



# United States Department of the Interior

BUREAU OF INDIAN AFFAIRS  
Great Plains Regional Office  
115 Fourth Avenue S.E.  
Aberdeen, South Dakota 57401



IN REPLY REFER TO:  
DESCRM  
MC-208

JAN 20 2010

## MEMORANDUM

TO: Superintendent, Fort Berthold Agency

FROM: <sup>ACTING</sup> Regional Director, Great Plains Region

SUBJECT: Environmental Assessment and Finding of No Significant Impact

In compliance with the regulations of the National Environmental Policy Act (NEPA) of 1969, as amended, for the proposed *Addendum to Questar Environmental Assessment dated November 2008* on the Fort Berthold Reservation, an Environmental Assessment (EA) Addendum has been completed and a Finding of No Significant Impact (FONSI) has been issued.

All the necessary requirements of the National Environmental Policy Act have been completed. Attached for your files is a copy of the EA Addendum, FONSI and Notice of Availability. The Council on Environmental Quality (CEQ) regulations requires that there be a public notice of availability of the FONSI (1506.6(b)). Please post the attached notice of availability at the agency and tribal buildings for 30 days.

If you have any questions, please call Marilyn Bercier, Regional Environmental Scientist, Division of Environment, Safety and Cultural Resources Management, at (605) 226-7656.

Attachment

cc: Marcus Levings, Chairman, Three Affiliated Tribes (with attachment)  
Perry "No Tears" Brady, THPO (with attachment)  
Tracy Opp, Questar (with attachment)  
Roy Swalling, Bureau of Land Management (with attachment)  
Jonathon Shelman, Corps of Engineers (with attachment)

## **Finding of No Significant Impact**

### **Questar Exploration and Production Company (Questar)**

#### **Addendum to:**

#### **Questar Exploration and Production Company September 2008 Environmental Assessment**

#### **MHA #1-19H-150-90 Amended to MHA #1-13-14H-150-91 Bakken Exploratory Oil Well**

#### **Fort Berthold Indian Reservation McLean County North Dakota**

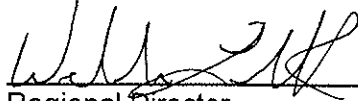
The U.S. Bureau of Indian Affairs (BIA) has received a proposal for an addendum to the above referenced Environmental Assessment (EA). The proposal is to authorize the construction of one additional well, drilling, and associated facilities in the same general location covered by the above referenced EA. The name of the additional well is MHA #1-19H-150-90. The site is located in the SW ¼ of Section 18, Township 150 North, Range 90 West. Associated federal actions by BIA include determinations of impacts and effects regarding environmental resources and positive recommendations to the Bureau of Land Management regarding the Applications for Permit to Drill.

The potential of the proposed actions to impact the human environment is analyzed in the attached addendum to an existing EA, as required by the National Environmental Policy Act. Based on the recently completed addendum to the EA, I have determined that the proposed project will not significantly affect the quality of the human environment. No Environmental Impact Statement is required for any portion of the proposed activities.

This determination is based on the following factors:

1. Agency and public involvement solicited for the preceding NEPA document was sufficient to ascertain potential environmental concerns associated with the currently proposed project.
2. Protective and prudent measures were designed to minimize impacts to air, water, soil, vegetation, wetlands, wildlife, public safety, water resources, and cultural resources. The remaining potential for impacts was disclosed for both the proposed actions and the No Action alternative.
3. Guidance from the U.S. Fish and Wildlife Service has been fully considered regarding wildlife impacts, particularly in regard to threatened or endangered species.
4. The proposed actions are designed to avoid adverse effects to historic, archaeological, cultural and traditional properties, sites and practices. Compliance with the procedures of the National Historic Preservation Act is complete.
5. Environmental justice was fully considered.
6. Cumulative effects to the environment are either mitigated or minimal.

7. No regulatory requirements have been waived or require compensatory mitigation measures.
8. The proposed projects will improve the socio-economic condition of the affected Indian community.

  
\_\_\_\_\_  
Regional Director

1/20/10  
\_\_\_\_\_  
Date

# **Notice of Availability and Appeal Rights**

Questar Addendum: Additional well from existing pad  
MHA #1-19H-150-90

**The Bureau of Indian Affairs (BIA) is planning to issue administrative approvals related to the Addendum to Questar Exploration and Production Company, November 2008, Environmental Assessment, One Bakken Formation Exploratory Wells at One Location: MHA #1-19H-150-90 as shown on the attached map. Construction by Questar is expected to begin in 2010.**

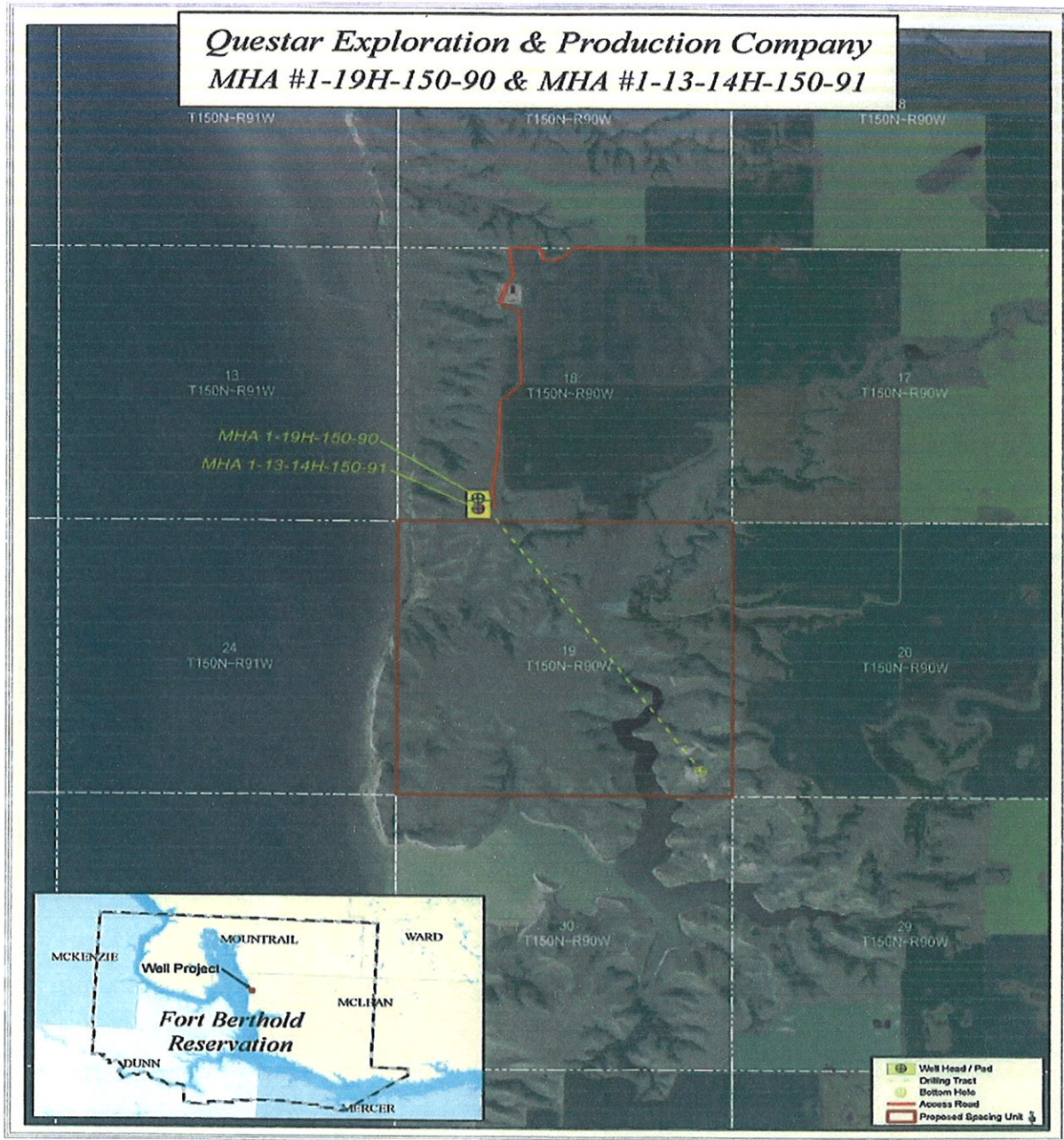
**An environmental assessment (EA) determined that proposed activities will not cause significant impacts to the human environment. An environmental impact statement is not required. Contact Howard Bemer, Superintendent at 701-627-4707 for more information and/or copies of the EA and the Finding of No Significant Impact (FONSI).**

**The FONSI is only a finding on environmental impacts – it is not a decision to proceed with an action and *cannot* be appealed. BIA's decision to proceed with administrative actions *can* be appealed until February 20, 2010, by contacting:**

**United States Department of the Interior  
Office of Hearings and Appeals  
Interior Board of Indian Appeals  
801 N. Quincy Street, Suite 300, Arlington, Va 22203.**

**Procedural details are available from the BIA Fort Berthold Agency at 701-627-4707.**

**Project locations.**



**Figure 1, Project Overview Map**

# **ENVIRONMENTAL ASSESSMENT**

## **Addendum**

**United States Bureau of Indian Affairs**

**Great Plains Regional Office  
Aberdeen, South Dakota**



**Questar Exploration and Production Company**

**Addendum to:**

**Questar Exploration and Production Company November 2008 Environmental  
Assessment**

**MHA #1-19H-150-90 Amended to MHA #1-13-14H-150-91  
Bakken Exploratory Oil Well**

**Fort Berthold Indian Reservation**

**January 2010**

For information contact:  
Bureau of Indian Affairs, Great Plains Regional Office  
Division of Environment, Safety and Cultural Resources  
115 4th Avenue SE  
Aberdeen, South Dakota 57401  
605-226-7656

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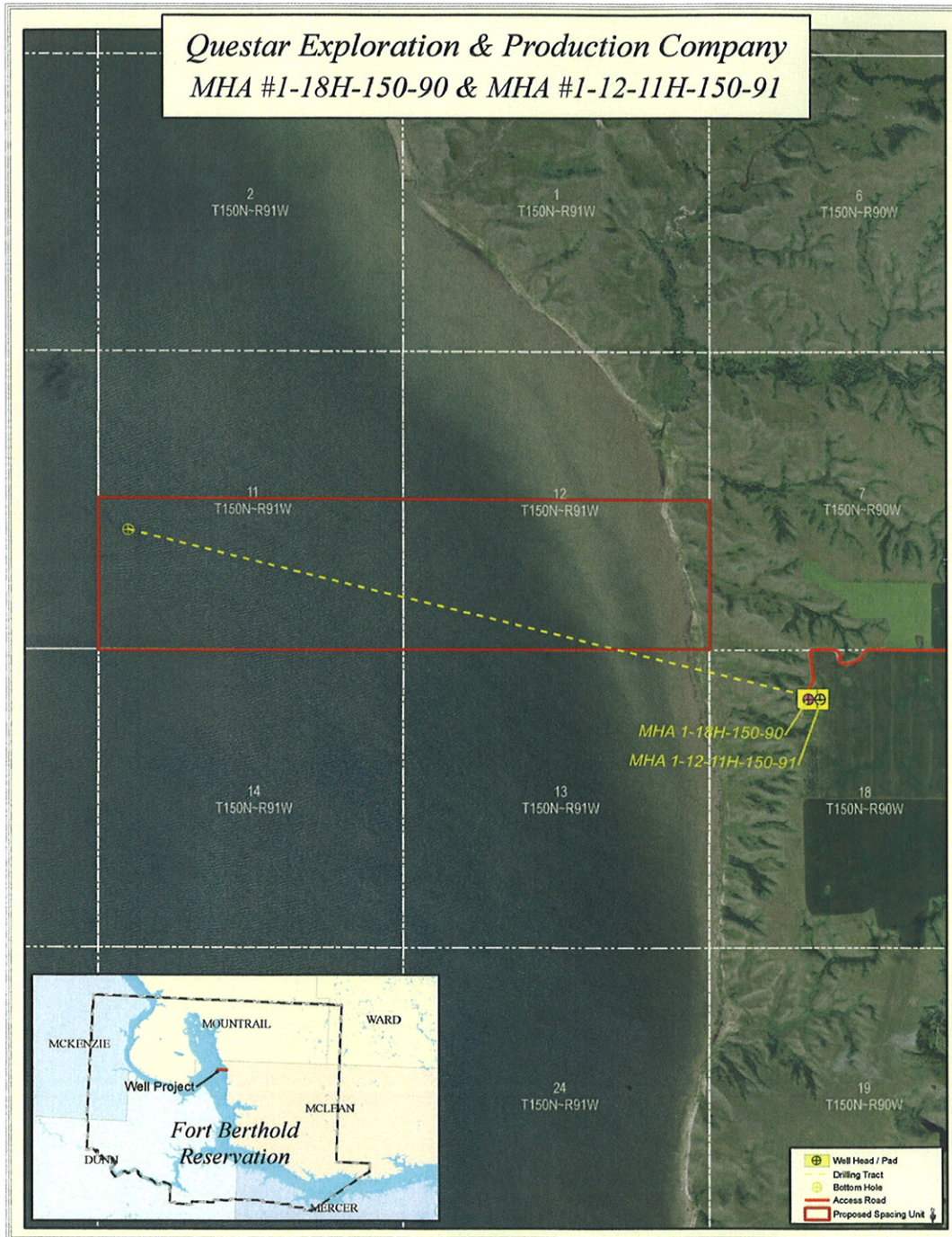
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## 1. Purpose and Need for the Proposed Action

Questar proposes to authorize the construction of one additional well, drilling, and associated facilities in the same general location covered by the previously authorized EA for Well MHA #1-18H-150-90. The name of the additional well is MHA #1-12-11H-150-91. The new well site is located in the E ½ NW ¼ of Section 18, Township 150 North, Range 90 West approximately 200 feet east of the previously authorized well. **Please refer to Figure 1, Project Overview Map**



**Figure 1, Project Overview Map**



The placement of the well would require an additional disturbance of approximately 76,000 square feet or 1.74 acres to the east of the existing pad. Please refer to **Figure 1, Project Overview Map** for the boring direction. Additional facilities (i.e. storage tanks, treater, battery, etc.) associated with the proposed wells will be constructed atop the existing pad and the proposed pad extension. All construction activities would take place atop areas that have achieved a Finding of No Significant Impact NEPA approval.

## **2. Authorities**

Oil and gas exploration and development activities are conducted under authority of the Indian Mineral Leasing Act of 1938 (25 United States Code [USC] 396a, et seq.), the Indian Mineral Development Act of 1982 (25 USC 2101, et seq.), and the Energy Policy Act of 2005 (42 USC 15801, et seq.).

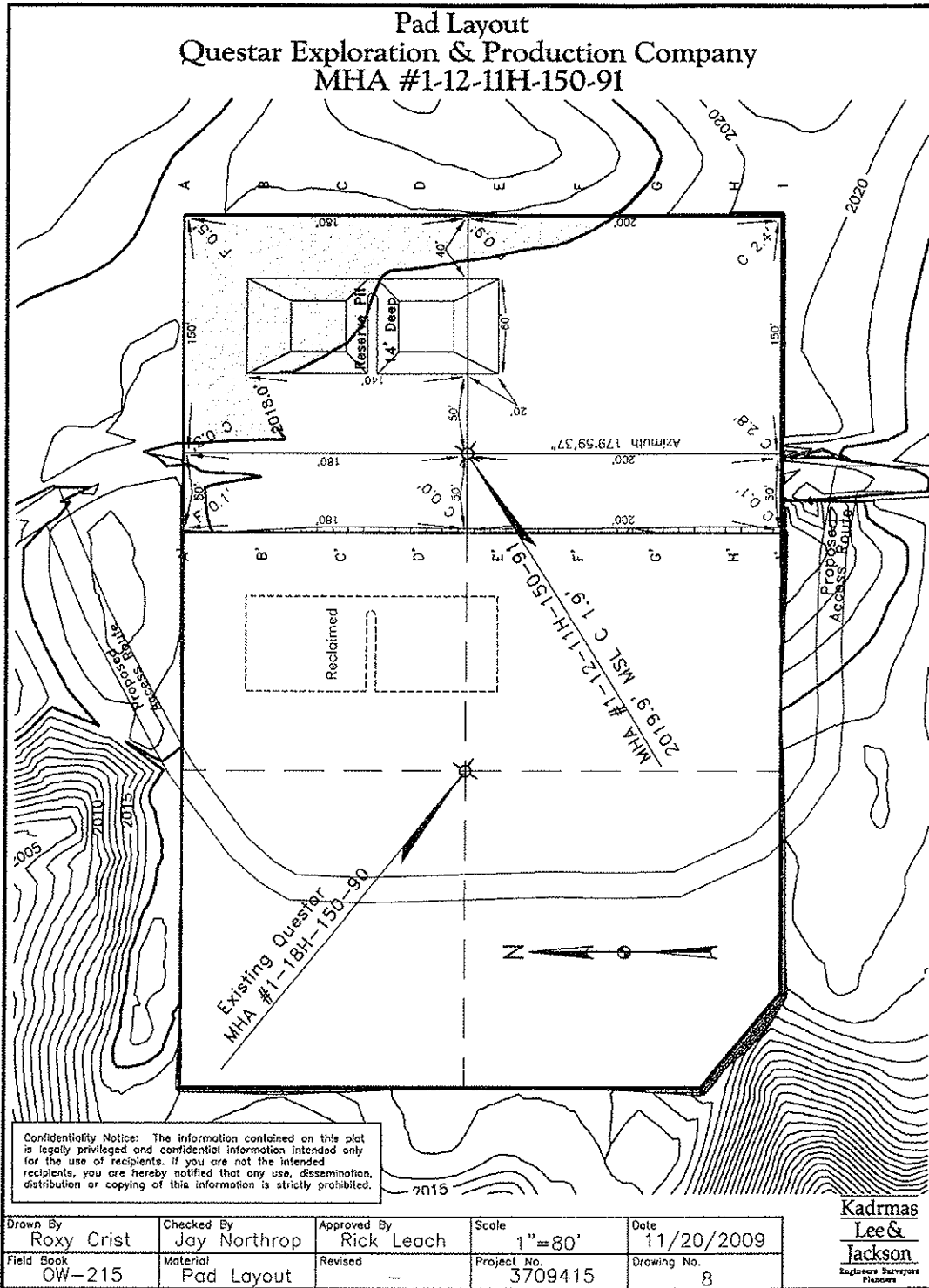
## **3. Legal Land Description of Proposed Action**

The proposed well MHA #1-12-11H-150-91 would be located in the E ½ NW ¼ of Section 18, Township 150 North, Range 90 West, approximately 200 feet east of the previously authorized well. The site would be accessed using the same road alignment as is being used and was previously authorized for the existing well.

## **4. Scope of Work for Proposed Action**

The proposed wells and associated facilities would be constructed atop and adjacent to the previously approved well pad; the pad would be extended from the original 380' x 350' to a proposed 380' x 550'. **Please refer to Figure 2, Pad Layout.** Aside from the minor pad expansion, all construction and surface disturbance would occur within previously approved locations, and no additional right-of-way would be required for the development of the well and facilities. As such, no additional environmental impacts aside from those disclosed in the previously referenced NEPA documents are anticipated from construction of the proposed well.

Should the well be determined a producing well, construction of ancillary facilities, including pipelines and electrical lines, would be preceded by all necessary agency approvals and guidelines for the installation of said structures. Any additional ROW corridors would follow the constructed well site access road.



**Figure 2, Pad Layout**

## 5. Applicable National Environmental Policy Act (NEPA) Documents

Environmental Assessment:

Questar Exploration and Production Company, MHA #1-18H-150-90 Bakken Exploratory Oil Well, Fort Berthold Indian Reservation, September 2008.

## 6. Cultural Resources

The proposed project area has been surveyed for cultural resources as part of the NEPA process identified above. There was a finding of *No Historical Properties Affected*.

As all construction activities associated with the proposed well would utilize areas that have achieved cultural resource clearance, it is anticipated that the proposed project would not impact cultural resources.

## 7. NEPA Adequacy Criteria

This document has identified one previously prepared NEPA document, *Questar Exploration and Production Company, MHA #1-18H-150-90 Bakken Exploratory Oil Well, Fort Berthold Indian Reservation, September 2008*, which adequately describes the environmental consequences of the newly proposed actions described herein, and meets the following NEPA Adequacy Criteria:

1. The proposed actions are substantially the same actions and at the sites specifically analyzed in the existing NEPA document.
2. The range of alternatives is reasonable with respect to the current proposed actions in the existing NEPA document, which appropriately considers and analyzes current environmental concerns, interests, and resource values.
3. The existing analysis and conclusions are adequate in the existing NEPA document. The analysis is still valid in light of new studies and/or resource assessment information.
4. The methodology and analytical approach used in the existing NEPA document continues to be appropriate for the proposed actions.
5. The direct and indirect impacts of the proposed actions are unchanged from those identified in the existing NEPA document.
6. The cumulative impacts that would result from implementation of the proposed actions are unchanged from those analyzed in the existing NEPA document.
7. A 30-day comment period involving public input and interagency review was used in the development of the existing NEPA document.

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT  
**APPLICATION FOR PERMIT TO DRILL OR REENTER**

FORM APPROVED  
OMB NO. 1004-0137  
Expires: March 31, 2007

5. Lease Serial No. <b>14-20-A04-8596</b> <b>7420A48596</b>	
6. If Indian, Allottee or Tribe Name <b>Three Affiliated Tribes</b>	
7. If Unit or CA Agreement, Name and No.	
8. Lease Name and Well No. <b>MHA 1-12-11H-150-91</b>	
9. API Well No. <b>Applied For</b>	
1a. Type of Work: <input checked="" type="checkbox"/> DRILL <input type="checkbox"/> REENTER	
1b. Type of Well: <input checked="" type="checkbox"/> Oil Well <input type="checkbox"/> Gas Well <input type="checkbox"/> Other <input checked="" type="checkbox"/> Single Zone <input type="checkbox"/> Multiple Zone	
2. Name of Operator <b>QUESTAR EXPLORATION &amp; PRODUCTION CO</b>	
3a. Address <b>1050 17th Street, Suite 500 Denver, Colorado 80265</b>	3b. Phone No. (include area code) <b>303.308.3068</b>
10. Field and Pool, or Exploratory <b>Bakken</b>	
4. Location of well (Report location clearly and in accordance with any State requirements. *) At surface <b>SHL: NENW of Sect 18: 871' FNL &amp; 1901' FWL Lat N47.816303 - Long W102.249817 (NAD 83)</b> At proposed prod zone <b>BHL: NWSW of Sect. 11: 2140' FSL &amp; 500' FWL Lat N47.824511 - Long W102.298453 (NAD 83)</b>	
11. Sec., T., R., M., or Blk. and Survey or Area <b>Sect. 18: T150N-R90W</b>	
14. Distance in miles and direction from the nearest town or post office* <b>15 miles southwest of Parshall, ND</b>	
12. County or Parish <b>McLean</b>	
13. State <b>North Dakota</b>	
15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drlg. unit line, if any) <b>SHL: 871' BHL: 500'</b>	16. No. of acres in lease <b>56,120.64 +/-</b>
17. Spacing Unit dedicated to this well <b>Laydown 640: S/2 Sect. 12 &amp; 11</b>	
18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft. <b>200'+/-</b>	19. Proposed Depth <b>9744' TVD/21,604'MD</b>
20. BLM/ BIA Bond No. on file <b>BIA #965 009 104</b>	
21. Elevations (Show whether DF, RT, GR, etc.) <b>2020' GR                      2052' KB</b>	22. Approximate date work will start* <b>May 15, 2010</b>
23. Estimated duration <b>35 days</b>	

24. Attachments

The following, completed in accordance with the requirements of Onshore Oil and Gas Order No. 1 shall be attached to this form:

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>1. Well plat certified by a registered surveyor.</li> <li>2. A Drilling Plan.</li> <li>3. A Surface Use Plan ( if the location is on National Forest System Lands, the SUPO shall be filed with the appropriate Forest Service Office).</li> </ul> | <ul style="list-style-type: none"> <li>4. Bond to cover the operations unless covered by existing bond on file(sec item 20 above).</li> <li>5. Operator certification.</li> <li>6. Such other site specific information and/ or plans as may be required by the a authorized officer.</li> </ul> |
|---|--|

25. Signature	Name (Printed/ Typed) <b>Debbie Stanberry</b>	Date <b>1/13/2010</b>
---------------	--	--------------------------

Title  
**Regional Supervisor, Regulatory Affairs**

Approved By (Signature)	Name (Printed/ Typed)	Date
-------------------------	-----------------------	------

Title	Office
-------	--------

Application approval does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.

Conditions of approval, if any, are attached.

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

\*(Instructions on page 2)

# WELL LOCATION PLAT

**Questar Exploration & Production Company**  
 1050 17th Street, Suite 500 Denver, Colorado 80235  
**MHA #1-12-11H-150-91**

**871 feet from the north line and 1901 feet from the west line (surface location)**

Section 18, T. 150 N., R. 90 W., 5th P.M.  
 2140 feet from the south line and 500 feet from the west line (bottom location)  
 Section 11, T. 150 N., R. 91 W., 5th P.M.

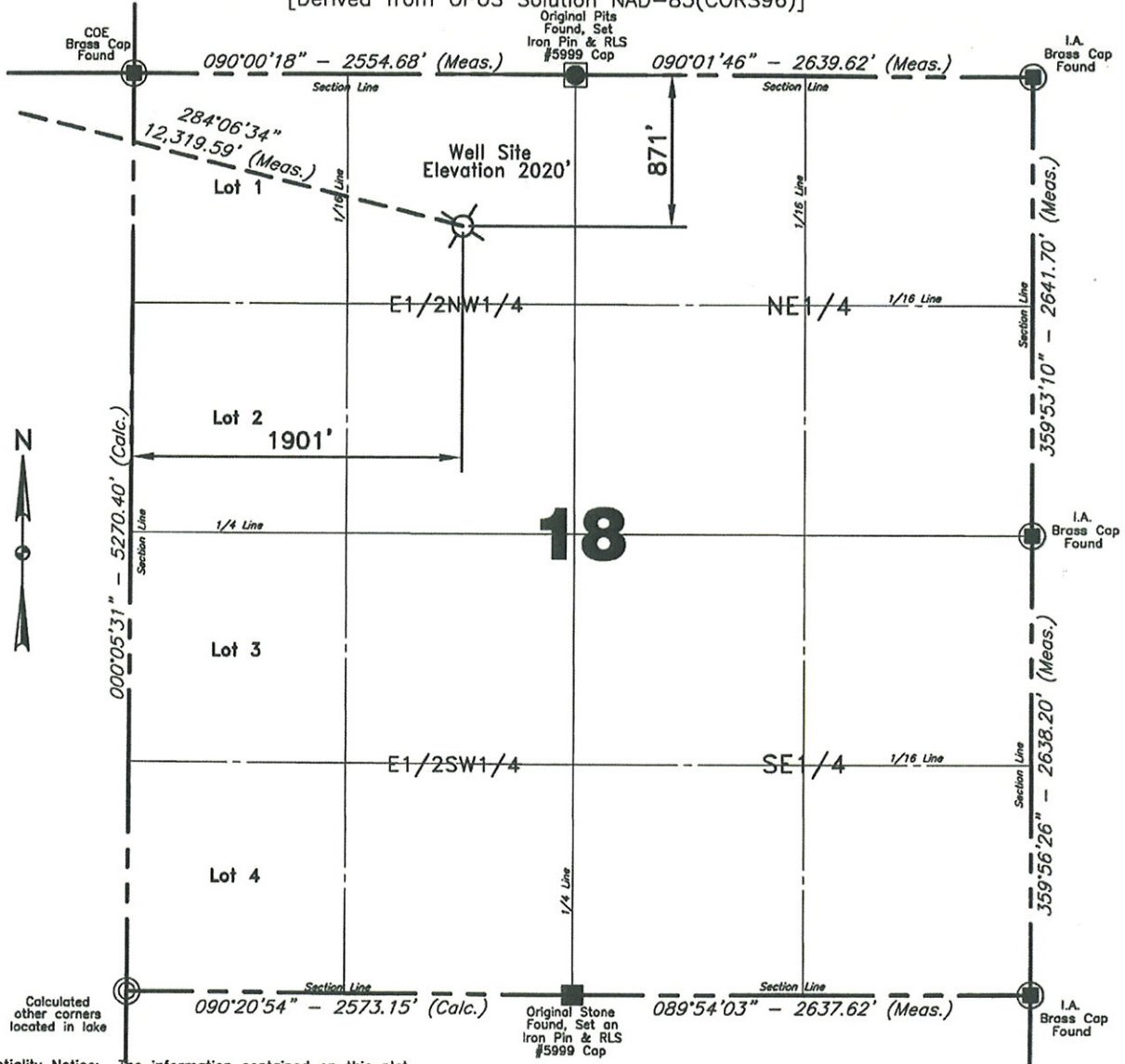
McLean County, North Dakota

Surface owner @ well site - Reuben Olson

**Latitude 47°48'58.69" North; Longitude 102°14'59.34" West (surface location)**

Latitude 47°49'28.24" North; Longitude 102°17'54.43" West (bottom hole location)

[Derived from OPUS Solution NAD-83(CORS96)]



**Confidentiality Notice:** The information contained on this plat is legally privileged and confidential information intended only for the use of recipients. If you are not the intended recipients, you are hereby notified that any use, dissemination, distribution or copying of this information is strictly prohibited.

**NOTE:** All land corners are assumed unless otherwise noted. The well location shown hereon is not an as-built location.

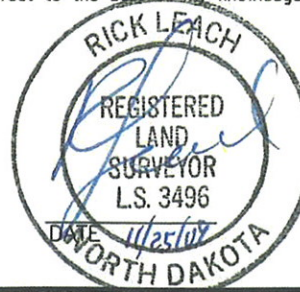
**Jay Northrop** 10/19/2009  
 Surveyed By Date

**Scale 1"=1000'**

I, Rick Leach, Professional Land Surveyor, N.D. No. 3496, do hereby certify that the survey plat shown hereon was made by me, or under my direction, from notes made in the field, and the same is true and correct to the best of my knowledge and belief.

Vertical Control Datum Used  
 Sea-Level Datum of NAVD 88  
 Based on elevation derived from OPUS Solution on GPS Base (iron rebar) in the NE1/4SE1/4 of Section 17, T150N, R 90W, on an azimuth of 073°32'03" a distance of 5,474.12' from the SE corner of Section 18, being at 2056.40' Elevation MSL.

**Professional Consulting Engineers and Surveyors**  
 Registered in  
 North Dakota, South Dakota  
 Montana, Wyoming & Minnesota  
 Tele-Fax No. 701-483-2795  
 Bus. Phone No. 701-483-1284  
 P.O. Box 1118  
 677 27th Ave. E.  
 Dickinson, North Dakota 58602  
 Certificate of Authorization #C-061



**Kadmas**  
**Lee &**  
**Jackson**  
 Engineers Surveyors  
 Planners

Project No. 3709415  
 Book OW-215 Pg. 76-79 Staking

# HORIZONTAL SECTION PLAT

Questar Exploration & Production Company  
1050 17th Street, Suite 500 Denver, Colorado 80235

MHA #1-12-11H-150-91

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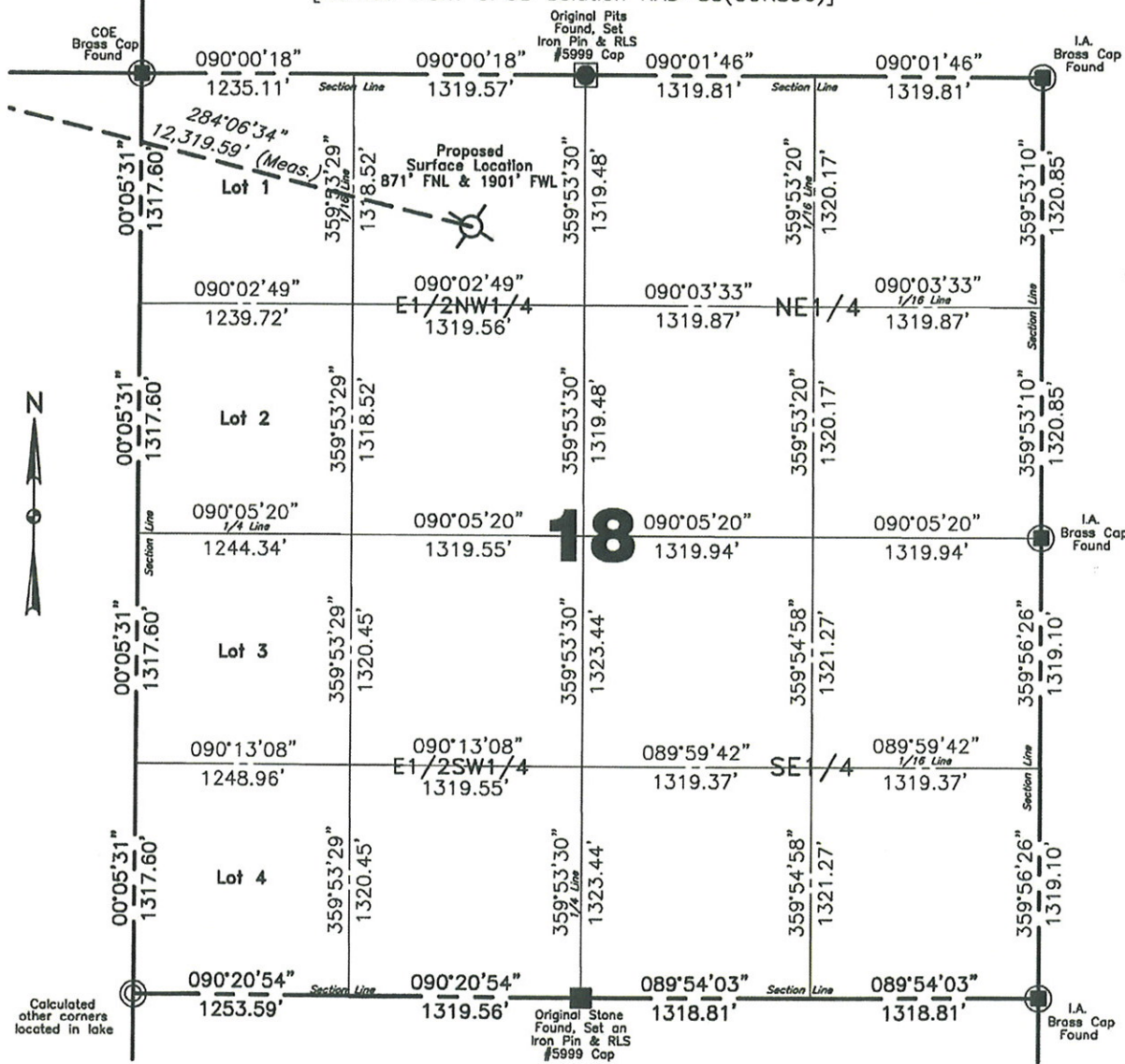
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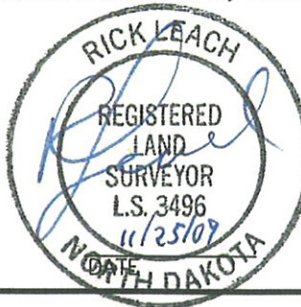


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All corners shown on this plat were found in the field during Questar Exploration & Production Company MHA #1-12-11H-150-91 oil well survey on October 19, 2009. Distances to all others are calculated. All azimuths are based on the south line of the SE1/4 of Section 18, being on an azimuth of 089°54'03".



Kadmas  
Lee &  
Jackson  
Engineers Surveyors  
Planners

Surveyed By Jay Northrop	Field Book OW-215
Computed & Drawn By Roxy Crist	Project No. 3709415

# HORIZONTAL SECTION PLAT

Questar Exploration & Production Company  
1050 17th Street, Suite 500 Denver, Colorado 80235

**MHA #1-12-11H-150-91**

871 feet from the north line and 1901 feet from the west line (surface location)

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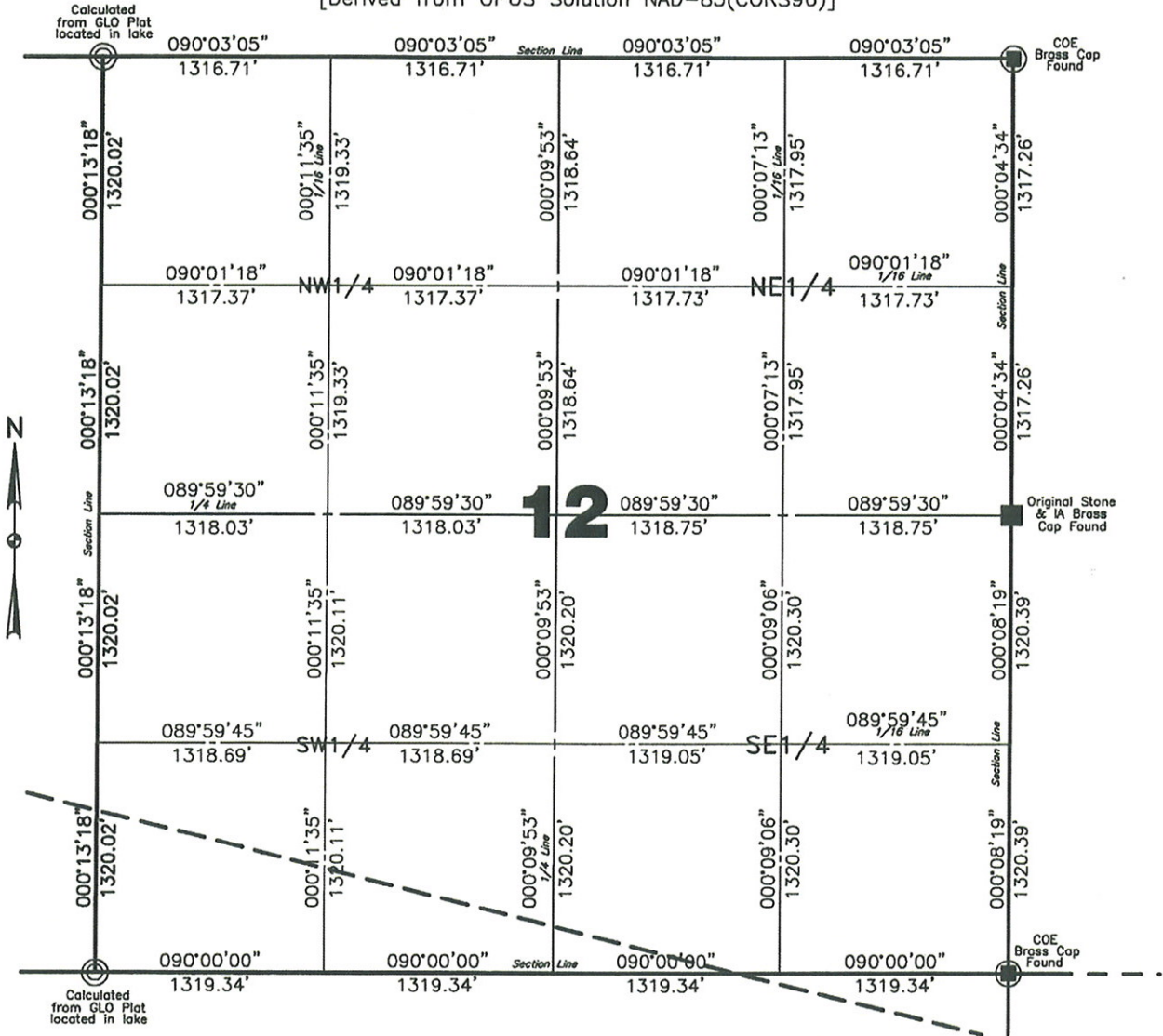
McLean County, North Dakota

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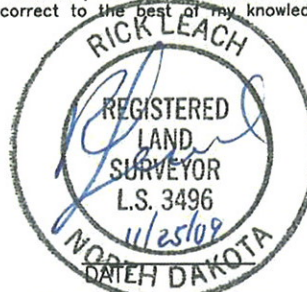
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Surveyed By Jay Northrop	Field Book OW-215
Computed & Drawn By Roxy Crist	Project No. 3709415



**Kadmas  
Lee &  
Jackson**  
Engineers Surveyors  
Planners

# HORIZONTAL SECTION PLAT

Questar Exploration & Production Company  
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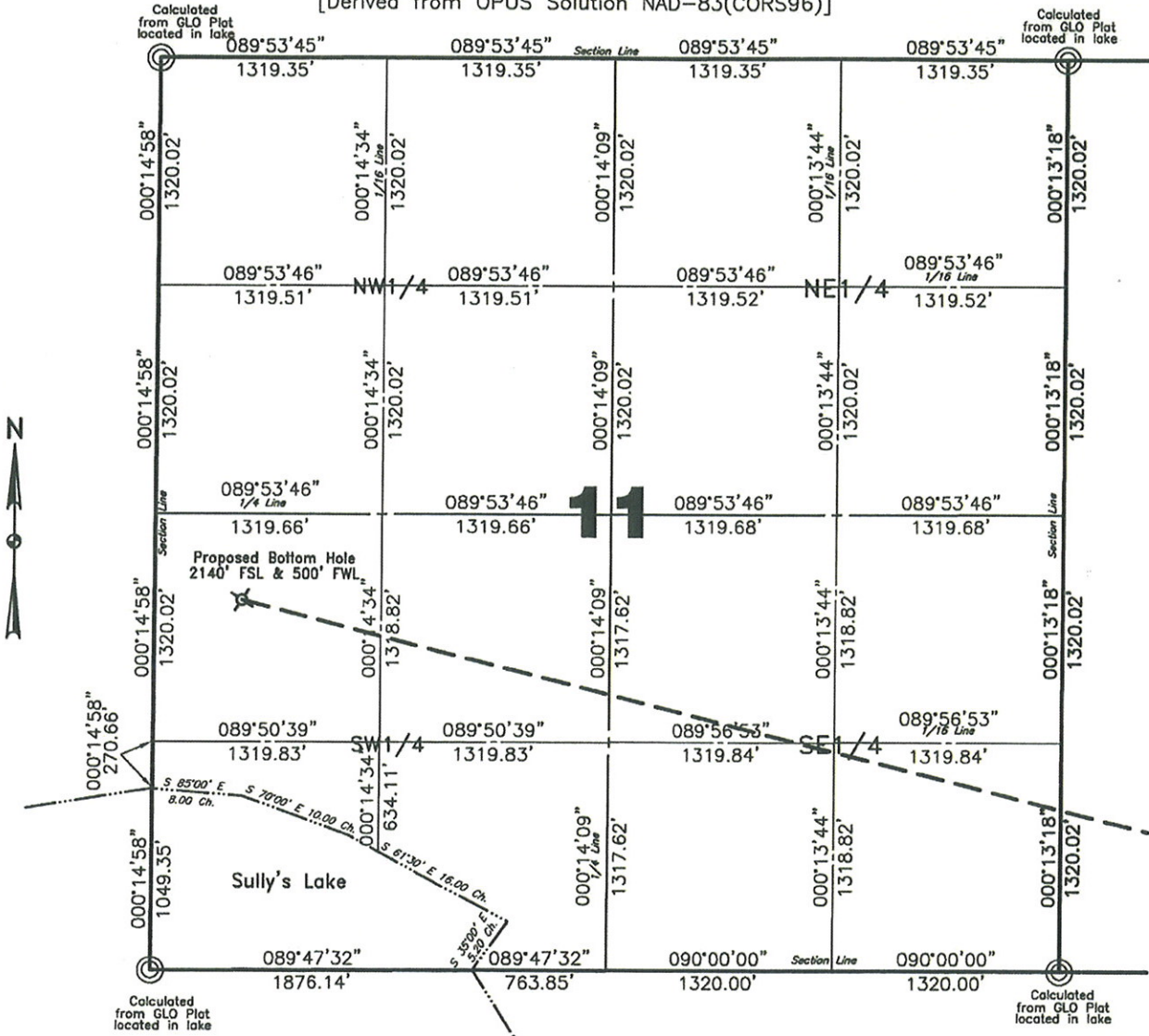
Section 11, T. 150 N., R. 91 W., 5th P.M.  
 McLean County, North Dakota

Surface owner @ well site - Reuben Olson

**Latitude 47°48'58.69" North; Longitude 102°14'59.34" West (surface location)**

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[Derived from OPUS Solution NAD-83(CORS96)]



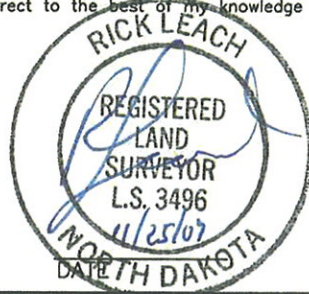
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Surveyed By Jay Northrop	Field Book OW-215
Computed & Drawn By Roxy Crist	Project No. 3709415



**Kadmas  
 Lee &  
 Jackson**  
 Engineers Surveyors  
 Planners



# BOTTOM HOLE LOCATION PLAT

Questar Exploration & Production Company  
1050 17th Street, Suite 500 Denver, Colorado 80235

**MHA #1-12-11H-150-91**

871 feet from the north line and 1901 feet from the west line (surface location)

Section 18, T. 150 N., R. 90 W., 5th P.M.

2140 feet from the south line and 500 feet from the west line (bottom location)

Section 11, T. 150 N., R. 91 W., 5th P.M.

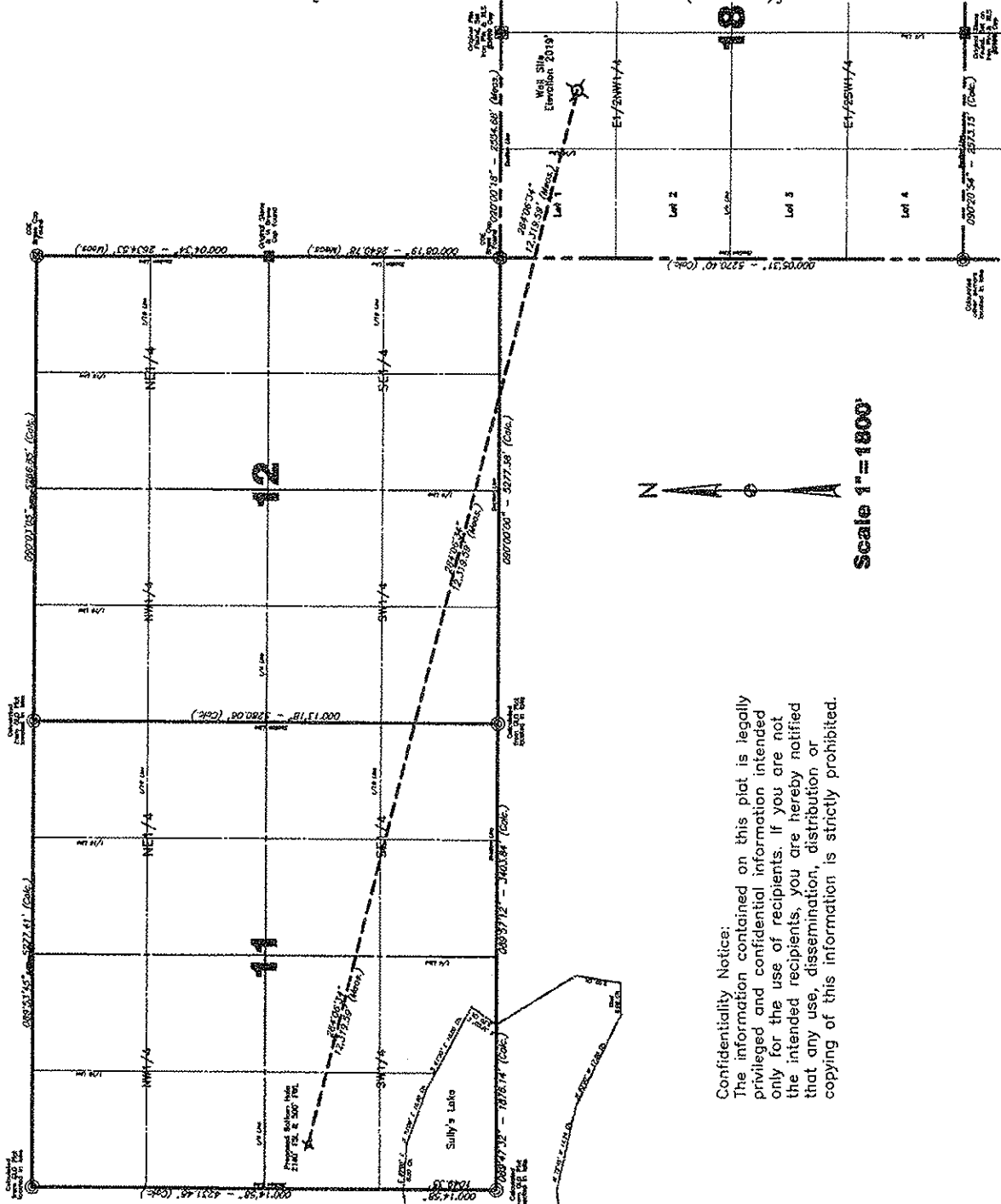
McLean County, North Dakota

Surface owner © well site - Reuben Olson

Latitude 47°48'58.69" North; Longitude 102°14'59.34" West (surface location)

Latitude 47°49'28.24" North; Longitude 102°17'54.43" West (bottom hole location)

[Derived from OPUS Solution NAD-83(CORS96)]

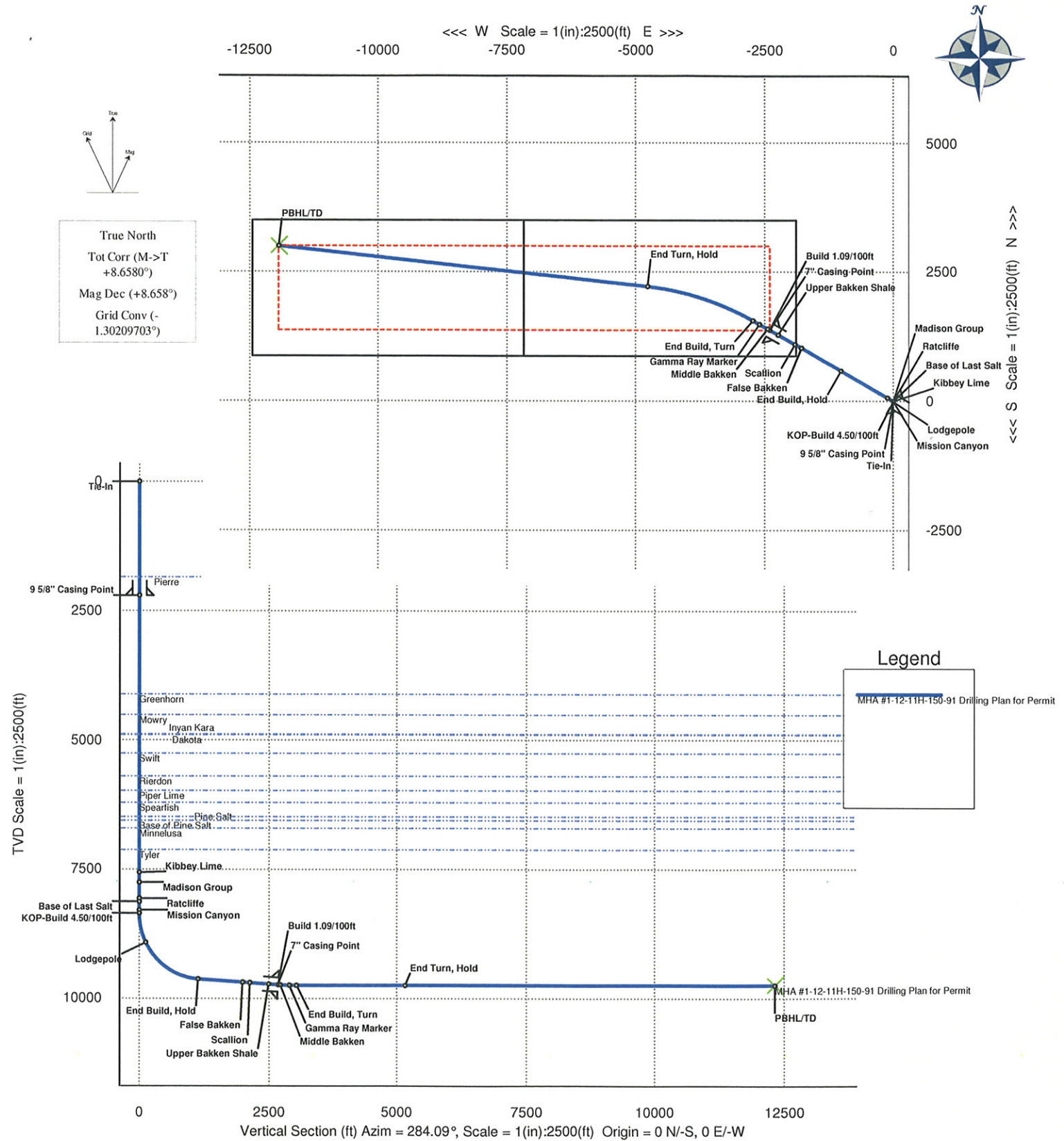


Confidentiality Notice:  
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Surveyed By <b>Jay Northrop</b>	Computed & Drawn By <b>Roxy Crist</b>	Approved By <b>Rick Leach</b>	Scale <b>1"=1500'</b>	Date <b>11/17/2009</b>
Field Book <b>OW-215</b>	Material <b>B.H. Layout</b>	Revised <b>-</b>	Project No. <b>3709415</b>	Drawing No. <b>5</b>

**Kadmas**  
**Lee &**  
**Jackson**  
Engineers Surveyors  
Planners

WELL	<b>MHA #1-12-11H-150-91</b>	FIELD	<b>North Dakota</b>	STRUCTURE	<b>McLean County</b>		
Magnetic Parameters	Model: KGRF 2005	Dip: 73.427° Mag Dec: +8.656°	Date: January 07, 2010 FS: 57389.6 nT	Surface Location Lat: N47 48 58.690 Lon: W102 14 59.340	NAD83 North Dakota State Planes, Northern Zone, US Feet Northing: 302642.67 BUS Easting: 1539627.76 BUS Grid Conv: -1.30209703° Scale Fact: 0.9999467028	Miscellaneous Slot: MHA #1-12-11H-150-91 Plan: MHA #1-12-11H-150-91 Drilling Plan, January 07, 2010	TVD Ref: KB (2044.60 ft above MSL)



# MHA #1-12-11H-150-91 Drilling Plan for Permit Proposal

Report Date: January 7, 2010 Client: Field: North Dakota Structure / Slot: McLean County / MHA #1-12-11H-150-91 Well: MHA #1-12-11H-150-91 Borehole: Original Hole (est RKB) UWI/API#: Survey Name / Date: MHA #1-12-11H-150-91 Drilling Plan for Permit / January 7, 2010 Tort / AHD / DDI / ERD ratio: 113.534° / 12523.18 ft / 6.499 / 1.285 Grid Coordinate System: NAD83 North Dakota State Planes, Northern Zone, US Feet Location Lat/Long: N 47 48 58.690, W 102 14 59.340 Location Grid N/E Y/X: N 302642.674 ftUS, E 1538627.756 ftUS Grid Convergence Angle: -1.30209703° Grid Scale Factor: 0.99994676	Survey / DLS Computation Method: Minimum Curvature / Lubinski Vertical Section Azimuth: 284.090° Vertical Section Origin: N 0.000 ft, E 0.000 ft TVD Reference Datum: KB TVD Reference Elevation: 2044.6 ft relative to MSL Sea Bed / Ground Level Elevation: 1921.000 ft relative to MSL Magnetic Declination: 8.658° Total Field Strength: 57389.566 nT Magnetic Dip: 73.427° Declination Date: January 07, 2010 Magnetic Declination Model: IGRF 2005 North Reference: True North Total Corr Mag North -> True North: +8.658° Local Coordinates Referenced To: Well Head
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Comments	Measured Depth (ft)	Inclination (deg)	Azimuth (deg)	TVD (ft)	Vertical Section (ft)	NS (ft)	EW (ft)	Closure (ft)	Closure Azimuth (deg)	DLS (deg/100ft)	Tool Face (deg)	Northing (ftUS)	Easting (ftUS)
Tie-In	0.00	0.00	299.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-60.27M	302642.67	1538627.76
Pierre	1846.00	0.00	299.73	1846.00	0.00	0.00	0.00	0.00	0.00	0.00	-60.27M	302642.67	1538627.76
9 5/8" Casing Point	2204.00	0.00	299.73	2204.00	0.00	0.00	0.00	0.00	0.00	0.00	-60.27M	302642.67	1538627.76
Greenhorn	4112.00	0.00	299.73	4112.00	0.00	0.00	0.00	0.00	0.00	0.00	-60.27M	302642.67	1538627.76
Mowry	4509.00	0.00	299.73	4509.00	0.00	0.00	0.00	0.00	0.00	0.00	-60.27M	302642.67	1538627.76
Inyan Kara	4883.00	0.00	299.73	4883.00	0.00	0.00	0.00	0.00	0.00	0.00	-60.27M	302642.67	1538627.76
Dakota	4899.00	0.00	299.73	4899.00	0.00	0.00	0.00	0.00	0.00	0.00	-60.27M	302642.67	1538627.76
Swift	5255.00	0.00	299.73	5255.00	0.00	0.00	0.00	0.00	0.00	0.00	-60.27M	302642.67	1538627.76
Rierdon	5696.00	0.00	299.73	5696.00	0.00	0.00	0.00	0.00	0.00	0.00	-60.27M	302642.67	1538627.76
Piper Lime	5975.00	0.00	299.73	5975.00	0.00	0.00	0.00	0.00	0.00	0.00	-60.27M	302642.67	1538627.76
Spearfish	6211.00	0.00	299.73	6211.00	0.00	0.00	0.00	0.00	0.00	0.00	-60.27M	302642.67	1538627.76
Pine Salt	6483.00	0.00	299.73	6483.00	0.00	0.00	0.00	0.00	0.00	0.00	-60.27M	302642.67	1538627.76
Base of Pine Salt	6554.00	0.00	299.73	6554.00	0.00	0.00	0.00	0.00	0.00	0.00	-60.27M	302642.67	1538627.76
Minnelusa	6704.00	0.00	299.73	6704.00	0.00	0.00	0.00	0.00	0.00	0.00	-60.27M	302642.67	1538627.76
Tyler	7122.00	0.00	299.73	7122.00	0.00	0.00	0.00	0.00	0.00	0.00	-60.27M	302642.67	1538627.76
Kibbey Lime	7559.00	0.00	299.73	7559.00	0.00	0.00	0.00	0.00	0.00	0.00	-60.27M	302642.67	1538627.76
Madison Group	7753.00	0.00	299.73	7753.00	0.00	0.00	0.00	0.00	0.00	0.00	-60.27M	302642.67	1538627.76
Ratcliffe	8062.00	0.00	299.73	8062.00	0.00	0.00	0.00	0.00	0.00	0.00	-60.27M	302642.67	1538627.76
Base of Last Salt	8127.00	0.00	299.73	8127.00	0.00	0.00	0.00	0.00	0.00	0.00	-60.27M	302642.67	1538627.76
Mission Canyon	8290.00	0.00	299.73	8290.00	0.00	0.00	0.00	0.00	0.00	0.00	-60.27M	302642.67	1538627.76
KOP-Build 4.50/100ft	8350.00	0.00	299.73	8350.00	0.00	0.00	0.00	0.00	0.00	0.00	-60.27M	302642.67	1538627.76
Lodgepole	8937.64	26.44	299.73	8917.00	128.29	66.06	-115.68	133.22	299.73	4.50	0.00G	302711.35	1538513.61
End Build, Hold	10261.11	86.00	299.73	9620.14	1140.57	587.37	-1028.52	1184.42	299.73	4.50	0.00G	303253.23	1537612.91
False Bakken	11147.94	86.00	299.73	9682.00	1992.48	1026.09	-1796.74	2069.09	299.73	0.00	0.00G	303709.27	1536854.89
Scallion	11291.30	86.00	299.73	9692.00	2130.19	1097.01	-1920.92	2212.10	299.73	0.00	0.00G	303782.99	1536732.36
Upper Bakken Shale	11664.02	86.00	299.73	9718.00	2488.24	1281.40	-2243.80	2583.91	299.73	0.00	0.00G	303974.66	1536413.78
7" Casing Point	11850.38	86.00	299.73	9731.00	2667.27	1373.59	-2405.24	2769.82	299.73	0.00	0.00G	304070.49	1536254.48
Build 1.09/100ft	11853.21	86.00	299.73	9731.20	2669.99	1374.99	-2407.69	2772.64	299.73	0.00	0.00G	304071.94	1536252.07
Middle Bakken	11895.87	86.46	299.73	9734.00	2710.97	1396.10	-2444.65	2815.21	299.73	1.09	0.00G	304093.88	1536215.60
Gamma Ray Marker	12075.11	88.42	299.73	9742.00	2883.40	1484.90	-2600.13	2994.26	299.73	1.09	0.00G	304186.19	1536062.18
End Build, Turn	12220.18	90.00	299.73	9744.00	3023.08	1556.83	-2726.10	3139.32	299.73	1.09	-90.00G	304260.96	1535937.89
End Turn, Hold	14378.90	90.00	276.20	9744.00	5161.76	2217.99	-4765.16	5256.07	294.96	1.09	-89.57G	304968.24	1533914.48
PBHL/TD	21604.05	90.00	276.20	9744.00	12318.48	2998.06	-11948.08	12318.48	284.09	0.00	0.00G	305911.29	1526751.54

**Survey Type:** Non-Def Proposal

**Survey Error Model:** SLB ISCWSA version 22 \*\*\* 3-D 95.00% Confidence 2.7955 sigma

**Surveying Prog:**

**MD From (ft)**

0.00

123.60

**MD To (ft) EOU Freq Survey Tool Type**

123.60

21604.05

1/100.00 SLB\_MWD-STD-Depth Only

1/100.00 SLB\_MWD-STD

**Borehole -> Survey**

Original Hole (est RKB) -> MHA #1-12-11H-150-91 Drilling Plan for Permit

Original Hole (est RKB) -> MHA #1-12-11H-150-91 Drilling Plan for Permit

DRILLING PROGRAM

ONSHORE OIL & GAS ORDER NO. 1  
Approval of Operations on Onshore  
Federal Oil and Gas Leases

All lease and/or unit operations will be conducted in such a manner that full compliance is made with applicable laws, regulations (43 CFR 3100), Onshore Oil and Gas No. 1, and the approved plan of operations. The operator is fully responsible for the actions of his subcontractors. A copy of these conditions will be furnished the field representative to insure compliance.

1. **Formation Tops**

The estimated tops of important geologic markers are as follows:

<b>Name</b>	<b><u>Subsea - GL</u></b>	<b><u>TVD - KB</u></b>
Pierre	200	1847
Greenhorn	-2067	4113
Mowry	-2464	4510
Inyan Kara	-2838	4884
Dakota	-2854	4900
Swift	-3210	5256
Rierdon	-3651	5697
Piper Lime	-3930	5976
Spearfish	-4166	6212
Pine Salt (70'+/-)	-4438	6484
Minnelusa	-4659	6705
Tyler	-5077	7123
Kibbey Lime	-5514	7560
Madison Group	-5708	7754
Ratcliffe	-6017	8063
Base of Last Salt	-6082	8128
Mission Canyon	-6245	8291
Lodgepole	-6872	8918
False Bakken	-7651	9682
Scallion	-7661	9692
Upper Bakken Shale	-7673	9719
Middle Bakken	-7689	9735
Gamma Ray Marker	-7797	9743
Proposed Target Zone	-7699	9745
Lower Bakken Shale	-7729	9775

The horizontal wellbore will kick off in the Mission Canyon formation at approximately 8,350'. Please reference directional plans for Measured Depths of the formations listed above.

GL elevation is 2,018'; KB elevation is 2,044' (26' KBM).

DRILLING PROGRAM

2. **Anticipated Depths of Oil Gas Water and Other Mineral Bearing Zones**

The estimated depths at which the top and bottom of the anticipated water, oil, gas or other mineral bearing formations are expected to be encountered are as follows:

<u>Substance</u>	<u>Formation</u>	<u>MD Depth</u>	<u>TVD Depth</u>
Oil	Middle Bakken	11,895'-21,604'	9,734'- 9,775'

All fresh water and prospectively valuable minerals encountered during drilling will be recorded by depth and adequately protected. All oil and gas shows will be tested to determine commercial potential.

3. **Operator's Specification for Pressure Control Equipment:**

- A. 11" or 13-5/8" 5,000 psi double gate, 5,000 psi annular BOP (schematic included) from 9-5/8" casing point to total depth. The choice of BOP stacks is based on the drilling contractor's availability.
- B. In the event the drilling contractor's substructure height is insufficient, the operator will eliminate the mud cross and flange the kill line and choke lines on the body of the blind rams to provide the same operational benefit that the mud cross allows.
- C. A high pressure rotating head will be installed to allow drilling the Middle Bakken under balanced.
- D. Functional test daily
- E. All casing strings shall be pressure tested (0.2 psi/foot or 1500 psi, whichever is greater) prior to drilling the plug after cementing; test pressure shall not exceed the internal yield pressure of the casing.
- F. Ram type preventers and associated equipment shall be tested to approved stack working pressure if isolated by test plug or to 70 percent of internal yield pressure of casing whichever is less. BOP and related equipment shall meet the minimum requirements of Onshore Oil and Gas Order No. 2 for equipment and testing requirements, procedures, etc. for a 5M system and individual components shall be operable as designed.
- G. Two (2) chokes with one (1) remotely controlled from rig floor will be installed in the choke manifold and tested per item (F) above.

DRILLING PROGRAM

4. **Casing Design:**

Hole Size	Csg. Size	Top (MD)	Bottom (MD)	Mud Weight	Wt. lb/ft	Grade	Thread	Cond.
22"	16"	sfc	80'	N/A	Steel	Cond.	None	Used
13-1/2"	9-5/8"	sfc	2,000'	9.0	36	J-55	STC	New
8-3/4"	7"	sfc	11,850'	10.0	32	HCL-80	LTC	New
6"	4-1/2"	8,350	21,604'	12.5	11.6	P-110	LTC	New

CASING STRENGTHS				COLLAPSE	BURST	TENSILE (min.)
9-5/8"	36 lb.	J-55	STC	2,020 psi	3,520 psi	394,000 lb.
7"	32 lb.	HCL-80	LTC	10,400 psi	9,060 psi	738,000 lb.
4-1/2"	11.6 lb.	P-110	LTC	7,580 psi	10,690 psi	279,000 lb.

MINIMUM DESIGN FACTORS:

COLLAPSE: 1.125  
 BURST: 1.10  
 TENSION: 1.80

Area Fracture Gradient: 0.9 psi/foot  
 Maximum anticipated mud weight: 12.5 ppg  
 Maximum surface treating pressure: 6350 psi

5. **Cementing Program**

**16" Conductor:**

Cement to surface with construction cement.

**9-5/8" Surface Casing: 0' – 2,000' (MD)**

**Lead Slurry:** 0' – 1500'. 425 sxs (1245 cu ft) Econocem System + 0.125 lbs/sk Poly-E-Flake (LCM) Slurry wt: 11.5 ppg, slurry yield: 2.933 ft<sup>3</sup>/sx, slurry volume: 13-1/2" hole + 70% excess.

**Tail slurry:** 1500'- 2000' 280 sxs (415 cu ft) Swiftcem System + 0.125 Poly-E-Flake (LCM) Slurry Wt: 14.2 ppg. Slurry yield: 1.482 ft<sup>3</sup>/sx, slurry volume: 13-1/2" hole + 70% excess.

**7" Intermediate Casing: 4,500' – 11,850' (MD)**

**Lead Slurry:** 4500' – 6000'. 70 sxs (295 cu ft) Tuned Light System w/ 0.125 lbs./sx Poly-E-flake (LCM) Slurry wt: 10.8 ppg, slurry yield: 4.36 ft<sup>3</sup>/sx, slurry volume: 8-3/4" hole + 30% excess.

## DRILLING PROGRAM

**Tail Slurry:** 6,000' – 11,850'. 710 sks (1145 cu ft) Tail Bondcem System w/ 0.4% HR-5 (Retarder)  
Slurry wt: 15.6 ppg, Slurry yield: 1.61 ft<sup>3</sup>/sk, Slurry volume: 8-3/4" hole + 30% excess.

**4-1/2" Production Casing: 8,350' – 21,604' (MD)**

**Lead/Tail Slurry:** Uncemented

### 6. **Auxiliary Equipment**

- A. Kelly Cock – yes
- B. Float at the bit – yes
- C. Monitoring equipment on the mud system – visually and PVT/Flow Show
- D. Full opening safety valve on the rig floor – yes
- E. Rotating Head – yes
- F. All other operations and equipment for air/gas drilling shall meet specifications in Onshore Order #2, Section III Requirements, subsection E. Special Drilling Operations and Onshore Order #1.

Surface hole will be drilled with air, air/mist, foam, or mud depending on hole conditions. Intermediate hole will be drilled with oil base mud (OBM). The Production hole will be OBM or brine water depending on hole and local downhole pressure conditions. No chromates will be used. Maximum anticipated mud weight is 12.5 ppg.

No minimum quantity of weight material will be required to be kept on location.

PVT/Flow Show will be used from base of surface casing to TD.

Gas detector will be used from surface casing depth to TD.

### 7. **Testing, logging and coring program**

- A. Cores – none anticipated
- B. DST – none anticipated
- C. Logging:
  - Mud logging – 7500' to TD.
  - If shows warrant while drilling - run a Triple Combo from surface casing to +/-35 degree in 8-3/4" open hole.
  - MWD/GR in build and horizontal lateral.
- D. Formation and Completion Interval: Middle Bakken interval, final determination of completion will be made by analysis of Mud Logs, GR Log and shows.
- E. Stimulation – Stimulation will be designed for the particular area of interest as encountered.

DRILLING PROGRAM

**8. Anticipated Abnormal Pressures and Temperatures, Other Potential Hazards**

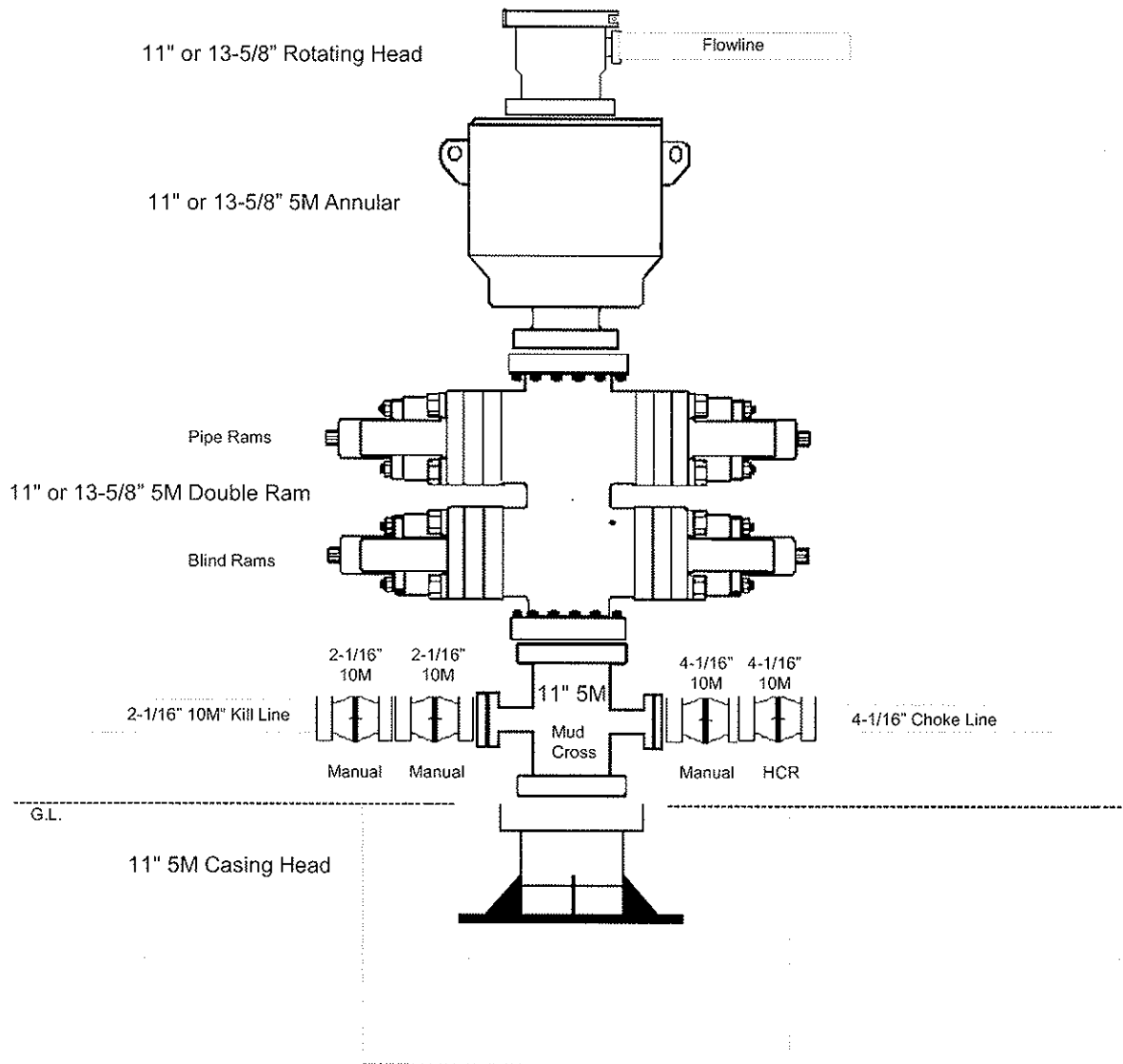
No abnormal temperatures or pressures are anticipated. No H<sub>2</sub>S has been encountered in or known to exist from previous wells drilled to similar depths in the general area. Maximum anticipated bottom hole pressure equals approximately 5825 psi. Maximum anticipated bottom hole temperature is 210° F.

**9. Additional Information For Oil Base Mud**

- A. See attached diagram of well pad layout. A reserve pit will be constructed for this location. This pit will be constructed so that a minimum of two vertical feet of freeboard exists above the top of the pit at all times and at least one-half of the holding capacity will be below ground level. The pit will be lined with a synthetic reinforced liner, 30 millimeters thick, with sufficient bedding used to cover any rocks prior to putting any fluids into the pit. The pad will be designed so that runoff from adjacent slopes does not flow into the reserve pit. The liner will overlap the pit walls and be covered with dirt and/or rocks to hold it in place.
- B. Oil-base mud will be mixed in the closed circulating system and transferred to four 500-bbl tanks on location for storage prior to and after drilling operations. Drip pans will be installed below the rotary beams on the substructure and can be viewed on site from the cellar area. As the intermediate and production section of the hole is drilled, the cuttings transported to the surface with the drilling fluid will be mechanically separated from the drilling fluid as waste by shale-shakers and then cleaned/dried via a mud cleaner and/or centrifuge. These separated cuttings will be transferred to the cuttings pit nearest the shakers and stored in this cuttings pit for solidification after the rig is released and moved off location.
- C. Plastic material will underlay the rig, oil base mud/diesel storage tanks and mud pits. All tanks on location will be placed inside of berms. Any oily waste fluids and sediments generated at the work site during drilling operations or when cleaning the fluid containment system after drilling will also be placed into the cuttings half of the pit.
- D. All rig ditches will be lined and directed to a lined sump for fluid recovery. A drip pan will be installed on the BOP stack, a mud bucket will be utilized as needed on connections and a vacuum system will be used on the rig floor for fluid recovery in those areas.
- E. Once all waste has been placed in the cuttings portion of the pit and all necessary approvals obtained, the oilfield waste management consultant Soli-Bond or a similar company will mobilize equipment and personnel to the site to perform the cement based solidification/stabilization process in-situ for encapsulation. Soil will be backfilled over the processed material used on the cuttings side of the pit and that portion of the pit area will be returned to the existing grade bordering the pit.

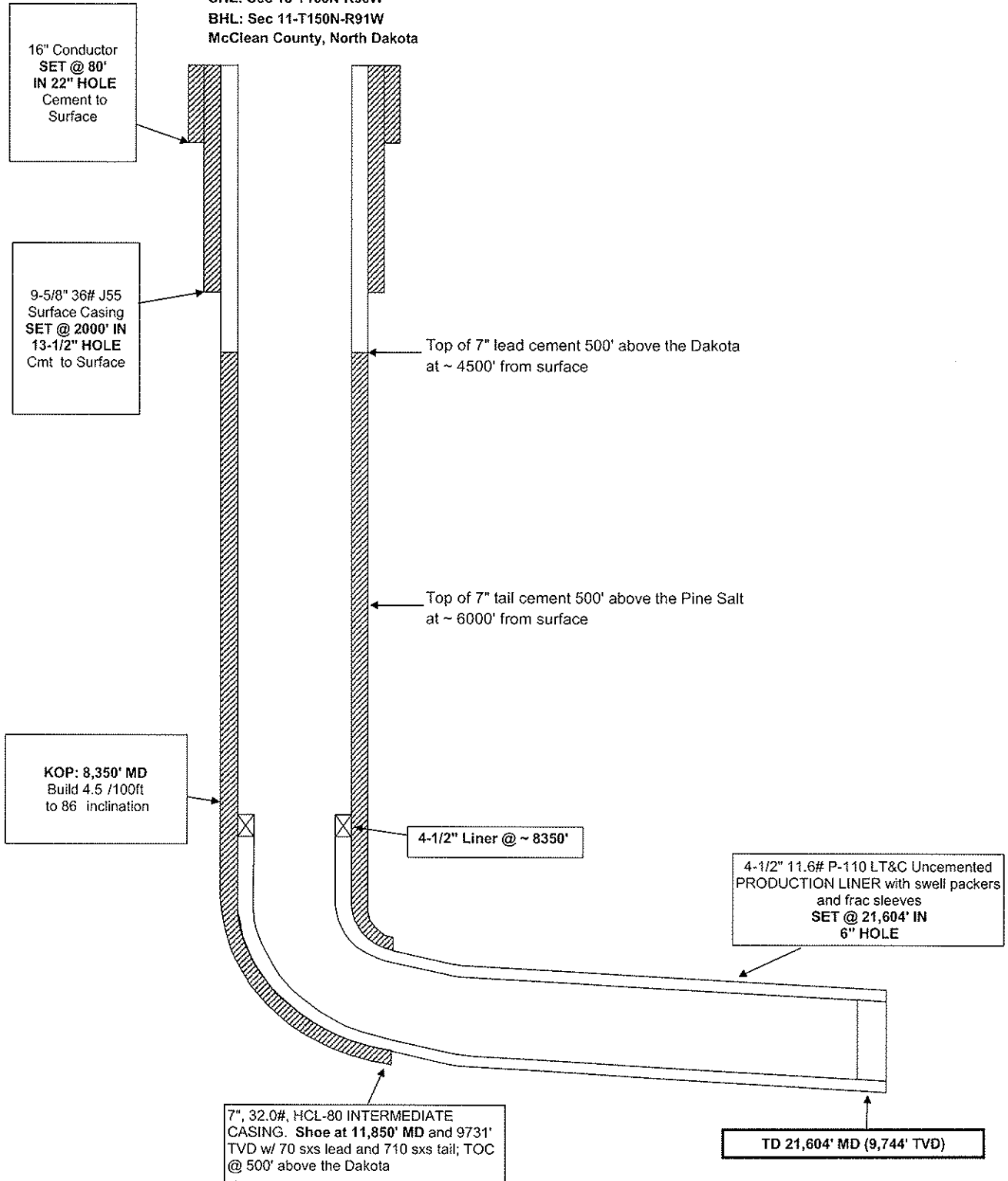


DRILLING PROGRAM



# MHA 1-12-11H-150-91

SHL: Sec 18-T150N-R90W  
BHL: Sec 11-T150N-R91W  
McClellan County, North Dakota



**Questar Exploration & Production Company**

**13-Point Surface Use Plan of Operations**

MHA 1-12-11-150-91  
SHL: 871' FNL, 1901' FWL  
NENW, Section 18, T. 150 N., R. 90 W.  
BHL: 2140' FSL, 500' FWL  
NWSW, Section 11, T. 150 N., R. 91 W.  
McLean County, North Dakota  
Allotted Lease # 7420A48596

**1. Existing Roads**

- a. Access roads and location of well – See Maps “A” & “B”.
- b. Directions to the location from the town of Parshall, North Dakota:

Travel Southerly on Highway 37 for 8 miles to an existing gravel road. Turn right and travel west for 4 miles, follow the curve 1 mile south to the SE corner of Section 8: T150N-R90W. Turn left and the follow the section line road to the MHA 1-18H-150-90 well location. The MHA 1-12-11H-150-91 will be drilled from the expanded MHA 1-18H-150-90 well pad.

- c. All existing roads will be maintained in the same or better condition as exist prior use by Questar.

**2. Access Roads to be Constructed and Reconstructed**

- a. No new access roads are proposed to constructed for this project.
- b. Any new access road will be crowned and ditched, with a minimum running surface of fourteen (14) feet. The maximum disturbed width will be sixty-six (66) feet. Topsoil will be stripped and windrowed prior to road construction and respread in the borrow area.
- c. Maximum grade of the road will be less than 8%.
- d. Any additional culverts required will be added as needed. A cattle guard will be placed at the entrance and exit of the location to ensure traffic flow for continues access to the MHA 1-13-14H-150-91 and proposed MHA 1-19H-150-90.
- e. After road construction is completed and topsoil is pulled back down the cut slope, the travel way will be surfaced prior to moving in the drilling rig, if necessary, due to weather conditions.

- f. Roads constructed on allotted lands will be constructed and maintained in accordance with the BLM minimum standards for a resource road as described in BLM Manual 9113, unless otherwise specified.

**3. Location of Existing Wells within a One-mile Radius**

- a. There are no known water wells within the project area.
- b. There are no known injection or disposal wells within the project area.
- c. There are 2 known producing wells in the area.
- d. There is 1 known drilling well in the area.
- e. There are no known plugged or abandoned wells in the area.
- f. There are no known shut-in wells in the area.
- g. There are no known monitoring or observation wells in the area.

**4. Location of Existing and/or Proposed Facilities – See Exhibit 2**

On Well Pad

- a. There are no existing facilities that will be utilized for this well. To ensure the surface footprint is minimized, the facilities for the well (should it be a producing well) will be co-located with the existing facilities of the MHA 1-18H-150-90 facilities.
- b. The proposed production facility layout will be submitted via sundry notice.
- c. Production facilities will be located on the disturbed portion of the well pad.
- d. All flowlines from the well site to the battery site will be buried below frost line depth.
- e. Tank batteries shall be surrounded by an impervious dike or Sioux containment system of sufficient size to hold 110% the capacity of the largest tank in the battery and still allow one (1) foot of freeboard.
- f. In the event of production, the following items will occur:
  1. The entire location will be fenced to prevent livestock and wildlife entry.
  2. The unused areas of the well location, if necessary, will be re-contoured to appropriate configurations (that allow lease operations and alleviate steep cut-and-fill slopes, minimizing accelerated erosion).

**5. Location and Type of Water Supply**

Water will be obtained from a commercial supplier in the area. Water will be transported by water trucks using existing and proposed access roads to the location.

**6. Source of Construction Materials**

- a. Native soils from the road and location will be used for construction materials. Surfacing materials will be purchased from commercial suppliers in the area.
- b. No material will be removed from federally-owned sources.

**7. Methods of Handling Waste Disposal**

- a. Cuttings and drilling fluids will be placed on a lined pit which will be constructed with at least one-half (0.5) of its holding capacity below ground level. The reserve pit will be designed to prevent the collection of surface runoff. The pit will be lined with a thirty-millimeter polyethylene liner to prevent leakage of fluids. The bottom of the pit shall be smooth and free of any sharp rocks.

If the pit has a rocky bottom, it shall be bedded with a material such as soil, straw, or hay to avoid the possibility of puncturing the liner. The liner will be rolled in place and recurved at the ends, i.e. buried on the top of the pit berms.

After construction and prior to use, the reserve pit will be fenced "stock-tight" on all four sides and will be flagged to keep livestock and wildlife from entering. The fence will be removed on the front side during drilling and re-installed at the time of rig release, at which time the pit will again be flagged.

After drilling and completion operations are completed, the reserve pit and its contents will be reclaimed per Point 9 of the Drilling Program submitted for the MHA 1-12-11H-150-91. Additional information can be found in the attachment titled "Questar Exploration and Production Company Wellsite Cuttings Management Plan".

- b. Any hydrocarbons produced during completion work will be contained in test tanks and removed from location at a later date. No hydrocarbons will be allowed in the reserve pit.
- c. Sewage will be handled in self-contained, chemical-treated portable toilets and contents hauled off location to a WDEQ-authorized sanitary disposal facility in accordance with state and local regulations.
- d. Garbage and other trash will be contained in a portable trash cage, which will be totally enclosed with small mesh wire. Cage and contents will be transported to an approved sanitary landfill. Any trash will be picked up if scattered and contained in trash cage as soon as practical after rig is moved off.

- e. Hazardous Materials: Questar E&P maintains a file, per 29 CFR 1910.1200 (g) containing current *Material Safety Data Sheets* (MSDS) for all chemicals, compounds, and/or substances which are used during the course of construction, drilling, completion, and production operations for this project. Hazardous materials (substances) which may be transported across these lands may include drilling mud and cementing products which are primarily inhalation hazards, fuels (flammable and/or combustible), materials that may be necessary for well completion/stimulation activities such as flammable or combustible substances and acids/gels (corrosives).

## 8. Ancillary Facilities

If the well is productive, Questar will consider the feasibility of installing oil and gas pipelines and a powerline.

## 9. Well Site Layout

- a. Survey Plats – See Exhibits 1 and 2
- b. Cut-and-Fill Cross Sections – See drawings 7, 8, & 9
- c. Location Layout – See drawing 8
- d. Typical Rig Layout – See drawing 10
- e. All equipment and vehicles will be confined to the access road, well pad, and areas specified in the APD.
- f. Prior to construction, six (6) inches of topsoil (or maximum available) will be removed from the entire site and stockpiled, as shown on the well pad diagram.
- g. The location (including the reserve pit) will be designed to prevent the collection of surface runoff.
- h. The construction program and design are on the attached cut, fill, and cross section diagrams – See drawings 6-12.

## 10. Surface Reclamation Plans

- a. The reserve pit will be reclaimed in accordance with Point 9 of the Drilling Program prepared for and submitted with the MHA 1-12-11H-150-91 APD.
- b. Prior to reclamation or abandonment of the well site and road, a joint inspection of the disturbed area will be held with the private surface owner.

In the event of a dry hole, the location will be re-contoured; the topsoil will be evenly distributed over the entire location and revegetation will be conducted as directed by the private surface owner.

In the event of production, those areas not needed for operations will be re-contoured and water-barred to support vegetation and reduce erosion. All disturbed areas will be seeded with a seed mixture agreed upon by the private surface owner.

- c. Questar E&P will control noxious weeds on the location in conformance with the EPA and BLM guidelines.
- d. Reclamation will begin upon completion of drilling operations. Complete reclamation will depend on weather conditions.

## 11. Surface Ownership

### Well Site and Access Road

NE1/4, E1/2NW1/4, Section 18, T. 150 N., R. 90 W., McLean County, ND  
Reuben Olson  
7250 35<sup>th</sup> Street NW  
Parshall, North Dakota 58770  
Phone: 701-862-3214

N1/2 Section 17, T. 150 N., R. 90 W. McLean County, ND  
Three Affiliated Tribes  
404 Frontage Road  
New Town, North Dakota 58763

## 12. Other Information

- a. A Class III Cultural Resources inventory has been completed by SWCA Environmental Consultants and submitted under separate cover.  
  
If historic or archaeological materials are uncovered, Questar E&P will suspend all operations that might further disturb such materials and immediately contact the Authorized Officer.
- b. A "Sundry Notice and Report of Wells" (Form 3160-5) will be filed for approval for all changes of plans and other operations.
- c. The dirt contractor will be provided with a complete copy of the approved APD with COAs.

**13. Lessee's or Operator's Representative and Certification**

Mike Stahl – Engineer  
Questar Exploration and Production Company  
1050 17<sup>th</sup> Street, Suite 500  
Denver, Colorado 80265  
Phone: 303.308.3070

Debbie Stanberry – Regional Supervisor, Regulatory Affairs  
Questar Exploration and Production Company  
1050 17<sup>th</sup> Street, Suite 500  
Denver, Colorado 80265  
Phone: 303.308.3068  
Cell: 303.241.1336  
Fax: 303.573.0290  
E-mail: [Debbie.Stanberry@Questar.com](mailto:Debbie.Stanberry@Questar.com)

**Certification**

I hereby certify that I, or persons under my direct supervision, have inspected the proposed drill site and access route; that I am familiar with the conditions which currently exist; that the statements made in this plan are, to the best of my knowledge, true and correct; and that the work associated with operation proposed herein will be performed by Questar Exploration and Production Company and its contractors in conformity with this plan and the terms and conditions under which it is approved. This statement is subject to the provisions of the 18 U.S.C. 1001 for filing of a false statement.

\_\_\_\_\_  
Debbie Stanberry  
Questar Exploration and Production Company

\_\_\_\_\_  
Date



**Questar Exploration & Production Company**  
**MHA #1-12-11H-150-91**  
**Sec. 18, T. 150 N., R. 90 W., 5th P.M.**  
**McLean County, North Dakota**

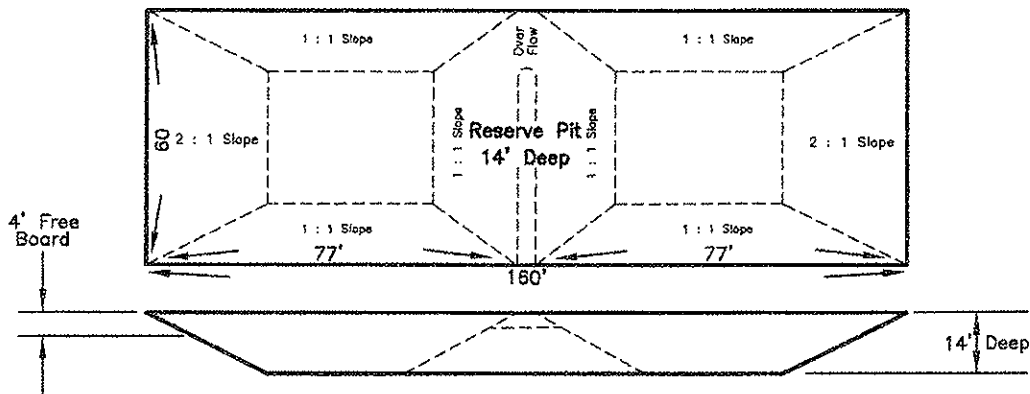
Well Site Elevation      2019.9' MSL  
 Well Pad Elevation      2018.0' MSL

Excavation	3,325 C.Y.
Plus Pit	2,800 C.Y.
	6,125 C.Y.
Embankment	330 C.Y.
Plus Shrinkage (+30%)	100 C.Y.
	430 C.Y.
Stockpile Pit	2,800 C.Y.
Stockpile Top Soil (6")	1,430 C.Y.
Road Embankment from Pad or Stockpile with Pit	1,465 C.Y.
Disturbed Area for Pad	1.77 Acres

**NOTE :**  
 All cut end slopes are designed at 1:1 slopes &  
 all fill end slopes are designed at 1 1/2:1 slopes

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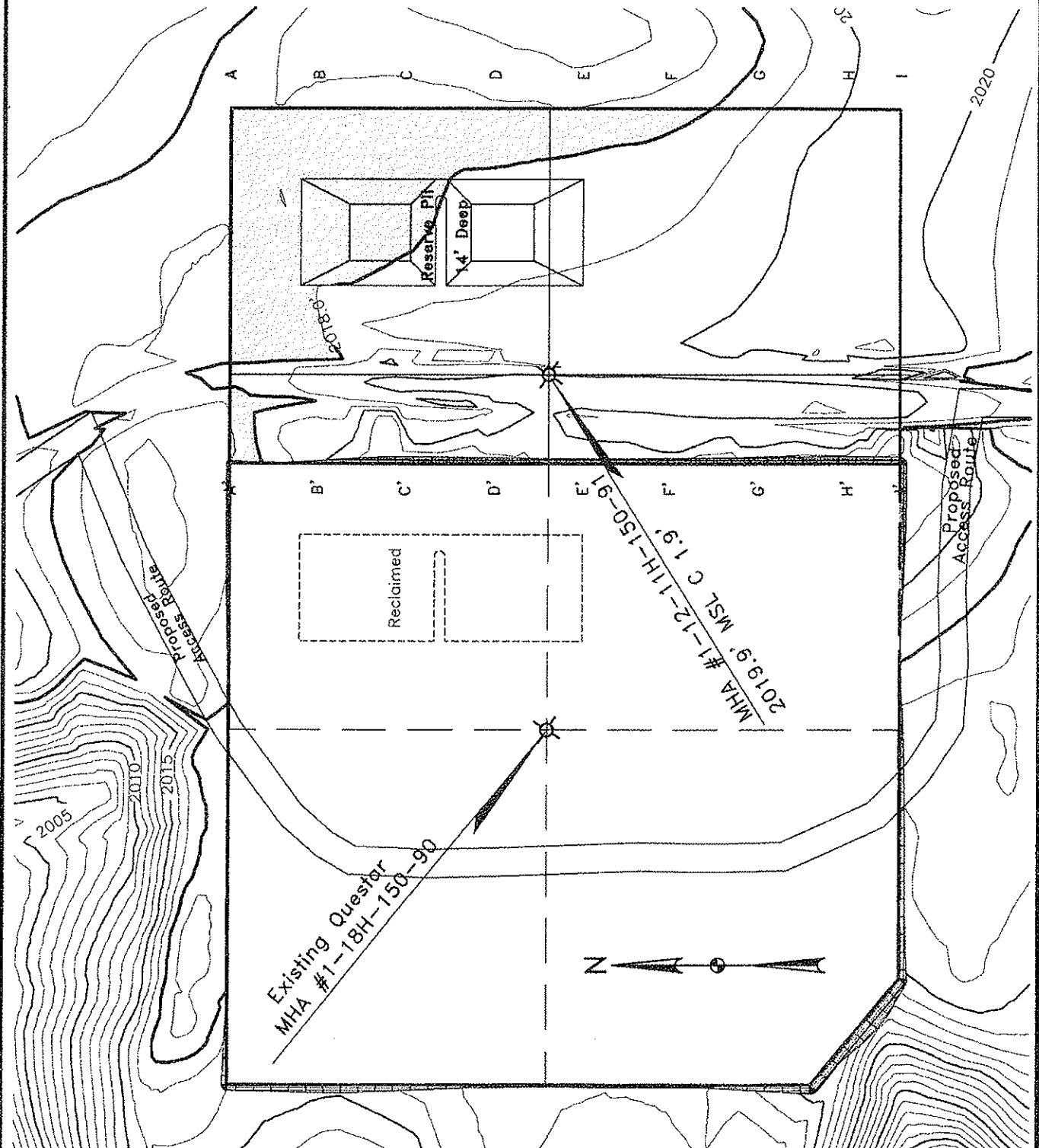
Well Site Location  
 871' FNL  
 1901' FWL



Drawn By Roxy Crist	Checked By Jay Northrop	Approved By Rick Leach	Scale None	Date 11/20/2009
Field Book OW-215	Material Quantities	Revised —	Project No. 3709415	Drawing No. 6

**Kadmas**  
**Lee &**  
**Jackson**  
Engineers Surveyors  
Planners

**Original Ground**  
**Questar Exploration & Production Company**  
**MHA #1-12-11H-150-91**



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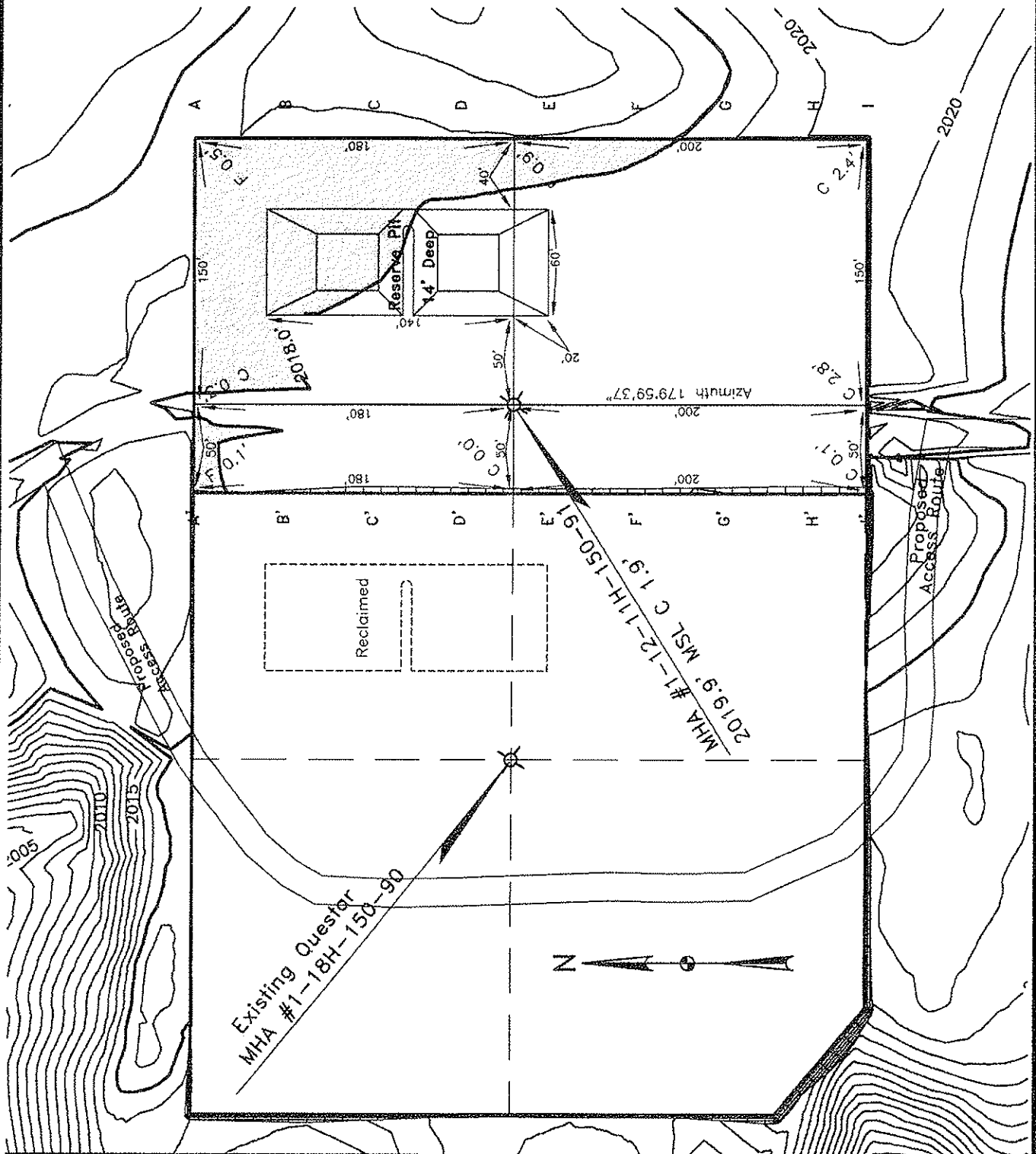
Drawn By Roxy Crist	Surveyed By Jay Northrop	Approved By Rick Leach	Scale 1"=80'	Date 11/20/2009
Field Book OW-215	Material Original Ground	Revised -	Project No. 3709415	Drawing No. 7

**Kadmas**  
**Lee &**  
**Jackson**  
Engineers Surveyors  
 Planners

# Pad Layout

## Questar Exploration & Production Company

### MHA #1-12-11H-150-91



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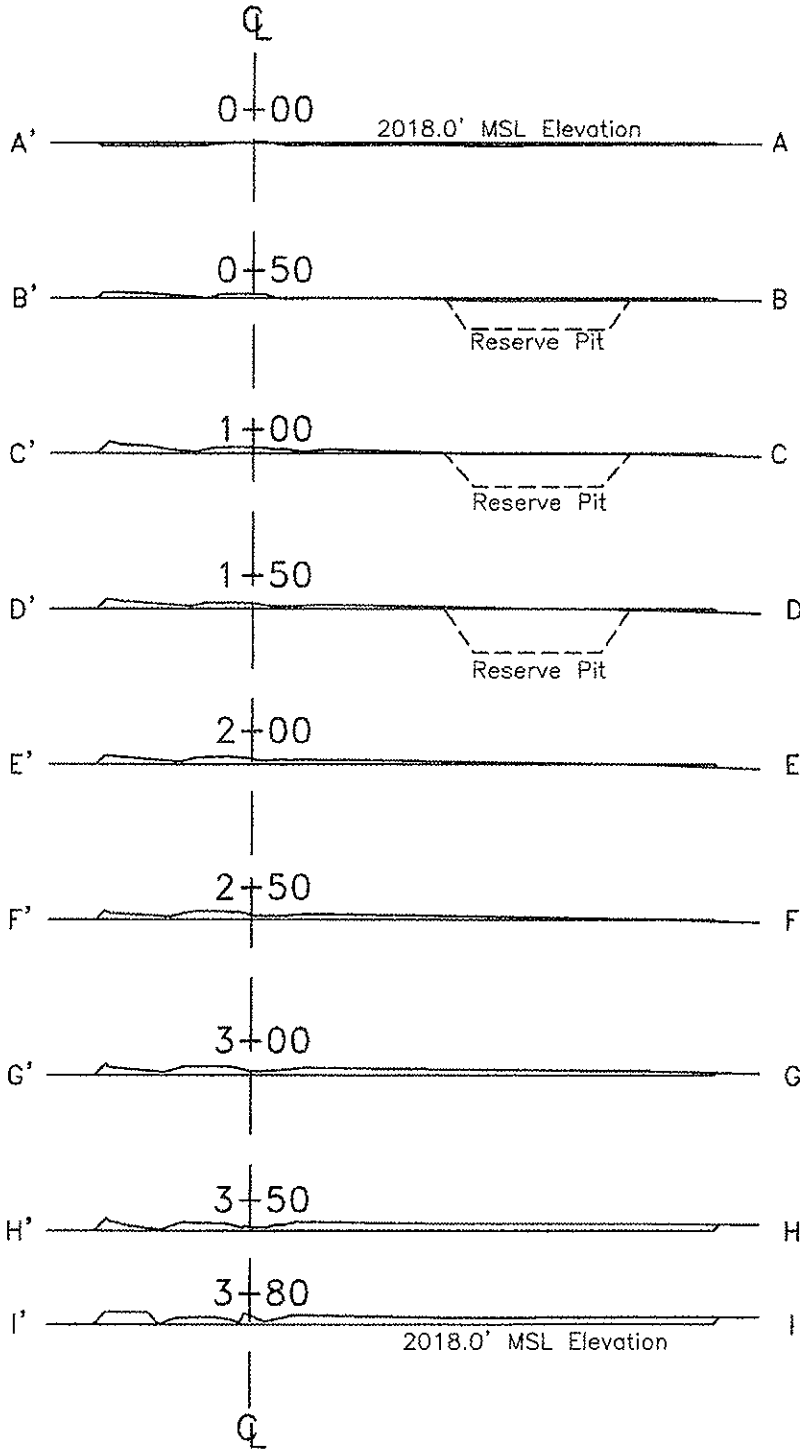
Drawn By Roxy Crist	Checked By Jay Northrop	Approved By Rick Leach	Scale 1"=80'	Date 11/20/2009
Field Book OW-215	Material Pad Layout	Revised -	Project No. 3709415	Drawing No. 8

**Kadmas**  
**Lee &**  
**Jackson**  
Engineers Surveyors  
Planners

# Pad Cross Sections

## Questar Exploration & Production Company

### MHA #1-12-11H-150-91



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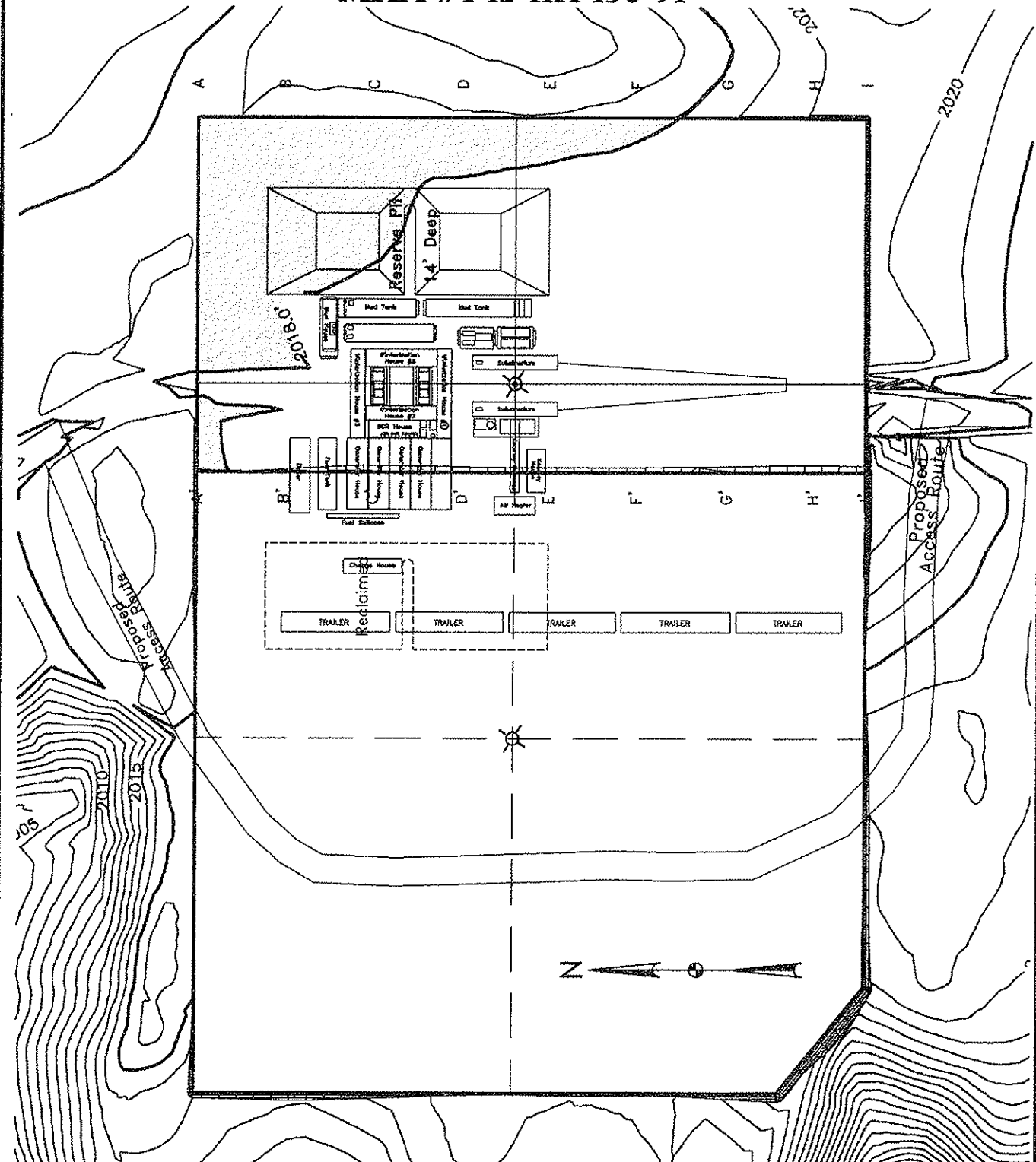
Drawn By Roxy Crist	Checked By Jay Northrop	Approved By Rick Leach	Scale 1"=60'	Date 11/20/2009
Field Book OW-215	Material Pad Layout	Revised -	Project No. 3709415	Drawing No. 9

**Kadmas**  
**Lee &**  
**Jackson**  
Engineers Surveyors  
Planners

# Rig Layout

## Questar Exploration & Production Company

### MHA #1-12-11H-150-91



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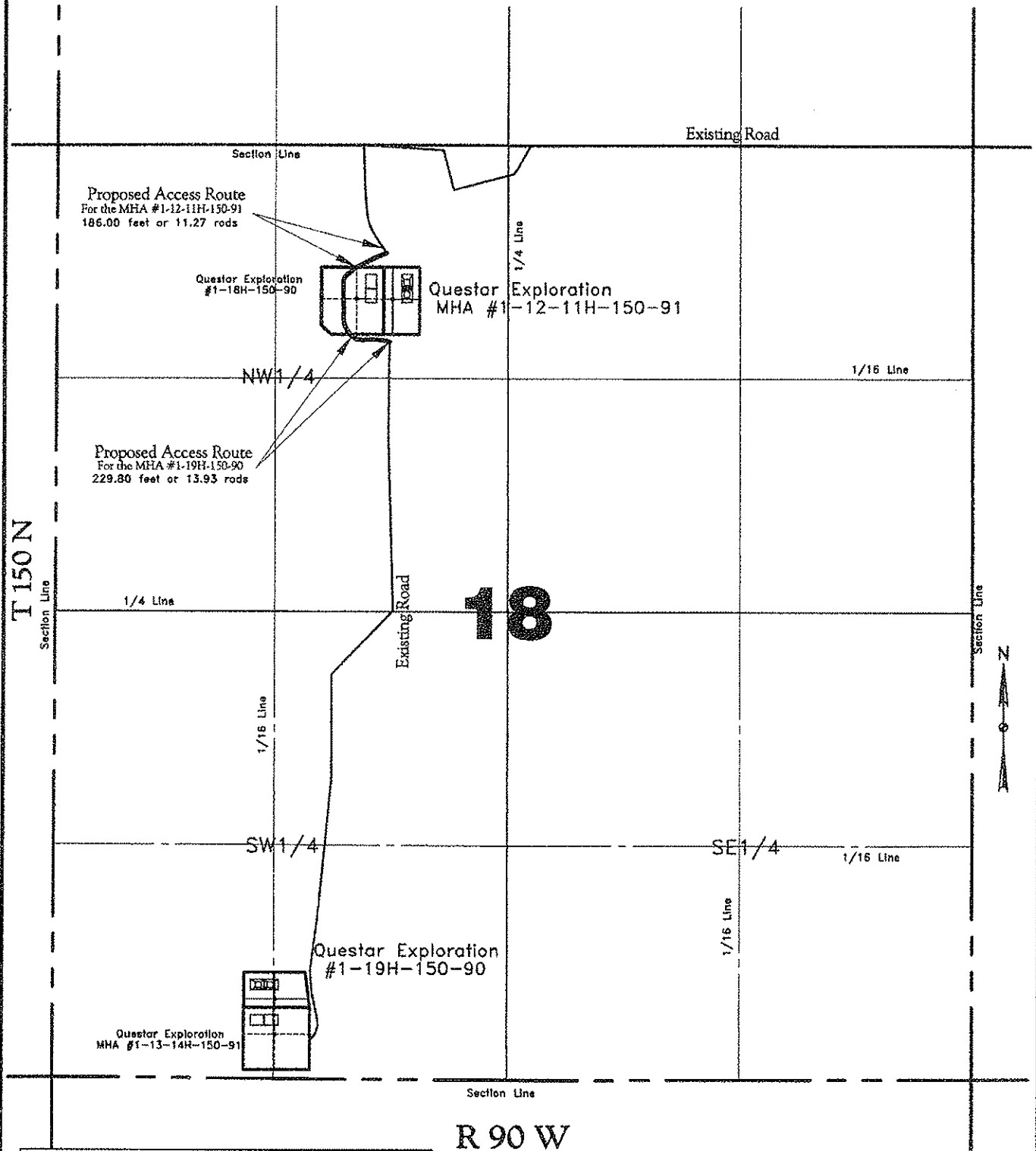
Drawn By Roxy Crist	Checked By Jay Northrop	Approved By Rick Leach	Scale 1"=80'	Date 11/20/2009
Field Book OW-215	Material Rig Layout	Revised -	Project No. 3709415	Drawing No. 10

  
**Kadmas**  
**Lee & Jackson**  
 Engineers Surveyors  
 Planners

# Access Road Layouts

## Questar Exploration & Production Company

### MHA #1-12-11H-150-91



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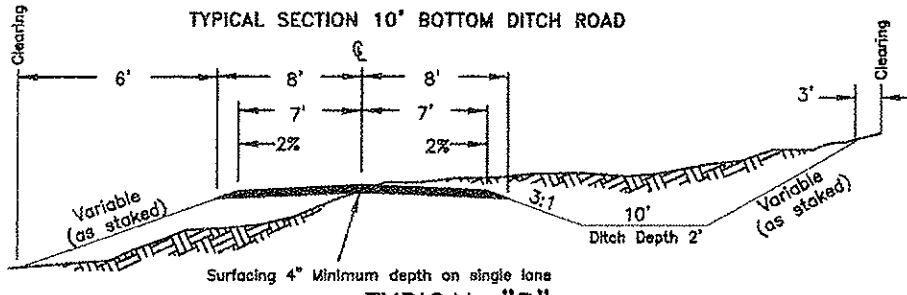
Drawn By Roxy Crist	Checked By Jay Northrop	Approved By Rick Leach	Scale 1"=800'	Date 11/20/2009
Field Book OW-215	Material Access Road	Revised -	Project No. 3709415	Drawing No. 11

**Kadmas**  
**Lee &**  
**Jackson**  
Engineers Surveyors  
Planners

# Roadway Typical Sections

## Questar Exploration & Production Company

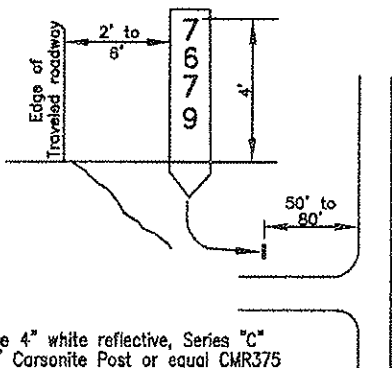
### MHA #1-12-11H-150-91



**TYPICAL "B"**  
No Scale

<p><b>FILL SLOPES</b></p> <p>3:1 Under 4' Height 2:1 Over 4' Height (-) Slopes steeper than 2:1 will be subject to FS approval</p>	<p><b>FILL WIDENING</b></p> <p>2' to 5' high/add 1' Over 5' high/add 2'</p>	<p><b>CUT SLOPES</b></p> <p>3:1 Under 10' height 2:1 10' to 20' height (-) Variable over 20' height w/FS approval</p>
<p><b>CURVE WIDENING</b></p> <p>130 / R</p>		

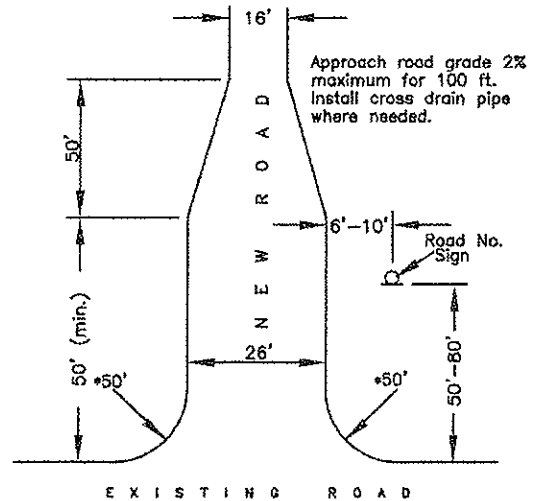
**TYPICAL SECTION VERTICAL ROUTE MARKER**



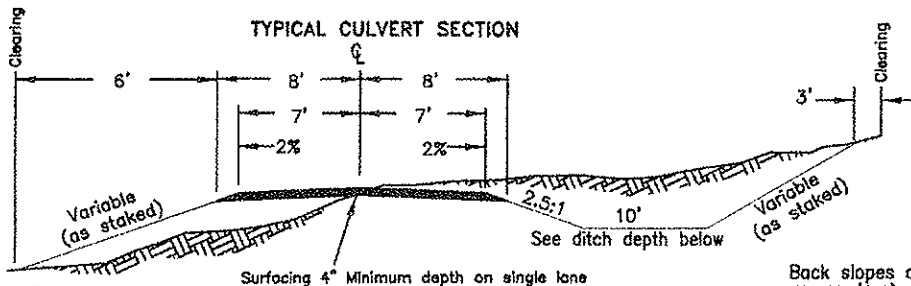
Letters shall be 4" white reflective, Series "C" on Brown 6" 6" Carsonite Post or equal CMR375  
Figure 11-28.- Typical Signage for Vertical Route Markers

**TYPICAL "F"**  
No Scale

**TYPICAL APPROACH ROAD CONNECTION**



\*As noted on road sheets



**TYPICAL "A"**  
No Scale

Fill slopes are V1 H1.5 (1.5:1) or as staked

Ditch width shall be the larger of the following:  
A. Standard ditch width  
B. 2 times the pipe diameter  
C. 4.25'

Ditch depth shall be:	
CMP diameter	Ditch depth
18"	2.5'
24"	3.0'
36"	4.0'
48"	5.0'

Back slopes are V1 H1 (1:1) or as staked

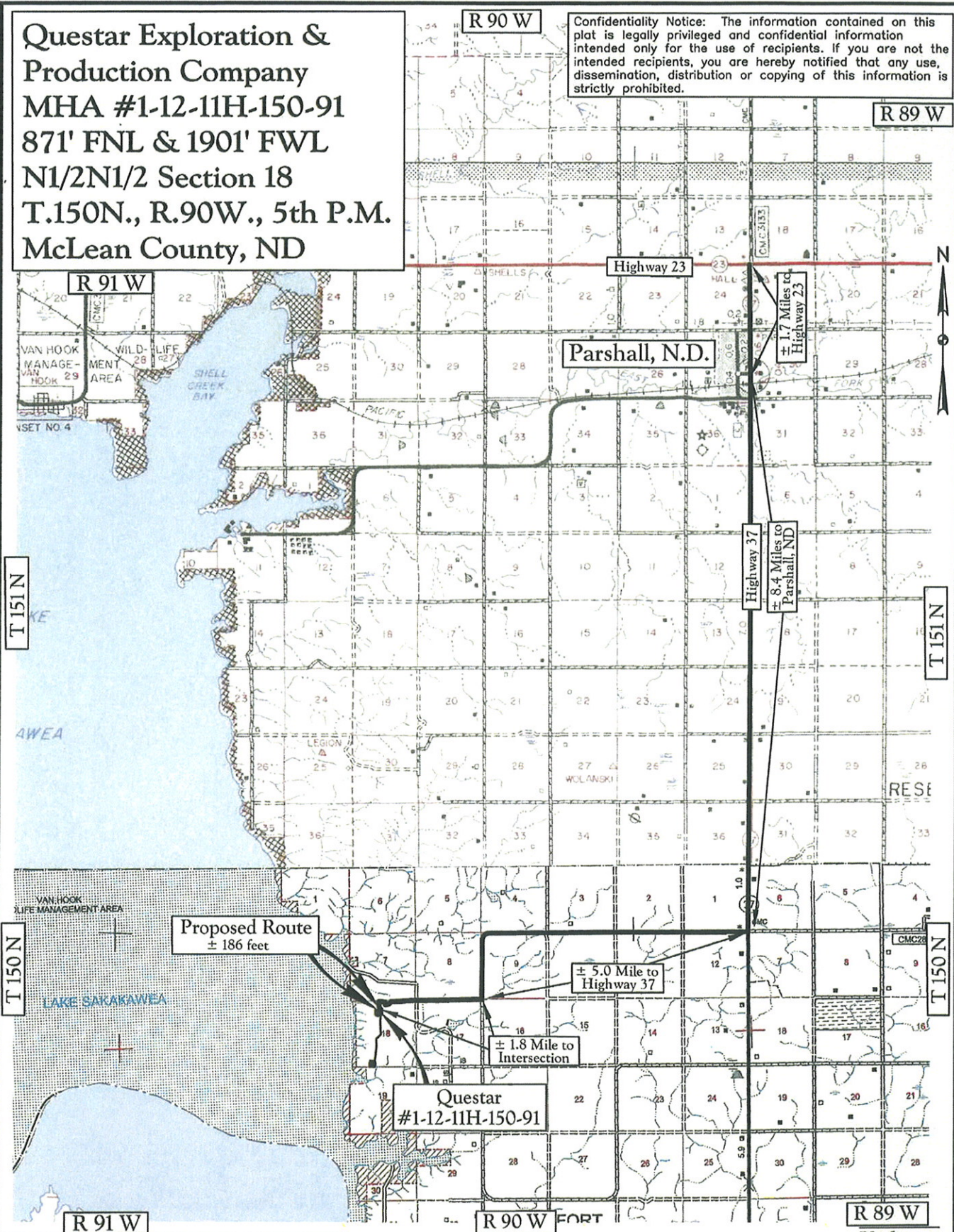
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Drawn By Roxy Crist	Surveyed By Jay Northrop	Approved By Rick Leach	Scale None	Date 11/20/2009
Field Book OW-215	Material Road Typical	Revised -	Project No. 3709415	Drawing No. 12

**Kadmas**  
**Lee &**  
**Jackson**  
Engineers Surveyors  
Planners

**Questar Exploration & Production Company**  
**MHA #1-12-11H-150-91**  
**871' FNL & 1901' FWL**  
**N1/2N1/2 Section 18**  
**T.150N., R.90W., 5th P.M.**  
**McLean County, ND**

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**Map "A"**  
**County Access Route**

**Legend**

Existing Roads

Proposed Roads

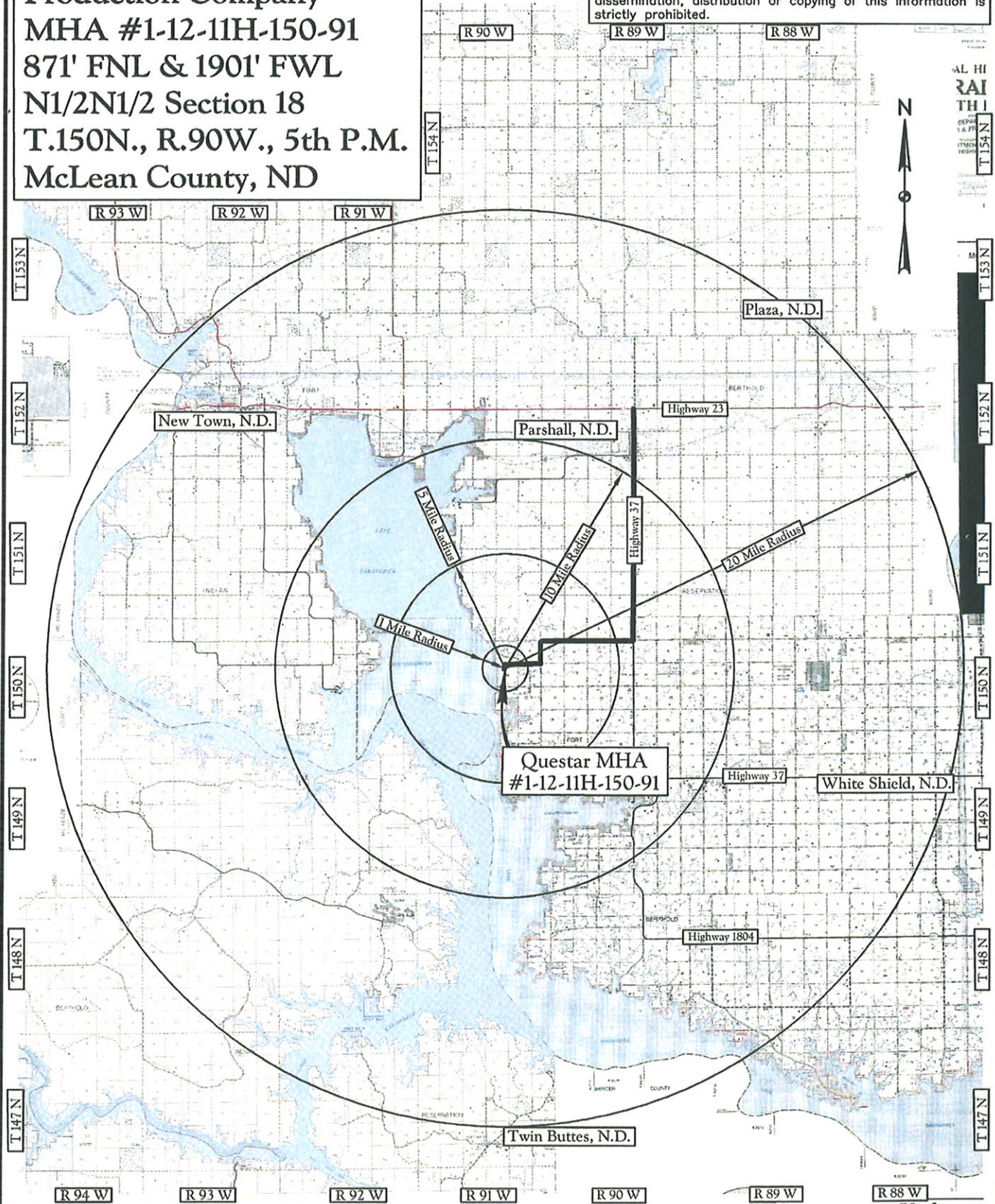
Scale 1" = 2 Miles

**Kadmas**  
**Lee &**  
**Jackson**  
 Engineers Surveyors  
 Planners



**Questar Exploration & Production Company**  
**MHA #1-12-11H-150-91**  
**871' FNL & 1901' FWL**  
**N1/2N1/2 Section 18**  
**T.150N., R.90W., 5th P.M.**  
**McLean County, ND**

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AL HI  
RAI  
TH I  
DEPA  
T & P  
ITME  
RESI

**Map "A-Radius"**  
**County Access Route**

**Legend**

Existing Roads

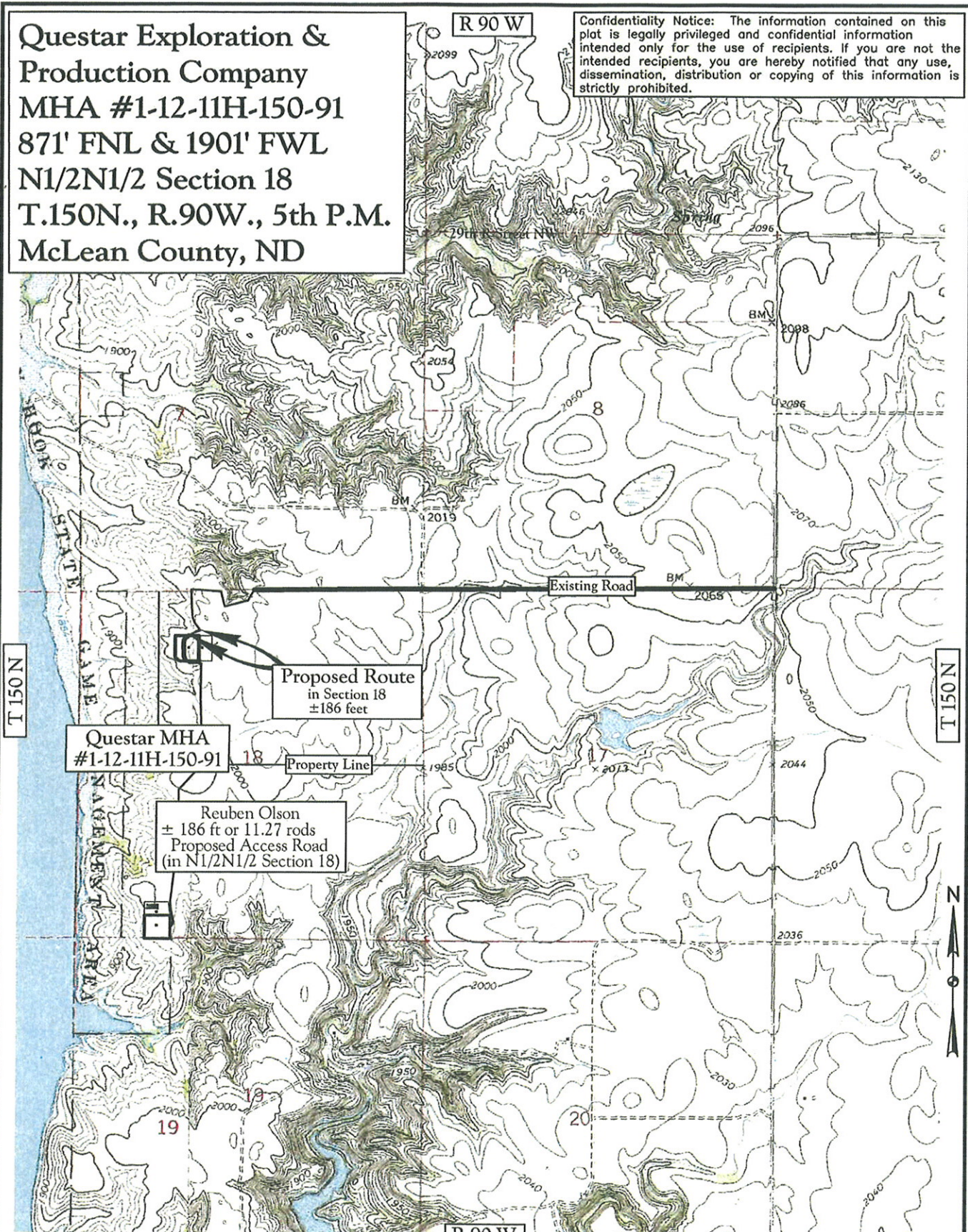
Proposed Roads

Scale 1"=6 Miles



**Kadmas**  
**Lee &**  
**Jackson**  
Engineers Surveyors  
Planners

**Questar Exploration &  
 Production Company**  
**MHA #1-12-11H-150-91**  
**871' FNL & 1901' FWL**  
**N1/2N1/2 Section 18**  
**T.150N., R.90W., 5th P.M.**  
**McLean County, ND**

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**Map "B"**  
**Quad Access Route**

**Legend**  
 Existing Roads   
 Proposed Roads 

**Scale 1" = 2000'**

**Kadmas  
 Lee &  
 Jackson**  
 Engineers Surveyors  
 Planners