CHECK SHEET

Date: 5/31/01 API Number: 105-21440

Company: Fidelity Exploration & Production Co.

Well Name: Federal 1130

County: Valley

Field: Bowdoin & Area

Surf. Location: 1552 FNL 1041 FWL SW NW Lot: Sec: 21 Twp: 31 N Rng: 35 E

Permit Number: 17365 Drilling Fee:

Intention to Drill: 5/30/01 Expiration Date: 11/30/01

Mineral Ownership: ☐ Private ☐ State ☑ Federal ☐ Indian

Well Type: Vertical ☐ Multiple Laterals

Proposed Depth/Formation: MD: 1300 TVD: Phillips

Drilling Unit 160 Acres Description: nw/4

Samples Required: ☐ Received: Core Chips. 690' to 752' 2-22-02

COMPLETION INFORMATION

Completion Date: 11-13-01 TD: 928 PBTD: 865

Completed As: Gas Well IP / Formation: 495 MCFD Bowdoin

Geological Well Report: Mud Log:

Sundry Notices:

Subsequent Report of Abandonment: Received: Approved:

Electric Logs: Platform Express CN Three Detector Density/ GR Sector Bond Log/ ✓ ✓ Array Ind./ BHCS/ Pulsed Neutron Decay/ Bowdoin Overlay 1-3-02

Miscellaneous: Core Analysis 5-29-02

FORM NO. 4 R/8/00
LOCATE WELL CORRECTLY

X			

(SUBMIT IN TRIPLICATE)
TO
BOARD OF OIL AND GAS CONSERVATION
OF THE STATE OF MONTANA
2535 ST. JOHNS AVENUE BILLINGS, MONTNA 59102

ARM 36.22.307
ARM 36.22.1011
ARM 36.22.1013
ARM 36.22.1414

SWNW

COMPLETION REPORT

Company Fidelity Exploration & Production Company Lease Federal Well No. 1130

Address P.O. Box 1010, Glendive, MT 59330-1010 Field (or Area) Bowdoin Dome

The well is located 1552' FNL and 1041' FWL of Sec. 21

Sec. 21 ; T. T31N ; R. R35E ; County Valley ; Elevation 2162' GL
(D.F., R.B., or G.L.)

Commenced drilling 09/20/01 ; Completed 11/13/01

Write the API# or the well name of another well on this lease if one exists N/A

The information given herewith is a complete and correct record of the well. The summary on this page is for the condition of the well at the above date.

Completed as Gas Well (oil well, gas well, dry hole) Signed Judy Schmitt Judy Schmitt
Title Operations Technician
API # 25-105-21440 Date December 28, 2001

(Bottom Hole Coordinates from Section Line)

IMPORTANT ZONES OF POROSITY

(denote oil by O, gas by G, water by W; state formation if known)

Niobrara "G" From 496' to 542'
Bowdoin "G" From 688' to 800'

CASING RECORD

Size Casing	Weight Per Ft.	Grade	Thread	Casing Set	From	To	Sack of Cement	Cut and Pulled from
7"	17#	H - 40	8 Rd	167'	0	157'	135	--
4.5"	10.5#	J - 55	8 Rd	887'	0	877'	110	--

TUBING RECORD

Size Tubing	Weight Per Ft.	Grade	Thread	Amount	Perforations
1.25"	2.3#	A-25	11 ½ V	804'	Open End

COMPLETION RECORD

Rotary tools were used from 0' to 928
Cable tools were used from --- to ---
Total depth 928 ft.; Plugged back to 865 T.D.; Open hole from --- to ---

PERFORATIONS			ACIDIZED, SHOT SAND FRACED, CEMENTED			
INTERVAL		Number and	INTERVAL		Amounts of	
From	To	Size and Type	From	To	Material Used	Pressure
762'	772'	4 spf	762'	772'	40,700# 12/20	691#

(If P&A show plugs above)

INITIAL PRODUCTION

Well is producing from Bowdoin (pool) formation.
I.P. --- barrels of oil per --- hours ---
(pumping or flowing)

495 Mcf of gas per 24 hours.
--- barrels of water per --- hours, or --- % W.C.

(OVER)

INITIAL PRODUCTION-(Continued)

Initial 10-day average production --- (bbl./day) (if taken)
Pressures (if measured): Tubing --- psi flowing; --- psi shut-in
Casing --- psi flowing; 79.7 psi shut-in
Gravity ____ ° API (corrected to 60° F.)

Formation Volume Factor ____ Porosity ____ % Average Connate Water ____ %

Type of Trap ____

Producing mechanism ____

DRILL STEM TESTS

D.S.T. No.	From	To	Tool Open (Min.)	Shut-in	F.P.	S.I.P.	Recovery	Cushion
--	--	--	--	--	--	--	--	--

CORES

No.	Interval	Recovered
1	690' – 720'	18'
2	721' – 775'	31'

LOG RUNS

Type	From	To
PND	200'	824'
CBL/GR	0'	834'
BHC	167'	886'
AIL	167'	920'
CNL	167'	910'

FORMATION RECORD

(Need no be filled out if Geologist sample description filed with Commission)

TOP / BOTTOM	SAMPLE AND CORE NO. AND DESCRIPTION	Top of Formation
496' - 542'	Niobrara	496'
688' - 800'	Bowdoin	688'

(Use additional sheets where needed to complete description)

Submit in quadruplicate to:

Montana Board of Oil and Gas Conservation
Billings or Shelby

MAY 2001 Received Board of Oil & Gas Cons. State of MT / Billings

Application for Permit	Lease Name: MTGF021471
	Lease Type (Private/State/Federal): Federal
	Well Number: 1130
To: Drill ☒ Deepen ☐ Re-enter ☐	Unit Agreement Name: Hinsdale Area
Operator: FIDELITY EXPLORATION & PRODUCTION COMPANY	Field Name or Wildcat: Bowdoin Dome
Address: P. O. Box 131	
City: Glendive State MT ZIP 59330-0131	Objective Formation(s): Phillips
Phone Number: 406-359-7200	
Location of Well (quarter-quarter section and footage measurements) SW, NW, T31N, R35E, Sec. 21, 1552' FNL, 1041' FWL (if directionally drilled, show both surface and bottom hole locations above)	Section, Township, and Range: Sec. 21, T31N, R35E

Proposed total depth	Formation at total depth	Elevation (indicate GL or KB)	County:
1300	Phillips	2162' GL	Valley

Size and description of drilling/spacing unit	API number of another well on this lease (if any)	Anticipated spud date
160	None	August 2001

Hole size	Casing size	Weight/foot	Grade(API)	Depth	Sacks of Cement	Type of Cement
9.875"	7	17	H-40/8 RND	150	80	Class G
6.25"	4.5	10.5	J-55	1275	115	Class G

Describe Proposed Operations:
Describe or attach labeled diagram of blowout preventer equipment. Indicate if air drilled or describe mud program.

Plan to drill a 9-7/8" surface hole and set and cement to surface 150' of 7", 17 lb/ft surface casing. Install and test BOP equipment. Then drill a 6-1/4" hole to TD and set and cement to surface 4-1/2" 10.5 lb/ft production casing. The well will then be completed in the Eagle formation and fracture stimulated. A wellhead assembly will then be installed and 1-1/4" tubing will be run to below the perforations. The well will be connected and metered and placed on production. Unlined pits will be used with fresh water mud. Upon completion of the drilling activity the drilling mud will be hauled to a company owned pit or left to dry in the pits.

BOARD USE ONLY

Approved (date) MAY 30 2001 Permit Fee $250.00

By Accepted for record purposes only Check Number 548181

Title Permit Expires 11-30-01

THIS PERMIT IS SUBJECT TO THE CONDITIONS OF APPROVAL STATED ON THE BACK.

Permit Number 17365

API Number 25-105-21440

Re-permit ☐

The undersigned hereby certifies that the information contained on this application is true and correct:

Signed (Agent) John Kennah

Title: Gas Production Staff Engineer

Date May 25, 2001

Samples Required: NONE X ALL ____ From ____ feet to ____ feet

Core chips to address below, full cores to USGS, Core Laboratory, Arvada, CO, Dry, washed cut delivered prepaid to:
Montana Board of Oil and Gas Conservation
2535 St. Johns Avenue
Billings, MT 59102

Only freshwater based fluid may be used when drilling surface hole Rule 36.22.1001(5)

Saltwater Pits Shall Be Impermeable

SUPPLEMENTAL INFORMATION

Note: Additional information or attachments may be required by Rule or by special request.

1 Attach a survey plat certified by a registered surveyor. The survey plat must show the location of the well with reference to the nearest lines of an established public survey.

2 Attach an 8½ x 11" photocopy of that portion of a topographic map showing the well location, the access route from county or other established roads, residences, and water wells within a 2 mile radius of the well.

3 Attach a sketch of the well site showing the dimensions and orientation of the site, the size and location of pits, topsoil stockpile, and the estimated cut-fill at the corners and centerstake. (Note: the diagram need not be done by an engineer or surveyor). Attach a sketch of a top view and two side views of the reserve pit(s), if utilized. The reserve pit sketch must show the length, width, depth, cut and fill amount of freeboard, area of topsoil stockpile, and the height and width of berms.

4 Describe the type and amount of material or liner, if any, to be used to seal the reserve pit. If a synthetic liner is used, indicated the liner thickness (mils), bursting strength, tensile strength, tear strength, puncture resistance, hydrostatic resistance, or attach the manufacturer's specifications.

5 Describe the proposed plan for the treatment and/or the disposal of reserve pit fluids and solids after the well is drilled. If the operator intends to dispose of or treat the reserve pit contents off-site, specify the location and the method of waste treatment and disposal. (Note: The operator must comply with all applicable federal, state, county, and local laws and regulations with regard to the handling, transportation, treatment, and disposal of solid wastes.)

6 Does construction of the access road or location, or some other aspect of the drilling operation require additional federal, state, or local permits or authorizations? If yes, indicate the type of permit or authorization required:

- ☐ No additional permits needed
- ☐ Stream crossing permit (apply through county conservation district)
- ☐ Air quality permit (apply through Montana Department of Health and Environmental Sciences)
- ☐ Water discharge permit (apply through Montana Department of Health and Environmental Sciences)
- ☐ Water use permit (apply through Montana Department of Natural Resources an Conservation)
- ☐ Solid waste disposal permit (apply through Montana Department of Health and Environmental Sciences)
- ☐ State lands drilling authorization (apply through Montana Department of State Lands)
- ☒ Federal drilling permit (specify agency) Mark R. & Heidi S. Johnson
- ☐ Other federal, state, county, or local permit or authorization: (specify type) _____

NOTICES:

1 Date and time of spudding must be reported to the Board verbally or in writing within 72 hours after the commencement of drilling operations.

2 The operator must give notice of drilling operations to the surface owner as required by Section 82-10-503, MCA, before the commencement of any surface activity.

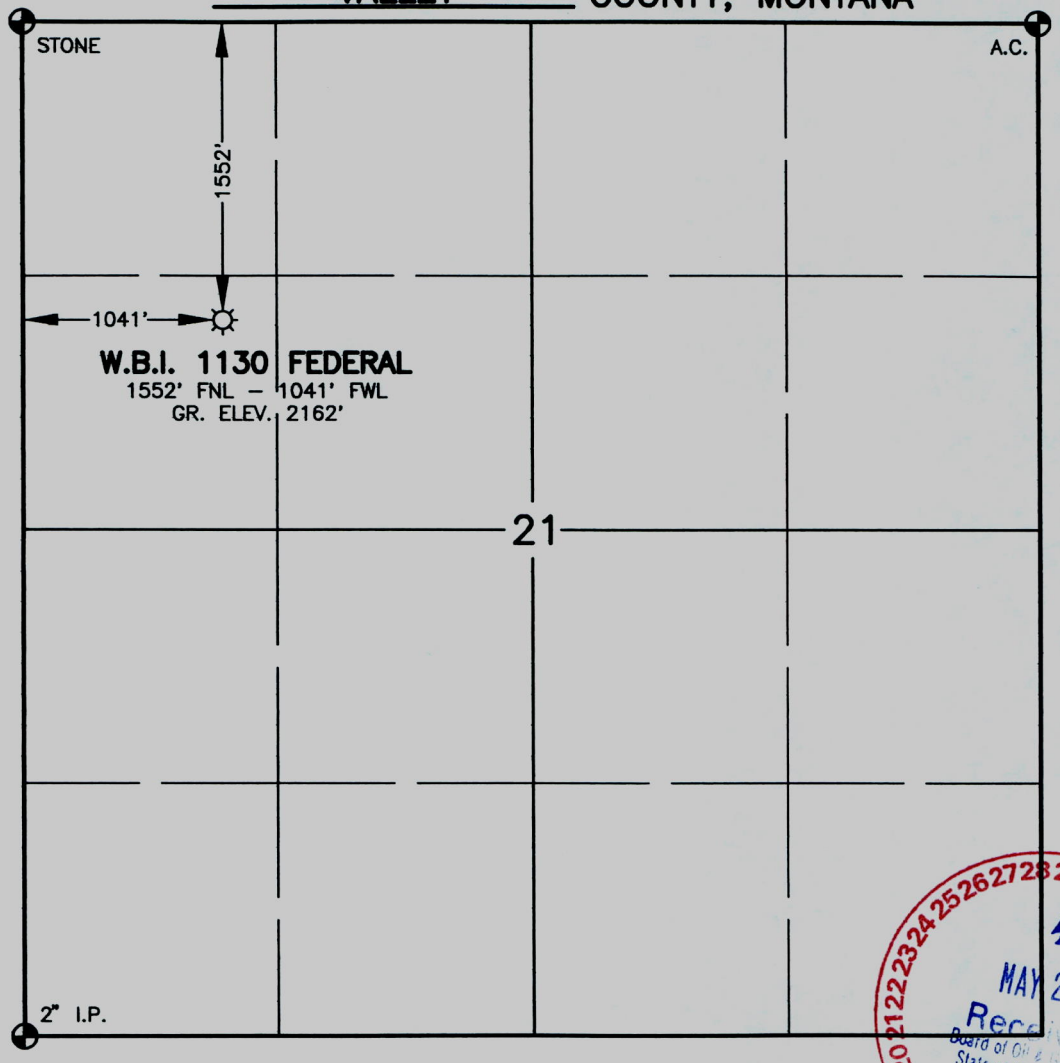
BOARD USE ONLY	CONDITIONS OF APPROVAL

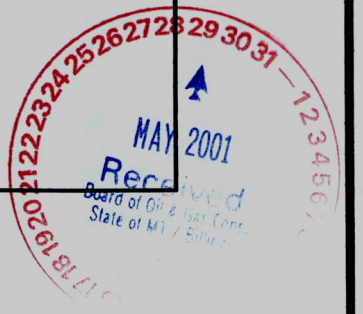
The operator must comply with the following condition(s) of approval:

WARNING: Failure to comply with conditions of approval may void this permit.

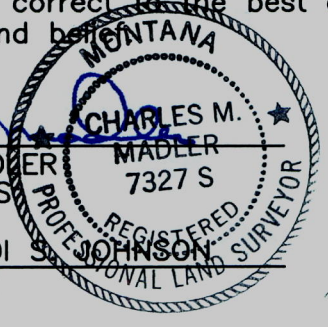
WELL LOCATION PLAT
FIDELITY EXPLORATION & PRODUCTION CO.

SW 1/4 NW 1/4, SECTION 21, TWP. 31 N. – RGE. 35 E., P.M.M.
VALLEY COUNTY, MONTANA





I, Charles M. Madler certify that this plat correctly represents work performed by me or under my responsible charge, and is true and correct to the best of my knowledge and belief.



CHARLES M. MADLER
P.L.S. NO. 7327S

MARK R. & HEIDI S. JOHNSON
SURFACE OWNER

DATE STAKED 4-17-01

BASIS OF VERTICAL DATUM: U.S.G.S. QUAD. MAP

EXHIBIT NO. 1

NO	DATE	BY	REVISION

FIDELITY
EXPLORATION & PRODUCTION COMPANY
A Subsidiary of MDU Resources Group, Inc.

W.B.I. NO. 1130 FEDERAL
WELL LOCATION
BOWDOIN FIELD

DATE	DRAWN BY	SCALE	COMP. NO.	DRAWING NO.
4-30-01	T.A.S.	1" = 1000'	1130LOC	A-5-2873

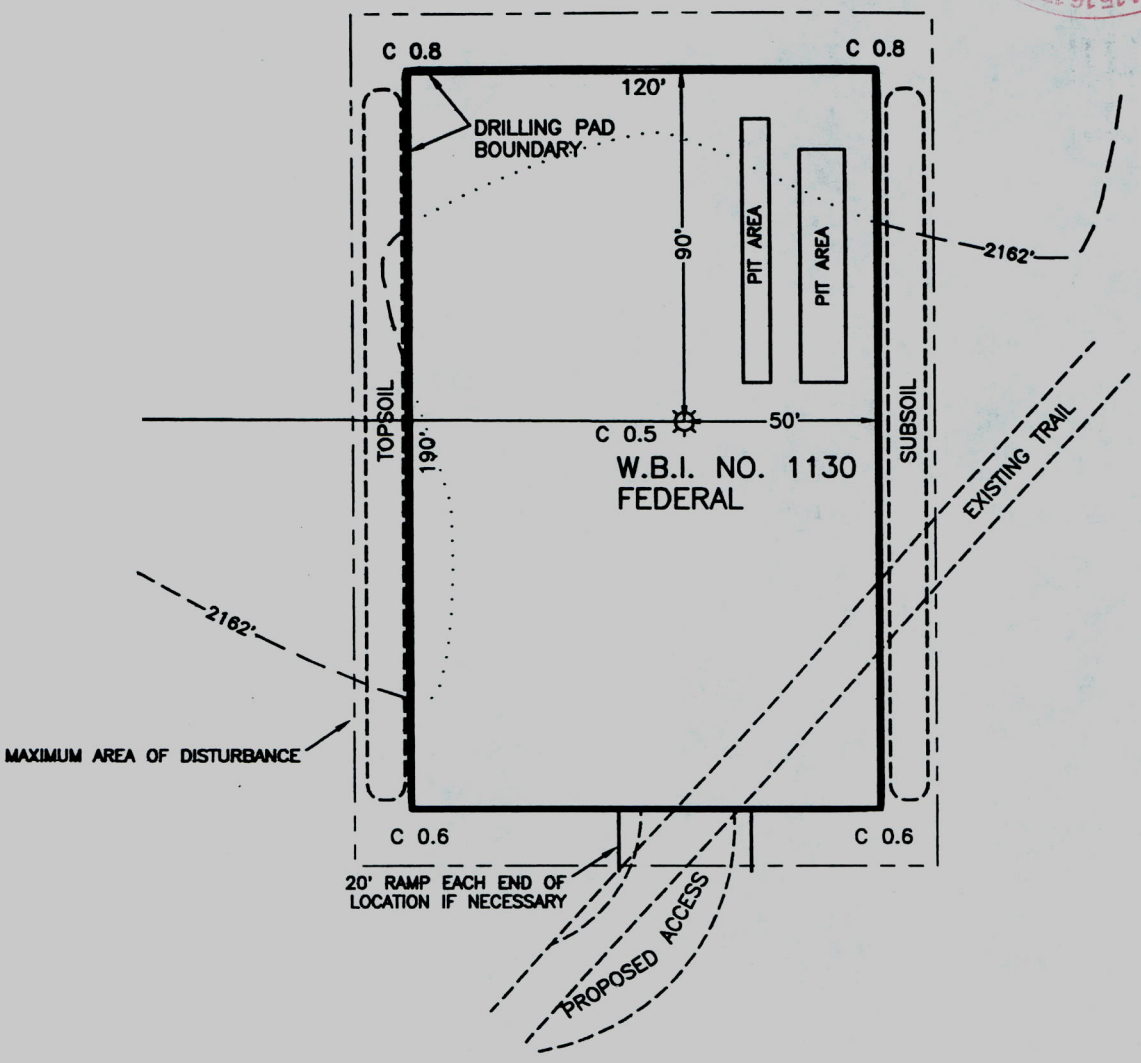


EXHIBIT NO. 2

ESTIMATED EARTHWORK

TOPSOIL (6" DEPTH)	422	C.Y.
EXCAVATION	133	C.Y.
FILL (W/10% SHRINKAGE)	0	C.Y.
WASTE MATERIAL	133	C.Y.
TOTAL EXCAVATION	*565	C.Y.

ACCESS ROAD – S.E. ON EXISTING TRAIL

* PIT EXCAVATION NOT INCLUDED
FILL 3:1 SLOPES
CUT 1.5:1 SLOPES

EXISTING WELL ELEV. 2161.76'
GRADED WELL ELEV. 2161.26'

CONTOUR INTERVAL 1.0'

NO	DATE	BY	REVISION

FIDELITY
EXPLORATION & PRODUCTION COMPANY
A Subsidiary of MDU Resources Group, Inc.

W.B.I. NO. 1130 FEDERAL WELL
DRILLING SITE LAYOUT

DATE	DRAWN BY	SCALE	COMP. NO.	DRAWING NO.
4-30-01	T.A.S.	1" = 50'	1130DSL	A-9-2872

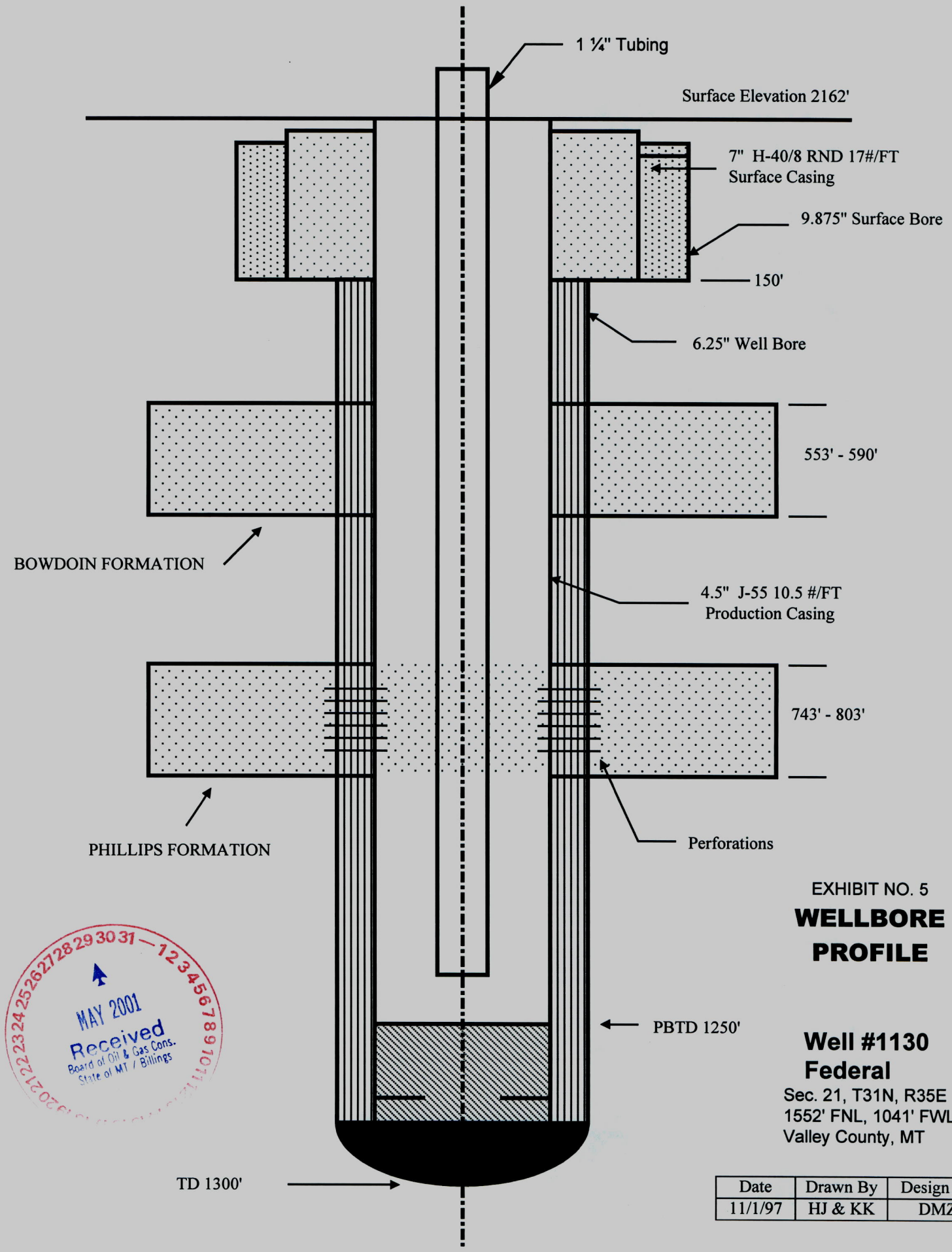
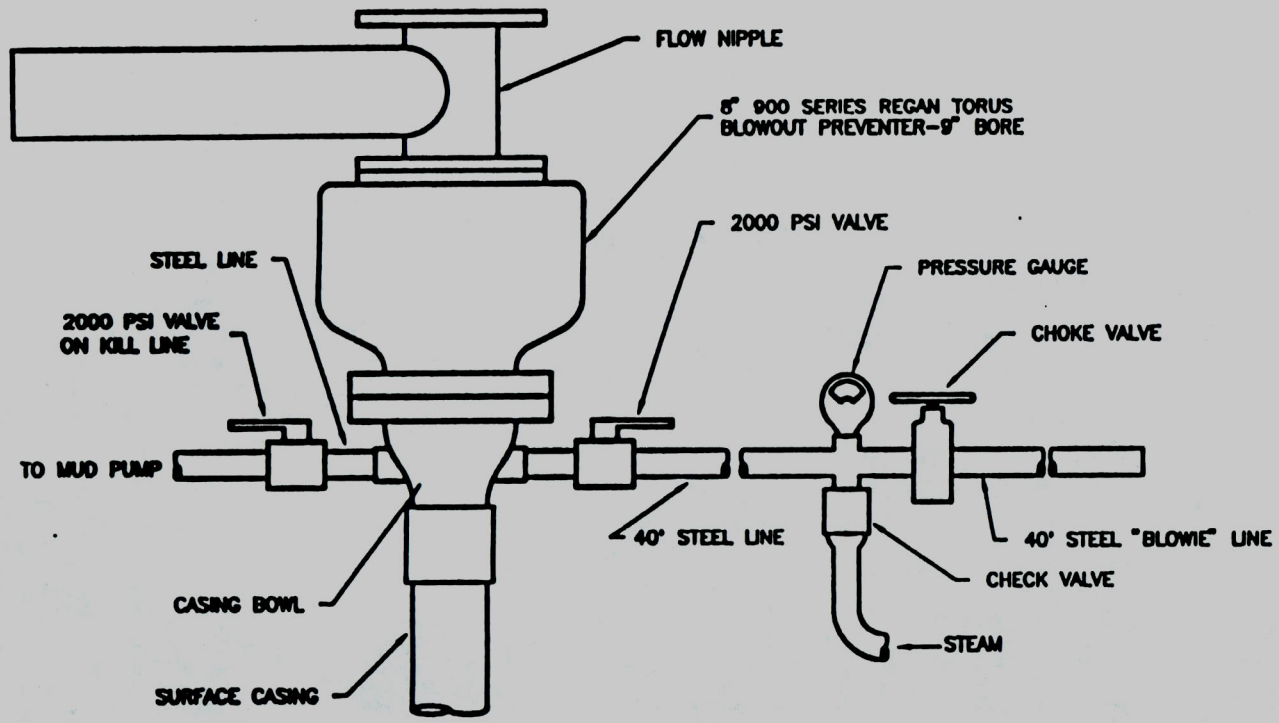


EXHIBIT NO. 5

WELLBORE PROFILE

Well #1130
Federal
Sec. 21, T31N, R35E
1552' FNL, 1041' FWL
Valley County, MT

Date	Drawn By	Design By
11/1/97	HJ & KK	DMZ



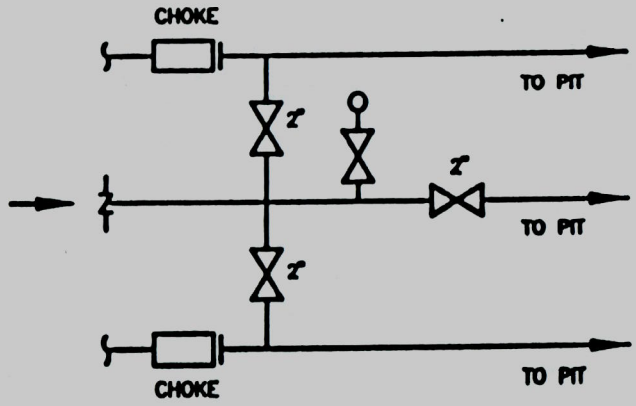


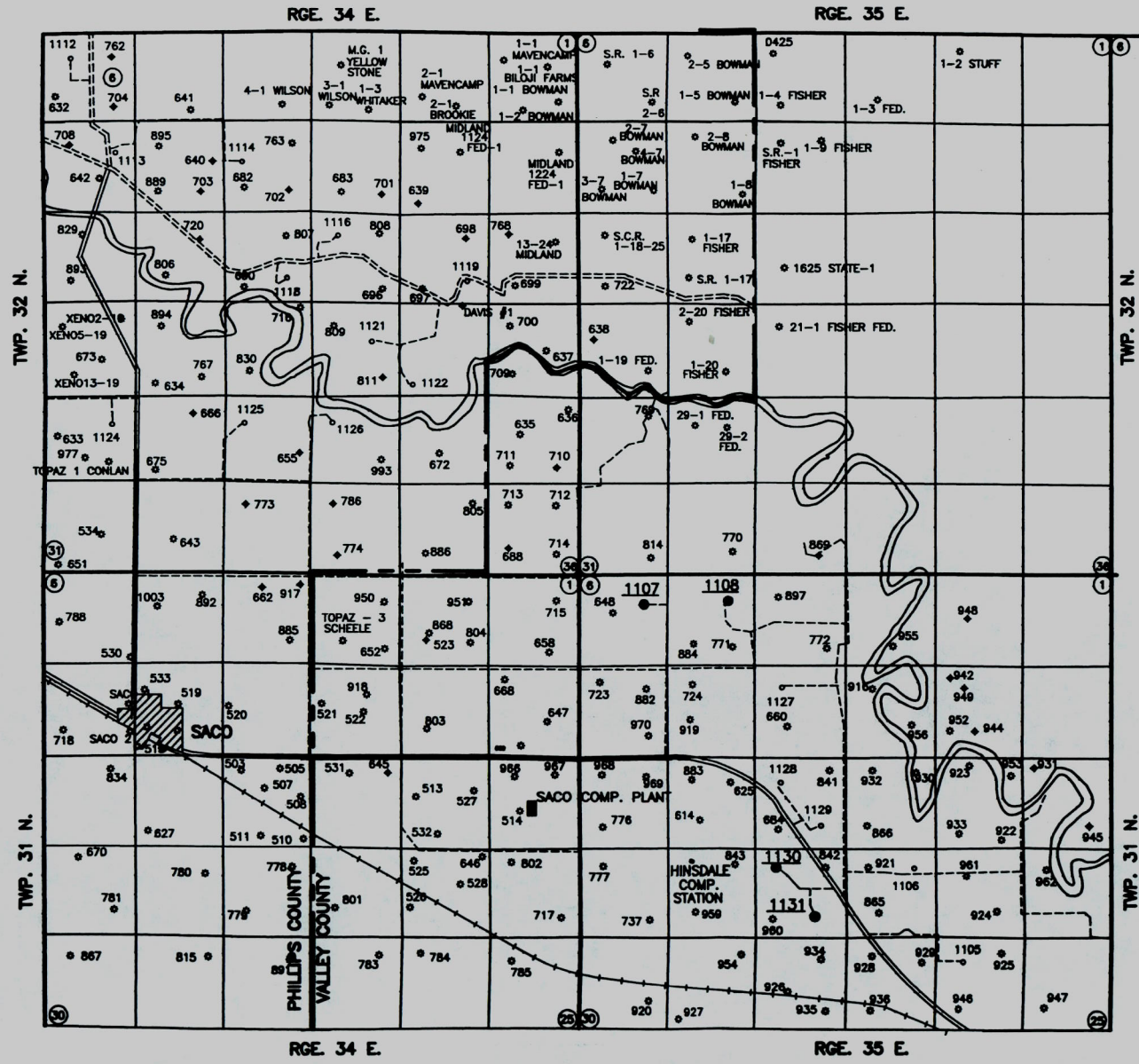
EXHIBIT 6

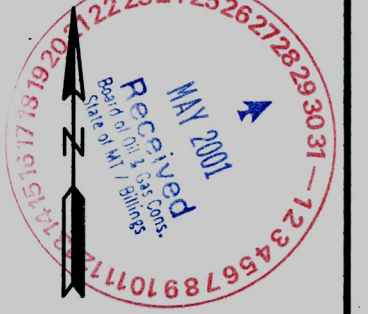
NO.	DATE	BY	DESIGN BY	REVISION

WILLISTON BASIN
INTERSTATE PIPELINE COMPANY
A Subsidiary of MDU Resources Group, Inc.

B.O.P. LAYOUT & SCHEMATIC

DATE	DRAWN BY	DESIGN BY	SCALE	COMP. NO.	SUB/SHEET NO.
2-22-96	T.A.S.	B.B.	NONE	A1000	A-6-1000





GROUP FIVE INCLUDES:

1107 FEE
1108 FEE
1130 FEDERAL
1131 FEDERAL

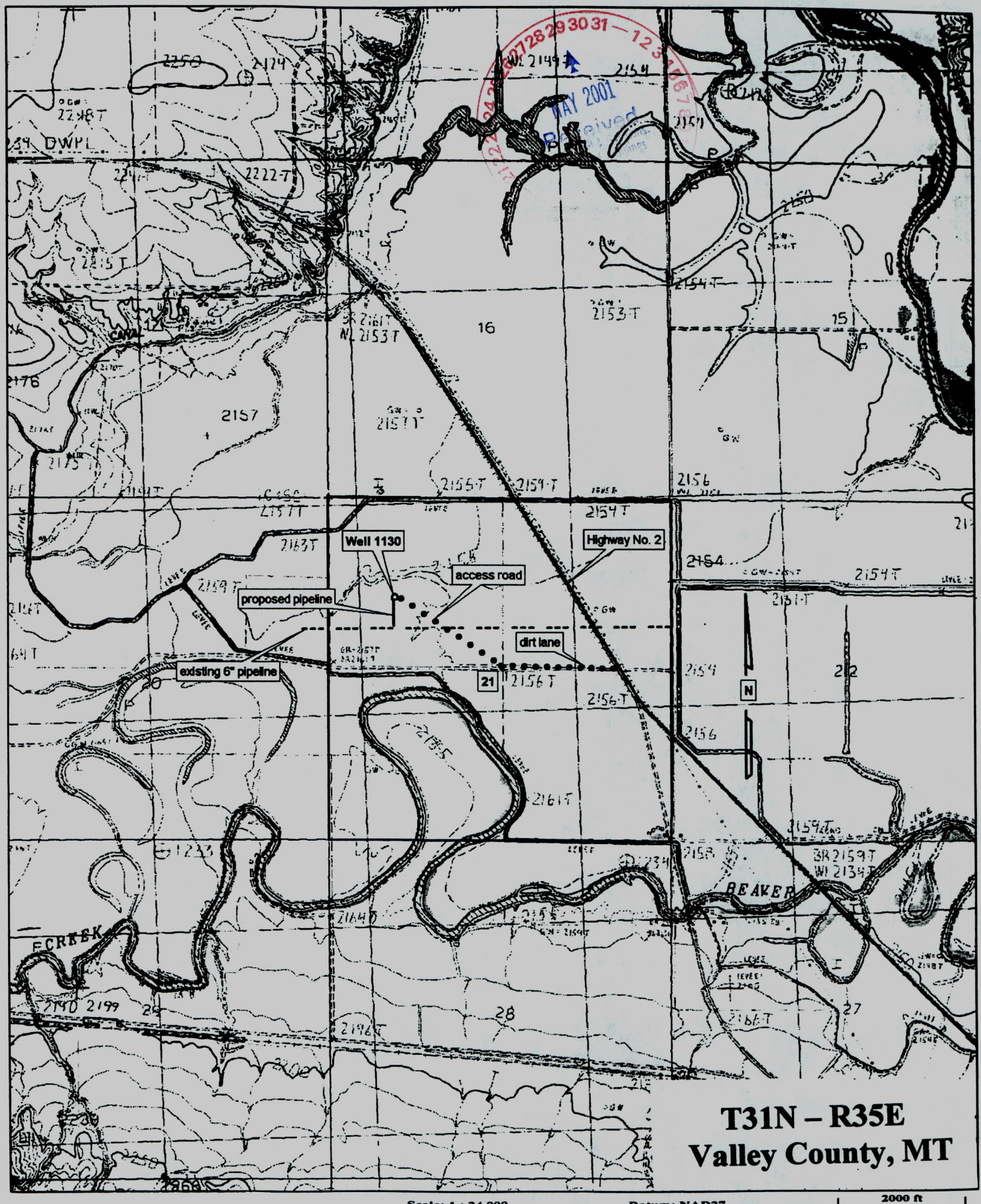
EXHIBIT NO. 7

NO	DATE	BY	REVISION

FIDELITY
EXPLORATION & PRODUCTION COMPANY
A Subsidiary of MDU Resources Group, Inc.

ORIENTATION MAP – GROUP 5
2001 DRILLING PROGRAM
BOWDOIN FIELD

DATE	DRAWN BY	SCALE	COMP. NO.	DRAWING NO.
5-01-01	T.A.S.	NOTED	BOFD05	B-7-2772-5



Well #1130 FED

SPUD INFORMATION

WELL NAME: 1130

API #: 105 ~~011~~ - 21440

LOCATION: SWNW 21-31N-35E

SPUD TIME: 2:30 pm **Tentative** ☐ **Actual** ☒

DATE: 9-20-01

DRILLING COMPANY: Elenburg

RIG #: 10

CALLER'S NAME: Jeff Merkel

COMPANY NAME: Fidelity

OTHER:

DEPARTMENT OF NATURAL
RESOURCES AND CONSERVATION
OIL AND GAS CONSERVATION DIVISION
STATE OF MONTANA
2535 ST. JOHNS AVENUE
BILLINGS, MONTANA 59102-4693

RECEIPT
Well Cuttings & Core Samples

COMPANY Fidelity Exploration & Production Co.

WELL NAME Federal 1130

LOCATION 31N-35E-21: SWNW

SAMPLE INTERVAL	
DITCH	CORE
	690 to 752'

RECEIVED FROM TerraTek, Inc.

BY K Maddaus

DATE 2-22-02

Core Analysis Program
Fidelity #11-30 Well
Valley County, Montana

31N-35E-21: SW NW

Prepared for:

Fidelity Exploration & Production Company
1700 Lincoln, Suite 4600
Denver, Colorado 80203

Attn: Mr. Barron Gimza

Prepared by:

TerraTek, Inc.
University Research Park
400 Wakara Way
Salt Lake City, Utah 84108

TR01-500250
May 2002

105-21440

UNCONVENTIONAL CORE ANALYSIS

1 INTRODUCTION

This report presents the results of unconventional and advanced rock properties tests performed on plug samples taken from the Bowdoin Formation from the #11-30 well in Valley County, Montana. TerraTek personnel were at the wellsite to receive the two cores. The two coring runs were partially successful with recoveries of 59% and 96%, respectively. At the TerraTek laboratories, bulk density, grain density, total (altered) porosity, and fluid saturation were measured on 46 plug samples.

Pulse decay permeability measurements were conducted on permeability samples 1 through 16, in order to determine matrix representative permeability at "as received" saturation conditions at or near net overburden conditions. These tests were conducted on samples spaced fairly evenly over the cored intervals and represented reservoir and non-reservoir rock. After careful examination of the core, a breakdown of the core-represented lithofacies was developed with the idea in mind that these facies should also be distinguishable on the wireline logs. Plug sample data (1 through 46) were used to represent the porosity and fluid saturations, whereas sixteen samples were selected to represent the mineralogical characteristics (XRD) and matrix permeability of the cores. Samples used for porosity and saturation data were plugged, weighed, and immersed bulk volumes determined prior to analysis. The gas-filled porosity values were determined from the measured water saturation and total (altered) porosity.

2 PROCEDURES

2.1 Wellsite

TerraTek personnel were at the wellsite to receive the two cores and appropriate samples were taken for desorption analysis (results are presented in another report section). Overall recoveries of the conventional core were somewhat limited, ranging from 59% to 96%. Best-fit depths were marked and reported.

2.2 Core Processing

Cores were initially laid out in depth order on the core racks by core number. Most of the core could be extracted from the inner core barrel by using a push rod, although some sections required clam-shelling the inner core barrel (clam-shelling is a process of cutting the inner core barrel into to halves prior to removing the core). Next, the cores were fitted together piece by piece. The cores were then marked for orientation (red and black strips, red on right for uphole).

Plug sample sites were drilled based on depths selected by the client (Tables C1 and C2). One-inch diameter plug samples were drilled using tap water. The plugs were then surface dried with a dry soft rag and wrapped circumferentially with Teflon tape prior to trimming to ¾ to

TerraTek
University Research Park
400 Wakara Way • Salt Lake City, Utah 84108
Telephone (801) 584-2400
FAX (801) 584-2406

105-21440

1-inch lengths. Once the samples were trimmed, they were washed of fines on the end surfaces, dried with a soft rag, and wrapped with Mylar film prior to placing in marked Ziploc bags. Plug endtrims were preserved in Ziploc bags for XRD analysis. Whole core sections were then wrapped in 3-4 layers of Mylar film and marked for depth and orientation.

After plugging and wrapping, the cores were slabbed, marked again on the surface of the slabs for depth, and boxed. The butt sections were re-wrapped with Mylar and re-marked, as necessary, prior to boxing. Cores were approximately 1/3 slabbed (1 inch slab thickness) and as a permanent record, the slabs were digitally imaged. Results of XRD analysis are presented in another report section, and digital images are included on the Report CD-R.

2.3 Testing

Bulk volume determinations were made on client-specified plug samples by de-ionized water immersion; Teflon tape insured sample integrity during bulk volume testing. The plug samples were then placed in a humidity oven in order to dry the samples without damaging the clays. We dried the samples at 140° F and 45% relative humidity, traditionally used for shaley samples, until stable weight conditions were attained.

Water saturations were determined gravimetrically using the initial weights and the final humidity dried weights. Dry weights with and without the Teflon wrap were recorded. Initial and final weights were corrected for Teflon weight. Initial Bulk Volumes were also corrected for Teflon volume. Grain Volumes were then measured using a Boyle's Law gas pyncnometer on the humidity-dried plugs. Final saturation and (altered) porosity data are reported in Table C3.

2.4 Advanced Testing

The sixteen pulse-decay permeability plugs, which represented the non-reservoir and reservoir intervals, were each prepared for pulse-decay measurements by adding pre-weighed 18 mesh screens for gas distribution over the endfaces of the samples. The samples were then weighed with Teflon and screens. After loading each sample in a hydrostatic coreholder, the samples were then allowed to reach net overburden and pore pressure equilibrium. Equilibrium conditions initially required 15 minutes to one hour prior to each test because of the slightly plastic behavior of the samples in their "as received" saturation state. Sample permeabilities were then measured by the pulse-decay method. After the initial saturation tests were complete, the samples were re-weighed, placed in small ziplock bags and placed where they could receive low level heating (approximately 100-120° F) for approximately 24 hours. The samples were then removed carefully and re-weighed prior to testing again. Each sample was tested three times at successively lower water saturations, in order to calculate the matrix permeability at "as received" water saturations[1]. Permeability to nitrogen gas (Kg) was measured at a net overburden pressure of 700 psi (the minimum system overburden necessary to assure no bypass). As indicated in Table C4, measured permeabilities reflect a texture that includes sand or silt within the shale/mudstone matrix.

[1]The pulse-decay permeability method is described in a paper, SPE 28450.

105-21440

Visual indications of fracture development in the plugs were also noted. Based on the four lithologic zones interpreted in this formation in this well, three of the four zones were represented in the plug samples. Table C5 presents general facies descriptions and depth intervals.

3 RESULTS

The unconventional rock properties measurements are summarized in Table C3. The gas-filled porosities (reported as a percentage of bulk volume [BV]) were adjusted to account for the coring-induced microfracture volumes by subtracting 1% from the total measured porosities. Typical induced microfracture volumes are between 0.5% and 1.0% of the total porosity. As Tables C3 and C4 show, we could not easily subdivide the Bowdoin reservoir into similar petrologic facies: apparently, averaging effects of the clay and silt/sand portions were having a major impact on the data.

Figure C1 presents a plot of the gas-filled porosity, a function of bulk volume, versus the total porosity. The data scatter indicates that gas-filled porosity is *not* a direct function of total porosity, as in most reservoirs. The scatter is likely due to clay expansion altering the total measured porosity. Typically, the intercept value of a straight-line function through the data would be an indicator of what porosity value is needed before hydrocarbons in the form of free gas are observed in the formation. This method of evaluating the data is adapted from Luffel et al. (1992a[2] and 1992b[3]).

Figure C2 is a plot of the gas-filled porosity versus pulse-decay permeability data reported in Table C4. It is apparent from the plot that the non-reservoir and reservoir samples acted similarly as the water saturation was altered. The exponential growth in permeability to gas for the reservoir and non-reservoir samples suggest some kind of plug alteration (such as desiccation) was taking place.

In Table C3, the total porosity is presented as a value representing the current sample conditions (i.e., humidity dried). A schematic diagram of the porosity system of the Bowdoin Formation is offered in Figure C3. The total measured porosity value is an altered value and, according to corresponding XRD data, the samples contain 0.7-12.4% expandable mixed layered illite/smectite clays with a 30%-70% hydrous expandability. These expandable clays do de-water during the humidity drying process. For example, if a sample contained 12.4% expandable mixed clays (% of BV) with a hydrous expandability of 70%, then 8.68% of the total rock could volume contain water that would likely be removed during the humidity drying process. Also important is the matrix permeability, which likely controls how much water is introduced to the expandable clays in the drilling/coring process.

It is important to understand that the "total" porosity is not the same as effective porosity (or

---

[2] Luffel, D.L. and Guldry, F.K.: "New Core Analysis Methods for Measuring Reservoir Rock Properties of Devonian Shale," *JPT* (Nov 1992) 1184 - 1190.

[3] Luffel, D.L., Guldry, F.K. and Curtis, J.B.: "Evaluation of Devonian Shale with New Core and Log Analysis Methods," *JPT* (Nov 1992) 1192-1197.

105-21440

porosity present downhole in the reservoir). Because of the presence of expandable clays, the "total" porosity should be viewed as a **dilated** porosity where 3.4-27.6% of the clay-sized material in the rock contains expandable clays that could grossly alter the measured total porosity. These expandable clays could contain water bound to the clays after drilling/coring. Shrinkage in bulk volumes between 2% and 14.7% were measured from the samples due to the humidity drying process.

The effective *in situ* porosity can be approximated for the reservoir and non-reservoir rock where the alteration to the bulk volume is entirely due to the addition of free water on the expandable clays. It is likely that the expandable clays collected free water during the drilling/coring operations. This conclusion is supported by the fact that the 3.5-inch diameter core visibly swelled in the inner core barrel making it often difficult to remove. The original bulk volume expansion could have been the result of free water binding to the clays. For the example above the alteration of bulk volume from "original "(after coring) to "current" (after humidity drying) was measured at 8.0% of bulk volume. This means that the clay-corrected porosity is approximately 15.6% instead of the measured porosity value of 23.7%.

Figure C4 is a histogram depicting the volume changes inferred from porosity; saturation, XRD data and shrinkage data to account for the drilling/coring induced volume changes. The changes in bulk volume possibly from clay content are presented in Table C6, along with predicted effective porosities based on bulk volume changes.

For this well, the reservoir and non-reservoir rock could not be easily separated by petrophysical parameters. The reservoir and non-reservoir rock could only be distinguished visually by lithofacies. The potential association between reduced wireline-logging gamma ray response and productive intervals may indicate an increase in sand/silt lens frequency, but should be confirmed with laser particle size analysis. Interbedded, thin lenticular layers of silt and sand (commonly cross-bedded and unconsolidated) likely offer the principle reservoir capacity and deliverability. These lenses are typically mixed with thicker intervals of shale, resulting in averaged petrophysical parameters, and creating difficult in distinguishing reservoir from non-reservoir. The use of micro-resistivity logs such as "microlog" might possibly facilitate the identification of potentially productive intervals. Another possibility might be use of the newer micro-density logging tools.

Specialized saturation and plugging techniques to acquire silt and sand lens data could and should be attempted if this reservoir is cored in the future. To separate entirely the lens and interbedded shale intervals may prove difficult, but possible using some creative drilling and specialized diameter plugging.

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Table C1. Core Inventory

Core Number	Cored Interval (ft)	Recovered Interval (ft)	Recovery (%)
1	31	690-721	59
2	31	721-752	96

Table C2. Sample Inventory

Sample Number	Plug Depth (feet)	Number & Depth of Pulse-Decay Samples (ft)	Sample Number	Plug Depth (ft)	Number & Depth of Pulse-Decay Samples (ft)
1	690.10	1 - 690.4	24	725.40	
2	691.50		25	726.90	
3	692.60	2 - 692.8	26	727.40	10 - 727.4
4	693.20		27	728.50	
5	694.30	3 - 694.7	28	729.70	
6	695.20		29	730.40	11 - 730.4
7	696.80		30	731.90	
8	697.80	4 - 697.8	31	732.70	
9	698.50		32	733.80	
10	699.20	5 - 699.2	33	734.30	
11	700.40		34	736.40	12 - 736.4
12	701.4	6 - 701.4	35	737.50	
13	702.1		36	738.60	
14	703.3	7 - 703.3	37	739.40	13 - 739.4
15	704.7		38	740.60	
16	705.9		39	741.70	14 - 741.7
17	706.7		40	742.20	
18	707.7		41	743.30	
19	708.1	8 - 708.1	42	744.70	15 - 744.7
20	721.6		43	746.60	
21	722.7		44	747.80	
22	723.6	9 - 723.6	45	748.50	16 - 748.5
23	724.3		46	750.20	

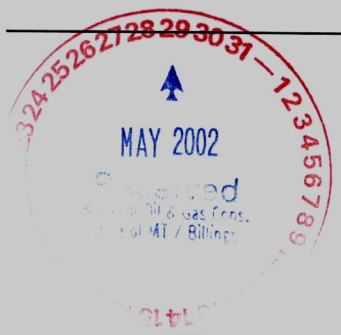

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Table C3. Unconventional Core Analysis Test Results

Sample Number	Sample Depth (ft)	Total Porosity (%)	Dry Bulk Density (g/cc)	As Received Bulk Density (g/cc)	Grain Density (g/cc)	Saturation Water (%)	Total-1% Porosity (%)	Gas-Filled Porosity (%)
1	690.1	27.40	1.906	2.153	2.626	89.89	26.40	2.67
2	691.5	32.45	1.769	2.070	2.618	92.81	31.45	2.26
3	692.6	27.76	1.890	2.144	2.616	91.73	26.76	2.21
4	693.2	30.35	1.814	2.097	2.604	93.45	29.35	1.92
5	694.3	29.99	1.830	2.107	2.615	92.25	28.99	2.25
6	695.2	33.95	1.715	2.047	2.596	97.95	32.95	0.68
7	696.8	28.79	1.871	2.123	2.628	87.39	27.79	3.50
8	697.8	7.38	2.524	2.576	2.725	71.36	6.38	1.83
9	698.5	27.74	1.893	2.149	2.620	92.13	26.74	2.10
10	699.2	27.15	1.908	2.163	2.619	93.83	26.15	1.61
11	700.4	36.15	1.671	1.989	2.617	87.91	35.15	4.25
12	701.4	25.23	1.961	2.191	2.623	91.09	24.23	2.16
13	702.1	25.08	1.972	2.199	2.632	90.64	24.08	2.26
14	703.3	25.05	1.947	2.179	2.598	92.58	24.05	1.78
15	704.7	25.85	1.919	2.173	2.588	98.19	24.85	0.45
16	705.9	32.93	1.756	2.060	2.618	92.34	31.93	2.45
17	706.7	31.93	1.787	2.067	2.626	87.52	30.93	3.86
18	707.7	29.54	1.840	2.088	2.612	83.96	28.54	4.58
19	708.1	23.63	1.988	2.202	2.603	90.67	22.63	2.11
20	721.6	29.10	1.853	2.115	2.613	90.17	28.10	2.76
21	722.7	27.38	1.903	2.152	2.621	90.71	26.38	2.45
22	723.6	30.85	1.867	2.135	2.701	86.90	29.85	3.91
23	724.3	30.60	1.810	2.097	2.608	93.79	29.60	1.84

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Table C3. Unconventional Core Analysis Test Results

Sample Number	Sample Depth (ft)	Total Porosity (%)	Dry Bulk Density (g/cc)	As Received Bulk Density (g/cc)	Grain Density (g/cc)	Saturation Water (%)	Total-1% Porosity (%)	Gas-Filled Porosity (%)
24	725.4	28.56	1.863	2.131	2.607	93.94	27.56	1.67
25	726.9	30.89	1.818	2.097	2.631	90.20	29.89	2.93
26	727.4	31.80	1.789	2.084	2.624	92.56	30.80	2.29
27	728.5	31.17	1.798	2.084	2.612	91.90	30.17	2.44
28	729.7	34.22	1.717	2.041	2.610	94.95	33.22	1.68
29	730.4	29.74	1.846	2.126	2.627	94.24	28.74	1.66
30	731.9	30.00	1.837	2.112	2.624	91.87	29.00	2.36
31	732.7	32.08	1.797	2.091	2.646	91.57	31.08	2.62
32	733.8	30.89	1.815	2.100	2.626	92.34	29.89	2.29
33	734.3	30.58	1.820	2.107	2.621	93.80	29.58	1.83
34	736.4	30.53	1.828	2.107	2.632	91.27	29.53	2.58
35	737.5	31.15	1.819	2.111	2.642	93.64	30.15	1.92
36	738.6	30.46	1.839	2.122	2.645	92.62	29.46	2.17
37	739.4	31.32	1.804	2.103	2.627	95.51	30.32	1.36
38	740.6	32.50	1.783	2.089	2.642	93.98	31.50	1.90
39	741.7	33.84	1.743	2.061	2.634	93.97	32.84	1.98
40	742.2	30.38	1.832	2.119	2.631	94.47	29.38	1.62
41	743.3	4.22	2.602	2.624	2.717	50.31	3.22	1.60
42	744.7	29.59	1.849	2.127	2.626	94.05	28.59	1.70
43	746.6	29.35	1.861	2.135	2.634	93.25	28.35	1.92
44	747.8	30.29	1.828	2.103	2.622	90.80	29.29	2.70
45	748.5	28.21	1.883	2.149	2.623	94.38	27.21	1.53
46	750.2	32.43	1.789	2.080	2.647	89.65	31.43	3.25

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Table C4. Advanced Unconventional Core Analysis Test Results

Sample ID	Sample Depth (ft)	NOB Pressure (psi)	Sample Length (in)	Sample Diameter (in)	Gas-Filled Porosity (%)	Bulk Density (g/cc)	Grain Density (g/cc)	Pulse Decay Permeability (md)	Saturation Water (%)
1orig	690.4		0.855	0.971	2.77	2.153	2.626		89.89
1.0		700			2.83	2.152		0.000104	89.67
1.1		700			8.60	2.095		0.000401	68.62
1.2		700			14.65	2.034		0.813535	46.49
1dry			0.844	0.944	27.39	1.907			0.00
2orig	692.8		0.692	0.954	2.29	2.144	2.616		91.73
2.0		700			11.58	2.058		0.053148	58.27
2.1		700			15.19	2.022		0.368309	45.23
2.2		700			20.92	1.965		5.900370	24.60
2dry			0.688	0.917	27.74	1.897			0.00
3orig	694.7		0.666	0.962	2.32	2.107	2.613		92.25
3.0		700			8.42	2.059		0.000371	71.81
3.1		700			15.15	1.991		0.885640	49.29
3.2		700			22.06	1.922		4.544550	26.17
31dry			0.653	0.920	29.89	1.844			0.00
4orig	697.8		0.742	0.996	2.14	2.576	2.727		71.36
4.0		700			7.12	2.527		0.001506	4.45
4.1		700			7.38	2.524		0.001588	1.00
4.2		700			7.42	2.524		0.001775	0.43
4dry					7.46	2.523			0.00
5orig	699.2		0.770	0.992	1.67	2.163	2.617		93.83
5.0		700			15.76	2.027		2.302335	41.62
5.1		700			16.84	2.016		2.364101	37.60
5.2		700			21.61	1.969		8.845275	19.96
5dry			0.770	0.957	26.99	1.915			0.00

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Table C4. Advanced Unconventional Core Analysis Test Results

Sample ID	Sample Depth (ft)	NOB Pressure (psi)	Sample Length (in)	Sample Diameter (in)	Gas-Filled Porosity (%)	Bulk Density (g/cc)	Grain Density (g/cc)	Pulse Decay Permeability (md)	Saturation Water (%)
6orig	701.4		0.720	1.022	2.66	2.057	2.624		91.09
6.0		700			21.68	1.925		4.472677	27.24
6.1		700			22.74	1.915		4.544663	23.70
6.2		700			26.79	1.874		10.965547	10.10
6dry			0.718	0.968	29.80	1.844			0.00
7orig	703.3		0.736	1.000	1.86	2.179	2.599		92.58
7.0		700			14.95	2.054		2.593691	40.32
7.1		700			17.05	2.033		4.624959	31.94
7.2		700			18.48	2.019		5.783738	26.25
7dry			0.735	0.969	25.05	1.953			0.00
8orig	708.1		0.648	0.998	2.21	2.202	2.604		90.67
8.0		700			15.97	2.068		1.661330	32.45
8.1		700			19.82	2.029		3.437960	16.17
8.2		700			21.00	2.018		3.503624	11.20
8dry			0.644	0.961	23.65	1.991			0.00
9orig	723.6		0.690	0.990	3.60	2.135	2.615		86.90
9.0		700			15.01	2.029		2.192310	45.40
9.1		700			20.22	1.977		5.361024	26.43
9.2		700			21.56	1.964		5.485976	21.55
9dry			0.690	0.941	27.49	1.905			0.00
10orig	727.4		0.720	0.973	2.36	2.084	2.624		92.56
10.0		700			15.54	1.958		0.090182	51.11
10.1		700			19.12	1.922		1.217697	39.86
10.2		700			21.53	1.898		1.423277	32.27
10dry			0.717	0.913	31.79	1.796			0.00

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Table C4. Advanced Unconventional Core Analysis Test Results

Sample ID	Sample Depth (ft)	NOB Pressure (psi)	Sample Length (in)	Sample Diameter (in)	Gas-Filled Porosity (%)	Bulk Density (g/cc)	Grain Density (g/cc)	Pulse Decay Permeability (md)	Saturation Water (%)
11orig	730.4		0.516	1.008	1.71	2.126	2.627		94.24
11.0		700			21.02	1.962		2.355283	49.18
11.1		700			25.91	1.914		5.652766	37.35
11.2		700			27.29	1.900		5.662780	34.01
11dry			0.513	0.958	31.96	1.853			22.72
12orig	736.4		0.589	0.963	2.67	2.107	2.633		91.27
12.0		700			17.18	1.975		5.235566	56.73
12.1		700			23.33	1.914		11.263705	41.23
12.2		700			25.71	1.890		11.948532	35.25
12dry			0.581	0.931	31.05	1.836			21.78
13orig	739.4		0.697	0.975	1.41	2.103	2.628		95.51
13.0		700			14.87	1.981		0.001043	54.59
13.1		700			22.09	1.909		2.756769	32.56
13.2		700			24.10	1.889		3.792605	26.42
13dry			0.691	0.915	31.94	1.811			2.47
14orig	741.7		0.594	0.985	2.04	2.061	2.634		93.97
14.0		700			22.87	1.870		0.118896	39.24
14.1		700			27.61	1.822		3.494468	26.64
14.2		700			28.91	1.809		3.841911	23.19
14dry			0.592	0.912	34.95	1.749			7.15
15orig	744.7		0.613	0.986	1.76	2.127	2.626		94.05
15.0		700			23.21	1.934		2.586047	36.15
15.1		700			26.96	1.897		4.860573	25.84
15.2		700			27.76	1.889		4.981826	23.63
15dry			0.611	0.935	31.39	1.852			13.65

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Table C4. Advanced Unconventional Core Analysis Test Results

Sample ID	Sample Depth (ft)	NOB Pressure (psi)	Sample Length (in)	Sample Diameter (in)	Gas-Filled Porosity (%)	Bulk Density (g/cc)	Grain Density (g/cc)	Pulse Decay Permeability (md)	Saturation Water (%)
16orig	748.5		0.523	0.992	1.59	2.149	2.623		94.38
16.0		700			24.60	1.945		1.795985	41.74
16.1		700			28.93	1.901		3.007125	31.51
16.2		700			29.62	1.894		3.065975	29.87
16dry			0.520	0.931	30.60	1.885			27.55

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Table C5. Bowdoin Formation - Facies Identification

Facies No.	Description
1	Shale/Mudstone
2	Shale/Mudstone interbedded with thin Sltst/Sdst laminae
3	Interbedded Sdst/Sd/Sltst/Shales and Mudstones - less distinct bedding and generally more sandy in character (sometimes homogenized - likely bioturbated in places)
4	Interbedded Shales/Mudstones with thin bedded lt gy Sdst/Sltst; well cemented
#11-30 Well	
Lithology / Facies	**Depth Interval (ft)**
Facies 1	690.0-706.4
Facies 2	706.4-708.3 / 721-723.7 / 734.2-736.7 / 738-739.4 / 743.5-749.1
Facies 3	723.7-734.2 / 736.7-738 / 739.4-743.2; contains many unconsolidated, thin, cross-bedded sands
Facies 4	749.1-750.8
Calcite-rich bed	697.6-698.2
Natural Fractures	In calcite bed at 743.2-743.5; partial calcite fill

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Table C6. Drilling/Coring Induced Bulk Volume Changes

Sample Number	Sample Depth (ft)	Total Porosity (%)	Smectite Content (%)	Smectite Expandability (%)	Illite/Smectite Content (%)	Illite/Smectite Expandability (%)	Expandable Clay Volume (%)	Change in Bulk Volume (%)	Corrected Effective Porosity (%)	Facies
1	690.4	27.39	11.0	30	3.30	6.74	10.249	9.558	20.6	1
2	692.8	27.74	6.2	30	1.86	7.87	7.967	7.340	19.9	1/2
3	694.7	29.89	8.3	30	2.49	10.39	7.786	6.977	19.5	1
4	697.8	7.46	0.7	30	0.21	1.97	9.353	9.169	5.5	1
5	699.2	26.99	4.7	30	1.41	6.85	9.595	8.938	20.1	1/2
6	701.4	29.80	4.8	30	1.44	10.69	9.569	8.546	19.1	1/2
7	703.3	25.05	3.9	30	1.17	6.22	9.336	8.755	18.8	1/2
8	708.1	23.65	12.4	70	8.68	8.01	8.156	7.503	15.6	1/2
9	723.6	27.49	5.2	70	3.64	9.83	8.575	7.732	17.7	2
10	727.4	31.79	2.3	70	1.61	12.44	8.667	7.589	19.4	3
11	730.4	31.96	1.8	70	1.26	10.33	6.661	5.973	21.6	3
12	736.4	31.05	3.8	70	2.66	8.07	6.940	6.380	23.0	2
13	739.4	31.94	4.0	60	2.40	12.96	8.412	7.322	19.0	3
14	741.7	34.95	3.0	70	2.10	14.73	7.319	6.241	20.2	3
15	744.7	31.39	2.3	70	1.61	10.22	7.670	6.886	21.2	2
16	748.5	30.60	2.2	70	1.54	12.26	6.624	5.812	18.3	2

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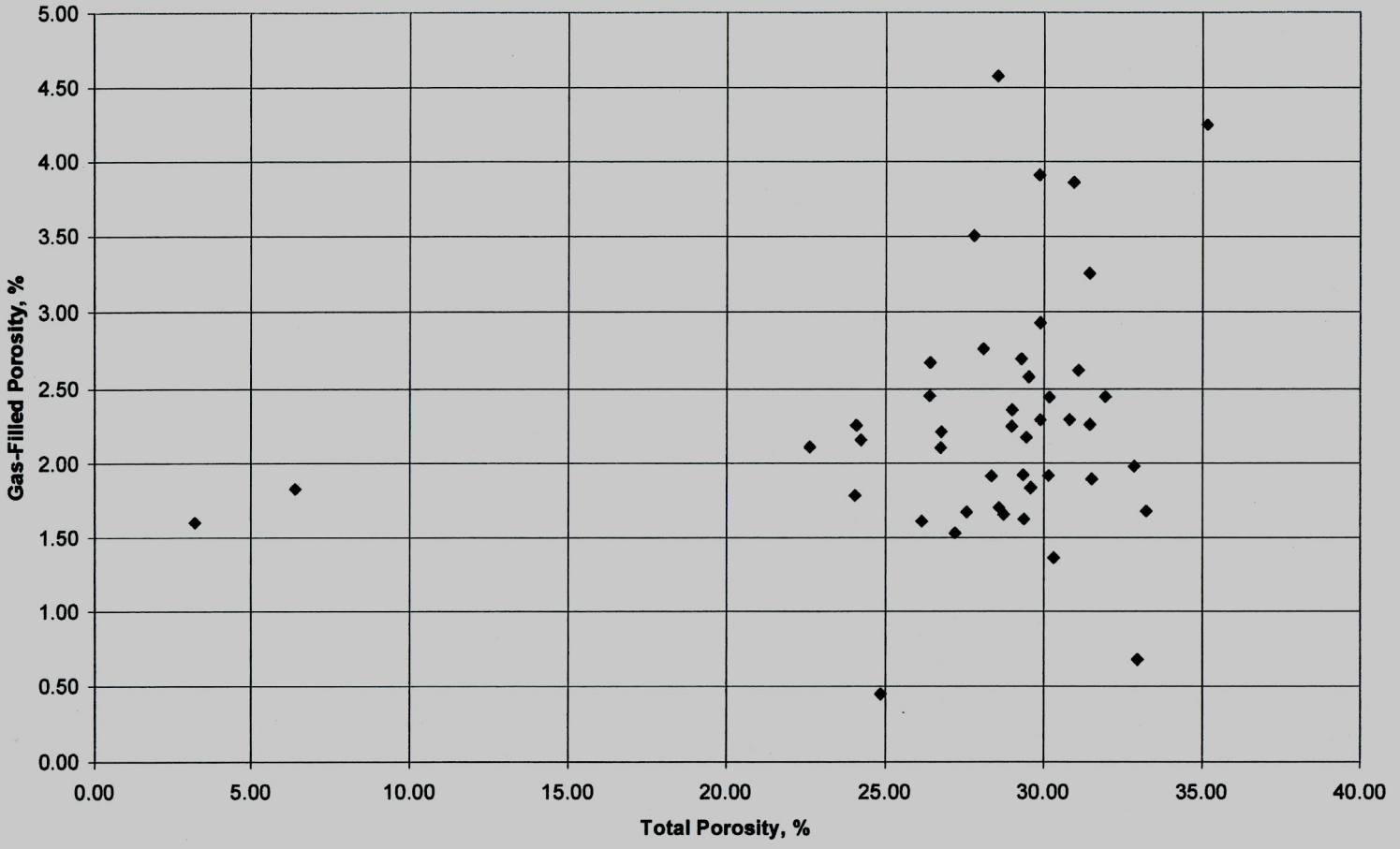

Figure C1. Plot of Gas-Filled Porosity versus Total Porosity

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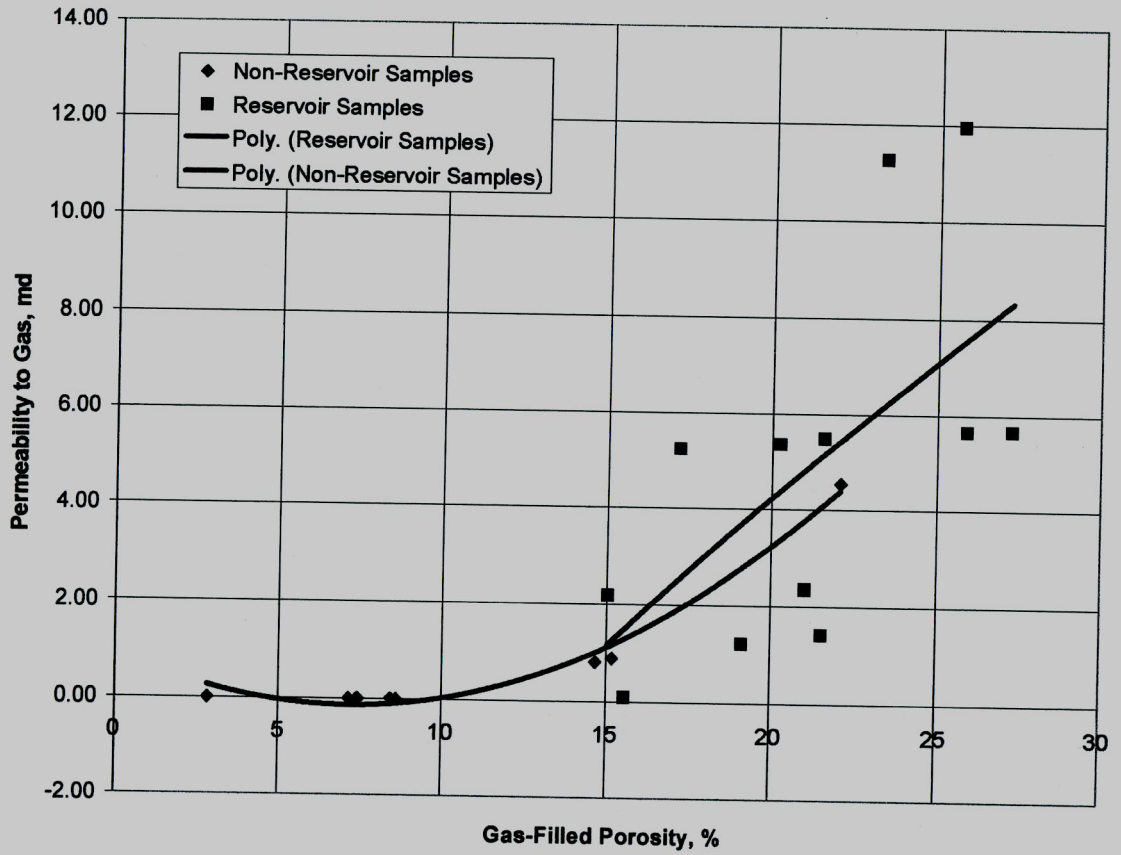

Figure C2. Plot of Gas-Filled Porosity versus Pulse Decay Permeability

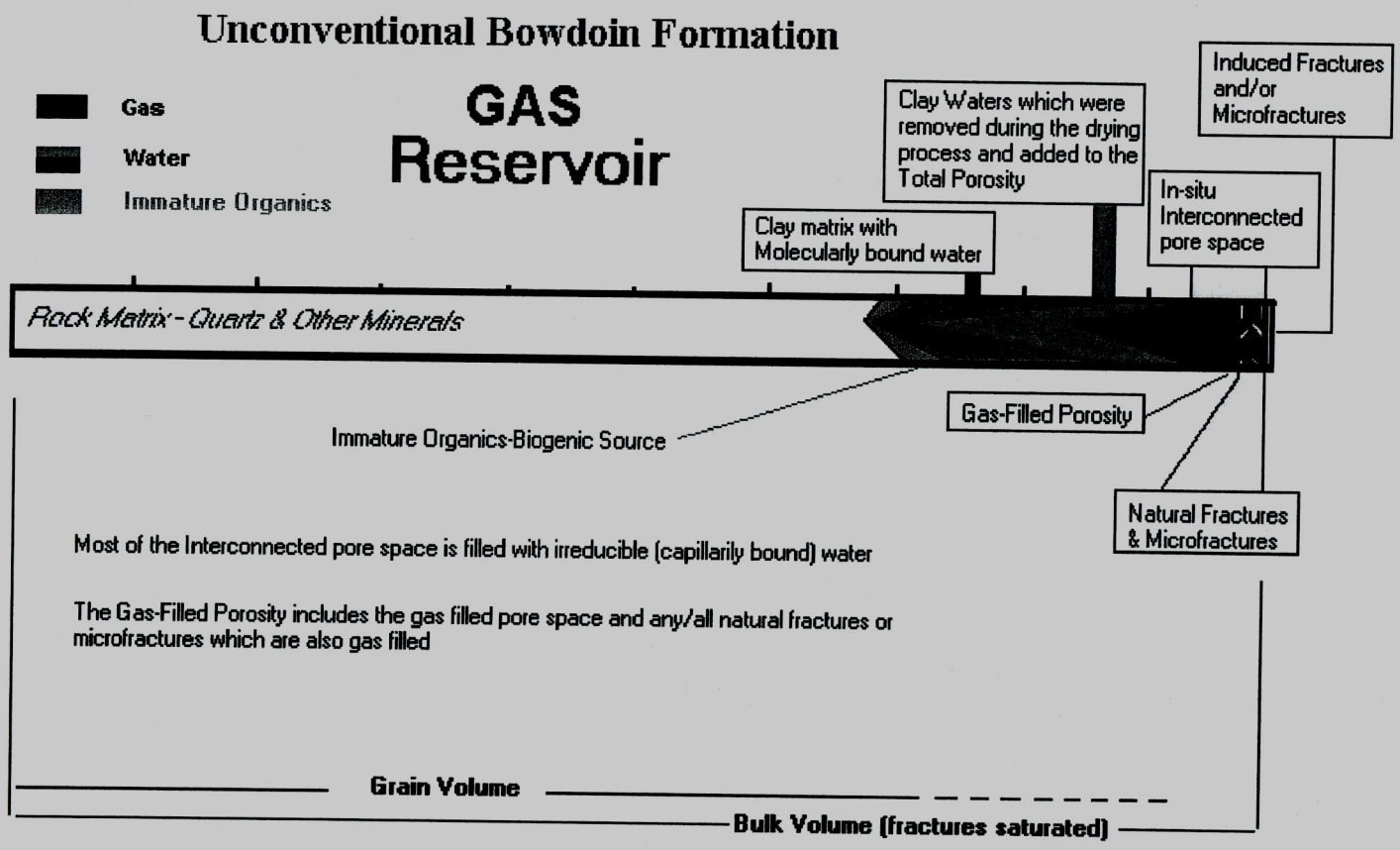

Figure C3. Schematic of Bowdoin Porosity System

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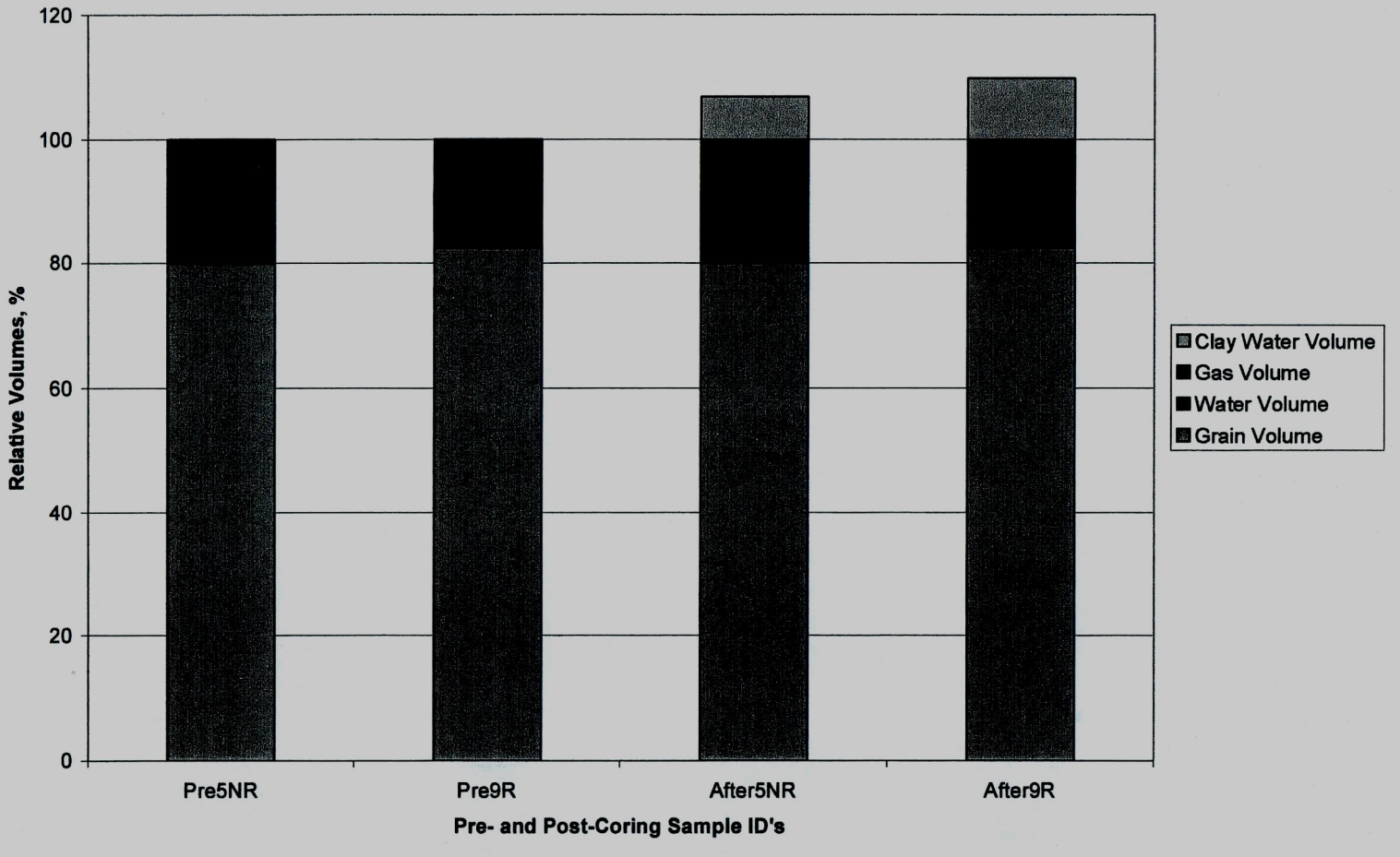

Figure C4. Histogram of Drilling/Coring-Induced Volume Change

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CANISTER DESORPTION STUDY

1 INTRODUCTION

At the request of Barron Gimza with Fidelity Exploration & Production Company, a shale gas analysis program was attempted on shale samples recovered from the #11-30 well located in Valley Co., Montana.

The testing program consisted of canister desorption measurements on selected samples at wellsite and in the laboratory.

2 TEST PROCEDURES

Six whole core samples were placed in desorption canisters at wellsite. The canisters were maintained at a reservoir temperature of approximately 30° C. Desorption data were collected from the samples for a period of time on location. The canisters, containing the samples were then transported to TerraTek, Inc. in Salt Lake City for continued desorption.

Upon arrival at TerraTek, the canisters were brought to temperature and underwent continued long-term desorption.

3 RESULTS

Unfortunately it was determined that the formation was not suitable for canister desorption techniques. Once the samples were placed in the canisters, most "evolved" gas measurements were negative values, thus, no desorption data were obtained. Table D1 summarizes the desorption sample depths.

4 REFERENCES

Diamond, W.P. and Levine, J.R.,: *USBM,* RI 8515, "Direct Method Determination of the Gas Content of Coal," (1981) 36.

McLennan, J.D., Schafer, P.S., and Pratt, T.J.: *A Guide to Determining Coalbed Gas Content,* Gas Research Institute, Chicago, IL, (1995).

Mavor, M.J., "Measurement and Evaluation of Coal Sorption Isotherm Data", Society of Petroleum Engineers, SPE 20728, pp.157-169.

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400 Wakara Way • Salt Lake City, Utah 84108
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105-21440

Table D1. Summary of Attempted Desorption Samples

Canistered Sample No.	Depth (feet)
1	695-696
2	700-701
3	705-706
4	725-726
5	735-736
6	745-746

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105-21440

X-RAY DIFFRACTION DATA - BULK MINERALOGY (Part 1)
Fidelity Exploration & Production Company - Well #11-30 - Bowdoin Shale
TerraTek Project No. 500250 22-May-02

TerraTek

WHOLE ROCK MINERALOGY

SAMPLE DEPTH (ft)	690.4	692.8	694.7	697.8	699.2	701.4	703.3	708.1
QUARTZ	47.3%	52.8%	47.9%	22.0%	36.7%	55.4%	48.7%	27.1%
POTASSIUM FELDSPAR	1.5%	1.6%	2.0%	0.6%	1.1%	2.1%	1.0%	0.9%
PLAGIOCLASE	2.4%	2.6%	2.1%	0.9%	1.5%	1.9%	1.2%	0.6%
CALCITE	3.6%	1.8%	2.7%	56.7%	5.4%	0.4%	0.1%	0.2%
Fe-DOLOMITE	0.0%	0.0%	0.0%	10.0%	0.0%	0.0%	0.0%	0.2%
DOLOMITE	0.8%	1.1%	0.5%	0.0%	1.1%	0.9%	0.0%	0.7%
SIDERITE	0.5%	0.7%	1.1%	0.2%	0.6%	0.6%	0.3%	0.3%
PYRITE	4.4%	3.3%	3.4%	2.2%	3.9%	4.7%	3.2%	4.3%
GYPSUM	0.0%	0.0%	0.2%	0.2%	0.2%	0.0%	0.0%	0.0%
TOTAL NON-CLAY	**60.6%**	**63.9%**	**59.7%**	**92.6%**	**50.2%**	**66.0%**	**54.6%**	**34.2%**
ILLITE/SMECTITE (I/S)	11.0%	6.2%	8.3%	0.7%	4.7%	4.8%	3.9%	12.4%
ILLITE	11.0%	13.5%	13.7%	3.3%	23.3%	12.9%	21.5%	16.8%
KAOLINITE	10.3%	9.0%	9.2%	1.7%	13.4%	9.9%	11.7%	26.6%
CHLORITE	7.1%	7.5%	8.8%	1.6%	8.3%	6.4%	8.4%	10.0%
TOTAL CLAY	**39.4%**	**36.1%**	**40.1%**	**7.2%**	**49.6%**	**34.0%**	**45.4%**	**65.8%**
GRAND TOTAL	**100.0%**	**100.0%**	**99.8%**	**99.8%**	**99.8%**	**100.0%**	**100.0%**	**100.0%**

RELATIVE CLAY ABUNDANCE

I/S % Expandability	25-30	25-30	25-30	25-30	30	25-30	25-30	70
ILLITE/SMECTITE	28%	17%	21%	10%	9%	14%	9%	19%
ILLITE/MICA	28%	37%	34%	45%	47%	38%	47%	26%
KAOLINITE	26%	25%	23%	23%	27%	29%	26%	40%
CHLORITE	18%	21%	22%	22%	17%	19%	19%	15%
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%

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X-RAY DIFFRACTION DATA - BULK MINERALOGY (Part 2)
Fidelity Exploration & Production Company - Well #11-30 - Bowdoin Shale
TerraTek Project No. 500250 22-May-02

TerraTek

WHOLE ROCK MINERALOGY

SAMPLE DEPTH (ft)	723.6	727.4	730.4	736.4	739.4	741.7	744.7	748.5
QUARTZ	43.1%	50.9%	51.6%	53.7%	35.9%	38.1%	40.4%	39.0%
POTASSIUM FELDSPAR	1.5%	0.9%	1.0%	0.8%	0.8%	0.9%	0.8%	1.0%
PLAGIOCLASE	1.6%	1.4%	1.4%	1.5%	1.4%	1.2%	1.3%	1.9%
CALCITE	0.3%	0.7%	0.8%	0.7%	1.0%	0.4%	1.4%	0.1%
Fe-DOLOMITE	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
DOLOMITE	0.7%	0.7%	0.6%	0.6%	1.5%	0.6%	1.5%	0.3%
SIDERITE	0.3%	0.5%	0.3%	0.4%	0.5%	0.5%	0.5%	0.4%
PYRITE	3.7%	3.2%	3.1%	3.4%	3.5%	4.9%	4.6%	4.1%
GYPSUM	0.0%	0.0%	0.0%	0.4%	0.0%	0.0%	0.1%	0.0%
TOTAL NON-CLAY	**51.2%**	**58.4%**	**58.7%**	**61.5%**	**44.6%**	**46.5%**	**50.7%**	**46.8%**
ILLITE/SMECTITE (I/S)	5.2%	2.3%	1.8%	3.8%	4.0%	3.0%	2.3%	2.2%
ILLITE	23.7%	21.4%	21.1%	19.8%	28.7%	28.3%	22.4%	24.7%
KAOLINITE	12.3%	11.4%	12.0%	8.1%	15.2%	14.5%	14.8%	16.5%
CHLORITE	7.5%	6.5%	6.4%	6.8%	7.4%	7.7%	9.8%	9.7%
TOTAL CLAY	**48.8%**	**41.6%**	**41.3%**	**38.5%**	**55.4%**	**53.5%**	**49.3%**	**53.2%**
GRAND TOTAL	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

RELATIVE CLAY ABUNDANCE

I/S % Expandability	70	70	70	70	60	60-70	60-70	60-70
ILLITE/SMECTITE (I/S)	11%	6%	4%	10%	7%	6%	5%	4%
ILLITE/MICA	49%	51%	51%	51%	52%	53%	45%	46%
KAOLINITE	25%	27%	29%	21%	27%	27%	30%	31%
CHLORITE	15%	16%	15%	18%	13%	14%	20%	18%
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%

05-319(d)

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X-RAY DIFFRACTION DATA - SIZE ANALYSIS (Part 1)
Fidelity Exploration & Production Company - Well #11-30 - Bowdoin Shale
TerraTek Project No. 500250 22-May-02

TerraTek

CLAYS/MINERALS < 4 MICRONS

SAMPLE DEPTH (ft)	690.4	692.8	694.7	697.8	699.2	701.4	703.3	708.1
WEIGHT PERCENT	55	50	53	16	61	41	44	45
I/S % Expandability	25-30	25-30	25-30	25-30	30	25-30	25-30	70
ILLITE/SMECTITE (I/S)	20.1%	12.4%	15.6%	4.3%	7.2%	11.6%	8.8%	27.6%
ILLITE/MICA	15.7%	21.0%	21.0%	6.3%	35.5%	21.6%	40.6%	15.5%
KAOLINITE	13.6%	13.4%	13.6%	2.3%	19.6%	19.3%	20.4%	39.3%
CHLORITE	9.4%	11.6%	13.0%	2.3%	11.2%	11.6%	14.2%	11.0%
QUARTZ	27.1%	32.5%	25.1%	5.7%	13.9%	24.0%	12.8%	4.2%
POTASSIUM FELDSPAR	1.7%	1.5%	2.1%	0.6%	1.2%	2.8%	1.0%	0.6%
PLAGIOCLASE	2.0%	1.6%	1.6%	0.5%	1.0%	1.6%	0.8%	0.2%
CALCITE	5.6%	2.5%	4.1%	63.8%	6.6%	0.8%	0.0%	0.0%
Fe-DOLOMITE	0.0%	0.0%	0.0%	12.3%	0.0%	0.0%	0.0%	0.4%
DOLOMITE	0.7%	0.8%	0.0%	0.0%	1.0%	1.4%	0.0%	0.0%
SIDERITE	0.7%	1.2%	1.7%	0.3%	0.8%	1.1%	0.3%	0.4%
PYRITE	3.4%	1.6%	2.1%	1.5%	1.8%	4.2%	1.2%	0.7%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

MINERALS > 4 MICRONS

WEIGHT PERCENT	45	50	47	84	39	59	56	55
QUARTZ	71.7%	72.9%	74.0%	25.1%	72.0%	77.5%	77.1%	45.8%
POTASSIUM FELDSPAR	1.3%	1.8%	1.9%	0.6%	1.0%	1.5%	1.1%	1.2%
PLAGIOCLASE	2.9%	3.5%	2.6%	1.0%	2.4%	2.1%	1.5%	0.8%
CALCITE	1.3%	1.1%	1.1%	55.3%	3.4%	0.2%	0.2%	0.3%
Fe-DOLOMITE	0.0%	0.0%	0.0%	9.6%	0.0%	0.0%	0.0%	0.0%
DOLOMITE	1.0%	1.5%	1.2%	0.0%	1.1%	0.6%	0.0%	1.2%
SIDERITE	0.2%	0.2%	0.3%	0.2%	0.2%	0.3%	0.3%	0.3%
PYRITE	5.5%	4.9%	4.8%	2.3%	7.1%	5.0%	4.9%	7.2%
GYPSUM	0.0%	0.0%	0.4%	0.2%	0.4%	0.0%	0.0%	0.0%
ILLITE/SMECTITE (I/S)	0.0%	0.0%	0.0%	0.0%	0.9%	0.0%	0.0%	0.0%
ILLITE/MICA	5.5%	6.1%	5.4%	2.7%	4.2%	6.7%	6.4%	17.9%
KAOLINITE	6.4%	4.5%	4.1%	1.6%	3.6%	3.3%	4.8%	16.2%
CHLORITE	4.3%	3.5%	4.1%	1.4%	3.7%	2.8%	3.9%	9.1%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

105-21940

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X-RAY DIFFRACTION DATA - SIZE ANALYSIS (Part 2)
Fidelity Exploration & Production Company - Well #11-30 - Bowdoin Shale
TerraTek Project No. 500250 22-May-02

TerraTek

CLAYS/MINERALS < 4 MICRONS

SAMPLE DEPTH (ft)	723.6	727.4	730.4	736.4	739.4	741.7	744.7	748.5
WEIGHT PERCENT	48	43	42	37	55	52	50	54
I/S % Expandability	70	70	70	70	60	60-70	60-70	60-70
ILLITE/SMECTITE (I/S)	10.2%	4.6%	3.4%	8.9%	6.6%	4.9%	3.7%	3.6%
ILLITE/MICA	43.0%	43.9%	43.8%	45.3%	44.6%	47.8%	36.0%	39.2%
KAOLINITE	20.9%	21.0%	23.6%	16.3%	21.6%	21.8%	24.5%	24.4%
CHLORITE	11.7%	10.3%	11.2%	13.4%	9.4%	9.5%	15.0%	14.4%
QUARTZ	11.6%	15.0%	12.4%	11.1%	13.0%	12.0%	15.1%	15.2%
POTASSIUM FELDSPAR	1.0%	1.0%	1.1%	0.5%	0.6%	0.7%	0.3%	0.8%
PLAGIOCLASE	0.5%	1.0%	1.0%	0.6%	0.6%	0.7%	0.6%	0.8%
CALCITE	0.0%	0.7%	1.4%	1.4%	1.4%	0.4%	1.9%	0.1%
Fe-DOLOMITE	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
DOLOMITE	0.4%	0.8%	0.4%	0.7%	0.6%	0.0%	0.8%	0.0%
SIDERITE	0.3%	0.6%	0.6%	0.5%	0.6%	0.6%	0.7%	0.5%
PYRITE	0.5%	1.2%	1.1%	1.3%	0.9%	1.5%	1.4%	1.1%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

MINERALS > 4 MICRONS

WEIGHT PERCENT	52	57	58	63	45	48	50	46
QUARTZ	71.9%	78.0%	80.0%	78.4%	64.3%	66.1%	66.1%	67.2%
POTASSIUM FELDSPAR	1.9%	0.9%	0.9%	1.0%	1.1%	1.1%	1.3%	1.3%
PLAGIOCLASE	2.5%	1.7%	1.7%	2.0%	2.4%	1.7%	1.9%	3.2%
CALCITE	0.7%	0.6%	0.3%	0.3%	0.5%	0.3%	0.9%	0.0%
Fe-DOLOMITE	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
DOLOMITE	1.0%	0.7%	0.7%	0.6%	2.5%	1.3%	2.2%	0.6%
SIDERITE	0.3%	0.5%	0.1%	0.3%	0.4%	0.3%	0.3%	0.2%
PYRITE	6.7%	4.7%	4.6%	4.6%	6.7%	8.5%	7.9%	7.7%
GYPSUM	0.0%	0.0%	0.0%	0.6%	0.0%	0.0%	0.2%	0.0%
ILLITE/SMECTITE (I/S)	0.7%	0.6%	0.7%	0.8%	0.8%	0.8%	0.9%	0.7%	
ILLITE/MICA	6.2%	4.4%	4.6%	5.0%	9.0%	7.4%	8.6%	7.6%
KAOLINITE	4.5%	4.1%	3.5%	3.4%	7.2%	6.8%	5.0%	7.3%
CHLORITE	3.7%	3.7%	2.9%	2.9%	5.0%	5.8%	4.6%	4.2%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

105-31W10

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Fidelity E & P Co.
Well No. 11-30

TerraTek

May 22, 2002
TerraTek No: 500250

COMPONENT CORE GAMMA LOG

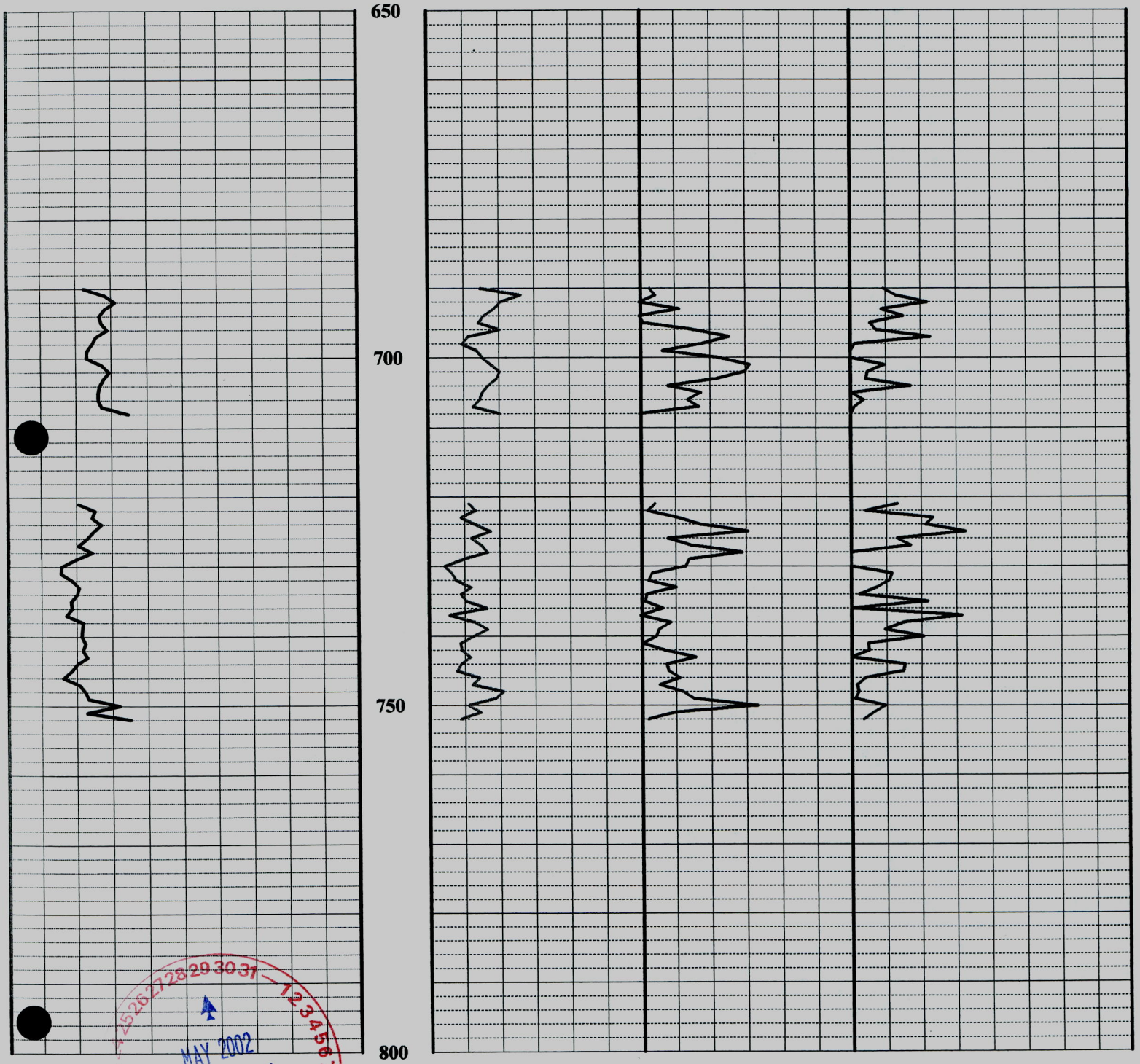
Total Counts
0.0 GR CPM 1000.0

Potassium
0.0 % 3.0

Uranium
0.0 ppm 24.0

Thorium
0.0 ppm 40.0

Depth



105-21440

Form 3160-3
(November 1983)

SUBMIT IN TRIPLICATE*
(Other instructions on reverse side)

Form approved
Budget Bureau No. 1004-0136
Expires August 31, 1985

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

APPLICATION FOR PERMIT TO DRILL, DEEPEN, OR PLUG BACK

5. LEASE DESIGNATION AND SERIAL NO.
MTGF021471

6. IF INDIAN, ALLOTTEE OR TRIBE NAME
NA

1a. TYPE OF WORK
DRILL ☒ **DEEPEN** ☐ **PLUG BACK** ☐

7. UNIT AGREEMENT NAME
Hinsdale Area None

b. TYPE OF WELL
OIL WELL ☐ GAS WELL ☒ OTHER ☐ SINGLE ZONE ☐ MULTIPLE ZONE ☐

8. FARM OR LEASE NAME
Federal

2. Name of Operator
WBI Production, Inc.

9. WELL NO. **1130** API #

3. Address and Telephone No.
P.O. Box 131, Glendive, Montana 59330-0131 (406) 359-7200 Great Falls, Montana

10. FIELD AND POOL, OR WILDCAT
Bowdoin Dome

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.)
At Surface **SW, NW, Sec. 21, T31N, R35E, 1552' FNL, 1041' FWL**
At proposed prod. zone

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA
Sec. 21. T31N, R35E

14. DISTANCE IN MILES AND DIRECTION FROM NEAREST TOWN OR POST OFFICE
7 Miles southeast

12. COUNTY OR PARISH **Valley** 13. STATE **MT**

15. DISTANCE FROM PROPOSED* LOCATION TO NEAREST PROPERTY OR LEASE LINE, FT. (Also to nearest drig. Unit line, if any)	**1552' FNL 1041' FWL**	16. NO. OF ACRES IN LEASE **520.00**	17. NO. OF ACRES ASSIGNED TO THIS WELL **160**
18. DISTANCE FROM PROPOSED LOCATION TO NEAREST WELL, DRILLING, COMPLETED, OR APPLIED FOR, ON THIS LEASE, FT.	**See attached map**	19. PROPOSED DEPTH **1300'**	20. ROTARY OR CABLE TOOLS **Rotary**

21. ELEVATIONS (Show whether DF, RT, GR, etc.)
2162'

22. APPROX. DATE WORK WILL START
August 2001

23. PROPOSED CASING AND CEMENTING PROGRAM

SIZE OF HOLE	SIZE OF CASING	WEIGHT PER FOOT	GRADE	SETTING DEPTH	QUANTITY OF CEMENT
9.875"	7"	17#/ft	H-40/8 RND	150'	80 sacks
6.25"	4.5"	10.5#/ft	J-55/8 RND	1275'	115 sacks

Plan to drill a 9-7/8" hole to a depth of 160', set and cement to surface 150' of 7", 17 lb/ft surface casing. Install and test BOP equipment. Then drill with fresh water mud system a 6-1/4" hole to TD and test the Phillips formation. Open hole logs may be run, with no drill stem test or coring planned. New 4-1/2" 10.5 lb/ft production casing will be set and cemented back to surface. The casing will then be perforated and, upon testing may require a fracture stimulation to increase production. Drilling mud will be hauled to a private reservoir or left to dry in the pits. Unlined pits will be used with fresh water mud.

NOTE: Bond coverage for this application for Williston Basin Interstate Pipeline Company will be covered by BLM Bond #MT0996.

Well to be drilled in accordance with the Master APD dated February 1998

See Attached Conditions Of Approval

IN ABOVE SPACE DESCRIBE PROPOSED PROGRAM: If proposal is to deepen or plug back, give data on present productive zone and proposed new productive zone. If proposal is to drill or deepen directionally, give pertinent data on subsurface locations and measured and true vertical depth. Give blowout preventer program, if any.

24.

SIGNED John Kennah TITLE Staff Engineer DATE May 25, 2001

(This space for Federal or State office use)

PERMIT NO. _____ APPROVAL DATE _____

APPROVED BY _____ TITLE Field Station Supervisor DATE 9-4-01

Conditions of Approval, if any:

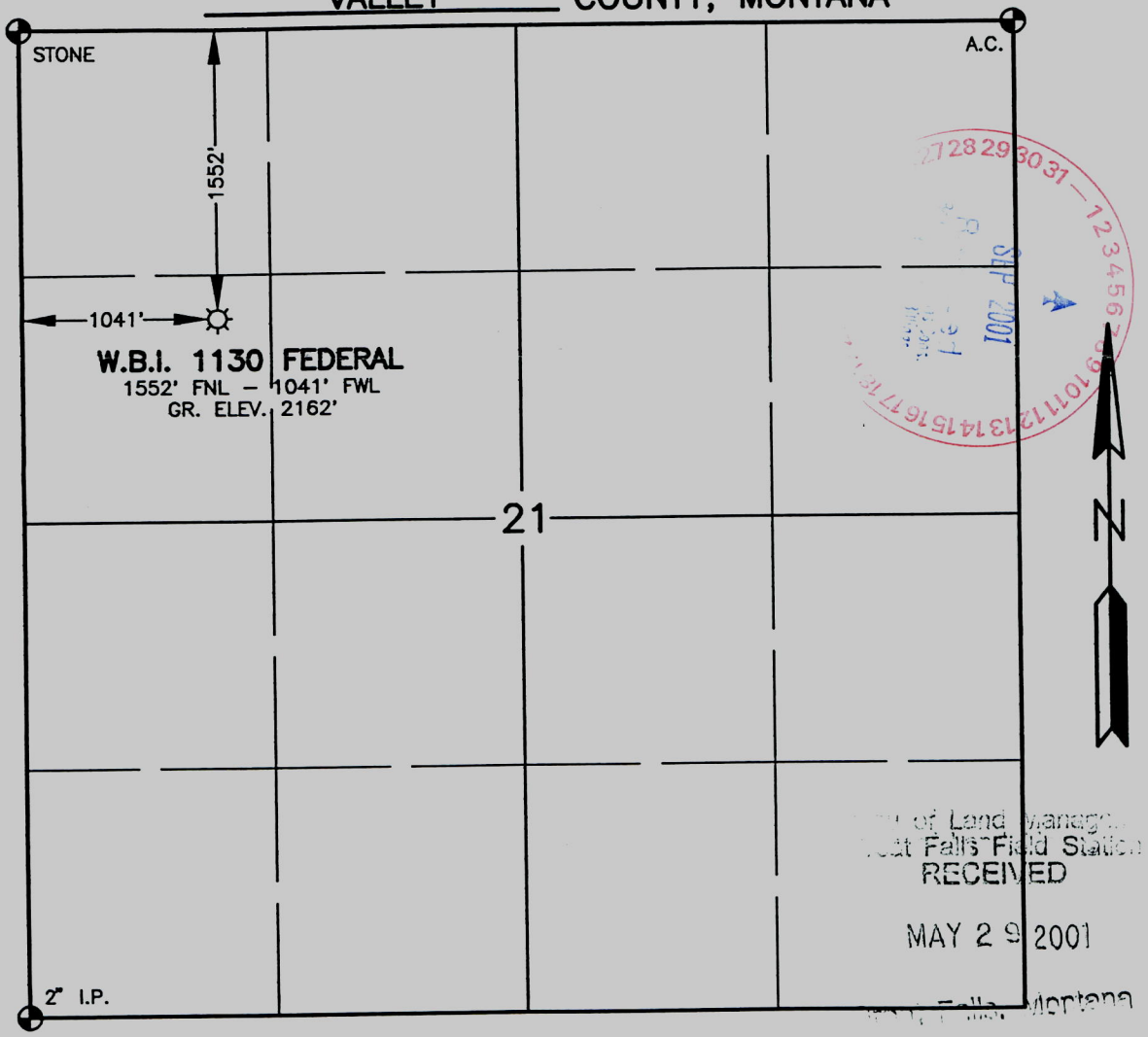
* See Instruction on Reverse Side

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

INSTRUCTIONS

WELL LOCATION PLAT
FIDELITY EXPLORATION & PRODUCTION CO.

SW 1/4 NW 1/4, SECTION 21, TWP. 31 N. – RGE. 35 E., P.M.M.
VALLEY COUNTY, MONTANA



I, Charles M. Madler certify that this plat correctly represents work performed by me or under my responsible charge, and is true and correct to the best of my knowledge and belief.

MONTANA
CHARLES M. MADLER
7327 S
REGISTERED
PROFESSIONAL LAND SURVEYOR

CHARLES M. MADLER
P.L.S. NO. 7327S

MARK R. & HEIDI S. JOHNSON
SURFACE OWNER

DATE STAKED 4-17-01

BASIS OF VERTICAL
DATUM: U.S.G.S. QUAD. MAP

EXHIBIT NO. 1

NO	DATE	BY	REVISION

FIDELITY
EXPLORATION & PRODUCTION COMPANY
A Subsidiary of MDU Resources Group, Inc.

W.B.I. NO. 1130 FEDERAL
WELL LOCATION
BOWDOIN FIELD

DATE	DRAWN BY	SCALE	COMP. NO.	DRAWING NO.
4-30-01	T.A.S.	1" = 1000'	1130LOC	A-5-2873

Halliburton

Job Log

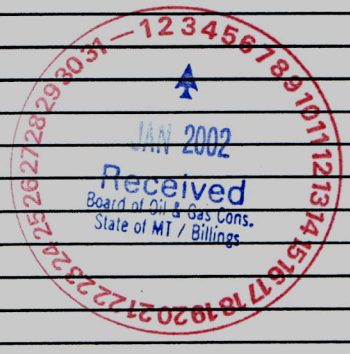
TICKET # 1267008	TICKET DATE Sept. 20, 01		
REGION NORTH AMERICA LAND	NWA / COUNTRY WESTERN	BDA / STATE Montana	COUNTY Valley
MBU ID / EMPL # 122102	H.E.S EMPLOYEE NAME Doug Kessel	PSL DEPARTMENT Cementing Services	
LOCATION Williston, N.D.	COMPANY Fidelity E&P	CUSTOMER REP / PHONE Jeff Merkel	
TICKET AMOUNT $3,893.96	WELL TYPE 02	API/UWI # 25-105-21440	
WELL LOCATION Bowdoin Dome	DEPARTMENT CEMENTING SERVICES 10003	JOB PURPOSE CODE 10	
LEASE / WELL # Federal	Well No. 1130	SEC / TWP / RNG 21-31N-35E	

Chart No.	Time	Rate (BPM)	Vol (BBL)(GAL)	Pmps T	Pmps C	Press.(PSI) Tbg	Press.(PSI) Csg	Job Description / Remarks
09-20-01	13:40							ARRIVE ON LOCATION
	14:00							Spot Equipment, and rig-up iron
09/21/2001	07:15							Pre-Job Safety Meeting for all Personnel on Location
	07:26	0.3	0.5			1500		Pressure Test Lines to 1000 psi.
	07:27	2.0	5.0				46	Pump 5.0 bbls. Of Fresh Water Spacer
	07:30	2.0	27.9				46-130	Mit and Pump 27.9 bbls. (135 sks.) of Premium Cement
								mixed at 15.8 ppg.
	07:44							Shut Down Pumping, Drop Top Wiper Plug
	07:45	2.0	6.3				0-55	Pump 6.3 bbls. Of Fresh Water Displacement
	07:48						55	Plug in Place, Shut in Well, Bleed off Pressure
	07:49							Job Complete
								13 bbls. Of Cement to the Pit

Job Log

Halliburton		TICKET # 1267029	TICKET DATE Sept. 23, 01
REGION NORTH AMERICA LAND	NWA / COUNTRY WESTERN	BDA / STATE Montana	COUNTY Valley
MBU ID / EMPL # 122102	H.E.S EMPLOYEE NAME Doug Kessel	PSL DEPARTMENT Cementing Services	
LOCATION Williston, N.D.	COMPANY Fidelity E&P	CUSTOMER REP / PHONE Jeff Merkel	
TICKET AMOUNT $3,698.65	WELL TYPE 02	API/UWI # 25-105-21440	
WELL LOCATION Bowdoin Dome	DEPARTMENT CEMENTING SERVICES 10003	JOB PURPOSE CODE 35	
LEASE / WELL # Federal	Well No. 1130	SEC / TWP / RNG 21-31N-35E	

Chart No.	Time	Rate (BPM)	Vol (BBL)(GAL)	Pmps T	Pmps C	Press.(PSI) Tbg	Press.(PSI) Csg	Job Description / Remarks
09-23-01	07:30							ARRIVE ON LOCATION
	10:20							Pre-Job Safety meeting for all Personnel on Location
	10:35	0.3	0.5			2000		Pressure Test Lines to 2000psi.
	10:38	2.5	10.0				89	Mix and Pump 10 bbls. Of Mud Flush
	10:42	2.5	10.0				95	Pump 10 bbls. Of Fresh Water Spacer
	10:46	2.5	9.1				105	Mix and Pump 9.1 bbls. (25 sks.) of Premium Lite Cement
								mixed at 12.5 ppg.
	10:50	2.5	17.6				105-235	Mix and Pump 17.6 bbls. (85 sks.) of Premium Cement
								mixed at 15.8 ppg.
	11:05							Shut Down Pumping, Open Line to Pit, Wash Pumps and
								lines
	11:06							Drop Latch Down Plug
	11:07	2.5	13.8				0-485	Pump 13.8 bbls. Of Fresh Water Displacement
	11:15						1240	Land Plug, Bleed off Pressure, Check Floats
	11:16							Floats Held, Job Complete
								10 bbls. Of Cement to the Pit



JOB SUMMARY

REGION: NORTH AMERICA LAND	NWA / COUNTRY: WESTERN	BDA / STATE: Montana	COUNTY: Valley
MBU ID / EMPL #: 122102	H.E.S EMPLOYEE NAME: Doug Kessel	PSL DEPARTMENT: Cementing Services	
LOCATION: Williston, N.D.	COMPANY: Fidelity E&P	CUSTOMER REP / PHONE: Jeff Merkel 406-350-1	
TICKET AMOUNT: $3,893.96	WELL TYPE: 02	API/UWI #: 25-105-21440	
WELL LOCATION: Bowdoin Dome	DEPARTMENT: CEMENTING SERVICES 10003	SAP BOMB NUMBER: 10	Description: Surface Casing
LEASE NAME: Federal / Well No.: 1130	SEC / TWP / RNG: 21-31N-35E		

SAP #/TICKET #: 126[illegible]08 — TICKET DATE: Sept. 20,

H.E.S. EMP NAME / EMP # / (EXPOSURE HOURS)	HRS	HRS	HRS	HRS
D. Kessel /122102	19.5			
J. Jones / 213675	19.5			
C. Marottek / 233390	19.5			

H.E.S. UNIT #'S / (R / T MILES)	R / T MILES	R / T MILES	R / T MILES	R / T MILES
Pickup / 421908	20			
Tractor/ 10251389	20			
Tractor/ 52809	100			
660 / 7500	100			

Form. Name _____ Type: _____
Form. Thickness _____ From _____ To _____
Packer Type _____ Set At _____
Bottom Hole Temp. _____ Pressure _____
Retainer Depth _____ Total Depth _____

	Called Out	On Location	Job Started	Job Completed
Date	09-20-01	09-20-01	09/21/2001	09/21/2001
Time	12:30	13:40	07:26	07:48

Tools and Accessories

Type and Size	Qty	Make
Float Shoe Reg. 7	1	Halliburton
Float Collar		
Centralizers 7x9.875	3	Halliburton
Limit Clamp		
Top Plug 7	1	Halliburton
Bottom Plug		
Weld - A	1 lb.	Halliburton
DV Tool		
Other Cement Head	1	A2360

Well Data

	New/Used	Weight	Size	Grade	From	To	Max. Allow
Casing	New	17.0	7	H-40	Surface	156.81ft.	
Casing							
Liner							
Tubing							
Drill Pipe							
Drill Pipe							
Open Hole			9.875		Surface	175	Shots/Ft.
Perforations							
Perforations							

Materials

Mud:
Type _____ Density _____ lb/gal

Spacers / Flushs Ahead:

5	bbl	Fresh Water
	bbl	Mud Flush
	bbl	Super Flush
	bbl	Mod Dual Spacer
	bbl	Other

Density: 8.33 lb/gal Water Req: 27.3 gal/bbl

Displacement:
Type Fresh Water Density 8.33 lb/gal

Hours On Location

Date	Hours
09-20-01	10.5
9/21	9.0
Total	19.5

Operating Hours

Date	Hours
9/21	0.5
Total	0.5

Description of Job: See Job Log

Ordered	Equipment Ordered / Avail.	Used
Lead Slurry	Average Rates in BPM / Tail Slurry	Displacement
Feet 30.00	Cement Left in Pipe / Reason	Shoe Joint

Cement Data

Stage	Sacks	Cement	Bulk/Sks	Additives	W/Rq.	Yield	Lbs/Gal
1	135	Premium G	Bulk	3% Calcium Chloride, .125#/sk. Poly-E-Flake	4.97	1.16	15.8
			BULK				
			BULK				
			BULK				
			BULK				

Summary

Calculated Pressure to land Plug _____
Actual Pressure to Land Plug _____
Cement Returned 13 bbls.
Yes ☐ Lost Returns ☒ No _____ bbl Away
Calculated Top of Cement Surface
Actual Top of Cement Surface

Spacer / Flush (bbl): 5 bbls. Fresh Water
Calculated Displacement (bbl): 6.3 bbls.
Actual Displacement (bbl): 6.3 bbls.
Cement Slurry: 27.9 bbls.
Total Volume: 39.2 bbls.

Thank You, Doug Kessel — Halliburton Energy Services - Williston Cementing Services

THE INFORMATION STATED HEREIN IS CORRECT
CUSTOMER REPRESENTATIVE _____ SIGNATURE

Halliburton

Job Log

TICKET #	TICKET DATE
1267008	Sept. 20, 01

REGION	NWA / COUNTRY	BDA / STATE	COUNTY
NORTH AMERICA LAND	WESTERN	Montana	Valley

MBU ID / EMPL #	H.E.S EMPLOYEE NAME	PSL DEPARTMENT
122102	Doug Kessel	Cementing Services

LOCATION	COMPANY	CUSTOMER REP / PHONE
Williston, N.D.	Fidelity E&P	Jeff Merkel

TICKET AMOUNT	WELL TYPE	API/UWI #
$3,893.96	02	25-105-21440

WELL LOCATION	DEPARTMENT	JOB PURPOSE CODE
Bowdoin Dome	CEMENTING SERVICES 10003	10

LEASE / WELL #	Well No.	SEC / TWP / RNG
Federal	1130	21-31N-35E

Chart No.	Time	Rate (BPM)	Vol (BBL)(GAL)	Pmps T	Pmps C	Press.(PSI) Tbg	Press.(PSI) Csg	Job Description / Remarks
09-20-01	13:40							ARRIVE ON LOCATION
	14:00							Spot Equipment, and rig-up iron
09/21/2001	07:15							Pre-Job Safety Meeting for all Personnel on Location
	07:26	0.3	0.5			1500		Pressure Test Lines to 1000 psi.
	07:27	2.0	5.0				46	Pump 5.0 bbls. Of Fresh Water Spacer
	07:30	2.0	27.9				46-130	Mit and Pump 27.9 bbls. (135 sks.) of Premium Cement
								mixed at 15.8 ppg.
	07:44							Shut Down Pumping, Drop Top Wiper Plug
	07:45	2.0	6.3				0-55	Pump 6.3 bbls. Of Fresh Water Displacement
	07:48						55	Plug in Place, Shut in Well, Bleed off Pressure
	07:49							Job Complete
								13 bbls. Of Cement to the Pit

JOB SUMMARY

Halliburton		SAP #/TICKET # 12[illegible]9	TICKET DATE Sept. 23
REGION NORTH AMERICA LAND	NWA / COUNTRY WESTERN	BDA / STATE Montana	COUNTY Valley
MBU ID / EMPL # 122102	H.E.S EMPLOYEE NAME Doug Kessel	PSL DEPARTMENT Cementing Services	
LOCATION Williston, N.D.	COMPANY Fidelity E&P	CUSTOMER REP / PHONE Jeff Merkel 406-350-12[illegible]	
TICKET AMOUNT $3,698.65	WELL TYPE 02	API/UWI # 25-105-21440	
WELL LOCATION Bowdoin Dome	DEPARTMENT CEMENTING SERVICES 10003	SAP BOMB NUMBER 35	Description Production Casing
LEASE NAME Federal / Well No. 1130	SEC / TWP / RNG 21-31N-35E		

H.E.S. EMP NAME / EMP # / (EXPOSURE HOURS)	HRS	HRS	HRS	HRS
D. Kessel /122102	4.5			
J. Jones / 213675	4.5			
C. Marottek / 233390	4.5			

H.E.S. UNIT #'S / (R / T MILES)	R / T MILES	R / T MILES	R / T MILES	R / T MILES
Pickup / 421908	20			
Tractor/ 10251389	20			
Tractor / 52809	100			
660 / 7500	100			

Form. Name _____ Type: _____
Form. Thickness _____ From _____ To _____
Packer Type _____ Set At _____
Bottom Hole Temp. _____ Pressure _____
Retainer Depth _____ Total Depth _____

	Called Out	On Location	Job Started	Job Completed
Date	09-23-01	09-23-01	09/23/2001	09/23/2001
Time	05:40	07:30	10:35	11:15

Tools and Accessories

Type and Size	Qty	Make
Float Shoe SSII 4.5in.	1	Halliburton
Float Collar LD 4.5in.	1	Halliburton
Centralizers 4.5x6.25	10	Halliburton
Limit Clamp 4.5in.	1	Halliburton
Top Plug LD 4.5in.	1	Halliburton
Bottom Plug		
Weld - A	1 lb.	Halliburton
DV Tool		
Other Cement Head	1	A2971

Well Data

	New/Used	Weight	Size	Grade	From	To	Max. Allow
Casing	New	10.5	4.5	J-55	Surface	876.59 ft.	
Casing							
Liner							
Tubing							
Drill Pipe							
Drill Pipe							
Open Hole			6.25		BOS	928	Shots/Ft.
Perforations							
Perforations							

Materials

Mud:
Type _____ Density _____ lb/gal

Spacers / Flushs Ahead:

10	bbl	Fresh Water
10	bbl	Mud Flush
	bbl	Super Flush
	bbl	Mod Dual Spacer
	bbl	Other

Density: 8.33 lb/gal Water Req: 50.6 gal/bbl

Displacement:
Type Fresh Water Density 8.33 lb/gal

Hours On Location

Date	Hours
09-23-01	4.5
Total	4.5

Operating Hours

Date	Hours
9/23	0.8
Total	0.8

Description of Job

See Job Log

Ordered		Equipment Ordered Avail.	Used
Lead Slurry		Average Rates in BPM Tail Slurry	Displacement
Feet 21.43		Cement Left in Pipe Reason	Shoe Joint

Cement Data

Stage	Sacks	Cement	Bulk/Sks	Additives	W/Rq.	Yield	Lbs/Gal
1	30	Halco Lite	Bulk	6% Gel, 3% Calcium Chloride, .125#/sk. Poly-E-Flake	11.20	2.04	12.5
2	110	Premium G	BULK	3% Calcium Chloride, .125#/sk. Poly-E-Flake	4.97	1.16	15.8
			BULK				
			BULK				
			BULK				

Summary

Calculated Pressure to land Plug _____
Actual Pressure to Land Plug _____
Cement Returned 10 bbls.
Yes ☐ Lost Returns ☒ No _____ bbl Away
Calculated Top of Cement Surface
Actual Top of Cement Surface

Spacer / Flush (bbl): 10 bbls. Mud Flush, 10 bbls. Fresh Water
Calculated Displacement (bbl): 13.8 bbls.
Actual Displacement (bbl): 13.8 bbls.
Cement Slurry: 26.7 bbls.
Total Volume: 60.5 bbls.

Thank You, Doug Kessel — Halliburton Energy Services - Williston Cementing Services

THE INFORMATION STATED HEREIN IS CORRECT
CUSTOMER REPRESENTATIVE _____ SIGNATURE

Halliburton

Job Log

TICKET #	TICKET DATE
1267029	Sept. 23, 01

REGION	NWA / COUNTRY	BDA / STATE	COUNTY
NORTH AMERICA LAND	WESTERN	Montana	Valley

MBU ID / EMPL #	H.E.S EMPLOYEE NAME	PSL DEPARTMENT
122102	Doug Kessel	Cementing Services

LOCATION	COMPANY	CUSTOMER REP / PHONE
Williston, N.D.	Fidelity E&P	Jeff Merkel

TICKET AMOUNT	WELL TYPE	API/UWI #
$3,698.65	02	25-105-21440

WELL LOCATION	DEPARTMENT	JOB PURPOSE CODE
Bowdoin Dome	CEMENTING SERVICES 10003	35

LEASE / WELL #	Well No.	SEC / TWP / RNG
Federal	1130	21-31N-35E

Chart No.	Time	Rate (BPM)	Vol (BBL)(GAL)	Pmps T	Pmps C	Press.(PSI) Tbg	Press.(PSI) Csg	Job Description / Remarks
09-23-01	07:30							ARRIVE ON LOCATION
	10:20							Pre-Job Safety meeting for all Personnel on Location
	10:35	0.3	0.5			2000		Pressure Test Lines to 2000psi.
	10:38	2.5	10.0				89	Mix and Pump 10 bbls. Of Mud Flush
	10:42	2.5	10.0				95	Pump 10 bbls. Of Fresh Water Spacer
	10:46	2.5	9.1				105	Mix and Pump 9.1 bbls. (25 sks.) of Premium Lite Cement
								mixed at 12.5 ppg.
	10:50	2.5	17.6				105-235	Mix and Pump 17.6 bbls. (85 sks.) of Premium Cement
								mixed at 15.8 ppg.
	11:05							Shut Down Pumping, Open Line to Pit, Wash Pumps and
								lines
	11:06							Drop Latch Down Plug
	11:07	2.5	13.8				0-485	Pump 13.8 bbls. Of Fresh Water Displacement
	11:15						1240	Land Plug, Bleed off Pressure, Check Floats
	11:16							Floats Held, Job Complete
								10 bbls. Of Cement to the Pit

HALLIBURTON
ENERGY SERVICES

Stimulation Performance Summary

Executive Summary

General

Customer:	Fidelity E&P	*Job Date:*	October 15, 2001
Lease:	Federal	*Customer Rep.*	JD Benson
Well Number:	1130	*Sales Order(s) Frac:*	1571411 **N2:** 1571424
Well Stage:	Bowdoin	*Halliburton Rep.*	Fabian Kjorstad
Job Type:	N2 Foam Frac	*Halliburton Svc Area:*	Rockies
Fluid System:	Waterfrac WG-18	*Halliburton Facility:*	Williston, ND

Well

API Number:		*Well Type:*	02 Gas
Country:	United States of America	*Wellbore Type:*	Vertical
State:	Mt.		
County:	Valley	*Primary Production:*	Gas
Legal Description:	Sec21, T31N R35E		
Field:	Bowdoin		

Wellbore Configuration

Injection Path	Length (ft)	True Vertical Depth	Open Hole Diameter	Casing Grade	Casing OD (in)	Casing Weight (lb/ft)	Casing Internal Yield (psi)	Tubing Grade	Tubing OD	Tubing Weight (lb/ft)	Tubing Internal Yield (psi)
Casing	930	930		J-55	4.5	10.5	4790				

Perforated Intervals

Top (ft)	Bottom (ft)	Number of Perfs	Perf Density (spf)	Interval Net Height (ft)	Perf Phasing (Deg)	Perf Diameter (in)	Total Number Perfs
762	772	41	4	10	90	0.31	41

Packers

Packer Type	Measured Depth
0	930
0	0

Zones of Interest

Top Measured Depth (ft):	762	*Formation Lithology:*	Sandstone/Shale
Bottom Measured Depth (ft):	772	*Permeability, (md):*	
Gross Height (ft):	10	*Porosity, (%):*	
Zone Net Height (ft):	10	*BH Pressure (psi):*	
Perf Midpoint (ft):	767	*BH Temperature, (deg F):*	75
Zone of Treatment:	Bowdoin		

Initial Wellhead Pressure Before Treatment, (psi): 82

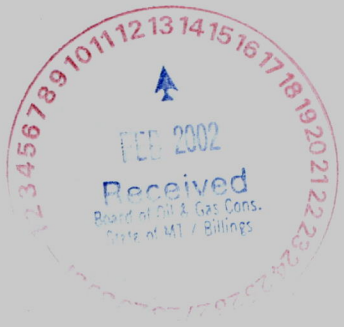
Notes:

Customer: Fideli
Well Desc: Federa 1130
Formation: Bowdoin

Da 15-
Ticket #: 157
Job Type: Foam

OPERATOR LOG

Chart	Time	FoamSf Rate (bpm)	Clean Stage Volume (gal)	Casing Press. (psi)	Remark
Event #1	09:47:07	0.00	0	0	START JOB
Event #2	09:47:14	0.00	0	150	SAFETY MEETING
Event #3	09:47:34	0.00	0	83	TEST LINES
Event #4	09:47:38	0.00	0	82	ISIP Casing Press 82 (psi)
Stage #1	09:47:47	0.00	1003	83	1200 Gal Pad with Slug
Event #5	09:49:08	22.56	0	1328	BREAK FORMATION Casing Press 1328 (psi) Foam Rate/Surf 179.
Stage #2	09:51:15	28.65	1000	804	1000 Gal 5.2-11.7# 65%
Stage #3	09:54:10	25.76	2407	696	2250 Gal 11.7-15.2#
Stage #4	10:01:15	18.54	531	477	START FLUSH
Stage #5	10:02:05	0.74	0	356	ISIP Casing Press 356 (psi)
Event #6	10:07:20	0.00	0	279	5 MIN SHUTIN PRES. Casing Press 279 (psi)
Event #7	10:07:34	0.00	0	278	END JOB



DATE	10/4/01
SALES / STN NO.	20647/3321
SERVICE ORDER NUMBER	49764
PAGE	1 OF 1
SERVICES ORDERED:	PND/CBL/GR 03

COMPUTALOG

Wellbore knowledge and solutions

COMPUTALOG WIRELINE SERVICES
HOME OFFICE: 500 WINSCOTT RD.
FT. WORTH, TEXAS 76126
PHONE 817-249-7200 FAX 817-249-7275

ENGINEER	Kevin Howe 20646
CREW	Morey Gummer 21168
CREW	
CREW	
SALESMAN	Martin O'Neil
PRICE SCHEDULE	Local

CUSTOMER AUTHORIZATION _____

COMPANY Fidelity E&P CUSTOMER # 20277

BILL TO (IF OTHER THAN ABOVE) _____

ADDRESS _____

CITY Glendive STATE Montana ZIP CODE 59330

P.O. # 1010 AFE # _____ CONTRACT # _____

WELL INFORMATION

WELL NAME: Gilbert 1130 Sec 21-31N-35E FIELD: Baudette Dome

COUNTY/PARISH: Valley STATE: Montana RIG NAME: Mast unit PRICE ZONE: Local

LOG MEASURED FROM Kelly Bushing, 6.0' FEET ABOVE PERMANENT DATUM

UNIT NUMBER	STATION NAME/NO.	ACTUAL ROUND TRIP DISTANCE FROM STATION	MILES	DISTANCE CHARGED MILES FROM
4841	Billings, MT (3321)	230		

RUN NO.		DATE	TIME	TIME ELAPSED	LOST TIME /GROUP	SERVICE
	TIME SET BY CLIENT	10/4				
	LEFT SHOP		6:30			
	ARV. DOCK EQUIP.					
	ARV. DOCK CREW					
	ARRIVE LOCATION		7:30	1		
	BEGIN RIG-UP		7:30			
	FINISH RIG-UP		7:45	1/4		
1	BEGIN OPERATION		7:45			PND
	FINISH OPERATION		9:30	1 3/4		
2	BEGIN OPERATION		9:30			CBL
	FINISH OPERATION		10:30	1		
3	BEGIN OPERATION					
	FINISH OPERATION					
4	BEGIN OPERATION					
	FINISH OPERATION					
5	BEGIN OPERATION					
	FINISH OPERATION					
6	BEGIN OPERATION					
	FINISH OPERATION					
7	BEGIN OPERATION					
	FINISH OPERATION					
8	BEGIN OPERATION					
	FINISH OPERATION					
9	BEGIN OPERATION					
	FINISH OPERATION					
	BEGIN RIG-DOWN		10:30			
	FINISH RIG-DOWN		10:45	1/4		
	LEAVE LOCATION		10:45			
	ARV. DOCK EQUIP.					
	ARV. DOCK CREW					
	RETURN TO SHOP		11:00	1/4		

CODE	DESCRIPTION	QTY	BOOK UNIT PRICE	FIELD AMOUNT
1000.10	Service Charge	834'		
1006.10	Mast unit	1		
1021.21	PND Bulk Inelastic Depth	min		
1021.22	Operation	min		
1021.23	Flat Charge	1		
1032.20	License Fee	1		
1302.11	PND Porosity Computations Set-up	1		
1302.12	Operation	1		
1040.11	Cement Bond Log w/GR/CCL Depth	min		
1040.12	Operation	min		
1038.11	Gamma Ray w/CCL Depth	min		
1038.12	Operation	min		
19999				
1003.07	Mileage	230		

COPY

TYPE OF WELL ☑ NEW ☐ WORKOVER ☐ PRODUCTION

SUB T

STATE TAX | COUNTY / PARISH TAX

TOTAL ESTIMATED CHARGE
ADDITIONAL CHARGES MAY APPLY

TOTAL FIELD HRS./CREW	4 1/2 hrs	TOTAL STANDBY HRS.	
TOTAL FIELD HRS./EQUIP.	4 1/2 hrs	TOTAL LOST TIME	
TOTAL OPR. HRS.	3 1/4 hrs	TOTAL TRAVEL TIME	1 1/4 hrs

PRINTS	RECIPIENTS INITIALS	FILM	TAPES	PRINTS
FIELD PRINTS: 10	RECEIVED AT WELL: 10			

	TOTAL TIME	OPER. TIME	ALLOW. TIME	CHG. TIME
EQUIP				
CREW				

WITNESSED BY (PRINT) Jim Rae

DISTRICT MANAGER (INITIALS) | ACCT. (INITIALS)

FLUID LEVEL	DEVIATION	SURF PRESS	BHT	NO. TRIPS
Full	0.4	0	75 Est	2

GUN SIZE AND TYPE | NO. OF GUNS | TOTAL SHOTS FIRED

RUN NO.	LENGTH	INTER. PERFORATED	SHOTS PER FT.	SHOTS FIRED

THE SERVICE(S) AND/OR EQUIPMENT COVERED BY THIS SERVICE ORDER HAVE BEEN PERFORMED OR RECEIVED

Signature of Customer or Authorized Representative: Jim Rae

Signature of Computalog Engineer: Kevin Howe

REV. 11/95

CUSTOMER INVOICE

105-2144D

20647

46502

DATE	10-13-01
SALES / STN NO.	3321
SERVICE ORDER NUMBER	52005
PAGE	1 OF 1
SERVICES ORDERED:	Swab
01	Perf
	Pressure Control

COMPUTALOG

Wellbore knowledge and solutions

COMPUTALOG WIRELINE SERVICES
HOME OFFICE: 500 WINSCOTT RD.
FT. WORTH, TEXAS 76126
PHONE 817-249-7200 FAX 817-249-7275

ENGINEER	DeVries Kenton
CREW	Peterson Robert 21171
CREW	Rossbenn 49980
CREW	
SALESMAN	Martin O'Neil
PRICE SCHEDULE	

The undersigned, hereinafter referred to as "Customer", agrees to pay to Computalog Wireline Services ("Computalog") for the service(s) specified below (including leased equipment) and any additional service(s) requested, in the currency of the United States of America, at the offices of Computalog at 500 Winscott Rd., Ft. Worth, Texas 76126, in accordance with the applicable provisions of Computalog's current price schedule. In consideration of the prices set out in Computalog's current price schedule, Customer elects to be bound by the terms and conditions set out on the reverse side hereof, including the assumption by Customer of the liabilities and responsibilities contained in the Indemnity, hold harmless and exculpatory clauses, rather than enter into a separate contract and furnish Computalog with insurance coverage against the liabilities herein assumed by customer. If this document is executed by an agent on behalf of customer, said agent represents that he has full authority from his principal, the Customer, to execute the same. In the absence of such authority, the party executing this document agrees that he shall be obligated hereunder as Customer. All amounts are subject to final Accounts Receivable Computer System verification.

CUSTOMER AUTHORIZATION _____

COMPANY Fidelity G+P CUSTOMER # 20277

BILL TO (IF OTHER THAN ABOVE) _____

ADDRESS _____

CITY _____ STATE _____ ZIP CODE _____

P.O. # _____ AFE # _____ CONTRACT # _____

WELL INFORMATION

WELL NAME: WBI 1130 / 21-31N-36E FIELD: Bowdoin Dome

COUNTY/PARISH: Valley STATE: MT RIG NAME: Mast PRICE ZONE: Land

LOG MEASURED FROM KB, 10.0 FEET ABOVE PERMANENT DATUM

UNIT NUMBER 4698 STATION NAME/NO. 3321 - Billings MT ACTUAL ROUND TRIP DISTANCE FROM STATION MILES DISTANCE CHARGED MILES FROM

RUN NO		DATE	TIME	TIME ELAPSED	LOST TIME /GROUP	SERVICE
	TIME SET BY CLIENT	10-13				
	LEFT SHOP					
	ARV DOCK EQUIP					
	ARV DOCK CREW					
	ARRIVE LOCATION		0945			
	BEGIN RIG-UP		0945	—		
	FINISH RIG-UP		1000	0.25		
1	BEGIN OPERATION		1000	0.5		Swab
	FINISH OPERATION		1030			
2	BEGIN OPERATION		1030	0.25		Perf
	FINISH OPERATION		1045			
3	BEGIN OPERATION					
	FINISH OPERATION					
4	BEGIN OPERATION					
	FINISH OPERATION					
5	BEGIN OPERATION					
	FINISH OPERATION					
6	BEGIN OPERATION					
	FINISH OPERATION					
7	BEGIN OPERATION					
	FINISH OPERATION					
8	BEGIN OPERATION					
	FINISH OPERATION					
9	BEGIN OPERATION					
	FINISH OPERATION					
	BEGIN RIG-DOWN		1045	—		
	FINISH RIG-DOWN		1100	0.25		
	LEAVE LOCATION		1100	—		
	ARV. DOCK EQUIP.					
	ARV. DOCK CREW					
	RETURN TO SHOP					

CODE	DESCRIPTION	QTY	BOOK UNIT PRICE	FIELD AMOUNT
1000.10	Service Charge	1		
1006.10	Mast	1		
1011.01	Pressure Control	1		
1100.11	Swab	820		
1231.00	Perf - Depth	772		
1231.01	Perf - Shots 3 1/8" 126gm	40		
	Book Price			
1999.9	Discount			
	Gth Field Total			

OCT 2001 Received Board of Oil & Gas Cons. State of MT / Billings

TYPE OF WELL ☒ NEW ☐ WORKOVER ☐ PRODUCTION

SUB TC

STATE TAX COUNTY / PARISH TAX

TOTAL ESTIMATED CHARGE
ADDITIONAL CHARGES MAY APPLY

TOTAL FIELD HRS /CREW	1.25	TOTAL STANDBY HRS.	0
TOTAL FIELD HRS /EQUIP	1.25	TOTAL LOST TIME	0
TOTAL OPR HRS	1.25	TOTAL TRAVEL TIME	0

PRINTS	RECIPIENTS INITIALS	FILM	TAPES	PRINTS
FIELD PRINTS	RECEIVED AT WELL			

	TOTAL TIME	OPER. TIME	ALLOW. TIME	CHG. TIME
EQUIP				
CREW				

WITNESSED BY (PRINT) JD Benson

DISTRICT MANAGER (INITIALS) ACCT (INITIALS)

FLUID LEVEL	DEVIATION	SURF PRESS	BHT	NO. TRIPS
0/820	NA	0	NA	1 / 3

GUN SIZE AND TYPE 3 1/8 HSC NO. OF GUNS 1 TOTAL SHOTS FIRED 40

RUN NO.	LENGTH	INTER. PERFORATED	SHOTS PER FT.	# SHOTS FIRED
	10	762-772	4	40

THE SERVICE(S) AND/OR EQUIPMENT COVERED BY THIS SERVICE ORDER HAVE BEEN PERFORMED OR RECEIVED

Signature of Customer or Authorized Representative

Signature of Computalog Engineer

REV. 11/95

CUSTOMER INVOICE

105-21440