

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
OMB No. 1004-0135
Expires November 30, 2000

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to re-enter an
Abandoned well. Use Form 3160-3 (APD) for such proposals.

5. Lease Serial No.

SF - 078194

6. If Indian, Allottee or tribe Name

7. If Unit or CA/Agreement, Name and/or No.

SUBMIT IN TRIPLICATE - Other instructions on reverse side

1. Type of Well

☐ Oil Well

☒ Gas Well

☐ Other

8. Well Name and No.

Ludwick LS 20M

2. Name of Operator

BP America Production Company Attn: Cherry Hlava

9. API Well No.

30-045-32920

3a. Address

P.O. Box 3092 Houston, TX 77253

3b. Phone No. (include area code)

281-366-4081

10. Field and Pool, or Exploratory Area

Basin Dakota/Blanco Mesaverde

4. Location of Well (Footage, Sec., T., R., M., or Survey Description)

SWNW 1640' FNL & 1200' FWL Sec. 29 T30N, R10W

11. County or Parish, State

San Juan County, New Mexico

12. CHECK APPROPRIATE BOX(ES) TO INDICATE NATURE OR NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION

☒ Notice of Intent

☐ Subsequent Report

☐ Final Abandonment Notice

TYPE OF ACTION

☐ Acidize

☐ Deepen

☐ Production (Start/Resume)

☐ Water shut-Off

☐ Alter Casing

☐ Fracture Treat

☐ Reclamation

☐ Well Integrity

☐ Casing Repair

☐ New Construction

☐ Recomplete

☒ Other Change BH Location

☐ Change Plans

☐ Plug and Abandon

☐ Water Disposal

☐ Convert to Injection

☐ Plug Back

13. Describe Proposed or Completed Operation (clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recompleat horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be performed or provide the Bond No. on file with BLM/BIA. Required subsequent reports shall be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompleat in a new interval, a Form 3160-4 shall be filed once testing has been completed. Final Abandonment Notices shall be filed only after all requirements, including reclamation, have been completed, and the operator has determined that the site is ready for final inspection.

On March 2, 2005 BP America submitted Application for Permit to Drill subject well as a straight hole. The APD was approved on May 31, 2005.

BP respectfully requests permission to move the bottom hole location to the south and east from the surface location. Supporting documentation is attached.

Please extend APD for 1 year. - This approval expires: MAY 31 2007

Should you have any technical questions please call John Papageorge @281-366-5721

HOLD COPY FOR Directional Survey

APR 2006

14. I hereby certify that the foregoing is true and correct
Name (Printed/typed)

Cherry Hlava

Title Regulatory Analyst

Signature

Cherry Hlava

Date 03/22/2006

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved by

Adrian Brumby

Title

PE

Date

4/6/06

Conditions of approval, if any, are attached. Approval of this notice does not warrant or Certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.

Office

FFO

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

NMOCD

2/25/2005 Revised 03/07/2006

OBJECTIVE:	Drill 240' below the top of the Two Wells Mbr, set 4-1/2" production liner, Stimulate DK, MF, and PL intervals.
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METHOD OF DRILLING		APPROXIMATE DEPTHS OF GEOLOGICAL MARKER		
TYPE OF TOOLS	DEPTH OF DRILLING	Actual GL:	6100	Estimated KB: 6,114.0'

LOG PROGRAM		Ojo Alamo		4,890'	1,224'	1,234'
Type	Depth Interval	Kirtland		4,746'	1,368'	1,380'
Single Run		Fruitland	*	4,104'	2,010'	2,030'
		Fruitland Coal	*	3,746'	2,368'	2,393'
		Pictured Cliffs	*	3,552'	2,562'	2,590'
		Lewis	*	3,257'	2,857'	2,889'
Cased Hole	TD to 7" shoe	Cliff House	#	2,104'	4,010'	4,058'
RST- CBL		Menefee	#	1,729'	4,385'	4,436'
	Identify 4 ½" cement top	Point Lookout	#	1,250'	4,864'	4,916'

REMARKS:	Mancos		841'	5,273'	5,325'
	Greenhorn		-742'	6,856'	6,908'
	Graneros (bent,mkr)		-797'	6,911'	6,963'
	Two Wells	#	-851'	6,965'	7,017'
	The recommended TD is intended to penetrate the ENCEN (~50') in order to evaluate, and possibly produce it. Offsetting wells encountered no water flow at this depth. See attached cross-section.	Paguete	#	-928'	7,042'
	Cubero	#	-986'	7,100'	7,152'
	L. Cubero	#	-1,027'	7,141'	7,193'
	Encinal Cyn	#	-1,057'	7,171'	7,223'

The intermediate casing should be set 100 ft. into the MENF to minimize the risks encountered drilling through the possibly water productive CLFH.				
	TOTAL DEPTH:		-1,091'	7,205'
	# Probable completion interval			* Possible Pay

SPECIAL TESTS	DRILL CUTTING SAMPLES			DRILLING TIME	
TYPE	FREQUENCY	DEPTH		FREQUENCY	DEPTH
None	30'/10' intervals	4,536'	to TD	Geologist	0 - TD

REMARKS:	
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MUD PROGRAM:					
Interval	TypeMud	#/gal	Vis, sec/qt	/30 min	Other Specification
200'	Spud	8.8 - 9.0	Sufficient to clean hole.		
4,536'	Water/LSND	8.4 - 9.0		<9	Sweep hole while whilst water drilling, LCM onsite
7,257'	Air	1	1000 cfm for hammer		Volume sufficient to maintain a stable and clean wellbore

CASING PROGRAM:							
CasingString	Depth	Size	Casing Size	Grade, Thread	Weight	Landing Point	Cement
Surface/Conductor	200'	13 1/2"	9-5/8"	H-40 ST&C	32#		cmt to surface
Intermediate 1	4000'	8-3/4"	7"	J/K-55 ST&C	20#		
Intermediate 2	4536'	8 3/4"	7"	N-80 ST&C	23#	100' below MENF	cmt to surface
Production	7,257'	6-1/4"	4-1/2"	J-55	11.6#	DKOT	150' inside Intermediate - TOC survey required

CORING PROGRAM:
None

COMPLETION PROGRAM:
Rigless, 2-3 Stage Limited Entry Hydraulic Frac, FMC Unihead

GENERAL REMARKS:	
Notify BLM/NMOCDD 24 hours prior to Spud, BOP testing, and Casing and Cementing.	

BOP Pressure Testing Requirements			
Formation	Depth	Anticipated bottom hole pressure	Max anticipated surface pressure**
Cliffhouse	4,010'	500	0
Point Lookout	4,864'	600	0
Dakota	6,965'	2600	1067.7

Requested BOP Pressure Test Exception = 1500 psi	** Note: Determined using the following formula: $ABHP - (.22 \times TVD) = ASP$
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Form 46 Reviewed by:		Logging program reviewed by:			
PREPARED BY:		APPROVED:		DATE:	APPROVED:
HGJ	JMP/GGZ			25/2005 Revised 03/07/200	
Form 46 7-84bw		For Drilling Dept.			For Production Dept.

Cementing Program

Well Name: Ludwick LS #20M
 Location: 29-30N-10W: 1640' FNL, 1200' FWL
 County: San Juan
 State: New Mexico

Well Flac
 Formation: Blanco Mesaverde/Basin Dakota
 KB Elev (est) 6114
 GL Elev. (est) 6100

Casing Program:

Casing String	Est. Depth (ft.)	Hole Size (in.)	Casing Size (in.)	Thread	TOC (ft.)	Stage Tool Or TOL (ft.)	Cmt Cir. Out (bbl.)
Surface	200	13.5	9.625	ST&C	Surface	NA	
Intermediate	4536	8.75	7	LT&C	Surface	NA	
Production -	7257	6.25	4.5	ST&C	4436	NA	

Casing Properties: (No Safety Factor Included)

Casing String	Size (in.)	Weight (lb/ft)	Grade	Burst (psi.)	Collapse (psi.)	Joint St. (1000 lbs.)	Capacity (bbl/ft.)	Drift (in.)
Surface		9.625	32 H-40	2270		1400	254	0.0787
Intermediate		7	20 K-55	3740		2270	234	0.0405
Production -		4.5	11.6 J-55	5350		4960	154	0.0155

Mud Program

Apx. Interval (ft.)	Mud Type	Mud Weight	<u>Recommended Mud Properties Prio Cementing:</u>	
			PV	<20
			YP	<10
			Fluid Lost	<15
0 - SCP	Water/Spud	8.6-9.2		
SCP - ICP	Water/LSND	8.6-9.2		
ICP - ICP2	Gas/Air Mist	NA		
ICP2 - TD	LSND	8.6 - 9.2		

Cementing Program:

	Surface	Intermediate	Production
Excess %, Lead	100	75	40
Excess %, Tail	NA	0	40
BHST (est deg. F)	75	120	183
Special Instructions	1,6,7	1,6,8	2,4,6

1. Do not wash pumps and lines.
2. Wash pumps and lines.
3. Reverse out
4. Run Blend Test on Cement
5. Record Rate, Pressure, and Density on 3.5" disk
6. Confirm densitometer with pressurized mud scales
7. 1" cement to surface if cement is not circulated.
8. If cement is not circulated to surface, run temp. survey 10-12 hr. after landing plug.

Notes:

*Do not wash up on top of plug. Wash lines before displacing production cement job to minimize drillout.

Surface:

Preflush	20 bbl.	FreshWater	
Slurry 1	154 sx Class C Cement		195 cuft
TOC@Surface	+ 2% CaCl2 (accelerator)		
			0.4887 cuft/ft OH

Slurry Properties:	Density (lb/gal)	Yield (ft ³ /sk)	Water (gal/sk)
Slurry 1	15.2	1.27	5.8

Casing Equipment:

- 9-5/8", 8R, ST&C
- 1 Guide Shoe
- 1 Top Wooden Plug
- 1 Autofill insert float valve
- Centralizers, as needed
- 1 Stop Ring
- 1 Thread Lock Compound

Cementing Program

Intermediate:

Fresh Water	20 bbl	fresh water	
Lead		397 sx Class "G" Cement	1044 cuft
Slurry 1		+ 3% D79 extender	
TOC@Surface		+ 1/4 #/sk. Cellophane Flake	
		+ 5 lb/sk Gilsonite	
Tail		59 sx 50/50 Class "G"/Poz	75 cuft
Slurry 2		+ 2% gel (extender)	
500 ft fill		+ 1/4 #/sk. Cellophane Flake	0.1503 cuft/ft OH
		+ 2% CaCl2 (accelerator)	0.1746 cuft/ft csg ann
		+ 5 lb/sk Gilsonite	

Slurry Properties:	Density	Yield	Water
	(lb/gal)	(ft ³ /sk)	(gal/sk)
Slurry 1	11.4	2.63	15.8
Slurry 2	13.5	1.27	5.72

Casing Equipment: 7", 8R, ST&C

1 Float Shoe (autofill with minimal LCM in mud)

1 Float Collar (autofill with minimal LCM in mud)

1 Stop Ring

Centralizers as needed

1 Top Rubber Plug

1 Thread Lock Compound

Production:

Fresh Water	10 bbl	CW100	
Lead		99 LiteCrete D961 / D124 / D154	251 cuft
Slurry 1		+ 0.03 gps D47 antifoam	
TOC, 400' above 7" shoe		+ 0.5% D112 fluid loss	
		+ 0.11% D65 TIC	
Tail		143 sx 50/50 Class "G"/Poz	206 cuft
Slurry 2		+ 5% D20 gel (extender)	
1432 ft fill		+ 0.1% D46 antifoam	
		+ 1/4 #/sk. Cellophane Flake	
		+ 0.25% D167 Fluid Loss	
		+ 5 lb/sk Gilsonite	
		+ 0.1% d800, retarder	
		+ 0.15% D65, dispersant	
			0.1026 cuft/ft OH
Slurry Properties:	Density	Yield	Water
	(lb/gal)	(ft ³ /sk)	(gal/sk)
Slurry 1	9.5	2.52	6.38
Slurry 2	13	1.44	6.5
			Top of Mancos
			5325

Casing Equipment: 4-1/2", 8R, ST&C

1 Float Shoe (autofill with minimal LCM in mud)

1 Float Collar (autofill with minimal LCM in mud)

1 Stop Ring

Centralizers, as needed

1 Top Rubber Plug

1 Thread Lock Compound

District I
1625 N. French Dr., Hobbs, NM 88240

District II
811 South First, Artesia, NM 88210

District III
1000 Rio Brazos Rd., Aztec, NM 87410

District IV
2040 South Pacheco, Santa Fe, NM 87505

State of New Mexico
Energy, Minerals & Natural Resources Department

OIL CONSERVATION DIVISION
2040 South Pacheco
Santa Fe, NM 87505

Form C-102
Revised August 15, 2000

Submit to Appropriate District Office
State Lease - 4 Copies
Fee Lease - 3 Copies

AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

¹ API Number 30-045-32920	² Pool Code 71599 & 72319	³ Pool Name Basin Dakota & Blanco Mesaverde
⁴ Property Code 000811	⁵ Property Name Ludwick LS	⁶ Well Number 20 M
⁷ OGRID No. 000778	⁸ Operator Name BP America Production Company	⁹ Elevation 6100' GR

¹⁰ Surface Location

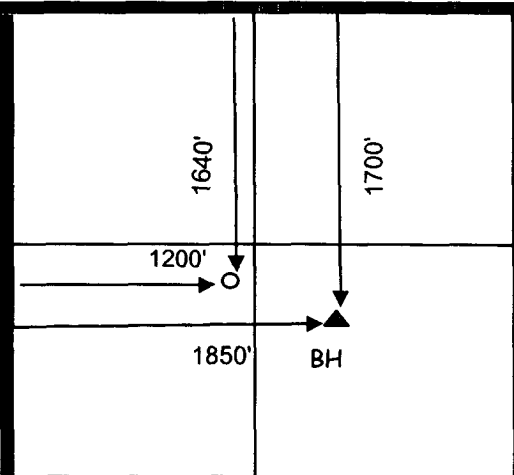
UL or lot no. E	Section 29	Township 30N	Range 10W	Lot Idn	Feet from 1640	North/South North	Feet from 1200	East/West West	County San Juan
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¹¹ Bottom Hole Location If Different From Surface

UL or lot no. F	Section 29	Township 30N	Range 10W	Lot Idn	Feet from 1700	North/South North	Feet 1850	East/West West	County San Juan
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¹² Dedicated Acres 313.3	¹³ Joint or Infill	¹⁴ Consolidation Code	¹⁵ Order No.
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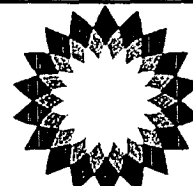
NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION

			¹⁷ OPERATOR CERTIFICATION <i>I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief.</i> Cherry Hlava Signature Cherry Hlava Printed Name Regulatory Analyst Title 3/21/2006 Date
			¹⁸ SURVEYOR CERTIFICATION <i>I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.</i> 3/4/2004 Date of Survey Signature and Seal of Professional Surveyor: Gary Vann 7016 Certificate Number



Scientific Drilling

Project: Western - San Juan South
Site: SEC 29-T30N-R10W
Well: Ludwick LS #20M
Wellbore: OH
Plan: Plan #1



bp

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	DLeg	TFace	VSec	Target
1	0.00	0.000	0.000	0.00	0.00	0.00	0.00	0.00	0.00	
2	300.00	0.000	0.000	300.00	0.00	0.00	0.00	0.00	0.00	
3	613.61	9.408	95.270	612.20	-2.36	25.58	3.00	95.27	25.69	
4	4057.74	9.408	95.270	4010.00	-54.07	586.20	0.00	0.00	588.69	
5	4536.46	4.621	95.270	4485.00	-59.44	644.40	1.00	180.00	647.14	
6	4690.49	0.000	0.000	4638.87	-60.01	650.59	3.00	180.00	653.35	
7	7256.62	0.000	0.000	7205.00	-60.01	650.59	0.00	0.00	653.35	PBHL-20M

WELLBORE TARGET DETAILS (MAP CO-ORDINATES AND LAT/LONG)

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
CSG.PT.-20M	4485.00	-59.44	644.40	2105252.747	2749561.699	36°47'7.787N	107°44'34.578W	Point
PBHL-20M	7205.00	-60.00	650.00	2105252.187	2749567.298	36°47'7.782N	107°44'34.509W	Circle (Radius: 100.00)

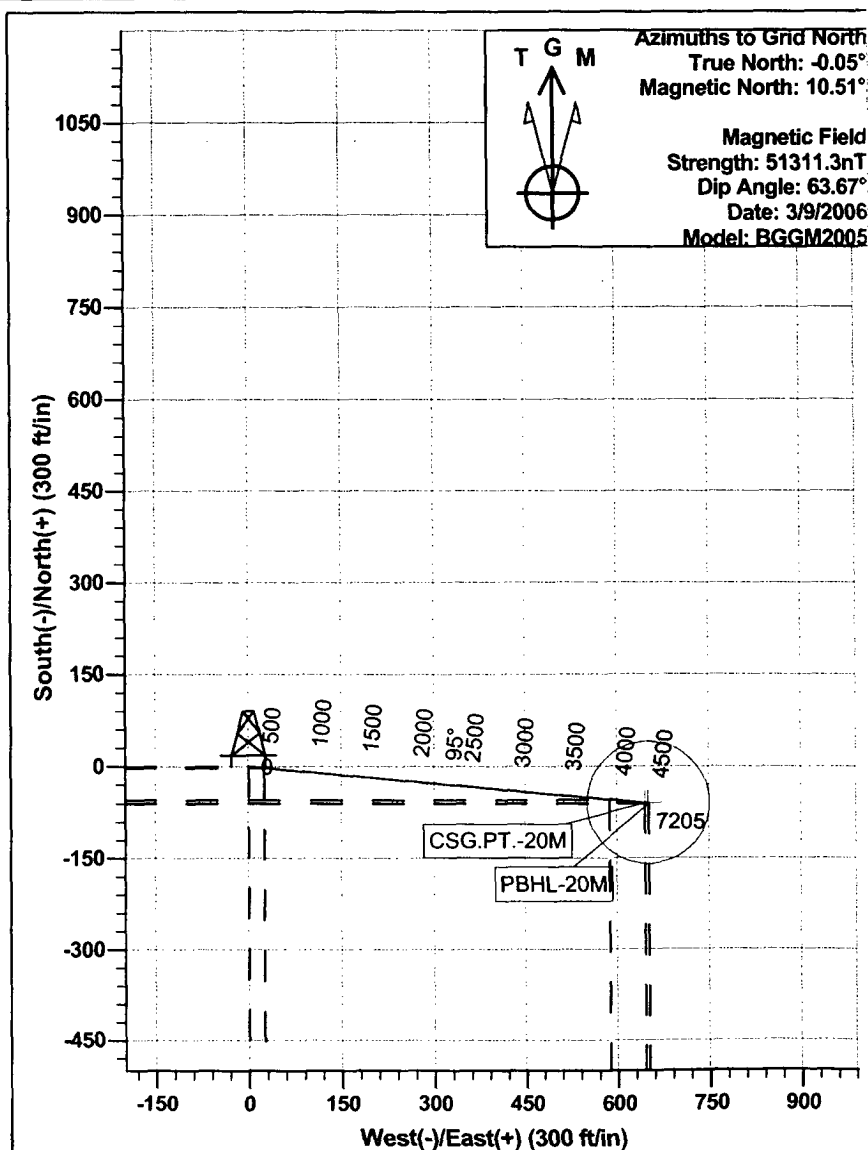
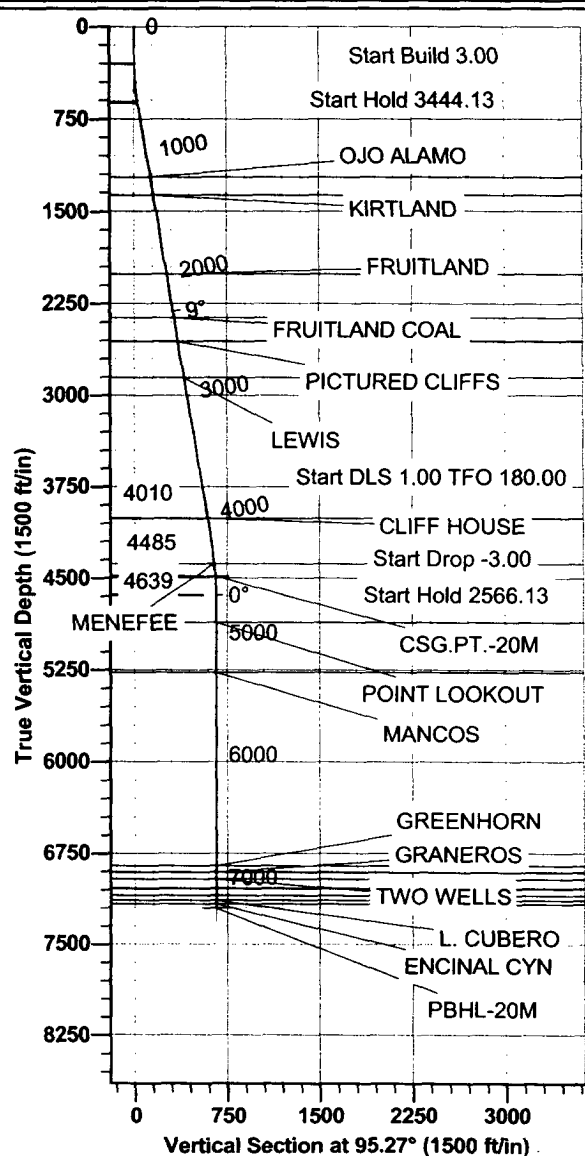
SITE DETAILS: SEC 29-T30N-R10W

Site Centre Northing: 2105312.182
Easting: 2748917.352

Positional Uncertainty: 0.00
Local North: 0.05
Convergence: Grid North

WELL DETAILS: Ludwick LS #20M

Ground Level: 6100.00
Northing: 2105312.182 Easting: 2748917.352 Latitude: 36°47'8.381N Longitude: 107°44'42.499W





Scientific Drilling
Planning Report



Database: EDM - Houston - Production
Company: North America - Onshore US - BP
Project: Western - San Juan South
Site: SEC 29-T30N-R10W
Well: Ludwick LS #20M
Wellbore: OH
Design: Plan #1

Local Co-ordinate Reference: Well Ludwick LS #20M
TVD Reference: WELL @ 6114.00ft (Original Well Elev)
MD Reference: WELL @ 6114.00ft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Project	Western - San Juan South		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Western Zone	Using geodetic scale factor	

Site		SEC 29-T30N-R10W			
Site Position:		Northing:	2,105,312.182 ft	Latitude:	36° 47' 08.381" N
From:	Lat/Long	Easting:	2,748,917.352 ft	Longitude:	107° 44' 42.499" W
Position Uncertainty:	0.00 ft	Slot Radius:	"	Grid Convergence:	0.05 °

Well	Ludwick LS #20M				
Well Position	+N/-S	0.00 ft	Northing:	2,105,312.182 ft	Latitude: 36° 47' 08.381" N
	+E/-W	0.00 ft	Easting:	2,748,917.352 ft	Longitude: 107° 44' 42.499" W
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level: 6,100.00 ft

Wellbore	OH					
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength	
			(°)	(°)	(nT)	
	BGGM2005	3/9/2006	10.57	63.67	51,311	

Design	Plan #1			
Audit Notes:				
Version:	Phase:	PROTOTYPE	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction
	(ft)	(ft)	(ft)	(°)
	0.00	0.00	0.00	95.270

Plan Sections										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	TFO (°)	Target
0.00	0.000	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
300.00	0.000	0.000	300.00	0.00	0.00	0.00	0.00	0.00	0.00	
613.61	9.408	95.270	612.20	-2.36	25.58	3.00	3.00	0.00	95.27	
4,057.74	9.408	95.270	4,010.00	-54.07	586.20	0.00	0.00	0.00	0.00	
4,536.46	4.621	95.270	4,485.00	-59.44	644.40	1.00	-1.00	0.00	180.00	
4,690.49	0.000	0.000	4,638.87	-60.01	650.59	3.00	-3.00	0.00	180.00	
7,256.62	0.000	0.000	7,205.00	-60.01	650.59	0.00	0.00	0.00	0.00	PBHL-20M

Database: EDM - Houston - Production
Company: North America - Onshore US - BP
Project: Western - San Juan South
Site: SEC 29-T30N-R10W
Well: Ludwick LS #20M
Wellbore: OH
Design: Plan #1

Local Co-ordinate Reference:
TVD Reference:
MD Reference:
North Reference:
Survey Calculation Method:

Well Ludwick LS #20M
 WELL @ 6114.00ft (Original Well Elev)
 WELL @ 6114.00ft (Original Well Elev)
 Grid
 Minimum Curvature

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
0.00	0.000	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.000	0.000	100.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.000	0.000	200.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.000	0.000	300.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	3.000	95.270	399.95	-0.24	2.61	2.62	3.00	3.00	0.00
500.00	6.000	95.270	499.63	-0.96	10.42	10.46	3.00	3.00	0.00
600.00	9.000	95.270	598.77	-2.16	23.41	23.51	3.00	3.00	0.00
613.61	9.408	95.270	612.20	-2.36	25.58	25.69	3.00	3.00	0.00
700.00	9.408	95.270	697.43	-3.66	39.64	39.81	0.00	0.00	0.00
800.00	9.408	95.270	796.09	-5.16	55.92	56.16	0.00	0.00	0.00
900.00	9.408	95.270	894.74	-6.66	72.20	72.51	0.00	0.00	0.00
1,000.00	9.408	95.270	993.40	-8.16	88.48	88.85	0.00	0.00	0.00
1,100.00	9.408	95.270	1,092.05	-9.66	104.75	105.20	0.00	0.00	0.00
1,200.00	9.408	95.270	1,190.70	-11.16	121.03	121.55	0.00	0.00	0.00
1,233.75	9.408	95.270	1,224.00	-11.67	126.53	127.06	0.00	0.00	0.00
OJO ALAMO									
1,300.00	9.408	95.270	1,289.36	-12.67	137.31	137.89	0.00	0.00	0.00
1,379.71	9.408	95.270	1,368.00	-13.86	150.29	150.92	0.00	0.00	0.00
KIRTLAND									
1,400.00	9.408	95.270	1,388.01	-14.17	153.59	154.24	0.00	0.00	0.00
1,500.00	9.408	95.270	1,486.67	-15.67	169.87	170.59	0.00	0.00	0.00
1,600.00	9.408	95.270	1,585.32	-17.17	186.14	186.93	0.00	0.00	0.00
1,700.00	9.408	95.270	1,683.98	-18.67	202.42	203.28	0.00	0.00	0.00
1,800.00	9.408	95.270	1,782.63	-20.17	218.70	219.63	0.00	0.00	0.00
1,900.00	9.408	95.270	1,881.29	-21.67	234.98	235.97	0.00	0.00	0.00
2,000.00	9.408	95.270	1,979.94	-23.18	251.25	252.32	0.00	0.00	0.00
2,030.47	9.408	95.270	2,010.00	-23.63	256.21	257.30	0.00	0.00	0.00
FRUITLAND									
2,100.00	9.408	95.270	2,078.60	-24.68	267.53	268.67	0.00	0.00	0.00
2,200.00	9.408	95.270	2,177.25	-26.18	283.81	285.01	0.00	0.00	0.00
2,300.00	9.408	95.270	2,275.91	-27.68	300.09	301.36	0.00	0.00	0.00
2,393.35	9.408	95.270	2,368.00	-29.08	315.28	316.62	0.00	0.00	0.00
FRUITLAND COAL									
2,400.00	9.408	95.270	2,374.56	-29.18	316.36	317.71	0.00	0.00	0.00
2,500.00	9.408	95.270	2,473.22	-30.68	332.64	334.05	0.00	0.00	0.00
2,589.99	9.408	95.270	2,562.00	-32.03	347.29	348.76	0.00	0.00	0.00
PICTURED CLIFFS									
2,600.00	9.408	95.270	2,571.87	-32.18	348.92	350.40	0.00	0.00	0.00
2,700.00	9.408	95.270	2,670.53	-33.69	365.20	366.75	0.00	0.00	0.00
2,800.00	9.408	95.270	2,769.18	-35.19	381.47	383.09	0.00	0.00	0.00
2,889.01	9.408	95.270	2,857.00	-36.52	395.96	397.65	0.00	0.00	0.00
LEWIS									
2,900.00	9.408	95.270	2,867.84	-36.69	397.75	399.44	0.00	0.00	0.00
3,000.00	9.408	95.270	2,966.49	-38.19	414.03	415.79	0.00	0.00	0.00
3,100.00	9.408	95.270	3,065.15	-39.69	430.31	432.13	0.00	0.00	0.00
3,200.00	9.408	95.270	3,163.80	-41.19	446.59	448.48	0.00	0.00	0.00
3,300.00	9.408	95.270	3,262.46	-42.69	462.86	464.83	0.00	0.00	0.00
3,400.00	9.408	95.270	3,361.11	-44.20	479.14	481.17	0.00	0.00	0.00
3,500.00	9.408	95.270	3,459.77	-45.70	495.42	497.52	0.00	0.00	0.00
3,600.00	9.408	95.270	3,558.42	-47.20	511.70	513.87	0.00	0.00	0.00
3,700.00	9.408	95.270	3,657.08	-48.70	527.97	530.22	0.00	0.00	0.00
3,800.00	9.408	95.270	3,755.73	-50.20	544.25	546.56	0.00	0.00	0.00
3,900.00	9.408	95.270	3,854.39	-51.70	560.53	562.91	0.00	0.00	0.00

Database: EDM - Houston - Production
Company: North America - Onshore US - BP
Project: Western - San Juan South
Site: SEC 29-T30N-R10W
Well: Ludwick LS #20M
Wellbore: OH
Design: Plan #1

Local Co-ordinate Reference: Well Ludwick LS #20M
TVD Reference: WELL @ 6114.00ft (Original Well Elev)
MD Reference: WELL @ 6114.00ft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
4,000.00	9.408	95.270	3,953.04	-53.20	576.81	579.26	0.00	0.00	0.00
4,057.74	9.408	95.270	4,010.00	-54.07	586.20	588.69	0.00	0.00	0.00
CLIFF HOUSE									
4,100.00	8.986	95.270	4,051.72	-54.69	592.93	595.45	1.00	-1.00	0.00
4,200.00	7.986	95.270	4,150.63	-56.05	607.62	610.20	1.00	-1.00	0.00
4,300.00	6.986	95.270	4,249.77	-57.24	620.60	623.23	1.00	-1.00	0.00
4,400.00	5.986	95.270	4,349.13	-58.28	631.84	634.53	1.00	-1.00	0.00
4,436.05	5.625	95.270	4,385.00	-58.62	635.48	638.17	1.00	-1.00	0.00
MENEFEE									
4,500.00	4.986	95.270	4,448.67	-59.16	641.36	644.09	1.00	-1.00	0.00
4,536.46	4.621	95.270	4,485.00	-59.44	644.40	647.14	1.00	-1.00	0.00
CSG.PT.-20M									
4,600.00	2.715	95.270	4,548.41	-59.81	648.45	651.20	3.00	-3.00	0.00
4,690.49	0.000	0.000	4,638.87	-60.01	650.59	653.35	3.00	-3.00	0.00
4,915.62	0.000	0.000	4,864.00	-60.01	650.59	653.35	0.00	0.00	0.00
POINT LOOKOUT									
5,324.62	0.000	0.000	5,273.00	-60.01	650.59	653.35	0.00	0.00	0.00
MANCOS									
6,907.62	0.000	0.000	6,856.00	-60.01	650.59	653.35	0.00	0.00	0.00
GREENHORN									
6,962.62	0.000	0.000	6,911.00	-60.01	650.59	653.35	0.00	0.00	0.00
GRANEROS									
7,016.62	0.000	0.000	6,965.00	-60.01	650.59	653.35	0.00	0.00	0.00
TWO WELLS									
7,093.62	0.000	0.000	7,042.00	-60.01	650.59	653.35	0.00	0.00	0.00
PAGUATE									
7,151.62	0.000	0.000	7,100.00	-60.01	650.59	653.35	0.00	0.00	0.00
CUBERO									
7,192.62	0.000	0.000	7,141.00	-60.01	650.59	653.35	0.00	0.00	0.00
L. CUBERO									
7,222.62	0.000	0.000	7,171.00	-60.01	650.59	653.35	0.00	0.00	0.00
ENCINAL CYN									
7,256.62	0.000	0.000	7,205.00	-60.01	650.59	653.35	0.00	0.00	0.00
PBHL-20M									

Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S ft	+E/-W ft	Northing (ft)	Easting (ft)	Latitude	Longitude
- hit/miss target - Shape									
PBHL-20M - plan hits target - Circle (radius 100.00)	0.00	0.00	7,205.00	-60.00	650.00	2,105,252.187	2,749,567.298	36° 47' 07.782" N	107° 44' 34.509" W
CSG.PT.-20M - plan misses by 118.88ft at 4536.46ft MD (4485.00 TVD, -59.44 N, 644.40 E) - Point	0.00	0.00	4,485.00	59.44	644.40	2,105,371.617	2,749,561.699	36° 47' 08.963" N	107° 44' 34.577" W

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MD Reference: WELL @ 6114.00ft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Formations

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
1,233.75	1,224.00	OJO ALAMO		0.00	0.000
1,379.71	1,368.00	KIRTLAND		0.00	0.000
2,030.47	2,010.00	FRUITLAND		0.00	0.000
2,393.35	2,368.00	FRUITLAND COAL		0.00	0.000
2,589.99	2,562.00	PICTURED CLIFFS		0.00	0.000
2,889.01	2,857.00	LEWIS		0.00	0.000
4,057.74	4,010.00	CLIFF HOUSE		0.00	0.000
4,436.05	4,385.00	MENEFEE		0.00	0.000
4,915.62	4,864.00	POINT LOOKOUT		0.00	0.000
5,324.62	5,273.00	MANCOS		0.00	0.000
6,907.62	6,856.00	GREENHORN		0.00	0.000
6,962.62	6,911.00	GRANEROS		0.00	0.000
7,016.62	6,965.00	TWO WELLS		0.00	0.000
7,093.62	7,042.00	PAGUATE		0.00	0.000
7,151.62	7,100.00	CUBERO		0.00	0.000
7,192.62	7,141.00	L. CUBERO		0.00	0.000
7,222.62	7,171.00	ENCINAL CYN		0.00	0.000