

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

CONFIDENTIAL

TIGHT HOLE

FORM APPROVED
OMB NO. 1004-0137
Expires July 31, 2010

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.

SUBMIT IN TRIPLICATE - Other instructions on page 2

1. Type of Well

☒ Oil Well ☐ Gas Well ☐ Other

2. Name of Operator

Energen Resources Corporation

3a. Address

2010 Afton Place, Farmington, NM 87401

3b. Phone No. (include area code)

(505) 325-6800

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

1282' FSL 1386' FWL, Sec 11 T27N R13W (N) SE/SW
380' FSL 330' FWL, Sec 10 T27N R13W (M) SW/SW

OIL CONS. DIV DIST. 3

OCT 15 2015

5. Lease Serial No.

NMSF077972

6. If Indian, Allottee or Tribe Name

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

8. Well Name and No.

Richardson Navaajo 27-13-10

#4H

9. API Well No.

30-045-35242

10. Field and Pool, or Exploratory Area

Basin Mancos

11. County or Parish, State

San Juan

NM

12. CHECK APPROPRIATE BOX(ES) TO INDICATE NATURE OF 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 Plans | ☐ Plug and Abandon | ☐ Temporarily Abandon | |
| ☐ Convert to Injection | ☐ Plug Back | ☐ Water Disposal | |

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 recomple 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 recomple 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 final site is ready for final inspection.)

Energen Resources would like to request the following changes to the well design for the subject well.

- Change the proposed TD to 5409' TVD/11090' MD from 5407' TVD/10786' MD.
 - Change 9-5/8" Surface csg set depth to 320' MD/TVD from 300' MD/TVD and increase cement to 170 sks.
 - Change 7.0" Intermediate csg set depth to 6365' MD/5409' TVD from 6264' MD/5407' TVD and increase the cement to 670 sks lead and decrease the tail to 90 sks.
 - Change 4-1/2" Production liner set depth to 6165'-11090' MD/5409'-5219' TVD from 6100'-10786'/5407'-5265' TVD and increase the cement to 446 sks. Also, change the hole diameter for the 4-1/2" production liner from 6-1/4" to 6-1/8".
 - Change BHL footage to 380' FSL 330' FWL from 380' FSL 380' FWL.
 - Drill thru in a manner to achieve an optimal departure to log and core the Mancos.
 - Plug back the drill thru to a KOP of 4150' MD.
 - Build and land curve.
 - Perform plug back as per attached sheet.
- CONDITIONS OF APPROVAL**
Adhere to previously issued stipulations.

BLM'S APPROVAL OR ACCEPTANCE OF THIS
NOTICE DOES NOT RELIEVE THE LESSEE AND
OPERATOR FROM OBTAINING ANY OTHER
AUTHORIZATION REQUIRED FOR OPERATIONS
ON FEDERAL AND INDIAN LANDS

- * The new drilling plans depicting the casing changes and the directional design is attached showing the revisions along with an amended C-102 and plug back information.

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

Anna Stotts

Title Regulatory Analyst

Signature

Date 9/30/15

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved by

Abdelgadir Elmadani

Title

PE

Date

10/09/15

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, makes 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.

FV NMOC

Richardson Navajo 27-13 10 #4H Cement Plugs

Plug #1:

5,950' – 5,804' (MD) 107 SKS PLUGCEM™ SYSTEM @ 15.8 ppg (1.147 ft³/sk)

Plug #2:

4,750' – 4,150' (MD) 255 sks PLUGCEM™ SYSTEM @ 17.0 ppg (0.989 ft³/sk)

District I
1625 N. French Dr., Hobbs, NM 88240
Phone: (575) 393-6161 Fax: (575) 393-0720
District II
811 S. First St., Artesia, NM 88210
Phone: (575) 748-1283 Fax: (575) 748-9720
District III
1000 Rio Brazos Road, Aztec, NM 87410
Phone: (505) 334-6178 Fax: (505) 334-6170
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505
Phone: (505) 476-3460 Fax: (505) 476-3462

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-102
Revised August 1, 2011
Submit one copy to
appropriate
District Office

☒ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

¹ API Number 30-045-35242	² Pool Code 97232	³ Pool Name BASIN MANCOS
⁴ Property Code 314806	⁵ Property Name RICHARDSON NAVAJO 27-13-10	⁶ Well Number 04H
⁷ GRID No. 162928	⁸ Operator Name ENERGEN RESOURCES CORPORATION	⁹ Elevation 5922

¹⁰ Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
N	11	27-N	13-W		1282'	SOUTH	1386'	WEST	SAN JUAN

¹¹ Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
M	10	27-N	13-W		380'	SOUTH	330	WEST	SAN JUAN

¹² Dedicated Acres 320 Acres S/2 SEC 10	¹³ Joint or Infill	¹⁴ Consolidation Code	¹⁵ Order No.
--	-------------------------------	----------------------------------	-------------------------

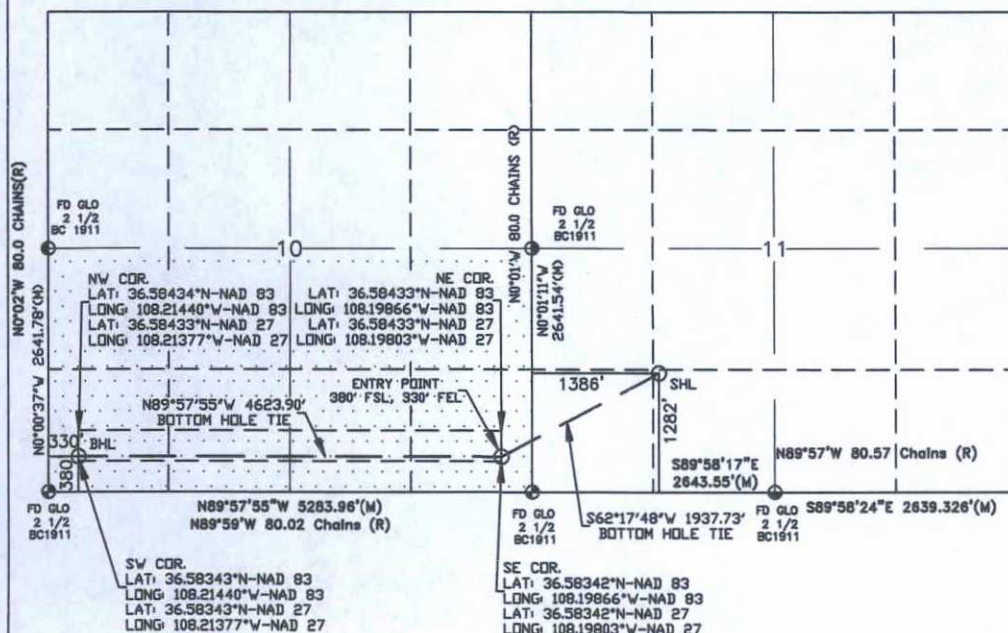
No allowable will be assigned to this completion until all interest have been consolidated or a non-standard unit has been approved by the division.

16

BOTTOM HOLE:
LAT: 36.58357°N-NAD 83
LONG: 108.21440°W-NAD 83
LAT: 36.58356°N-NAD 27
LONG: 108.21377°W-NAD 27

ENTRY POINT:
LAT: 36.58356°N-NAD 83
LONG: 108.19866°W-NAD 83
LAT: 36.58356°N-NAD 27
LONG: 108.19803°W-NAD 27

SURFACE HOLE LOCATION:
LAT: 36.586035°N-NAD 83
LONG: 108.192817°W-NAD 83
LAT: 36.58603°N-NAD 27
LONG: 108.19219°W-NAD 27



¹⁷ OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Signature: Anna Stotts
Date: 9/30/15

Printed Name: ANNA STOTTS

E-mail Address: astotts@energen.com

¹⁸ SURVEYOR CERTIFICATION

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.

NOV 25, 2008

Date of Survey

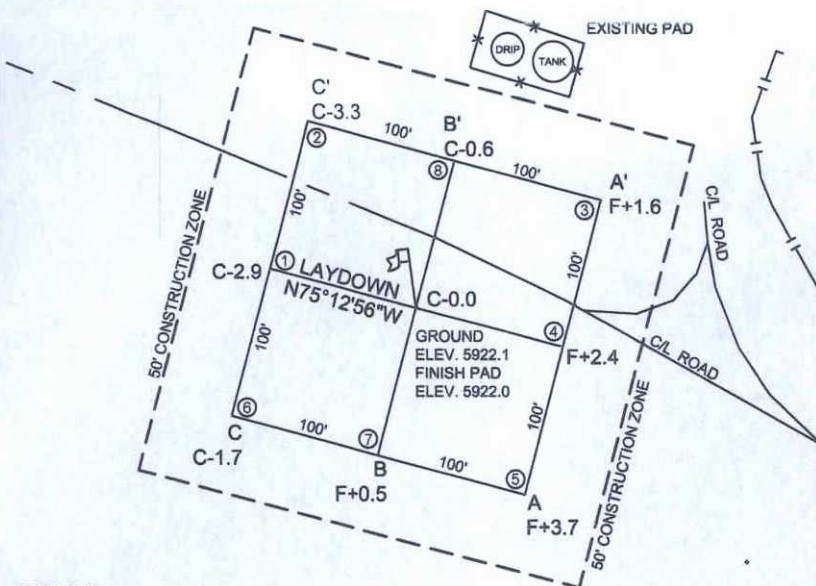
Signature and Seal of Professional Surveyor:

WILLIAM E. MAHNKE III
8466
REGISTERED
WILLIAM E. MAHNKE III
Certificate Number: 8466

ENERGEN RESOURCES
RICHARDSON #2E

ENERGEN RESOURCES CORPORATION

RICHARDSON NAVAJO 27-13-10 04H
SURFACE HOLE - 1282' FSL, 1386' FWL
LOCATED IN THE SE/4 SW/4 OF SECTION 11,
BOTTOM HOLE - 380' FSL & 330' FWL
LOCATED IN THE SW/4 SW/4 OF SECTION 10
T27N, R13W, N.M.P.M.,
SAN JUAN COUNTY, NEW MEXICO
ELEVATION: 5922', NAVD 88



TOTAL PAD:
0.92 ACRES
TOTAL DISTURBANCES:
1.38 ACRES



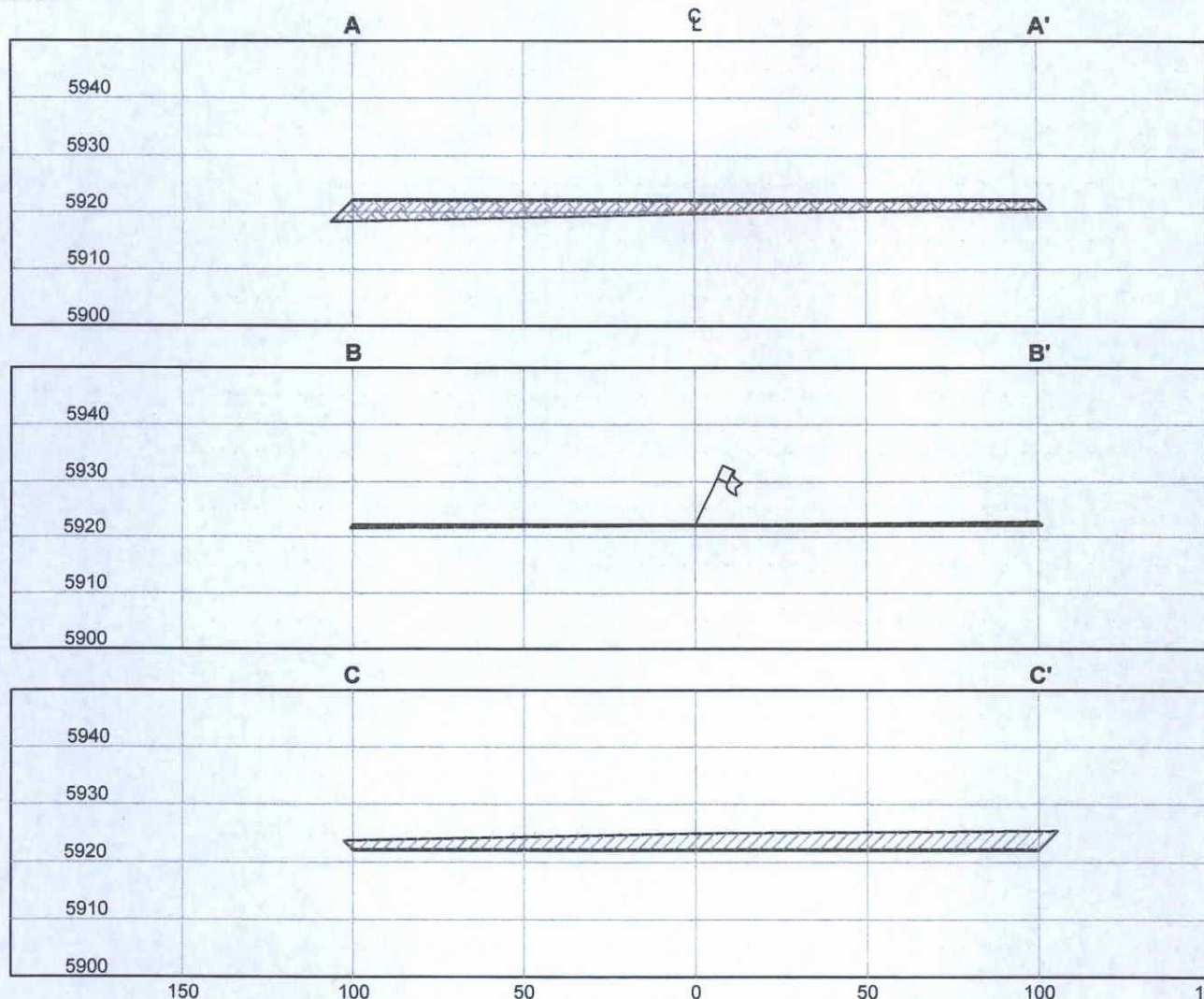
NOT TO SCALE

WELL FLAG
LATITUDE: 36.586035°N
LONGITUDE: 108.192817°W
DATUM: NAD 83

BOTTOM HOLE
LATITUDE: 36.58357°N
LONGITUDE: 108.21440°W
DATUM: NAD 83

WELL FLAG
LATITUDE: 36.58603°N
LONGITUDE: 108.19219°W
DATUM: NAD 27

BOTTOM HOLE
LATITUDE: 36.58356°N
LONGITUDE: 108.21377°W
DATUM: NAD 27



HORIZ. SCALE: 1"=100'
VERT. SCALE: 1"=30'

Red Skies Surveying & Mapping, Inc.

A Native American Owned Company
101 Fauver Lane, Bloomfield, New Mexico 87413
Phone/Fax: (505) 632-8906 Cell No: (505) 793-5325

ENERGEN RESOURCES CORPORATION

RICHARDSON NAVAJO 27-13-10 04H
SURFACE HOLE - 1282' FSL, 1386' FWL
LOCATED IN THE SE/4 SW/4 OF SECTION 11,
BOTTOM HOLE - 380' FSL & 330' FWL
LOCATED IN THE SW/4 SW/4 OF SECTION 10
T27N, R13W, N.M.P.M.,
SAN JUAN COUNTY, NEW MEXICO

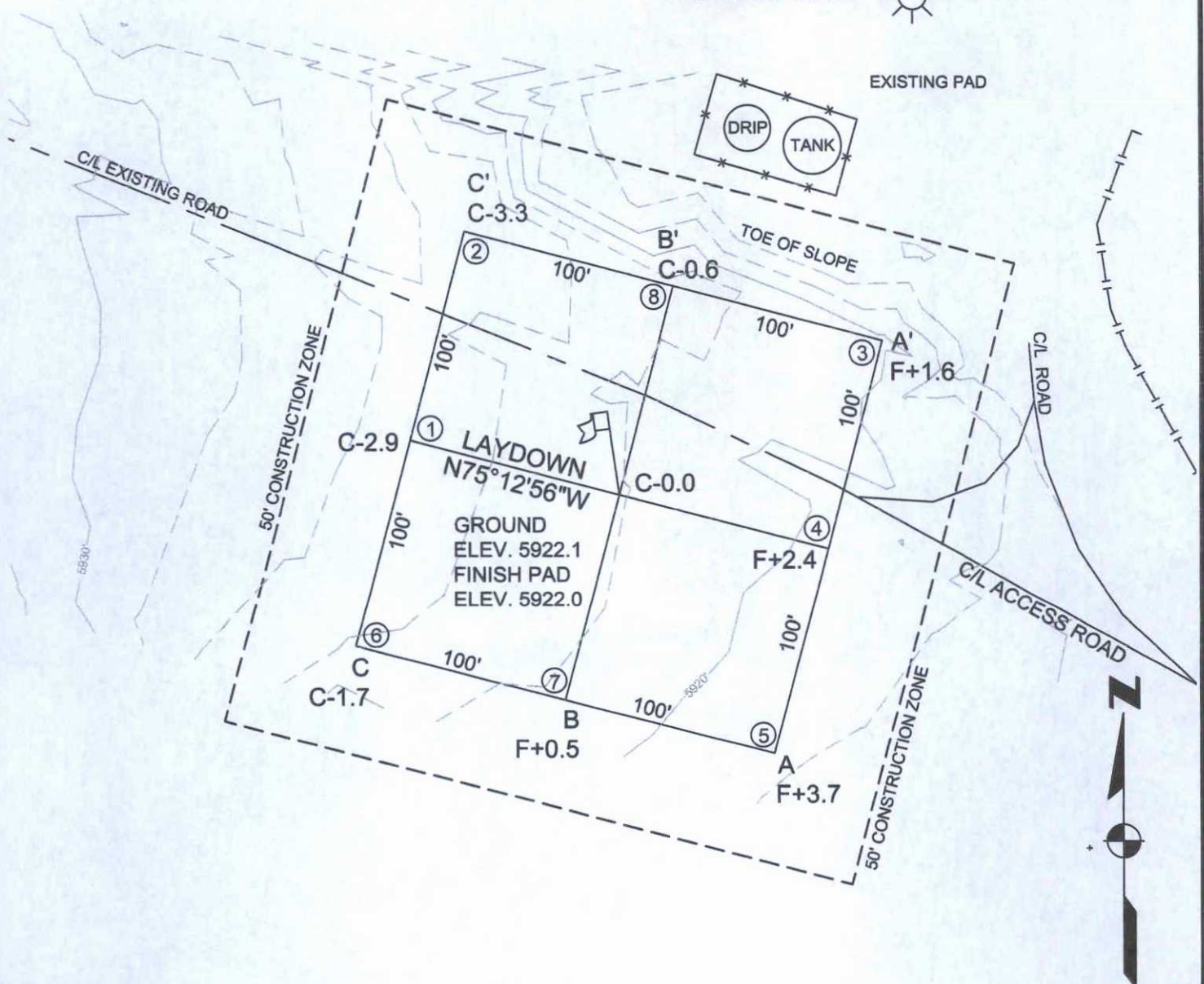
WELL FLAG

LATITUDE: 36.586035°N
LONGITUDE: 108.192817°W
DATUM: NAD 83

BOTTOM HOLE

LATITUDE: 36.58357°N
LONGITUDE: 108.21440°W
DATUM: NAD 83

ENERGEN RESOURCES
RICHARDSON #2E



NOT TO SCALE

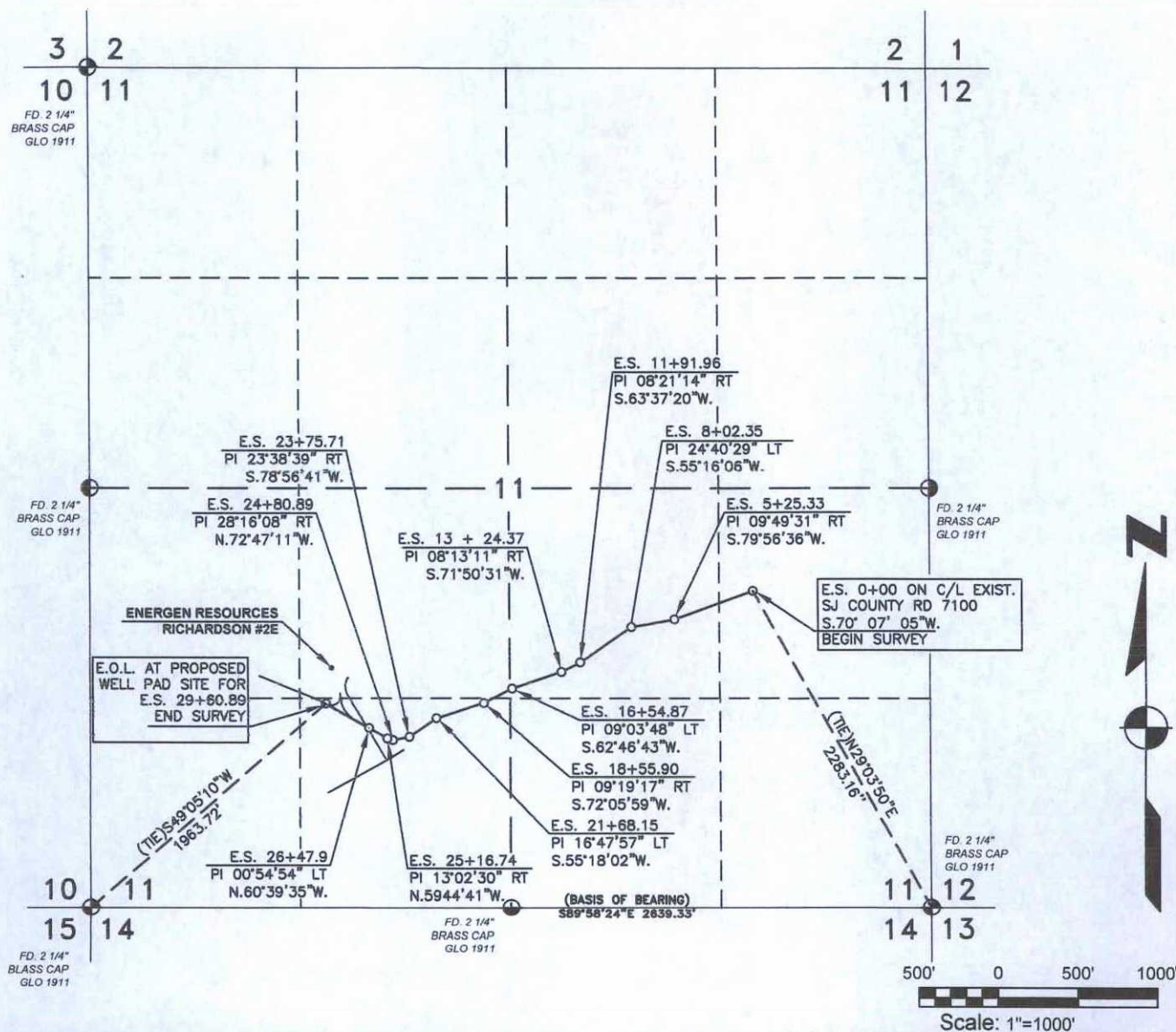
TOTAL PAD:
0.92 ACRES
TOTAL DISTURBANCES:
1.38 ACRES

Red Skies Surveying & Mapping, Inc.

A Native American Owned Company

101 Fauver Lane, Bloomfield, New Mexico 87413
Phone/Fax: (505) 632-8906 Cell No: (505) 793-5325

ENERGEN RESOURCES CORPORATION
CENTERLINE SURVEY OF ACCESS ROAD - RIGHT OF WAY 30' IN WIDTH
RICHARDSON NAVAJO 27-13-10 04H
LOCATED IN THE S/2 SEC.11, T27N, R13W, N.M.P.M.,
SAN JUAN COUNTY, NEW MEXICO



OWNERSHIP	LOCATION	ENGINEERING STATION	OWNER	FEET / RODS / ACRES
	S/4 SEC. 11	0+00 TO 29+60.89	NAVAJO NATION	2960.89' / 179.45 / 2.04 +/- AC

NOTES	DATE OF SURVEY: 5/14/09 - 06-24-09	BASIS OF BEARING: AS MEASURED BY GPS BETWEEN FOUND MONUMENTS AT THE SOUTH QUARTER CORNER AND THE SOUTHEAST CORNER OF SECTION 11, T27N, R13W, N.M.P.M., SAN JUAN COUNTY, NEW MEXICO. LINE BEARS S89°58'24"E, A DISTANCE OF 2639.33'
	1. C/L ROAD SURVEY IS ALONG AN EXISTING GRADED ROAD.	

I, WILLIAM E. MAHNKE II, A PROFESSIONAL SURVEYOR IN THE STATE OF NEW MEXICO, HEREBY CERTIFY THAT THIS SURVEY WAS CHECKED BY ME AND THAT IT MEETS THE MINIMUM REQUIREMENTS FOR SURVEYING IN THE STATE OF NEW MEXICO.

WILLIAM E. MAHNKE II, P.S. 8468
STATE OF NEW MEXICO
DATE 10-19-14

SRVYD BY: KW Sr
DWN. BY: KWSr
CHKD. BY: BM
JOB #: ERG118
DATE: 10/19/14
SCALE: 1"=1000'
DWG. NO. ERG118_CF

REVISIONS			
NO.	DATE	BY	DESCRIPTION
1	2-25-15	KW	REVISED WELL NAME

Red Skies Surveying & Mapping, Inc.
A Native American Owned Company
101 Fauver Lane Bloomfield, NM 87413
Telephone: (505) 632-3863
Fax: (505) 632-6823 Cell: 793-5325

ENERGEN RESOURCES CORPORATION

RICHARDSON NAVAJO 27-13-10 04H
SURFACE HOLE - 1282' FSL, 1386' FWL
LOCATED IN THE SE/4 SW/4 OF SECTION 11,
BOTTOM HOLE - 380' FSL & 330' FWL
LOCATED IN THE SW/4 SW/4 OF SECTION 10
T27N, R13W, N.M.P.M.,
SAN JUAN COUNTY, NEW MEXICO

WELL FLAG

LATITUDE: 36.586035°N
LONGITUDE: 108.192817°W
DATUM: NAD 83

DRIVING DIRECTIONS:

TRAVEL SOUTH ON 371 FROM FARMINGTON, NM TO THE INTERSECTION OF HWY 371 AND SJ CO 7100.

TRAVEL SOUTHEAST ON SJ CO 7100 5.4 MILES.

TURN RT ON DIRT ROAD AND TRAVEL WEST 0.6 MILES TO STAKED NEW WELL LOCATION.

Red Skies Surveying & Mapping, Inc.

A Native American Owned Company

101 Fauver Lane, Bloomfield, New Mexico 87413

Phone/Fax: (505) 632-8906 Cell No: (505) 793-5325

ENERGEN RESOURCES CORPORATION
 RICHARDSON NAVAJO 27-13-10 04H
 SURFACE HOLE: 1282' FSL, 1386' FWL
 SE/4 SW/4 SEC 11, T27N, R13W, NMPM
 BOTTOM HOLE: 380' FSL, 330' FWL
 SW/4 SW/4 SEC 10, T27N, R13W, NMPM
 SAN JUAN COUNTY, NEW MEXICO
 TOPO: HUGH, NM
 NO NEW ACCESS ROAD
 NAVAJO INDIAN RESERVATION

ENERGEN RESOURCES
 RICHARDSON #2E
 EXISTING WELL HEAD

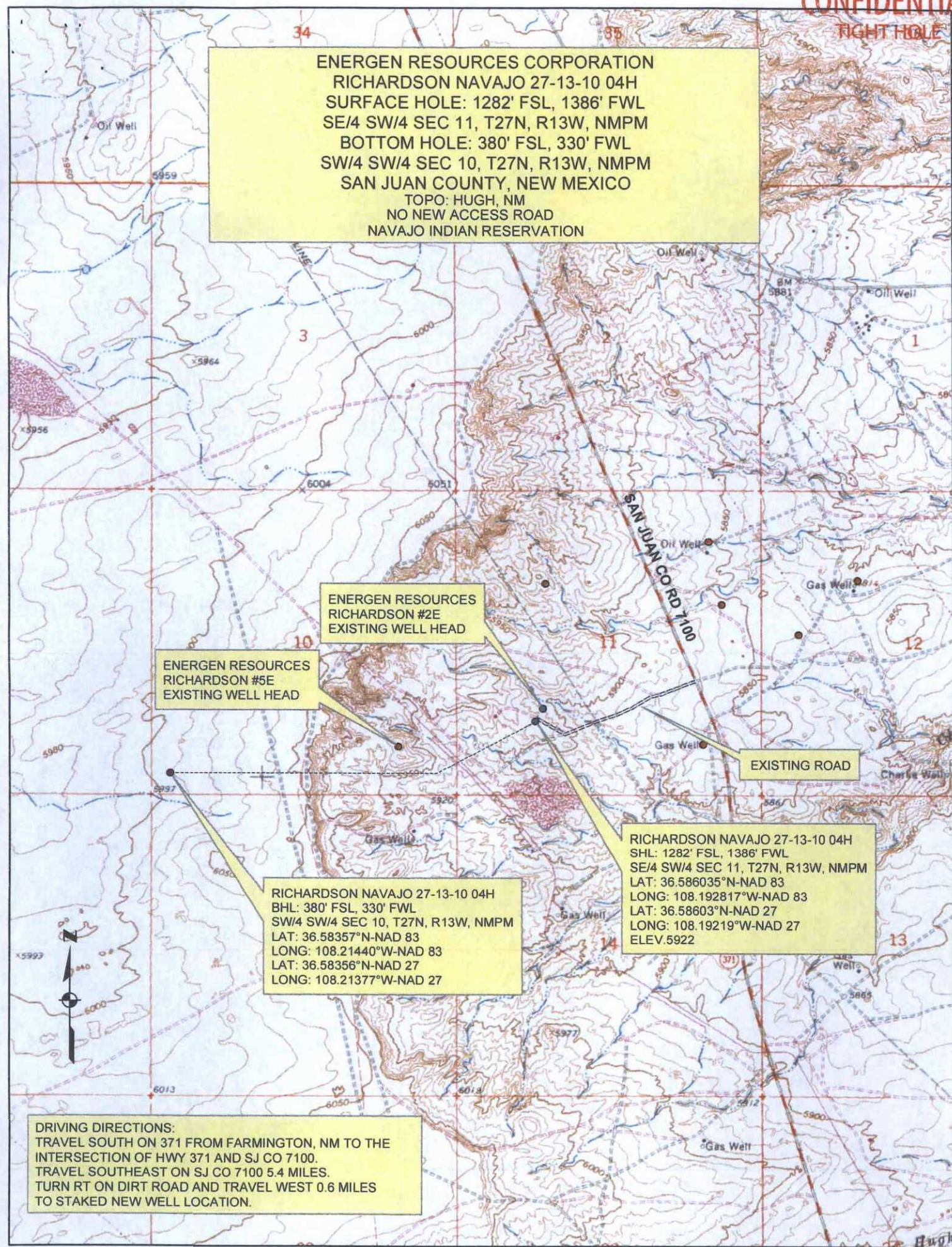
ENERGEN RESOURCES
 RICHARDSON #5E
 EXISTING WELL HEAD

EXISTING ROAD

RICHARDSON NAVAJO 27-13-10 04H
 BHL: 380' FSL, 330' FWL
 SW/4 SW/4 SEC 10, T27N, R13W, NMPM
 LAT: 36.58357°N-NAD 83
 LONG: 108.21440°W-NAD 83
 LAT: 36.58356°N-NAD 27
 LONG: 108.21377°W-NAD 27

RICHARDSON NAVAJO 27-13-10 04H
 SHL: 1282' FSL, 1386' FWL
 SE/4 SW/4 SEC 11, T27N, R13W, NMPM
 LAT: 36.586035°N-NAD 83
 LONG: 108.192817°W-NAD 83
 LAT: 36.58603°N-NAD 27
 LONG: 108.19219°W-NAD 27
 ELEV.5922

DRIVING DIRECTIONS:
 TRAVEL SOUTH ON 371 FROM FARMINGTON, NM TO THE
 INTERSECTION OF HWY 371 AND SJ CO 7100.
 TRAVEL SOUTHEAST ON SJ CO 7100 5.4 MILES.
 TURN RT ON DIRT ROAD AND TRAVEL WEST 0.6 MILES
 TO STAKED NEW WELL LOCATION.



Drilling Plan
Energen Resources Corporation

Richardson Navajo 27-13 10 #4H

Surface Location: 1282 FSL, 1386 FWL

Legal Description: Sec 11, T27N, R13W (36.58603° N, 108.19282° W – NAD83)

Bottom Hole Location: 380 FSL, 330 FWL

Legal Description: Sec 10, T27N, R13W (36.58357° N, 108.21440° W – NAD83)

San Juan County, NM

1. The elevation of the unprepared ground is 5,922 feet above sea level.
2. The geological name of the surface formation is the Nacimiento.
3. A rotary rig will be used to drill the well to a Proposed Total Depth of 5,409' TVD/11,090' MD.
4. Estimated top of important geological markers:

<u>Formation</u>	<u>Depth (TVD)(ft)</u>	<u>Depth (MD)(ft)</u>
Nacimiento	Surface	Surface
Ojo Alamo	395	395
Kirtland	445	445
Fruitland	865	865
Pictured Cliffs	1,355	1,355
Huerfanto Bentonite	1,785	1,786
Chacra	2,245	2,248
Cliff House	2,894	2,901
Menefee	2,904	2,911
Point Lookout	3,885	3,897
Mancos	4,145	4,159
Greenhorn	5,831	5,854
Graneros	5,895	5,918
Dakota	6,021	5,982

5. Estimated depth at which anticipated water, oil, gas or other mineral bearing formations are expected to be encountered:

<u>Formation</u>	<u>Depth (TVD)(ft)</u>	<u>Water/HydroCarbon</u>
Fruitland	865	Water/Gas
Pictured Cliffs	1,355	Gas
Cliffhouse	2,894	Gas
Point Lookout	3,885	Gas
Mancos	4,145	Water/Oil/Gas

6. All proposed casing is new and the program is as follows:

Casing	Size	Depth		Grade	Weight	Connection	PSI		x1000 lbs
		MD	TVD				Burst	Collapse	Tension
Surface	9-5/8"	0-320'	0-320'	J-55	36.00	STC	3520	2020	394
Intermediate	7"	0-6,365'	0-5,409'	L-80	26.00	DQX TMK IPSCO	7240	5410	830
Production	4-1/2"	6,165'-11,090'	5,409-5,219'	P-110	11.60	DQX TMK IPSCO	10690	7560	367

7. Cementing Program:

- a. 12-1/4" hole x 9-5/8" casing at 320' will have cement circulated to surface with 170 sks (100% excess true hole) Class H Cement with 1.0 % CaCl₂, 1/2 #/sk Poly-E-Flake 15.8 ppg, 1.17 ft³/sk. Note: CEMENT MUST BE CIRCULATED TO SURFACE. STANDARD BOW SPRING CENTRALIZERS SHALL BE PLACED ON THE FIRST 3 (BOTTOM 3) JOINTS OF CASING (1 PER JOINT) AND 1 EVERY 3RD JOINT TO SURFACE. 20 BBLS OF WATER FOLLOWED BY 20 BBLS OF MUDFLUSH AHEAD OF CEMENT AS SPACER
- b. 8-3/4" hole x 7" casing at 6,365'. Cement will be circulated to surface with 670 sks (50% excess true hole) of HALCEM™ SYSTEM with 0.1250 #/sk Poly-E-Flake – 12.3 ppg, 1.97 ft³/sk followed by 90 sks (50% excess true hole) VARICEM™ SYSTEM – 13.5 ppg, 1.29 ft³/sk. ONE CENTRALIZER PER JOINT FOR THE FIRST 3 JOINTS, THEN EVERY 3RD JOINT TO SURFACE. 20 BBLS OF MUDFLUSH FOLLOWED BY 20 BBLS OF CHEMWASH AHEAD OF CEMENT AS SPACER.
- c. 6-1/8" hole x 4-1/2" liner at 11,090'. A fluid caliper will be run to determine base slurry cement to have TOC at 6,165'. Cement with 446 sks (30% excess true hole) BONDCEM™ SYSTEM – 13.3 ppg, 1.35 ft³/sk. ONE CENTRALIZER PER JOINT FOR THE FIRST 3 JOINTS, THEN DISCRETIONARY TO THE 7" SHOE. THEN ONE CENTRALIZER PER JOINT THROUGH THE LINER LAP.

8. Pressure Control Equipment

- a. BOPE to be installed prior to Surface Casing drillout.
- b. Pressure control equipment will be used to meet 2,000 (2M) psi specifications.
- c. BOPE working pressure of 3,000 psi.
- d. Function test and visual inspection to be done at each casing size change prior to drill out.
- e. BOP annular to be tested to 85% of working pressure.
- f. All BOP and related equipment will be tested in accordance with the requirements outlined in Onshore Order No. 2 and Notice to Operators dated May 27, 2005.
- g. BOP remote controls to be located on rig floor and readily accessible, master control on ground at accumulator will be able to function all preventors.
- h. Kill line will be 2 in min and have two kill line valves, one being a check valve.
- i. Choke line will be 2 in min and have two choke line valves, choke manifold with have two adjustable chokes, one manual and one remote. All choke lines will be as straight as possible. Any turns will be properly targeted using block and/or running tees. Choke line and manifold to be pressure tested to 1,500 psi.
- j. Float sub and TIW valve will be on the rig floor at all times.
- k. If high pressure co-flex hoses are used, they will be run as straight as possible and anchored to prevent whip.
- l. The main discharge line (panic line) will be at least 100' from the choke manifold and discharged into an appropriately sized discharge facility.

9. Mud Program:

0' - 320'	Fresh water/Spud Mud. Paper for losses and seepage. 8.5 to 9.0 ppg, 32 to 75 vis, PV 3 to 5, YP 5 to 7, WL NC
320' - 6,365'	Fresh water/LSND. As needed LCM for losses and seepage. 8.5 to 9.5 ppg, pH 10, 28 to 60 vis, PV 1, YP 1, WL 8-15
6,365' - 11,090'	WBM with shale and clay stabilizers. As needed LCM for losses and seepage. 8.3 to 9.3 ppg, 15 to 35 vis, PV 4-6, YP 4-6, WL < 20

****During drilling operations, all necessary products will be sufficiently stored on location for abnormal situations. The characteristics, use, testing of drilling mud and the implementation of related drilling procedures shall be designed to prevent the loss of well control. Sufficient quantities of mud materials shall be maintained or readily accessible for the purpose of assuring well control.**

****A pH of 10 or above in the fresh water base mud system shall be maintained to control the effects corrosion has on metallurgy of equipment used.**

Operating and Maintenance

Energen Resources Corporation will be using all above ground steel pits for fluid and cuttings while drilling. If any tank develops a leak we will have immediate visual discovery, we would then transfer the fluid to another tank then remove any contaminated soil and dispose of it in the cuttings bins for transportation. Any leaks, spills or other undesirable events will be reported in accordance with BLM NTL 3A. Rig crews will monitor the tanks at all times. A trip/surge tank will be used to monitor returns for any "kicks" of formation fluids.

Equipment:

2-Mongoose Shale Shakers

2-3400 High Speed Centrifuges with stands and pumps

2-Roll off bins with Tracks

2-200 bbl Open top Frac tanks

1-Mud/Gas Separator and Degasser

1-Trip/Surge Tank

Electronic or Visual monitoring system to indicate lost returns

10. Testing, Logging and Coring Program:

- a. Testing Program: No drillstem tests are anticipated
- b. Electric Logging Program: PEX/ECS/CMR/FMI/SS
- c. LWD Program: TBD
- d. Coring Program: 50 Rotary Sidewall
- e. CBL's and/or Temperature Surveys Will Be Performed as Needed or Required.

11. Bottom Hole Pressure expected to be 2,500 +/- psi

12. Bottom Hole Temperature expected to be 160 deg F.

ENERGEN

Energen Resources Corp.

San Juan County, NM (NAD83)

Richardson Navajo

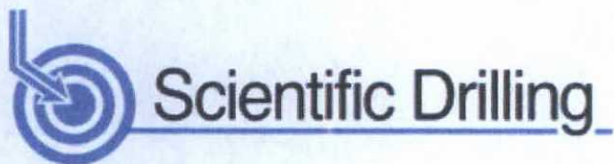
Richardson Navajo 27-13-10 #4H

Horizontal

Plan: Plan #1

Standard Planning Report

29 September, 2015



www.scientificdrilling.com

Project: San Juan County, NM (NAD83)
 Site: Richardson Navajo
 Well: Richardson Navajo 27-13-10 #4H
 Wellbore: Horizontal
 Design: Plan #1

Geodetic System: US State Plane 1983
 Datum: North American Datum 1983
 Ellipsoid: GRS 1980
 Zone: New Mexico Western Zone
 System Datum: Mean Sea Level
 Local North: True



Azimuths to True Nor
 Magnetic North: 9.3

Magnetic Fiel
 Strength: 50109.1sr
 Dip Angle: 63.2
 Date: 9/29/20
 Model: HDG

WELL DETAILS: Richardson Navajo 27-13-10 #4H

Plan: Plan #1 (Richardson Navajo 27-13-10 #4H/Horizontal)

Created By: Janie Collins Date: 11:03, September 29 2015

GL 5922' & RKB 17' @ 5939.00ft (Key 881)

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.00	0.00	2032823.73	2617552.99	36.5860350	-108.1928170

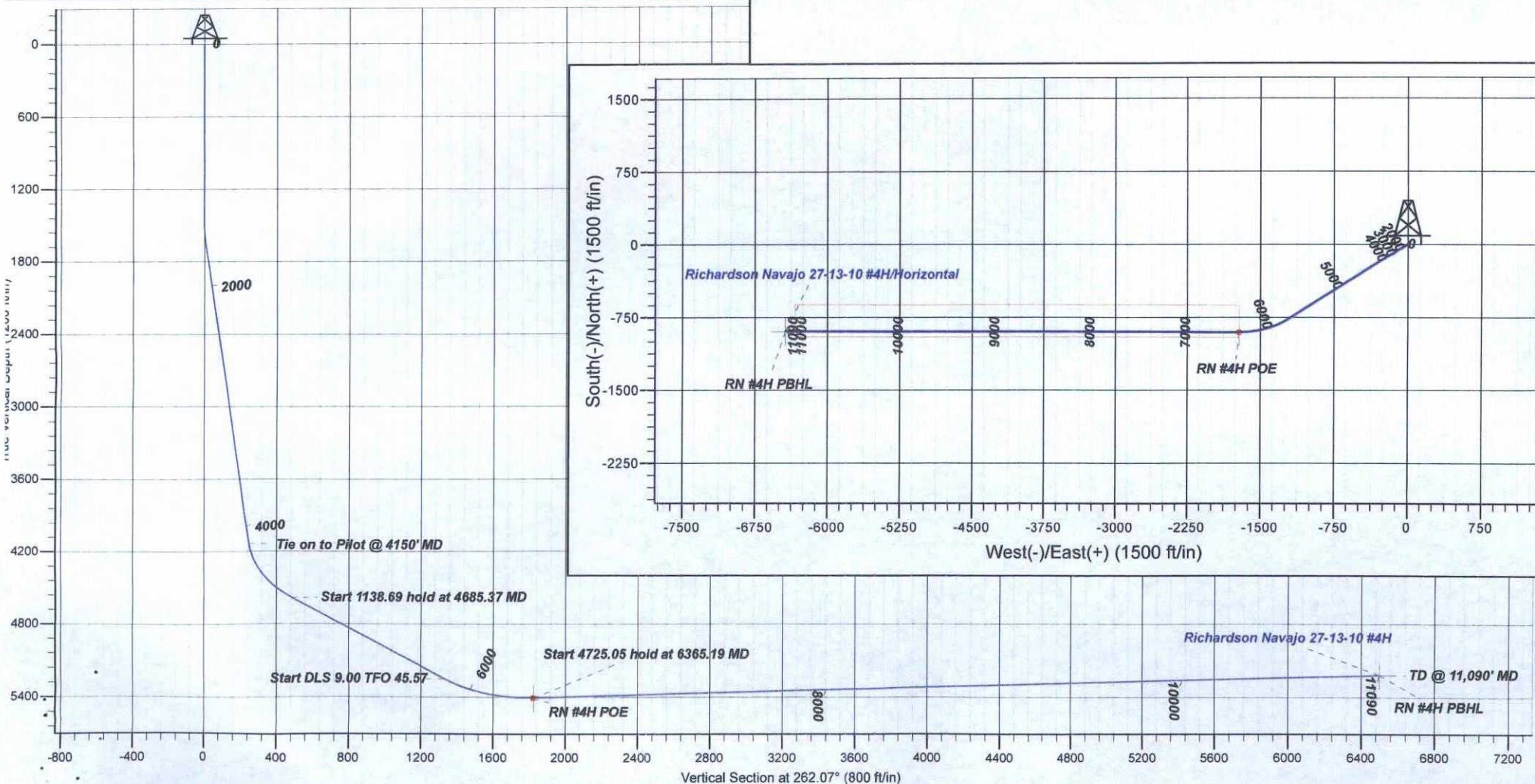
DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
RN #4H POE	5409.00	-900.97	-1715.49	2031929.18	2615834.15	36.5835600	-108.1986600
RN #4H PBHL	5219.00	-896.67	-6436.71	2031951.13	2611112.99	36.5835699	-108.2147406

SECTION DETAILS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec
4150.00	6.00	238.48	4135.92	-141.54	-230.79	0.00	0.00	248.11
4685.37	54.18	237.58	4585.61	-280.87	-451.00	9.00	-0.98	485.44
5824.06	54.18	237.58	5251.98	-775.96	-1230.39	0.00	0.00	1325.68
6365.19	92.30	270.05	5409.00	-900.97	-1715.49	9.00	45.57	1823.39
11090.23	92.30	270.05	5219.00	-896.67	-6436.71	0.00	0.00	6498.87

Target	Annotation
RN #4H POE	Tie on to Pilot @ 4150' MD
RN #4H PBHL	Start 1138.69 hold at 4685.37 MD
	Start DLS 9.00 TFO 45.57
	Start 4725.05 hold at 6365.19 MD
	TD @ 11,090' MD



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Richardson Navajo 27-13-10 #4H
Company:	Energen Resources Corp.	TVD Reference:	GL 5922' & RKB 17' @ 5939.00ft (Key 881)
Project:	San Juan County, NM (NAD83)	MD Reference:	GL 5922' & RKB 17' @ 5939.00ft (Key 881)
Site:	Richardson Navajo	North Reference:	True
Well:	Richardson Navajo 27-13-10 #4H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Horizontal		
Design:	Plan #1		

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

Site	Richardson Navajo		
------	-------------------	--	--

Site Position:		Northing:	2,032,823.72 usft	Latitude:	36.5860350
From:	Lat/Long	Easting:	2,617,552.99 usft	Longitude:	-108.1928170
Position Uncertainty:	0.00 ft	Slot Radius:	13.200 in	Grid Convergence:	-0.21 °

Well	Richardson Navajo 27-13-10 #4H				
------	--------------------------------	--	--	--	--

Well Position	+N/-S	0.00 ft	Northing:	2,032,823.72 usft	Latitude:	36.5860350
	+E/-W	0.00 ft	Easting:	2,617,552.99 usft	Longitude:	-108.1928170
Position Uncertainty		0.00 ft	Wellhead Elevation:	0.00 ft	Ground Level:	5,922.00 ft

Wellbore	Horizontal				
----------	------------	--	--	--	--

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	9/29/2015	9.33	63.25	50,109

Design	Plan #1				
--------	---------	--	--	--	--

Audit Notes:					
--------------	--	--	--	--	--

Version:	Phase:	PLAN	Tie On Depth:	4,150.00
----------	--------	------	---------------	----------

Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.00	0.00	0.00	262.07

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
4,150.00	6.00	238.48	4,135.92	-141.54	-230.79	0.00	0.00	0.00	0.00	
4,685.37	54.18	237.58	4,585.61	-280.87	-451.00	9.00	9.00	-0.17	-0.98	
5,824.06	54.18	237.58	5,251.98	-775.96	-1,230.39	0.00	0.00	0.00	0.00	
6,365.19	92.30	270.05	5,409.00	-900.97	-1,715.49	9.00	7.04	6.00	45.57	RN #4H POE
11,090.23	92.30	270.05	5,219.00	-896.67	-6,436.71	0.00	0.00	0.00	0.00	RN #4H PBHL



Database: Grand Junction District
 Company: Energen Resources Corp.
 Project: San Juan County, NM (NAD83)
 Site: Richardson Navajo
 Well: Richardson Navajo 27-13-10 #4H
 Wellbore: Horizontal
 Design: Plan #1

Local Co-ordinate Reference: Well Richardson Navajo 27-13-10 #4H
 TVD Reference: GL 5922' & RKB 17' @ 5939.00ft (Key 881)
 MD Reference: GL 5922' & RKB 17' @ 5939.00ft (Key 881)
 North Reference: True
 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)
4,150.00	6.00	238.48	4,135.92	-141.54	-230.79	248.11	0.00	0.00	0.00
Tie on to Pilot @ 4150' MD									
4,200.01	10.50	238.06	4,185.40	-145.32	-236.89	254.67	9.00	9.00	-0.85
4,300.01	19.50	237.79	4,281.89	-159.06	-258.79	278.26	9.00	9.00	-0.26
4,400.01	28.50	237.69	4,373.15	-180.76	-293.14	315.28	9.00	9.00	-0.10
4,500.01	37.50	237.63	4,456.93	-209.86	-339.11	364.82	9.00	9.00	-0.06
4,600.01	46.50	237.60	4,531.17	-245.66	-395.56	425.67	9.00	9.00	-0.04
4,685.37	54.18	237.58	4,585.61	-280.87	-451.00	485.44	9.00	9.00	-0.03
Start 1138.69 hold at 4685.37 MD									
4,700.01	54.18	237.58	4,594.18	-287.23	-461.02	496.24	0.00	0.00	0.00
4,800.01	54.18	237.58	4,652.70	-330.71	-529.46	570.03	0.00	0.00	0.00
4,900.01	54.18	237.58	4,711.22	-374.19	-597.91	643.82	0.00	0.00	0.00
5,000.01	54.18	237.58	4,769.74	-417.67	-666.36	717.61	0.00	0.00	0.00
5,100.01	54.18	237.58	4,828.26	-461.15	-734.80	791.40	0.00	0.00	0.00
5,200.01	54.18	237.58	4,886.78	-504.63	-803.25	865.19	0.00	0.00	0.00
5,300.01	54.18	237.58	4,945.30	-548.10	-871.70	938.98	0.00	0.00	0.00
5,400.01	54.18	237.58	5,003.82	-591.58	-940.14	1,012.77	0.00	0.00	0.00
5,500.01	54.18	237.58	5,062.34	-635.06	-1,008.59	1,086.57	0.00	0.00	0.00
5,600.01	54.18	237.58	5,120.86	-678.54	-1,077.04	1,160.36	0.00	0.00	0.00
5,700.01	54.18	237.58	5,179.38	-722.02	-1,145.48	1,234.15	0.00	0.00	0.00
5,800.01	54.18	237.58	5,237.90	-765.50	-1,213.93	1,307.94	0.00	0.00	0.00
5,824.06	54.18	237.58	5,251.98	-775.96	-1,230.39	1,325.68	0.00	0.00	0.00
Start DLS 9.00 TFO 45.57									
5,900.01	59.10	243.26	5,293.75	-807.17	-1,285.55	1,384.62	9.00	6.48	7.48
6,000.01	65.91	249.90	5,339.92	-842.23	-1,366.90	1,470.03	9.00	6.81	6.64
6,100.01	72.98	255.86	5,375.03	-869.66	-1,456.31	1,562.37	9.00	7.07	5.96
6,200.01	80.21	261.37	5,398.22	-888.77	-1,551.59	1,659.37	9.00	7.23	5.52
6,300.01	87.52	266.65	5,408.90	-899.10	-1,650.37	1,758.64	9.00	7.31	5.28
6,365.19	92.30	270.05	5,409.00	-900.97	-1,715.49	1,823.39	9.00	7.34	5.22
Start 4725.05 hold at 6365.19 MD - RN #4H POE									
6,400.01	92.30	270.05	5,407.60	-900.94	-1,750.29	1,857.85	0.00	0.00	0.00
6,500.01	92.30	270.05	5,403.58	-900.85	-1,850.21	1,956.80	0.00	0.00	0.00
6,600.01	92.30	270.05	5,399.56	-900.76	-1,950.13	2,055.76	0.00	0.00	0.00
6,700.01	92.30	270.05	5,395.54	-900.66	-2,050.05	2,154.71	0.00	0.00	0.00
6,800.01	92.30	270.05	5,391.52	-900.57	-2,149.96	2,253.66	0.00	0.00	0.00
6,900.01	92.30	270.05	5,387.49	-900.48	-2,249.88	2,352.61	0.00	0.00	0.00
7,000.01	92.30	270.05	5,383.47	-900.39	-2,349.80	2,451.56	0.00	0.00	0.00
7,100.01	92.30	270.05	5,379.45	-900.30	-2,449.72	2,550.51	0.00	0.00	0.00
7,200.01	92.30	270.05	5,375.43	-900.21	-2,549.64	2,649.46	0.00	0.00	0.00
7,300.01	92.30	270.05	5,371.41	-900.12	-2,649.56	2,748.41	0.00	0.00	0.00
7,400.01	92.30	270.05	5,367.39	-900.03	-2,749.48	2,847.36	0.00	0.00	0.00
7,500.02	92.30	270.05	5,363.37	-899.94	-2,849.40	2,946.32	0.00	0.00	0.00
7,600.02	92.30	270.05	5,359.35	-899.85	-2,949.32	3,045.27	0.00	0.00	0.00
7,700.02	92.30	270.05	5,355.32	-899.76	-3,049.24	3,144.22	0.00	0.00	0.00
7,800.02	92.30	270.05	5,351.30	-899.66	-3,149.16	3,243.17	0.00	0.00	0.00
7,900.02	92.30	270.05	5,347.28	-899.57	-3,249.08	3,342.12	0.00	0.00	0.00
8,000.02	92.30	270.05	5,343.26	-899.48	-3,349.00	3,441.07	0.00	0.00	0.00
8,100.02	92.30	270.05	5,339.24	-899.39	-3,448.92	3,540.02	0.00	0.00	0.00
8,200.02	92.30	270.05	5,335.22	-899.30	-3,548.83	3,638.97	0.00	0.00	0.00
8,300.02	92.30	270.05	5,331.20	-899.21	-3,648.75	3,737.92	0.00	0.00	0.00
8,400.02	92.30	270.05	5,327.18	-899.12	-3,748.67	3,836.88	0.00	0.00	0.00
8,500.02	92.30	270.05	5,323.16	-899.03	-3,848.59	3,935.83	0.00	0.00	0.00
8,600.02	92.30	270.05	5,319.13	-898.94	-3,948.51	4,034.78	0.00	0.00	0.00
8,700.02	92.30	270.05	5,315.11	-898.85	-4,048.43	4,133.73	0.00	0.00	0.00

Database:	Grand Junction District	Local Co-ordinate Reference:	Well Richardson Navajo 27-13-10 #4H
Company:	Energen Resources Corp.	TVD Reference:	GL 5922' & RKB 17' @ 5939.00ft (Key 881)
Project:	San Juan County, NM (NAD83)	MD Reference:	GL 5922' & RKB 17' @ 5939.00ft (Key 881)
Site:	Richardson Navajo	North Reference:	True
Well:	Richardson Navajo 27-13-10 #4H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Horizontal		
Design:	Plan #1		

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)
8,800.02	92.30	270.05	5,311.09	-898.75	-4,148.35	4,232.68	0.00	0.00	0.00
8,900.02	92.30	270.05	5,307.07	-898.66	-4,248.27	4,331.63	0.00	0.00	0.00
9,000.02	92.30	270.05	5,303.05	-898.57	-4,348.19	4,430.58	0.00	0.00	0.00
9,100.02	92.30	270.05	5,299.03	-898.48	-4,448.11	4,529.53	0.00	0.00	0.00
9,200.02	92.30	270.05	5,295.01	-898.39	-4,548.03	4,628.48	0.00	0.00	0.00
9,300.02	92.30	270.05	5,290.99	-898.30	-4,647.95	4,727.44	0.00	0.00	0.00
9,400.02	92.30	270.05	5,286.97	-898.21	-4,747.87	4,826.39	0.00	0.00	0.00
9,500.02	92.30	270.05	5,282.94	-898.12	-4,847.79	4,925.34	0.00	0.00	0.00
9,600.02	92.30	270.05	5,278.92	-898.03	-4,947.70	5,024.29	0.00	0.00	0.00
9,700.02	92.30	270.05	5,274.90	-897.94	-5,047.62	5,123.24	0.00	0.00	0.00
9,800.02	92.30	270.05	5,270.88	-897.85	-5,147.54	5,222.19	0.00	0.00	0.00
9,900.02	92.30	270.05	5,266.86	-897.75	-5,247.46	5,321.14	0.00	0.00	0.00
10,000.02	92.30	270.05	5,262.84	-897.66	-5,347.38	5,420.09	0.00	0.00	0.00
10,100.02	92.30	270.05	5,258.82	-897.57	-5,447.30	5,519.04	0.00	0.00	0.00
10,200.02	92.30	270.05	5,254.80	-897.48	-5,547.22	5,618.00	0.00	0.00	0.00
10,300.02	92.30	270.05	5,250.78	-897.39	-5,647.14	5,716.95	0.00	0.00	0.00
10,400.02	92.30	270.05	5,246.75	-897.30	-5,747.06	5,815.90	0.00	0.00	0.00
10,500.02	92.30	270.05	5,242.73	-897.21	-5,846.98	5,914.85	0.00	0.00	0.00
10,600.02	92.30	270.05	5,238.71	-897.12	-5,946.90	6,013.80	0.00	0.00	0.00
10,700.02	92.30	270.05	5,234.69	-897.03	-6,046.82	6,112.75	0.00	0.00	0.00
10,800.02	92.30	270.05	5,230.67	-896.94	-6,146.74	6,211.70	0.00	0.00	0.00
10,900.02	92.30	270.05	5,226.65	-896.84	-6,246.66	6,310.65	0.00	0.00	0.00
11,000.02	92.30	270.05	5,222.63	-896.75	-6,346.57	6,409.60	0.00	0.00	0.00
11,090.23	92.30	270.05	5,219.00	-896.67	-6,436.71	6,498.87	0.00	0.00	0.00

TD @ 11,090' MD - RN #4H PBHL

Design Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
RN #4H PBHL	0.00	0.00	5,219.00	-896.67	-6,436.71	2,031,951.13	2,611,112.99	36.5835699	-108.2147406
- plan hits target center									
- Point									
RN #4H POE	0.00	0.00	5,409.00	-900.97	-1,715.49	2,031,929.18	2,615,834.15	36.5835600	-108.1986600
- plan hits target center									
- Point									

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Comment
4,150.00	4,135.92	-141.54	-230.79	Tie on to Pilot @ 4150' MD
4,685.37	4,585.61	-280.87	-451.00	Start 1138.69 hold at 4685.37 MD
5,824.06	5,251.98	-775.96	-1,230.39	Start DLS 9.00 TFO 45.57
6,365.19	5,409.00	-900.97	-1,715.49	Start 4725.05 hold at 6365.19 MD
11,090.23	5,219.00	-896.67	-6,436.71	TD @ 11,090' MD



Energen Resources Corp.

San Juan County, NM (NAD83)

Richardson Navajo

Richardson Navajo 27-13-10 #4H

Pilot

Plan: Plan #1

Standard Planning Report

29 September, 2015



Scientific Drilling

www.scientificdrilling.com



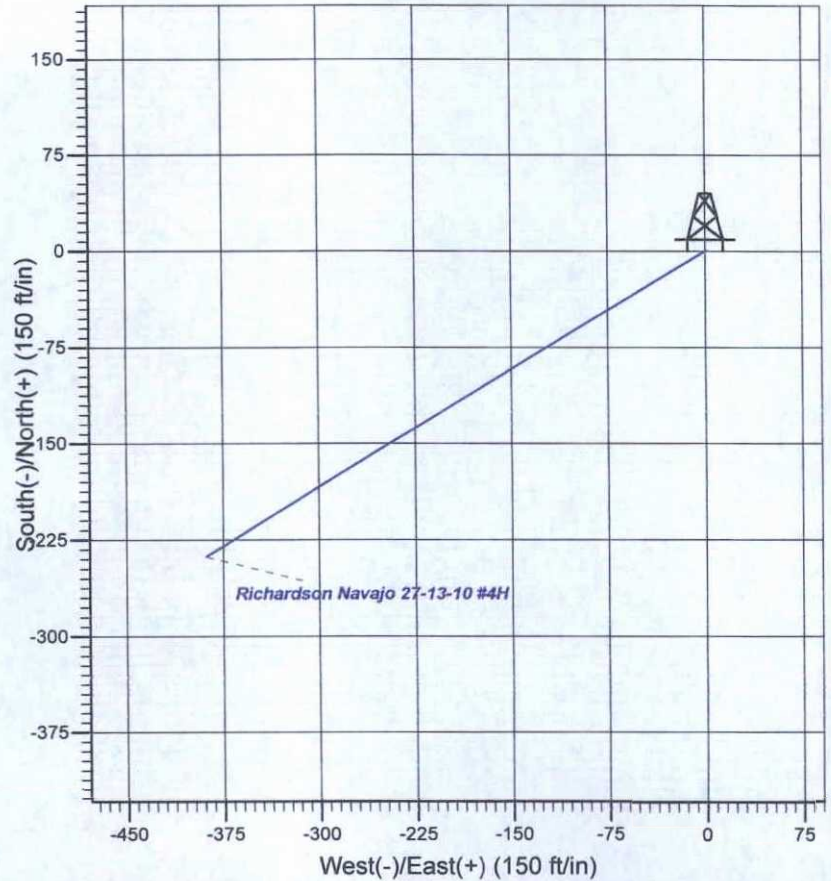
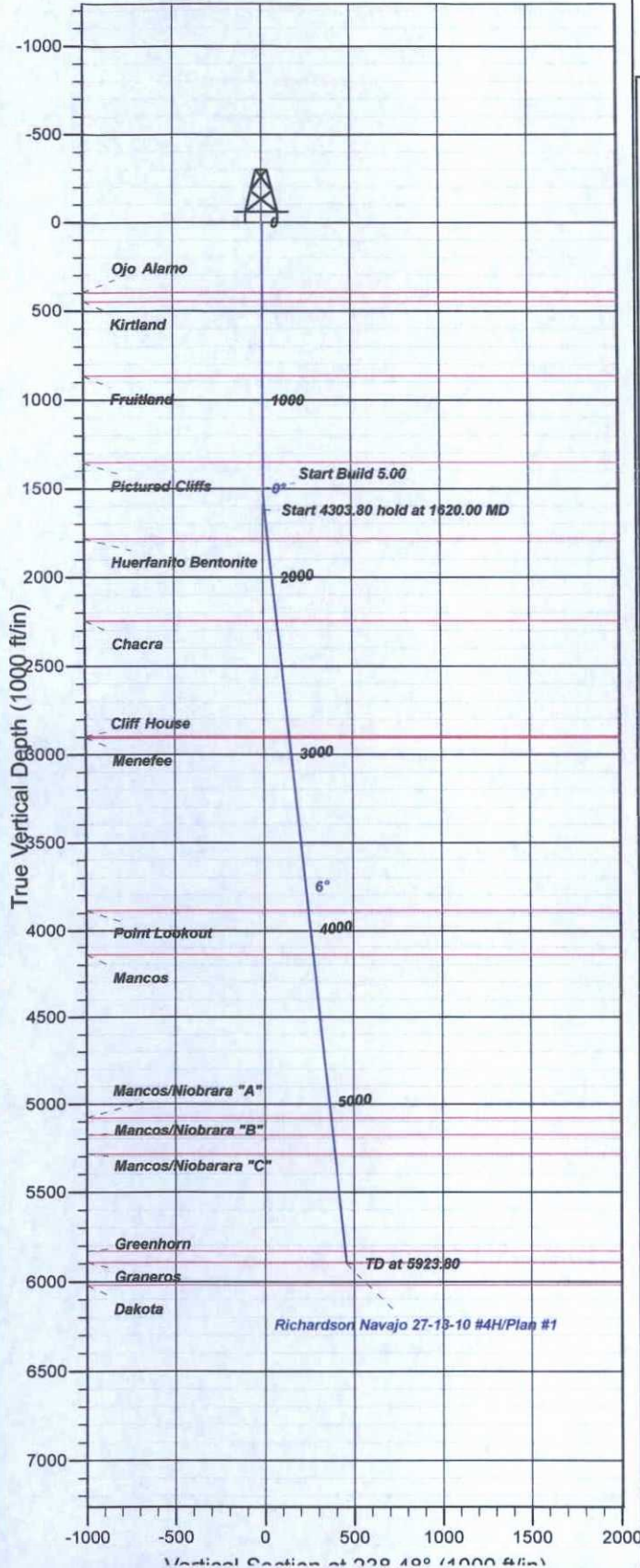
Well Details: Richardson Navajo 27-13-10 #4H

GL 5922' & RKB 17' @ 5939.00ft (Key 881)

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.00	0.00	2032823.73	2617552.99	36.5860350	-108.1928170	

T M Azimuths to True North
 Magnetic North: 9.33°

Magnetic Field
 Strength: 50109.4snT
 Dip Angle: 63.25°
 Date: 9/28/2015
 Model: HDGM



FORMATION TOP DETAILS

TVDPPath	MDPath	Formation
395.00	395.00	Ojo Alamo
445.00	445.00	Kirtland
865.00	865.00	Fruitland
1355.00	1355.00	Pictured Cliffs
1785.00	1786.13	Huerfano Bentonite
2245.00	2248.66	Chacra
2894.00	2901.24	Cliff House
2904.00	2911.29	Menefee
3885.00	3897.70	Point Lookout
4145.00	4159.13	Mancos
5079.00	5098.27	Mancos/Niobrara "A"
5176.00	5195.81	Mancos/Niobrara "B"
5284.00	5304.40	Mancos/Niobrara "C"
5831.00	5854.42	Greenhorn
5895.00	5918.77	Graneros

Plan: Plan #1

10:52, September 29 2015
 Created By: Janie Collins

PROJECT DETAILS: San Juan County, NM (NAD83)

Geodetic System: US State Plane 1983
 Datum: North American Datum 1983
 Ellipsoid: GRS 1980
 Zone: New Mexico Western Zone

System Datum: Mean Sea Level

CASING DETAILS

No casing data is available

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	1500.00	0.00	0.00	1500.00	0.00	0.00	0.00	0.00	0.00	
3	1620.00	6.00	238.48	1619.78	-3.28	-5.35	5.00	238.48	6.28	
4	5923.80	6.00	238.48	5900.00	-238.47	-388.85	0.00	0.00	456.15	

DESIGN TARGET DETAILS

No target data is available.

Database:	Grand Junction District	Local Co-ordinate Reference:	Well Richardson Navajo 27-13-10 #4H
Company:	Energen Resources Corp.	TVD Reference:	GL 5922' & RKB 17' @ 5939.00ft (Key 881)
Project:	San Juan County, NM (NAD83)	MD Reference:	GL 5922' & RKB 17' @ 5939.00ft (Key 881)
Site:	Richardson Navajo	North Reference:	True
Well:	Richardson Navajo 27-13-10 #4H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Pilot		
Design:	Plan #1		

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

Site	Richardson Navajo				
Site Position:		Northing:	2,032,823.72 usft	Latitude:	36.5860350
From:	Lat/Long	Easting:	2,617,552.99 usft	Longitude:	-108.1928170
Position Uncertainty:	0.00 ft	Slot Radius:	13.200 in	Grid Convergence:	-0.21 °

Well	Richardson Navajo 27-13-10 #4H					
Well Position	+N/-S	0.00 ft	Northing:	2,032,823.72 usft	Latitude:	36.5860350
	+E/-W	0.00 ft	Easting:	2,617,552.99 usft	Longitude:	-108.1928170
Position Uncertainty		0.00 ft	Wellhead Elevation:	0.00 ft	Ground Level:	5,922.00 ft

Wellbore	Pilot				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	9/28/2015	9.33	63.25	50,109

Design	Plan #1			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.00	0.00	0.00	238.48

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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,620.00	6.00	238.48	1,619.78	-3.28	-5.35	5.00	5.00	0.00	238.48	
5,923.80	6.00	238.48	5,900.00	-238.47	-388.85	0.00	0.00	0.00	0.00	

Database:	Grand Junction District	Local Co-ordinate Reference:	Well Richardson Navajo 27-13-10 #4H
Company:	Energen Resources Corp.	TVD Reference:	GL 5922' & RKB 17' @ 5939.00ft (Key 881)
Project:	San Juan County, NM (NAD83)	MD Reference:	GL 5922' & RKB 17' @ 5939.00ft (Key 881)
Site:	Richardson Navajo	North Reference:	True
Well:	Richardson Navajo 27-13-10 #4H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Pilot		
Design:	Plan #1		

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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00
395.00	0.00	0.00	395.00	0.00	0.00	0.00	0.00	0.00	0.00
Ojo Alamo									
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00
445.00	0.00	0.00	445.00	0.00	0.00	0.00	0.00	0.00	0.00
Kirtland									
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00
865.00	0.00	0.00	865.00	0.00	0.00	0.00	0.00	0.00	0.00
Fruitland									
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00
1,355.00	0.00	0.00	1,355.00	0.00	0.00	0.00	0.00	0.00	0.00
Pictured Cliffs									
1,400.00	0.00	0.00	1,400.00	0.00	0.00	0.00	0.00	0.00	0.00
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00
1,600.00	5.00	238.48	1,599.88	-2.28	-3.72	4.36	5.00	5.00	0.00
1,620.00	6.00	238.48	1,619.78	-3.28	-5.35	6.28	5.00	5.00	0.00
1,700.00	6.00	238.48	1,699.35	-7.65	-12.48	14.64	0.00	0.00	0.00
1,786.13	6.00	238.48	1,785.00	-12.36	-20.15	23.64	0.00	0.00	0.00
Huerfano Bentonite									
1,800.00	6.00	238.48	1,798.80	-13.12	-21.39	25.09	0.00	0.00	0.00
1,900.00	6.00	238.48	1,898.25	-18.58	-30.30	35.55	0.00	0.00	0.00
2,000.00	6.00	238.48	1,997.70	-24.05	-39.21	46.00	0.00	0.00	0.00
2,100.00	6.00	238.48	2,097.16	-29.51	-48.12	56.45	0.00	0.00	0.00
2,200.00	6.00	238.48	2,196.61	-34.98	-57.03	66.90	0.00	0.00	0.00
2,248.66	6.00	238.48	2,245.00	-37.64	-61.37	71.99	0.00	0.00	0.00
Chacra									
2,300.00	6.00	238.48	2,296.06	-40.44	-65.94	77.36	0.00	0.00	0.00
2,400.00	6.00	238.48	2,395.51	-45.91	-74.85	87.81	0.00	0.00	0.00
2,500.01	6.00	238.48	2,494.97	-51.37	-83.77	98.26	0.00	0.00	0.00
2,600.01	6.00	238.48	2,594.42	-56.84	-92.68	108.72	0.00	0.00	0.00
2,700.01	6.00	238.48	2,693.87	-62.30	-101.59	119.17	0.00	0.00	0.00
2,800.01	6.00	238.48	2,793.32	-67.77	-110.50	129.62	0.00	0.00	0.00
2,900.01	6.00	238.48	2,892.77	-73.23	-119.41	140.07	0.00	0.00	0.00
2,901.24	6.00	238.48	2,894.00	-73.30	-119.52	140.20	0.00	0.00	0.00
Cliff House									
2,911.29	6.00	238.48	2,904.00	-73.85	-120.41	141.25	0.00	0.00	0.00
Menefee									
3,000.01	6.00	238.48	2,992.23	-78.70	-128.32	150.53	0.00	0.00	0.00
3,100.01	6.00	238.48	3,091.68	-84.16	-137.23	160.98	0.00	0.00	0.00
3,200.01	6.00	238.48	3,191.13	-89.62	-146.14	171.43	0.00	0.00	0.00
3,300.01	6.00	238.48	3,290.58	-95.09	-155.05	181.89	0.00	0.00	0.00
3,400.01	6.00	238.48	3,390.04	-100.55	-163.96	192.34	0.00	0.00	0.00
3,500.01	6.00	238.48	3,489.49	-106.02	-172.87	202.79	0.00	0.00	0.00

Database:	Grand Junction District	Local Co-ordinate Reference:	Well Richardson Navajo 27-13-10 #4H
Company:	Energen Resources Corp.	TVD Reference:	GL 5922' & RKB 17' @ 5939.00ft (Key 881)
Project:	San Juan County, NM (NAD83)	MD Reference:	GL 5922' & RKB 17' @ 5939.00ft (Key 881)
Site:	Richardson Navajo	North Reference:	True
Well:	Richardson Navajo 27-13-10 #4H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Pilot		
Design:	Plan #1		

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)
3,600.01	6.00	238.48	3,588.94	-111.48	-181.78	213.24	0.00	0.00	0.00
3,700.01	6.00	238.48	3,688.39	-116.95	-190.69	223.70	0.00	0.00	0.00
3,800.01	6.00	238.48	3,787.85	-122.41	-199.60	234.15	0.00	0.00	0.00
3,897.70	6.00	238.48	3,885.00	-127.75	-208.31	244.36	0.00	0.00	0.00
Point Lookout									
3,900.01	6.00	238.48	3,887.30	-127.88	-208.51	244.60	0.00	0.00	0.00
4,000.01	6.00	238.48	3,986.75	-133.34	-217.42	255.06	0.00	0.00	0.00
4,100.01	6.00	238.48	4,086.20	-138.81	-226.34	265.51	0.00	0.00	0.00
4,159.13	6.00	238.48	4,145.00	-142.04	-231.60	271.69	0.00	0.00	0.00
Mancos									
4,200.01	6.00	238.48	4,185.66	-144.27	-235.25	275.96	0.00	0.00	0.00
4,300.01	6.00	238.48	4,285.11	-149.74	-244.16	286.41	0.00	0.00	0.00
4,400.01	6.00	238.48	4,384.56	-155.20	-253.07	296.87	0.00	0.00	0.00
4,500.01	6.00	238.48	4,484.01	-160.67	-261.98	307.32	0.00	0.00	0.00
4,600.01	6.00	238.48	4,583.47	-166.13	-270.89	317.77	0.00	0.00	0.00
4,700.01	6.00	238.48	4,682.92	-171.60	-279.80	328.23	0.00	0.00	0.00
4,800.01	6.00	238.48	4,782.37	-177.06	-288.71	338.68	0.00	0.00	0.00
4,900.01	6.00	238.48	4,881.82	-182.52	-297.62	349.13	0.00	0.00	0.00
5,000.01	6.00	238.48	4,981.27	-187.99	-306.53	359.58	0.00	0.00	0.00
5,098.27	6.00	238.48	5,079.00	-193.36	-315.29	369.86	0.00	0.00	0.00
Mancos/Niobrara "A"									
5,100.01	6.00	238.48	5,080.73	-193.45	-315.44	370.04	0.00	0.00	0.00
5,195.81	6.00	238.48	5,176.00	-198.69	-323.98	380.05	0.00	0.00	0.00
Mancos/Niobrara "B"									
5,200.01	6.00	238.48	5,180.18	-198.92	-324.35	380.49	0.00	0.00	0.00
5,300.01	6.00	238.48	5,279.63	-204.38	-333.26	390.94	0.00	0.00	0.00
5,304.40	6.00	238.48	5,284.00	-204.62	-333.65	391.40	0.00	0.00	0.00
Mancos/Niobrara "C"									
5,400.01	6.00	238.48	5,379.08	-209.85	-342.17	401.40	0.00	0.00	0.00
5,500.01	6.00	238.48	5,478.54	-215.31	-351.08	411.85	0.00	0.00	0.00
5,600.01	6.00	238.48	5,577.99	-220.78	-359.99	422.30	0.00	0.00	0.00
5,700.01	6.00	238.48	5,677.44	-226.24	-368.91	432.75	0.00	0.00	0.00
5,800.01	6.00	238.48	5,776.89	-231.71	-377.82	443.21	0.00	0.00	0.00
5,821.40	6.00	238.48	5,798.16	-232.88	-379.72	445.44	0.00	0.00	0.00
RN #4H PBHL									
5,854.42	6.00	238.48	5,831.00	-234.68	-382.66	448.89	0.00	0.00	0.00
Greenhorn									
5,900.01	6.00	238.48	5,876.35	-237.17	-386.73	453.66	0.00	0.00	0.00
5,918.77	6.00	238.48	5,895.00	-238.20	-388.40	455.62	0.00	0.00	0.00
Graneros									
5,923.80	6.00	238.48	5,900.00	-238.47	-388.85	456.15	0.00	0.00	0.00

Design Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
RN #4H PBHL	0.00	0.00	5,219.00	-896.67	-6,436.71	2,031,951.13	2,611,112.99	36.5835699	-108.2147406
- plan misses target center by 6120.72ft at 5821.40ft MD (5798.16 TVD, -232.88 N, -379.72 E)									
- Point									



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Richardson Navajo 27-13-10 #4H
Company:	Energen Resources Corp.	TVD Reference:	GL 5922' & RKB 17' @ 5939.00ft (Key 881)
Project:	San Juan County, NM (NAD83)	MD Reference:	GL 5922' & RKB 17' @ 5939.00ft (Key 881)
Site:	Richardson Navajo	North Reference:	True
Well:	Richardson Navajo 27-13-10 #4H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Pilot		
Design:	Plan #1		

Formations						
Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)	
395.00	395.00	Ojo Alamo		0.00	0.00	
445.00	445.00	Kirtland		0.00	0.00	
865.00	865.00	Fruitland		0.00	0.00	
1,355.00	1,355.00	Pictured Cliffs		0.00	0.00	
1,786.13	1,785.00	Huerfanito Bentonite		0.00	0.00	
2,248.66	2,245.00	Chacra		0.00	0.00	
2,901.24	2,894.00	Cliff House		0.00	0.00	
2,911.29	2,904.00	Menefee		0.00	0.00	
3,897.70	3,885.00	Point Lookout		0.00	0.00	
4,159.13	4,145.00	Mancos		0.00	0.00	
5,098.27	5,079.00	Mancos/Niobrara "A"		0.00	0.00	
5,195.81	5,176.00	Mancos/Niobrara "B"		0.00	0.00	
5,304.40	5,284.00	Mancos/Niobarara "C"		0.00	0.00	
5,854.42	5,831.00	Greenhorn		0.00	0.00	
5,918.77	5,895.00	Graneros		0.00	0.00	