DRILLING PLAN LEA UNIT 56H LEGACY RESERVES OPERATING LP SHL: Unit B, Section 11 BHL: Unit G, Section 14 T20S-R34E, Lea County, New Mexico

To satisfy requirements of Onshore Oil and Gas Order No. 1, Legacy Reserves Operating LP submits the following for your consideration:

 1.
 Location:
 SHL:
 170' FNL & 1640' FEL, Sec.11, T20S-R34E (First Take: 330 FNL & 1696 FEL)

 BHL:
 2310' FNL & 2210' FEL, Sec. 14, T20S-R34E (Last Take)

2. *Elevations:* 3,662' GL

3.	Geological Name of Surface Formation:	Quaternary alluvium deposits
4.	Drilling Tools and Associated Equipment:	Rotary drilling rig using fluid as a means for removal of solid cuttings from the well.

5. Proposed Drilling Depth: 16,993' MD 9,800' TVD

6. Estimated Tops of Geological Markers:

Rustler	1,680'	Delaware	5,666'
Top Salt	1,720'	Bone Spring Lime	8,205'
Bottom Salt	3,150'	Avalon	8,760'
Top of Capitan Reef	3,150'	1 st . Bone Spring	9,501'
Capitan Reef Bottom	4,710'		
San Andres	4,710'		

7. Possible mineral bearing formations:

Primary: Bone Spring (oil); Secondary: Delaware (oil), Avalon (oil), fresh water (~125')

8. Proposed Mud System:

Depth	Mud Wt.	Visc	Fluid Loss	Type Mud
0' to 1800'	8.4-8.9	30-32	NC	Fresh water gel spud mud
1800' to 5600'	9.8-10	28-29	NC	Brine water
5600' to 9,800'	8.4-8.6	28-29	NC	Fresh water/brine, use hi-viscosity
				sweeps to clean hole
9,800' to 16,993'	8.9-9.1	28-29	18-20	Fresh water/brine

Sufficient mud materials will be kept on location at all times in order to combat lost circulation or unexpected kicks. A Pason PVT system will be rigged up prior to spudding this well. A volume monitoring system that measures, calculates and displays readings from the mud system on the rig to alert the rig crew of impending

gas kicks and lost circulation. In order to effectively run open hole logs and casing, the mud viscosity and fluid loss properties may be adjusted.

9. Proposed Drilling Plan:

Set surface and intermediate casing and cement to surface. Drill 8-3/4" to ~9,800', Kick off and drill 8-3/4" hole to TD of ~16,993'. Set 5-1/2" casing from surface to TD (~ 16,993'). Cement 5-1/2" production casing back to surface.

10. Casing Information:

String	Hole si	ze	Depth		Casing OD	Collar	Weight	Grade
Surface	17-1/2		1800' 1	MD	New 13-3/8"	STC	54.5#	J-55
Intermediate	12-1/4	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	4000' 1	ND	New 9-5/8"	LTC	40#	J-55
Intermediate	12-1/4	,,	5600' N	ND	New 9-5/8"	LTC	40#	HCK-55
Production	8-3/4"		17,000	' MD	New 5-1/2"	BTC	20#	P-110
<u>13-3/8", J-55:</u>				<u>9-5/8"</u>	, J-55			
Collapse Factor	r:	1.42		Collaps	se Factor:	1.25		
Burst Factor: 3.86		3.86	Burst Factor:		1.41			
Tension Factor	:	2.59		Tensio	n Factor:	1.6		
<u>9-5/8", HCK-55</u>		<u>5-1/2", P-110</u>						
Collapse Factor	r:	1.45		Collaps	se Factor:	2.17		
Burst Factor:		1.27		Burst F	actor:	1.26		
Tension Factor	:	4.23		Tensio	n Factor:	1.63		

11. Cementing Information:

Surface Casing (75% excess on lead & 75% excess on tail to design for cement top at surface):

- Lead: 1100 sxs class C cement + 4% bwoc bentonite II + 2% bwoc Calcium Chloride + 0.25 lbs/sack Cello Flake + 0.005% bwoc Static Free + 0.005 gps FP-6L (13.50 ppg, 1.93 cfps, 9.71 gps wtr).
- Tail: 200 sxs class C cement + 1.5% bwoc Calcium Chloride + 0.005 lbs/sack Static Free + 0.005 gps FP-6L (14.80 ppg, 1.34 cfps, 6.35 gps wtr).

Intermediate Casing

In the event that circulation is lost (> 50%) while drilling the 12-1/4" intermediate hole in the Capitan Reef at +/-4000', we will plan to install a DV tool and external casing packer within 200' of the top depth where lost circulation occurred and will pump a two-stage cement job with the potential to add an additional DV tool for a three-stage cement job. If there is no lost circulation a single stage cementing procedure will be followed. Legacy plans to cement to surface regardless of whether a single stage, 2-stage or 3-stage procedure is implemented.

No DV tool (80% excess on lead & 80% excess on tail to design for cement top at surface)

Lead: 1400 sx (35:65) poz (fly ash) class C cement+ 4% bwoc bentonite II + 5% bwoc MPA-5 + 0.25% bwoc FL- 52 + 5 lbs/sack LCM-1 + 0.125 lbs/sk cello flake+ 0.005 lbs/sk defoamer + 0.005 gps

FP-6L + 1.2% bwoc Sodium Metasilicate + 5% bwow Sodium Chloride (12.5 ppg, 2.13 cfps, 8.81 gps wtr)

<u>Tail:</u> 200 sx class C cement (14.80 ppg, 1.33 cfps, 6.35 gps wtr)

With (1) DV Tool (100% excess on lead & 100% excess on tail to design for cement top at surface)

Assuming DV tool set at 3950' but if the setting depth changes, cement volumes will be adjusted proportionately.

Stage 1

Lead: 400 sx (35:65) paz (fly ash) class C cement+ 4% bwoc Bentonite II+ 5% bwoc MPA-5 + 0,25% bwoc FL-52 + 5 lbs/sack LCM-1 + 0.125 lbs/sk cello flake+ 0.005 lbs/sk defoamer + 0.005 gps FP-6L + 1.2% bwoc Sodium Metasilicate + 5% bwow Sodium Chloride (12.5 ppg, 2.13 cfps, 8.81 gps wtr)

<u>Tail:</u> 200 sx class C cement (14.80 ppg, 1.33 cfps, 6.35 gps wtr)

Stage 2

Lead: 1100 sx (35:65) paz (fly ash) class C cement+ 4% bwoc bentonite II + 5% bwoc MPA-5 + 0,25% bwoc FL-52 + 5 lbs/sack LCM-1 + 0.125 lbs/sk Cello Flake+ 0.005 lbs/sk Static Free+ 0.005 gps FP-6L + 1.2% bwoc Sodium Metasilicate + 5% bwow Sodium Chloride (12.5 ppg, 2.13 cfps, 8.81 gps wtr)

Tail: 200 sx class C cement (14.80 ppg, 1.33 cfps, 6.35 gps wtr)

With (2) DV Tools (100% excess on lead & 100% excess on tail to design for cement top at surface)

Assuming one DV tool set at 3950' and one DV tool set at 1800' but if the setting depths change, cement volumes will be adjusted proportionately.

Stage 1

Lead: 400 sx (35:65) paz (fly ash) class C cement+ 4% bwoc Bentonite II+ 5% bwoc MPA-5 + 0,25% bwoc FL-52 + 5 lbs/sack LCM-1 + 0.125 lbs/sk cello flake+ 0.005 lbs/sk defoamer + 0.005 gps FP-6L + 1.2% bwoc Sodium Metasilicate + 5% bwow Sodium Chloride (12.5 ppg, 2.13 cfps, 8.81 gps wtr)

<u>Tail:</u> 200 sx class C cement (14.80 ppg, 1.33 cfps, 6.35 gps wtr)

Stage 2

Lead: 600 sx (35:65) paz (fly ash) class C cement+ 4% bwoc bentonite II + 5% bwoc MPA-5 + 0,25% bwoc FL-52 + 5 lbs/sack LCM-1 + 0.125 lbs/sk Cello Flake+ 0.005 lbs/sk Static Free+ 0.005 gps FP-6L + 1.2% bwoc Sodium Metasilicate + 5% bwow Sodium Chloride (12.5 ppg, 2.13 cfps, 8.81 gps wtr)

Tail: 200 sx class C cement (14.80 ppg, 1.33 cfps, 6.35 gps wtr)

Stage 3

Lead: 600 sx (35:65) paz (fly ash) class C cement+ 4% bwoc bentonite II + 5% bwoc MPA-5 + 0,25% bwoc FL-52 + 5 lbs/sack LCM-1 + 0.125 lbs/sk Cello Flake+ 0.005 lbs/sk Static Free+ 0.005 gps FP-6L + 1.2% bwoc Sodium Metasilicate + 5% bwow Sodium Chloride (12.5 ppg, 2.13 cfps, 8.81 gps wtr)

Production Casing (80% excess on lead & 20% excess on tail to design for cement top at surface):

- Lead: 1600 sxs (50:50) poz (fly ash) class H cement + 10% bwoc bentonite II + 5% bwow sodium chloride + 5 pps LCM-1 + 0.005 lbs/sk Static Free + 0.005 gps FP-6L (11.90 ppg, 2.38 cf/sx, 13.22 gps wtr).
- Tail:
 1700 sxs Class H (15:61:11) poz (fly ash): class H cement: CSE-2 + 4% bwow sodium chloride + 3 pps LCM-1 + 0.6% bwoc FL-25 + 0.005 gps FP-6L + 0.005% bwoc Static Free (13.20 ppg, 1.62 cf/sx, 9.45 gps wtr).

12. Pressure Control Eqpt/BOP:

Legacy Reserves plans to use a 13-5/8" 5000-psi working pressure BOP system consisting of a double ram BOP with one ram being pipe and one ram being blind, a 5000-psi annular type preventer, a 5000-psi choke manifold and 80 gallon accumulator with floor, five remote operating stations and an auxiliary power system. A rotating head will be utilized as needed. A drill string safety valve in the open position will be available on the rig floor. A mud gas separator will be available for use if needed.

A 3M BOP will be used to drill from the surface casing shoe (~1800') to the intermediate casing shoe (~5600'). The BOP will be a 5M system, however the "A" section wellhead will be a 3M wellhead (see attached BOP Diagram).

The BOP unit will be hydraulically operated. The BOP will be operated at least once per day while drilling and the blind rams will be operated when out of hole during trips. No abnormal pressure or temperature is expected while drilling.

The BOPs will be tested by an independent service company to 250 psi low and 5000 psi high.

13. Testing, Logging, and Coring Program:

- A. Mud logging program: 2 man unit from approximately after setting intermediate casing.
- B. No open hole logs, DST's or cores are planned.

14. Potential Hazards

No abnormal pressures or temperatures are expected during the drilling of this well. If H2S is encountered the operator will comply with provisions of Onshore Order 6. Since there will be an H2S Safety package on location, attached is an "H2S Drilling Operations Plan". Adequate flare lines will be installed on the mud/gas separator so gas may be flared safely. All personnel will be familiar with all aspects of safe operations of equipment being used. Lost circulation may occur and a cement contingency plan is included in this plan along with mud materials to be kept on location at all times in order to combat lost circulation or unexpected kicks. Estimated BHP: 4312 psi, estimated BHT: 162°F.

15. Road and Location

Road and location construction will begin after BLM approval of the APD. Drilling is expected to take 30-35 days and an additional 10 days for the completion.

16. Additional Requirements of Project:

Completion: The targeted Bone Spring pay zone will be perforated and stimulated in multiple stages using acid and hydraulic fracturing treatments. Fresh water used in the drilling and completion of this well will be transferred from off-site via temporary flowlines and stored in frac tanks on the location.



U.S. Department of the Interior BUREAU OF LAND MANAGEMENT



APD ID: 10400013827

Operator Name: LEGACY RESERVES OPERATING LP

Well Name: LEA UNIT

Well Type: OIL WELL

Submission Date: 05/05/2017

Well Number: 56H Well Work Type: Drill Highlighted data reflects the most recent changes

Show Final Text

Section 1 - Existing Roads

Will existing roads be used? YES

Existing Road Map:

Lea_56H_road_map_05-03-2017.pdf

Existing Road Purpose: ACCESS, FLUID TRANSPORT

Row(s) Exist? YES

ROW ID(s)

ID:

Do the existing roads need to be improved? YES

Existing Road Improvement Description: As needed, existing roads will be improved and maintained to prevent soil erosion and accomodate all-weather traffic, according to BLM standards. At this point, all roads are in place, there will be no new construction.

Existing Road Improvement Attachment:

Section 2 - New or Reconstructed Access Roads

Will new roads be needed? NO

Section 3 - Location of Existing Wells

Existing Wells Map? YES

Attach Well map:

Operator Name: LEGACY RESERVES OPERATING LP Well Name: LEA UNIT

Well Number: 56H

Lea_56H_well_map_05-04-2017.pdf Existing Wells description:

Section 4 - Location of Existing and/or Proposed Production Facilities

Submit or defer a Proposed Production Facilities plan? SUBMIT

Estimated Production Facilities description:

Production Facilities description:

Production Facilities map:

Lea_56H_production_diagram_05-04-2017.pdf

Section 5 - Location and Types of Water Supply

Water Source Table

Water source use type: INTERMEDIATE/PRODUCTION CASING, Water source type: GW WELL STIMULATION, SURFACE CASING Describe type:

Source latitude:

Source datum:

Water source permit type: WATER WELL

Source land ownership: FEDERAL

Water source transport method: TRUCKING

Source transportation land ownership: FEDERAL

Water source volume (barrels): 17705

Source volume (gal): 743610

Water source and transportation map:

Lea 56H water source map 05-04-2017.pdf

Water source comments:

New water well? NO

New Water Well Info

Well latitude:Well Longitude:Well datum:Well target aquifer:Est. depth to top of aquifer(ft):Est thickness of aquifer:Aquifer comments:Aquifer documentation:Est thickness of aquifer

Source longitude:

Source volume (acre-feet): 2.2820523

Well Name: LEA UNIT

Well Number: 56H

Well depth (ft):	Well casing type:
Well casing outside diameter (in.):	Well casing inside diameter (in.):
New water well casing?	Used casing source:
Drilling method:	Drill material:
Grout material:	Grout depth:
Casing length (ft.):	Casing top depth (ft.):
Well Production type:	Completion Method:
Water well additional information:	

State appropriation permit:

Additional information attachment:

Section 6 - Construction Materials

Construction Materials description: CONSTRUCTION MATERIALS: CALICHE WILL BE USED TO CONSTRUCT THISWELL PAD Any construction material that may be required for surfacing of the drill pad will be from a contractor having a permitted source of materials within the general area. No construction materials will be removed from Federal lands without prior approval from the appropriate surface management agency. See attached for source information. **Construction Materials source location attachment:**

Section 7 - Methods for Handling Waste

Waste type: DRILLING

Waste content description: Drilling fluids (flowback, water, cuttings)

Amount of waste: 20000 barrels

Waste disposal frequency : Daily

Safe containment description: Drilling fluids will be contained in steel mud tanks.

Safe containmant attachment:

Waste disposal type: HAUL TO COMMERCIAL Disposal location ownership: PRIVATE FACILITY Disposal type description:

Disposal location description: NMOCD approved disposal site in Halfway, NM.

Reserve Pit

Reserve Pit being used? NO

Temporary disposal of produced water into reserve pit?

Reserve pit length (ft.) Reserve pit width (ft.)

Reserve pit depth (ft.)

Reserve pit volume (cu. yd.)

Is at least 50% of the reserve pit in cut?

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Reserve pit liner

Reserve pit liner specifications and installation description

Cuttings Area

Cuttings Area being used? NO

Are you storing cuttings on location? YES

Description of cuttings location Drill cuttings will be held in roll-off style mud boxes and taken to an NMOCD approved disposal site.

Cuttings area length (ft.)

Cuttings area depth (ft.)

Cuttings area width (ft.)

Cuttings area volume (cu. yd.)

Is at least 50% of the cuttings area in cut?

WCuttings area liner

Cuttings area liner specifications and installation description

Section 8 - Ancillary Facilities

Are you requesting any Ancillary Facilities?: NO Ancillary Facilities attachment:

Comments:

Section 9 - Well Site Layout

Well Site Layout Diagram:

Lea_56H_well_site_layout_05-04-2017.pdf

Comments:

Section 10 - Plans for Surface Reclamation

Type of disturbance: NO NEW SURFACE DISTURBANCE

Recontouring attachment:

Lea_56H_recontouring_plat_05-04-2017.pdf

Drainage/Erosion control construction: Access road and well pad already exist - no construction needed. Any maintenance or improvement necessary will be according to BLM standards. Figures below are identical for short term and long term disturbance because reclamation is already complete for this pad (Lea Unit 54H).

Drainage/Erosion control reclamation: • The original landform will be restored for all disturbed areas including well pads, production facilities, roads, pipelines, and utility corridors. • A self-sustaining, vigorous, diverse, native (or otherwise approved) plant community will be established on the site, with a density sufficient to control erosion and invasion by non-native plants and to re-establish wildlife habitat or forage production. At a minimum, the established plant community will

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Well Number: 56H

consist of species included in the seed mix and/or desirable species occurring in the surrounding natural vegetation. • Erosion features are equal to or less than surrounding area and erosion control is sufficient so that water naturally infiltrates into the soil and gullying, headcutting, slumping, and deep or excessive rills (greater than 3 inches) are not observed. • The site will be free of State- or county-listed noxious weeds, oil field debris and equipment, and contaminated soil. Invasive and non-native weeds are controlled.

Wellpad long term disturbance (acres): 4.13	Wellpad short term disturbance (acres): 4.13
Access road long term disturbance (acres): 2	Access road short term disturbance (acres): 2
Pipeline long term disturbance (acres): 4.8562903	Pipeline short term disturbance (acres): 4.8562903
Other long term disturbance (acres): 0	Other short term disturbance (acres): 0
Total long term disturbance: 10.98629	Total short term disturbance: 10.98629

Reconstruction method: Final reclamation to achieve restoration of the original landform and a natural vegetative community. The original landform will be restored for all disturbed areas including well pads, production facilities, roads, pipelines, and utility corridors. **Topsoil redistribution:** Evenly

Soil treatment: Erosion features are equal to or less than surrounding area and erosion control is sufficient so that water naturally infiltrates into the soil and gullying, headcutting, slumping, and deep or excessive rills (greater than 3 inches) are not observed. The site will be free of state- or county-listed noxious weeds, oil field debris and equipment, and contaminated soil. Invasive and non-native weeds are controlled.

Existing Vegetation at the well pad:

Existing Vegetation at the well pad attachment:

Existing Vegetation Community at the road:

Existing Vegetation Community at the road attachment:

Existing Vegetation Community at the pipeline:

Existing Vegetation Community at the pipeline attachment:

Existing Vegetation Community at other disturbances:

Existing Vegetation Community at other disturbances attachment:

Non native seed used?

Non native seed description:

Seedling transplant description:

Will seedlings be transplanted for this project?

Seedling transplant description attachment:

Will seed be harvested for use in site reclamation?

Seed harvest description:

Seed harvest description attachment:

Seed Management

Seed Table

Operator Name: LEGACY RE	ESERVES OPERATING LP			
Well Name: LEA UNIT	Well Number: 56H			
Seed type:	Seed source:			
Seed name:				
Source name:	Source address:			
Source phone:				
Seed cultivar:				
Seed use location:				
PLS pounds per acre:	Proposed seeding season:			
Seed St	Immary Total pounds/Acre:			
Seed Type	Pounds/Acre			
Geed Type				
Seed reclamation attachmen	φ.			
Operator Contact/H	Responsible Official Contact Info			
First Name:	Last Name:			
Phone:	Email:			
Seedbed prep:				
Seed BMP:				
Seed method:				
Existing invasive species? NO				
Existing invasive species treatment description:				
Existing invasive species treatment attachment:				
Weed treatment plan description: Noxious weeds will be controlled				
Weed treatment plan attachment:				
Monitoring plan description: On pumper visits				
Monitoring plan attachment:				
Success standards: To BLM standards				
Pit closure description: N/A (closed loop)				
Pit closure attachment:				

Section 11 - Surface Ownership

Well Name: LEA UNIT

Well Number: 56H

Disturbance type: EXISTING ACCESS ROAD Describe: Surface Owner: BUREAU OF LAND MANAGEMENT Other surface owner description: **BIA Local Office: BOR Local Office: COE Local Office:** DOD Local Office: NPS Local Office: State Local Office: Military Local Office: **USFWS** Local Office: **Other Local Office: USFS Region: USFS Forest/Grassland: USFS Ranger District:**

Disturbance type: WELL PAD Describe: Surface Owner: BUREAU OF LAND MANAGEMENT Other surface owner description: BIA Local Office: BOR Local Office: COE Local Office: DOD Local Office: NPS Local Office: State Local Office: Military Local Office: USFWS Local Office: USFS Region: USFS Forest/Grassland:

USFS Ranger District:

Operator Name: LEGACY RESERVES OPERATING LP Well Name: LEA UNIT

Well Number: 56H

Disturbance type: PIPELINE	
Describe:	
Surface Owner: BUREAU OF LAND MANAGEMENT	
Other surface owner description:	
BIA Local Office:	
BOR Local Office:	
COE Local Office:	
DOD Local Office:	
NPS Local Office:	
State Local Office:	
Military Local Office:	
USFWS Local Office:	
Other Local Office:	
USFS Region:	
USFS Forest/Grassland:	USFS Ranger District:

Section 12 - Other Information

Right of Way needed? NO ROW Type(s): Use APD as ROW?

ROW Applications

SUPO Additional Information:

Use a previously conducted onsite? YES

Previous Onsite information: ON-SITE PERFORMED ON 8/16/15 RESULTED IN PROPOSED LOCATION BEING OK WHERE STAKED. IT WAS AGREED TO TURN THE LOCATION TO A V-DOOR EAST. IT WAS ALSO AGREED TO MOVE AND PLACE THE TOP SOIL TO THE NORTH, AND THE INTERIM RECLAMATION WILL BE THE NORTH, EAST, SOUTH, AND WEST PORTION OF THIS PAD. PRESENT AT ON-SITE: CRAIG SPARKMAN-LEGACY RESERVES OPERATING, L.P. TRISH BADBEAR-BLM CASSANDRA BROOKS-BLM CHRISTOPHER FREEMAN-CEHMM DOUG BURGER-LEGACY LAND & ENVIRONMENTAL SOLUTIONS KELLY POINDEXTER-WEST COMPANY OF MIDLAND-SURVEYORS

Other SUPO Attachment

Operator Name: LEGACY RESERVES OPERATING LP Well Name: LEA UNIT

Well Number: 56H