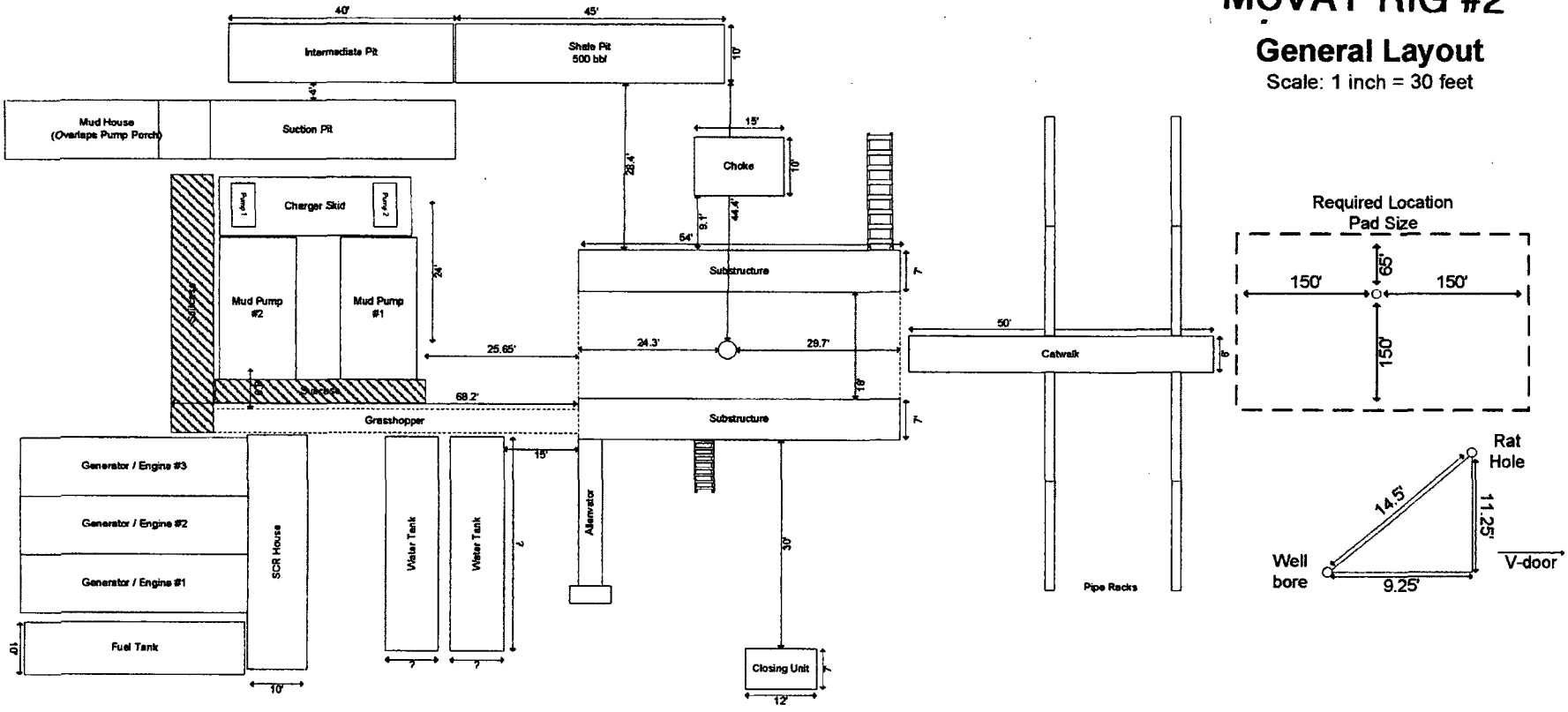
Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
FTP-100H - plan misses target center by 0.4usft at 11080.9usft MD (11035.1 TVD, -191.4 N, -418.1 E) - Point	0.00	0.00	11,035.0	-191.5	-418.5	580,757.40	788,898.50	32° 35' 38.340 N	103° 31' 46.216 W
BHL-100H - plan hits target center - Point	0.00	0.00	11,300.0	-7,451.2	-361.9	573,497.70	788,955.10	32° 34' 26.505 N	103° 31' 46.196 W

MCVAY RIG #2

General Layout

Scale: 1 inch = 30 feet



Required Location
Pad Size

Midwest Hose & Specialty, Inc.

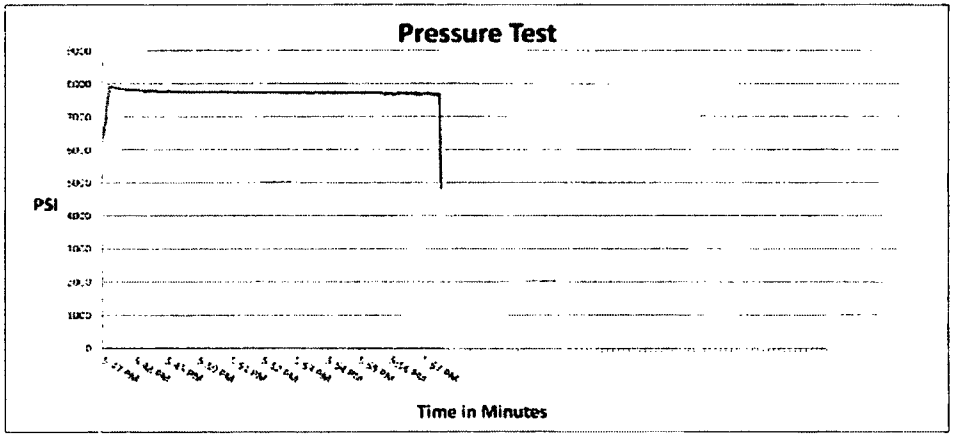
Internal Hydrostatic Test Graph

February 19, 2017

Customer: Hobbs

Pick Ticket #: 384842

Hose Specifications		Verification	
Hose Type	**Length**	**Type of Fitting**	**Coupling Method**
D	20'	4 1/2" SK	Swage
I.D.	**O.D.**	**Die Size**	**Final O.D.**
4.5"	5.03"	5.62"	5.55"
Working Pressure	**Burst Pressure**	**Hose Serial #**	**Hose Assembly Serial #**
5000 PSI	[illegible]	10928	384842



Test Pressure	Time Held at Test Pressure	Actual Burst Pressure	Peak Pressure
7500 PSI	30 2/4 Minutes		[illegible] PSI

Comments: Hose assembly pressure tested with water at ambient temperature

Tested By: Richard Davis

Approved By: [illegible]