Marathon **Oil Company**

5555 San Felipe
Houston, TX 77056
P. O. Box 3128
Houston, TX 77253-3128
Telephone 713-629-6600

October 31, 2006

Karlene Fine, Executive Director
North Dakota Industrial Commission
State Capitol—14th Floor
600 East Blvd. Ave. Dept 405
Bismarck, ND 58505-0840

Dear Ms. Fine:

Please find attached to this letter a grant application from Marathon Oil Company to the North Dakota Oil and Gas Research Council requesting $150,000 of matching funds to conduct a Vertical Seismic Profile in a newly drilled Bakken horizontal well in North Dakota (total cost $300,000). The purpose of this study is to test and further understand the ability to detect fracture systems and small faults in the Bakken by seismic methods. This knowledge will allow optimization of the wellbore azimuth of future horizontal wells and can enhance overall Bakken well economic success rate.

This letter shall form a binding commitment on behalf of Marathon Oil Company to complete a Vertical Seismic Profile study of Bakken seismic fracture/fault test if the Industrial Commission makes the grant requested.

Sincerely,

David L. Brimberry
Bakken Project Subsurface Manager

Vertical Seismic Profiling Test

of Seismic Fault and Fracture Detection

in the Bakken Formation

A Grant Application in the Amount of $150,000

To the

North Dakota Oil and Gas Research Council

Made by

Marathon Oil Company

5555 San Felipe Road

Houston, Texas 77056-2725

October 31, 2006

Principal Investigators
Chuck Meeder, Senior Technical Consultant, Marathon Oil Company
Chris Tuttle, Advanced Senior Geophysicist, Marathon Oil Company

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Abstract

Section 1.0—Abstract

One of the significant unknowns in the current development of the Middle Bakken horizontal play is the preferred fracture orientation, which is determined by the current minimum and maximum horizontal stresses in the Bakken. Understanding fracture orientation is critical in planning the optimum direction to drill the wellbore and identifying the best well locations. A wellbore may be drilled parallel to the fracture orientation in order to create a single, longitudinal conductive fracture along its entire length. Alternatively, a wellbore can be drilled perpendicular to the fracture orientation in order to intercept as many existing natural fractures as possible. However, understanding fracture orientation is critical to implementing or evaluating either design. Additionally, identifying fault locations with seismic can help steer the lateral and control drilling costs by staying in zone.

This grant requests funds to conduct a Vertical Seismic Profile (VSP) in one of Marathon's wells in Dunn County, North Dakota. A VSP study consists of recording seismic data in the vertical portion of the well from the Bakken level up to thousands of feet uphole. The seismic signal is generated by a surface seismic source (Vibroseis) at one or more locations above the lateral portion of the well. The high resolution seismic image can be correlated to observations in the well and demonstrate the detectability of fractures and faults by the seismic method. This VSP data, along with other well data, will provide the basis for testing the viability of using 3D seismic for fracture and fault detection in the Bakken. As described above, this information will allow for better well designs, which will enhance the economic viability of the Bakken play.

The VSPs will be acquired in one day after other well logs are run. Preliminary data analysis will take two weeks, but integration with other well data, and complete analysis will take 3 months. Marathon will participate in the study as the operator, and Schlumberger will be the contractor. The total project cost is estimated to be $300,000.

Section 2.0—Project Description

The objective of this study is to acquire and analyze VSP data in one of Marathon's wells in Dunn County, North Dakota for 1) accurate time-depth data to tie surface seismic to the well, 2) testing seismic for small fault and fracture detection calibrated by well observations, 3) testing and verification of applications of 3D seismic to improve efficiency of drilling and development of the Bakken shale reserves. The Klatt 31-14H is currently the candidate well, but may change as detailed planning continues. The information gathered in this study will be applicable to wells in the area regardless of which well it is gathered from.

After the well is drilled and wireline logs obtained, the VSPs will be recorded with seismic sources at two surface locations. (Figure 1) Data will be recorded by three component seismic sensors at 50 ft intervals in the vertical portion of the well from near the top of the Bakken to about 2500 ft depth.

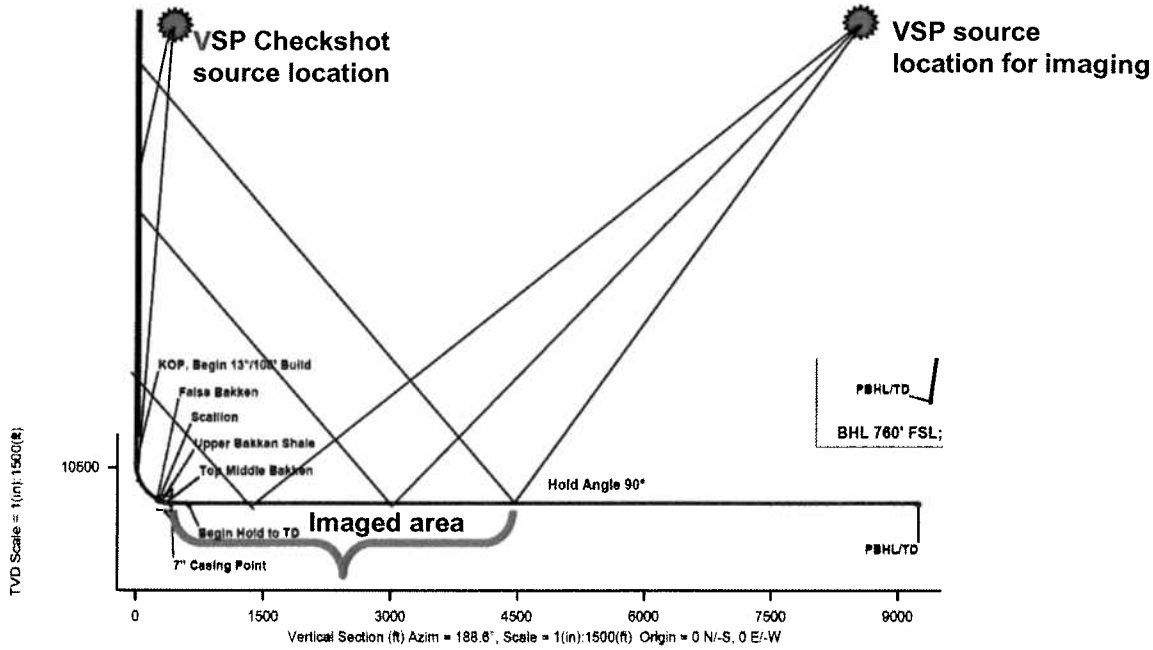

Figure 1: Representation of USP acquisition set up.

The VSP data will be processed and analyzed to provide a high resolution image along the lateral well path as illustrated above. Due to this seismic data acquisition geometry with sensors in the quiet well bore environment, the VSP data can usually resolve objects about half the size of those detectable from surface seismic. Therefore it is a good tool for testing seismic detection limits, correlating seismic to well observations, and calibrating surface seismic.

A better understanding of applications of seismic data for effective drilling and development is the primary result of this study. If fracture zones and minor, as well as major, faults be detected and mapped with 3D seismic drilling can be optimized. Orientation of faults and fractures is important because it is a major component in the optimal direction of the horizontal wellbore. Fault and fracture pattern orientations are known to vary throughout the area. Seismic imaging could help understand that pattern and optimize lateral well orientation and avoid coming out of zone due to faulting.

If the fracture orientation is not known, it is difficult or impossible to optimize the production of the well. However, with this grant, Marathon, and subsequently other operators in the Bakken horizontal play, will be able to determine fracture orientation, which will allow for optimization in wellbore direction.

Marathon will utilize Schlumberger as a contractor to provide the VSP equipment, field operations, and data processing for this project.

In summary, this study will advance several of the purposes of the Oil and Gas Research Council. It will add to the pool of Bakken knowledge that will benefit operators as well as the state and people of North Dakota in several ways, including identifying oil and gas exploration technologies not presently used widely for this play, enhanced oil and gas production rates, increased ultimate well recovery, enhanced well economics, and increased viability of the Bakken horizontal play. These things will result in increased tax revenues, and ultimately can result in the creation of oil and gas jobs and wealth for the state of North Dakota.

Section 3.0—Standards of Success

There are two levels of success that will be measured in this project. The first will be to acquire and analyze the VSP data necessary to image the Bakken formations. If the fracture zones, and small faults can be detected and correlated with other well data, this level will be considered successful. The second level of success will be if this information can be used by Marathon (and, once it is released to the public, other operators) to acquire and use 3D seismic data to improve well placement and orientation, and achieve higher economic drilling success rates and ultimate oil and gas recoveries.

It is the application of the knowledge gained through this grant that will provide value to the state of North Dakota through tax revenue, job growth, and other potential benefits of increased oil and gas production in the Bakken play.

Section 4.0—Background/Qualifications

Marathon Oil Corporation (marathon.com) is engaged in the worldwide exploration and production of crude oil and natural gas, as well as the domestic refining, marketing and transportation of petroleum products. Marathon is among the leading energy industry players, applying innovative technologies to discover valuable energy resources and deliver the highest quality products to the marketplace. Marathon is the 4th largest US-based integrated oil and gas company, and has actively drilled for and produced oil and gas since its founding in Ohio since 1887.

Chuck Meeder has 26 years of experience with Marathon and has been involved with seismic and VSP acquisition, processing, and analysis around the world. He is currently a Senior Technical Consultant working in the Seismic and System Services section of Marathon's Technology Services Group.

Chris Tuttle has 22 years of experience with Marathon and has been involved in seismic data processing, synthetic seismograms, seismic inversion, and calibrating seismic data to well data in numerous basins around the world. He is currently an Advanced Senior Geophysicist in the Reservoir Characterization section of Marathon's Technology Services group and has been involved with the Bakken since Marathon began drilling operations in North Dakota in 2006.

Section 5.0—Management

Key milestones in the project will be as follows (not necessarily being completed consecutively—some work can be completed in parallel): 1) Approval of grant from OGRC and authorization for work to begin, 2) Completion of VSP survey design, 3) Completion of agreements with surface landowners and subsurface mineral interest for seismic source locations, 4) End of drilling of well and wirleine logging, 5) recording of the borehole seismic data, 6) Processing of the VSP data and 7) correlation of the VSP results to the well logs.

This project will be managed through consistent communication between the principal investigators, other Marathon employees, and Schlumberger, the primary contractor. Upon authorization of the project, a specific timeline will be created for the various milestones based on the anticipated date of drilling the well. This timeline will be reviewed for progress and updating, if necessary, on a frequent basis. The date of the data acquisition will be set as it becomes more apparent when exactly the well will finish drilling. The field operation is currently estimated to occur sometime near February 7. The project timetable will be based on this date.

Section 6.0—Timetable

November 1, 2006—Detailed design of VSP data acquisition

December 1, 2006—Project Authorization from Marathon and NDOGRC

December 1, 2006—Begin obtaining agreements with surface owners for seismic source point locations

January 1, 2007—Klatt 31-14H spuds

February 1, 2007—Drilling completed and logging program begins.

February 7, 2007 – Vertical Seismic Profiles recording

March 1,2007 - Preliminary processing and analysis complete

May 1, 2007—Data Analysis Complete

Section 7.0—Budget

VSP recording ……..,$200,000

VSP processing……..$ 50,000

Rig Time (18-24 hours)……$ 75,000

Total……..$300,000

Section 8.0—Tax Liability

Affidavits from Marathon's Tax Organization are attached.

Section 9.0—Confidential Information

Marathon requests that the results and interpretations of the results remain confidential for a period of 1 year following the release of the "Data Analysis Complete" date to protect marathon's business interest.

Section 10.0—Patents and Rights to Technical Data

None

Section 11.0—Appendices

None

Check No	Check Date	Bank	Bank No	Vendor No	Marathon Oil Company P. O. Box 22164 Tulsa, OK 74121-2164	Direct Inquiries to: ACCOUNTS PAYABLE DEPARTMENT Accts Payable Contact Center Phone: 918-925-6097	Hndlg
1243993	10/30/2006	NCBAS	7780	5003155			HS

Invoice Number	Invoice Date	Document No	Remit Comment	Gross Amount	Discount	Invoice/Pay Amount
ST100.00	10/30/2006	1900047587		100.00		100.00
			TOTAL:	100.00		100.00

(FOLD ON PERFORATION BELOW AND DETACH CHECK STUB BEFORE DEPOSITING)

DO NOT CASH UNLESS WARNING BAND AND THE CHECK BACKGROUND ARE IN VIOLET. THE LINE BELOW CONTAINS MICROPRINTING.

FORM 2501 REV. 5/00

7780

ACCOUNTS PAYABLE CHECK

Marathon Oil Company
P. O. Box 22164
Tulsa, OK 74121-2164

56-389/412

CHECK DATE **10/30/2006**

CHECK NUMBER **1243993**

U.S. Funds

VOID AFTER 180 DAYS

PAY TO THE ORDER OF:
STATE OF NORTH DAKOTA
P.O. BOX 5523
BISMARCK, ND 58506-5523

$100.00
ONE ZERO ZERO ZERO ZERO

MATCH AMOUNT IN WORDS WITH NUMBERS

By: James A Ballard
Authorized Representative

NATIONAL CITY BANK
Ashland, Ohio

One hundred and 00/100 Dollars

DO NOT CASH UNLESS THIS CHECK IS ON WATERMARKED PAPER. HOLD TO LIGHT TO VIEW. THE LINE ABOVE CONTAINS MICROPRINTING.

⑈001243993⑈ ⑆041203895⑆ 0183484⑈

AFFIDAVIT REGARDING OUTSTANDING TAX LIABILITY

I, Mary M. Joseph, am employed by Marathon Oil Company as the State Tax Manager. In that capacity, I am responsible for the administration of all state income and franchise taxes for Marathon Oil Corporation. I certify that there are no outstanding state income and franchise taxes owed to the State of North Dakota or any of its political subdivisions.

My signature certifies that all information provided in this affidavit is complete and accurate.

Mary M. Joseph
State Tax Manager

Before me, a Notary Public in and for said state, personally appeared Mary M. Joseph, who being by me duly affirmed deposes and says that she is the State Tax Manager of Marathon Oil Corporation.

Further, affiant sayeth naught.

Mary M. Joseph

Affirmed before me and signed in my presence this 30 day of October, 2006.

ALLICIA ANN HULETT
Notary Public, State of Texas
Commission Expires 07-23-2007

Seal

Allicia Ann Hulett
Name
Notary Public, State of Texas
My commission expires: 7-23-2007

AFFIDAVIT REGARDING OUTSTANDING TAX LIABILITY

I, John A. Fletcher, am employed by Marathon Petroleum Company LLC as the Severance Tax Coordinator. In that capacity, I am responsible for overseeing the administration of all severance taxes through IBM. I certify that there are no outstanding severance taxes owed to the State of North Dakota or any of its political subdivisions. My signature certifies that all information provided in this affidavit is complete and accurate.

John A. Fletcher
Severance Tax Coordinator

Before me, a Notary Public in and for said state, personally appeared John A. Fletcher, who being by me duly affirmed deposes and says that he is the Severance Tax Coordinator of Marathon Petroleum Company LLC.

Further, affiant sayeth naught.

John A. Fletcher

Affirmed before me and signed in my presence this 26th day of October, 2006.

Renee Pochard
Name
Notary Public, State of Ohio
My commission expires: June 29, 2009

Renee Pochard
Notary Public, State of Ohio
My Commission Expires June 29, 2009

Seal

AFFIDAVIT REGARDING OUTSTANDING TAX LIABILITY

I, Kenneth R. Cooksey, am employed by Marathon Petroleum Company LLC as the Property & Severance Tax Manager. In that capacity, I am responsible for the administration of all property taxes for Marathon Oil Corporation. I certify that there are no outstanding property taxes owed to the State of North Dakota or any of its political subdivisions.

My signature certifies that all information provided in this affidavit is complete and accurate.

Kenneth R. Cooksey
Property & Severance Tax Manager

Before me, a Notary Public in and for said state, personally appeared Kenneth R. Cooksey, who being by me duly affirmed deposes and says that he is the Property & Severance Tax Manager of Marathon Petroleum Company LLC.

Further, affiant sayeth naught.

Kenneth R. Cooksey

Affirmed before me and signed in my presence this 26th day of October, 2006.

Renee Pochard
Name
Notary Public, State of Ohio
My commission expires: June 29, 2009

Seal

Renee Pochard
Notary Public, State of Ohio
My Commission Expires June 29, 2009

AFFIDAVIT REGARDING OUTSTANDING TAX LIABILITY

I, Glenn W. Brickman, am employed by Marathon Petroleum Company LLC as the Sales & Use Tax Audit Coordinator. In that capacity, I am responsible for the administration of all sales and use taxes for Marathon Oil Corporation. I certify that there are no outstanding sales and use taxes owed to the State of North Dakota or any of its political subdivisions.

My signature certifies that all information provided in this affidavit is complete and accurate.

Glenn W. Brickman

Glenn W. Brickman
Sales & Use Tax Audit Coordinator

Before me, a Notary Public in and for said state, personally appeared Glenn W. Brickman, who being by me duly affirmed deposes and says that he is the Sales & Use Tax Audit Coordinator of Marathon Petroleum Company LLC.

Further, affiant sayeth naught.

Glenn W. Brickman

Affirmed before me and signed in my presence this 26th day of October, 2006.

Renee Pochard

Name
Notary Public, State of Ohio
My commission expires: June 29, 2009

Seal

Renee Pochard
Notary Public, State of Ohio
My Commission Expires June 29, 2009