

PMESD-409128759  
Sup: 4-19-2004



P.O. Box 3128  
Houston, TX 77253-3128  
Telephone 713/629-6600

RECEIVED

March 22, 2004

MAR 29 2004

Mr. Richard Ezeanyim  
Oil Conservation Division OIL CONSERVATION  
1220 South Saint Francis Drive DIVISION  
Santa Fe, New Mexico 87504

**RE: Amendment to Administrative Order NSL-4750 (BHL) (SD)  
Indian Hills Unit Well No. 45 (API No. 30-015-32338) Horizontal Re-Entry  
806' FNL & 1,010' FEL, Sec. 28, Township 21 South, Range 24 East (SHL),  
339' FSL & 1,148' FEL, Sec. 21, Township 21 South, Range 24 East (BHL)  
Indian Basin Upper Pennsylvanian Associated Pool**

Dear Mr. Ezeanyim,

By means of this application, Marathon respectfully requests to amend the previously approved non-standard location application for the Indian Hills Unit Well No. 45. This well has a surface location of 806' FNL & 1,010' FEL, Section 28, Township 21 South, Range 24 East. Marathon requests this amendment in order to re-enter the existing Indian Hills Unit Well No. 45, and horizontally drill to an orthodox location in the Upper Pennsylvanian formation, with a new final bottom hole location of 2,084' FSL & 785' FEL, Section 21, Township 21 South, Range 24 East, and shall remain dedicated to the standard spacing unit consisting of the east half of Section 21.

Marathon proposes to horizontally sidetrack the Indian Hills Unit Well No. 45 in the "Indian Basin Upper Pennsylvanian Associated Pool" as promulgated by the New Mexico Oil Conservation Division Order Nos. R-9922, R-9922-A, R-9922-B, R-9922-C, and R-9922-D and the general rules for the Associated Gas Pools of Southeast New Mexico as promulgated by Division Order No. R-5533. These rules require wells to be located no closer than 660 feet to the outer boundary of the proration/spacing unit and no closer than 330 feet to the governmental quarter/quarter section line. The proposed Indian Hills Unit Well No. 45 horizontal is unorthodox because the heel section of the lateral will be within the 660 foot setback from the southern outer boundary of the proposed 320-acre "stand-up" gas proration unit dedicated to the east half of Section 21. Based on the proposed directional plan, it is expected that the Upper Pennsylvanian formation will be penetrated along the interval from the kick-off point at 119' FSL & 1,080' FEL in Section 21, through to the anticipated end of the lateral section at 2,084' FSL & 785' FEL in Section 21 (please see Attachment #1 - Well Location and Acreage Dedication Plat, Attachment #2 - Location Verification Map, and Attachment #3 - Directional Plat supplied by Baker Inteq, Marathon's proposed directional drilling company for the well). In summary, this amendment application requests approval to produce from the non-standard lateral section between the kick-off point, and the 660 foot setback from the southern outer boundary of Section 21.

In support of this application, specific details will be provided for the proposed unorthodox location. These details will include a brief Indian Hills Unit Well No. 45 history, the proration units related to the proposed well work, how the well (and specifically horizontal technology) fits into Marathon's reservoir management plan, and why the proposed location is geologically superior to a standard location in Section 21.

#### **Well History and Directional Plan:**

The Indian Hills Unit Well No. 45 was directionally drilled in July, 2002, to a total depth of 8,230' MD. The well was completed in the Upper Pennsylvanian formation and placed on production. Marathon has evaluated the option to temporarily abandon the well due to uneconomic production rates, but believes that a horizontal sidetrack would help to best deplete the reservoir.

Marathon's proposed plan is to first squeeze off the existing Upper Pennsylvanian formation perforations and set a whip-stock to kick-off at 7,550' MD. Assuming favorable hole conditions, it is anticipated that the wellbore will be drilled horizontally for approximately 1,960' from the kick-off point.

#### **Proration Unit:**

Currently, the Indian Hills Unit Well No. 45 is dedicated to the existing standard 298.02 acre spacing consisting of the east half of Section 21, Township 21 South, Range 24 East. The proposed lateral will remain within this same proration unit. Further, there are presently three other wells, the Indian Hills Unit Well No. 24 (API No. 30-015-31266), the Indian Hills Unit Well No. 28 (API No. 30-015-31267), and the Indian Hills Unit Well No. 41 (API No. 30-015-32539), that also produce from this proration unit.

The Indian Hills Unit is operated by Marathon Oil Company. Marathon has a 99.54544% working interest and Nearburg Exploration has a 0.45456% working interest. The ownership of this proration unit is identical to Section 28 which offsets to the south the proposed unorthodox location in the Upper Pennsylvanian formation.

#### **Geologic Issues:**

The Indian Basin Upper Pennsylvanian Associated Pool is predominantly composed of dolomite and limestone sequences. With current technology, only the fractured, vuggy dolomite sequences have proven productive and economic. The proposed lateral in Indian Hills Unit Well No. 45 is an attempt to further develop the eastern extent of the oil bearing dolomite horizons within the Indian Hills Unit (please see Attachment #4 - Upper Pennsylvanian Structure map) by connecting the wellbore with more of the productive fractured, vuggy reservoir. Further, based on Formation Micro Imager open hole logs of analogous wells, it is believed that the Indian Hills Unit Well No. 45 vertical wellbore failed to most efficiently connect to a fracture network in the oil leg of the Upper Pennsylvanian formation. This data is supported by the relatively high current oil production rates in offset wells.

Marathon has two geologic goals in drilling the proposed lateral. The first is to increase connectivity to the fracture network in the oil leg. A horizontal wellbore will provide this by greatly increasing the amount of reservoir exposed by the wellbore. The second goal of the proposed lateral is to expose the wellbore to potentially heterogeneous layers of the oil column. Marathon suspects that there may be oil bearing porosity developments within the dolomite sequences that are poorly connected to the existing vertical and deviated wellbores due to the discontinuous porosity and permeability in some areas of the Upper Pennsylvanian formation. A cross section between Indian Hills Unit Well No. 24, the Indian Hills Unit Well No. 45, and the Lowe Staple 'AMF' No. 1 (API No. 30-015-10040) has been included to help illustrate this variability between two wells that are only 80 acres apart (please see Attachment #5).

#### **Reservoir Management Plan:**

Over the last two years, Marathon has focused on developing the oil potential of the Upper Pennsylvanian formation in the Indian Hills Unit. This has been accomplished primarily by infilling the well density to 80-acres in prospective oil areas. Marathon is now looking at horizontal well technology as a method to improve oil recoveries from poorly drained areas of the reservoir. Recently completed directional wellbores have confirmed strong oil potential in the eastern portion of the Indian Hills Unit. The terminus of the proposed lateral is targeted to improve drainage from an area along the eastern region of the Unit that Marathon believes is not being effectively drained by the existing wellbores.

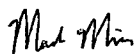
It is Marathon's belief that the proposed unorthodox location represents a superior location in regards to both reservoir drainage and geologic risk. Firstly, the proposed azimuth for the wellbore will maximize the distance between the lateral and the existing wells thereby minimizing potential for well-to-well interference. Secondly, by extending the lateral to the proposed unorthodox terminus location, additional reservoir rock will be exposed to the wellbore, hence increasing the likelihood to encounter fractures and productive dolomite, and ultimately increasing reserves recovery.

#### **Notifications:**

It is Marathon's understanding that because the gas spacing unit to which the Indian Hills Unit Well No. 45 is unorthodox is identical in ownership to that of the proposed, standard, 320-acre gas spacing unit, no waivers or notifications are required.

Should you have any questions/comments/concerns, please contact me at (713) 296-1921.

Respectfully,



Mark Mick  
Operations Engineer  
Indian Basin Asset Team  
Marathon Oil Company

DISTRICT I  
P.O. Box 1980, Hobbs, NM 88241-1980

DISTRICT II  
P.O. Drawer DD, Artesia, NM 88211-0719

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

DISTRICT IV  
P.O. BOX 2088, SANTA FE, N.M. 87504-2088

State of New Mexico  
Energy, Minerals and Natural Resources Department

OIL CONSERVATION DIVISION  
P.O. Box 2088  
Santa Fe, New Mexico 87504-2088

ATTACHMENT #1  
Form C-102  
Revised February 10, 1994  
Submit to Appropriate District Office  
State Lease - 4 Copies  
Fee Lease - 3 Copies

WELL LOCATION AND ACREAGE DEDICATION PLAT

☐ AMENDED REPORT

API Number	Pool Code	Pool Name
	78960	Indian Basin Morrow Gas Pool
Property Code	Property Name	Well Number
	INDIAN HILLS UNIT	45
OGRID No.	Operator Name	Elevation
14021	MARATHON OIL COMPANY	3654'

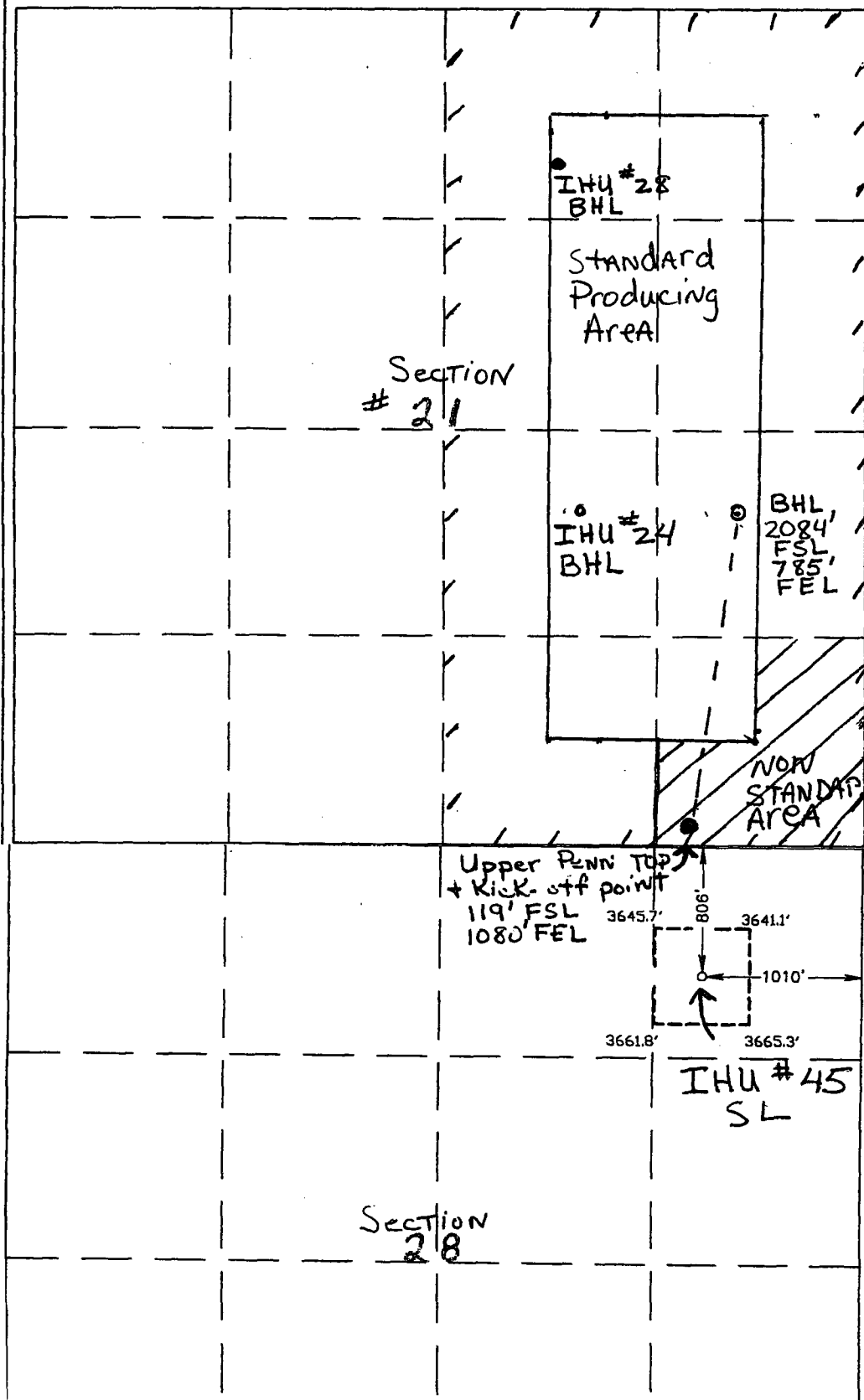
Surface Location

UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
A	28	21-S	24-E		806	NORTH	1010	EAST	EDDY

Bottom Hole Location If Different From Surface

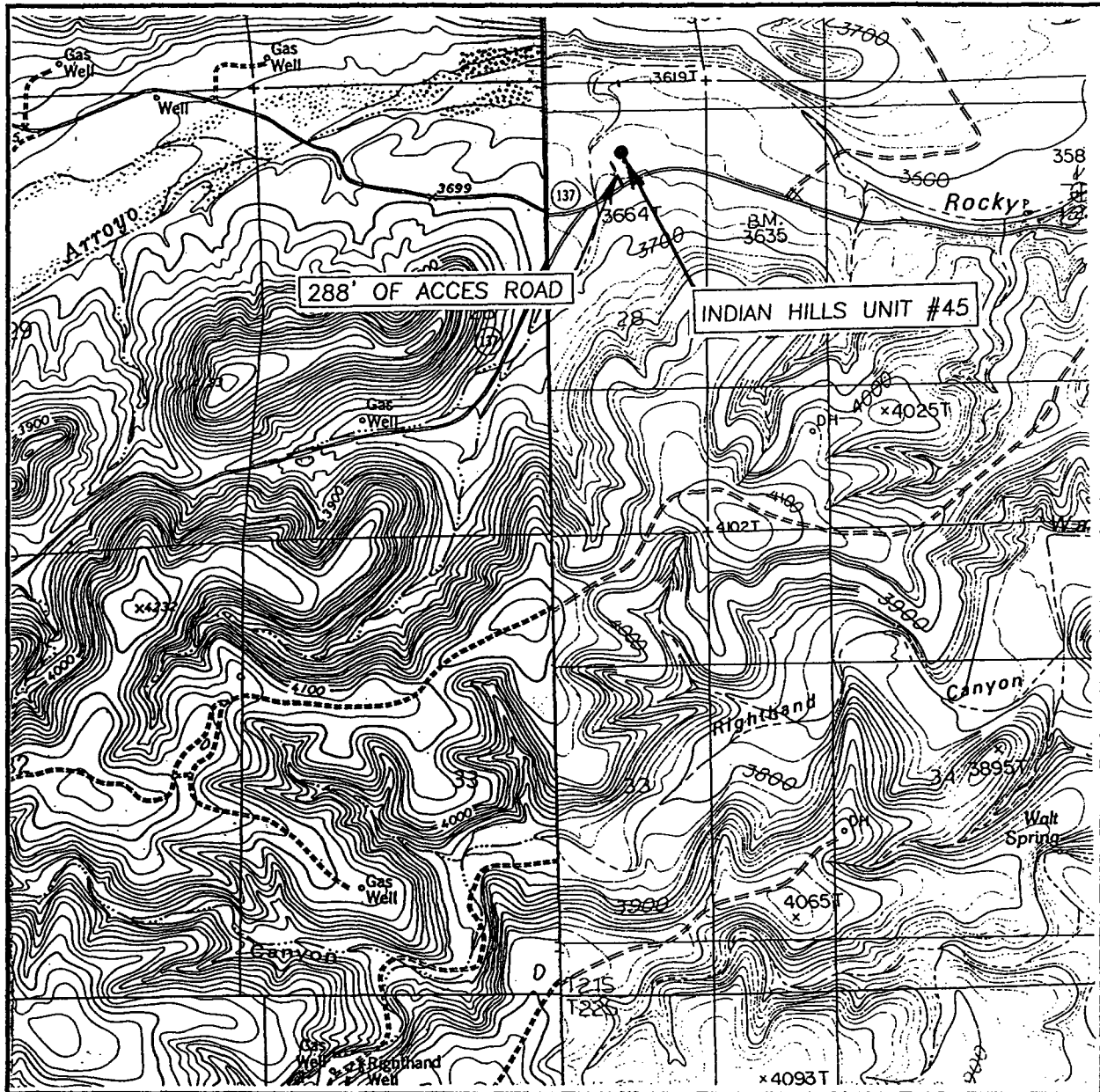
UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
I	21	21-S	24-E		2084'	South	785'	EAST	EDDY
Dedicated Acres	Joint or Infill	Consolidation Code	Order No.						
320 E/2									

NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED  
OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION



<b>OPERATOR CERTIFICATION</b>  I hereby certify the the information contained herein is true and complete to the best of my knowledge and belief.  Mike Mick Signature MIKE MICK Printed Name Engineer Tech. Title 3-24-04 Date
<b>SURVEYOR CERTIFICATION</b>  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.  JANUARY 29, 2002 Date Surveyed AWB Signature & Seal of Professional Surveyor RONALD J. EIDSON 02.11.0080 Certificate No. RONALD J. EIDSON 3239 GARY EIDSON 12641
<b>OPERATOR CERTIFICATION</b>  I hereby certify the the information contained herein is true and complete to the best of my knowledge and belief.  Signature Printed Name Title Date
<b>SURVEYOR CERTIFICATION</b>  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.

# LOCATION VERIFICATION MAP



SCALE: 1" = 2000'

CONTOUR INTERVAL: 20'  
AZOTEA PEAK, N.M.

SEC. 28 TWP. 21-S RGE. 24-E

SURVEY N.M.P.M.

COUNTY EDDY

DESCRIPTION 806' FNL 1010' FEL

ELEVATION 3654'

OPERATOR MARATHON OIL COMPANY

LEASE INDIAN HILLS UNIT

U.S.G.S. TOPOGRAPHIC MAP  
AZOTEA PEAK, N.M.

JOHN WEST SURVEYING  
HOBBS, NEW MEXICO  
(505) 393-3117



BAKER  
HUGHES  
INTEQ

# Marathon Oil Company

Structure : INDIAN HILLS UNIT 45

Slot : slot #1

Field : INDIAN BASIN

Location : Eddy County New Mexico

Created by: dmf

Date plotted : 22-Mar-2004

Plot Reference is ST P2.

Coordinates are in feet reference slot #1.

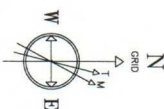
True Vertical Depths are reference rotary table.

45sep2

--- Baker Hughes INTEQ ---

## WELL PROFILE DATA

Point	MD	Inc	Dir	TVD	North	East	V. Sect	Deg/100
KOP	7550.00	14.71	354.40	7418.26	924.25	-106.77	927.74	0.00
Target End of Build	8046.09	90.00	0.00	7700.00	1289.18	-113.99	1292.67	15.19
T.D. & Target BHL	9646.00	90.00	360.00	7700.00	2889.09	-113.99	2891.34	0.00



17-Mar-2004 (source: BCGM 2003)  
Magnetic North is 8.55 deg East of True North  
GRID North is 0.08 degrees West of True North  
To correct azimuth from True to GRID add 0.09 deg  
To correct azimuth from Magnetic to GRID add 8.55 deg

### STRUCTURE SET-UP REFERENCE

LAT : 32 27 19.812 N

LONG : 104 29 49.800 W

X = 449465.200 Y = 529464.400

PROJECTION: MERCATOR

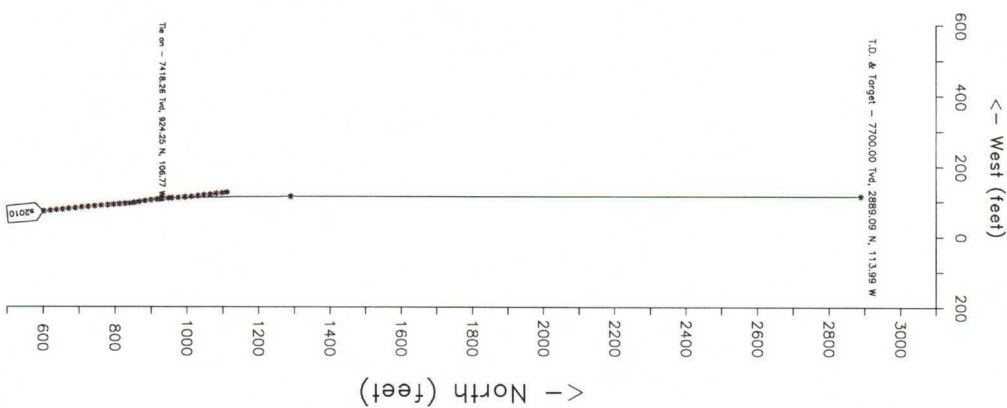
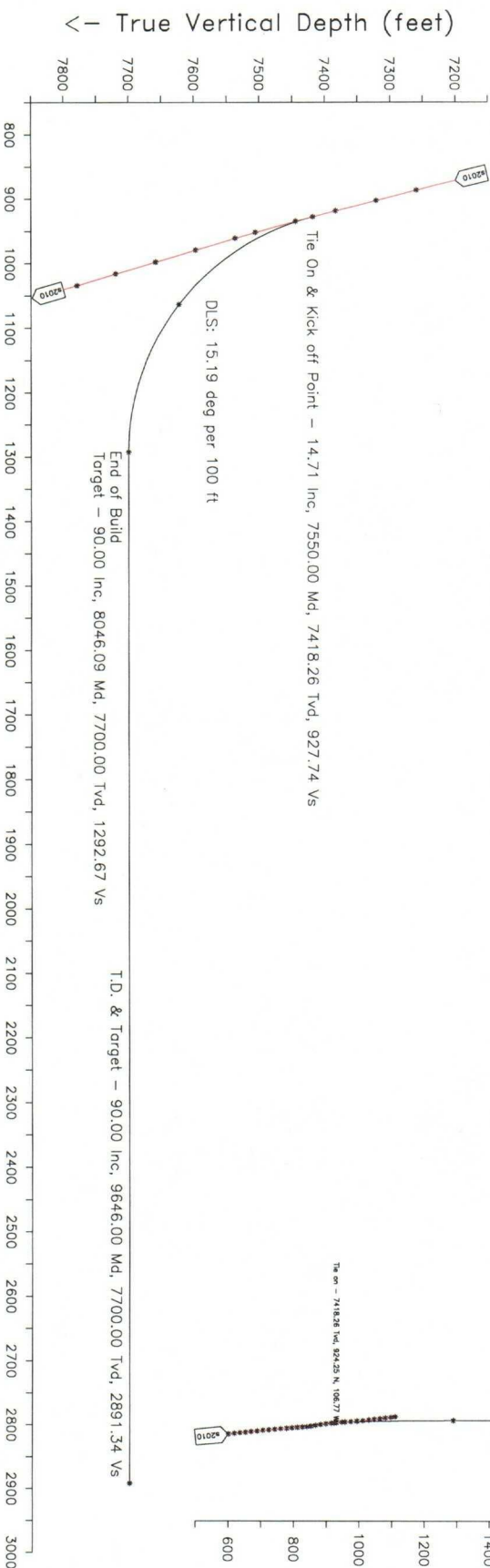
Mercator Zone: New Mexico East

Spheroid Used: Clarke = 1866

Data Source: BCGM

Dip Angle: 60.44 deg

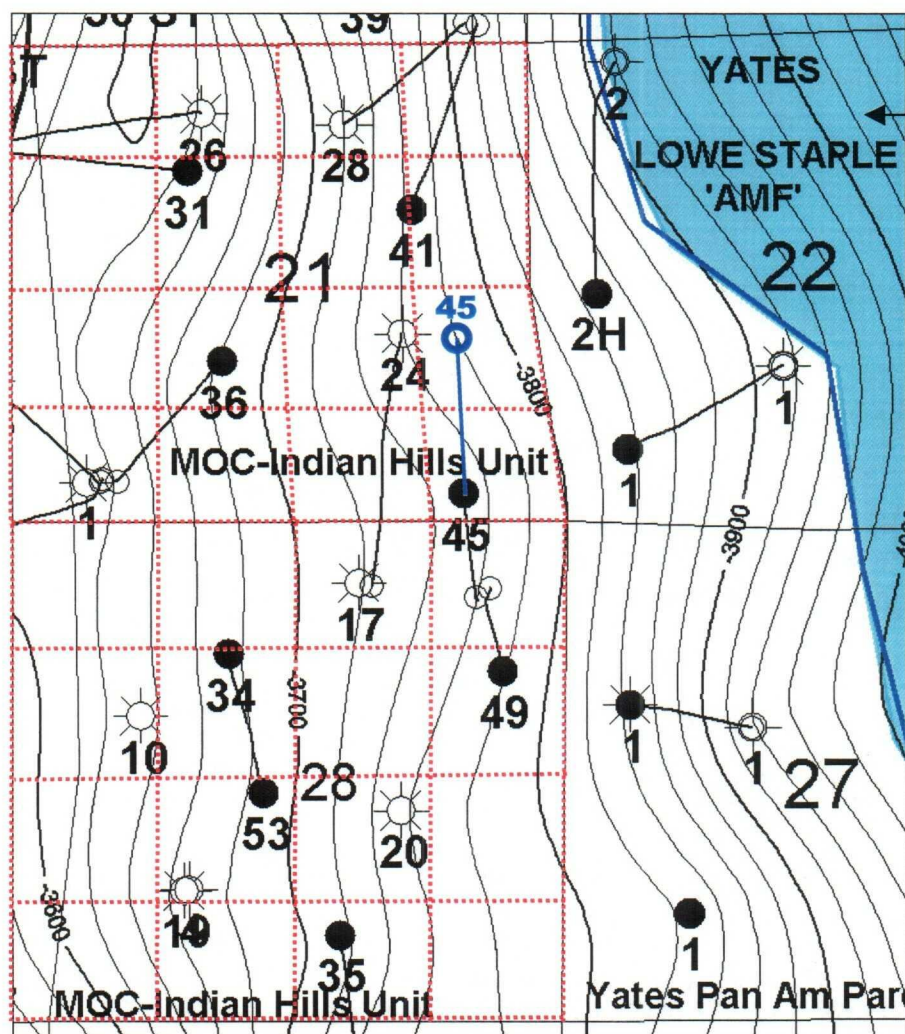
Field Strength: 49480.00 nT



Azimuth 357.74 with reference 0.00 N, 0.00 E from slot #1



# STRUCTURAL ELEVATION, TOP OF UPPER PENNSYLVANIAN AND PROPOSED IHU #45 LOCATION





# Indian Hills Unit #45 Pre-Drill Assessment

## Structural Cross Section

(hung on OWC @ -4100' elevation)

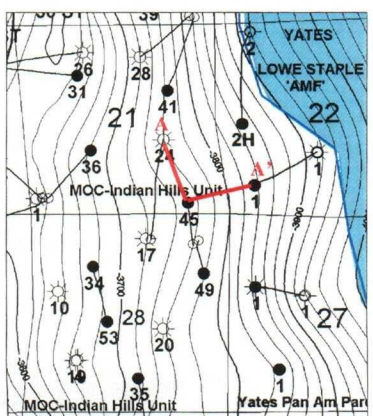
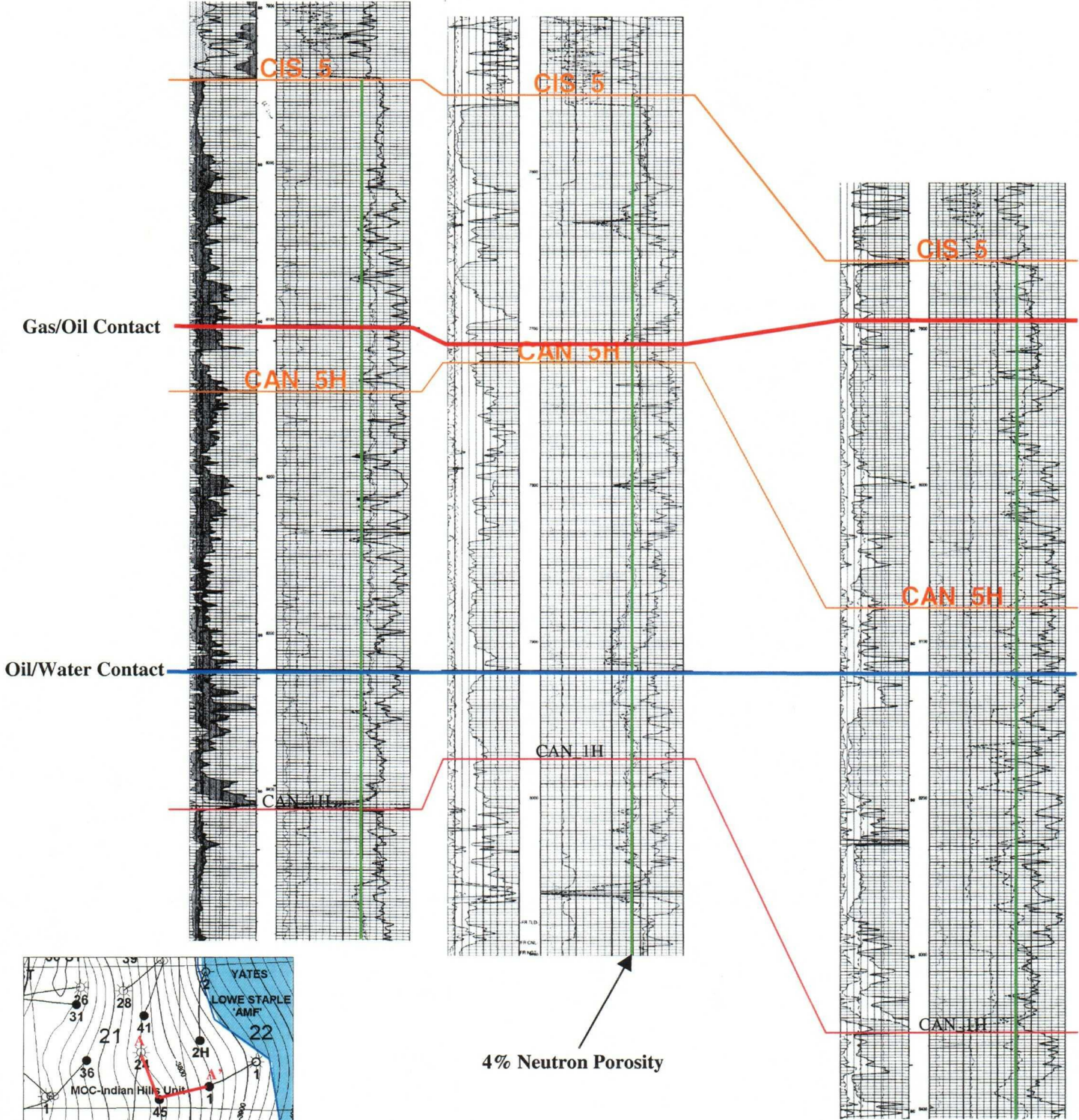
A

30015312660000  
Marathon Oil Company  
Indian Hills Unit #24

30015323380000  
Marathon Oil Company  
Indian Hills Unit #45

30015100400100  
Yates Petroleum Corp.  
Lowe Staple 'AMR' Fed #1

A'





## **Stogner, Michael**

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**From:** Stogner, Michael  
**Sent:** Friday, April 23, 2004 1:45 PM  
**To:** Mark Mick (E-mail)  
**Subject:** Indian Hills Unit #45

I am now processing a non-standard location order for your application filed on March 29th. From your application the proposed directional plan anticipates the Upper Pennsylvanian formation will be penetrated at a sub-surface location 119' FSL & 1080' FEL of Section 21.

At what depth is this expected to occur?

**Stogner, Michael**

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**From:** Mick, Mark S. [msmick@marathonoil.com]**Sent:** Friday, April 23, 2004 2:43 PM**To:** Stogner, Michael**Subject:** RE: Indian Hills Unit #45

Mr. Stogner,

In response to your e-mailed question regarding Marathon's non-standard location application for the horizontal Indian Hills Unit #45 well, I have provided the penetration depths. As you mentioned, we anticipate the Upper Pennsylvanian formation to be penetrated at a sub-surface location 119' FSL & 1,080' FEL of Section 21. This corresponds to the following approximate depths:

- -3,750' SSTVD
- 7,700' TVD
- 8,954' MD

As you know, because we are planning to drill this well as a horizontal, the MD footage will be higher than our "typical" Upper Penn. wells. I hope this provides you with the information you need, but if not please do not hesitate to let me know.

Thank you very much,

Mark Mick

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**Mark S. Mick****Operations Engineer**

Indian Basin Asset Team

Marathon Oil Company

Office: (713) 296-1921

Cell: (713) 408-2247

Fax: (713) 296-4441

[msmick@marathonoil.com](mailto:msmick@marathonoil.com)

-----Original Message-----

**From:** Stogner, Michael [mailto:MSTOGNER@state.nm.us]**Sent:** Friday, April 23, 2004 2:45 PM**To:** Mick, Mark S.**Subject:** Indian Hills Unit #45

I am now processing a non-standard location order for your application filed on March 29th. From your application the proposed directional plan anticipates the Upper Pennsylvanian formation will be penetrated at a sub-surface location 119' FSL & 1080' FEL of Section 21.

At what depth is this expected to occur?

4/23/2004