

Industrial Commission of North Dakota  
Oil and Gas Division  
Spill / Incident Report

Date/Time Reported : Jan 11 2015 / 16:26

State Agency person :

Responsible Party : OASIS PETROLEUM NORTH AMERICA LLC

Well Operator : OASIS PETROLEUM NORTH AMERICA LLC

Date/Time of Incident : 1/6/2015 12:00:00 AM

NDIC File Number : 23230

Facility Number :

Well or Facility Name : ASH FEDERAL 5300 11-18T

Type of Incident : Valve/Piping Connection Leak

Field Name : BAKER

County : MCKENZIE

Section : 18

Township : 153

Range : 100

Quarter-Quarter :

Quarter :

Distance to nearest residence : 3 Mile

Distance to nearest water well : 3 Mile

Release Oil : 1 Barrels

Release Brine :

Release Other :

Recovered Oil : 1 Barrels

Recovered Brine :

Recovered Other :

Has/Will the incident be reported to the NRC? : No

Was release contained : Yes - On Constructed Well Site

Description of other released substance :

Immediate risk evaluation : None just a little surface contamination, cleaned up with ~~the skid~~ Requested Y/N : N



# SUNDRY NOTICE AND REPORTS ON WELLS - FORM

INDUSTRIAL COMMISSION OF NORTH DAKOTA  
OIL AND GAS DIVISION  
600 EAST BOULEVARD DEPT 405  
BISMARCK, ND 58505-0840  
SFN 5749 (09-2006)



Well File No.  
**23230**

PLEASE READ INSTRUCTIONS BEFORE FILLING OUT FORM.  
PLEASE SUBMIT THE ORIGINAL AND ONE COPY.

<input type="checkbox"/> Notice of Intent	Approximate Start Date	<input type="checkbox"/> Drilling Prognosis	<input type="checkbox"/> Spill Report
<input checked="" type="checkbox"/> Report of Work Done	Date Work Completed <b>February 8, 2013</b>	<input type="checkbox"/> Redrilling or Repair	<input type="checkbox"/> Shooting
<input type="checkbox"/> Notice of Intent to Begin a Workover Project that may Qualify for a Tax Exemption Pursuant to NDCC Section 57-51.1-03.	Approximate Start Date	<input type="checkbox"/> Casing or Liner	<input type="checkbox"/> Acidizing
		<input type="checkbox"/> Plug Well	<input type="checkbox"/> Fracture Treatment
		<input type="checkbox"/> Supplemental History	<input type="checkbox"/> Change Production Method
		<input type="checkbox"/> Temporarily Abandon	<input type="checkbox"/> Reclamation
		<input type="checkbox"/> Other	<b>Well is now on pump</b>

Well Name and Number  
**Ash Federal 5300 11-18T**

Footages <b>800 F N L</b>	<b>350 F W L</b>	Qtr-Qtr <b>LOT1</b>	Section <b>18</b>	Township <b>153 N</b>	Range <b>100 W</b>
Field <b>Baker</b>	Pool <b>Bakken</b>	County <b>McKenzie</b>			

24-HOUR PRODUCTION RATE			
Before	After	Oil	Bbls
Oil	Bbls	Oil	Bbls
Water	Bbls	Water	Bbls
Gas	MCF	Gas	MCF

Name of Contractor(s)

Address	City	State	Zip Code
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## DETAILS OF WORK

Effective February 8, 2013 the well referenced above is on pump.

Tubing: 2-7/8" L-80 tubing @ 10127

Pump: 2-1/2" x 2.0" x 24' insert pump @ 10196

Company <b>Oasis Petroleum North America LLC</b>	Telephone Number <b>281 404-9563</b>	
Address <b>1001 Fannin, Suite 1500</b>		
City <b>Houston</b>	State <b>TX</b>	Zip Code <b>77002</b>
Signature 	Printed Name <b>Heather McCowan</b>	
Title <b>Regulatory Assistant</b>	Date <b>April 4, 2013</b>	
Email Address <b>hmccowan@oasispetroleum.com</b>		

<input checked="" type="checkbox"/> Received	<input type="checkbox"/> Approved
Date <b>April 10, 2013</b>	
By 	
Title <b>PETROLEUM ENGINEER</b>	



# WELL COMPLETION OR RECOMPLETION REPORT - FORM

INDUSTRIAL COMMISSION OF NORTH DAKOTA  
OIL AND GAS DIVISION  
600 EAST BOULEVARD DEPT 405  
BISMARCK, ND 58505-0840  
SFN 2468 (04-2010)



Well File No.  
**23230**

PLEASE READ INSTRUCTIONS BEFORE FILLING OUT FORM.

PLEASE SUBMIT THE ORIGINAL AND ONE COPY.

## Designate Type of Completion

- |  |                                   |  |  |   |  |
|--|-----------------------------------|--|--|---|--|
| <input checked="" type="checkbox"/> Oil Well | <input type="checkbox"/> EOR Well | <input type="checkbox"/> Recompletion      | <input type="checkbox"/> Deepened Well | <input type="checkbox"/> Added Horizontal Leg | <input type="checkbox"/> Extended Horizontal Leg |
| <input type="checkbox"/> Gas Well            | <input type="checkbox"/> SWD Well | <input type="checkbox"/> Water Supply Well | <input type="checkbox"/> Other:        |   |  |

## Well Name and Number

**Ash Federal 5300 11-18T**

## Spacing Unit Description

**T153N R100W Section 17 & 18**

## Operator

**Oasis Petroleum North America LLC**

## Telephone Number

**(281) 404-9491**

## Field

**Baker**

## Address

**1001 Fannin, Suite 1500**

## Pool

**Bakken**

## City

**Houston**

## State

**TX**

## Zip Code

**77002**

## Permit Type

Wildcat

Development

Extension

## LOCATION OF WELL

At Surface		Qtr-Qtr	Section	Township	Range	County
<b>800</b>	<b>F N L</b>	<b>350</b>	<b>F WL</b>	<b>LOT1</b>	<b>18</b>	<b>153 N</b>
Spud Date		Date TD Reached		Drilling Contractor and Rig Number		KB Elevation (Ft)
<b>August 22, 2012</b>		<b>September 15, 2012</b>		<b>Nabors B22</b>		<b>2078</b>
Graded Elevation (Ft)						<b>2053</b>

Type of Electric and Other Logs Run (See Instructions)

**N/A**

## CASING & TUBULARS RECORD (Report all strings set in well)

Well Bore	String Type	Size (Inch)	Top Set (MD Ft)	Depth Set (MD Ft)	Hole Size (Inch)	Weight (Lbs/Ft)	Anchor Set (MD Ft)	Packer Set (MD Ft)	Sacks Cement	Top of Cement
<b>Surface Hole</b>	<b>Surface</b>	<b>9 5/8</b>		<b>2200</b>	<b>13 1/2</b>	<b>36</b>				<b>0</b>
<b>Vertical Hole</b>	<b>Intermediate</b>	<b>7</b>		<b>11101</b>	<b>8 3/4</b>	<b>29 &amp; 32</b>				<b>2150</b>
<b>Lateral1</b>	<b>Liner</b>	<b>4 1/2</b>	<b>10197</b>	<b>20447</b>	<b>6</b>	<b>11.6</b>				

## PERFORATION & OPEN HOLE INTERVALS

Well Bore	Well Bore TD Drillers Depth (MD Ft)	Completion Type	Open Hole/Perforated Interval (MD Ft)	Kick-off Point (MD Ft)	Top of Casing Window (MD Ft)	Date Perfd or Drilled	Date Isolated	Isolation Method	Sacks Cement
<b>Lateral1</b>	<b>20447</b>	<b>Perforations</b>	<b>11101</b>	<b>20482</b>	<b>10335</b>		<b>10/26/2012</b>		
	<b>14938</b>			<b>14938</b>					
<b>sidetrack1</b>	<b>20482</b>		<b>13332</b>	<b>20482</b>					

## PRODUCTION

Current Producing Open Hole or Perforated Interval(s), This Completion, Top and Bottom, (MD Ft)				Name of Zone (If Different from Pool Name)			
<b>Lateral 1- 11-101-20,482'</b>				<b>Three Forks</b>			
Date Well Completed (SEE INSTRUCTIONS)		Producing Method		Pumping-Size & Type of Pump			
<b>November 7, 2012</b>		<b>Flowing</b>					
Date of Test	Hours Tested	Choke Size	Production for Test	Oil (Bbls)	Gas (MCF)	Water (Bbls)	Oil Gravity-API (Corr.)
<b>11/20/2012</b>	<b>24</b>	<b>68 /64</b>		<b>2734</b>	<b>2940</b>	<b>3564</b>	<b>42.6 °</b>
Disposition of Gas							
Flowing Tubing Pressure (PSI)	Flowing Casing Pressure (PSI)	Calculated 24-Hour Rate	Oil (Bbls)	Gas (MCF)	Water (Bbls)	Gas-Oil Ratio	
			<b>2734</b>	<b>2940</b>	<b>3564</b>	<b>1075</b>	

## GEOLOGICAL MARKERS

## **PLUG BACK INFORMATION**

## CORES CUT

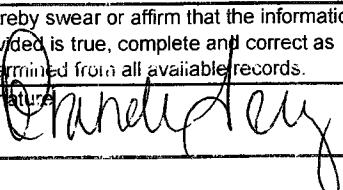
Scores Cut					
Top (Ft)	Bottom (Ft)	Formation	Top (Ft)	Bottom (Ft)	Formation

## Drill Stem Test

### Well Specific Stimulation

Date Stimulated <b>10/26/2012</b>	Stimulated Formation <b>Three Forks</b>		Top (Ft) <b>11101</b>	Bottom (Ft) <b>20482</b>	Stimulation Stages <b>36</b>	Volume <b>92216</b>	Volume Units <b>Barrels</b>
Type Treatment <b>Sand Frac</b>	Acid %	Lbs Proppant <b>3700348</b>	Maximum Treatment Pressure (PSI) <b>9214</b>		Maximum Treatment Rate (BBLS/Min) <b>42.2</b>		
Details <b>100 mesh-144,777 40/70 sand- 1,426,577 20/40 ceramic-2,128,994</b>							
Date Stimulated	Stimulated Formation		Top (Ft)	Bottom (Ft)	Stimulation Stages	Volume	Volume Units
Type Treatment	Acid %	Lbs Proppant	Maximum Treatment Pressure (PSI)		Maximum Treatment Rate (BBLS/Min)		
Details							
Date Stimulated	Stimulated Formation		Top (Ft)	Bottom (Ft)	Stimulation Stages	Volume	Volume Units
Type Treatment	Acid %	Lbs Proppant	Maximum Treatment Pressure (PSI)		Maximum Treatment Rate (BBLS/Min)		
Details							
Date Stimulated	Stimulated Formation		Top (Ft)	Bottom (Ft)	Stimulation Stages	Volume	Volume Units
Type Treatment	Acid %	Lbs Proppant	Maximum Treatment Pressure (PSI)		Maximum Treatment Rate (BBLS/Min)		
Details							
Date Stimulated	Stimulated Formation		Top (Ft)	Bottom (Ft)	Stimulation Stages	Volume	Volume Units
Type Treatment	Acid %	Lbs Proppant	Maximum Treatment Pressure (PSI)		Maximum Treatment Rate (BBLS/Min)		
Details							

### ADDITIONAL INFORMATION AND/OR LIST OF ATTACHMENTS

I hereby swear or affirm that the information provided is true, complete and correct as determined from all available records. 	Email Address <b>bterry@oasispetroleum.com</b>	Date <b>01/16/2013</b>
Signature	Printed Name <b>Brandi Terry</b>	Title <b>Regulatory Specialist</b>



## AUTHORIZATION TO PURCHASE AND TRANSPORT OIL FROM LEASE - Form 8

INDUSTRIAL COMMISSION OF NORTH DAKOTA  
OIL AND GAS DIVISION  
600 EAST BOULEVARD DEPT 405  
BISMARCK, ND 58505-0840  
SFN 5698 (03-2000)



Well File No.
23230
NDIC CTB No.
123230 →

220275

PLEASE READ INSTRUCTIONS BEFORE FILLING OUT FORM.

PLEASE SUBMIT THE ORIGINAL AND FOUR COPIES.

Well Name and Number ASH FEDERAL 5300 11-18T	Qtr-Qtr LOT1	Section 18	Township 153 N	Range 100 W	County #N/A <i>McKenzie</i>
---	-----------------	---------------	-------------------	----------------	--------------------------------

Operator Oasis Petroleum North America LLC	Telephone Number (281) 404-9573	Field BAKER
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Address 1001 Fannin, Suite 1500	City Houston	State TX	Zip Code 77002
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Name of First Purchaser Oasis Petroleum Marketing LLC	Telephone Number (281) 404-9573	% Purchased 100%	Date Effective November 7, 2012
Principal Place of Business 1001 Fannin, Suite 1500	City Houston	State TX	Zip Code 77002
Field Address	City	State	Zip Code
Transporter Hiland Crude, LLC	Telephone Number (580) 616-2058	% Transported 75%	Date Effective November 7, 2012
Address P.O. Box 3886	City Enid	State OK	Zip Code 73702
The above named producer authorizes the above named purchaser to purchase the percentage of oil stated above which is produced from the lease designated above until further notice. The oil will be transported by the above named transporter.			

Other First Purchasers Purchasing From This Lease	% Purchased	Date Effective
Other First Purchasers Purchasing From This Lease	% Purchased	Date Effective
Other Transporters Transporting From This Lease	% Transported	Date Effective
Blackstone Crude Oil LLC	25%	November 7, 2012
Other Transporters Transporting From This Lease	% Transported	Date Effective
Comments		

I hereby swear or affirm that the information provided is true, complete and correct as determined from all available records.	Date November 9, 2012
Signature <i>Annette Terrell</i>	Printed Name Annette Terrell

Above Signature Witnessed By: Signature <i>Dina Barron</i>	Printed Name Oil & Gas Production Analyst Dina Barron	Title Mktg. Contracts Administrator
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Industrial Commission of North Dakota  
Oil and Gas Division

Well or Facility No

23230

AD

Verbal Approval To Purchase and Transport Oil      Tight Hole      Yes

**OPERATOR**

Operator <b>OASIS PETROLEUM NORTH AMERICA LL</b>	Representative <b>Terry Nelson</b>	Rep Phone <b>(406) 489-3036</b>
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**WELL INFORMATION**

Well Name <b>ASH FEDERAL 5300 11-18T</b>	Inspector <b>Richard Dunn</b>
Well Location    QQ            Sec            Twp            Rng	County <b>MCKENZIE</b>
LOT1    18    153    N    100    W	Field <b>BAKER</b>
Footages        800      Feet From the N Line	Pool <b>BAKKEN</b>
350      Feet From the W Line	Date of First Production Through Permanent Wellhead <b>This Is Not The First Sales</b>

**PURCHASER / TRANSPORTER**

Purchaser <b>BANNER PIPELINE COMPANY LLC</b>	Transporter <b>BANNER TRANSPORTATION CO., LLC</b>
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**TANK BATTERY**

Single Well Tank Battery Number :

**SALES INFORMATION**    This Is Not The First Sales

ESTIMATED BARRELS TO BE SOLD		ACTUAL BARRELS SOLD	DATE
15000	BBLS	BBLS	
	BBLS	BBLS	

**DETAILS**

Must E-Mail or Call Inspector at 701-770-3554/rsdunn@nd.gov on first date of sales and report amount sold, date sold, and first date of production through the permanent wellhead. Must also forward Forms 6 & 8 to State prior to reaching 15000 Bbl estimate or no later than required time frame for submitting those forms.

Start Date	11/6/2012
Date Approved	11/6/2012
Approved By	Richard Dunn



# SUNDRY NOTICES AND REPORTS ON WELLS - FORM 4

INDUSTRIAL COMMISSION OF NORTH DAKOTA  
OIL AND GAS DIVISION  
600 EAST BOULEVARD DEPT 405  
BISMARCK, ND 58505-0840  
SFN 5749 (09-2006)

Well File No.  
**23230**



PLEASE READ INSTRUCTIONS BEFORE FILLING OUT FORM.

PLEASE SUBMIT THE ORIGINAL AND ONE COPY.

<input checked="" type="checkbox"/> Notice of Intent	Approximate Start Date <b>October 10, 2012</b>
<input type="checkbox"/> Report of Work Done	Date Work Completed
<input type="checkbox"/> Notice of Intent to Begin a Workover Project that may Qualify for a Tax Exemption Pursuant to NDCC Section 57-51.1-03.	Approximate Start Date

<input type="checkbox"/> Drilling Prognosis	<input type="checkbox"/> Spill Report
<input type="checkbox"/> Redrilling or Repair	<input type="checkbox"/> Shooting
<input type="checkbox"/> Casing or Liner	<input type="checkbox"/> Acidizing
<input type="checkbox"/> Plug Well	<input type="checkbox"/> Fracture Treatment
<input type="checkbox"/> Supplemental History	<input type="checkbox"/> Change Production Method
<input type="checkbox"/> Temporarily Abandon	<input type="checkbox"/> Reclamation
<input type="checkbox"/> Other	<b>Waiver from tubing/packer requirement</b>

Well Name and Number <b>Ash Federal 5300 11-18T</b>					
Footages <b>800 F N L</b>	Qtr-Qtr <b>350 F W L</b>	Section <b>LOT1</b>	Township <b>18</b>	Range <b>153 N</b>	Range <b>100 W</b>
Field <b>Baker</b>	Pool <b>Bakken</b>	County <b>McKenzie</b>			

24-HOUR PRODUCTION RATE			
Before		After	
Oil	Bbls	Oil	Bbls
Water	Bbls	Water	Bbls
Gas	MCF	Gas	MCF

Name of Contractor(s)			
Address		City	State
			Zip Code

## DETAILS OF WORK

Oasis Petroleum North America LLC requests a waiver from the tubing/pkr requirement included in NDAC 43-02-03-21: Casing, tubing, and cementing requirements during the completion period immediately following the upcoming fracture stimulation.

The following assurances apply:

1. The well is equipped with new 29# & 32# casing at surface with an API burst rating of 11,220 psi
2. The frac design will use a safety factor of 0.85 API burst rating to determine the maximum pressure.
3. Damage to the casing during the frac would be detected immediately by monitoring equipment.
4. The casing is exposed to significantly lower rates and pressures during flow back than during the frac job.
5. The frac fluid and formation fluids have very low corrosion and erosion rates.
6. Production equipment will be installed as soon as possible after the well ceases flowing.
7. A 300# gauge will be installed on the surface casing during the flowback period.

Company <b>Oasis Petroleum North America LLC</b>		Telephone Number <b>281-404-9491</b>
Address <b>1001 Fannin, Suite 1500</b>		
City <b>Houston</b>	State <b>TX</b>	Zip Code <b>77002</b>
Signature 	Printed Name <b>Brandi Terry</b>	
Title <b>Regulatory Specialist</b>	Date <b>October 10, 2012</b>	
Email Address <b>bterry@oasispetroleum.com</b>		

FOR STATE USE ONLY	
<input type="checkbox"/> Received	<input checked="" type="checkbox"/> Approved
Date <i>October 15, 2012</i>	
By 	
Title <b>PETROLEUM ENGINEER</b>	



# SUNDRY NOTICES AND REPORTS ON WELLS - FORM 4

INDUSTRIAL COMMISSION OF NORTH DAKOTA  
OIL AND GAS DIVISION  
600 EAST BOULEVARD DEPT 405  
BISMARCK, ND 58505-0840  
SFN 5749 (09-2006)

Well File No.

23230



PLEASE READ INSTRUCTIONS BEFORE FILLING OUT FORM.  
PLEASE SUBMIT THE ORIGINAL AND ONE COPY.

<input checked="" type="checkbox"/> Notice of Intent	Approximate Start Date <b>October 10, 2012</b>
<input type="checkbox"/> Report of Work Done	Date Work Completed
<input type="checkbox"/> Notice of Intent to Begin a Workover Project that may Qualify for a Tax Exemption Pursuant to NDCC Section 57-51.1-03.	Approximate Start Date

- |   |   |
|---|---|
| <input type="checkbox"/> Drilling Prognosis   | <input type="checkbox"/> Spill Report             |
| <input type="checkbox"/> Redrilling or Repair | <input type="checkbox"/> Shooting                 |
| <input type="checkbox"/> Casing or Liner      | <input type="checkbox"/> Acidizing                |
| <input type="checkbox"/> Plug Well            | <input type="checkbox"/> Fracture Treatment       |
| <input type="checkbox"/> Supplemental History | <input type="checkbox"/> Change Production Method |
| <input type="checkbox"/> Temporarily Abandon  | <input type="checkbox"/> Reclamation              |
| <input checked="" type="checkbox"/> Other     | <u>Change well status to CONFIDENTIAL</u>         |

Well Name and Number  
**Ash Federal 5300 11-18T**

Footages <b>800 F N L</b>	Qtr-Qtr <b>350 F W L</b>	Section <b>LOT1</b>	Township <b>18</b>	Range <b>153 N</b>	<b>100 W</b>
Field <b>Baker</b>	Pool <b>Bakken</b>	County <b>McKenzie</b>			

## 24-HOUR PRODUCTION RATE

	Before		After
Oil	Bbls	Oil	Bbls
Water	Bbls	Water	Bbls
Gas	MCF	Gas	MCF

Name of Contractor(s)

Address

City

State

Zip Code

## DETAILS OF WORK

**Effective immediately, we request CONFIDENTIAL STATUS for the above referenced well.**

Ends 4-11-2013

Company <b>Oasis Petroleum North America LLC</b>	Telephone Number <b>281-404-9491</b>	
Address <b>1001 Fannin, Suite 1500</b>		
City <b>Houston</b>	State <b>TX</b>	Zip Code <b>77002</b>
Signature 	Printed Name <b>Brandi Terry</b>	
Title <b>Regulatory Specialist</b>	Date <b>October 10, 2012</b>	
Email Address <b>bterry@oasispetroleum.com</b>		

## FOR STATE USE ONLY

<input type="checkbox"/> Received	<input checked="" type="checkbox"/> Approved
Date <b>10-11-2012</b>	
By 	
Title <b>Engineering Technician</b>	

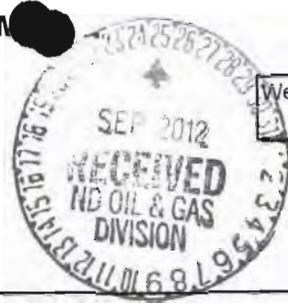


# SUNDY NOTICE AND REPORTS ON WELLS - FORM

INDUSTRIAL COMMISSION OF NORTH DAKOTA  
OIL AND GAS DIVISION  
600 EAST BOULEVARD DEPT 405  
BISMARCK, ND 58505-0840  
SFN 5749 (09-2006)

Well File No.

23230



PLEASE READ INSTRUCTIONS BEFORE FILLING OUT FORM.

PLEASE SUBMIT THE ORIGINAL AND ONE COPY.

<input checked="" type="checkbox"/> Notice of Intent	Approximate Start Date <b>September 27, 2012</b>	<input type="checkbox"/> Drilling Prognosis	<input type="checkbox"/> Spill Report
<input type="checkbox"/> Report of Work Done	Date Work Completed	<input type="checkbox"/> Redrilling or Repair	<input type="checkbox"/> Shooting
<input type="checkbox"/> Notice of Intent to Begin a Workover Project that may Qualify for a Tax Exemption Pursuant to NDCC Section 57-51.1-03. Approximate Start Date		<input type="checkbox"/> Casing or Liner	<input type="checkbox"/> Acidizing
		<input type="checkbox"/> Plug Well	<input type="checkbox"/> Fracture Treatment
		<input type="checkbox"/> Supplemental History	<input type="checkbox"/> Change Production Method
		<input type="checkbox"/> Temporarily Abandon	<input checked="" type="checkbox"/> Reclamation
		<input type="checkbox"/> Other	<b>Reserve pit reclamation</b>

## Well Name and Number

**Ash Federal 5300 11-18T**

Footages	Qtr-Qtr	Section	Township	Range
800 F N L	350 F W L	LOT1	18	153 N 100 W
Field <b>Baker</b>	Pool <b>Bakken</b>		County <b>McKenzie</b>	

## 24-HOUR PRODUCTION RATE

Before	After
Oil Bbls	Oil Bbls
Water Bbls	Water Bbls
Gas MCF	Gas MCF

## Name of Contractor(s)

**Excel Industries, Inc**

Address P.O. Box 159	City Miles City	State MT	Zip Code 59301

## DETAILS OF WORK

Oasis Petroleum North America LLC plans to reclaim the reserve pit for the above referenced wells as follows:

The NDIC field inspector, Rick Dunn and the surface owners, were notified on 09-21-2012.

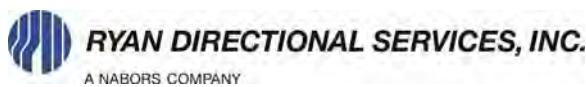
Surface owners: Stewart and Alicia Kline, 13794 46th Street NW, Williston, ND 58801

There is no fluid in the pit to dispose of. Spread cuttings out in pit and backfill with clay, fold edges of liner over pit to completely cover pit. Slope and contour wellsite to ensure proper drainage.

Company <b>Oasis Petroleum North America LLC</b>	Telephone Number <b>281-404-9491</b>	
Address <b>1001 Fannin, Suite 1500</b>		
City <b>Houston</b>	State <b>TX</b>	Zip Code <b>77002</b>
Signature 	Printed Name <b>Brandi Terry</b>	
Title <b>Regulatory Specialist</b>	Date <b>September 24, 2012</b>	
Email Address <b>bterry@oasispetroleum.com</b>		

## FOR STATE USE ONLY

<input type="checkbox"/> Received	<input checked="" type="checkbox"/> Approved
Date <b>9-26-12</b>	
By 	
Title <b>CDW</b>	



19510 Oil Center Blvd  
Houston, TX 77073  
Bus 281.443.1414  
Fax 281.443.1676

Monday, October 01, 2012

State of North Dakota

Subject: **Surveys**

Re: **Oasis**  
**Ash Federal 5300 11-18T**  
**McKenzie County, ND**

Enclosed, please find the original and one copy of the survey performed on the above-referenced well by Ryan Directional Services, Inc. Other information required by your office is as follows:

<b>Surveyor Name</b>	<b>Surveyor Title</b>	<b>Borehole Number</b>	<b>Start Depth</b>	<b>End Depth</b>	<b>Start Date</b>	<b>End Date</b>	<b>Type of Survey</b>	<b>TD Straight Line Projection</b>
Mccammond, Mike	MWD Operator	O.H.	2183'	14837'	08/25/12	09/07/12	MWD	14938'
Mccammond, Mike	MWD Operator	ST 1	13238'	20420'	09/08/12	09/18/12	MWD	20482'

A certified plat on which the bottom hole location is oriented both to the surface location and to the lease lines (or unit lines in case of pooling) is attached to the survey report. If any other information is required please contact the undersigned at the letterhead address or phone number.

A handwritten signature in black ink that reads "Douglas Hudson".

**Douglas Hudson**  
Well Planner



19510 Oil Center Blvd  
Houston, TX 77073  
Bus 281.443.1414  
Fax 281.443.1676

Monday, October 01, 2012

State of North Dakota

Subject: **Survey Certification Letter**

Re: **Oasis**  
**Ash Federal 5300 11-18T**  
**McKenzie County, ND**

I, Mike Mccammond, certify that; I am employed by Ryan Directional Services, Inc.; that I did on the conduct or supervise the taking of the following MWD surveys:

on the day(s) of 8/25/2012 thru 9/7/2012 from a depth of 2183' MD to a depth of 14837' MD and Straight line projection to TD 14938' MD;

on the day(s) of 9/8/2012 thru 9/18/2012 from a depth of 13238' MD to a depth of 20420' MD and Straight line projection to TD 20482' MD;

that the data is true, correct, complete, and within the limitations of the tool as set forth by Ryan Directional Services, Inc.; that I am authorized and qualified to make this report; that this survey was conducted at the request of Oasis for the Ash Federal 5300 11-18T; in McKenzie County, ND.

Mike Mccammond

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**Mike Mccammond**  
MWD Operator  
Ryan Directional Services, Inc.

Report #: 1  
Date: \_\_\_\_\_



**RYAN DIRECTIONAL  
SERVICES**  
A NABORS COMPANY

Ryan Job # 5451  
Kit # 9

**SURVEY REPORT**

Customer:	Oasis Petroleum
Well Name:	Ash Federal 5300 11-18T
Block or Section:	Section 18 T-153N R-100W
Rig #:	Nabors B-22
Calculation Method:	Minimun Curvature Calculation

MWD Operator:	Mike McCommand
Directional Drillers:	D Bohn/M Bader
Survey Corrected To:	True North
Vertical Section Direction:	90.29
Survey Correction:	8.47
Temperature Forecasting Model (Chart Only):	Logarithmic

Survey #	MD	Inc	Azm	Temp	TVD	VS	N/S	E/W	DLS
<b>Tie in to Gyro Surveys</b>									
<b>Tie In</b>	<b>2183</b>	<b>0.00</b>	<b>0.00</b>		<b>2183.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>
1	2261	1.20	173.10	89.00	2260.99	0.10	-0.81	0.10	1.54
2	2354	0.90	183.40	93.00	2353.98	0.18	-2.51	0.17	0.38
3	2448	0.70	203.60	96.00	2447.97	-0.08	-3.77	-0.10	0.36
4	2541	0.40	249.50	100.00	2540.97	-0.61	-4.40	-0.63	0.55
<b>5</b>	<b>2634</b>	<b>0.80</b>	<b>271.30</b>	<b>102.00</b>	<b>2633.96</b>	<b>-1.56</b>	<b>-4.50</b>	<b>-1.59</b>	<b>0.49</b>
6	2727	1.00	274.10	105.00	2726.95	-3.02	-4.43	-3.05	0.22
7	2821	1.10	288.60	107.00	2820.93	-4.70	-4.08	-4.72	0.30
8	2914	1.20	294.00	109.00	2913.91	-6.44	-3.40	-6.45	0.16
9	3007	1.50	299.60	109.00	3006.89	-8.39	-2.41	-8.40	0.35
<b>10</b>	<b>3101</b>	<b>1.40</b>	<b>305.10</b>	<b>111.00</b>	<b>3100.86</b>	<b>-10.41</b>	<b>-1.14</b>	<b>-10.41</b>	<b>0.18</b>
11	3194	1.30	305.50	113.00	3193.83	-12.20	0.13	-12.20	0.11
12	3287	1.20	304.30	114.00	3286.81	-13.87	1.29	-13.86	0.11
13	3381	1.20	313.70	118.00	3380.79	-15.40	2.52	-15.39	0.21
14	3474	1.20	308.00	120.00	3473.77	-16.88	3.80	-16.86	0.13
<b>15</b>	<b>3568</b>	<b>1.10</b>	<b>310.30</b>	<b>123.00</b>	<b>3567.75</b>	<b>-18.35</b>	<b>4.99</b>	<b>-18.32</b>	<b>0.12</b>
16	3661	1.00	303.00	125.00	3660.74	-19.71	6.01	-19.68	0.18
17	3754	1.00	310.00	125.00	3753.72	-21.02	6.97	-20.99	0.13
18	3848	1.00	311.40	125.00	3847.71	-22.27	8.04	-22.23	0.03
19	3941	0.80	310.70	127.00	3940.70	-23.38	9.00	-23.33	0.22
<b>20</b>	<b>4034</b>	<b>0.80</b>	<b>314.00</b>	<b>131.00</b>	<b>4033.69</b>	<b>-24.34</b>	<b>9.87</b>	<b>-24.29</b>	<b>0.05</b>
21	4127	0.80	316.20	132.00	4126.68	-25.26	10.79	-25.21	0.03
22	4221	0.80	320.90	134.00	4220.67	-26.13	11.78	-26.07	0.07
23	4314	0.50	322.80	136.00	4313.66	-26.79	12.60	-26.73	0.32
24	4407	0.40	321.20	136.00	4406.66	-27.24	13.18	-27.18	0.11
<b>25</b>	<b>4500</b>	<b>0.40</b>	<b>324.30</b>	<b>138.00</b>	<b>4499.66</b>	<b>-27.64</b>	<b>13.70</b>	<b>-27.57</b>	<b>0.02</b>
26	4594	0.50	331.60	138.00	4593.65	-28.03	14.32	-27.96	0.12
27	4687	0.80	321.50	140.00	4686.65	-28.63	15.19	-28.56	0.34
28	4780	0.80	340.50	138.00	4779.64	-29.26	16.31	-29.18	0.28
29	4873	0.60	1.50	138.00	4872.63	-29.47	17.41	-29.38	0.35
<b>30</b>	<b>4966</b>	<b>0.60</b>	<b>12.50</b>	<b>140.00</b>	<b>4965.63</b>	<b>-29.35</b>	<b>18.37</b>	<b>-29.26</b>	<b>0.12</b>
31	5059	0.60	38.30	141.00	5058.62	-28.95	19.23	-28.85	0.29
32	5153	0.40	59.70	141.00	5152.62	-28.37	19.78	-28.27	0.29
33	5246	0.30	183.10	143.00	5245.62	-28.10	19.70	-28.00	0.66
34	5339	0.70	141.20	145.00	5338.61	-27.75	19.01	-27.66	0.56
<b>35</b>	<b>5432</b>	<b>0.20</b>	<b>152.80</b>	<b>147.00</b>	<b>5431.61</b>	<b>-27.32</b>	<b>18.43</b>	<b>-27.23</b>	<b>0.54</b>
36	5526	0.10	56.20	147.00	5525.61	-27.18	18.33	-27.08	0.25
37	5619	0.30	339.60	149.00	5618.61	-27.19	18.60	-27.10	0.32
38	5712	0.30	264.60	149.00	5711.61	-27.52	18.80	-27.43	0.39
39	5806	0.60	296.80	149.00	5805.61	-28.21	19.00	-28.11	0.41
<b>40</b>	<b>5899</b>	<b>0.50</b>	<b>310.60</b>	<b>150.00</b>	<b>5898.60</b>	<b>-28.95</b>	<b>19.49</b>	<b>-28.85</b>	<b>0.18</b>
41	5992	0.50	341.80	150.00	5991.60	-29.39	20.14	-29.29	0.29
42	6086	0.80	344.20	152.00	6085.59	-29.70	21.16	-29.60	0.32
43	6179	1.20	1.20	154.00	6178.58	-29.87	22.76	-29.75	0.53
44	6273	1.60	3.90	156.00	6272.55	-29.77	25.05	-29.64	0.43
<b>45</b>	<b>6366</b>	<b>1.50</b>	<b>10.20</b>	<b>158.00</b>	<b>6365.52</b>	<b>-29.48</b>	<b>27.54</b>	<b>-29.34</b>	<b>0.21</b>
46	6458	1.90	20.20	159.00	6457.48	-28.75	30.16	-28.60	0.54
47	6552	2.20	21.60	161.00	6551.42	-27.57	33.30	-27.40	0.32
48	6645	2.70	22.70	163.00	6644.33	-26.08	36.98	-25.89	0.54
49	6738	1.30	359.40	165.00	6737.27	-25.26	40.06	-25.06	1.71
<b>50</b>	<b>6832</b>	<b>1.20</b>	<b>345.30</b>	<b>168.00</b>	<b>6831.25</b>	<b>-25.53</b>	<b>42.07</b>	<b>-25.32</b>	<b>0.34</b>
51	6925	1.60	358.30	170.00	6924.22	-25.83	44.31	-25.61	0.55
52	7018	1.50	4.30	172.00	7017.19	-25.79	46.82	-25.55	0.20
53	7111	1.50	1.50	174.00	7110.16	-25.68	49.26	-25.43	0.08
54	7205	1.40	7.40	176.00	7204.13	-25.51	51.62	-25.25	0.19
<b>55</b>	<b>7298</b>	<b>1.50</b>	<b>7.70</b>	<b>177.00</b>	<b>7297.10</b>	<b>-25.21</b>	<b>53.96</b>	<b>-24.94</b>	<b>0.11</b>
56	7391	1.60	21.90	176.00	7390.06	-24.58	56.37	-24.29	0.43
57	7484	1.60	32.50	177.00	7483.03	-23.41	58.67	-23.11	0.32
58	7578	1.60	32.10	177.00	7576.99	-22.02	60.89	-21.71	0.01
59	7671	1.50	39.50	179.00	7669.96	-20.56	62.93	-20.25	0.24
<b>60</b>	<b>7764</b>	<b>1.70</b>	<b>38.80</b>	<b>179.00</b>	<b>7762.92</b>	<b>-18.94</b>	<b>64.94</b>	<b>-18.61</b>	<b>0.22</b>
61	7857	1.00	37.00	179.00	7855.89	-17.59	66.66	-17.25	0.75
62	7951	0.80	48.50	179.00	7949.88	-16.61	67.75	-16.27	0.29
63	8044	0.80	58.20	179.00	8042.87	-15.58	68.53	-15.23	0.15
64	8137	0.80	53.90	179.00	8135.86	-14.50	69.25	-14.15	0.06
<b>65</b>	<b>8231</b>	<b>0.60</b>	<b>46.40</b>	<b>181.00</b>	<b>8229.86</b>	<b>-13.62</b>	<b>69.98</b>	<b>-13.27</b>	<b>0.23</b>

Report #: 1  
Date: \_\_\_\_\_



**RYAN DIRECTIONAL  
SERVICES**  
A NABORS COMPANY

Ryan Job # 5451  
Kit # 9

**SURVEY REPORT**

Customer:	Oasis Petroleum
Well Name:	Ash Federal 5300 11-18T
Block or Section:	Section 18 T-153N R-100W
Rig #:	Nabors B-22
Calculation Method:	Minimum Curvature Calculation

MWD Operator:	Mike McCommand
Directional Drillers:	D Bohn/M Bader
Survey Corrected To:	True North
Vertical Section Direction:	90.29
Survey Correction:	8.47
Temperature Forecasting Model (Chart Only):	Logarithmic

Survey #	MD	Inc	Azm	Temp	TVD	VS	N/S	E/W	DLS
66	8324	0.50	50.80	185.00	8322.85	-12.96	70.57	-12.60	0.12
67	8417	0.50	46.40	183.00	8415.85	-12.35	71.10	-11.99	0.04
68	8511	0.60	51.60	181.00	8509.85	-11.67	71.69	-11.31	0.12
69	8604	0.80	68.00	183.00	8602.84	-10.69	72.24	-10.33	0.30
70	<b>8697</b>	<b>0.90</b>	<b>59.40</b>	<b>185.00</b>	<b>8695.83</b>	<b>-9.46</b>	<b>72.85</b>	<b>-9.10</b>	<b>0.17</b>
71	8791	1.00	69.20	186.00	8789.82	-8.07	73.52	-7.69	0.20
72	8884	0.80	66.70	188.00	8882.80	-6.71	74.07	-6.34	0.22
73	8977	0.80	70.50	190.00	8975.79	-5.51	74.54	-5.13	0.06
74	9071	0.90	79.80	190.00	9069.78	-4.16	74.89	-3.78	0.18
75	<b>9164</b>	<b>0.80</b>	<b>79.40</b>	<b>192.00</b>	<b>9162.77</b>	<b>-2.81</b>	<b>75.14</b>	<b>-2.43</b>	<b>0.11</b>
76	9257	0.80	75.00	194.00	9255.77	-1.54	75.43	-1.16	0.07
77	9351	0.80	79.80	195.00	9349.76	-0.27	75.71	0.12	0.07
78	9444	0.70	92.20	197.00	9442.75	0.94	75.80	1.32	0.20
79	9538	0.70	79.20	199.00	9536.74	2.08	75.89	2.46	0.17
80	<b>9631</b>	<b>0.60</b>	<b>92.70</b>	<b>194.00</b>	<b>9629.74</b>	<b>3.12</b>	<b>75.97</b>	<b>3.51</b>	<b>0.20</b>
81	9724	0.70	83.50	201.00	9722.73	4.17	76.01	4.56	0.16
82	9818	0.70	78.00	203.00	9816.72	5.30	76.20	5.69	0.07
83	9911	0.50	78.00	203.00	9909.72	6.25	76.40	6.64	0.22
84	10004	0.50	50.20	203.00	10002.71	6.96	76.75	7.35	0.26
85	<b>10098</b>	<b>0.60</b>	<b>45.70</b>	<b>203.00</b>	<b>10096.71</b>	<b>7.63</b>	<b>77.35</b>	<b>8.02</b>	<b>0.12</b>
86	10191	0.70	50.70	206.00	10189.70	8.41	78.05	8.81	0.12
87	10283	0.70	30.90	203.00	10281.70	9.13	78.89	9.53	0.26
88	10315	0.80	42.50	186.00	10313.69	9.38	79.22	9.78	0.57
89	10346	3.20	87.70	186.00	10344.67	10.39	79.42	10.79	8.70
90	<b>10377</b>	<b>8.10</b>	<b>88.40</b>	<b>188.00</b>	<b>10375.51</b>	<b>13.44</b>	<b>79.51</b>	<b>13.84</b>	<b>15.81</b>
91	10408	13.90	85.90	188.00	10405.93	19.34	79.84	19.74	18.77
92	10440	17.90	85.90	186.00	10436.70	28.08	80.47	28.49	12.50
93	10471	18.50	85.20	186.00	10466.15	37.73	81.22	38.14	2.06
94	10502	21.50	82.70	190.00	10495.28	48.26	82.35	48.68	10.06
95	<b>10533</b>	<b>25.40</b>	<b>85.50</b>	<b>190.00</b>	<b>10523.71</b>	<b>60.52</b>	<b>83.60</b>	<b>60.94</b>	<b>13.08</b>
96	10564	28.50	86.20	190.00	10551.34	74.53	84.61	74.96	10.05
97	10595	33.90	87.50	192.00	10577.85	90.55	85.48	90.98	17.55
98	10626	38.10	87.60	190.00	10602.92	108.75	86.25	109.19	13.55
99	10657	40.10	87.50	190.00	10626.98	128.27	87.09	128.72	6.45
100	<b>10688</b>	<b>45.50</b>	<b>88.40</b>	<b>192.00</b>	<b>10649.72</b>	<b>149.31</b>	<b>87.84</b>	<b>149.76</b>	<b>17.53</b>
101	10720	50.00	89.60	190.00	10671.23	172.99	88.24	173.44	14.33
102	<b>10751</b>	<b>51.20</b>	<b>89.60</b>	<b>190.00</b>	<b>10690.90</b>	<b>196.94</b>	<b>88.41</b>	<b>197.39</b>	<b>3.87</b>
103	10782	56.70	88.90	190.00	10709.14	221.99	88.74	222.44	17.84
104	10813	61.10	90.40	190.00	10725.15	248.52	88.89	248.98	14.79
105	<b>10844</b>	<b>64.40</b>	<b>91.30</b>	<b>190.00</b>	<b>10739.34</b>	<b>276.08</b>	<b>88.48</b>	<b>276.53</b>	<b>10.95</b>
106	10875	67.80	90.60	190.00	10751.90	304.41	88.01	304.86	11.16
107	10906	71.40	89.30	190.00	10762.70	333.46	88.04	333.91	12.26
108	10937	74.70	88.50	190.00	10771.74	363.10	88.61	363.56	10.93
109	10969	77.90	88.10	192.00	10779.32	394.17	89.54	394.63	10.07
110	<b>11000</b>	<b>80.20</b>	<b>88.40</b>	<b>192.00</b>	<b>10785.21</b>	<b>424.58</b>	<b>90.47</b>	<b>425.05</b>	<b>7.48</b>
111	11031	82.60	88.40	192.00	10789.84	455.22	91.32	455.68	7.74
112	11048	84.80	88.10	192.00	10791.71	472.10	91.84	472.57	13.06
113	11116	91.70	87.60	208.00	10793.78	539.97	94.39	540.45	10.17
114	11190	92.10	88.60	204.00	10791.33	613.87	96.84	614.37	1.45
115	<b>11284</b>	<b>90.40</b>	<b>88.80</b>	<b>204.00</b>	<b>10789.28</b>	<b>707.81</b>	<b>98.97</b>	<b>708.32</b>	<b>1.82</b>
116	11378	88.20	90.00	206.00	10790.43	801.78	99.96	802.30	2.67
117	11470	87.80	89.20	206.00	10793.64	893.72	100.60	894.24	0.97
118	11562	89.10	88.80	206.00	10796.13	985.66	102.20	986.19	1.48
119	11656	91.90	90.90	206.00	10795.31	1079.64	102.45	1080.17	3.72
120	<b>11749</b>	<b>91.10</b>	<b>92.80</b>	<b>208.00</b>	<b>10792.87</b>	<b>1172.57</b>	<b>99.45</b>	<b>1173.09</b>	<b>2.22</b>
121	11842	89.80	94.30	210.00	10792.14	1265.41	93.69	1265.90	2.13
122	11937	88.70	94.40	210.00	10793.38	1360.16	86.49	1360.62	1.16
123	12031	88.00	94.00	212.00	10796.09	1453.90	79.60	1454.33	0.86
124	12124	88.00	94.20	213.00	10799.34	1546.64	72.96	1547.03	0.21
125	<b>12218</b>	<b>88.00</b>	<b>93.60</b>	<b>213.00</b>	<b>10802.62</b>	<b>1640.40</b>	<b>66.57</b>	<b>1640.76</b>	<b>0.64</b>
126	12310	87.60	93.30	212.00	10806.15	1732.19	61.04	1732.52	0.54
127	12403	89.70	91.80	217.00	10808.34	1825.08	56.90	1825.40	2.77
128	12495	89.50	91.60	215.00	10808.98	1917.05	54.17	1917.35	0.31
129	12585	89.60	90.60	217.00	10809.69	2007.04	52.44	2007.33	1.12
130	<b>12676</b>	<b>90.00</b>	<b>89.90</b>	<b>217.00</b>	<b>10810.01</b>	<b>2098.04</b>	<b>52.05</b>	<b>2098.33</b>	<b>0.89</b>

Report #: 1  
Date: \_\_\_\_\_



**RYAN DIRECTIONAL  
SERVICES**  
A NABORS COMPANY

Ryan Job # 5451  
Kit # 9

**SURVEY REPORT**

Customer: Oasis Petroleum  
Well Name: Ash Federal 5300 11-18T  
Block or Section: Section 18 T-153N R-100W  
Rig #: Nabors B-22  
Calculation Method: Minimun Curvature Calculation

MWD Operator: Mike McCommand  
Directional Drillers: D Bohn/M Bader  
Survey Corrected To: True North  
Vertical Section Direction: 90.29  
Survey Correction: 8.47  
Temperature Forecasting Model (Chart Only): Logarithmic

Survey #	MD	Inc	Azm	Temp	TVD	VS	N/S	E/W	DLS
131	12708	90.80	89.70	219.00	10809.78	2130.04	52.16	2130.33	2.58
132	12769	90.00	89.40	219.00	10809.36	2191.03	52.64	2191.32	1.40
133	12863	90.20	89.70	221.00	10809.19	2285.02	53.38	2285.32	0.38
134	12956	90.20	89.90	222.00	10808.87	2378.02	53.70	2378.32	0.22
<b>135</b>	<b>13050</b>	<b>90.60</b>	<b>89.20</b>	<b>224.00</b>	<b>10808.21</b>	<b>2472.01</b>	<b>54.44</b>	<b>2472.31</b>	<b>0.86</b>
136	13144	89.90	90.10	222.00	10807.80	2566.00	55.01	2566.31	1.21
137	13238	88.90	90.40	224.00	10808.79	2659.99	54.60	2660.30	1.11
138	13331	89.70	90.90	224.00	10809.92	2752.98	53.55	2753.29	1.01
139	13425	92.10	91.40	226.00	10808.45	2846.95	51.66	2847.25	2.61
<b>140</b>	<b>13519</b>	<b>91.60</b>	<b>93.20</b>	<b>226.00</b>	<b>10805.41</b>	<b>2940.84</b>	<b>47.89</b>	<b>2941.12</b>	<b>1.99</b>
141	13618	89.30	94.20	228.00	10804.63	3039.66	41.50	3039.90	2.53
142	13711	89.10	94.30	228.00	10805.93	3132.42	34.61	3132.64	0.24
143	13742	89.20	94.90	230.00	10806.39	3163.33	32.13	3163.54	1.96
144	13805	90.70	95.10	230.00	10806.45	3226.12	26.64	3226.30	2.40
<b>145</b>	<b>13899</b>	<b>89.20</b>	<b>94.90</b>	<b>228.00</b>	<b>10806.53</b>	<b>3319.80</b>	<b>18.44</b>	<b>3319.93</b>	<b>1.61</b>
146	13992	88.00	94.90	230.00	10808.80	3412.47	10.50	3412.57	1.29
147	14086	88.00	94.30	230.00	10812.08	3506.15	2.97	3506.21	0.64
148	14180	90.10	93.20	230.00	10813.64	3599.95	-3.18	3599.98	2.52
149	14274	90.00	92.30	231.00	10813.56	3693.87	-7.69	3693.87	0.96
<b>150</b>	<b>14368</b>	<b>90.50</b>	<b>92.40</b>	<b>233.00</b>	<b>10813.15</b>	<b>3787.80</b>	<b>-11.54</b>	<b>3787.79</b>	<b>0.54</b>
151	14462	89.20	92.00	235.00	10813.39	3881.75	-15.15	3881.72	1.45
152	14555	89.50	92.80	235.00	10814.45	3974.68	-19.05	3974.63	0.92
153	14649	87.60	91.70	235.00	10816.83	4068.59	-22.73	4068.53	2.34
154	14743	90.80	91.70	235.00	10818.14	4162.54	-25.52	4162.46	3.40
<b>155</b>	<b>14837</b>	<b>94.00</b>	<b>91.30</b>	<b>237.00</b>	<b>10814.20</b>	<b>4256.42</b>	<b>-27.98</b>	<b>4256.34</b>	<b>3.43</b>
Projection	14938	94.00	91.30		10807.16	4357.16	-30.27	4357.06	0.00

Report #: 2  
Date: 8-Sep-12



**RYAN DIRECTIONAL  
SERVICES**  
A NABORS COMPANY

Ryan Job # 5451  
Kit # 9

**SURVEY REPORT**

Customer: Oasis Petroleum  
Well Name: Ash Federal 5300 11-18T  
Block or Section: Section 18 T-153N R-100W  
Rig #: Nabors B-22  
Calculation Method: Minimun Curvature Calculation

MWD Operator: Mike McCommand  
Directional Drillers: D Bohn/M Bader  
Survey Corrected To: True North  
Vertical Section Direction: 90.29  
Survey Correction: 8.47  
Temperature Forecasting Model (Chart Only): Logarithmic

Survey #	MD	Inc	Azm	Temp	TVD	VS	N/S	E/W	DLS
<b>Tie in to Gyro Surveys</b>									
<b>Tie In</b>	<b>13238</b>	<b>88.90</b>	<b>90.40</b>	<b>224.00</b>	<b>10808.78</b>	<b>2659.99</b>	<b>54.60</b>	<b>2660.30</b>	<b>1.11</b>
1	13302	88.50	90.70	219.00	10810.23	2723.97	53.99	2724.28	0.78
2	13333	88.80	90.00	219.00	10810.96	2754.96	53.80	2755.27	2.46
3	13365	87.00	88.60	221.00	10812.13	2786.94	54.19	2787.24	7.12
4	13396	87.40	87.40	221.00	10813.65	2817.87	55.27	2818.19	4.08
<b>5</b>	<b>13427</b>	<b>87.50</b>	<b>87.10</b>	<b>221.00</b>	<b>10815.03</b>	<b>2848.80</b>	<b>56.75</b>	<b>2849.12</b>	<b>1.02</b>
6	13458	89.30	87.40	222.00	10815.89	2879.74	58.24	2880.07	5.89
7	13491	89.70	88.10	222.00	10816.18	2912.71	59.54	2913.05	2.44
8	13521	89.60	88.40	222.00	10816.37	2942.69	60.45	2943.03	1.05
9	13552	90.60	89.20	224.00	10816.31	2973.68	61.10	2974.02	4.13
<b>10</b>	<b>13583</b>	<b>90.60</b>	<b>88.90</b>	<b>224.00</b>	<b>10815.99</b>	<b>3004.67</b>	<b>61.61</b>	<b>3005.02</b>	<b>0.97</b>
11	13615	90.60	88.80	226.00	10815.65	3036.66	62.26	3037.01	0.31
12	13646	90.40	89.20	226.00	10815.38	3067.65	62.80	3068.00	1.44
13	13677	90.20	88.50	226.00	10815.22	3098.64	63.42	3099.00	2.35
14	13708	90.20	88.90	226.00	10815.11	3129.62	64.12	3129.99	1.29
<b>15</b>	<b>13739</b>	<b>90.60</b>	<b>89.10</b>	<b>228.00</b>	<b>10814.89</b>	<b>3160.62</b>	<b>64.66</b>	<b>3160.98</b>	<b>1.44</b>
16	13771	91.20	89.20	224.00	10814.39	3192.60	65.14	3192.98	1.90
17	13802	91.20	89.10	226.00	10813.74	3223.59	65.60	3223.97	0.32
18	13833	91.00	90.40	228.00	10813.15	3254.58	65.73	3254.96	4.24
19	13864	91.30	90.50	226.00	10812.52	3285.58	65.49	3285.95	1.02
<b>20</b>	<b>13896</b>	<b>91.20</b>	<b>90.60</b>	<b>228.00</b>	<b>10811.83</b>	<b>3317.57</b>	<b>65.18</b>	<b>3317.94</b>	<b>0.44</b>
21	13927	90.40	91.30	228.00	10811.39	3348.56	64.67	3348.93	3.43
22	13958	90.90	91.40	228.00	10811.04	3379.56	63.94	3379.92	1.64
23	13989	90.20	91.30	228.00	10810.74	3410.55	63.21	3410.91	2.28
24	14021	89.70	90.80	230.00	10810.77	3442.55	62.62	3442.91	2.21
<b>25</b>	<b>14052</b>	<b>88.70</b>	<b>91.30</b>	<b>230.00</b>	<b>10811.21</b>	<b>3473.54</b>	<b>62.05</b>	<b>3473.90</b>	<b>3.61</b>
26	14083	88.90	91.30	228.00	10811.85	3504.53	61.35	3504.88	0.65
27	14114	90.90	92.10	230.00	10811.91	3535.52	60.43	3535.87	6.95
28	14146	92.10	91.80	230.00	10811.07	3567.49	59.34	3567.84	3.87
29	14177	91.70	91.70	228.00	10810.04	3598.47	58.40	3598.81	1.33
<b>30</b>	<b>14208</b>	<b>91.20</b>	<b>90.90</b>	<b>231.00</b>	<b>10809.26</b>	<b>3629.45</b>	<b>57.69</b>	<b>3629.79</b>	<b>3.04</b>
31	14240	89.70	90.90	231.00	10809.01	3661.45	57.19	3661.78	4.69
32	14271	90.00	91.10	231.00	10809.09	3692.44	56.65	3692.78	1.16
33	14302	90.10	91.30	230.00	10809.06	3723.44	56.00	3723.77	0.72
34	14334	90.60	91.70	231.00	10808.87	3755.43	55.16	3755.76	2.00
<b>35</b>	<b>14365</b>	<b>90.20</b>	<b>91.50</b>	<b>230.00</b>	<b>10808.65</b>	<b>3786.42</b>	<b>54.30</b>	<b>3786.75</b>	<b>1.44</b>
36	14396	90.00	91.70	231.00	10808.60	3817.42	53.43	3817.73	0.91
37	14427	89.30	91.30	231.00	10808.79	3848.41	52.62	3848.72	2.60
38	14459	89.30	91.40	233.00	10809.18	3880.40	51.87	3880.71	0.31
39	14490	89.10	91.20	233.00	10809.61	3911.39	51.16	3911.70	0.91
<b>40</b>	<b>14521</b>	<b>89.00</b>	<b>90.70</b>	<b>233.00</b>	<b>10810.12</b>	<b>3942.39</b>	<b>50.65</b>	<b>3942.69</b>	<b>1.64</b>
41	14552	88.70	90.80	233.00	10810.74	3973.38	50.24	3973.68	1.02
42	14584	89.00	90.90	233.00	10811.39	4005.37	49.77	4005.67	0.99
43	14615	89.40	90.90	233.00	10811.82	4036.37	49.28	4036.67	1.29
44	14646	90.20	90.90	235.00	10811.93	4067.36	48.80	4067.66	2.58
<b>45</b>	<b>14677</b>	<b>90.00</b>	<b>90.50</b>	<b>235.00</b>	<b>10811.87</b>	<b>4098.36</b>	<b>48.42</b>	<b>4098.66</b>	<b>1.44</b>
46	14709	90.50	90.40	235.00	10811.73	4130.36	48.17	4130.66	1.59
47	14740	90.90	90.50	235.00	10811.36	4161.36	47.92	4161.65	1.33
48	14771	91.20	90.40	235.00	10810.79	4192.35	47.68	4192.65	1.02
49	14803	90.90	90.20	233.00	10810.20	4224.35	47.51	4224.64	1.13
<b>50</b>	<b>14834</b>	<b>91.10</b>	<b>89.90</b>	<b>235.00</b>	<b>10809.66</b>	<b>4255.34</b>	<b>47.48</b>	<b>4255.64</b>	<b>1.16</b>
51	14865	89.60	90.30	235.00	10809.47	4286.34	47.43	4286.64	5.01
52	14896	88.90	89.90	237.00	10809.88	4317.34	47.38	4317.63	2.60
53	14927	88.40	89.30	237.00	10810.61	4348.33	47.59	4348.62	2.52
54	14959	88.20	89.00	237.00	10811.56	4380.31	48.07	4380.61	1.13
<b>55</b>	<b>14990</b>	<b>88.20</b>	<b>88.70</b>	<b>235.00</b>	<b>10812.53</b>	<b>4411.28</b>	<b>48.69</b>	<b>4411.58</b>	<b>0.97</b>
56	15021	88.30	88.70	237.00	10813.48	4442.26	49.39	4442.56	0.32
<b>57</b>	<b>15052</b>	<b>89.10</b>	<b>89.30</b>	<b>237.00</b>	<b>10814.18</b>	<b>4473.24</b>	<b>49.93</b>	<b>4473.55</b>	<b>3.23</b>
58	15084	88.50	89.50	237.00	10814.85	4505.23	50.27	4505.54	1.98
59	15115	89.50	89.80	237.00	10815.39	4536.22	50.46	4536.53	3.37
<b>60</b>	<b>15146</b>	<b>90.10</b>	<b>89.90</b>	<b>237.00</b>	<b>10815.50</b>	<b>4567.22</b>	<b>50.54</b>	<b>4567.53</b>	<b>1.96</b>
61	15177	90.80	90.20	239.00	10815.26	4598.22	50.51	4598.53	2.46
62	15209	90.30	90.30	239.00	10814.95	4630.22	50.37	4630.53	1.59
63	15240	90.60	89.80	239.00	10814.71	4661.22	50.34	4661.53	1.88
64	15271	90.40	89.60	239.00	10814.43	4692.21	50.51	4692.53	0.91
<b>65</b>	<b>15302</b>	<b>90.30</b>	<b>89.20</b>	<b>239.00</b>	<b>10814.25</b>	<b>4723.21</b>	<b>50.83</b>	<b>4723.53</b>	<b>1.33</b>

Report #: **2**  
Date: **8-Sep-12**



**RYAN DIRECTIONAL  
SERVICES**  
A NABORS COMPANY

Ryan Job # **5451**  
Kit # **9**

**SURVEY REPORT**

Customer: **Oasis Petroleum**  
Well Name: **Ash Federal 5300 11-18T**  
Block or Section: **Section 18 T-153N R-100W**  
Rig #: **Nabors B-22**  
Calculation Method: **Minimun Curvature Calculation**

MWD Operator: **Mike McCommand**  
Directional Drillers: **D Bohn/M Bader**  
Survey Corrected To: **True North**  
Vertical Section Direction: **90.29**  
Survey Correction: **8.47**  
Temperature Forecasting Model (Chart Only): **Logarithmic**

Survey #	MD	Inc	Azm	Temp	TVD	VS	N/S	E/W	DLS
66	15333	90.20	88.60	239.00	10814.11	4754.20	51.43	4754.52	1.96
67	15365	90.20	87.80	237.00	10814.00	4786.18	52.43	4786.50	2.50
68	15396	90.30	87.80	237.00	10813.86	4817.15	53.62	4817.48	0.32
69	15427	90.20	88.80	239.00	10813.73	4848.13	54.54	4848.47	3.24
<b>70</b>	<b>15458</b>	<b>90.50</b>	<b>89.20</b>	<b>237.00</b>	<b>10813.54</b>	<b>4879.12</b>	<b>55.08</b>	<b>4879.46</b>	<b>1.61</b>
71	15490	90.50	89.10	237.00	10813.26	4911.11	55.56	4911.46	0.31
72	15521	89.10	90.70	239.00	10813.37	4942.11	55.61	4942.45	6.86
73	15584	89.30	91.10	239.00	10814.25	5005.10	54.62	5005.44	0.71
74	15615	89.20	91.10	240.00	10814.65	5036.09	54.03	5036.43	0.32
<b>75</b>	<b>15677</b>	<b>90.00</b>	<b>91.30</b>	<b>240.00</b>	<b>10815.09</b>	<b>5098.08</b>	<b>52.73</b>	<b>5098.42</b>	<b>1.33</b>
76	15708	90.10	91.00	240.00	10815.06	5129.08	52.11	5129.41	1.02
77	15771	89.90	91.10	239.00	10815.06	5192.07	50.95	5192.40	0.35
78	15802	89.10	91.30	240.00	10815.33	5223.07	50.30	5223.39	2.66
79	15865	89.00	90.80	240.00	10816.37	5286.05	49.15	5286.37	0.81
<b>80</b>	<b>15896</b>	<b>88.90</b>	<b>90.90</b>	<b>240.00</b>	<b>10816.94</b>	<b>5317.05</b>	<b>48.69</b>	<b>5317.36</b>	<b>0.46</b>
81	15958	88.30	90.70	242.00	10818.46	5379.03	47.82	5379.34	1.02
82	15990	88.30	90.40	242.00	10819.41	5411.01	47.52	5411.32	0.94
83	16052	88.10	91.20	240.00	10821.35	5472.98	46.65	5473.28	1.33
84	16083	88.40	92.80	240.00	10822.30	5503.95	45.57	5504.25	5.25
<b>85</b>	<b>16146</b>	<b>90.80</b>	<b>93.60</b>	<b>240.00</b>	<b>10822.74</b>	<b>5566.86</b>	<b>42.05</b>	<b>5567.15</b>	<b>4.02</b>
86	16177	92.10	93.60	242.00	10821.96	5597.80	40.11	5598.07	4.19
<b>87</b>	<b>16239</b>	<b>93.00</b>	<b>94.10</b>	<b>240.00</b>	<b>10819.20</b>	<b>5659.62</b>	<b>35.95</b>	<b>5659.87</b>	<b>1.66</b>
88	16270	91.80	93.90	242.00	10817.90	5690.52	33.79	5690.77	3.92
89	16333	91.50	93.30	240.00	10816.09	5753.39	29.83	5753.62	1.06
<b>90</b>	<b>16364</b>	<b>88.80</b>	<b>93.40</b>	<b>242.00</b>	<b>10816.00</b>	<b>5784.35</b>	<b>28.02</b>	<b>5784.56</b>	<b>8.72</b>
91	16427	87.60	92.90	242.00	10817.98	5847.24	24.56	5847.43	2.06
92	16520	87.70	93.10	242.00	10821.80	5940.05	19.70	5940.23	0.24
93	16552	88.80	92.20	242.00	10822.77	5972.01	18.22	5972.18	4.44
94	16614	88.80	92.40	244.00	10824.07	6033.96	15.73	6034.12	0.32
<b>95</b>	<b>16677</b>	<b>88.80</b>	<b>93.30</b>	<b>244.00</b>	<b>10825.39</b>	<b>6096.88</b>	<b>12.60</b>	<b>6097.02</b>	<b>1.43</b>
96	16708	89.80	93.80	244.00	10825.77	6127.83	10.68	6127.96	3.61
97	16739	91.00	93.80	244.00	10825.55	6158.77	8.63	6158.89	3.87
98	16802	91.70	93.60	244.00	10824.07	6221.64	4.56	6221.74	1.16
99	16833	90.50	94.10	244.00	10823.47	6252.57	2.48	6252.67	4.19
<b>100</b>	<b>16864</b>	<b>90.60</b>	<b>94.40</b>	<b>244.00</b>	<b>10823.18</b>	<b>6283.50</b>	<b>0.18</b>	<b>6283.58</b>	<b>1.02</b>
101	16895	90.30	94.20	244.00	10822.93	6314.42	-2.14	6314.49	1.16
102	16958	88.90	94.30	246.00	10823.37	6377.27	-6.81	6377.31	2.23
103	16989	89.50	94.10	246.00	10823.81	6408.19	-9.08	6408.23	2.04
104	17020	89.70	93.60	246.00	10824.02	6439.13	-11.16	6439.16	1.74
<b>105</b>	<b>17083</b>	<b>89.90</b>	<b>93.20</b>	<b>246.00</b>	<b>10824.24</b>	<b>6502.04</b>	<b>-14.90</b>	<b>6502.05</b>	<b>0.71</b>
106	17114	90.00	93.20	246.00	10824.27	6533.00	-16.63	6533.00	0.32
107	17176	90.00	92.70	246.00	10824.27	6594.93	-19.82	6594.92	0.81
108	17208	88.40	92.30	246.00	10824.72	6626.90	-21.21	6626.88	5.15
109	17270	89.00	92.10	248.00	10826.12	6688.85	-23.59	6688.82	1.02
<b>110</b>	<b>17302</b>	<b>89.70</b>	<b>92.30</b>	<b>248.00</b>	<b>10826.49</b>	<b>6720.83</b>	<b>-24.82</b>	<b>6720.79</b>	<b>2.28</b>
111	17364	89.50	91.60	248.00	10826.92	6782.80	-26.93	6782.75	1.17
112	17395	88.90	91.60	248.00	10827.35	6813.79	-27.80	6813.74	1.94
113	17458	89.70	91.90	248.00	10828.12	6876.77	-29.72	6876.70	1.36
114	17489	89.80	92.00	248.00	10828.26	6907.75	-30.77	6907.69	0.46
<b>115</b>	<b>17552</b>	<b>89.70</b>	<b>91.30</b>	<b>249.00</b>	<b>10828.53</b>	<b>6970.74</b>	<b>-32.59</b>	<b>6970.66</b>	<b>1.12</b>
116	17583	89.40	91.00	249.00	10828.77	7001.73	-33.21	7001.65	1.37
117	17645	89.60	91.00	249.00	10829.32	7063.72	-34.29	7063.64	0.32
118	17707	91.00	91.20	249.00	10828.99	7125.71	-35.48	7125.63	2.28
119	17739	90.80	91.10	248.00	10828.49	7157.71	-36.12	7157.62	0.70
<b>120</b>	<b>17801</b>	<b>89.20</b>	<b>90.40</b>	<b>249.00</b>	<b>10828.49</b>	<b>7219.70</b>	<b>-36.94</b>	<b>7219.61</b>	<b>2.82</b>
121	17833	90.20	90.80	249.00	10828.66	7251.70	-37.27	7251.61	3.37
122	17864	90.50	90.70	249.00	10828.47	7282.70	-37.68	7282.60	1.02
123	17895	90.40	90.70	249.00	10828.22	7313.70	-38.06	7313.60	0.32
124	17926	91.00	90.70	249.00	10827.84	7344.69	-38.43	7344.59	1.94
<b>125</b>	<b>18020</b>	<b>90.60</b>	<b>89.90</b>	<b>249.00</b>	<b>10826.53</b>	<b>7438.68</b>	<b>-38.93</b>	<b>7438.58</b>	<b>0.95</b>
126	18051	90.10	89.90	249.00	10826.34	7469.68	-38.87	7469.58	1.61
127	18114	90.40	90.10	251.00	10826.07	7532.68	-38.87	7532.58	0.57
128	18177	91.20	89.40	251.00	10825.19	7595.67	-38.60	7595.57	1.69
129	18208	90.80	89.00	249.00	10824.65	7626.66	-38.17	7626.57	1.82
<b>130</b>	<b>18270</b>	<b>89.00</b>	<b>88.50</b>	<b>249.00</b>	<b>10824.76</b>	<b>7688.64</b>	<b>-36.81</b>	<b>7688.55</b>	<b>3.01</b>

Report #: 2  
Date: 8-Sep-12



**RYAN DIRECTIONAL  
SERVICES**  
A NABORS COMPANY

Ryan Job # 5451  
Kit # 9

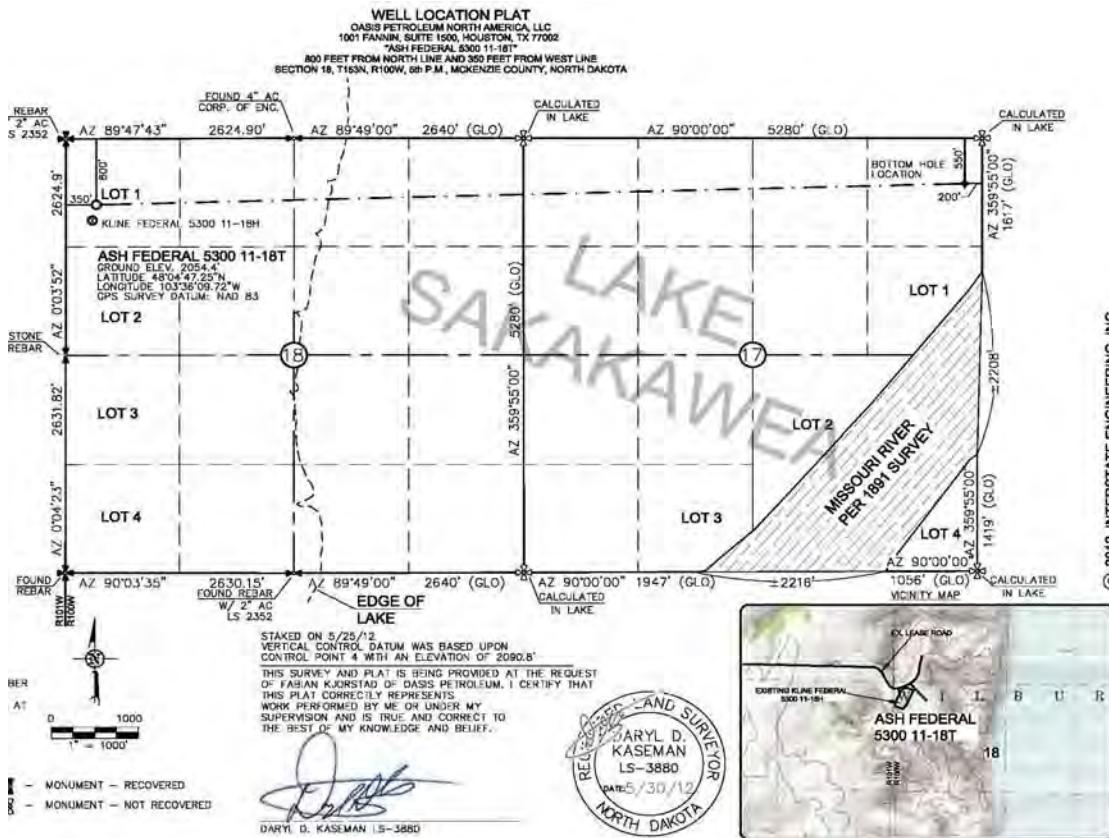
**SURVEY REPORT**

Customer:	Oasis Petroleum
Well Name:	Ash Federal 5300 11-18T
Block or Section:	Section 18 T-153N R-100W
Rig #:	Nabors B-22
Calculation Method:	Minimun Curvature Calculation

MWD Operator:	Mike McCommand
Directional Drillers:	D Bohn/M Bader
Survey Corrected To:	True North
Vertical Section Direction:	90.29
Survey Correction:	8.47
Temperature Forecasting Model (Chart Only):	Logarithmic

Survey #	MD	Inc	Azm	Temp	TVD	VS	N/S	E/W	DLS
131	18302	90.00	88.60	251.00	10825.03	7720.62	-36.00	7720.54	3.14
132	18333	89.90	88.40	251.00	10825.06	7751.60	-35.19	7751.53	0.72
133	18395	90.40	87.60	251.00	10824.90	7813.55	-33.03	7813.49	1.52
134	18427	90.20	87.00	251.00	10824.73	7845.51	-31.52	7845.45	1.98
135	<b>18489</b>	<b>90.10</b>	<b>86.90</b>	<b>251.00</b>	<b>10824.57</b>	<b>7907.40</b>	<b>-28.22</b>	<b>7907.36</b>	<b>0.23</b>
136	18520	89.00	87.60	251.00	10824.81	7938.36	-26.73	7938.33	4.21
137	18583	88.70	87.90	251.00	10826.08	8001.28	-24.26	8001.26	0.67
138	18614	88.90	89.10	251.00	10826.73	8032.26	-23.45	8032.25	3.92
139	18676	88.60	89.10	253.00	10828.08	8094.23	-22.48	8094.22	0.48
140	<b>18707</b>	<b>89.20</b>	<b>89.50</b>	<b>253.00</b>	<b>10828.67</b>	<b>8125.22</b>	<b>-22.10</b>	<b>8125.22</b>	<b>2.33</b>
141	18770	88.60	89.50	253.00	10829.88	8188.21	-21.55	8188.20	0.95
142	18801	88.10	89.50	253.00	10830.78	8219.19	-21.28	8219.19	1.61
143	18863	88.60	89.20	253.00	10832.56	8281.16	-20.57	8281.16	0.94
144	18895	88.30	89.10	253.00	10833.43	8313.14	-20.10	8313.14	0.99
145	<b>18926</b>	<b>88.10</b>	<b>89.00</b>	<b>253.00</b>	<b>10834.40</b>	<b>8344.11</b>	<b>-19.59</b>	<b>8344.12</b>	<b>0.72</b>
146	18957	88.00	88.80	251.00	10835.46	8375.09	-18.99	8375.10	0.72
147	19020	88.00	89.40	253.00	10837.65	8438.04	-18.00	8438.05	0.95
148	19051	88.00	89.40	251.00	10838.74	8469.01	-17.68	8469.03	0.00
149	19113	88.40	90.00	253.00	10840.68	8530.98	-17.35	8531.00	1.16
150	<b>19145</b>	<b>88.50</b>	<b>90.20</b>	<b>251.00</b>	<b>10841.55</b>	<b>8562.97</b>	<b>-17.41</b>	<b>8562.99</b>	<b>0.70</b>
151	19207	89.10	90.30	253.00	10842.85	8624.95	-17.68	8624.97	0.98
152	19238	89.50	90.20	253.00	10843.23	8655.95	-17.82	8655.97	1.33
153	19332	90.20	90.20	257.00	10843.47	8749.95	-18.14	8749.97	0.74
154	19363	90.20	90.00	253.00	10843.36	8780.95	-18.20	8780.97	0.65
155	<b>19425</b>	<b>90.60</b>	<b>90.00</b>	<b>255.00</b>	<b>10842.93</b>	<b>8842.95</b>	<b>-18.20</b>	<b>8842.97</b>	<b>0.65</b>
156	19457	90.60	89.90	253.00	10842.60	8874.94	-18.17	8874.97	0.31
157	19519	91.10	90.20	255.00	10841.68	8936.94	-18.22	8936.96	0.94
158	19550	91.30	90.00	255.00	10841.03	8967.93	-18.28	8967.95	0.91
159	19613	91.30	89.80	253.00	10839.60	9030.91	-18.17	9030.94	0.32
160	<b>19644</b>	<b>90.60</b>	<b>89.30</b>	<b>255.00</b>	<b>10839.08</b>	<b>9061.90</b>	<b>-17.92</b>	<b>9061.93</b>	<b>2.77</b>
161	19706	90.80	88.60	255.00	10838.33	9123.88	-16.79	9123.91	1.17
162	19738	90.60	87.80	255.00	10837.94	9155.86	-15.78	9155.90	2.58
163	19800	90.10	87.20	257.00	10837.56	9217.78	-13.08	9217.84	1.26
164	19831	89.90	86.40	255.00	10837.56	9248.73	-11.35	9248.79	2.66
165	<b>19890</b>	<b>89.60</b>	<b>86.00</b>	<b>251.00</b>	<b>10837.81</b>	<b>9307.57</b>	<b>-7.44</b>	<b>9307.66</b>	<b>0.85</b>
166	19921	90.00	86.00	251.00	10837.92	9338.49	-5.28	9338.58	1.29
167	19984	89.90	86.10	253.00	10837.98	9401.32	-0.94	9401.43	0.22
168	20015	89.80	86.20	253.00	10838.06	9432.23	1.15	9432.36	0.46
169	20077	90.00	86.40	253.00	10838.17	9494.08	5.15	9494.23	0.46
170	<b>20108</b>	<b>89.80</b>	<b>86.60</b>	<b>253.00</b>	<b>10838.22</b>	<b>9525.02</b>	<b>7.04</b>	<b>9525.17</b>	<b>0.91</b>
171	20171	90.10	86.40	255.00	10838.28	9587.88	10.88	9588.06	0.57
172	20202	90.10	86.70	255.00	10838.22	9618.81	12.75	9619.00	0.97
173	20264	90.20	86.20	255.00	10838.06	9680.67	16.59	9680.88	0.82
174	20295	90.50	86.30	255.00	10837.87	9711.59	18.62	9711.81	1.02
175	<b>20358</b>	<b>90.80</b>	<b>86.60</b>	<b>255.00</b>	<b>10837.16</b>	<b>9774.45</b>	<b>22.52</b>	<b>9774.69</b>	<b>0.67</b>
176	20420	91.20	87.20	257.00	10836.07	9836.33	25.87	9836.59	1.16
Projection	20482	91.20	87.20		10834.77	9898.23	28.90	9898.50	0.00

**Oasis Petroleum North America, LLC**  
**Ash Federal 5300 11-18T**  
**800' FNL & 350' FWL**  
**Lot 1 Section 18, T153N, R100W**  
**Baker Field / Three Forks**  
**McKenzie County, ND**



## **BOTTOM HOLE LOCATION:**

**28.91' north & 9,898.5' east of surface location or approx.**

**771.09' FNL & 296.4' FEL, NE NE Section 17, T153N, R100W**

### **Prepared for:**

Brian Cornette

Brian Comette  
Oasis Petroleum North America, LLC  
1001 Fannin, Suite 1500  
Houston, TX 77002

Prepared by:

G. Wayne Peterson, Eric Benjamin  
PO Box 51297; Billings, MT 59105  
2150 Harnish Blvd., Billings, MT 59101  
(406) 259-4124  
[geology@sunburstconsulting.com](mailto:geology@sunburstconsulting.com)  
[www.sunburstconsulting.com](http://www.sunburstconsulting.com)

## **WELL EVALUATION**



**Figure 1. Nabors B22 drilling the Oasis Petroleum North America, LLC - Ash Federal 5300 11-18T during September, 2012 in Baker Field, McKenzie County, North Dakota.**  
**(G. Wayne Peterson, Sunburst Consulting Geologist).**

### **INTRODUCTION**

Oasis Petroleum North America, LLC Ash Federal 5300 11-18T [Lot 1 Sec. 18, T153N R100W] is located approximately 8 miles south and 2 miles east of the town of Williston in McKenzie County, North Dakota. The Ash Federal 5300 11-18T is a horizontal Three Forks development well in part of Oasis Petroleum's Baker prospect (Baker Field) within the Williston Basin. The vertical hole was planned to be drilled to approximately 10,328'. The curve will be built at 12 degrees per 100' to land within the upper Three Forks. This well is a two section lateral which originates in the northwest quarter of Section 18, then drills east to northeast quarter of Section 17 (Figure 2). Directional drilling technologies and geo-steering techniques will be used to land in the Three Forks reservoir and maintain exposure to the ideal target rock.

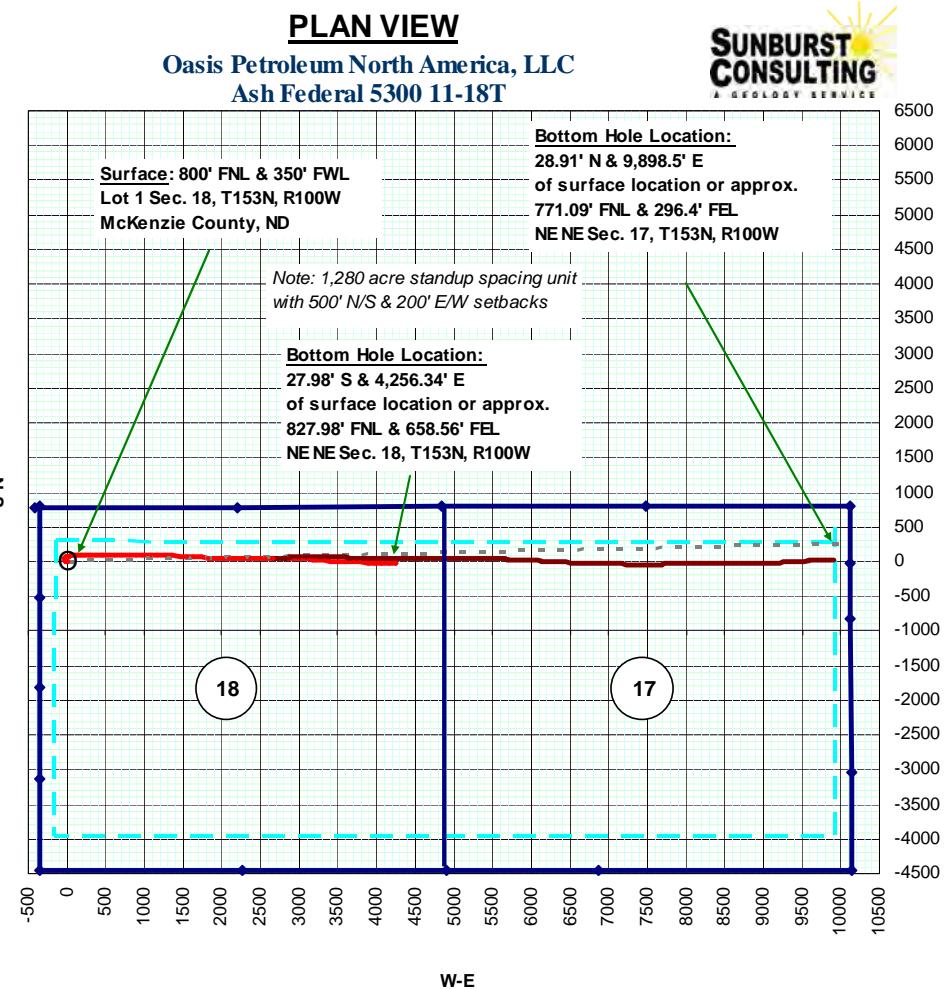


Figure 2. Plan view of Ash Federal 5300 11-18T spacing unit and well path.

## OFFSET WELLS

The primary offset wells used for depth correlation during curve operations were the Gulf Oil Exploration and Production Lindvig 1-11HR and the Oasis Petroleum North America, LLC. Kline 5300 11-18H (Figure 3). The Gulf Oil Exploration and Production Lindvig 1-11HR [SE SE Section 11, T153N, R101W] is located approximately 1.5 miles west northwest of the Ash Federal 5300 11-18T. This well was completed in March of 1982 and reached a total depth of 13,800', true vertical depth (TVD). The Oasis Petroleum North America, LLC. Kline 5300 11-18H [Lot 1 Section 18 T153N, R100W] is located approximately 200' south of the Ash Federal 5300 11-18T. This well was completed in October of 2011 and reached a total depth of 20,978' MD. The formation thicknesses expressed by gamma signatures in these wells, and the Oasis Petroleum North America, LLC Larry 5301 44-12B [SE SE Section 12, T153N, R101W] were used to assist in landing the curve. This was accomplished by comparing gamma signatures from the offset wells to gamma data collected during drilling operations. The casing target landing true vertical depth (TVD) was periodically updated to ensure accurate landing of the curve. Data used in this evaluation are found in this report.

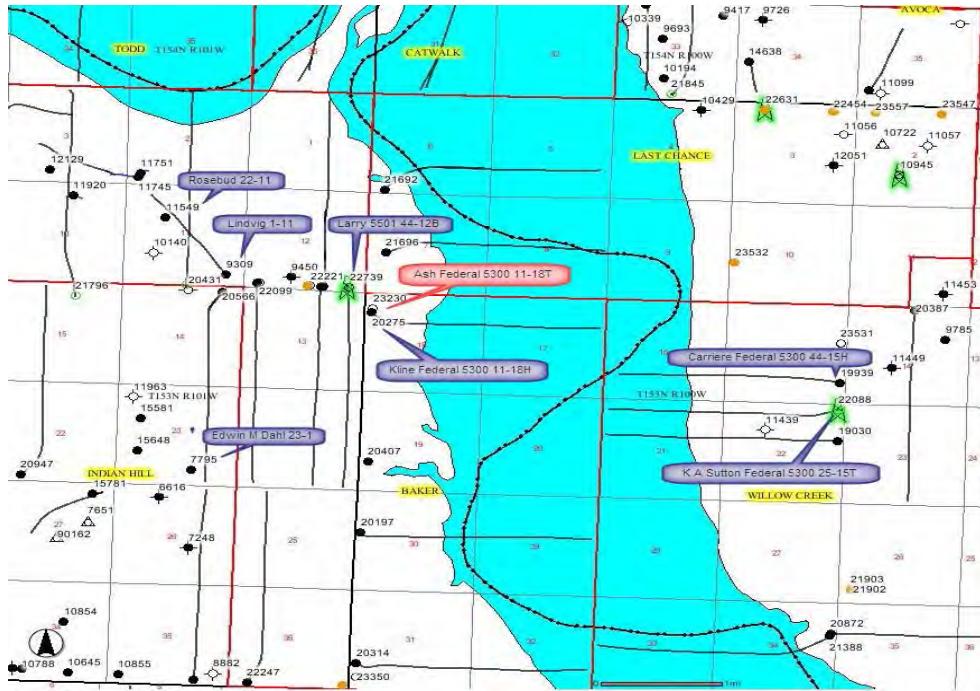


Figure 3. Base map of Ash Federal 5300 11-18T location with offset well locations and field boundaries.

## ENGINEERING

### Vertical Operations

The Ash Federal 5300 11-18T was spud on 23 August, 2012 by Nabors B22. A 13 ½" hole was drilled with fresh water to 2,187' and isolated with 9 5/8" J-55 casing and cemented to surface. After re-entry, the drilling fluid was diesel invert with target weight of 9.7-10.35 ppg for the vertical hole and 10.0-10.35 ppg for curve operations. The vertical hole was drilled from surface casing to the KOP of 10,335' MD in 84.5 hours with bit #2, a Halliburton DX650, and a Baker 5/6 low speed motor.

### Directional Operations

Ryan Energy Technologies provided personnel and equipment for MWD services in the vertical hole, the curve, and throughout the lateral. The directional drillers (RPM), MWD and Sunburst Consulting contractors worked closely together throughout the project to evaluate data and make steering decisions to maximize the amount of borehole in the targeted zones and increase rate of penetration (ROP) of the formation.

### **Curve Build**

The curve was 781' and was drilled in approximately 26 hours by bit #3, a 8 ¾" Reed E1202-A1B PDC bit, attached to a 2.38 degree adjustable National 7/8 5 stage mud motor. The curve was successfully landed at 11,116' MD, approximately 30' below the base of the Lower Bakken Shale. Seven inch diameter 32# HCP-110 and 29# HCP-110 casing were set to 11,101' MD and cemented.

## **Lateral**

After completion of curve operations, MWD tools and bit #4, a 6" Baker T406X, 6 blade PDC bit, attached to a 1.5° fixed Baker XL/LS 5/6 low speed motor were run in the hole. This assembly drilled to 14,938' MD, drilling 3,822' in 69 hours in the lateral before the decision was made to sidetrack due to excessive dog-legs. A new BHA consisting of MWD tools and bit #5 a Security FX64D attached to a new 1.5° fixed Baker XL/LS 5/6 low speed motor were run in the hole. This assembly drilled to 19,907' MD, drilling 6,572' in 149 hours before the MWD tool ceased pulsing. A new BHA consisting of new MWD tools and bit #6 a Varel VM613P2 attached to a new 1.5° fixed Baker XL/LS 5/6 low speed motor were run in the hole. At approximately 13,300' during a sidetrack check, the MWD tool ceased pulsing and was subsequently TOH. A new BHA with a new MWD tool and bit RR#6 and the previously run motor were assembled and TIH. This assembly drilled to TD, drilling 575' in 10.5 hours. Total depth of 20,482', with a final azimuth of 87.20° and inclination of 91.20° was achieved at 0416 hours CDT September 18, 2012. The resulting final vertical section was 9,898.23'.

The bottom hole location (BHL) is 28.91' north & 9,898.5' east of surface location or approximately 771.09' FNL & 296.4' FEL, NE NE Sec. 17, T153N, R100W. The hole was then circulated, and reamed for completion.

## **GEOLOGY**

### **Methods**

Geologic analysis for the Ash Federal 5300 11-18T was provided by Sunburst Consulting, Inc. Information was networked through Rig-watch's electronic data recorder system. This information network provided depth, drilling rate, pump strokes and total gas units to multiple areas throughout the well site. Gas data was fed from Sunburst's digital gas detector, a total gas chromatograph, through Rig-watch for dissemination. Hydrocarbon constituents (C<sub>1</sub> through C<sub>4</sub>) were recorded in part-per-million concentrations. Gas sampling was pulled through ¼" poly tubing after agitation in Sunburst's gas trap at the shakers. Rig crews caught lagged samples at the direction of the well site geologists. Samples were collected at 30' intervals in the vertical/curve and 30' intervals in the lateral. Rock cuttings were analyzed in wet and dry conditions under a 10x45 power binocular microscope (for detailed lithologic descriptions see appendix). Cuttings were sent to North Dakota Geologic Survey. In addition to rock samples, rate of penetration and gamma ray data were also used in geologic analysis to aid geo-steering and dip calculations.

### **Lithology**

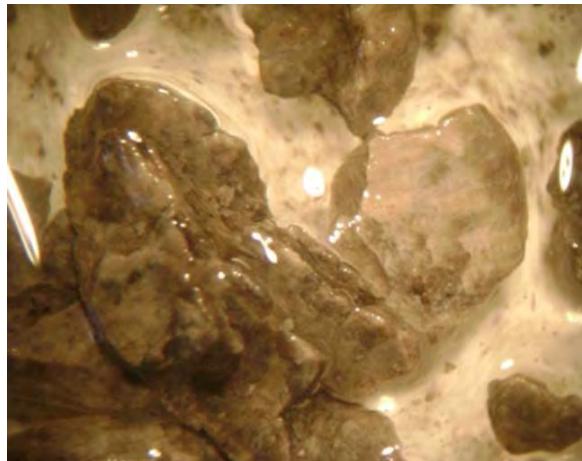
Formation analysis began at 8,110' MD with a red orange siltstone and anhydrite characteristic of the Kibbey Formation [Mississippian Big Snowy Group]. This interval consisted of a blocky, red to orange, red brown, friable siltstone with calcareous cement moderately cemented with an earthy texture. Also present was a trace amount of anhydrite which was off white. It was soft, amorphous, with an earthy texture.

The Kibbey "Lime" came in at 8,347' MD 8,346' TVD (-6,268') subsea (SS). This marker is represented by an anhydrite which was off white. It was soft, amorphous, with an earthy texture. The anhydrite is often accompanied by slower penetration rates as the bit transitions out of the overlying siltstone. The rate of penetration (ROP) then increases as the bit exits the anhydrite into the underlying limestone mudstone. This carbonate was described as a light gray, light gray brown, off white, lime mudstone which was microcrystalline, friable, and dense, with an earthy texture. Samples in the lower section consisted of red to orange, red brown, light orange to off white siltstone that was friable and blocky with an earthy texture. This facies was moderately cemented with calcite and also was interbedded with soft, off white amorphous or microcrystalline anhydrite.

The Charles Formation [Mississippian Madison Group] consisted of salt, anhydrite, limestone and argillaceous lime mudstone. The first Charles salt was drilled at 8,492' MD 8,491' TVD (-6,413') SS. The Base of the Last Salt (BLS) was logged at 9,188' MD 9,187' TVD (-7,109') SS as indicated by slower penetration rates and increased weight on bit. The intervals of salt within the Charles Formation can be identified by an increase in penetration rates and lower gamma count. Samples of the salt intervals were described as clear frosted, crystalline, anhedral to rare subhedral with a trace euhedral, and hard, crystalline in texture with no visible porosity. Slower penetration rates are observed as the bit encounters sections of lime mudstone to wackestone, which was cream, light gray to dark gray, microcrystalline, firm to hard, and dense, with an earthy texture. This limestone was argillaceous in part and contained a trace of disseminated pyrite. In areas where the penetration rates were slowest anhydrite was observed. These samples were described as off white to white, soft with cryptocrystalline texture or amorphous. Within the Charles Formation at 9,090' MD slower penetration rates indicated the presence of anhydrite. This section was approximately 14' thick, its base, as indicated by the transition to faster penetration rates and higher gamma counts is indicative of the Upper Berenton which was drilled at 9,104' MD 9103 TVD (-7,025') SS.

The Ratcliffe interval [Charles Formation] was drilled at 9,221' MD 9,220' TVD (-7,142') SS. The top of this interval was observed as faster penetration rates were encountered, as the well bore transitioned from anhydrite and lime mudstone. This limestone was cream to light gray with a trace of dark brown to a trace of medium brown. It was microcrystalline, firm, and dense; with an earthy texture and a trace of disseminated pyrite. Also noted was anhydrite which was off white, cryptocrystalline or amorphous with no visible porosity.

The Mission Canyon Formation [Mississippian Madison Group] was logged at 9,415' MD 9,414' TVD (-7,336') SS. The Mission Canyon Formation consisted of lime mudstone. This limestone facies was described as off white, light gray to gray, light brown, off white, blackish gray and cream in color. The microcrystalline to crystalline structure was predominately friable to firm with an earthy texture. Certain samples were a trace siliceous with rare a trace of sparry calcite and a trace of disseminated pyrite. Fossil fragments, along with dark brown algal material were visible in some intervals throughout the Mission Canyon Formation. At connections and downtime, gas shows of 129 to 744 units were noted in this formation. A trace to rare *dark brown dead spotty oil stain* was occasionally observed while logging the Mission Canyon (Figure 4).



**Figure 4. Limestone with spotty light brown & and dark brown dead oil staining in the Mission Canyon.**

The Lodgepole Formation [Mississippian Madison Group] was encountered at 9,965' MD 9,964' TVD (-7,886') SS. This interval was characterized by light to medium gray, dark gray, argillaceous lime mudstone which was evidenced by the elevated gamma. The lithology was further characterized as being microcrystalline, firm to a trace hard, and dense, with an earthy to crystalline texture. Disseminated pyrite was also seen in the samples as a trace mineral. At connections and downtime, gas shows of 165 to 587 units were noted in this formation.

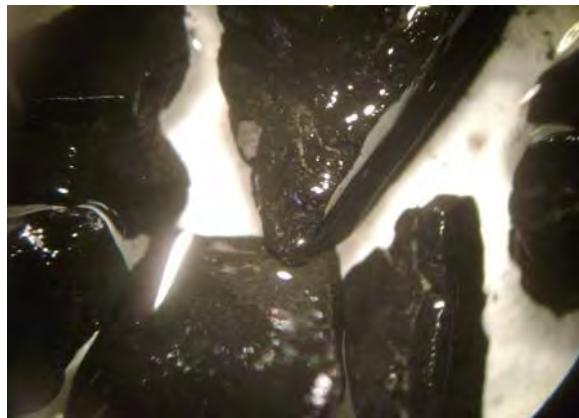
The “False Bakken” [Lodgepole Formation] was drilled at 10,749' MD 10,689' TVD (-8,611') SS, and the Scallion limestone at 10,751' MD 10,691' TVD (-8,613') SS. Samples from the False Bakken are typically brown, black, shale, friable with an earthy texture. This facies is calcareous, with a trace of disseminated pyrite. Due to the thin structure of the Scallion no samples were collected. Gas levels were slightly elevated through this interval with a maximum of 262 units likely due to fracture porosity.

The top of the Upper Bakken Shale Member [Mississippian] was drilled at 10,755' MD 10,695' TVD (-8,617') SS. Entry into this interval was characterized by high gamma, elevated background gas and increased rates of penetration. Unfortunately due to the thinness of this formation and the angle of penetration a sample of this formation was not collected. Drilling gas in this interval reached a maximum of 690 units.

The Bakken Middle Member [Mississippian-Devonian] was reached at 10,783' MD 10,709' TVD (-8,631') SS. This formation was predominantly siltstone and silty sandstone noted by the decreasing penetration rates, gamma units and recorded gas levels relative to the overlying source rock. The siltstone was tan gray, friable, subplaty to subblocky, with an earthy texture. It was moderately calcite cemented, with a trace of disseminated pyrite. Also present was silty sandstone which was light gray, very fine grained, friable, subangular to subrounded, well sorted, and contained possible intergranular porosity. It was moderately calcite cemented. Trace minerals included disseminated and nodular pyrite. Drilling gas in this interval reached a maximum of 503 units. Also observed was occasional *dark brown spotty oil stain*.

The Lower Bakken Shale Member [Devonian] reached at 10,880' MD 10,754' TVD (-8,676') SS. This was 13' to the Kline 5300 11-18H. Entry into this interval was characterized by high

gamma, elevated background gas and increased rates of penetration. The shale is black, friable, with an earthy texture and possible fracture porosity. Additionally the shale is described as carbonaceous and petroliferous (Figure 5). Trace minerals included disseminated pyrite. Drilling gas in this interval reached a maximum of 795 units with a connection gas of 894 units.



**Figure 5. Sample of black, carbonaceous and petroliferous shale from the Lower Bakken Member.**

The Pronghorn Member [Devonian-Bakken Formation] was reached at 10,913' MD 10,765' TVD (-8,687') SS. Entry into this interval was characterized by lower gamma, and slightly slower penetration rates. Samples from the Pronghorn were described as a siltstone which was medium gray, friable, and subplaty to sub-blocky, with an earthy texture. The siltstone contained dolomite cement moderately cemented and contained possible intergranular porosity. Trace minerals included disseminated and nodular pyrite. Drilling gas in this interval reached a maximum of 452 units with a connection gas of 509 units. A trace to rare *light brown spotty oil stain* was occasionally observed while logging the Pronghorn.

The Three Forks Formation [Devonian] was reached at 10,966' MD 10,779' TVD (-8,701') SS. The target zone of the Three Forks was to be drilled in the dolomitic facies in an eleven foot zone beginning 10 feet into the Three Forks Formation (Figure 6).

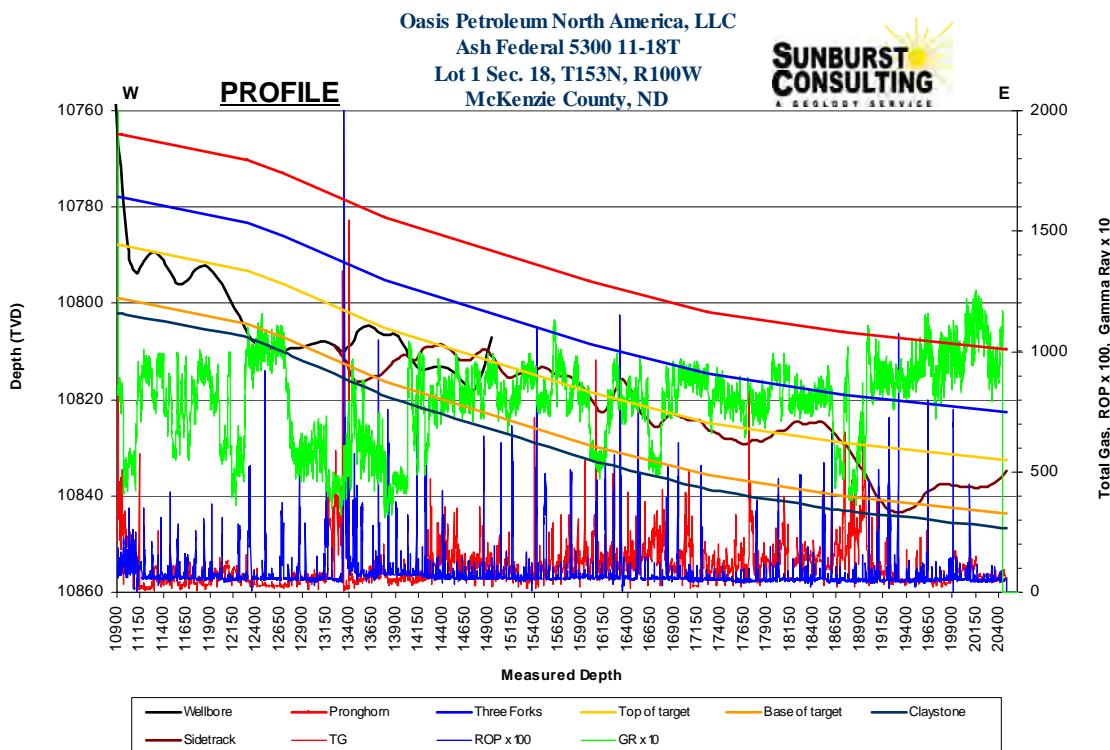


**Figure 6. Sample of shale and dolomite from high in Three Forks target zone on left; sample from the low gamma low in zone dolomite and shale on right.**

Samples in the Three Forks were generally dolomite which was tan, light brown, light pink to pink, and off white (see Figure 6). Additionally this facies was microcrystalline, friable, with an earthy to sucrosic texture; it also contained a trace of disseminated and nodular pyrite. Possible intercrystalline porosity was observed, as was a *common to a trace of light brown spotty oil stain*. Also present in varying amounts was a light green, light gray, shale. This shale was friable, sub-blocky to subplaty, with an earthy texture. Also a trace of nodular and disseminated pyrite was noted, and the shale contained no visible porosity.

## **Gas and Oil Shows**

Gas monitoring and fluid gains provided evidence of a hydrocarbon saturated reservoir during the drilling of the Ash Federal 5300 11-18T. Oil and gas shows at the shakers and in samples were continuously monitored. In the closed mud system, hydrostatic conditions were maintained near balance. This allowed for gas and fluid gains from the well to be monitored. Gas on the Ash Federal 5300 11-18T varied according to penetration rates and stratigraphic position; with generally higher gas liberated from the dolomite-dominated intervals characterized by low gamma values (Figure 7). Observed concentrations ranged from 300 to 400 units of background gas, and connection peaks of 300 to 600 units in earlier portion of the lateral where shows were the best. In the later portion of the lateral flow was diverted through the gas buster, effectively muting recordable gas values. A trip gas of 1,334 units at 13,335' MD was observed, a later trip at 19,907' yielded a non- recorded 2,500 units of circulating gas. Chromatography of gas revealed typical concentrations of methane, ethane, propane and butane (Figure 8).



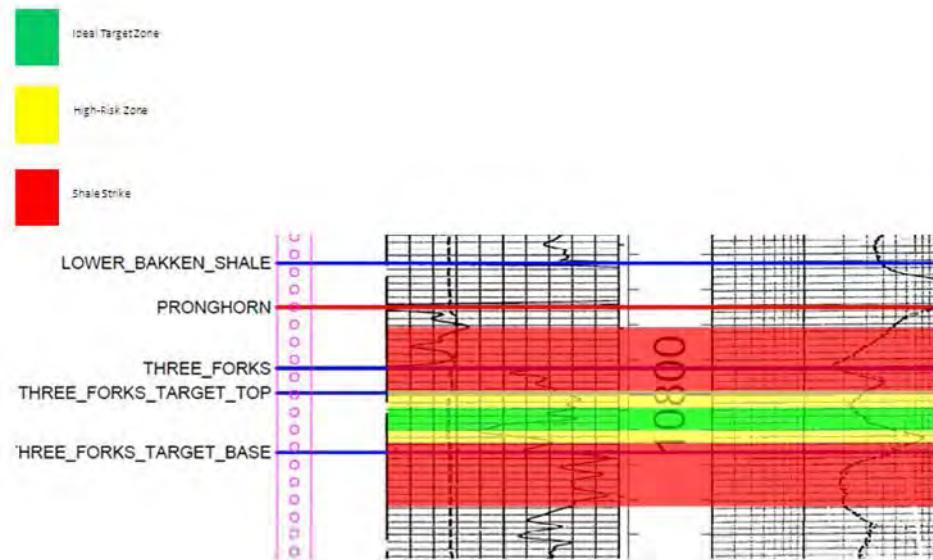
**Figure 7. Profile displaying total gas, gamma ray and rate of penetration for the Ash Federal lateral.**



**Figure 8.** Gas chromatography of 600 unit connection gas peaks and drilling gas. Note the measurable concentrations of C<sub>4</sub> at 4 minutes.

## Geo-steering

Geologic structure maps in the vicinity of the Ash Federal 5300 11-18T estimated 0.28 degree down apparent dip for the first 4,000' of the lateral. This apparent dip would then flatten slightly for approximately 1,000' then resume the 0.28 degree down dip until total depth (TD) was reached. The Ash Federal 5300 11-18T preferred drilling interval consisted of an eleven foot zone located approximately ten feet below the Pronghorn Member. Stratigraphic location in the target zone was based on penetration rates, gas shows, gamma ray values and sample observations. The projected target landing was to be eight feet into the Three Forks and was successfully reached prior to casing operations. Using offsets provided by Oasis representatives, projected porosity zones were identified as the preferred drilling areas (Figure 9).



**Figure 9. CND type log gamma profile from the Lindvig 1-11HR used for target zone gamma character.**

As the well bore moved from the top to the bottom of the preferred drilling zone gamma counts, collected samples and gas were evaluated along with penetration rates to identify areas within the 11' preferred drilling zone that yielded the best prospect potential (refer to Figure 10).

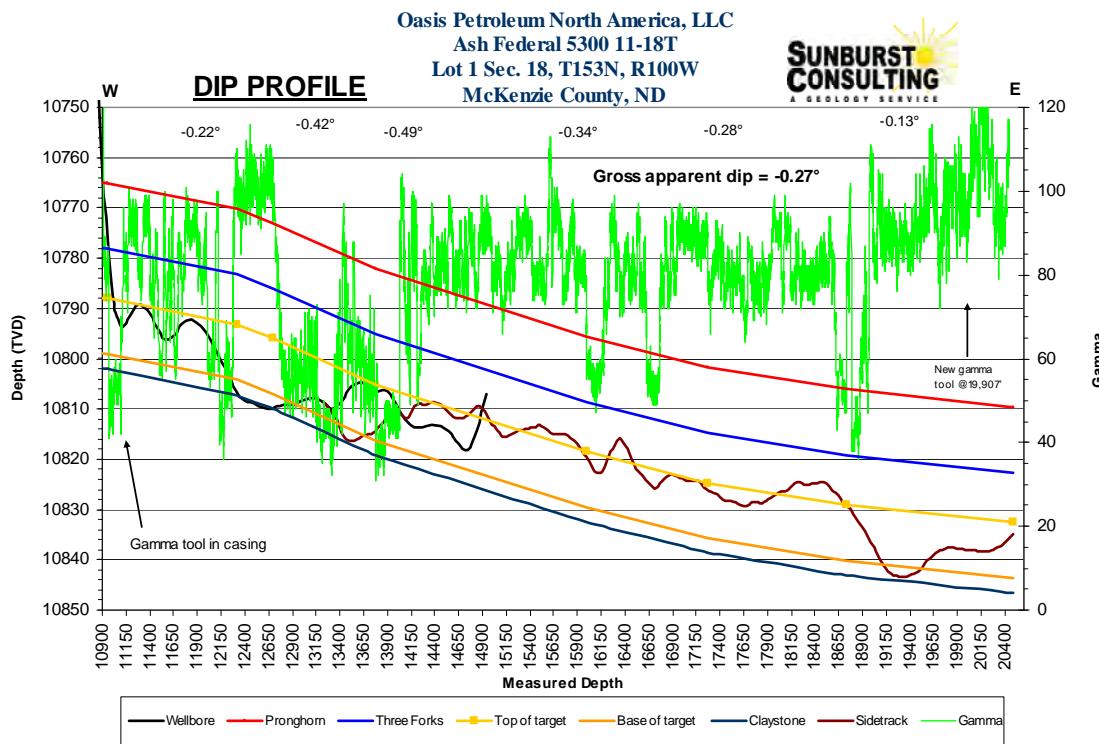
It should be noted that due to the west to east direction of the well-bore the survey and gamma tools were positioned further back than normal. This positioning resulted in a delayed response to the deflections of the well-bore and also resulted in a greater potential for dog-legs. Drilling in the original well-bore was halted at 14,398' MD, and a sidetrack was drilled beginning at 13,335' MD as a result of severe dog-legs in the well-bore.

After beginning the lateral, Oasis representatives expressed a desire to remain in the upper portion of the preferred drilling zone. Due to problems during completions associated with hydraulic fracturing when the well-bore was positioned too close to the underlying claystone.

Drilling out of intermediate casing with the well-bore in the upper portion of the drilling zone, gamma values ranged from 100 to 75 api. When moving down section, gamma counts ranged from 50 to 60 api indicated that the well-bore had encountered a tight streak located in the middle of the drilling zone. The well-bore deflected away from this tight streak many times during the drilling of the Ash Federal 5300 11-18T. When in the top of the zone and moving down onsite personnel adopted a strategy to avoid dog-legs. This policy was not to steer after the gamma had dropped to between 50 and 60 api. Onsite staff would then monitor the well-bore and make steering decisions based on the direction of the well-bore after it encountered the tight streak. Gamma counts below the tight streak moving down would move first high to 90 to 100 api , then low to 30 to 80 api as the well-bore continued moving lower. If the well-bore entered the underlying claystone gamma counts were recorded from 90 to 120 api. A new gamma tool inserted towards the final portion of the lateral resulted in elevated gamma api values.

Samples tended to contain a greater quantity of the light pink light brown dolomite, where gamma values were lower. A greater quantity of the blue gray shale was observed in intervals with higher gamma. In the lower portion of the target zone there was observed a thin layer of dolomite that contained fair to good intercrystalline porosity and *common spotty to even spotty light to dark brown oil staining* was observed. As noted earlier in this report Oasis personnel decided not to drill near the claystone due to the problems during completions.

A TD of 20,482' MD was achieved at 0416 hours CDT September 18, 2012. The well site team worked well together maintaining the well bore in the desired target interval for 88% of the lateral, opening 9,518' of potentially productive reservoir rock. The bottom hole location (BHL) lies: 28.91' north & 9,898.5' east of surface location or approximately 771.09' FNL & 296.4' FEL, NE NE Sec. 17, T153N, R100W. The hole was then circulated and reamed for completion.



**Figure 10. Cross-sectional interpretation of the Ash Federal 5300 11-18T borehole based upon lithology, MWD gamma ray.**

## SUMMARY

The Ash Federal 5300 11-18T is a successful well in Oasis Petroleum's horizontal Three Forks development program in Baker Field. The project was drilled from surface to TD in 26 days. The TD of 20,482' MD was achieved at 0416 hours CDT September 18, 2012. The well site team worked well together maintaining the well bore in the desired target interval for 88% of the lateral, opening 9,518' of potentially productive reservoir rock.

Samples in the Three Forks were generally dolomite which was tan, light brown, light pink to pink and off white. Additionally this facies was microcrystalline, friable, with an earthy to sucrosic texture. It also contained a trace of disseminated and nodular pyrite. Possible intercrystalline porosity was observed, as was a *common to a trace of light brown spotty oil stain*. Also present in varying amounts was light green and light gray shale. This shale was friable, sub-blocky to subplaty, with an earthy texture. Also a trace of nodular and disseminated pyrite was noted, and the shale contained no visible porosity.

Gas on the Ash Federal 5300 11-18T varied according to penetration rates and location of the well bore in the stratigraphic column. In general higher gas response was recorded from the dolomite-dominated intervals characterized by low gamma values. Observed concentrations ranged from 300 to 400 units of background gas, and connection peaks of 300 to 600 units in the earlier portion of the lateral where shows were the best. A trip gas of 1,334 units at 13,335' MD was observed, a later trip at 19,907' yielded an observed 2,500 units of circulating gas.

The Oasis Petroleum North America, LLC. Ash Federal 5300 11-18T awaits completion operations to determine its ultimate production potential.

Respectfully submitted,  
**G. Wayne Peterson**  
c/o Sunburst Consulting, Inc.  
21 September, 2012

# **WELL DATA SUMMARY**

**OPERATOR:** Oasis Petroleum North America, LLC

**ADDRESS:** 1001 Fannin, Suite 1500  
Houston, TX 77002

**WELL NAME:** Ash Federal 5300 11-18T

**API #:** 33-053-04211

**SURFACE LOCATION:** 800' FNL & 350' FWL  
Lot 1 Section 18, T153N, R100W

**FIELD/ PROSPECT:** Baker Field / Three Forks

**COUNTY, STATE** McKenzie County, ND

**BASIN:** Williston

**WELL TYPE:** Three Forks Horizontal

**ELEVATION:** GL: 2,053'  
KB: 2,078'

**SPUD/ RE-ENTRY DATE:** August 23, 2012

**BOTTOM HOLE LOCATION1:** 27.98' south & 4,256.34' east of surface location or approx.  
827.98' FNL & 658.56' FEL, NE NE Section 18, T153N, R100W

**CLOSURE COORDINATES:** Closure Azimuth: 90.40°  
Closure Distance: 4357.17'

**TOTAL DEPTH / DATE:** 14,938' on September 7, 2012

**SIDETRACK BOTTOM HOLE LOCATION:** 28.91' north & 9,898.5' east of surface location or approx.  
771.09' FNL & 296.4' FEL, NE NE Section 17, T153N, R100W

**CLOSURE COORDINATES:** Closure Azimuth: 89.83°  
Closure Distance: 9,898.54'

**TOTAL DEPTH / DATE:** 20,482' on September 18, 2012

<u><b>TOTAL DRILLING DAYS:</b></u>	26 days
<u><b>CONTRACTOR:</b></u>	Nabors B22
<u><b>PUMPS:</b></u>	#1 & #2 - H&H Triplex (stroke length - 12")
<u><b>TOOLPUSHERS:</b></u>	Ron Cheney, Chase Erdman
<u><b>FIELD SUPERVISORS:</b></u>	Dominic Bohn, Mike Bader
<u><b>CHEMICAL COMPANY:</b></u>	NOV Fluid Control
<u><b>MUD ENGINEER:</b></u>	Mike McCall, Don Groetken
<u><b>MUD TYPE:</b></u>	Fresh water in surface hole Diesel invert in curve; Saltwater brine in lateral
<u><b>MUD LOSSES:</b></u>	Invert Mud: 797 bbls, Salt Water: 0 bbls
<u><b>PROSPECT GEOLOGIST:</b></u>	Brian Cornette
<u><b>WELLSITE GEOLOGISTS:</b></u>	G. Wayne Peterson, Eric Benjamin
<u><b>GEOSTEERING SYSTEM:</b></u>	Sunburst Digital Wellsite Geological System
<u><b>ROCK SAMPLING:</b></u>	30' from 8,110' - 10,960' & 11,110' - 20,482' (TD) 10' from 10,960' -11,110'
<u><b>SAMPLE EXAMINATION:</b></u>	Binocular microscope & fluoroscope
<u><b>SAMPLE CUTS:</b></u>	Trichloroethylene (Carbo-Sol)
<u><b>GAS DETECTION:</b></u>	MSI (Mudlogging Systems, Inc.) TGC - total gas with chromatograph
<u><b>ELECTRIC LOGS:</b></u>	None
<u><b>DIRECTIONAL DRILLERS:</b></u>	RPM Inc. Dominic Bohn, Mike Bader, Rick Bansemer
<u><b>MWD:</b></u>	Ryan Mike McCommand, Edgar Maldonaldo

**CASING:**

Surface: 9 5/8" 36# J-55 set to 2,187'

Intermediate: 7" 3,654' 32# HCP-110, 7,447' 29# HCP-110  
set to 11,101'

**KEY OFFSET WELLS:**

**Oasis Petroleum North America, LLC**

**Larry 5301 44-12B**

SESE Section 12 T153N R101W  
McKenzie County, ND

**Oasis Petroleum North America, LLC**

**Kline 5300 11-18H**

Lot 1 Section 18 T153N R100W  
McKenzie County, ND

**SM Energy Company**

**Lindvig 1-11HR**

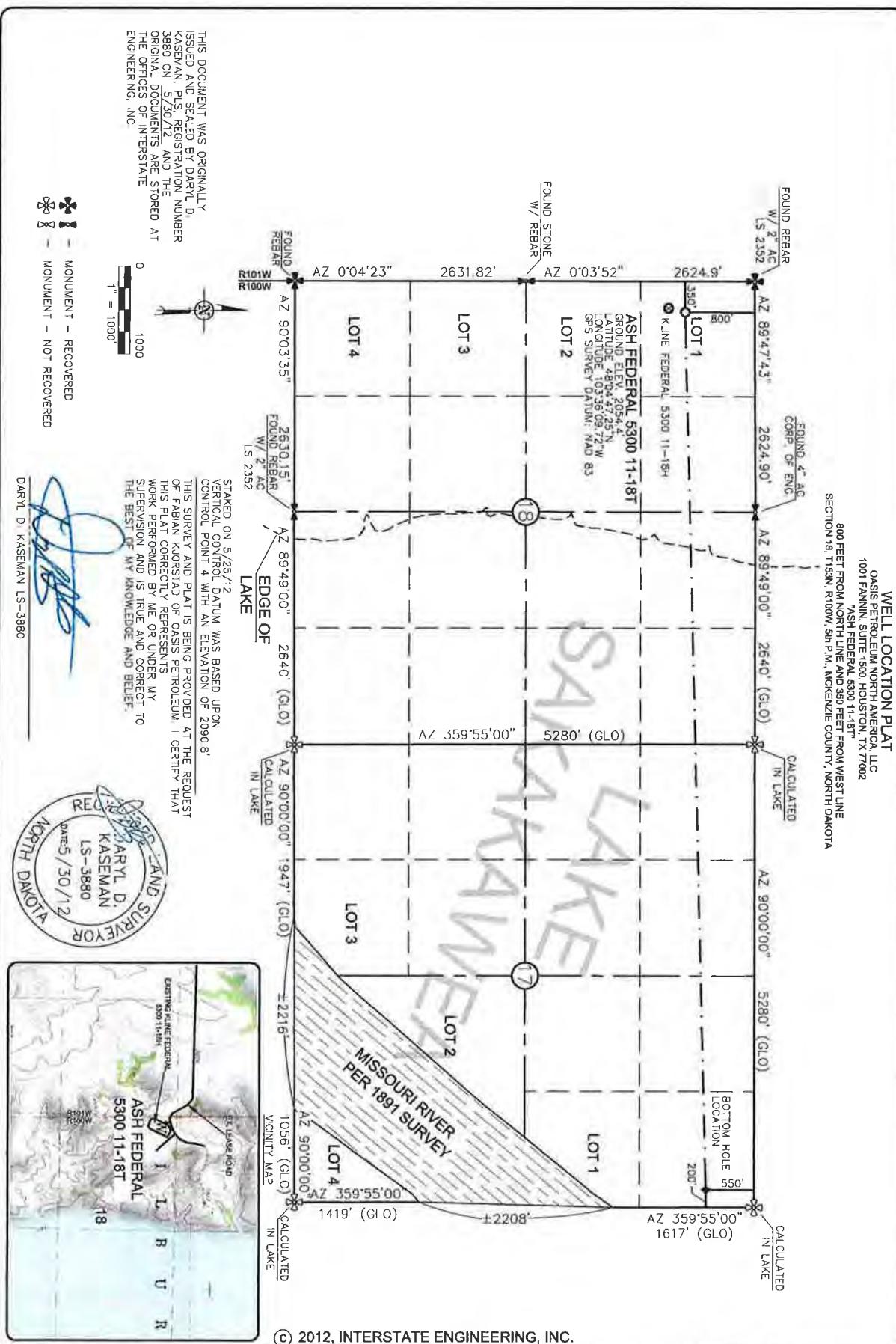
SESE Section 11, T153N, R101W  
McKenzie County, ND

## WELL LOCATION PLAT

OASIS PETROLEUM NORTH AMERICA, LLC  
1001 EANNIN SUITE 1500 HOUSTON TX 77019

100 | HANING, SUITE 1300, HOUSTON, TX 77002  
"ASH FEDERAL 5300 11-18T"

800 FEET FROM NORTH LINE AND 350 FEET FROM WEST LINE  
SECTION 18, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA



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425 East Main Street  
Sidney, Montana 59270  
Ph (406) 433-5617  
Fax (406) 433-5618  
[www.ieng.com](http://www.ieng.com)

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WELL LOCATION PLAT  
SECTION 18, T153N, R100W

MCKENZIE COUNTY, NORTH DAKOTA

Material No.	Date	By	Description

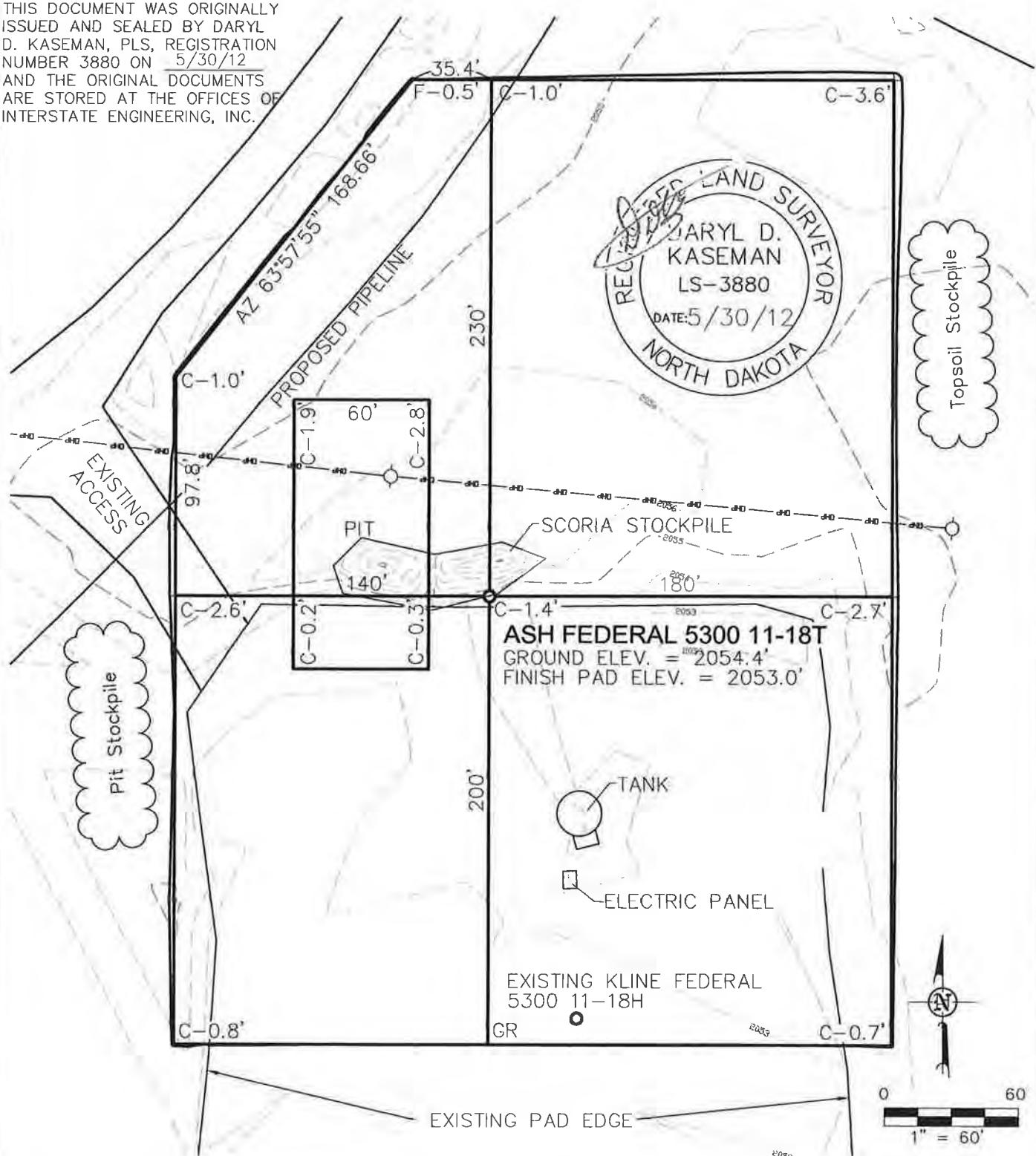


# PAD LAYOUT

OASIS PETROLEUM NORTH AMERICA, LLC  
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002  
"ASH FEDERAL 5300 11-18T"

800 FEET FROM NORTH LINE AND 350 FEET FROM WEST LINE  
SECTION 18, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA

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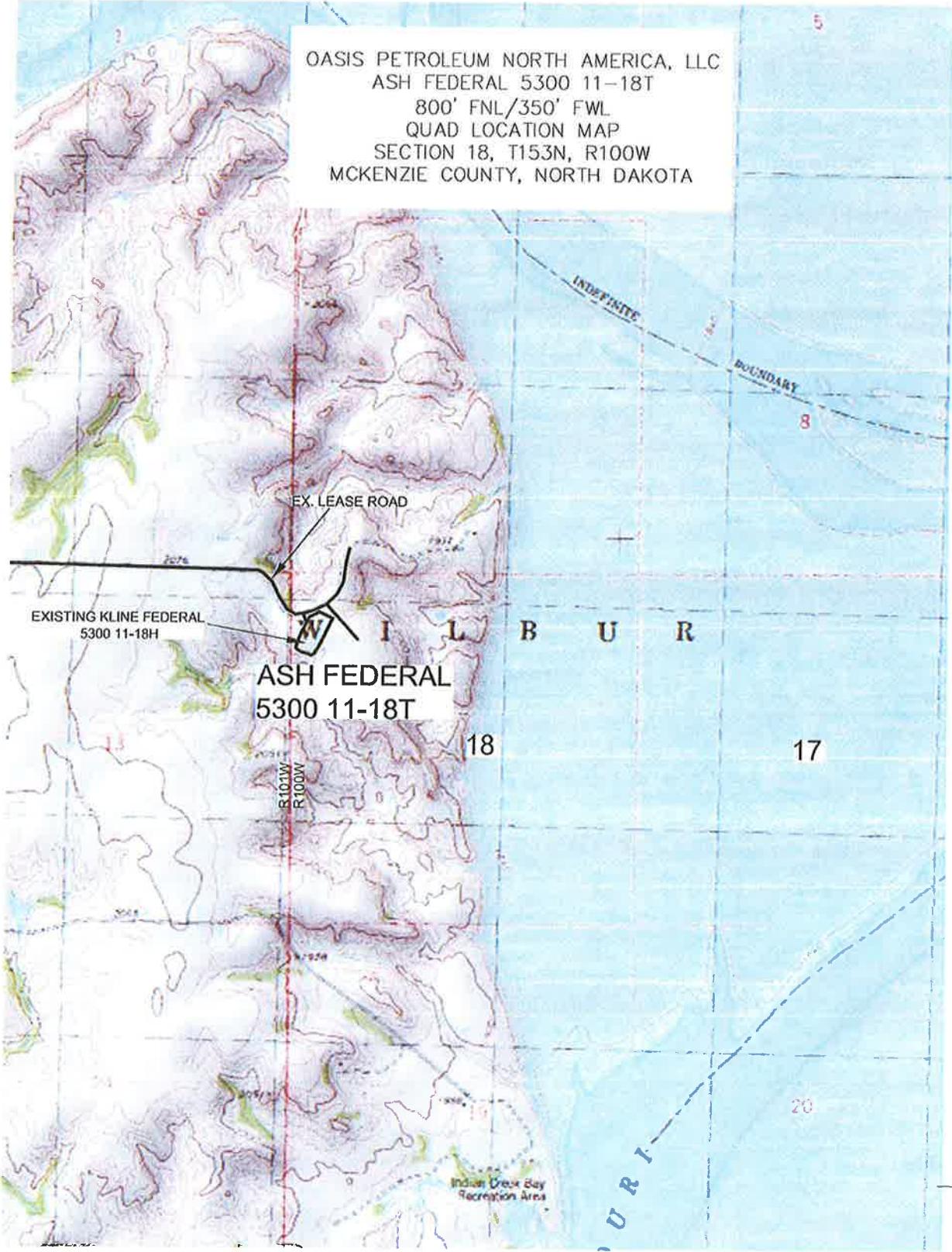
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Interstate Engineering, Inc.  
P.O. Box 648  
425 East Main Street  
Sidney, Montana 59270  
Ph. (406) 433-5617  
Fax (406) 433-5618  
[www.lengi.com](http://www.lengi.com)  
Other offices in Minnesota, North Dakota and South Dakota

OASIS PETROLEUM NORTH AMERICA, LLC  
PAD LAYOUT  
SECTION 18, T153N, R100W  
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By:	B.J.H.	Project No.:	S12-09-145
Checked By:	D.D.K.	Date:	MAY 2012

Revision No.	Date	By	Description



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Interstate Engineering, Inc.  
P.O. Box 646  
425 East Main Street  
Sidney, Montana 59270  
Ph (406) 432-5817  
Fax (406) 432-5618  
[www.ieni.com](http://www.ieni.com)

OASIS PETROLEUM NORTH AMERICA, LLC  
QUAD LOCATION MAP  
SECTION 18, T153N, R100W  
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. Project No.: S12-09-145  
Checked By: D.D.K. Date: MAY 2012

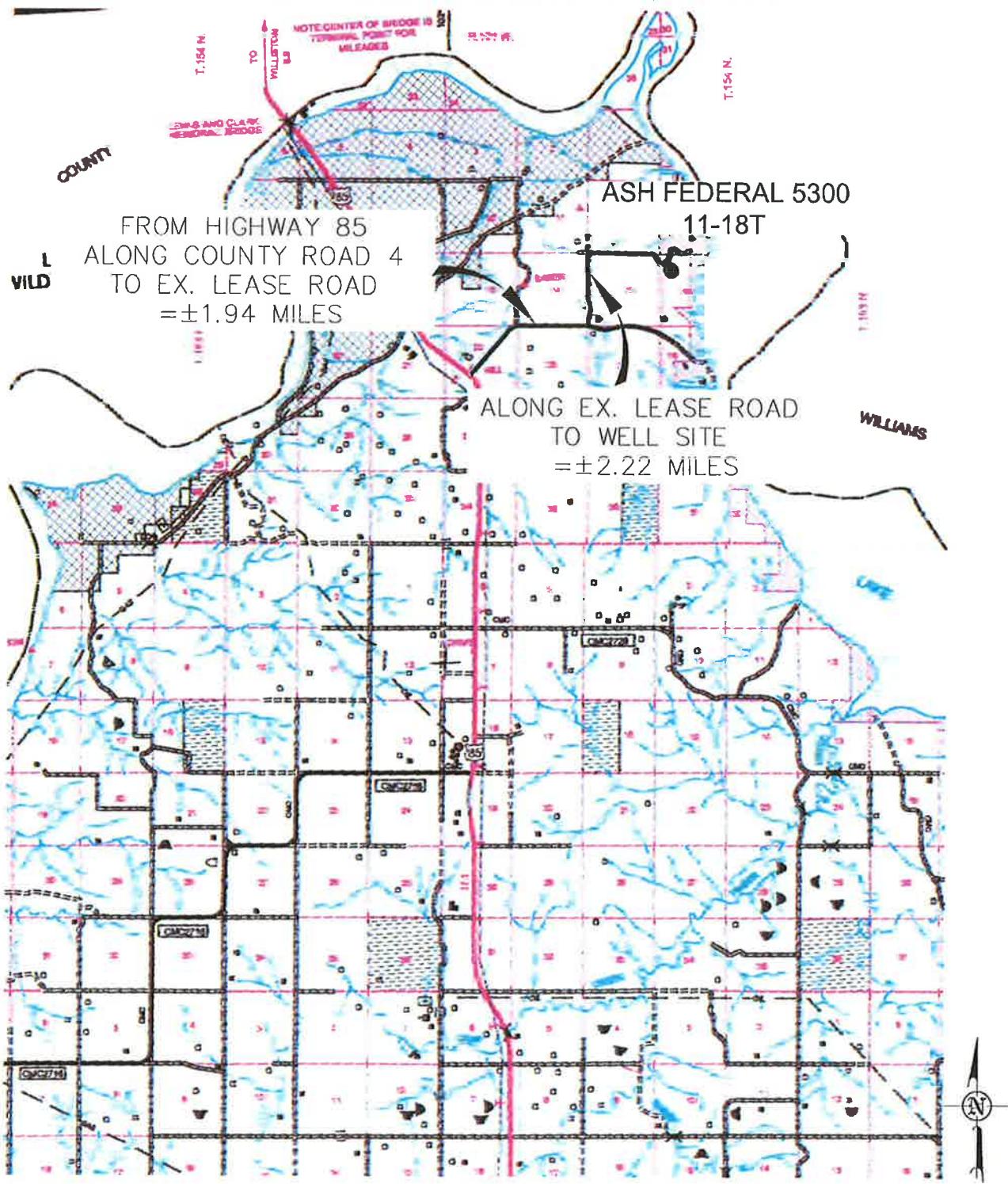
Revision	File #	Date	By	Description

# COUNTY ROAD MAP

OASIS PETROLEUM NORTH AMERICA, LLC  
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002

"ASH FEDERAL 5300 11-18T"

800 FEET FROM NORTH LINE AND 350 FEET FROM WEST LINE  
SECTION 18, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA



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COUNTY ROAD MAP  
SECTION 18, T153N, R100W  
MCKENZIE COUNTY, NORTH DAKOTA

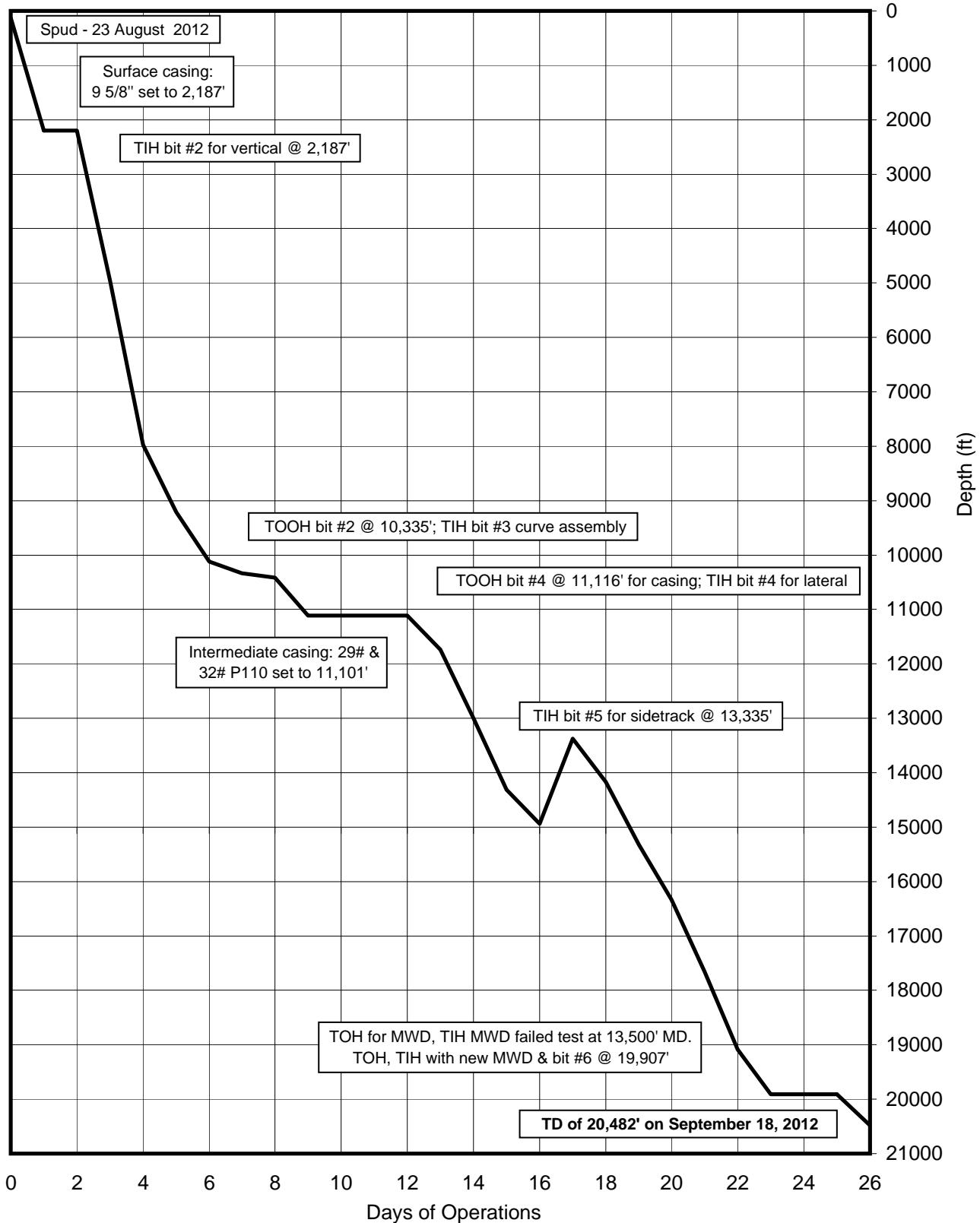
Drawn By: B.H.H. Project No: S1209145  
Checked By: D.D.K. Date: MAY 2012

Section No.	Date	By	Description

# TIME VS DEPTH

Oasis Petroleum North America, LLC

Ash Federal 5300 11-18T



## DAILY DRILLING SUMMARY

Day	Date 2012	Depth (0600 Hrs)	24 Hr Footage	Bit #	WOB (Klbs) RT	WOB (Klbs) MM	RPM (RT)	RPM (MM)	PP	SPM 1	SPM 2	GPM	24 Hr Activity	Formation
0	8/23	126'	1,012'	-	-	-	-	-	-	-	-	-	Drill 126'-1012'	-
1	8/24	2,200'	2,200	-	-	-	-	-	-	-	-	-	Drill 1012-2200' TOH Lay down BHA Laydown 8" tools. Rig up to run casing.	-
2	8/25	2,200'	0	1	15	-	50	-	2900	110	0	541	Run Casing. Rig down casing. Rig up cementers. Cement. Rig down cementers. Install wellheads, prep wellhead. Stab BOP. Nipple up BOP. Test BOP, retest. Hook up super choke.	-
3	8/26	4,956'	2,756	1	15	-	50	-	3200	0	110	541	Test BOP. Nipple up BOP. Pick up BHA TH. Drill cement float and shoe track. Drill 2176'-2631'. Service top drive. Drill 2631'-4956'	-
4	8/27	7,970'	3,014	2	20	-	60	118	3300	100	0	492	Drilling 4956'-5671'. Service top drive, Drilling 5671'-6790' 7970'	Kibey
5	8/28	9,210'	1,240	2	30	-	65	108	3300	50	50	451	Drilling 7941'-8470', Service rig, Drilling 8470-8656', Drilling 8656'-8843', Service top drive-grease packing, Drilling 8843'-9210'	Base Last Salt
6	8/29	10,116'	906	2	30	-	45	108	3500	50	50	451	Drilling 9200'-9497', Service rig, Drilling 9497'-9675', Circulate and condition add LCM to stop losses, Drilling 9675'-9714', Drilling 9714'-10116'	Lodgepole
7	8/30	10,335'	219	2	34	-	45	89	3000	90	0	369	Drilling 10119'-10336', Circulate and condition, TOOH, Reaming back out, TOOH, Pump dry job and TOOH, Circulate and condition bottoms up, Pull rotating rubber and install trip nipple	Lodgepole
8	8/31	10,418'	83	3	0	20	0	95	2300	0	80	394	I/D BHA, L/D mud motor and bit, P/U BHA, P/U new motor and bit, Service rig, TH, Test MWD tool, TH, Pull trip nipple and put rotating head in, TH, TH--reaming to bottom as needed, Drilling 10335'-10418'	Lodgepole
9	9/1	11,116'	698	3	35	25	10	95	2395	0	80	394	Drilling 10414'-10725', Service top drive, Drilling 10725'-10819', Drilling 10819'-11116', TOOH	Three Forks
10	9/2	11,116'	0	-	-	-	-	-	-	-	-	-	Circulate and condition weight up system, L/D drill pipe, Circulate and condition, L/D drill pipe, L/D BHA	Three Forks
11	9/3	11,116'	0	-	-	-	-	-	-	-	-	-	L/D BHA, Rig up to run casing, Clean rig floor, Rig up casing, Run casing, Wash to bottom and land casing, Circulate and condition bottoms up, Primary cementing	Three Forks
12	9/4	11,116'	0	4	-	-	-	-	-	-	-	-	Primary cementing, Rig crew cementing, Lay landing joint out, Cut drilling line, P/U tools, Clean rig floor, Cut drilling line, P/U drill pipe, Change out quill, Strapping drill pipe, P/U BHA, Directional work/working on MWD tool, P/U dr pipe	Three Forks
13	9/5	11,738'	622	4	15	20	20	115	2000	80	0	235	P/U drill pipe, Change rotating head rubber, Pull trip nipple and install rotating head, Ream and washing, Pressure test casing and shoe, Drillout of float and shoe, Formation integrity test, Drilling 1116'-1165', Service top drive, Drilling 11165'-11,738	Three Forks

## DAILY DRILLING SUMMARY

Day	Date 2012	Depth (0600 Hrs)	24 Hr Footage	Bit #	WOB (Klbs) RT	WOB (Klbs) MM	RPM (RT)	RPM (MM)	PP	SPM 1	SPM 2	GPM	24 Hr Activity		Formation
													Drilling	Service top drive, Drilling 11752'-12347', Drilling 12347'-13000'	
14	9/6	13,000'	1,262	4	20	30	30	115	2600	80	0	235	Drilling	11735'-11752', Service top drive, Drilling 11752'-12347', Drilling 12347'-13000'	Three Forks
15	9/7	14,315'	1,315	4	20	36	30	253	2700	80	0	517	Drilling	13000'-13498', Service top drive, Drilling 13498'-13592', Drilling 13592'-14315'	Three Forks
16	9/8	14,938'	623	4	15	35	30	138	2600	0	80	282	Drilling	14325'-14809', Service rig, Drilling 14809'-14936', Circulate and condition, TOOH to BHA. Lay down BHA. Pick up BHA. TIH	Three Forks
17	9/9	13,375'	-1,563	5	-	30	-	138	2500	80	0	282	TIH, Directional work, Trough for time drilling, Directional work, Time drilling, Drilling 13,335'-13,375'	Three Forks	
18	9/10	14,170'	795	5	20	13	30	115	2500	80	0	235	Directional work, Drilling 13375'-13497', Service rig, Drilling 13497'-13717', Drilling 13717'-14170'	Three Forks	
19	9/11	15,320'	1,150	5	25	17	30	138	3200	0	80	282	Drilling	141165'-14530', Service rig, Drilling 14530'-14748', Drilling 14748'-15279', Service rig, Drilling 15279'-15320'	Three Forks
20	9/12	16,330'	1,010	5	25	10	30	138	3200	0	80	282	Drilling	15311'-15561', Service rig, Drilling 15561'-15842', Drilling 15842'-16330'	Three Forks
21	9/13	17,660'	1,330	5	25	10	30	138	3200	0	80	282	Drilling	16341'-16591', Service rig, Drilling 16591'-16873', Drilling 16873'-17660'	Three Forks
22	9/14	19,090'	1,430	5	25	19	30	115	3400	80	0	235	Drilling	17654'-17997', Service rig, Drilling 17997'-18404', Drilling 18404'-19090'	Three Forks
23	9/15	19,907'	817	5	25	28	30	138	3400	0	80	282	Drilling	19091'-19309', Service rig, Drilling 19309'-19528', Drilling 19528'-19907', Directional work--trouble shoot MWD tool, Circulate bottoms up, Pump pill, TOOH	Three Forks
24	9/16	19,907'	0	5	-	-	-	-	-	-	-	-	TOOH, Service rig, TOOH, L/D BHA, P/U BHA, TIH, Cut drilling line, TIH, Change saver sub, Install rotating head, Ream and washing	Three Forks	
25	9/17	19,907'	0	6	-	-	-	-	-	-	-	-	TIH, Reaming, TOOH due to MWD failure, TOOH, Circulate bottoms up, Pump dry job, TOOH, L/D BHA, P/U BHA, Make up bit, TIH, Directional work--test MWD tool, TIH, Directional work--test MWD tool, TIH	Three Forks	
26	9/18	20,482'	575	6	17	48	30	138	3710	0	80	282	TIH, Service rig, TIH, Drilling 19907'-20482', TOOH	Three Forks	

## DAILY MUD SUMMARY

Day	Date 2012	Mud Depth	Mud WT (ppg)	Vis (sec/qt)	PV (cP)	YP (lbs/100 ft <sup>2</sup> )	Gels (lbs/100 ft <sup>2</sup> )	600/300 (ratio)	NAP/H <sub>2</sub> O (ratio)	API/HTHP Filterate (ml)	Cake Solids (API/HTHP)	Cor. Solids (%)	Oil/H <sub>2</sub> O (%)	Alk	pH	Excess Lime (lb/bbl)	Cr (mg/L)	LGS/HGS (%)	Salinity (ppm)	Electrical Stability	Gain/Loss (bbls)
0	08/23	pit	8.4	27	1	-	1/1/-	2/1	-	-	0	0/100	9	-	500	0.1/0	-	-	-	-	
1	08/24	1,151'	8.6	30	1	1	1/1/-	3/2	-	-	0	0.5/99.5	8.5	-	500	0.3/0	-	-	-	-	
2	08/25	2,200'	9	34	2	5	4/5/-	7/9	-	-	2	0/98	8.5	-	300	1.5/0.5	-	-	-	-	
3	08/26	2,200'	10.4	90	27	15	10/18/-	69/42	76.7/23.3	4.2	2	11.3	66/20	2.8	-	3.6	79k	2.3/9	264,320	320	-
4	08/27	5,489'	10.35	73	22	16	13/21/-	60/38	75.6/24.4	4.4	2	11.2	65/21	4.2	-	5.4	67k	3.0/8.3	264,320	580	-88
5	08/28	8,119'	10	56	19	11	9/13/-	49/30	79.3/20.7	4.2	2	10.6	69/18	2.2	-	2.8	57k	3.5/7.0	264,320	620	-176
6	08/29	9,290'	9.85	56	22	16	12/20/-	60/38	79.3/20.7	4.4	2	10.6	69/18	2.9	-	3.8	64k	5.8/4.8	264,320	727	-69
7	08/30	10,204'	9.7	44	16	8	5/8/-	40/24	84.1/15.9	5	2	10.1	74/14	1.3	-	1.7	50k	4.0/6.1	264,320	760	-331
8	08/31	10,335'	10.25	58	15	8	7/11/-	38/23	82.6/17.4	5.8	2	12	71/15	1.8	-	2.3	52k	3.7/8.3	264,320	750	-131
9	09/01	10,479'	10	44	12	7	6/10/-	31/19	80.5/19.5	6.4	2	10.7	70/17	1.8	-	2.3	55k	3.5/3.5	264,320	590	-
10	09/02	11,116'	10.35	48	16	7	6/10/-	39/23	80.5/19.5	5.2	2	10.7	70/17	2.1	-	2.7	55k	1.8/9.0	264,320	625	-
11	09/03																				
12	09/04	11,116'	10.2	29	2	1	1/1/-	5/3	-	-	-	1/89	-	8	-	167k	1.4/0.5	-	-	-	
13	09/05	11,738'	10.2	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
14	09/06	12,117'	9.95	28	1	1	1/1/-	3/2	-	-	-	1/90	-	9	-	156k	1.7/1.6	-	-	-	
15	09/07	-	9.85	48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
16	09/08	14,905'	9.8	28	1	1	1/1/-	3/2	-	-	-	0.5/91.5	-	9.5	-	156k	0.7/0.7	-	-	-	
17	09/09	-	9.8	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
18	09/10	13,677'	9.9	28	1	1	1/1/-	3/2	-	-	-	0.5/91.5	-	9.5	-	168k	0.7/0.7	-	-	-	
19	09/11	-	9.9	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
20	09/12	15,835'	9.9	28	1	1	1/1/-	3/2	-	-	-	2/90	-	8.5	-	164k	1.2/1.2	-	-	-	
21	09/13	-	9.9	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
22	09/14	17,996'	9.9	28	1	1	1/1/-	3/2	-	-	-	0/92	-	9	-	171k	0.5/0.4	-	-	-	
23	09/15	-	9.9	28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
24	09/16	19,907'	9.9	27	1	1	1/1/-	3/2	-	-	-	0/92	-	8.5	-	169k	0.5/0.6	-	-	-	
25	09/17	-	9.9	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
26	09/18	19,907'	9.9	28	1	1	1/1/-	3/2	-	-	-	1/90	-	8.5	-	176k	0.4/0.5	-	-	-	

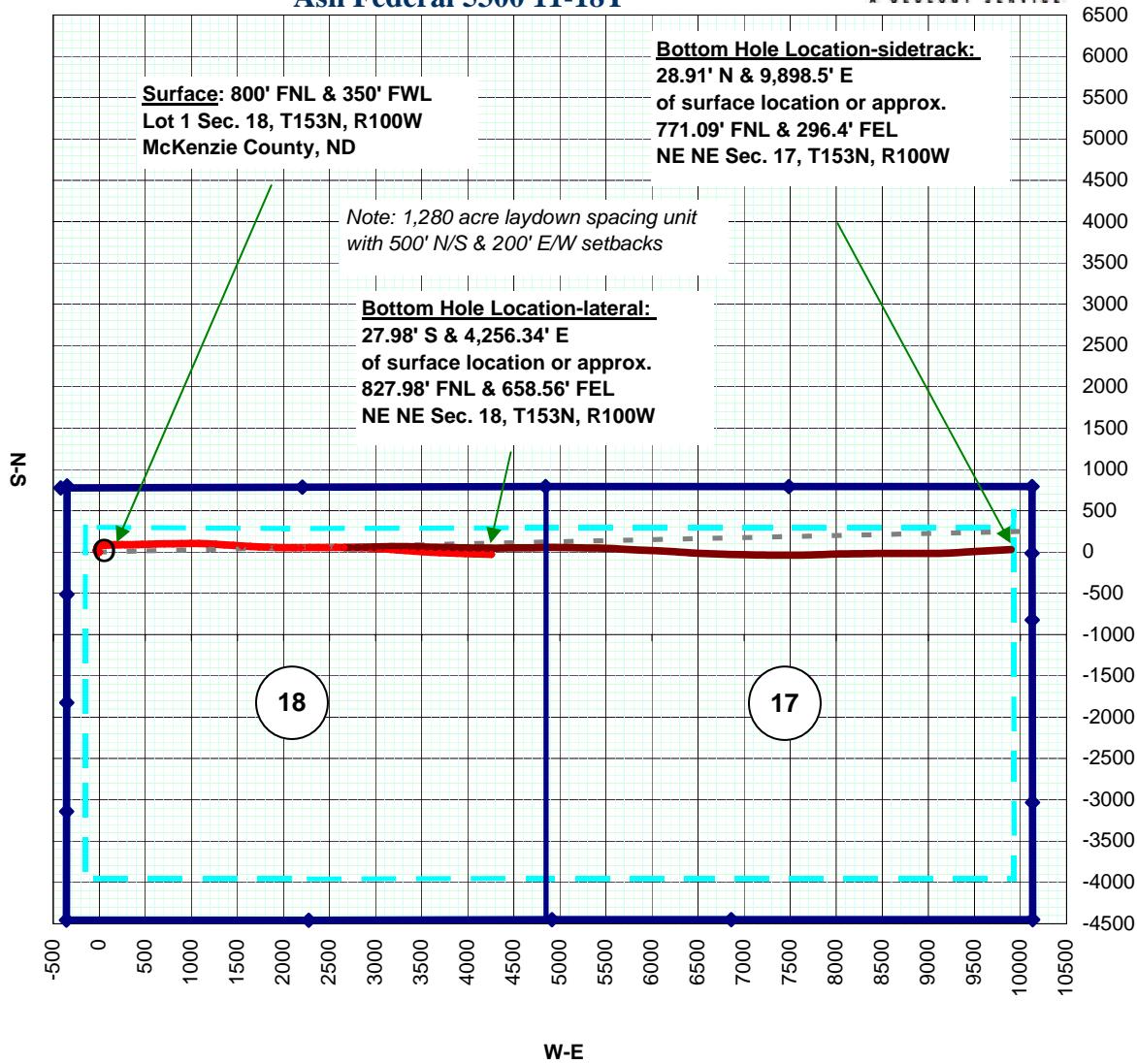
Change over from diesel invert to saltwater brine drilling fluid

## BIT RECORD

Bit #	Size	Type	Make	Model	Serial #	Jets	Depth In	Depth Out	Footage	Hours	Accum. Hours	Vert. Dev.
1	13 1/2"	PDC	Hughs	MX-1	5184113	3x18 1x22	106'	2,187'	2,081'	20	20.00	Surface
2	8 3/4"	PDC	Security	DX650	12060802	6x12	2,187'	10,335'	8,148'	84.5	104.50	Vertical
3	8 3/4"	PDC	Reed	E156190	5x18	10,335'	11,116'	781'	26	130.50	Curve	
4	6"	PDC	HTC	T406X	156190	3x22 3x13	11,116'	14,938'	3,822'	69	199.50	Lateral
5	6"	PDC	Security	FX64D	12026004	6x16	13,335'	19,907'	6,572'	149	348.50	Lateral
6	6"	PDC	Varel	VM613P2	4004836	6x20	19,907'	20,482'	575'	10.5	359.00	Lateral

## PLAN VIEW

**Oasis Petroleum North America, LLC  
Ash Federal 5300 11-18T**

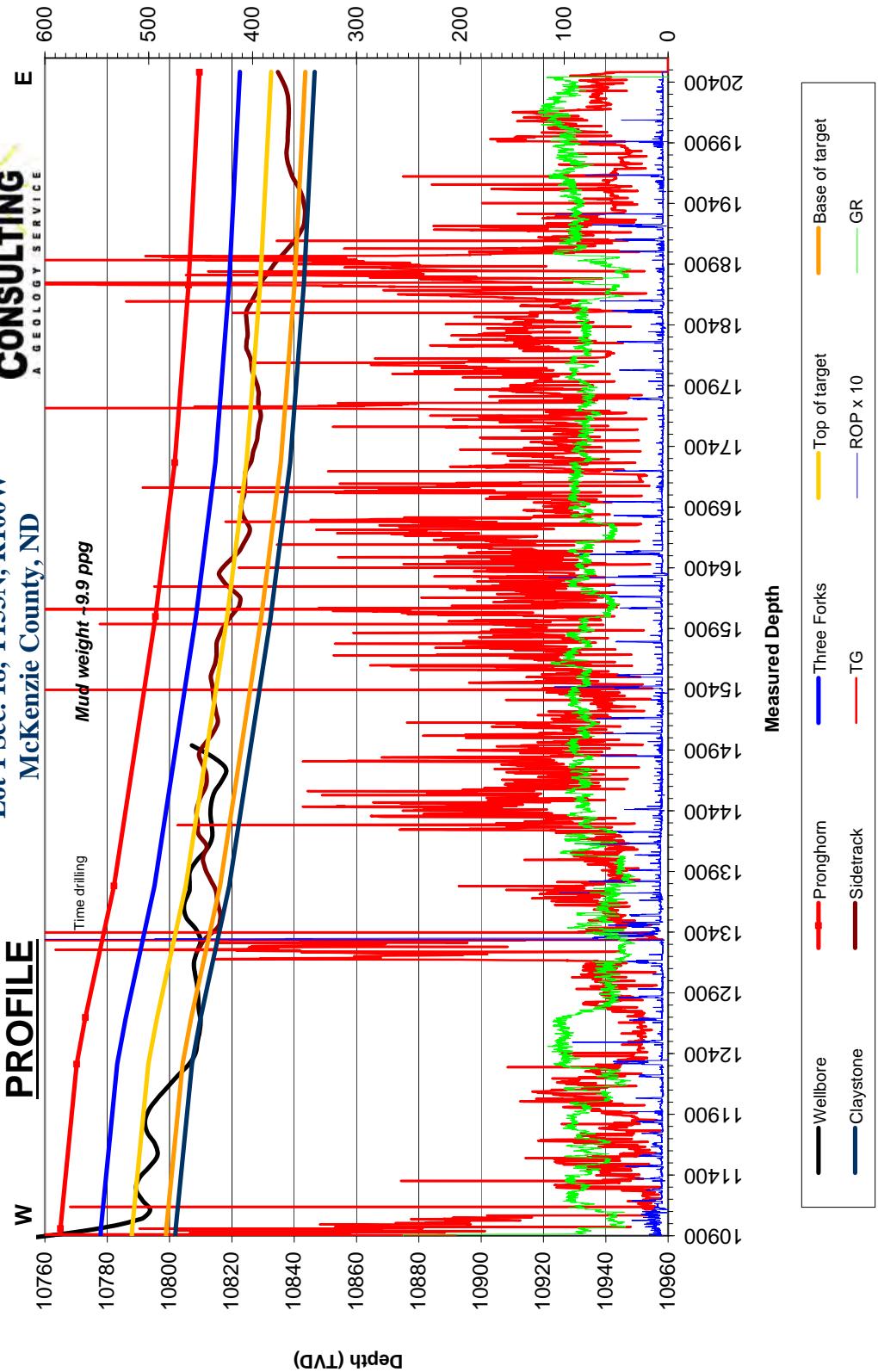


Oasis Petroleum North America, LLC  
 Ash Federal 5300 11-18T  
 Lot 1 Sec. 18, T153N, R100W  
 McKenzie County, ND



## PROFILE

Total Gas, ROP x 10, Gamma Ray



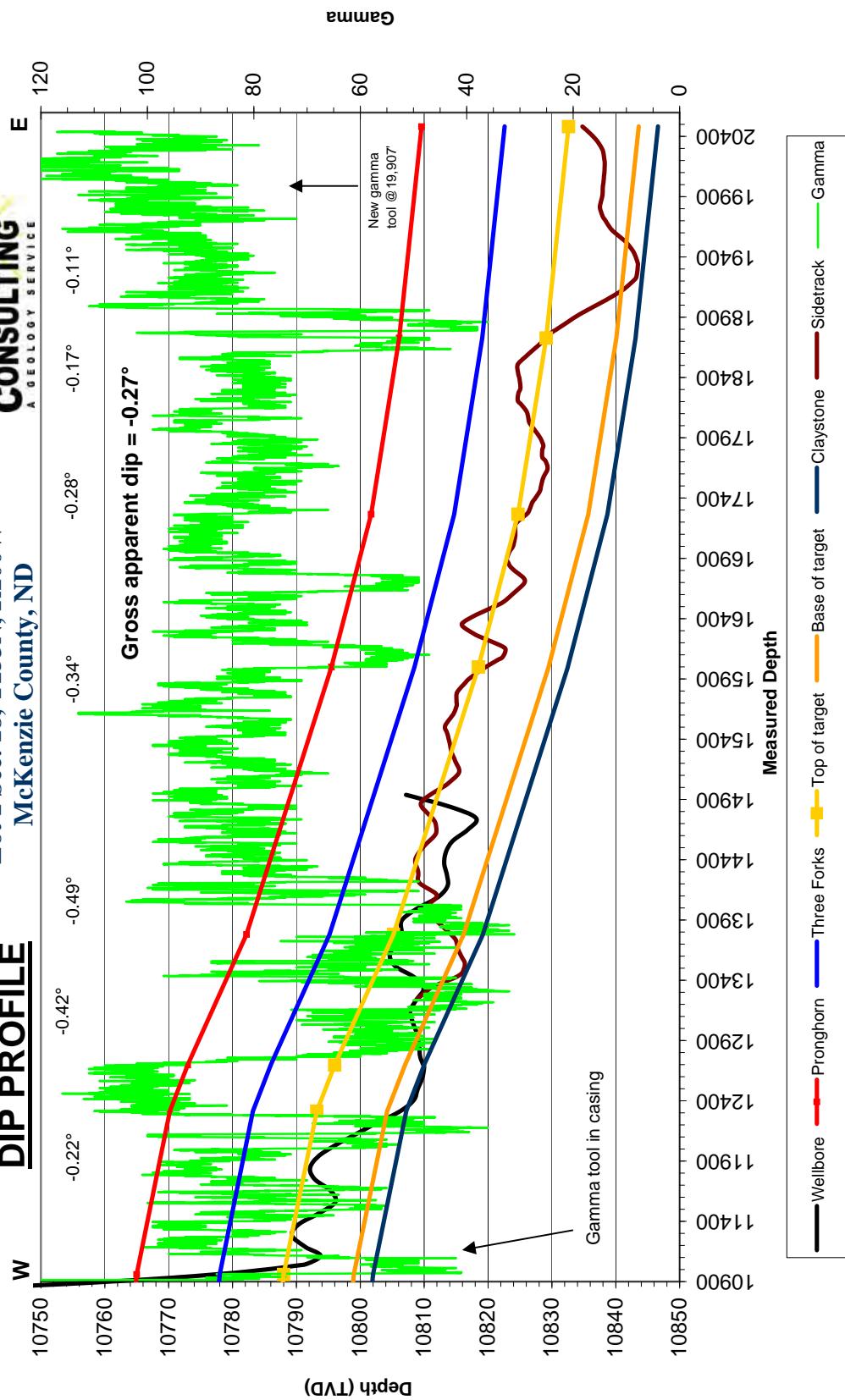
## FORMATION MARKERS & DIP ESTIMATES

*Oasis Petroleum North America, LLC - Ash Federal 5300 11-18T*

Dip Change Points	MD	TVD	TVD diff.	MD diff.	Dip	Dipping up/down	Type of Marker
Marker							
Initial Target Contact	10,960'	10,788.00					
Claystone	12,314'	10,793.20	5.20	1354.00	-0.22	Down	Gamma
Claystone	12,698'	10,796.00	2.80	384.00	-0.42	Down	Gamma
Low gamma	13,781'	10,805.20	9.20	1083.00	-0.49	Down	Gamma
Tight streak, low gamma	16,000'	10,818.50	13.30	2219.00	-0.34	Down	Gamma
Top of zone	17,267'	10,824.70	6.20	1267.00	-0.28	Down	Gamma
Tight streak, low gamma	18,729'	10,829.10	4.40	1462.00	-0.17	Down	Gamma
TD	20,482'	10,832.60	3.50	1753.00	-0.11		
<b>Gross Dip</b>							
Initial Target Contact	10,960'	10,788.00					
Projected Final Target Contact	20,482'	10,832.60	44.60	9522.00	-0.27	Down	Projection

**Oasis Petroleum North America, LLC**  
Ash Federal 5300 11-18T  
**Lot 1 Sec. 18, T153N, R100W**  
**McKenzie County, ND**

**DIP PROFILE**



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# SUNBURST CONSULTING, INC.

&gt;

Operator:	Oasis Petroleum North America, LLC	
Well :	Ash Federal 5300 11-18T	
County:	McKenzie	State: ND
QQ:	Lot 1	Section: 18
Township:	153	N/S: N
Range:	100	E/W: W
Footages:	800	FN/SL: N
	350	FE/WL: W

Kick-off:	8/31/2012
Finish:	9/8/2012
Directional Supervision:	RPM Inc.

Date: 9/26/2012  
 Time: 13:34

**F9 to re-calculate**Proposed dir: 90.29

Minimum Curvature Method (SPE-3362)

[North and East are positive and South and West are negative, relative to surface location]

No.	MD	INC	TRUE				SECT	DLS/ 100
			AZM	TVD	N-S	E-W		
Tie	2183.00	0.00	0.00	2183.00	0.00	0.00	0.00	
1	2261.00	1.20	173.10	2260.99	-0.81	0.10	0.10	1.54
2	2354.00	0.90	183.40	2353.98	-2.51	0.17	0.18	0.38
3	2448.00	0.70	203.60	2447.97	-3.77	-0.10	-0.08	0.36
4	2541.00	0.40	249.50	2540.97	-4.40	-0.63	-0.61	0.55
5	2634.00	0.80	271.30	2633.96	-4.50	-1.59	-1.56	0.49
6	2727.00	1.00	274.10	2726.95	-4.43	-3.05	-3.02	0.22
7	2821.00	1.10	288.60	2820.93	-4.08	-4.72	-4.70	0.30
8	2914.00	1.20	294.00	2913.91	-3.40	-6.45	-6.44	0.16
9	3007.00	1.50	299.60	3006.89	-2.41	-8.40	-8.39	0.35
10	3101.00	1.40	305.10	3100.86	-1.14	-10.41	-10.41	0.18
11	3194.00	1.30	305.50	3193.83	0.13	-12.20	-12.20	0.11
12	3287.00	1.20	304.30	3286.81	1.29	-13.86	-13.87	0.11
13	3381.00	1.20	313.70	3380.79	2.52	-15.39	-15.40	0.21
14	3474.00	1.20	308.00	3473.77	3.80	-16.86	-16.88	0.13
15	3568.00	1.10	310.30	3567.75	4.99	-18.32	-18.35	0.12
16	3661.00	1.00	303.00	3660.74	6.01	-19.68	-19.71	0.18
17	3754.00	1.00	310.00	3753.72	6.97	-20.99	-21.02	0.13
18	3848.00	1.00	311.40	3847.71	8.04	-22.23	-22.27	0.03
19	3941.00	0.80	310.70	3940.70	9.00	-23.33	-23.38	0.22
20	4034.00	0.80	314.00	4033.69	9.87	-24.29	-24.34	0.05
21	4127.00	0.80	316.20	4126.68	10.79	-25.21	-25.26	0.03
22	4221.00	0.80	320.90	4220.67	11.78	-26.07	-26.13	0.07
23	4314.00	0.50	322.80	4313.66	12.60	-26.73	-26.79	0.32
24	4407.00	0.40	321.20	4406.66	13.18	-27.18	-27.24	0.11
25	4500.00	0.40	324.30	4499.66	13.70	-27.57	-27.64	0.02
26	4594.00	0.50	331.60	4593.65	14.32	-27.96	-28.03	0.12
27	4687.00	0.80	321.50	4686.65	15.19	-28.56	-28.63	0.34
28	4780.00	0.80	340.50	4779.64	16.31	-29.18	-29.26	0.28
29	4873.00	0.60	1.50	4872.63	17.41	-29.38	-29.47	0.35
30	4966.00	0.60	12.50	4965.63	18.37	-29.26	-29.35	0.12
31	5059.00	0.60	38.30	5058.62	19.23	-28.85	-28.95	0.29
32	5153.00	0.40	59.70	5152.62	19.78	-28.27	-28.37	0.29
33	5246.00	0.30	183.10	5245.62	19.70	-28.00	-28.10	0.66
34	5339.00	0.70	141.20	5338.61	19.01	-27.66	-27.75	0.56
35	5432.00	0.20	152.80	5431.61	18.43	-27.23	-27.32	0.54
36	5526.00	0.10	56.20	5525.61	18.33	-27.08	-27.18	0.25
37	5619.00	0.30	339.60	5618.61	18.60	-27.10	-27.19	0.32
38	5712.00	0.30	264.60	5711.61	18.80	-27.43	-27.52	0.39
39	5806.00	0.60	296.80	5805.61	19.00	-28.11	-28.21	0.41
40	5899.00	0.50	310.60	5898.60	19.49	-28.85	-28.95	0.18

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# SUNBURST CONSULTING, INC.

&gt;

Operator:	Oasis Petroleum North America, LLC	
Well :	Ash Federal 5300 11-18T	
County:	McKenzie	State: ND
QQ:	Lot 1	Section: 18
Township:	153	N/S: N
Range:	100	E/W: W
Footages:	800	FN/SL: N
	350	FE/WL: W

Kick-off:	8/31/2012
Finish:	9/8/2012
Directional Supervision:	RPM Inc.

Date: 9/26/2012  
 Time: 13:34

**F9 to re-calculate**Proposed dir: 90.29

Minimum Curvature Method (SPE-3362)

[North and East are positive and South and West are negative, relative to surface location]

No.	MD	INC	TRUE				SECT	DLS/ 100
			AZM	TVD	N-S	E-W		
41	5992.00	0.50	341.80	5991.60	20.14	-29.29	-29.39	0.29
42	6086.00	0.80	344.20	6085.59	21.16	-29.60	-29.70	0.32
43	6179.00	1.20	1.20	6178.58	22.76	-29.75	-29.87	0.53
44	6273.00	1.60	3.90	6272.55	25.05	-29.64	-29.77	0.43
45	6366.00	1.50	10.20	6365.52	27.54	-29.34	-29.48	0.21
46	6458.00	1.90	20.20	6457.48	30.16	-28.60	-28.75	0.54
47	6552.00	2.20	21.60	6551.42	33.30	-27.40	-27.57	0.32
48	6645.00	2.70	22.70	6644.33	36.98	-25.89	-26.08	0.54
49	6738.00	1.30	359.40	6737.27	40.06	-25.06	-25.26	1.71
50	6832.00	1.20	345.30	6831.25	42.07	-25.32	-25.53	0.34
51	6925.00	1.60	358.30	6924.22	44.31	-25.61	-25.83	0.55
52	7018.00	1.50	4.30	7017.19	46.82	-25.55	-25.79	0.20
53	7111.00	1.50	1.50	7110.16	49.26	-25.43	-25.68	0.08
54	7205.00	1.40	7.40	7204.13	51.62	-25.25	-25.51	0.19
55	7298.00	1.50	7.70	7297.10	53.96	-24.94	-25.21	0.11
56	7391.00	1.60	21.90	7390.06	56.37	-24.29	-24.58	0.43
57	7484.00	1.60	32.50	7483.03	58.67	-23.11	-23.41	0.32
58	7578.00	1.60	32.10	7576.99	60.89	-21.71	-22.02	0.01
59	7671.00	1.50	39.50	7669.96	62.93	-20.25	-20.56	0.24
60	7764.00	1.70	38.80	7762.92	64.94	-18.61	-18.94	0.22
61	7857.00	1.00	37.00	7855.89	66.66	-17.25	-17.59	0.75
62	7951.00	0.80	48.50	7949.88	67.75	-16.27	-16.61	0.29
63	8044.00	0.80	58.20	8042.87	68.53	-15.23	-15.58	0.15
64	8137.00	0.80	53.90	8135.86	69.25	-14.15	-14.50	0.06
65	8231.00	0.60	46.40	8229.86	69.98	-13.27	-13.62	0.23
66	8324.00	0.50	50.80	8322.85	70.57	-12.60	-12.96	0.12
67	8417.00	0.50	46.40	8415.85	71.10	-11.99	-12.35	0.04
68	8511.00	0.60	51.60	8509.85	71.69	-11.31	-11.67	0.12
69	8604.00	0.80	68.00	8602.84	72.24	-10.33	-10.69	0.30
70	8697.00	0.90	59.40	8695.83	72.85	-9.10	-9.46	0.17
71	8791.00	1.00	69.20	8789.82	73.52	-7.69	-8.07	0.20
72	8884.00	0.80	66.70	8882.80	74.07	-6.34	-6.71	0.22
73	8977.00	0.80	70.50	8975.79	74.54	-5.13	-5.51	0.06
74	9071.00	0.90	79.80	9069.78	74.89	-3.78	-4.16	0.18
75	9164.00	0.80	79.40	9162.77	75.14	-2.43	-2.81	0.11
76	9257.00	0.80	75.00	9255.77	75.43	-1.16	-1.54	0.07
77	9351.00	0.80	79.80	9349.76	75.71	0.12	-0.27	0.07
78	9444.00	0.70	92.20	9442.75	75.80	1.32	0.94	0.20
79	9538.00	0.70	79.20	9536.74	75.89	2.46	2.08	0.17

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# SUNBURST CONSULTING, INC.

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Operator:	Oasis Petroleum North America, LLC	
Well :	Ash Federal 5300 11-18T	
County:	McKenzie	State: ND
QQ:	Lot 1	Section: 18
Township:	153	N/S: N
Range:	100	E/W: W
Footages:	800	FN/SL: N
	350	FE/WL: W

Kick-off:	8/31/2012
Finish:	9/8/2012
Directional Supervision:	RPM Inc.

Date: 9/26/2012  
 Time: 13:34

**F9 to re-calculate**Proposed dir: 90.29

Minimum Curvature Method (SPE-3362)

[North and East are positive and South and West are negative, relative to surface location]

No.	MD	INC	TRUE				SECT	DLS/ 100
			AZM	TVD	N-S	E-W		
80	9631.00	0.60	92.70	9629.74	75.97	3.51	3.12	0.20
81	9724.00	0.70	83.50	9722.73	76.01	4.56	4.17	0.16
82	9818.00	0.70	78.00	9816.72	76.20	5.69	5.30	0.07
83	9911.00	0.50	78.00	9909.72	76.40	6.64	6.25	0.22
84	10004.00	0.50	50.20	10002.71	76.75	7.35	6.96	0.26
85	10098.00	0.60	45.70	10096.71	77.35	8.02	7.63	0.12
86	10191.00	0.70	50.70	10189.70	78.05	8.81	8.41	0.12
87	10283.00	0.70	30.90	10281.70	78.89	9.53	9.13	0.26
88	10315.00	0.80	42.50	10313.69	79.22	9.78	9.38	0.57
89	10346.00	3.20	87.70	10344.67	79.42	10.79	10.39	8.70
90	10377.00	8.10	88.40	10375.51	79.51	13.84	13.44	15.81
91	10408.00	13.90	85.90	10405.93	79.84	19.74	19.34	18.77
92	10440.00	17.90	85.90	10436.70	80.47	28.49	28.08	12.50
93	10471.00	18.50	85.20	10466.15	81.22	38.14	37.73	2.06
94	10502.00	21.50	82.70	10495.28	82.35	48.68	48.26	10.06
95	10533.00	25.40	85.50	10523.71	83.60	60.94	60.52	13.08
96	10564.00	28.50	86.20	10551.34	84.61	74.96	74.53	10.05
97	10595.00	33.90	87.50	10577.85	85.48	90.98	90.55	17.55
98	10626.00	38.10	87.60	10602.92	86.25	109.19	108.75	13.55
99	10657.00	40.10	87.50	10626.98	87.09	128.72	128.27	6.45
100	10688.00	45.50	88.40	10649.72	87.84	149.76	149.31	17.53
101	10720.00	50.00	89.60	10671.23	88.24	173.44	172.99	14.33
102	10751.00	51.20	89.60	10690.90	88.41	197.39	196.94	3.87
103	10782.00	56.70	88.90	10709.14	88.74	222.44	221.99	17.84
104	10813.00	61.10	90.40	10725.15	88.89	248.98	248.52	14.79
105	10844.00	64.40	91.30	10739.34	88.48	276.53	276.08	10.95
106	10875.00	67.80	90.60	10751.90	88.01	304.86	304.41	11.16
107	10906.00	71.40	89.30	10762.70	88.04	333.91	333.46	12.26
108	10937.00	74.70	88.50	10771.74	88.61	363.56	363.10	10.93
109	10969.00	77.90	88.10	10779.32	89.54	394.63	394.17	10.07
110	11000.00	80.20	88.40	10785.21	90.47	425.05	424.58	7.48
111	11031.00	82.60	88.40	10789.84	91.32	455.68	455.22	7.74
112	11048.00	84.80	88.10	10791.71	91.84	472.57	472.10	13.06
113	11116.00	91.70	87.60	10793.78	94.39	540.45	539.97	10.17
114	11190.00	92.10	88.60	10791.33	96.84	614.37	613.87	1.45
115	11284.00	90.40	88.80	10789.28	98.97	708.32	707.81	1.82
116	11378.00	88.20	90.00	10790.43	99.96	802.30	801.78	2.67
117	11470.00	87.80	89.20	10793.64	100.60	894.24	893.72	0.97
118	11562.00	89.10	88.80	10796.13	102.20	986.19	985.66	1.48
119	11656.00	91.90	90.90	10795.31	102.45	1080.17	1079.64	3.72

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# SUNBURST CONSULTING, INC.

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Operator:	Oasis Petroleum North America, LLC	
Well :	Ash Federal 5300 11-18T	
County:	McKenzie	State: ND
QQ:	Lot 1	Section: 18
Township:	153	N/S: N
Range:	100	E/W: W
Footages:	800	FN/SL: N
	350	FE/WL: W

Kick-off:	8/31/2012
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Minimum Curvature Method (SPE-3362)

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No.	MD	INC	TRUE				SECT	DLS/ 100
			AZM	TVD	N-S	E-W		
120	11749.00	91.10	92.80	10792.87	99.45	1173.09	1172.57	2.22
121	11842.00	89.80	94.30	10792.14	93.69	1265.90	1265.41	2.13
122	11937.00	88.70	94.40	10793.38	86.49	1360.62	1360.16	1.16
123	12031.00	88.00	94.00	10796.09	79.60	1454.33	1453.90	0.86
124	12124.00	88.00	94.20	10799.34	72.96	1547.03	1546.64	0.21
125	12218.00	88.00	93.60	10802.62	66.57	1640.76	1640.40	0.64
126	12310.00	87.60	93.30	10806.15	61.04	1732.52	1732.19	0.54
127	12403.00	89.70	91.80	10808.34	56.90	1825.40	1825.08	2.77
128	12495.00	89.50	91.60	10808.98	54.17	1917.35	1917.05	0.31
129	12585.00	89.60	90.60	10809.69	52.44	2007.33	2007.04	1.12
130	12676.00	90.00	89.90	10810.01	52.05	2098.33	2098.04	0.89
131	12708.00	90.80	89.70	10809.78	52.16	2130.33	2130.04	2.58
132	12769.00	90.00	89.40	10809.36	52.64	2191.32	2191.03	1.40
133	12863.00	90.20	89.70	10809.19	53.38	2285.32	2285.02	0.38
134	12956.00	90.20	89.90	10808.87	53.70	2378.32	2378.02	0.22
135	13050.00	90.60	89.20	10808.21	54.44	2472.31	2472.01	0.86
136	13144.00	89.90	90.10	10807.80	55.01	2566.31	2566.00	1.21
137	13238.00	88.90	90.40	10808.79	54.60	2660.30	2659.99	1.11
138	13331.00	89.70	90.90	10809.92	53.55	2753.29	2752.98	1.01
139	13425.00	92.10	91.40	10808.45	51.66	2847.25	2846.95	2.61
140	13519.00	91.60	93.20	10805.41	47.89	2941.12	2940.84	1.99
141	13618.00	89.30	94.20	10804.63	41.50	3039.90	3039.66	2.53
142	13711.00	89.10	94.30	10805.93	34.61	3132.64	3132.42	0.24
143	13742.00	89.20	94.90	10806.39	32.13	3163.54	3163.33	1.96
144	13805.00	90.70	95.10	10806.45	26.64	3226.30	3226.12	2.40
145	13899.00	89.20	94.90	10806.53	18.44	3319.93	3319.80	1.61
146	13992.00	88.00	94.90	10808.80	10.50	3412.57	3412.47	1.29
147	14086.00	88.00	94.30	10812.08	2.97	3506.21	3506.15	0.64
148	14180.00	90.10	93.20	10813.64	-3.18	3599.98	3599.95	2.52
149	14274.00	90.00	92.30	10813.56	-7.69	3693.87	3693.87	0.96
150	14368.00	90.50	92.40	10813.15	-11.54	3787.79	3787.80	0.54
151	14462.00	89.20	92.00	10813.39	-15.15	3881.72	3881.75	1.45
152	14555.00	89.50	92.80	10814.45	-19.05	3974.63	3974.68	0.92
153	14649.00	87.60	91.70	10816.83	-22.73	4068.53	4068.59	2.34
154	14743.00	90.80	91.70	10818.14	-25.52	4162.46	4162.54	3.40
155	14837.00	94.00	91.30	10814.20	-27.98	4256.34	4256.42	3.43
156	14938.00	94.00	91.30	10807.16	-30.27	4357.06	4357.16	0.00

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# SUNBURST CONSULTING, INC.

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Operator:	Oasis Petroleum North America, LLC		
Well :	Ash Federal 5300 11-18T Sidetrack #1		
County:	McKenzie	State:	ND
QQ:	Lot 1	Section:	18
Township:	153	N/S:	N
Range:	100	E/W:	W
Footages:	800	FN/SL:	N
	350	FE/WL:	W

Kick-off:	9/8/2012
Finish:	9/18/2012
Directional Supervision:	
RPM Inc	

Date: 9/26/2012  
 Time: 13:34  
**F9 to re-calculate**

Proposed dir: **90.29**

Minimum Curvature Method (SPE-3362)

[North and East are positive and South and West are negative, relative to surface location]

No.	MD	TRUE					SECT	DLS/ 100
		INC	AZM	TVD	N-S	E-W		
Tie	13238.00	88.90	90.40	10808.78	54.60	2660.30	2659.99	1.11
1	13300.00	88.50	90.70	10810.19	54.01	2722.28	2721.98	0.81
2	13333.00	88.80	90.00	10810.96	53.81	2755.27	2754.97	2.31
3	13365.00	87.00	88.60	10812.14	54.20	2787.25	2786.94	7.12
4	13396.00	87.40	87.40	10813.65	55.28	2818.19	2817.88	4.08
5	13427.00	87.50	87.10	10815.03	56.76	2849.12	2848.80	1.02
6	13458.00	89.30	87.40	10815.90	58.25	2880.08	2879.74	5.89
7	13491.00	89.70	88.10	10816.18	59.55	2913.05	2912.71	2.44
8	13521.00	89.60	88.40	10816.37	60.46	2943.03	2942.69	1.05
9	13552.00	90.60	89.20	10816.31	61.11	2974.03	2973.68	4.13
10	13583.00	90.60	88.90	10815.99	61.62	3005.02	3004.67	0.97
11	13615.00	90.60	88.80	10815.65	62.27	3037.01	3036.66	0.31
12	13646.00	90.40	89.20	10815.38	62.81	3068.01	3067.65	1.44
13	13677.00	90.20	88.50	10815.22	63.43	3099.00	3098.64	2.35
14	13708.00	90.20	88.90	10815.11	64.13	3129.99	3129.63	1.29
15	13739.00	90.60	89.10	10814.90	64.67	3160.99	3160.62	1.44
16	13771.00	91.20	89.20	10814.39	65.15	3192.98	3192.61	1.90
17	13802.00	91.20	89.10	10813.74	65.61	3223.97	3223.59	0.32
18	13833.00	91.00	90.40	10813.15	65.74	3254.96	3254.59	4.24
19	13864.00	91.30	90.50	10812.53	65.50	3285.95	3285.58	1.02
20	13896.00	91.20	90.60	10811.83	65.19	3317.94	3317.57	0.44
21	13927.00	90.40	91.30	10811.40	64.68	3348.94	3348.57	3.43
22	13958.00	90.90	91.40	10811.04	63.95	3379.93	3379.56	1.64
23	13989.00	90.20	91.30	10810.75	63.22	3410.92	3410.55	2.28
24	14021.00	89.70	90.80	10810.77	62.63	3442.91	3442.55	2.21
25	14052.00	88.70	91.30	10811.21	62.06	3473.90	3473.54	3.61
26	14083.00	88.90	91.30	10811.86	61.36	3504.89	3504.53	0.65
27	14114.00	90.90	92.10	10811.91	60.44	3535.87	3535.52	6.95
28	14146.00	92.10	91.80	10811.07	59.35	3567.84	3567.50	3.87
29	14177.00	91.70	91.70	10810.05	58.41	3598.81	3598.47	1.33
30	14208.00	91.20	90.90	10809.26	57.70	3629.79	3629.45	3.04
31	14240.00	89.70	90.90	10809.01	57.20	3661.79	3661.45	4.69
32	14271.00	90.00	91.10	10809.09	56.66	3692.78	3692.45	1.16
33	14302.00	90.10	91.30	10809.06	56.01	3723.77	3723.44	0.72
34	14334.00	90.60	91.70	10808.87	55.17	3755.76	3755.44	2.00
35	14365.00	90.20	91.50	10808.65	54.31	3786.75	3786.43	1.44
36	14396.00	90.00	91.70	10808.60	53.44	3817.74	3817.42	0.91
37	14427.00	89.30	91.30	10808.79	52.63	3848.73	3848.41	2.60
38	14459.00	89.30	91.40	10809.18	51.88	3880.71	3880.40	0.31
39	14490.00	89.10	91.20	10809.61	51.17	3911.70	3911.39	0.91

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# SUNBURST CONSULTING, INC.

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Operator:	Oasis Petroleum North America, LLC	
Well :	Ash Federal 5300 11-18T Sidetrack #1	
County:	McKenzie	State: ND
QQ:	Lot 1	Section: 18
Township:	153	N/S: N
Range:	100	E/W: W
Footages:	800	FN/SL: N
	350	FE/WL: W

Kick-off:	9/8/2012
Finish:	9/18/2012
Directional Supervision:	
RPM Inc	

Date: 9/26/2012  
 Time: 13:34  
**F9 to re-calculate**

Proposed dir: 90.29

Minimum Curvature Method (SPE-3362)

[North and East are positive and South and West are negative, relative to surface location]

No.	MD	INC	AZM	TVD	TRUE			DLS/ 100
					N-S	E-W	SECT	
38	14521.00	89.00	90.70	10810.12	50.66	3942.69	3942.39	1.64
40	14552.00	88.70	90.80	10810.75	50.25	3973.69	3973.38	1.02
41	14584.00	89.00	90.90	10811.39	49.78	4005.68	4005.37	0.99
42	14615.00	89.40	90.90	10811.82	49.29	4036.67	4036.37	1.29
43	14646.00	90.20	90.90	10811.93	48.81	4067.66	4067.37	2.58
44	14677.00	90.00	90.50	10811.88	48.43	4098.66	4098.36	1.44
45	14709.00	90.50	90.40	10811.74	48.18	4130.66	4130.36	1.59
46	14740.00	90.90	90.50	10811.36	47.93	4161.66	4161.36	1.33
47	14771.00	91.20	90.40	10810.79	47.69	4192.65	4192.36	1.02
48	14803.00	90.90	90.20	10810.20	47.52	4224.65	4224.35	1.13
49	14834.00	91.10	89.90	10809.66	47.49	4255.64	4255.35	1.16
50	14865.00	89.60	90.30	10809.47	47.44	4286.64	4286.34	5.01
51	14896.00	88.90	89.90	10809.88	47.39	4317.64	4317.34	2.60
52	14927.00	88.40	89.30	10810.61	47.60	4348.63	4348.33	2.52
53	14959.00	88.20	89.00	10811.56	48.08	4380.61	4380.31	1.13
54	14990.00	88.20	88.70	10812.53	48.70	4411.59	4411.28	0.97
55	15021.00	88.30	88.70	10813.48	49.40	4442.57	4442.26	0.32
56	15052.00	89.10	89.30	10814.18	49.94	4473.55	4473.24	3.23
57	15084.00	88.50	89.50	10814.85	50.28	4505.54	4505.23	1.98
58	15115.00	89.50	89.80	10815.39	50.47	4536.54	4536.22	3.37
59	15146.00	90.10	89.90	10815.50	50.55	4567.54	4567.22	1.96
60	15177.00	90.80	90.20	10815.26	50.52	4598.54	4598.22	2.46
61	15209.00	90.30	90.30	10814.95	50.38	4630.53	4630.22	1.59
62	15240.00	90.60	89.80	10814.71	50.35	4661.53	4661.22	1.88
63	15271.00	90.40	89.60	10814.44	50.52	4692.53	4692.22	0.91
64	15302.00	90.30	89.20	10814.25	50.84	4723.53	4723.21	1.33
65	15333.00	90.20	88.60	10814.11	51.44	4754.52	4754.20	1.96
66	15365.00	90.20	87.80	10814.00	52.44	4786.51	4786.18	2.50
67	15396.00	90.30	87.80	10813.87	53.63	4817.48	4817.15	0.32
68	15427.00	90.20	88.80	10813.73	54.55	4848.47	4848.13	3.24
69	15458.00	90.50	89.20	10813.54	55.09	4879.46	4879.12	1.61
70	15490.00	90.50	89.10	10813.26	55.57	4911.46	4911.11	0.31
71	15521.00	89.10	90.70	10813.37	55.62	4942.46	4942.11	6.86
72	15584.00	89.30	91.10	10814.25	54.63	5005.44	5005.10	0.71
73	15615.00	89.20	91.10	10814.65	54.04	5036.43	5036.10	0.32
74	15677.00	90.00	91.30	10815.09	52.74	5098.42	5098.09	1.33
75	15708.00	90.10	91.00	10815.06	52.12	5129.41	5129.08	1.02
76	15771.00	89.90	91.10	10815.06	50.96	5192.40	5192.08	0.35
77	15802.00	89.10	91.30	10815.33	50.31	5223.39	5223.07	2.66
78	15865.00	89.00	90.80	10816.38	49.16	5286.37	5286.06	0.81

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# SUNBURST CONSULTING, INC.

&gt;

Operator:	Oasis Petroleum North America, LLC		
Well :	Ash Federal 5300 11-18T Sidetrack #1		
County:	McKenzie	State:	ND
QQ:	Lot 1	Section:	18
Township:	153	N/S:	N
Range:	100	E/W:	W
Footages:	800	FN/SL:	N
	350	FE/WL:	W

Kick-off:	9/8/2012
Finish:	9/18/2012
Directional Supervision:	
RPM Inc	

Date: 9/26/2012  
 Time: 13:34  
**F9 to re-calculate**

Proposed dir: 90.29

Minimum Curvature Method (SPE-3362)

[North and East are positive and South and West are negative, relative to surface location]

No.	MD	INC	AZM	TVD	TRUE			DLS/ 100
					N-S	E-W	SECT	
79	15896.00	88.90	90.90	10816.94	48.70	5317.37	5317.05	0.46
80	15958.00	88.30	90.70	10818.46	47.83	5379.34	5379.03	1.02
81	15990.00	88.30	90.40	10819.41	47.53	5411.32	5411.02	0.94
82	16052.00	88.10	91.20	10821.36	46.66	5473.29	5472.98	1.33
83	16083.00	88.40	92.80	10822.30	45.58	5504.25	5503.95	5.25
84	16146.00	90.80	93.60	10822.74	42.06	5567.15	5566.86	4.02
85	16177.00	92.10	93.60	10821.96	40.12	5598.08	5597.80	4.19
86	16239.00	93.00	94.10	10819.20	35.96	5659.87	5659.62	1.66
87	16270.00	91.80	93.90	10817.90	33.80	5690.77	5690.53	3.92
88	16333.00	91.50	93.30	10816.09	29.84	5753.62	5753.40	1.06
89	16364.00	88.80	93.40	10816.01	28.03	5784.56	5784.35	8.72
90	16427.00	87.60	92.90	10817.98	24.57	5847.44	5847.24	2.06
91	16520.00	87.70	93.10	10821.80	19.71	5940.23	5940.06	0.24
92	16552.00	88.80	92.20	10822.78	18.23	5972.18	5972.01	4.44
93	16614.00	88.80	92.40	10824.07	15.74	6034.12	6033.96	0.32
94	16677.00	88.80	93.30	10825.39	12.61	6097.03	6096.88	1.43
95	16708.00	89.80	93.80	10825.77	10.69	6127.96	6127.83	3.61
96	16739.00	91.00	93.80	10825.56	8.64	6158.89	6158.77	3.87
97	16802.00	91.70	93.60	10824.07	4.57	6221.74	6221.64	1.16
98	16833.00	90.50	94.10	10823.48	2.49	6252.67	6252.58	4.19
99	16864.00	90.60	94.40	10823.18	0.19	6283.58	6283.50	1.02
100	16895.00	90.30	94.20	10822.93	-2.13	6314.49	6314.42	1.16
101	16958.00	88.90	94.30	10823.37	-6.80	6377.32	6377.27	2.23
102	16989.00	89.50	94.10	10823.81	-9.07	6408.23	6408.19	2.04
103	17020.00	89.70	93.60	10824.02	-11.15	6439.16	6439.13	1.74
104	17083.00	89.90	93.20	10824.24	-14.89	6502.05	6502.04	0.71
105	17114.00	90.00	93.20	10824.27	-16.62	6533.00	6533.00	0.32
106	17176.00	90.00	92.70	10824.27	-19.81	6594.92	6594.93	0.81
107	17208.00	88.40	92.30	10824.72	-21.20	6626.88	6626.91	5.15
108	17270.00	89.00	92.10	10826.12	-23.58	6688.82	6688.85	1.02
109	17302.00	89.70	92.30	10826.49	-24.81	6720.80	6720.83	2.28
110	17364.00	89.50	91.60	10826.92	-26.92	6782.76	6782.81	1.17
111	17395.00	88.90	91.60	10827.35	-27.79	6813.74	6813.80	1.94
112	17458.00	89.70	91.90	10828.12	-29.71	6876.71	6876.77	1.36
113	17489.00	89.80	92.00	10828.26	-30.76	6907.69	6907.76	0.46
114	17552.00	89.70	91.30	10828.53	-32.58	6970.66	6970.74	1.12
115	17583.00	89.40	91.00	10828.78	-33.20	7001.65	7001.73	1.37
116	17645.00	89.60	91.00	10829.32	-34.28	7063.64	7063.73	0.32
117	17707.00	91.00	91.20	10828.99	-35.47	7125.63	7125.72	2.28
118	17739.00	90.80	91.10	10828.49	-36.11	7157.62	7157.71	0.70

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# SUNBURST CONSULTING, INC.

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Operator:	Oasis Petroleum North America, LLC	
Well :	Ash Federal 5300 11-18T Sidetrack #1	
County:	McKenzie	State: ND
QQ:	Lot 1	Section: 18
Township:	153	N/S: N
Range:	100	E/W: W
Footages:	800	FN/SL: N
	350	FE/WL: W

Kick-off:	9/8/2012
Finish:	9/18/2012
Directional Supervision:	
RPM Inc	

Date: 9/26/2012  
 Time: 13:34  
**F9 to re-calculate**

Proposed dir: 90.29

Minimum Curvature Method (SPE-3362)

[North and East are positive and South and West are negative, relative to surface location]

No.	MD	INC	AZM	TVD	N-S	E-W	SECT	DLS/	
								100	
119	17801.00	89.20	90.40	10828.49	-36.93	7219.61	7219.71	2.82	
120	17833.00	90.20	90.80	10828.66	-37.26	7251.61	7251.70	3.37	
121	17864.00	90.50	90.70	10828.47	-37.67	7282.61	7282.70	1.02	
122	17895.00	90.40	90.70	10828.22	-38.05	7313.60	7313.70	0.32	
123	17926.00	91.00	90.70	10827.85	-38.42	7344.60	7344.70	1.94	
124	18020.00	90.60	89.90	10826.53	-38.92	7438.59	7438.69	0.95	
125	18051.00	90.10	89.90	10826.34	-38.86	7469.58	7469.69	1.61	
126	18114.00	90.40	90.10	10826.07	-38.86	7532.58	7532.68	0.57	
127	18177.00	91.20	89.40	10825.19	-38.59	7595.58	7595.67	1.69	
128	18208.00	90.80	89.00	10824.65	-38.16	7626.57	7626.66	1.82	
129	18270.00	89.00	88.50	10824.76	-36.80	7688.55	7688.64	3.01	
130	18302.00	90.00	88.60	10825.04	-35.99	7720.54	7720.62	3.14	
131	18333.00	89.90	88.40	10825.06	-35.18	7751.53	7751.61	0.72	
132	18395.00	90.40	87.60	10824.90	-33.02	7813.49	7813.56	1.52	
133	18427.00	90.20	87.00	10824.73	-31.51	7845.45	7845.51	1.98	
134	18489.00	90.10	86.90	10824.57	-28.21	7907.37	7907.41	0.23	
135	18520.00	89.00	87.60	10824.81	-26.72	7938.33	7938.36	4.21	
136	18583.00	88.70	87.90	10826.08	-24.25	8001.27	8001.29	0.67	
137	18614.00	88.90	89.10	10826.73	-23.44	8032.25	8032.26	3.92	
138	18676.00	88.60	89.10	10828.08	-22.47	8094.23	8094.24	0.48	
139	18707.00	89.20	89.50	10828.68	-22.09	8125.22	8125.23	2.33	
140	18770.00	88.60	89.50	10829.89	-21.54	8188.20	8188.21	0.95	
141	18801.00	88.10	89.50	10830.78	-21.27	8219.19	8219.19	1.61	
142	18863.00	88.60	89.20	10832.56	-20.56	8281.16	8281.16	0.94	
143	18895.00	88.30	89.10	10833.43	-20.09	8313.14	8313.14	0.99	
144	18926.00	88.10	89.00	10834.40	-19.58	8344.13	8344.12	0.72	
145	18957.00	88.00	88.80	10835.46	-18.98	8375.10	8375.09	0.72	
146	19020.00	88.00	89.40	10837.66	-17.99	8438.05	8438.04	0.95	
147	19051.00	88.00	89.40	10838.74	-17.67	8469.03	8469.02	0.00	
148	19113.00	88.40	90.00	10840.69	-17.34	8531.00	8530.98	1.16	
149	19145.00	88.50	90.20	10841.55	-17.40	8562.99	8562.97	0.70	
150	19207.00	89.10	90.30	10842.85	-17.67	8624.98	8624.96	0.98	
151	19238.00	89.50	90.20	10843.23	-17.81	8655.97	8655.95	1.33	
152	19332.00	90.20	90.20	10843.47	-18.13	8749.97	8749.95	0.74	
153	19363.00	90.20	90.00	10843.37	-18.19	8780.97	8780.95	0.65	
154	19425.00	90.60	90.00	10842.93	-18.19	8842.97	8842.95	0.65	
155	19457.00	90.60	89.90	10842.60	-18.16	8874.97	8874.95	0.31	
156	19519.00	91.10	90.20	10841.68	-18.21	8936.96	8936.94	0.94	
157	19550.00	91.30	90.00	10841.03	-18.27	8967.95	8967.93	0.91	
158	19613.00	91.30	89.80	10839.60	-18.16	9030.94	9030.91	0.32	

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# SUNBURST CONSULTING, INC.

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Operator:	Oasis Petroleum North America, LLC	
Well :	Ash Federal 5300 11-18T Sidetrack #1	
County:	McKenzie	State: ND
QQ:	Lot 1	Section: 18
Township:	153	N/S: N
Range:	100	E/W: W
Footages:	800	FN/SL: N
	350	FE/WL: W

Kick-off:	9/8/2012
Finish:	9/18/2012
Directional Supervision:	
RPM Inc	

Date: 9/26/2012  
 Time: 13:34  
**F9 to re-calculate**

Proposed dir: 90.29

Minimum Curvature Method (SPE-3362)

[North and East are positive and South and West are negative, relative to surface location]

No.	MD	INC	AZM	TVD	TRUE			DLS/ 100
					N-S	E-W	SECT	
159	19644.00	90.60	89.30	10839.09	-17.91	9061.93	9061.91	2.77
160	19706.00	90.80	88.60	10838.33	-16.78	9123.92	9123.89	1.17
161	19738.00	90.60	87.80	10837.94	-15.77	9155.90	9155.86	2.58
162	19800.00	90.10	87.20	10837.56	-13.07	9217.84	9217.79	1.26
163	19831.00	89.90	86.40	10837.56	-11.34	9248.79	9248.73	2.66
164	19890.00	89.60	86.00	10837.82	-7.43	9307.66	9307.58	0.85
165	19921.00	90.00	86.00	10837.92	-5.27	9338.58	9338.49	1.29
166	19984.00	89.90	86.10	10837.98	-0.93	9401.43	9401.32	0.22
167	20015.00	89.80	86.20	10838.06	1.16	9432.36	9432.24	0.46
168	20077.00	90.00	86.40	10838.17	5.16	9494.23	9494.09	0.46
169	20108.00	89.80	86.60	10838.22	7.05	9525.18	9525.02	0.91
170	20171.00	90.10	86.40	10838.28	10.89	9588.06	9587.88	0.57
171	20202.00	90.10	86.70	10838.22	12.76	9619.00	9618.81	0.97
172	20264.00	90.20	86.20	10838.06	16.60	9680.88	9680.67	0.82
173	20295.00	90.50	86.30	10837.87	18.63	9711.82	9711.60	1.02
174	20358.00	90.80	86.60	10837.16	22.53	9774.69	9774.45	0.67
175	20420.00	91.20	87.20	10836.07	25.88	9836.59	9836.33	1.16
176	20482.00	91.20	87.20	10834.78	28.91	9898.50	9898.23	0.00

# FORMATION TOPS & STRUCTURAL RELATIONSHIPS

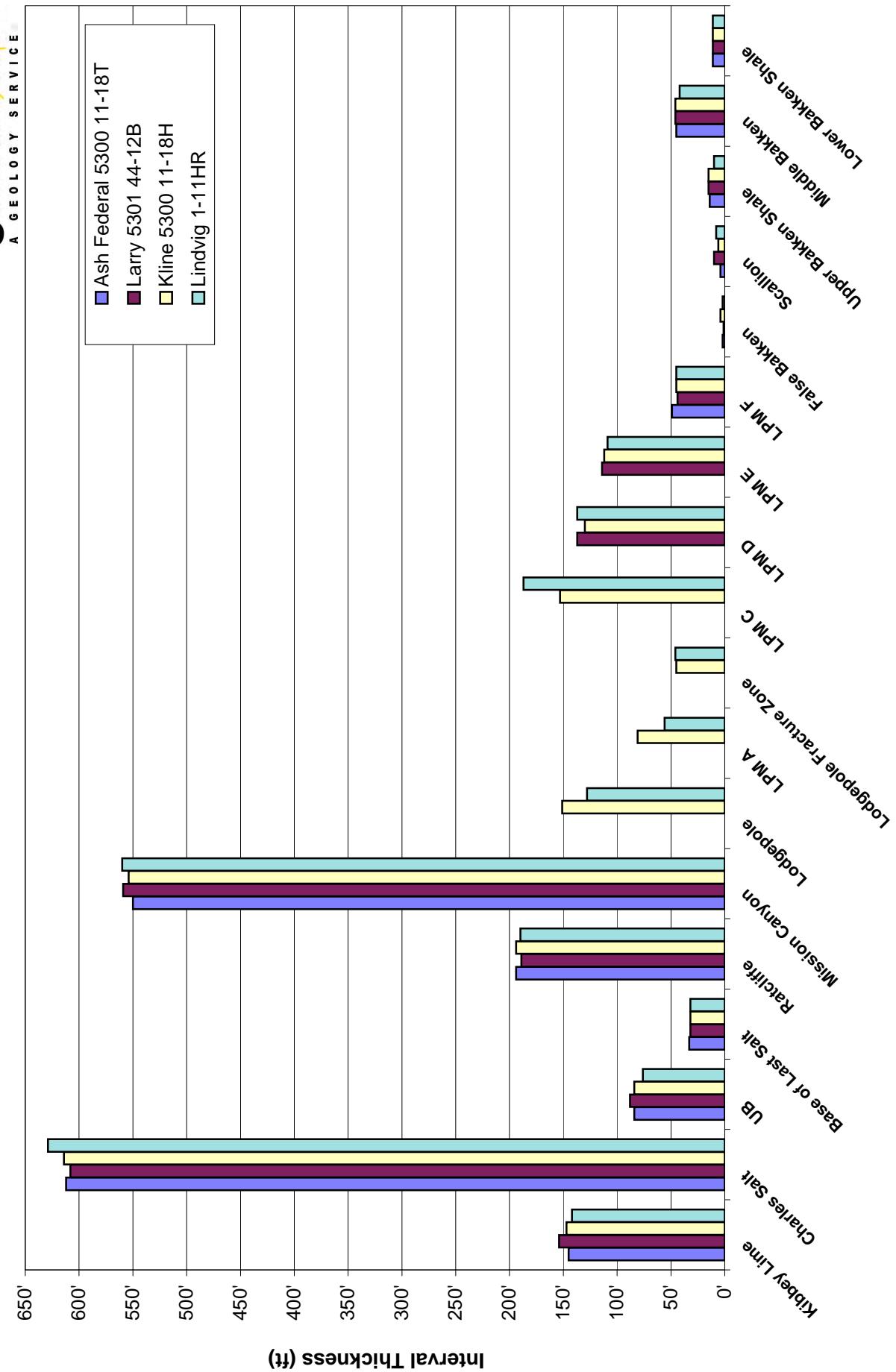
# CONTROL DATA

Operator:	Oasis Petroleum North America, LLC	Oasis Petroleum North America, LLC	SM Energy Company	
Well Name:	<b>Larry 5301 44-12B</b>	<b>Kline 5300 11-18H</b>	<b>Lindvig 1-11HR</b>	
Location:	SESE Section 12 T153N R101W McKenzie County, ND .25 mile NW of the Ash Federal 5300 11-18T	Lot 1 Section 18 T153N R100W McKenzie County, ND 200' south of the Ash Federal 5300 11-18T	SESE Section 11, T153N, R101W McKenzie County, ND 1.5 miles NW of the Ash Federal 5300 11-18T	
Elevation:	KB: 2,083'	KB: 2,079'	KB: 2,105'	
Formation/ Zone	E-Log Top	Datum (MSL)	Interval Thickness	
			Thickness to Target	
Kibbey Lime	8,348'	-6,265'	154' 2,454'	
Charles Salt	8,502'	-6,419'	608' 2,300'	
UB	9,110'	-7,027'	88' 1,692'	
Base of Last Salt	9,198'	-7,115'	32' 1,604'	
Ratcliff	9,230'	-7,147'	189' 1,572'	
Mission Canyon	9,419'	-7,336'	559' 1,383'	
Lodgepole	9,978'	-7,895'	- 824'	
LPM A	-	-	- -	
Lodgepole Fracture Zone	-	-	- -	
LPM C	-	-	- -	
LPM D	10,397'	-8,314'	137' 405'	
LPM E	10,534'	-8,451'	114' 268'	
LPM F	10,648'	-8,565'	44' 154'	
False Bakken	10,692'	-8,609'	1' 110'	
Scallion	10,693'	-8,610'	10' 109'	
Upper Bakken Shale	10,703'	-8,620'	15' 99'	
Middle Bakken	10,718'	-8,635'	46' 84'	
Lower Bakken Shale	10,764'	-8,681'	11' 38'	
Pronghorn	10,775'	-8,692'	19' 27'	
Three Forks	10,794'	-8,711'	8' 0'	
Three Forks Landing	10,802'	-8,719'	19' - <td></td>	
Base of Target	10,821'	-8,738'	10,825' - <td></td>	



# INTERVAL THICKNESS

Oasis Petroleum North America, LLC - Ash Federal 5300 11-18T



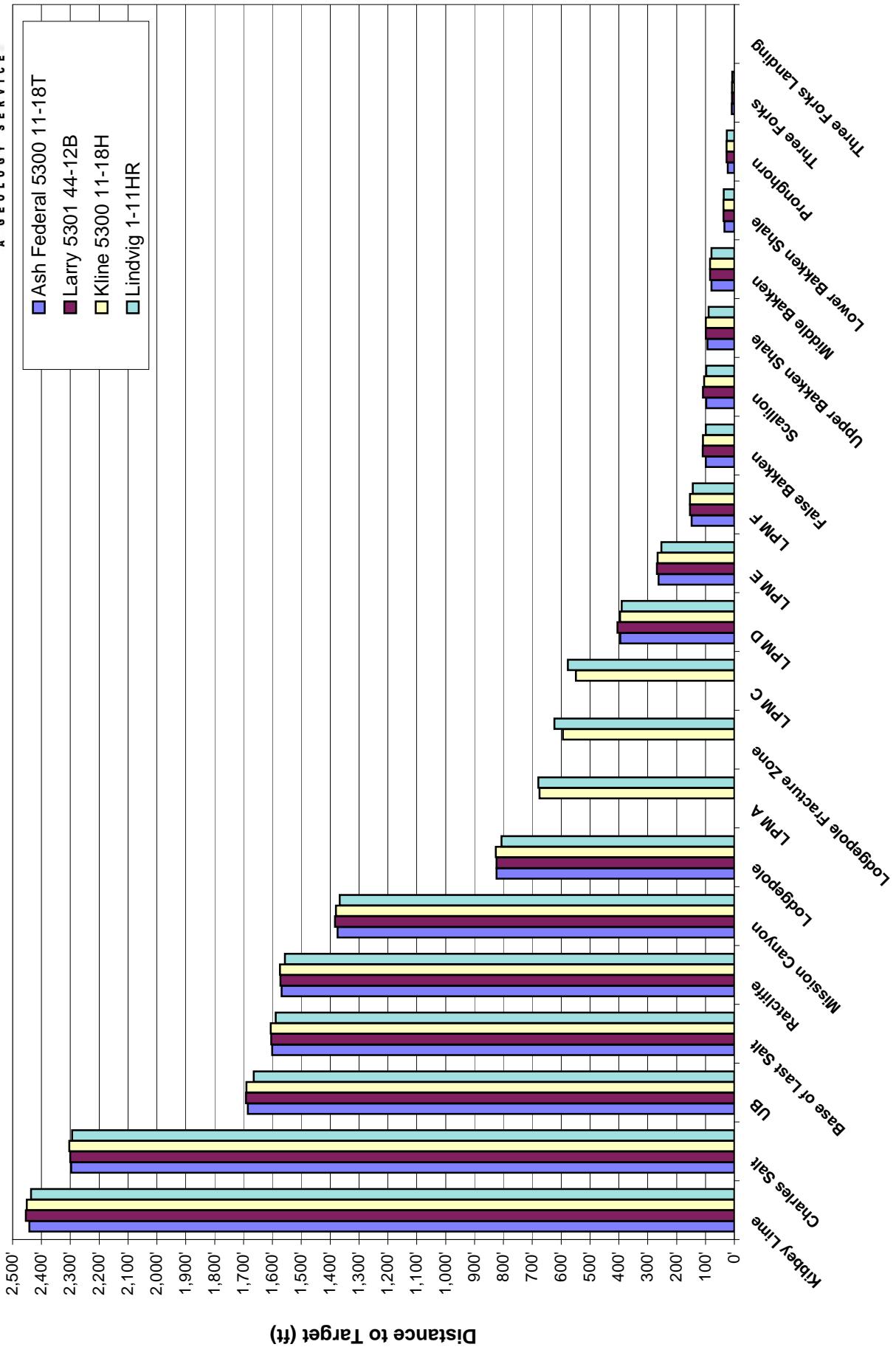
# TARGET PROXIMATION

Formation/ Zone:		Larry 5301 44-12B	Kline 5300 11-18H	Proposed Landing Target From:	Lindvig 1-11HR	Average of Offset Wells
Kibbey Lime	10,800'	10,797'	10,782'		10,793'	
Charles Salt	10,791'	10,795'	10,785'		10,790'	
UB	10,795'	10,793'	10,768'		10,785'	
Base of Last Salt	10,791'	10,793'	10,776'		10,787'	
Ratcliffe	10,792'	10,794'	10,777'		10,788'	
Mission Canyon	10,797'	10,794'	10,781'		10,791'	
Lodgepole	10,788'	10,790'	10,771'		10,783'	
LPM A	-	-	-		-	
Lodgepole Fracture Zone	-	-	-		-	
LPM C	-	-	-		-	
LPM D	10,798'	10,789'	10,783'		10,790'	
LPM E	10,793'	10,791'	10,778'		10,787'	
LPM F	10,794'	10,794'	10,784'		10,791'	
False Bakken	10,799'	10,798'	10,788'		10,795'	
Scallion	10,800'	10,796'	10,788'		10,795'	
Upper Bakken Shale	10,794'	10,794'	10,784'		10,791'	
Middle Bakken	10,793'	10,793'	10,788'		10,791'	
Lower Bakken Shale	10,792'	10,792'	10,791'		10,792'	
Pronhorn	10,792'	10,792'	10,791'		10,792'	
Three Forks	10,787'	10,787'	10,786'		10,787'	
Three Forks Landing	10,788'	10,788'	10,788'		10,788'	

Landing Target (26' below the base of the LBS): **10,788'**

# ISOPACH TO TARGET

Oasis Petroleum North America, LLC - Ash Federal 5300 11-18T



## **LITHOLOGY**

### Oasis Petroleum North America, LLC Ash Federal 11-18T

*Rig crews caught lagged samples, under the supervision of Sunburst geologists, in 30' intervals from 8,140' to 10,960', 10' intervals from 10,960' to 11,110', and then 30' intervals to the TD at 20,482' MD. Sample or gamma ray marker tops have been inserted in the sample descriptions below for reference. Samples were examined wet and dry under a binocular microscope. The drilling fluid was diesel-based invert from surface casing to the TD of the curve at 11,110', and salt water from 11,110' to 20,482' MD.*

### **Drilling in Kibbey Formation**

8140-8170 SILTSTONE: off white, light orange, light brown, friable, blocky, calcareous cement, moderately cemented

8170-8200 SILTSTONE: red to orange, red brown, friable, blocky, calcareous cement moderately cemented; rare ANHYDRITE: off white, microcrystalline, soft, massive, amorphous

8200-8230 SILTSTONE: red to orange, red brown, light orange to off white, trace light brown, friable, blocky, calcareous cement moderately cemented

8230-8260 SILTSTONE: red to orange, red brown, light orange to off white, trace light brown, friable, blocky, calcareous cement moderately cemented; trace ANHYDRITE: off white, microcrystalline, soft, massive, amorphous

8260-8290 red to orange, red brown, light orange to off white, trace light brown, friable, blocky, calcareous cement moderately cemented; trace ANHYDRITE: off white, microcrystalline, soft, massive, amorphous

8290-8320 red to orange, red brown, light orange to off white, trace light brown, friable, blocky, calcareous cement moderately cemented; trace ANHYDRITE: off white, microcrystalline, soft, massive, amorphous

**Kibbey "Lime": 8,347' MD 8,346' TVD (-6,268')**

8320-8350 ANHYDRITE: off white, microcrystalline, soft, massive, amorphous; SILTSTONE: red to orange, red brown, light orange to off white, trace light brown, friable, blocky, calcareous cement moderately cemented

8350-8380 LIMESTONE: mudstone to wackestone, light gray light gray brown, off white, microcrystalline, friable, dense, earthy

8380-8410 SILTSTONE: red to orange, red brown, light orange to off white, trace light brown, friable, blocky, calcareous cement moderately cemented; occasional LIMESTONE: mudstone to wackestone, light gray light gray brown, off white, microcrystalline, friable, dense, earthy; trace ANHYDRITE: off white, microcrystalline, soft, massive, amorphous

8410-8440 SILTSTONE: red to orange, red brown, light orange to off white, trace light brown, friable, blocky, calcareous cement moderately cemented; trace ANHYDRITE: off white, microcrystalline, soft, massive, amorphous

8440-8470 SILTSTONE: red to orange, red brown, light orange to off white, trace light brown, friable, blocky, calcareous cement moderately cemented; trace ANHYDRITE: off white, microcrystalline, soft, massive, amorphous

**Charles Salt:****8,492' MD 8,491' TVD (-6,413')**

8470-8500 SILTSTONE: red to orange, red brown, light orange to off white, trace light brown, friable, blocky, calcareous cement moderately cemented; common SALT: clear to milky, crystalline, hard, euhedral crystalline texture; trace ANHYDRITE: off white, microcrystalline, soft, massive, amorphous

8500-8530 SALT: frosted to trace clear, crystalline, hard, anhedral to rare subhedral to trace euhedral, crystalline texture, no visible porosity; rare SILTSTONE: red orange, firm, sub-blocky to subplaty, calcareous cement, moderately cemented, no visible porosity

8530-8560 SALT: clear to rare frosted, crystalline, hard, anhedral to rare subhedral, crystalline texture, no visible porosity; rare SILTSTONE: red orange, friable to trace firm, sub-blocky to subplaty, calcareous cement, moderately cemented, no visible porosity

8560-8590 SALT: frosted to rare clear, crystalline, hard, anhedral to rare subhedral to trace euhedral, crystalline texture, no visible porosity; trace SILTSTONE: red orange, friable, sub-blocky to subplaty, calcareous cement, moderately cemented, no visible porosity

8590-8620 No Sample

8620-8650 SALT: frosted to rare clear to trace milky, crystalline, hard, anhedral to rare subhedral, crystalline texture, no visible porosity; rare SILTSTONE: red orange, firm to trace friable, sub-blocky to subplaty, calcareous cement, moderately cemented, no visible porosity; trace ANHYDRITE: off white, soft, amorphous, no visible porosity

8650-8680 SALT: frosted to rare clear, crystalline, hard, anhedral to rare subhedral, crystalline texture, no visible porosity; rare SILTSTONE: medium gray to trace red orange, firm to trace friable, sub-blocky to subplaty, calcareous cement, moderately cemented, no visible porosity; trace ANHYDRITE: off white, soft, amorphous, no visible porosity

8680-8710 No Sample

8710-8740 SILTSTONE: red orange to trace medium gray, firm, sub-blocky to subplaty, calcareous cement, well cemented, no visible porosity; rare ANHYDRITE: off white, soft, amorphous, no visible porosity; rare SALT: frosted to trace clear, crystalline, hard, anhedral to trace subhedral, crystalline texture, no visible porosity

8740-8770 No Sample

8770-8800 SILTSTONE: medium gray, firm, sub-blocky to subplaty, calcareous cement, well cemented, no visible porosity; occasional ANHYDRITE: off white, soft, amorphous, no visible porosity

8800-8830 SALT: frosted to occasional clear, anhedral to rare subhedral to rare euhedral, crystalline texture, no visible porosity; trace SILTSTONE: medium gray, firm, sub-blocky to subplaty, calcareous cement, well cemented, no visible porosity

8830-8860 LIMESTONE: mudstone, cream, light gray to trace medium brown, microcrystalline, firm to trace brittle, earthy texture, no visible porosity; rare ANHYDRITE: off white, soft, amorphous, no visible porosity; rare SALT: clear to trace frosted, anhedral, crystalline texture, no visible porosity

8860-8890 LIMESTONE: mudstone, cream to rare light gray to trace medium gray, firm to trace hard, earthy to trace crystalline texture, trace siliceous, no visible porosity

8890-8920 LIMESTONE: mudstone, cream, microcrystalline, firm, earthy texture, possible intergranular porosity, trace dark light brown dead spotty oil stain; trace SALT: clear, anhedral, crystalline texture, no visible porosity

8920-8950 ANHYDRITE: off white, soft, amorphous, no visible porosity

8950-8980 SALT: frosted to occasional clear, crystalline, hard, anhedral to occasional subhedral to trace euhedral, crystalline texture, no visible porosity; trace ANHYDRITE: off white, soft, amorphous, no visible porosity

8980-9010 ANHYDRITE: off white, soft, amorphous, no visible porosity; rare SILTSTONE: medium gray, firm, sub-blocky to subplaty, calcareous cement, well cemented, no visible porosity; rare SALT: clear to trace frosted, crystalline, hard, anhedral to trace subhedral, crystalline texture, no visible porosity

9010-9040 ANHYDRITE: off white, soft, amorphous, no visible porosity; trace LIMESTONE: mudstone, light gray to trace dark gray, microcrystalline, firm to rare hard, earthy to rare crystalline texture, siliceous in part, no visible porosity; trace SALT: clear, crystalline, hard, anhedral to trace subhedral, crystalline texture, no visible porosity

9040-9070 ARGILLACEOUS LIMESTONE: mudstone, dark gray, microcrystalline, firm, earthy texture, trace disseminated pyrite, no visible porosity; rare ANHYDRITE: off white, soft, amorphous, no visible porosity; trace LIMESTONE: mudstone, cream to trace dark gray, microcrystalline, firm to trace hard, earthy to trace crystalline texture, trace siliceous, no visible porosity

9070-9100 ARGILLACEOUS LIMESTONE: mudstone, dark gray, microcrystalline, firm, earthy texture, trace disseminated pyrite, no visible porosity; occasional ANHYDRITE: off white, soft, amorphous, no visible porosity

**Upper Berenton:** **9,104' MD 9103 TVD (-7,025')**

9100-9130 No sample

9130-9160 SALT: clear to trace frosted, crystalline, hard, anhedral to trace subhedral, crystalline texture, no visible porosity; ARGILLACEOUS LIMESTONE: mudstone, light gray to gray, microcrystalline, firm, earthy texture, trace disseminated pyrite, no visible porosity

9160-9190 ARGILLACEOUS LIMESTONE: mudstone, light gray, light gray brown, off white, microcrystalline, firm, earthy texture, trace disseminated pyrite, no visible porosity; ANHYDRITE: off white, soft, amorphous; trace SALT: clear to trace frosted, crystalline, hard, anhedral to trace subhedral, crystalline texture

**Base Last Salt:** **9,188' MD 9,187' TVD (-7,109')**

9190-9220 ARGILLACEOUS LIMESTONE: mudstone, light gray to gray, light gray brown, off white, microcrystalline, firm, earthy texture, trace disseminated pyrite, no visible porosity; ANHYDRITE: off white to white, soft, amorphous

**Ratcliffe:** **9,221' MD 9,220' TVD (-7,142')**

9250-9280 ANHYDRITE: off white, soft, amorphous, no visible porosity; common LIMESTONE: mudstone, creamish light gray to trace dark brown to trace medium brown, microcrystalline, firm, earthy to trace crystalline texture, trace siliceous, no visible porosity

**Mission Canyon:** **9,415' MD 9,414' TVD (-7,336')**

9220-9250 LIMESTONE: mudstone, light gray to gray, light brown, off white, trace dark gray, microcrystalline, firm, earthy texture, trace disseminated pyrite, no visible porosity; ANHYDRITE: off white to white, soft, amorphous

9250-9280 LIMESTONE: mudstone, light brown, off white, trace dark gray, microcrystalline, firm, earthy texture, trace disseminated pyrite, no visible porosity trace fossil fragment; ANHYDRITE: off white to white, soft, amorphous

9280-9310 LIMESTONE: mudstone, light brown, off white, light brown gray, microcrystalline, firm, earthy texture, trace disseminated pyrite, no visible porosity; ANHYDRITE: off white to white, soft, amorphous

9310-9340 LIMESTONE: mudstone, light gray to gray, light brown, off white, microcrystalline, firm to friable, earthy texture, trace disseminated pyrite, no visible porosity; trace ANHYDRITE: off white to white, soft, amorphous

9340-9370 LIMESTONE: mudstone, light gray to gray, light brown, off white, microcrystalline, firm to friable, earthy texture, trace disseminated pyrite, no visible porosity trace fossil fragment

9370-9400 LIMESTONE: mudstone, light gray to gray, light brown, off white, microcrystalline, firm to friable, earthy texture, trace disseminated pyrite, no visible porosity

9400-9430 LIMESTONE: mudstone, light gray to gray, light brown, off white, microcrystalline, firm to friable, earthy texture, trace disseminated pyrite, no visible porosity

9430-9460 LIMESTONE: mudstone, light gray to gray, light brown, off white, microcrystalline, firm to friable, earthy texture, trace disseminated pyrite, no visible porosity, trace fossil fragments

9460-9490 ARGILLACEOUS LIMESTONE: mudstone, light gray to gray, light brown, off white, microcrystalline, firm to friable, earthy texture, trace disseminated pyrite, no visible porosity, trace fossil fragments

9490-9520 ARGILLACEOUS LIMESTONE: mudstone, light gray to gray, light brown, off white, microcrystalline, firm to friable, earthy texture, trace disseminated pyrite, no visible porosity, trace fossil fragments

9520-9550 ARGILLACEOUS LIMESTONE: mudstone, light gray to gray, light brown, off white, microcrystalline, firm to friable, earthy texture, trace disseminated pyrite, no visible porosity, trace fossil fragments, trace alga material

9550-9580 ARGILLACEOUS LIMESTONE: mudstone, light gray to gray, light brown, off white, microcrystalline, firm to friable, earthy texture, trace disseminated pyrite, no visible porosity, trace fossil fragments, trace alga material

9580-9610 ARGILLACEOUS LIMESTONE: mudstone, off white, light brown, light gray, microcrystalline, firm to friable, earthy texture, trace disseminated pyrite, no visible porosity, trace spar calcite, trace alga material

9610-9640 LIMESTONE: mudstone, cream, microcrystalline, firm, earthy texture, possible intergranular porosity, trace dark brown dead spotty oil stain

9640-9670 LIMESTONE: mudstone, cream to trace dark to light gray, microcrystalline, firm to trace hard, earthy texture, trace argillaceous, no visible porosity

9670-9700 LIMESTONE: mudstone, creamish light gray to occasional tan to trace dark brown, microcrystalline, firm to trace hard, earthy to trace crystalline texture, siliceous in part, no visible porosity

9700-9730 LIMESTONE: mudstone, light gray, microcrystalline, firm, earthy texture, no visible porosity; occasional ANHYDRITE: off white, soft, amorphous, no visible porosity

9730-9760 No Sample

9760-9790 LIMESTONE: mudstone, cream to trace light to dark gray, microcrystalline, firm to trace hard, earthy to trace crystalline texture, trace siliceous, trace spar calcareous, possible intergranular porosity, trace dark brown dead spotty oil stain

9790-9820 LIMESTONE: mudstone, cream to rare off white, microcrystalline, hard to trace firm, earthy texture, rare spar calcareous, possible intergranular porosity, trace dark brown dead spotty oil stain

9820-9850 LIMESTONE: mudstone, tan to trace dark gray, microcrystalline, firm, earthy texture, trace argillaceous, possible intergranular porosity, rare dark brown dead spotty oil stain

9850-9880 ARGILLACEOUS LIMESTONE: mudstone, blackish gray to trace cream, microcrystalline, firm to trace friable, earthy texture, trace disseminated pyrite, trace spar calcareous, trace intercrystalline porosity; trace LIMESTONE: mudstone, cream to trace light gray, microcrystalline, firm to trace hard, earthy to trace crystalline texture, trace siliceous, trace spar calcareous, no visible porosity

9880-9910 LIMESTONE: mudstone, cream to trace light gray, microcrystalline, firm to trace hard, earthy to trace crystalline texture, no visible porosity; trace ARGILLACEOUS LIMESTONE: mudstone, blackish gray, microcrystalline, friable, earthy texture, trace disseminated pyrite, no visible porosity

9910-9940 No Sample

9940-9970 LIMESTONE: mudstone, light gray, microcrystalline, hard, earthy to occasional crystalline texture, siliceous in part, no visible porosity; rare ARGILLACEOUS LIMESTONE: mudstone, blackish gray, firm, earthy texture, trace disseminated pyrite, no visible porosity

**Lodgepole: 9,965' MD 9,964' TVD (-7,886')**

9970-10000 ARGILLACEOUS LIMESTONE: mudstone, medium gray to trace dark gray, microcrystalline, firm, earthy texture, trace disseminated pyrite, no visible porosity

10000-10030 ARGILLACEOUS LIMESTONE: mudstone, medium gray to rare light gray, microcrystalline, firm to trace hard, earthy to trace crystalline texture, trace siliceous, trace disseminated pyrite, no visible porosity

10030-10060 ARGILLACEOUS LIMESTONE: mudstone, medium gray to rare light gray, microcrystalline, firm to trace hard, earthy to trace crystalline texture, trace siliceous, trace disseminated pyrite, no visible porosity

10060-10090 ARGILLACEOUS LIMESTONE: mudstone, medium gray to light gray, microcrystalline, firm to trace hard, earthy to trace crystalline texture, trace disseminated pyrite, no visible porosity

10090-10120 No sample

10120-10150 ARGILLACEOUS LIMESTONE: mudstone, light to dark gray, microcrystalline, firm to trace hard, earthy to trace crystalline texture, trace disseminated pyrite, no visible porosity

10150-10180 ARGILLACEOUS LIMESTONE: mudstone, medium to light gray, microcrystalline, firm to trace hard, earthy to trace crystalline texture, trace disseminated pyrite, no visible porosity

10180-10210 ARGILLACEOUS LIMESTONE: mudstone, medium to light gray, microcrystalline, firm to trace hard, earthy to trace crystalline texture, trace disseminated pyrite, no visible porosity

10210-10240 ARGILLACEOUS LIMESTONE: mudstone, medium to light gray, microcrystalline, firm to trace hard, earthy to trace crystalline texture, trace disseminated pyrite, no visible porosity

10240-10270 ARGILLACEOUS LIMESTONE: mudstone, medium to light gray, microcrystalline, firm to trace hard, earthy to trace crystalline texture, trace disseminated pyrite, no visible porosity

10270-10300 ARGILLACEOUS LIMESTONE: mudstone, medium to light gray, microcrystalline, firm to trace hard, earthy to trace crystalline texture, trace disseminated pyrite, no visible porosity

10300-10330 ARGILLACEOUS LIMESTONE: mudstone, medium to light gray, microcrystalline, firm to trace hard, earthy to trace crystalline texture, trace disseminated pyrite, no visible porosity

10335-10360 ARGILLACEOUS LIMESTONE: mudstone, medium to light gray, microcrystalline, firm to trace hard, earthy to trace crystalline texture, trace disseminated pyrite, no visible porosity

10360-10390 ARGILLACEOUS LIMESTONE: mudstone, medium to light gray, microcrystalline, firm to trace hard, earthy to trace crystalline texture, trace disseminated pyrite, no visible porosity

10390-10420 No sample

10420-10450 ARGILLACEOUS LIMESTONE: mudstone, medium to light gray, microcrystalline, firm to trace hard, earthy to trace crystalline texture, trace disseminated pyrite, no visible porosity

10450-10480 ARGILLACEOUS LIMESTONE: mudstone, medium to light gray, microcrystalline, firm to trace hard, earthy to trace crystalline texture, trace disseminated pyrite, no visible porosity

10480-10510 ARGILLACEOUS LIMESTONE: mudstone, medium to light gray, microcrystalline, firm to trace hard, crystalline to earthy texture, trace disseminated pyrite, no visible porosity

10510-10540 ARGILLACEOUS LIMESTONE: mudstone, medium to light gray, microcrystalline, firm to trace hard, earthy to trace crystalline texture, trace disseminated pyrite, no visible porosity

10540-10570 ARGILLACEOUS LIMESTONE: mudstone, medium to light gray, microcrystalline, firm to trace hard, earthy to trace crystalline texture, trace disseminated pyrite, no visible porosity

10570-10600 ARGILLACEOUS LIMESTONE: mudstone, medium to light gray, microcrystalline, firm to trace hard, earthy to trace crystalline texture, trace disseminated pyrite, no visible porosity

10600-10630 ARGILLACEOUS LIMESTONE: mudstone, medium to light gray, microcrystalline, firm to trace hard, earthy to trace crystalline texture, trace disseminated pyrite, no visible porosity

10630-10660 ARGILLACEOUS LIMESTONE: mudstone, medium to light gray, microcrystalline, firm to trace hard, earthy to trace crystalline texture, trace disseminated pyrite, no visible porosity

10660-10690 ARGILLACEOUS LIMESTONE: mudstone, medium to light gray, microcrystalline, firm to trace hard, earthy to trace crystalline texture, trace disseminated pyrite, no visible porosity

10690-10720 ARGILLACEOUS LIMESTONE: mudstone, medium to light gray, microcrystalline, firm to trace hard, earthy to trace crystalline texture, trace disseminated pyrite, no visible porosity

10720-10750 LIMESTONE: mudstone, tan light gray to trace medium gray, microcrystalline, firm to trace hard, earthy to trace crystalline texture, trace siliceous, no visible porosity; trace SHALE: black, friable, earthy texture, trace disseminated pyrite, petroliferous, carbonaceous

**False Bakken:** **10,749' MD 10,689' TVD (-8,611')**

10720-10750 LIMESTONE: mudstone, tan light gray to trace medium gray, microcrystalline, firm to trace hard, earthy to trace crystalline texture, trace siliceous, no visible porosity; trace SHALE: black, friable, earthy texture, trace disseminated pyrite

**Scallion:** **10,751' MD 10,691' TVD (-8,613')**

10750-10780 No Sample

**Upper Bakken Shale:** **10,755' MD 10,695' TVD (-8,617')**

10750-10780 No Sample

**Middle Bakken:** **10,783' MD 10,709' TVD (-8,631')**

10780-10810 SILTSTONE: tan gray, friable, subplaty to sub-blocky, earthy texture, calcareous cement, moderately cemented, trace disseminated pyrite, possible intergranular porosity, occasional dark brown spotty oil stain; trace SHALE: black, friable, earthy texture, trace disseminated pyrite, petrolierous, carbonaceous, fracture porosity

10810-10840 SILTSTONE: light gray, friable, subplaty to sub-blocky, earthy texture, calcareous cement, moderately cemented, trace disseminated pyrite, possible intergranular porosity, occasional dark brown spotty oil stain; trace SLITY SANDSTONE: light gray, very fine gray, friable, subangular to subrounded, well sorted, calcareous cement, moderately cemented, trace disseminated and nodular pyrite, possible intergranular porosity, occasional dark brown spotty oil stain

**Lower Bakken Shale:** **10,880' MD 10,754' TVD (-8,676')**

10840-10870 SHALE: black, friable, earthy texture, trace disseminated pyrite, petrolierous, carbonaceous, fracture porosity; occasional SLITY SANDSTONE: medium gray to tan, very fine gray, firm to trace friable, subangular to subrounded, well sorted, calcareous cement, well to trace moderately cemented, possible intergranular porosity, trace dark brown spotty oil stain

10870-10900 SHALE: black, friable, earthy texture, trace disseminated pyrite, petrolierous, carbonaceous, fracture porosity; trace SLITY SANDSTONE: tan gray, very fine gray, firm to trace friable, subangular to subrounded, well sorted, calcareous cement, well to trace moderately cemented, possible intergranular porosity, trace dark brown spotty oil stain

10900-10913 SHALE: black, friable, earthy texture, trace disseminated pyrite, petrolierous, carbonaceous, fracture porosity

**Pronghorn:** **10,913' MD 10,765' TVD (-8,687')**

10913-10930 SHALE: black, friable, earthy texture, trace disseminated pyrite, petrolierous, carbonaceous, fracture porosity

10930-10960 SHALE: dark brown black, friable, earthy texture, trace disseminated pyrite, petrolierous, carbonaceous, fracture porosity; trace SILTSTONE: medium gray, friable, subplaty to sub-blocky, earthy texture, dolomite cement, moderately cemented, trace disseminated and nodular pyrite, possible intergranular porosity, trace light brown spotty oil stain

**Three Forks:****10,966' MD 10,779' TVD (-8,701')**

10960-10970 No Sample

10970-10980 SHALE: light green to rare dark black brown, friable, earthy texture, trace disseminated pyrite, no visible porosity; rare SILTSTONE: off white, friable, subplaty to sub-blocky, earthy texture, dolomite cement, moderately cemented, trace disseminated and nodular pyrite, possible intergranular porosity, trace light brown spotty oil stain

10980-10990 SHALE: light green to rare dark black brown, friable, earthy texture, trace disseminated pyrite, no visible porosity; rare SILTSTONE: off white, friable, subplaty to sub-blocky, earthy texture, dolomite cement, moderately cemented, trace disseminated and nodular pyrite, possible intergranular porosity, trace light brown spotty oil stain; trace DOLOMITE: mudstone, cream, microcrystalline, firm, crystalline texture, no visible porosity

10990-11000 SHALE: light green to trace dark black brown, friable, earthy texture, trace disseminated pyrite, no visible porosity; common DOLOMITE: cream, cream, microcrystalline, firm, crystalline texture, no visible porosity; trace SILTSTONE: off white, friable, subplaty to sub-blocky, earthy texture, dolomite cement, moderately cemented, trace disseminated and nodular pyrite, possible intergranular porosity, occasional light brown spotty oil stain

11000-11010 SHALE: light green, friable, earthy texture, trace disseminated and nodular pyrite, no visible porosity; occasional DOLOMITE: mudstone, pink tan, microcrystalline, hard, crystalline texture, no visible porosity

11010-11020 No Sample

11020-11030 SHALE: light green, friable, earthy texture, trace disseminated and nodular pyrite, no visible porosity; rare SILTSTONE: off white, friable, subplaty to sub-blocky, earthy texture, dolomite cement, moderately cemented, trace disseminated and nodular pyrite, possible intergranular porosity, rare light brown spotty oil stain; rare DOLOMITE: mudstone, pink tan, microcrystalline, hard, crystalline texture, no visible porosity

11030-11040 SHALE: light green, firm, earthy texture, trace disseminated pyrite, no visible porosity; occasional SILTSTONE: off white, friable, subplaty to sub-blocky, well sorted, dolomite cement, moderately cemented, trace disseminated pyrite, possible intergranular porosity, trace light brown spotty oil stain; trace DOLOMITE: mudstone, pink tan, microcrystalline, hard, crystalline texture, no visible porosity

11040-11050 SHALE: light green, firm to trace friable, earthy texture, trace disseminated and nodular pyrite, no visible porosity; rare SILTSTONE: off white, friable, subplaty to sub-blocky, well sorted, dolomite cement, moderately cemented, trace disseminated pyrite, possible intergranular porosity, trace light brown spotty oil stain; trace DOLOMITE: mudstone, pink tan, microcrystalline, hard, crystalline texture, no visible porosity

11050-11060 SHALE: light green, firm to trace friable, earthy texture, trace disseminated and nodular pyrite, no visible porosity; rare SILTSTONE: off white, friable, subplaty to sub-blocky, well sorted, dolomite cement, moderately cemented, trace disseminated pyrite, possible intergranular porosity, trace light brown spotty oil stain

11060-11070 SHALE: light green, firm to trace friable, earthy texture, trace disseminated and nodular pyrite, no visible porosity; rare SILTSTONE: off white, friable, subplaty to sub-blocky, well sorted, dolomite cement, moderately cemented, trace disseminated pyrite, possible intergranular porosity, trace light brown spotty oil stain

11070-11080 SHALE: light green, friable, earthy texture, trace disseminated and nodular pyrite, no visible porosity; occasional SILTSTONE: off white, friable, subplaty to sub-blocky, well sorted, dolomite cement, moderately cemented, trace disseminated pyrite, possible intergranular porosity, trace light brown spotty oil stain

11080-11090 SHALE: light green, friable, earthy texture, trace disseminated and nodular pyrite, no visible porosity; occasional SILTSTONE: off white, friable, subplaty to sub-blocky, well sorted, dolomite cement, moderately cemented, trace disseminated pyrite, possible intergranular porosity, trace light brown spotty oil stain

11090-11100 SILTSTONE: off white, friable, subplaty to sub-blocky, well sorted, dolomite cement, moderately cemented, trace disseminated pyrite, possible intergranular porosity, trace light brown spotty oil stain; SHALE: light green, friable, earthy texture, trace disseminated and nodular pyrite, no visible porosity

11100-11110 SILTSTONE: off white, friable, subplaty to sub-blocky, well sorted, dolomite cement, moderately cemented, trace disseminated pyrite, possible intergranular porosity, trace light brown spotty oil stain; SHALE: light green, friable, earthy texture, trace disseminated and nodular pyrite, no visible porosity

11110-11140 DOLOMITE: mudstone, tan pink, friable, earthy texture, possible intergranular porosity, trace light brown spotty oil stain; occasional SHALE: light green, firm, sub-blocky to subplaty, earthy texture, no visible porosity

11140-11170 DOLOMITE: mudstone, tan pink, friable to trace firm, earthy texture, possible intergranular porosity, trace light brown spotty oil stain; rare SHALE: light green, firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

11170-11200 SHALE: light green, firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: tan pink to rare off white, friable to trace firm, earthy texture, possible intergranular porosity, rare medium to light brown spotty oil stain

11200-11230 SHALE: light green, firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: tan pink to rare off white, friable to trace firm, earthy texture, possible intergranular porosity, rare medium to light brown spotty oil stain

11230-11260 No Sample

11260-11290 SHALE: light green, firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, possible intergranular porosity, trace medium brown laminated oil stain; abundant DOLOMITE: tan pink to rare off white, friable to trace firm, earthy texture, possible intergranular porosity, common medium to light brown spotty to even oil stain

11290-11320 SHALE: light green, firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, possible intergranular porosity, trace medium brown laminated oil stain; common DOLOMITE: tan pink to rare off white, friable to trace firm, earthy texture, possible intergranular porosity, common medium to light brown spotty to even oil stain

11320-11350 SHALE: light green, firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, possible intergranular porosity, trace medium brown laminated oil stain; common DOLOMITE: tan pink to rare off white, friable to trace firm, earthy texture, possible intergranular porosity, common dark to light brown spotty to even oil stain

11350-11380 SHALE: light green, firm to rare friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, possible intergranular porosity, trace medium brown laminated oil stain; occasional DOLOMITE: tan pink to rare off white, friable to trace firm, earthy texture, possible intergranular porosity, common dark to light brown spotty to even oil stain

11380-11410 DOLOMITE: mudstone, tan pink to rare off white, friable to trace firm, earthy texture, possible intergranular porosity, occasional dark to light brown spotty to even oil stain; occasional SHALE: light green, firm to rare friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

11410-11440 DOLOMITE: mudstone, tan pink to rare off white, friable to trace firm, earthy texture, possible intergranular porosity, occasional dark to light brown spotty to even oil stain; occasional SHALE: light green, firm to rare friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

11440-11470 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; abundant DOLOMITE: mudstone, tan pink to rare off white, friable to trace firm, earthy texture, possible intergranular porosity, common dark to light brown spotty to even oil stain

11470-11500 DOLOMITE: mudstone, tan pink to rare off white, friable to trace firm, earthy to sucrosic texture, possible intergranular porosity, occasional medium to light brown spotty to even oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

11500-11530 DOLOMITE: mudstone, tan pink to rare off white, friable to trace firm, earthy to sucrosic texture, possible intergranular porosity, occasional medium to light brown spotty to even oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

11530-11560 SHALE: light green, friable to trace firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; occasional DOLOMITE: mudstone, tan pink to trace off white, friable to trace firm, earthy to sucrosic texture, possible intergranular porosity, occasional dark to light brown spotty to even oil stain

11560-11590 SHALE: light green, friable to trace firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to trace off white, friable to trace firm, earthy to sucrosic texture, possible intergranular porosity, trace dark to light brown spotty to even oil stain

11590-11620 DOLOMITE: mudstone, tan pink to trace off white, friable to trace firm, earthy to sucrosic texture, possible intergranular porosity, trace dark to light brown spotty to even oil stain; common SHALE: light green, friable to trace firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

11620-11650 DOLOMITE: mudstone, tan, light pink to off white, friable to trace firm, earthy to sucrosic texture, possible intergranular porosity, trace dark to light brown spotty to even oil stain; common SHALE: light green, friable to trace firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

11650-11680 DOLOMITE: mudstone, tan, light brown to off white, friable to trace firm, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, trace dark to light brown spotty to even oil stain; common SHALE: light green, friable to trace firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

11680-11710 DOLOMITE: mudstone, tan, light brown to off white, friable to trace firm, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, trace dark to light brown spotty to even oil stain; common SHALE: light green, friable to trace firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity



12040-12070 DOLOMITE: mudstone, tan, light brown to off white, friable to trace firm, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, trace dark to light brown spotty to even oil stain; common SHALE: light green, friable to trace firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

12070-12100 DOLOMITE: mudstone, tan, light brown to off white, friable to trace firm, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, trace dark to light brown spotty to even oil stain; common SHALE: light green, friable to trace firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

12100-12130 DOLOMITE: mudstone, tan, light brown to off white, friable to trace firm, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, trace dark to light brown spotty to even oil stain; common SHALE: light green, friable to trace firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

12130-12160 DOLOMITE: mudstone, tan, light brown to off white, friable to trace firm, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, trace dark to light brown spotty to even oil stain; trace SHALE: light green, friable to trace firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

12160-12190 DOLOMITE: mudstone, tan, light brown to off white, light pink, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, trace dark to light brown spotty to even oil stain; trace SHALE: light green, friable to trace firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

12190-12220 DOLOMITE: mudstone, tan, light brown to off white, friable to trace firm, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, trace dark to light brown spotty to even oil stain; rare SHALE: light gray, light green, friable to trace firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

12220-12250 DOLOMITE: mudstone, tan, light brown to off white, friable to trace firm, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, trace dark to light brown spotty to even oil stain; rare SHALE: light gray, light green, friable to trace firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

12250-12280 DOLOMITE: mudstone, tan, light brown to off white, friable to trace firm, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, trace dark to light brown spotty to even oil stain; rare SHALE: light gray, light green, friable to trace firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

12280-12310 CLAYSTONE: light gray to trace light green, friable to trace firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; occasional DOLOMITE: mudstone, tan pink to trace off white, friable to trace firm, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain

12310-12340 No Sample

12340-12370 CLAYSTONE: medium to light gray to trace light green, friable to trace firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; occasional DOLOMITE: mudstone, tan pink to trace off white, friable to trace firm, earthy to sucrosic texture, possible intergranular porosity, occasional dark to light brown spotty to even oil stain

12370-12400 DOLOMITE: mudstone, tan pink to trace off white, friable to trace firm, earthy to sucrosic texture, possible intergranular porosity, trace dark to light brown spotty to even oil stain; occasional CLAYSTONE: light to medium gray to rare light green, friable to trace firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

12400-12430 CLAYSTONE: light gray to trace medium gray to trace light green, friable to trace firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; rare DOLOMITE: tan pink to rare off white, friable to trace firm, earthy to sucrosic texture, possible intergranular porosity, trace dark to light brown spotty to even oil stain

12430-12460 CLAYSTONE: medium gray to trace light gray to trace light green, friable to trace firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, possible intergranular porosity, trace medium brown laminated oil stain; trace DOLOMITE: tan pink to trace off white, friable to trace firm, earthy to sucrosic texture, possible intergranular porosity, trace dark to light brown spotty to even oil stain

12460-12490 CLAYSTONE: dark to medium gray to trace light green, firm to occasional friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; trace DOLOMITE: tan pink to trace off white, friable to trace firm, earthy to sucrosic texture, possible intergranular porosity, trace medium to light brown spotty to even oil stain

12490-12520 CLAYSTONE: medium to rare light gray to trace green, friable to trace firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; rare DOLOMITE: off white to rare tan pink, friable to trace firm, earthy to sucrosic texture, possible intergranular porosity, trace medium to light brown spotty to even oil stain

12520-12550 CLAYSTONE: light gray to occasional medium gray to trace light green, friable to trace firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; trace DOLOMITE: off white to trace tan pink, friable to trace firm, earthy to sucrosic texture, possible intergranular porosity, trace medium to light brown spotty to even oil stain

12550-12580 CLAYSTONE: medium gray to rare light gray to rare light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; occasional DOLOMITE: off white to rare tan pink, friable to trace firm, earthy to sucrosic texture, possible intergranular porosity, trace medium to light brown spotty to even oil stain

12580-12610 CLAYSTONE: light gray to occasional medium gray to rare dark gray to trace light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; rare DOLOMITE: tan pink to trace off white, friable to trace firm, earthy to sucrosic texture, possible intergranular porosity, trace medium to light brown spotty to even oil stain

12610-12640 CLAYSTONE: light gray to common medium gray to trace light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; rare DOLOMITE: off white to trace tan pink, friable to trace firm, earthy to sucrosic texture, possible intergranular porosity, trace medium to light brown spotty to even oil stain

12640-12670 CLAYSTONE: light gray to occasional medium gray to trace light green, friable to trace firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; trace DOLOMITE: tan pink to trace off white, friable to trace firm, earthy to sucrosic texture, possible intergranular porosity, trace medium to light brown spotty to even oil stain

12670-12700 CLAYSTONE: light gray to common medium gray to trace light green, friable to trace firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; rare DOLOMITE: off white to trace tan pink, friable to trace firm, earthy to sucrosic texture, possible intergranular porosity, trace medium to light brown spotty to even oil stain

12700-12730 CLAYSTONE: medium gray to occasional light gray to trace light green, friable to trace firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; occasional DOLOMITE: off white to rare tan pink, friable to trace firm, earthy to sucrosic texture, possible intergranular porosity, trace medium to light brown spotty to even oil stain

12730-12760 DOLOMITE: tan pink to trace off white, friable to trace firm, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain; rare SHALE: light green to common dark gray, friable to trace firm, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

12760-12790 DOLOMITE: tan pink to trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, occasional dark to light brown spotty to even oil stain; trace SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

12790-12820 DOLOMITE: tan pink to trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain; trace SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

12820-12850 DOLOMITE: tan pink to trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain; trace SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

12850-12880 DOLOMITE: tan pink to trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain; trace SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

12880-12910 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

12910-12940 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

12940-12970 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

12970-13000 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13000-13030 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13030-13060 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13060-13090 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13090-13120 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13120-13150 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13150-13180 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13180-13210 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13210-13240 Sample heavily contaminated well lube; DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13240-13270 Sample heavily contaminated well lube; DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13270-13300 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13300-13330 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13330-13360 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13360-13390 DOLOMITE: tan, light pink, trace off white, trace light brown, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13390-13420 DOLOMITE: tan, light pink, trace off white, trace light brown, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13420-13450 No sample

13450-13480 DOLOMITE: tan, light pink, trace off white, trace light brown, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, occasional dark to light brown spotty to even oil stain; common SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13480-13510 DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, trace medium to light brown spotty to even oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13510-13540 DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain; occasional SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13540-13570 DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain; common SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13570-13600 No Sample

13600-13630 DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, trace dark to light brown spotty to even oil stain; common SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13630-13660 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; rare DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, trace medium to light brown spotty oil stain

13660-13690 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; rare DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, trace medium to light brown spotty oil stain

13690-13720 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, occasional medium to light brown spotty to even oil stain

13720-13750 DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, occasional medium to light brown spotty to even oil stain; occasional SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13750-13780 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, rare nodular pyrite, trace disseminated pyrite, no visible porosity; occasional DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare medium to light brown spotty to even oil stain

13780-13810 DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, occasional medium to light brown spotty to even oil stain; occasional SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, no visible porosity

13810-13840 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, no visible porosity; rare DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, trace dark to light brown spotty to even oil stain

13840-13870 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain

13870-13900 DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, trace medium to light brown spotty oil stain; common SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, no visible porosity

13900-13930 DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare medium to light brown spotty to even oil stain; common SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, no visible porosity

13930-13960 DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare medium to light brown spotty to even oil stain; occasional SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, no visible porosity

13960-13990 DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, occasional medium to light brown spotty to even oil stain; occasional SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated, rare nodular pyrite, no visible porosity

13990-14020 DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, trace light brown spotty oil stain; occasional SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, no visible porosity

14020-14050 DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, trace light brown spotty oil stain; occasional SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, no visible porosity

14050-14080 DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, trace light brown spotty oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, no visible porosity

14080-14110 DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, trace dark to light brown spotty oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated pyrite, rare nodular pyrite, no visible porosity

14110-14140 DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty oil stain; occasional SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, no visible porosity

14140-14170 DOLOMITE: tan, light pink, off white, trace light brown, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; common SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

14170-14200 DOLOMITE: tan, light pink, off white, trace light brown, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; common SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

14200-14230 DOLOMITE: tan, light pink, off white, trace light brown, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; common SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

14230-14260 DOLOMITE: tan, light pink, off white, trace light brown, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; common SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

14260-14290 DOLOMITE: tan, light pink, off white, trace light brown, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; common SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

14290-14320 DOLOMITE: tan, light pink, off white, trace light brown, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; common SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

14320-14350 DOLOMITE: tan, light pink, off white, trace light brown, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; common SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

14350-14380 DOLOMITE: tan, light pink, off white, trace light brown, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

14380-14410 DOLOMITE: tan, light pink, off white, trace light brown, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

14410-14440 DOLOMITE: tan, light pink, off white, trace light brown, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; common SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

14440-14470 DOLOMITE: tan, light pink, off white, trace light brown, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; common SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

14470-14500 DOLOMITE: tan, light pink, off white, trace light brown, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; common SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

14500-14530 DOLOMITE: tan, light pink, off white, trace light brown, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; common SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

14530-14560 Sample heavily contaminated well lube; DOLOMITE: tan, light pink, off white, trace light brown, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; common SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

14560-14590 Sample heavily contaminated well lube; DOLOMITE: tan, light pink, off white, trace light brown, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; common SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

14590-14620 DOLOMITE: tan, light pink, off white, trace light brown, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; common SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

14620-14650 SHALE: light gray, light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; DOLOMITE: tan, light pink, off white, trace light brown, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain

14650-14680 SHALE: light gray, light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; DOLOMITE: tan, light pink, off white, trace light brown, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain

14680-14710 SHALE: light gray, light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; DOLOMITE: tan, light pink, off white, trace light brown, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain

14710-14740 SHALE: light gray, light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; DOLOMITE: tan, light pink, off white, trace light brown, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain

14740-14770 SHALE: light gray, light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; DOLOMITE: tan, light pink, off white, trace light brown, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain

14770-14800 DOLOMITE: tan, light pink, off white, trace light brown, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; SHALE: light gray, light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

14800-14830 DOLOMITE: tan, light pink, off white, trace light brown, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; SHALE: light gray, light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

14830-14860 DOLOMITE: tan, light pink, off white, trace light brown, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; SHALE: light gray, light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

14860-14890 DOLOMITE: tan, light pink, off white, trace light brown, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; SHALE: light gray, light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

14890-14920 DOLOMITE: tan, light pink, off white, trace light brown, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; SHALE: light gray, light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

### **Sidetrack @ 13,335' MD:**

13335-13360 DOLOMITE: off white, tan, light brown, light pink, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13360-13390 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13390-13420 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13420-13450 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13450-13480 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13480-13510 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13510-13540 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13540-13570 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13570-13600 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13600-13630 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13630-13660 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13660-13690 DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, occasional dark to light brown spotty oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13690-13720 DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, occasional dark to light brown spotty oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13720-13750 DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty oil stain; rare SHALE: light green to occasional dark to medium green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13750-13780 DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty oil stain; rare SHALE: light green to occasional dark to medium green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13780-13810 DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty oil stain; occasional SHALE: light green to rare medium green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13810-13840 DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty oil stain; rare SHALE: light green to trace medium green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13840-13870 DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, trace dark to light brown spotty oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13870-13900 DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, trace dark to light brown spotty oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13900-13930 DOLOMITE: mudstone, tan pink to occasional off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light spotty to even oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13930-13960 DOLOMITE: mudstone, tan pink to occasional off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light spotty to even oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13960-13990 DOLOMITE: mudstone, tan pink to occasional off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, trace dark to light brown spotty oil stain; trace SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

13990-14020 DOLOMITE: mudstone, tan pink to occasional off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, trace dark to light brown spotty oil stain; trace SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

14020-14050 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain

14050-14080 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain

14080-14110 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain

14110-14140 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain

14140-14170 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; occasional DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain

14170-14200 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; occasional DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain

14200-14230 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain

14230-14260 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain

14260-14290 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain

14290-14320 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain

14320-14350 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain

14350-14380 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain

14380-14410 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain

14410-14440 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain

14440-14470 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain

14470-14500 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain

14500-14530 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain

14530-14560 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain

14560-14590 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain

14590-14620 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain

14620-14650 DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare medium to light brown spotty oil stain; occasional SHALE: light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

14650-14680 DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare medium to light brown spotty oil stain; occasional SHALE: light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

14680-14710 SHALE: light gray to rare light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, occasional dark to light brown spotty to even oil stain

14710-14740 SHALE: light gray to rare light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, occasional dark to light brown spotty to even oil stain

14740-14770 SHALE: light gray to occasional light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain

14770-14800 SHALE: light gray to occasional light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain

14800-14830 SHALE: light gray to trace light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; occasional DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain

14830-14860 SHALE: light gray to trace light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; occasional DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain

14860-14890 SHALE: light gray to common light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; occasional DOLOMITE: mudstone, tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain

14890-14920 SHALE: light gray to common light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; occasional DOLOMITE: mudstone, tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain

14920-14950 SHALE: light gray to trace light green, friable, sub-blocky to subplaty, earthy texture, rare nodular pyrite, trace disseminated pyrite, no visible porosity; rare DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, occasional dark to light brown spotty to even oil stain

14950-14980 SHALE: light gray to trace light green, friable, sub-blocky to subplaty, earthy texture, rare nodular pyrite, trace disseminated pyrite, no visible porosity; rare DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, occasional dark to light brown spotty to even oil stain

14980-15010 DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, occasional dark to light brown spotty to even oil stain; occasional SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, no visible porosity

15010-15040 DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, occasional dark to light brown spotty to even oil stain; occasional SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, no visible porosity

15040-15070 No sample

15070-15100 No sample

15100-15130 SHALE: medium to light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, possible intergranular porosity, trace medium brown laminated oil stain; occasional DOLOMITE: mudstone, tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain

15130-15160 SHALE: medium to light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, possible intergranular porosity, trace medium brown laminated oil stain; occasional DOLOMITE: mudstone, tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain

15160-15190 SHALE: medium to light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, possible intergranular porosity, trace medium brown laminated oil stain; occasional DOLOMITE: mudstone, tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain

15190-15220 SHALE: medium to light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, possible intergranular porosity, trace medium brown laminated oil stain; occasional DOLOMITE: mudstone, tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain

15220-15250 SHALE: medium to light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, possible intergranular porosity, trace medium brown laminated oil stain; occasional DOLOMITE: mudstone, tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain

15250-15280 SHALE: medium to light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, possible intergranular porosity, trace medium brown laminated oil stain; occasional DOLOMITE: mudstone, tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain

15280-15310 SHALE: medium to light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, possible intergranular porosity, trace medium brown laminated oil stain; occasional DOLOMITE: mudstone, tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain

15310-15340 SHALE: medium to light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, possible intergranular porosity, trace medium brown laminated oil stain; occasional DOLOMITE: mudstone, tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain

15340-15370 SHALE: medium to light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, possible intergranular porosity, trace medium brown laminated oil stain; occasional DOLOMITE: mudstone, tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain

15370-15400 SHALE: medium to light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, possible intergranular porosity, trace medium brown laminated oil stain; occasional DOLOMITE: mudstone, tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain

15400-15430 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

15430-15460 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

15460-15490 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

15490-15520 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

15520-15550 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

15550-15580 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

15580-15610 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

15610-15640 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

15640-15670 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

15670-15700 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; trace SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

15700-15730 No Sample

15730-15760 No Sample

15760-15790 DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated pyrite, rare nodular pyrite, possible intergranular porosity, trace dark laminated oil stain

15790-15820 SHALE: light gray to trace light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, no visible porosity; occasional DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain

15820-15850 DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, occasional dark to light brown spotty to even oil stain; occasional SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, no visible porosity

15850-15880 DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, occasional dark to light brown spotty to even oil stain; occasional SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, no visible porosity

15880-15910 DOLOMITE: mudstone, tan pink to occasional off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, occasional dark to light brown spotty to even oil stain; occasional SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated pyrite, rare nodular pyrite, no visible porosity

15910-15940 DOLOMITE: mudstone, tan pink to occasional off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, occasional dark to light brown spotty to even oil stain; occasional SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated pyrite, rare nodular pyrite, no visible porosity

15940-15960 DOLOMITE: mudstone, tan pink to occasional off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, occasional dark to light brown spotty to even oil stain; occasional SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, no visible porosity

15960-16000 DOLOMITE: mudstone, tan pink to occasional off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, occasional dark to light brown spotty to even oil stain; occasional SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, no visible porosity

16000-16030 DOLOMITE: mudstone, off white to rare tan pink ,microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain; trace SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, no visible porosity

16030-16060 DOLOMITE: mudstone, off white to rare tan pink ,microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain; trace SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, no visible porosity

16060-16090 DOLOMITE: mudstone, tan pink to occasional off white ,microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, occasional dark to light brown spotty to even oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, no visible porosity

16090-16120 DOLOMITE: mudstone, tan pink to occasional off white ,microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, occasional dark to light brown spotty to even oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, no visible porosity

16120-16150 No Sample

16150-16180 No Sample

16180-16210 DOLOMITE: mudstone, off white to common tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain; occasional SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, no visible porosity

16210-16240 DOLOMITE: mudstone, off white to common tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain; occasional SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, no visible porosity

16240-16270 DOLOMITE: mudstone, off white to common tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain; occasional SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, no visible porosity

16270-16300 DOLOMITE: mudstone, off white to common tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain; occasional SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace disseminated and nodular pyrite, no visible porosity

16300-16330 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

16330-16360 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

16360-16390 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

16390-16420 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

16420-16450 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

16450-16480 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

16480-16510 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

16510-16540 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

16540-16570 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

16570-16600 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

16600-16640 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

16640-16660 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

16660-16690 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

16690-16720 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

16720-16750 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

16750-16780 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

16780-16810 SHALE: light gray to trace light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; occasional DOLOMITE: mudstone, tan pink to occasional off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty oil stain

16810-16840 SHALE: light gray to trace light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; occasional DOLOMITE: mudstone, tan pink to occasional off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty oil stain

16840-16870 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; occasional DOLOMITE: mudstone, tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain

16870-16900 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; occasional DOLOMITE: mudstone, tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain

16900-16930 SHALE: light gray to trace light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain

16930-16960 SHALE: light gray to trace light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain

16960-16990 SHALE: light green to trace light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; occasional DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain

16990-17020 SHALE: light green to trace light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; occasional DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain

17020-17050 SHALE: light green to trace light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; occasional DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, trace dark to light brown spotty to even oil stain

17050-17080 SHALE: light green to trace light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; occasional DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, trace dark to light brown spotty to even oil stain

17080-17110 SHALE: light gray to trace medium gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; occasional DOLOMITE: mudstone, off white to rare tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, trace dark to light brown spotty oil stain

17110-17140 SHALE: light gray to trace medium gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; occasional DOLOMITE: mudstone, off white to rare tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, trace dark to light brown spotty oil stain

17140-17170 SHALE: light gray to trace light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; occasional DOLOMITE: mudstone, off white to rare tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, occasional dark to light brown spotty to even oil stain

17170-17200 SHALE: light gray to trace light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; occasional DOLOMITE: mudstone, off white to rare tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, occasional dark to light brown spotty to even oil stain

17200-17230 SHALE: light green to rare light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain

17230-17260 SHALE: light green to rare light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain

17260-17290 SHALE: light gray to trace light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; occasional DOLOMITE: mudstone, off white to rare tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, trace dark brown spotty to even oil stain

17290-17320 SHALE: light gray to trace light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; occasional DOLOMITE: mudstone, off white to rare tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, trace dark brown spotty to even oil stain

17320-17350 DOLOMITE: mudstone, off white to rare tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, trace dark brown spotty to even oil stain; occasional SHALE: light gray to rare light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

17350-17380 DOLOMITE: mudstone, off white to rare tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, trace dark brown spotty to even oil stain; occasional SHALE: light gray to rare light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

17380-17410 DOLOMITE: mudstone, off white to tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, trace dark brown spotty to even oil stain; occasional SHALE: light green to occasional light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

17410-17440 DOLOMITE: mudstone, off white to tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, trace dark brown spotty to even oil stain; occasional SHALE: light green to occasional light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

17440-17470 DOLOMITE: tan, light brown, light pink, off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

17470-17500 DOLOMITE: tan, light brown, light pink, off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

17500-17530 DOLOMITE: tan, light brown, light pink, off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

17530-17560 DOLOMITE: tan, light brown, light pink, off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity



17890-17920 DOLOMITE: tan, light brown, light pink, off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

17920-17950 DOLOMITE: tan, light brown, light pink, off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

17950-17980 DOLOMITE: tan, light brown, light pink, off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

17980-18010 DOLOMITE: tan, light brown, light pink, off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

18010-18040 DOLOMITE: tan, light brown, light pink, off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

18040-18070 DOLOMITE: tan, light brown, light pink, off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

18070-18100 DOLOMITE: tan, light brown, light pink, off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

18100-18130 DOLOMITE: tan, light brown, light pink, off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

18130-18160 DOLOMITE: tan, light brown, light pink, off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, rare dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

18160-18190 SHALE: light green to trace light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; occasional DOLOMITE: mudstone, off white to occasional tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark-light brown spotty to even oil stain

18190-18220 SHALE: light green to trace light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; occasional DOLOMITE: mudstone, off white to occasional tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark-light brown spotty to even oil stain

18220-18250 DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain; occasional SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

18250-18280 DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain; occasional SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

18280-18310 DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain; common SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

18310-18340 DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain; common SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

18340-18370 DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain; common SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

18370-18400 DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain; common SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

18400-18430 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; occasional DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain

18430-18460 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; occasional DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common dark to light brown spotty to even oil stain

18460-18490 DOLOMITE: mudstone, off white to rare tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, occasional dark to light brown spotty to even oil stain; occasional SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

18490-18520 DOLOMITE: mudstone, off white to rare tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, occasional dark to light brown spotty to even oil stain; occasional SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

18520-18550 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain

18550-18580 SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity; common DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain

18580-18610 DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common medium to light brown spotty to even oil stain; rare SHALE: light green to rare light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

18610-18640 DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, common medium to light brown spotty to even oil stain; rare SHALE: light green to rare light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

18640-18670 No Sample

18670-18700 No Sample

18700-18730 DOLOMITE: mudstone, off white to occasional tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty oil stain; occasional SHALE: light green to rare light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

18730-18760 DOLOMITE: mudstone, off white to occasional tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty oil stain; occasional SHALE: light green to rare light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

18760-18790 DOLOMITE: mudstone, off white to occasional tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty oil stain; rare SHALE: light green to rare light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

18790-18820 DOLOMITE: mudstone, off white to occasional tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty oil stain; rare SHALE: light green to rare light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

18820-18850 DOLOMITE: mudstone, off white to rare tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty oil stain; occasional SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

18850-18880 DOLOMITE: mudstone, off white to rare tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty oil stain; occasional SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

18880-18910 DOLOMITE: mudstone, tan pink to occasional off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty oil stain; occasional SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

18910-18940 DOLOMITE: mudstone, tan pink to occasional off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty oil stain; occasional SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

18940-18970 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

18970-19000 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19000-19030 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19030-19060 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19060-19090 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19090-19120 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19120-19150 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19150-19180 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19180-19210 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19210-19240 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19240-19270 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19270-19300 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19300-19330 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19330-19360 DOLOMITE: tan, light brown, light pink, trace off white, friable, earthy to sucrosic texture, possible intergranular porosity, trace very fine sand grains, common dark to light brown spotty to even oil stain; occasional SHALE: light green, light gray, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19360-19390 DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19390-19420 DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19420-19450 DOLOMITE: mudstone, off white to occasional tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19450-19480 DOLOMITE: mudstone, off white to occasional tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19480-19510 DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare medium to light brown spotty to even oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19510-19540 DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare medium to light brown spotty to even oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19540-19570 DOLOMITE: mudstone, tan pink to occasional off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, occasional dark to light brown spotty to even oil stain; trace SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19570-19600 DOLOMITE: mudstone, tan pink to occasional off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, occasional dark to light brown spotty to even oil stain; trace SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19600-19630 DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain; trace SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19630-19660 DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain; trace SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19660-19690 DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, occasional dark to light brown spotty to even oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19690-19720 DOLOMITE: mudstone, tan pink to rare off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, occasional dark to light brown spotty to even oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19720-19750 DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, occasional dark to light brown spotty to even oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19750-19780 DOLOMITE: mudstone, tan pink to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, occasional dark to light brown spotty to even oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19780-19810 DOLOMITE: mudstone, off white to rare tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19810-19840 DOLOMITE: mudstone, off white to rare tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19840-19870 DOLOMITE: mudstone, off white to occasional medium gray to rare tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain; trace SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19870-19900 DOLOMITE: mudstone, off white to occasional medium gray to rare tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain; trace SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19900-19930 DOLOMITE: mudstone, off white to rare light gray to rare tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19930-19960 DOLOMITE: mudstone, off white to rare light gray to rare tan pink, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19960-19990 DOLOMITE: mudstone, tan pink to rare off white to rare medium gray, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain; occasional SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

19990-20020 DOLOMITE: mudstone, tan pink to rare off white to rare medium gray, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain; occasional SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

20020-20050 DOLOMITE: mudstone, off white to rare tan pink to trace medium gray, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

20050-20080 DOLOMITE: mudstone, off white to rare tan pink to trace medium gray, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

20080-20110 DOLOMITE: mudstone, tan pink to rare medium gray to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

20110-20140 DOLOMITE: mudstone, tan pink to rare medium gray to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare dark to light brown spotty to even oil stain; rare SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

20140-20170 DOLOMITE: mudstone, tan pink to rare medium gray to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare medium to light brown spotty to even oil stain; trace SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

20170-20200 DOLOMITE: mudstone, tan pink to rare medium gray to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare medium to light brown spotty to even oil stain; trace SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

20200-20230 DOLOMITE: mudstone, tan pink to occasional medium gray to trace medium gray, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare medium to light brown spotty to even oil stain; trace SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

20230-20260 DOLOMITE: mudstone, tan pink to occasional medium gray, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare medium to light brown spotty to even oil stain; trace SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

20260-20290 DOLOMITE: mudstone, tan pink to occasional medium gray to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare medium to light brown spotty to even oil stain; trace SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

20290-20320 DOLOMITE: mudstone, tan pink to occasional medium gray to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare medium to light brown spotty to even oil stain; trace SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

20320-20350 DOLOMITE: mudstone, tan pink to occasional medium gray to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare medium to light brown spotty to even oil stain; trace SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

20350-20380 DOLOMITE: mudstone, tan pink to occasional medium gray to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare medium to light brown spotty to even oil stain; trace SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

20380-20410 DOLOMITE: mudstone, tan pink to occasional medium gray to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare medium to light brown spotty to even oil stain; trace SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

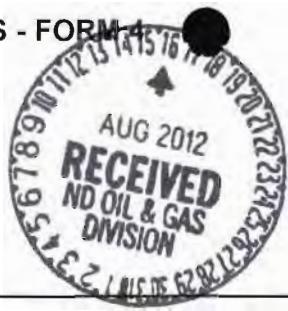
20410-20440 DOLOMITE: mudstone, tan pink to occasional medium gray to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare medium to light brown spotty to even oil stain; trace SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity

20440-20482 DOLOMITE: mudstone, tan pink to occasional medium gray to trace off white, microcrystalline, friable, earthy to sucrosic texture, possible intergranular porosity, rare medium to light brown spotty to even oil stain; trace SHALE: light green, friable, sub-blocky to subplaty, earthy texture, trace nodular and disseminated pyrite, no visible porosity



# SUNDRY NOTICES AND REPORTS ON WELLS - FORM 4

INDUSTRIAL COMMISSION OF NORTH DAKOTA  
OIL AND GAS DIVISION  
600 EAST BOULEVARD DEPT 405  
BISMARCK, ND 58505-0840  
SFN 5749 (09-2006)



Well File No.  
**23230**

PLEASE READ INSTRUCTIONS BEFORE FILLING OUT FORM.  
PLEASE SUBMIT THE ORIGINAL AND ONE COPY.

<input checked="" type="checkbox"/> Notice of Intent	Approximate Start Date <b>August 15, 2012</b>	<input type="checkbox"/> Drilling Prognosis	<input type="checkbox"/> Spill Report
<input type="checkbox"/> Report of Work Done	Date Work Completed	<input type="checkbox"/> Redrilling or Repair	<input type="checkbox"/> Shooting
<input type="checkbox"/> Notice of Intent to Begin a Workover Project that may Qualify for a Tax Exemption Pursuant to NDCC Section 57-51.1-03.		<input type="checkbox"/> Casing or Liner	<input type="checkbox"/> Acidizing
Approximate Start Date		<input type="checkbox"/> Plug Well	<input type="checkbox"/> Fracture Treatment
		<input type="checkbox"/> Supplemental History	<input type="checkbox"/> Change Production Method
		<input type="checkbox"/> Temporarily Abandon	<input type="checkbox"/> Reclamation
		<input checked="" type="checkbox"/> Other	<b>Revise BHL and Casing Point</b>

Well Name and Number

**Ash Federal 5300 11-18T**

Footages	800 F N L	350 F W L	Qtr-Qtr <b>LOT1</b>	Section <b>18</b>	Township <b>153 N</b>	Range <b>100 W</b>
Field	Baker	Pool	Bakken	County	McKenzie	

24-HOUR PRODUCTION RATE

Before		After	
Oil	Bbls	Oil	Bbls
Water	Bbls	Water	Bbls
Gas	MCF	Gas	MCF

Name of Contractor(s)

Address	City	State	Zip Code
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DETAILS OF WORK

Oasis Petroleum respectfully requests to make the following changes to the well plan for the subject well:

Intermediate casing point changed to: 798' FNL & 840'FWL Sec. 18 T153N R100W

Bottom hole changed to: 850'FNL & 200'FEL Sec. 17 T153N R100W

Attached is revised plats, drill plan, directional plan and plot

Company <b>Oasis Petroleum North America LLC</b>	Telephone Number <b>281-404-9491</b>	
Address <b>1001 Fannin, Suite 1500</b>		
City <b>Houston</b>	State <b>TX</b>	Zip Code <b>77002</b>
Signature 	Printed Name <b>Brandi Terry</b>	
Title <b>Regulatory Specialist</b>	Date <b>August 15, 2012</b>	
Email Address <b>bterry@oasispetroleum.com</b>		

FOR STATE USE ONLY

<input type="checkbox"/> Received	<input checked="" type="checkbox"/> Approved
Date <b>August 20, 2012</b>	
By 	
Title <b>Petroleum Resource Specialist</b>	



**Oasis Petroleum  
Well Summary  
Ash Federal 5300 11-18T  
Section 18 T153N R100W  
McKenzie County, ND**

**SURFACE CASING AND CEMENT DESIGN**

Size	Interval	Weight	Grade	Coupling	I.D.	Drift	Make-up Torque (ft-lbs)		
							Minimum	Optimum	Max
9-5/8"	0' to 2,130'	36	J-55	LTC	8.921"	8.765"	3400	4530	5660

Interval	Description	Collapse	Burst	Tension	Cost per ft
		(psi) a	(psi) b	(1000 lbs) c	
0' to 2,130'	9-5/8", 36#, J-55, LTC, 8rd	2020 / 2.02	3520 / 3.53	453 / 2.72	

**API Rating & Safety Factor**

- a) Based on full casing evacuation with 9.0 ppg fluid on backside (2150' setting depth).
- b) Burst pressure based on 9 ppg fluid with no fluid on backside (2150' setting depth).
- c) Based on string weight in 9.0 ppg fluid at 2125' TVD plus 100k# overpull.  
(Buoyed weight equals 66k lbs.)

Cement volumes are based on 9-5/8" casing set in 13-1/2" hole with 55% excess to circulate cement back to surface.  
Mix and pump the following slurry.

**Pre-flush (Spacer):**      **20 bbls** fresh water

**Lead Slurry:**                **413 sks** (234 bbls) Conventional system with 94 lb/sk cement, 4% extender, 2% expanding agent, 2% CaCl2 and 0.25 lb/sk lost circulation control agent

**Tail Slurry:**                **225 sks** (60 bbls) Conventional system with 94 lb/sk cement, 3% NaCl, and .25 lb/sk lost circulation control agent

**Oasis Petroleum**  
**Well Summary**  
**Ash Federal 5300 11-18T**  
**Section 18 T153N R100W**  
**McKenzie County, ND**

INTERMEDIATE CASING AND CEMENT DESIGN

**Intermediate Casing Design**

<b>Size</b>	<b>Interval</b>	<b>Weight</b>	<b>Grade</b>	<b>Coupling</b>	<b>I.D.</b>	<b>Drift</b>	<b>Make-up Torque (ft-lbs)</b>		
							<b>Minimum</b>	<b>Optimum</b>	<b>Max</b>
7"	0' – 6,600'	29	P-110	LTC	6.184"	6.059"	5,980	7,970	8,770
7"	6,600' – 10,328'	32	HCP-110	LTC	6.094"	6.000"**	6,730	8,970	9,870
7"	10,328' – 11,090'	29	P-110	LTC	6.184"	6.059"	5,980	7,970	8,770

\*\*Special Drift

<b>Interval</b>	<b>Length</b>	<b>Description</b>	<b>Collapse</b>	<b>Burst</b>	<b>Tension</b>
			(psi) a	(psi) b	(1000 lbs) c
0' – 6,600'	6,600'	7", 29#, P-110, LTC, 8rd	8530 / 2.41*	11220 / 1.19	797 / 2.08
6,600' – 10,328'	3,728'	7", 32#, HCP-110, LTC, 8rd	11820 / 2.20*	12460 / 1.29	
6,600' – 10,328'	3,728'	7", 32#, HCP-110, LTC, 8rd	11820 / 1.06**	12460 / 1.29	
10,328' – 11,090'	762'	7", 29 lb, P-110, LTC, 8rd	8530 / 1.51*	11220 / 1.15	

API Rating & Safety Factor

- a. \*Assume full casing evacuation with 10 ppg fluid on backside. \*\*Assume full casing evacuation with 1.2 psi/ft equivalent fluid gradient across salt intervals.
- b. Burst pressure based on 9,000 psig max press for stimulation plus 10.2 ppg fluid in casing and 9.0 ppg fluid on backside—to 10,805' TVD.
- c. Based on string weight in 10 ppg fluid, (281k lbs buoyed weight) plus 100k lbs overpull.

Cement volumes are estimates based on 7" casing set in an 8-3/4" hole with 30% excess. TOC targeted to 1,500' above Dakota (3,929').

**Pre-flush (Spacer):**      **125 bbls** Saltwater  
**20 sks** Pozmix A  
**10 bbls** Fresh Water

**Lead Slurry:**      **246 sks** (95 bbls) Conventional system with 47 lb/sk cement, 10% NaCl, 34 lb/sk extender, 10% D020 extender, 1% D079 extender, 1% anti-settling agent, 1% fluid loss agent, 0.2% anti-foam agent, 0.6% retarder, and 0.4% dispersant

**Tail Slurry:**      **666 sks** (196 bbls) Conventional system with 94 lb/sk cement, 10% NaCl, 35% Silica, 0.2% fluid loss agent, 0.8% dispersant and 0.3% retarder

**Oasis Petroleum**  
**Well Summary**  
**Ash Federal 5300 11-18T**  
**Section 18 T153N R100W**  
**McKenzie County, ND**

PRODUCTION LINER

Size	Interval	Weight	Grade	Coupling	I.D.	Drift	Make-up Torque (ft-lbs)		
							Minimum	Optimum	Max
4-1/2"	10,278' to 20,594'	13.5	P-110	BTC	4.000"	3.875"	2,270	3,020	3,780

Interval	Description	Collapse	Burst	Tension	Cost per ft
		(psi) a	(psi) b	(1000 lbs) c	
10,278' to 20,594'	4-1/2", 13.5 lb, P-110, BTC, 8rd	10670 / 1.99	12410 / 1.28	443 / 2.02	

API Rating & Safety Factor

- a) Based on full casing evacuation with 9.5 ppg fluid on backside @ 10,851' TVD.
- b) Burst pressure based on 9,000 psi treating pressure with 10.2 ppg internal fluid gradient and 9.0 ppg external fluid gradient @ 10,851' TVD.
- c) Based on string weight in 9.5 ppg fluid (Buoyed weight: 119k lbs.) plus 100k lbs overpull.

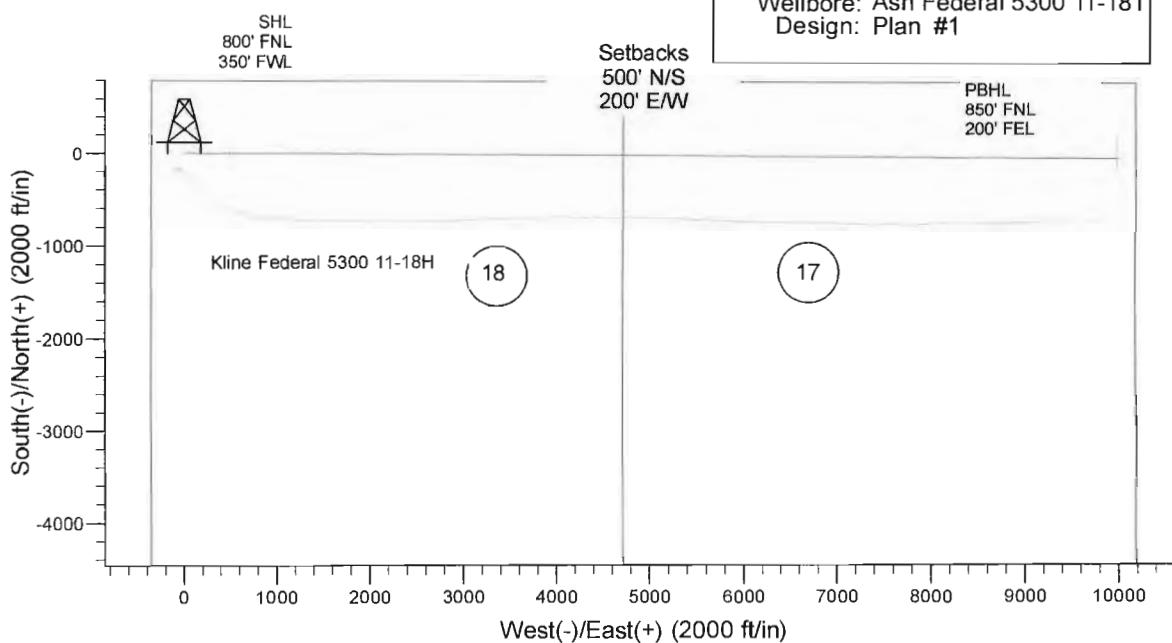


Azimuths to True North  
Magnetic North: 8.47°

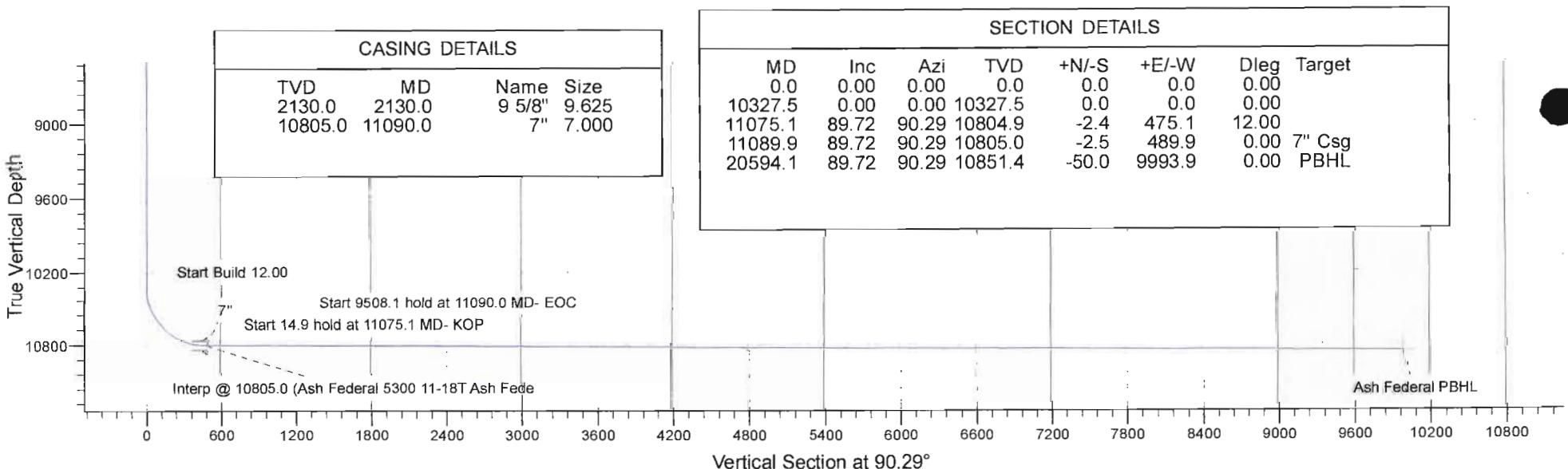
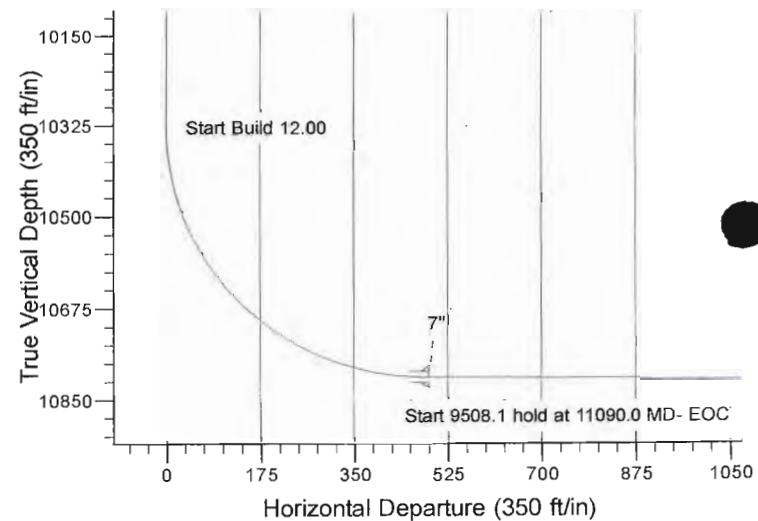
Magnetic Field  
Strength: 56673.3snT  
Dip Angle: 73.07°  
Date: 6/6/2012  
Model: IGRF200510



Project: Indian Hills  
Site: 153N-100W-18/17  
Well: Ash Federal 5300 11-18T  
Wellbore: Ash Federal 5300 11-18T  
Design: Plan #1



SITE DETAILS: 153N-100W-18/17
Site Centre Latitude: 48° 4' 47.250 N
Longitude: 103° 36' 9.720 W
Positional Uncertainty: 0.0
Convergence: -2.31
Local North: True



# **Oasis**

**Indian Hills**

**153N-100W-18/17**

**Ash Federal 5300 11-18T**

**Ash Federal 5300 11-18T**

**Plan: Plan #1**

# **Standard Planning Report**

**15 August, 2012**

## Planning Report

<b>Database:</b>	OpenWellsCompass - EDM Prod	<b>Local Co-ordinate Reference:</b>	Well Ash Federal 5300 11-18T
<b>Company:</b>	Oasis	<b>TVD Reference:</b>	WELL @ 2078.0ft (Original Well Elev)
<b>Project:</b>	Indian Hills	<b>MD Reference:</b>	WELL @ 2078.0ft (Original Well Elev)
<b>Site:</b>	153N-100W-18/17	<b>North Reference:</b>	True
<b>Well:</b>	Ash Federal 5300 11-18T	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Ash Federal 5300 11-18T		
<b>Design:</b>	Plan #1		

<b>Project</b>	Indian Hills		
<b>Map System:</b>	US State Plane 1983	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	North American Datum 1983		
<b>Map Zone:</b>	North Dakota Northern Zone		

<b>Site</b>	153N-100W-18/17				
<b>Site Position:</b>		<b>Northing:</b>	124,709.16 m	<b>Latitude:</b>	48° 4' 47.250 N
<b>From:</b>	Lat/Long	<b>Easting:</b>	368,894.57 m	<b>Longitude:</b>	103° 36' 9.720 W
<b>Position Uncertainty:</b>	0.0 ft	<b>Slot Radius:</b>	13.200 in	<b>Grid Convergence:</b>	-2.31 °

<b>Well</b>	Ash Federal 5300 11-18T				
<b>Well Position</b>	+N/S +E/W	0.0 ft	<b>Northing:</b> <b>Easting:</b>	124,709.16 m 368,894.57 m	<b>Latitude:</b> <b>Longitude:</b>
					48° 4' 47.250 N 103° 36' 9.720 W
<b>Position Uncertainty</b>		0.0 ft	<b>Wellhead Elevation:</b>		<b>Ground Level:</b> 2,053.0 ft

<b>Wellbore</b>	Ash Federal 5300 11-18T				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination</b> (°)	<b>Dip Angle</b> (°)	<b>Field Strength</b> (nT)
	IGRF200510	6/6/2012	8.47	73.07	56,673

<b>Design</b>	Plan #1				
<b>Audit Notes:</b>					
<b>Version:</b>		<b>Phase:</b>	<b>PROTOTYPE</b>	<b>Tie On Depth:</b>	0.0
<b>Vertical Section:</b>		<b>Depth From (TVD) (ft)</b>	<b>+N/S (ft)</b>	<b>+E/W (ft)</b>	<b>Direction (°)</b>
		0.0	0.0	0.0	90.29

<b>Plan Sections</b>											
<b>Measured</b>	<b>Depth</b> (ft)	<b>Inclination</b> (°)	<b>Azimuth</b> (°)	<b>Vertical</b> <b>Depth</b> (ft)	<b>+N-S</b> (ft)	<b>+E-W</b> (ft)	<b>Dogleg</b> <b>Rate</b> (°/100ft)	<b>Build</b> <b>Rate</b> (°/100ft)	<b>Turn</b> <b>Rate</b> (°/100ft)	<b>TFO</b> (°)	<b>Target</b>
	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00

# Planning Report

<b>Database:</b>	OpenWellsCompass - EDM Prod	<b>Local Co-ordinate Reference:</b>	Well Ash Federal 5300 11-18T
<b>Company:</b>	Oasis	<b>TVD Reference:</b>	WELL @ 2078.0ft (Original Well Elev)
<b>Project:</b>	Indian Hills	<b>MD Reference:</b>	WELL @ 2078.0ft (Original Well Elev)
<b>Site:</b>	153N-100W-18/17	<b>North Reference:</b>	True
<b>Well:</b>	Ash Federal 5300 11-18T	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Ash Federal 5300 11-18T		
<b>Design:</b>	Plan #1		

## Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/S (ft)	+E/W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
2,028.0	0.00	0.00	2,028.0	0.0	0.0	0.0	0.00	0.00	0.00
<b>Pierre</b>									
2,130.0	0.00	0.00	2,130.0	0.0	0.0	0.0	0.00	0.00	0.00
<b>9 5/8"</b>									
4,615.0	0.00	0.00	4,615.0	0.0	0.0	0.0	0.00	0.00	0.00
<b>Greenhorn</b>									
5,025.0	0.00	0.00	5,025.0	0.0	0.0	0.0	0.00	0.00	0.00
<b>Mowry</b>									
5,429.0	0.00	0.00	5,429.0	0.0	0.0	0.0	0.00	0.00	0.00
<b>Dakota</b>									
6,449.0	0.00	0.00	6,449.0	0.0	0.0	0.0	0.00	0.00	0.00
<b>Rierdon</b>									
6,784.0	0.00	0.00	6,784.0	0.0	0.0	0.0	0.00	0.00	0.00
<b>Dunham Salt</b>									
6,901.0	0.00	0.00	6,901.0	0.0	0.0	0.0	0.00	0.00	0.00
<b>Dunham Salt Base</b>									
6,985.0	0.00	0.00	6,985.0	0.0	0.0	0.0	0.00	0.00	0.00
<b>Spearfish</b>									
7,250.0	0.00	0.00	7,250.0	0.0	0.0	0.0	0.00	0.00	0.00
<b>Pine Salt</b>									
7,297.0	0.00	0.00	7,297.0	0.0	0.0	0.0	0.00	0.00	0.00
<b>Pine Salt Base</b>									
7,341.0	0.00	0.00	7,341.0	0.0	0.0	0.0	0.00	0.00	0.00
<b>Opecche Salt</b>									
7,372.0	0.00	0.00	7,372.0	0.0	0.0	0.0	0.00	0.00	0.00
<b>Opecche Salt Base</b>									
7,576.0	0.00	0.00	7,576.0	0.0	0.0	0.0	0.00	0.00	0.00
<b>Broom Creek (Top of Minnelusa Gp.)</b>									
7,653.0	0.00	0.00	7,653.0	0.0	0.0	0.0	0.00	0.00	0.00
<b>Arnsden</b>									
7,823.0	0.00	0.00	7,823.0	0.0	0.0	0.0	0.00	0.00	0.00
<b>Tyler</b>									
7,994.0	0.00	0.00	7,994.0	0.0	0.0	0.0	0.00	0.00	0.00
<b>Otter (Base of Minnelusa Gp.)</b>									
8,368.0	0.00	0.00	8,368.0	0.0	0.0	0.0	0.00	0.00	0.00
<b>Kibby Lime</b>									
8,516.0	0.00	0.00	8,516.0	0.0	0.0	0.0	0.00	0.00	0.00
<b>Charles Salt</b>									
9,140.0	0.00	0.00	9,140.0	0.0	0.0	0.0	0.00	0.00	0.00
<b>UB</b>									
9,216.0	0.00	0.00	9,216.0	0.0	0.0	0.0	0.00	0.00	0.00
<b>Base Last Salt</b>									
9,262.0	0.00	0.00	9,262.0	0.0	0.0	0.0	0.00	0.00	0.00
<b>Ratcliffe</b>									
9,440.0	0.00	0.00	9,440.0	0.0	0.0	0.0	0.00	0.00	0.00
<b>Mission Cyn</b>									
9,993.0	0.00	0.00	9,993.0	0.0	0.0	0.0	0.00	0.00	0.00
<b>Lodgepole</b>									
10,209.0	0.00	0.00	10,209.0	0.0	0.0	0.0	0.00	0.00	0.00
<b>Lodgepole Fracture Zone</b>									

## Planning Report

<b>Database:</b>	OpenWellsCompass - EDM Prod	<b>Local Co-ordinate Reference:</b>	Well Ash Federal 5300 11-18T
<b>Company:</b>	Oasis	<b>TVD Reference:</b>	WELL @ 2078.0ft (Original Well Elev)
<b>Project:</b>	Indian Hills	<b>MD Reference:</b>	WELL @ 2078.0ft (Original Well Elev)
<b>Site:</b>	153N-100W-18/17	<b>North Reference:</b>	True
<b>Well:</b>	Ash Federal 5300 11-18T	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Ash Federal 5300 11-18T		
<b>Design:</b>	Plan #1		

### Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/S (ft)	+E/W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
10,327.4	0.00	0.00	10,327.4	0.0	0.0	0.0	0.00	0.00	0.00
<b>Start Build 12.00</b>									
10,750.0	50.71	90.29	10,697.0	-0.9	175.1	175.1	12.00	12.00	0.00
<b>False Bakken</b>									
10,764.5	52.45	90.29	10,706.0	-0.9	186.5	186.5	12.00	12.00	0.00
<b>Upper Bakken</b>									
10,788.3	55.30	90.29	10,720.0	-1.0	205.6	205.6	12.00	12.00	0.00
<b>Middle Bakken</b>									
10,883.3	66.70	90.29	10,766.0	-1.4	288.6	288.6	12.00	12.00	0.00
<b>Lower Bakken</b>									
10,939.0	73.39	90.29	10,785.0	-1.7	340.9	340.9	12.00	12.00	0.00
<b>Three Forks</b>									
11,075.1	89.72	90.29	10,804.9	-2.4	475.1	475.1	12.00	12.00	0.00
<b>Start 14.9 hold at 11075.1 MD- KOP</b>									
11,089.9	89.72	90.29	10,805.0	-2.5	489.9	489.9	0.02	0.02	0.00
<b>Three Forks Target</b>									
11,090.0	89.72	90.29	10,805.0	-2.5	490.0	490.0	0.00	0.00	0.00
<b>Start 9508.1 hold at 11090.0 MD- EOC - 7"</b>									
20,594.1	89.72	90.29	10,851.4	-50.0	9,993.9	9,994.0	0.00	0.00	0.00

### Design Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/S (ft)	+E/W (ft)	Northing (m)	Easting (m)	Latitude	Longitude
- hit/miss target - Shape	0.00	0.00	10,805.0	-2.5	489.9	124,702.40	369,043.74	48° 4' 47.226 N	103° 36' 2.505 W
Interp @ 10805.0 (Ash F - plan hits target center - Point									
Ash Federal PBHL - plan hits target center - Point	0.00	0.00	10,851.4	-50.0	9,993.9	124,571.22	371,937.62	48° 4' 46.730 N	103° 33' 42.535 W

### Casing Points

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (in)	Hole Diameter (in)
2,130.0	2,130.0 9 5/8"		9.625	13.500
11,090.0	10,805.0 7"		7.000	8.750

# Planning Report

**Database:** OpenWellsCompass - EDM Prod  
**Company:** Oasis  
**Project:** Indian Hills  
**Site:** 153N-100W-18/17  
**Well:** Ash Federal 5300 11-18T  
**Wellbore:** Ash Federal 5300 11-18T  
**Design:** Plan #1

**Local Co-ordinate Reference:** Well Ash Federal 5300 11-18T  
**TVD Reference:** WELL @ 2078.0ft (Original Well Elev)  
**MD Reference:** WELL @ 2078.0ft (Original Well Elev)  
**North Reference:** True  
**Survey Calculation Method:** Minimum Curvature

## Formations

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
2,028.0	2,028.0	Pierre			
4,615.0	4,615.0	Greenhorn			
5,025.0	5,025.0	Mowry			
5,429.0	5,429.0	Dakota			
6,449.0	6,449.0	Rierdon			
6,784.0	6,784.0	Dunham Salt			
6,901.0	6,901.0	Dunham Salt Base			
6,985.0	6,985.0	Spearfish			
7,250.0	7,250.0	Pine Salt			
7,297.0	7,297.0	Pine Salt Base			
7,341.0	7,341.0	Opeche Salt			
7,372.0	7,372.0	Opeche Salt Base			
7,576.0	7,576.0	Broom Creek (Top of Minnelusa Gp.)			
7,653.0	7,653.0	Amsden			
7,823.0	7,823.0	Tyler			
7,994.0	7,994.0	Otter (Base of Minnelusa Gp.)			
8,368.0	8,368.0	Kibby Lime			
8,516.0	8,516.0	Charles Salt			
9,140.0	9,140.0	UB			
9,216.0	9,216.0	Base Last Salt			
9,262.0	9,262.0	Ratcliffe			
9,440.0	9,440.0	Mission Cyn			
9,993.0	9,993.0	Lodgepole			
10,209.0	10,209.0	Lodgepole Fracture Zone			
10,750.0	10,697.0	False Bakken			
10,764.5	10,706.0	Upper Bakken			
10,788.3	10,720.0	Middle Bakken			
10,883.3	10,766.0	Lower Bakken			
10,939.0	10,785.0	Three Forks			
11,089.9	10,805.0	Three Forks Target			

## Plan Annotations

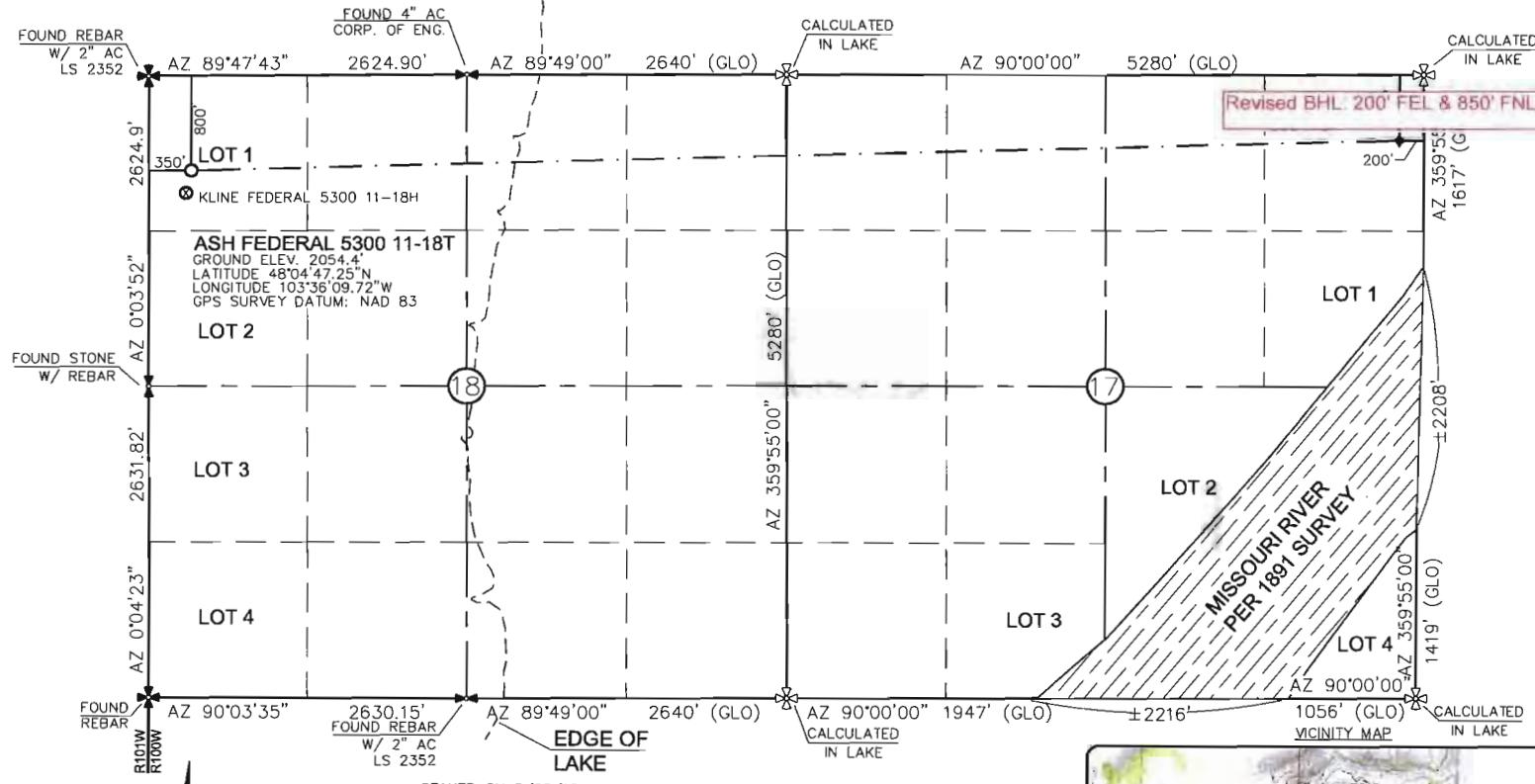
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			Comment
		+N/-S (ft)	+E/-W (ft)		
10,327.4	10,327.4	0.0	0.0		Start Build 12.00
11,075.1	10,804.9	11.9	475.0		Start 14.9 hold at 11075.1 MD- KOP
11,090.0	10,805.0	12.3	489.9		Start 9508.1 hold at 11090.0 MD- EOC
20,598.1					TD at 20598.1

### WELL LOCATION PLAT

OASIS PETROLEUM NORTH AMERICA, LLC  
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002

"ASH FEDERAL 5300 11-18T"

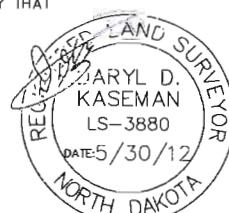
800 FEET FROM NORTH LINE AND 360 FEET FROM WEST LINE  
SECTION 18, T15N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA



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DARYL D. KASEMAN LS-3880



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Project No.	Date	By	Description

Project No.	Date	By	Description
OASIS PETROLEUM NORTH AMERICA, LLC			
WELL LOCATION PLAT			
SECTION 18, T15N, R100W			
MCKENZIE COUNTY, NORTH DAKOTA			
Drawn By: B.H.M.	Plotted By: B.H.M.	Checked By: J.D.K.	Approved By: J.D.K.
Date:			

Interstate Engineering, Inc.		
1425 East Main Street		
Saint Paul, Minnesota 55127-0000		
Ph. (651) 433-5617		
Fax (651) 433-5618		
www.bingj.com		
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## SECTION BREAKDOWN

OASIS PETROLEUM NORTH AMERICA, LLC

1001 FANNIN, SUITE 1500, HOUSTON, TX 77002  
"ASH FEDERAL 5300 11-18T"

**\*ASH FEDERAL 5300 11-181\***

800 FEET FROM NORTH LINE AND 350 FEET FROM WEST LINE  
SECTIONS 17 & 18, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA

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ALL AZIMUTHS ARE BASED ON G.P.S. OBSERVATIONS. THE ORIGINAL SURVEY OF THIS AREA FOR THE GENERAL LAND OFFICE (G.L.O.) WAS 1891. THE CORNERS FOUND ARE AS INDICATED AND ALL OTHERS ARE COMPUTED FROM THOSE CORNERS FOUND AND BASED ON G.L.O. DATA. THE MAPPING ANGLE FOR THIS AREA IS APPROXIMATELY 003°.



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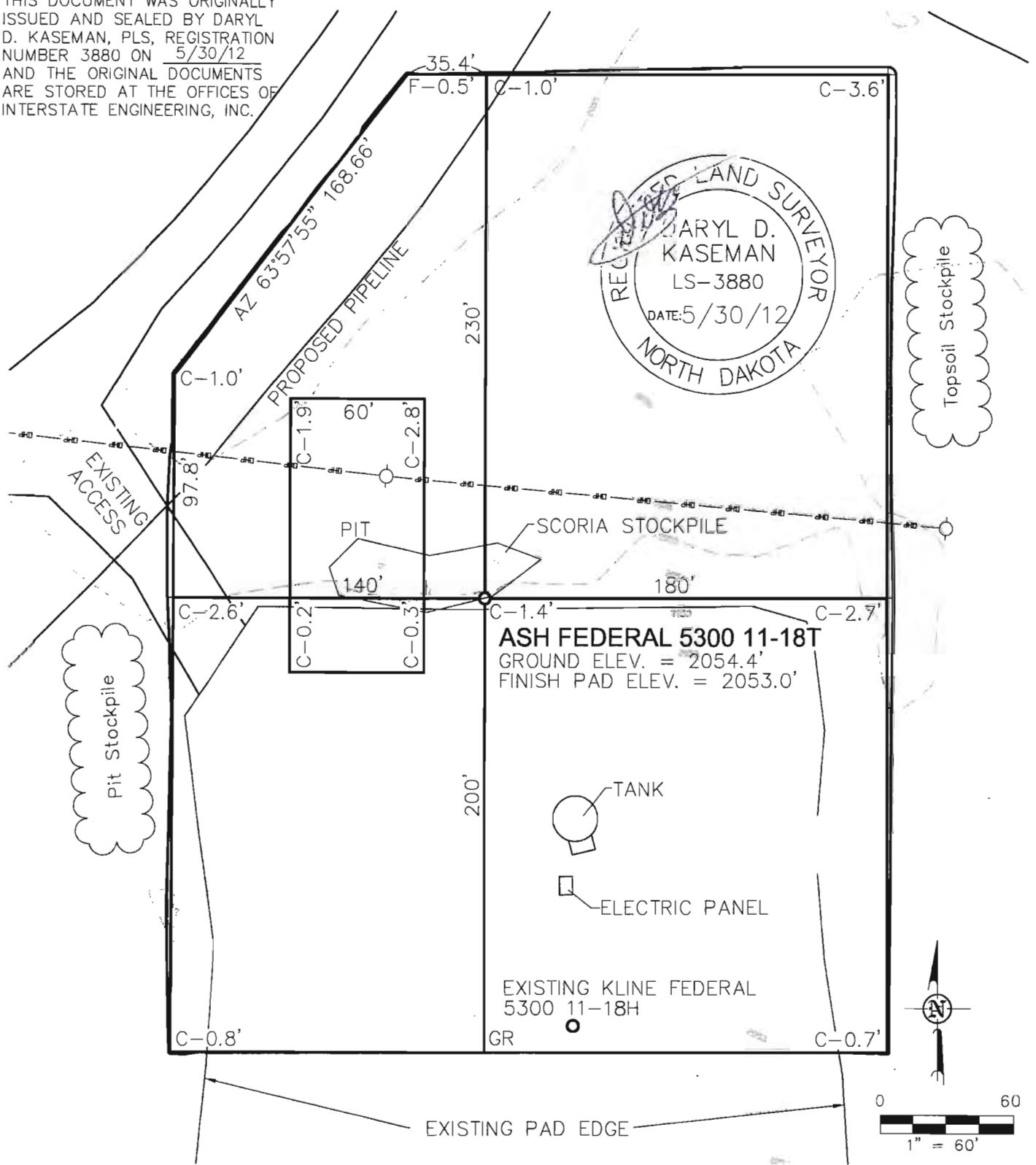
2/8

# PAD LAYOUT

OASIS PETROLEUM NORTH AMERICA, LLC  
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002  
"ASH FEDERAL 5300 11-18T"

800 FEET FROM NORTH LINE AND 350 FEET FROM WEST LINE  
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PAD LAYOUT  
SECTION 18, T153N, R100W  
MCKENZIE COUNTY, NORTH DAKOTA  
Drawn By: B.H.H. Project No.: S12-09-145  
Checked By: D.D.K. Date: MAY 2012

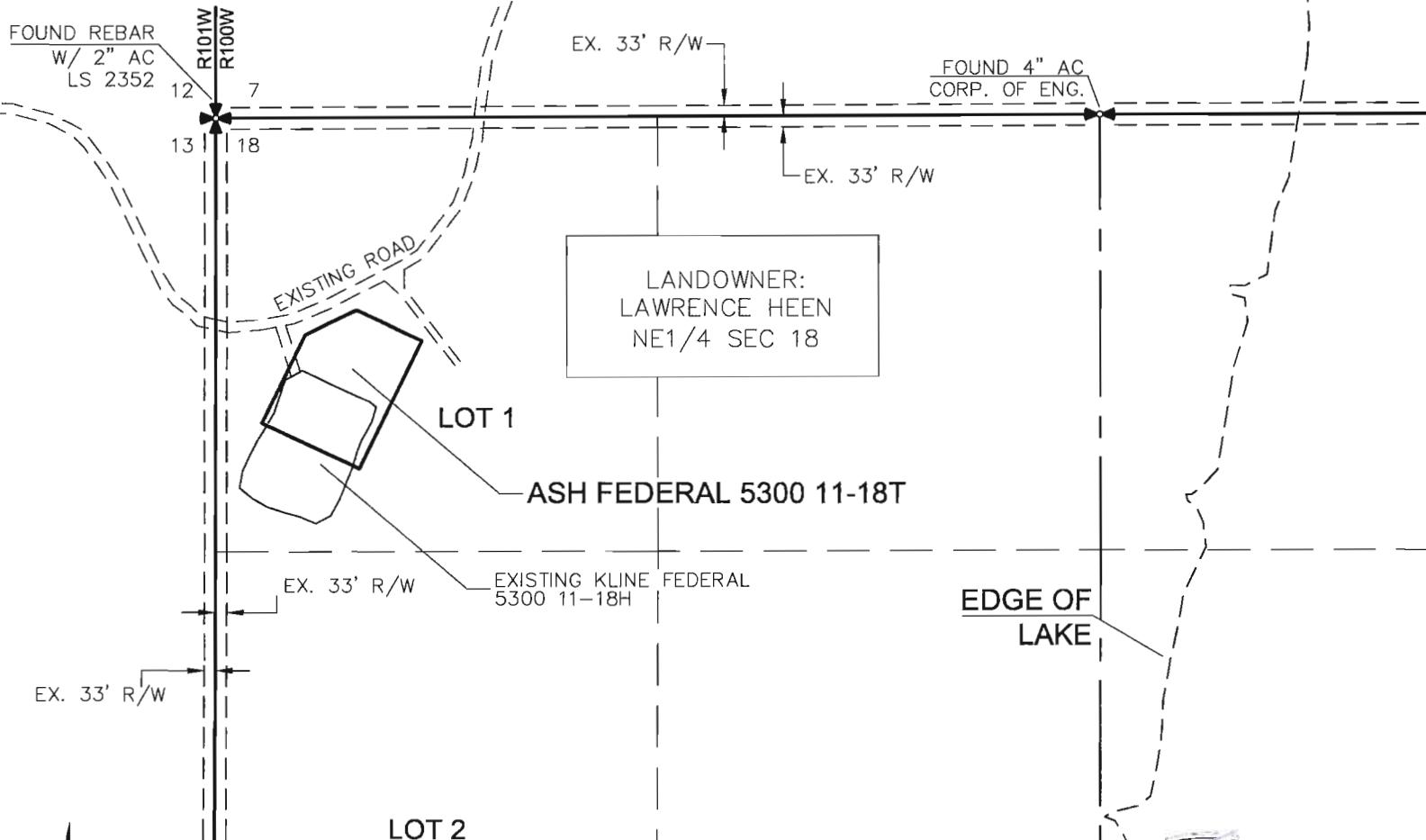
Revision No.	Date	By	Description

## ACCESS APPROACH

OASIS PETROLEUM NORTH AMERICA, LLC  
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002

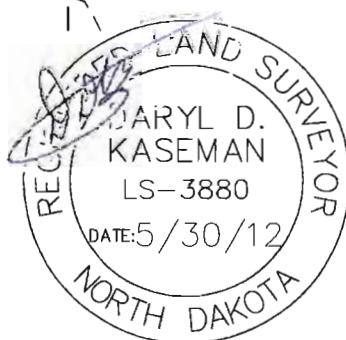
"ASH FEDERAL 5300 11-18T"

800 FEET FROM NORTH LINE AND 350 FEET FROM WEST LINE  
SECTION 18, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA



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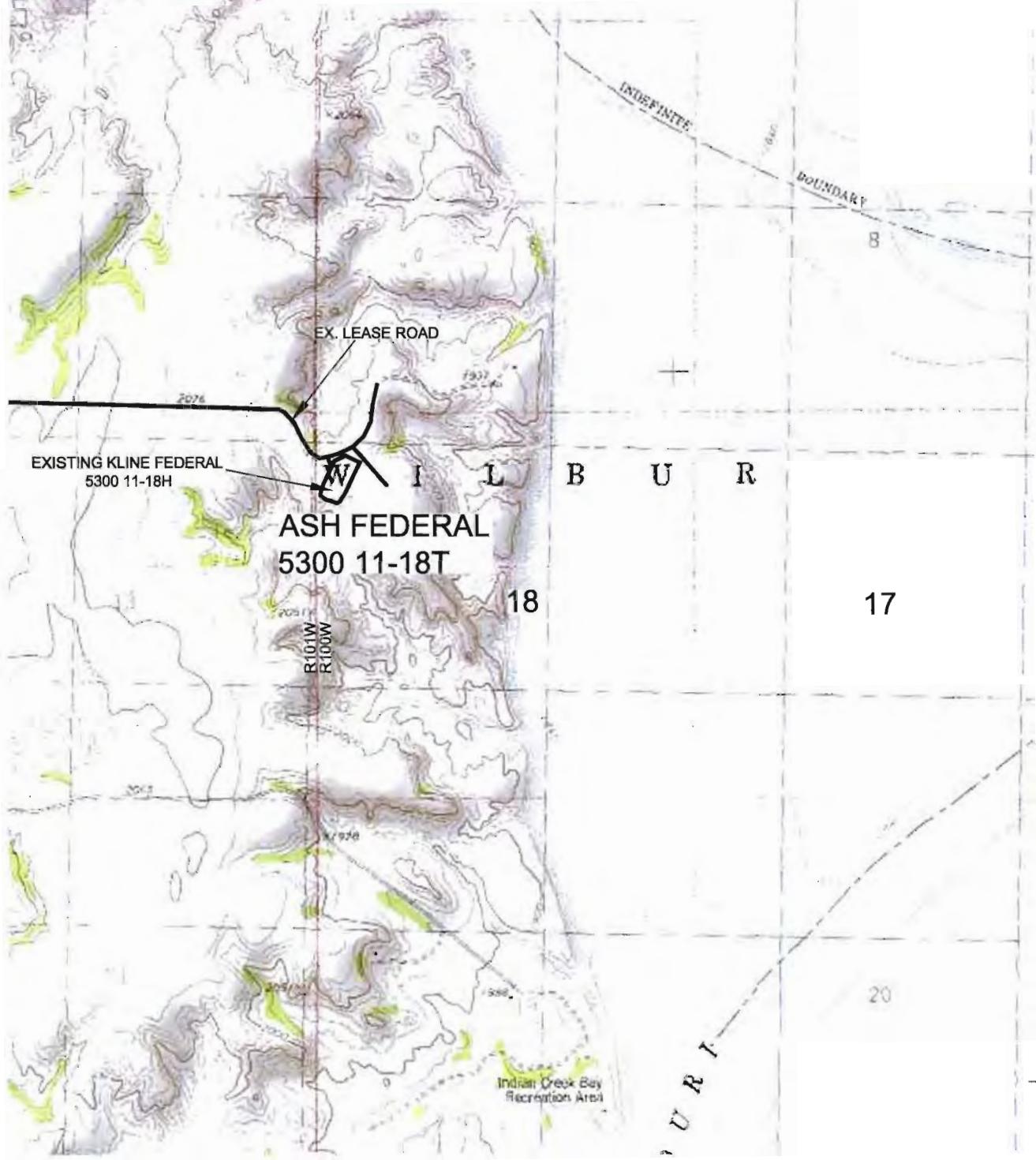


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ACCESS APPROACH	
SECTION 18, T153N, R100W	MCKENZIE COUNTY, NORTH DAKOTA
Project No.: S1249-145	Date: MAY 2012
Drawn By: B.H.H.	Checked By: D.D.K.
Approved By:	Date:

OASIS PETROLEUM NORTH AMERICA, LLC  
 ASH FEDERAL 5300 11-18T  
 800' FNL/350' FWL  
 QUAD LOCATION MAP  
 SECTION 18, T153N, R100W  
 MCKENZIE COUNTY, NORTH DAKOTA



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OASIS PETROLEUM NORTH AMERICA, LLC  
 QUAD LOCATION MAP  
 SECTION 18, T153N, R100W  
 MCKENZIE COUNTY, NORTH DAKOTA

Drawn By:	B.H.H.	Project No.:	S12-09-145
Checked By:	D.D.K.	Date:	MAY 2012

Revision No.	Date	By	Description

## COUNTY ROAD MAP

OASIS PETROLEUM NORTH AMERICA, LLC

1001 FANNIN, SUITE 1500, HOUSTON, TX 77002

"ASH FEDERAL 5300 11-18T"

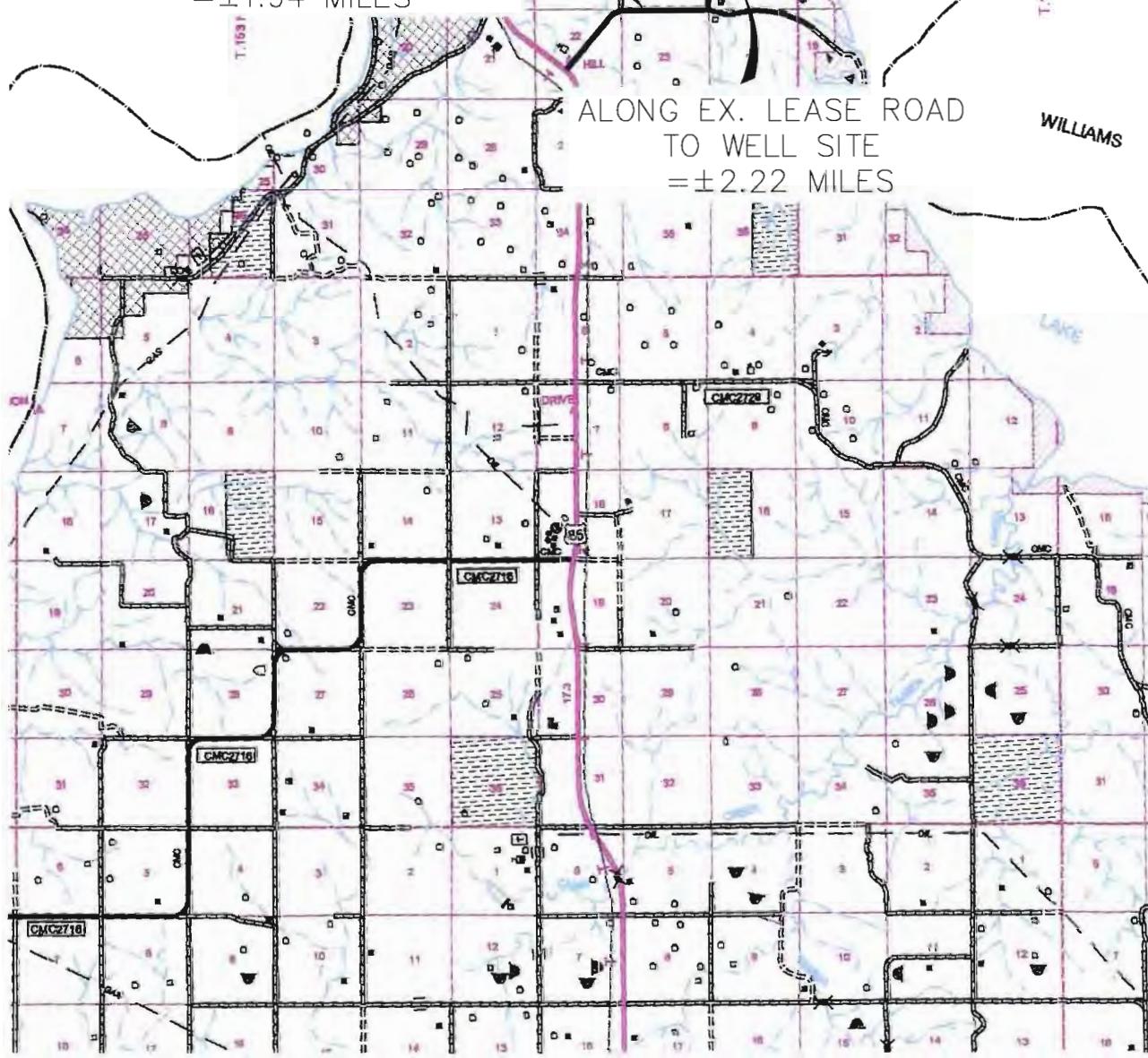
800 FEET FROM NORTH LINE AND 350 FEET FROM WEST LINE  
SECTION 18, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA

FROM HIGHWAY 85  
ALONG COUNTY ROAD 4  
TO EX. LEASE ROAD  
 $\pm 1.94$  MILES

ASH FEDERAL 5300

11-18T

ALONG EX. LEASE ROAD  
TO WELL SITE  
=±2.22 MILES



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SCALE: 1" = 2 MILE

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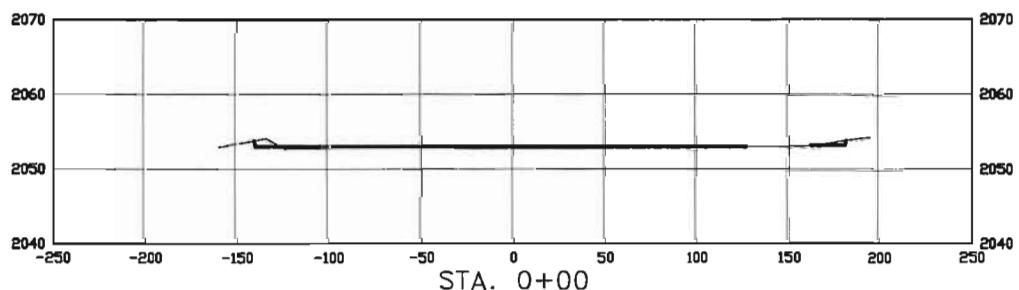
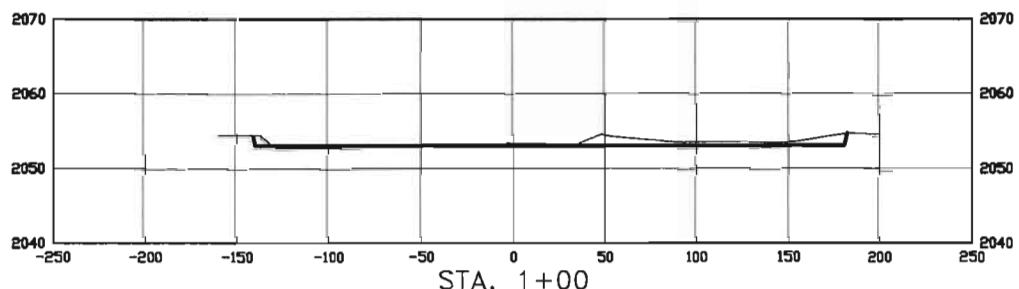
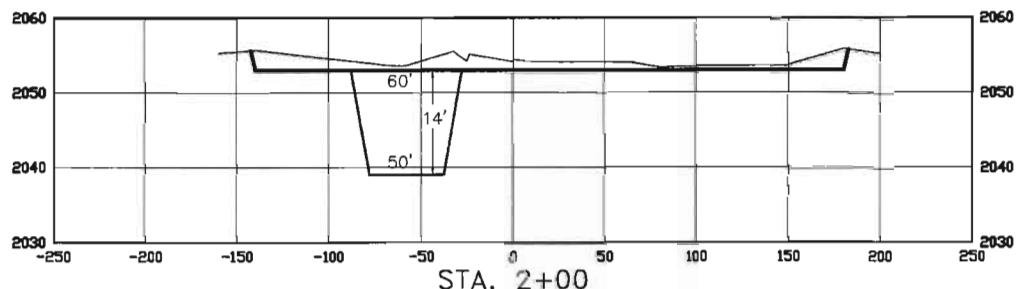
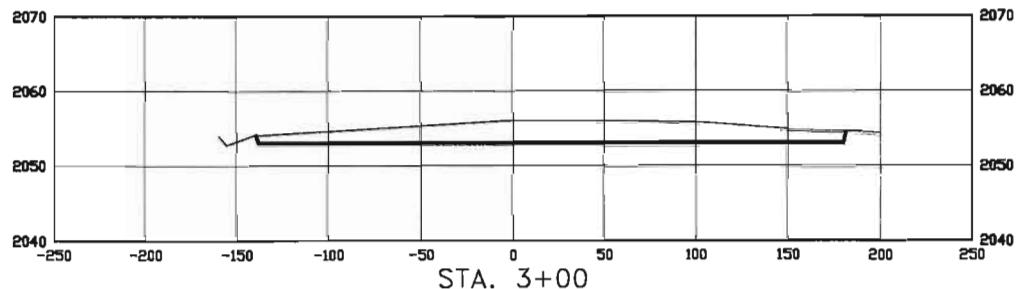
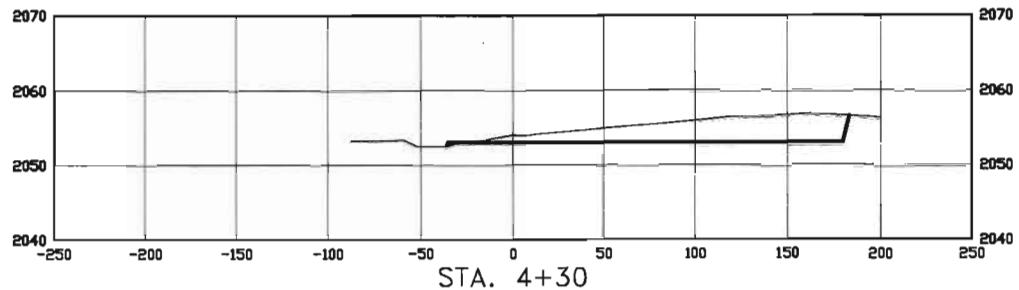
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OASIS PETROLEUM NORTH AMERICA, LLC  
COUNTY ROAD MAP  
SECTION 18, T153N, R100W  
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. Project No.: S12-09-145  
Checked By: D.D.K. Date: MAY 2012

**CROSS SECTIONS**  
 OASIS PETROLEUM NORTH AMERICA, LLC  
 1001 FANNIN, SUITE 1500, HOUSTON, TX 77002  
 "ASH FEDERAL 5300 11-18T"  
 800 FEET FROM NORTH LINE AND 350 FEET FROM WEST LINE  
 SECTION 18, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA



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SCALE  
 HORIZ 1"=100'  
 VERT 1"=25'

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 PAD CROSS SECTIONS  
 SECTION 18, T153N, R100W  
 MCKENZIE COUNTY, NORTH DAKOTA

Revision No.	Date	By	Description

**WELL LOCATION SITE QUANTITIES**  
**OASIS PETROLEUM NORTH AMERICA, LLC**  
**1001 FANNIN, SUITE 1500, HOUSTON, TX 77002**  
**"ASH FEDERAL 5300 11-18"**  
**800 FEET FROM NORTH LINE AND 350 FEET FROM WEST LINE**  
**SECTION 18, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA**

WELL SITE ELEVATION	2054.4
WELL PAD ELEVATION	2053.0
EXCAVATION	6,996
PLUS PIT	<u>3,150</u>
	10,146
EMBANKMENT	118
PLUS SHRINKAGE (30%)	<u>35</u>
	153
STOCKPILE PIT	3,150
STOCKPILE TOP SOIL (6")	2,457
STOCKPILE MATERIAL	4,386
DISTURBED AREA FROM PAD	3.05 ACRES

NOTE: ALL QUANTITIES ARE IN CUBIC YARDS (UNLESS NOTED)

CUT END SLOPES AT 1:1

FILL END SLOPES AT 1.5:1

**WELL SITE LOCATION**

800' FNL

350' FWL

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 Ph (406) 433-5817  
 Fax (406) 433-5818  
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OASIS PETROLEUM NORTH AMERICA, LLC  
 QUANTITIES  
 SECTION 18, T153N, R100W

MCKENZIE COUNTY, NORTH DAKOTA

Drawn By:	B.H.H.	Project No.:	S1249-145
Checked By:	D.D.K.	Date:	MAY 2012

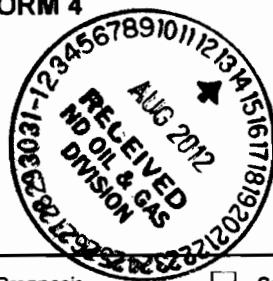
Revision No.	Date	By	Description



## SUNDRY NOTICES AND REPORTS ON WELLS - FORM 4

INDUSTRIAL COMMISSION OF NORTH DAKOTA  
OIL AND GAS DIVISION  
600 EAST BOULEVARD DEPT 405  
BISMARCK, ND 58505-0840  
SFN 5749 (09-2006)

Well File No.  
23230



PLEASE READ INSTRUCTIONS BEFORE FILLING OUT FORM.  
PLEASE SUBMIT THE ORIGINAL AND ONE COPY.

<input checked="" type="checkbox"/> Notice of Intent	Approximate Start Date <b>August 13, 2012</b>	<input type="checkbox"/> Drilling Prognosis	<input type="checkbox"/> Spill Report
<input type="checkbox"/> Report of Work Done	Date Work Completed	<input type="checkbox"/> Redrilling or Repair	<input type="checkbox"/> Shooting
<input type="checkbox"/> Notice of Intent to Begin a Workover Project that may Qualify for a Tax Exemption Pursuant to NDCC Section 57-51.1-03.	Approximate Start Date	<input type="checkbox"/> Casing or Liner	<input type="checkbox"/> Acidizing
		<input type="checkbox"/> Plug Well	<input type="checkbox"/> Fracture Treatment
		<input type="checkbox"/> Supplemental History	<input type="checkbox"/> Change Production Method
		<input type="checkbox"/> Temporarily Abandon	<input type="checkbox"/> Reclamation
		<input checked="" type="checkbox"/> Other	<u>Waiver to Rule 43-02-03-31</u>

Well Name and Number  
**Ash Federal 5300 11-18T**

Footages <b>800 F N L</b>	350 F W L	Qtr-Qtr <b>LOT1</b>	Section <b>18</b>	Township <b>153 N</b>	Range <b>100 W</b>
Field <b>Baker</b>	Pool <b>Bakken</b>			County <b>McKenzie</b>	

### 24-HOUR PRODUCTION RATE

	Before	After
Oil	Bbls	Bbls
Water	Bbls	Water
Gas	MCF	Gas

Name of Contractor(s)

Address	City	State	Zip Code
---------	------	-------	----------

### DETAILS OF WORK

Oasis Petroleum respectfully requests a waiver to Rule 43-02-03-31 in regards to running open hole logs for the above referenced well. Justification for this request is as follows:

The Oasis Petroleum/ Kline 5300 11-18H located within a mile of the subject well.

If this exception is approved, Oasis Petroleum will run a CBL on the intermediate string, and we will also run GR to surface. Oasis Petroleum will also submit two digital copies of each cased hole log and a copy of the mud log containing MWD gamma ray.

Company <b>Oasis Petroleum North America LLC</b>	Telephone Number <b>281-404-9491</b>	
Address <b>1001 Fannin, Suite 1500</b>		
City <b>Houston</b>	State <b>TX</b>	Zip Code <b>77002</b>
Signature 	Printed Name <b>Brandi Terry</b>	
Title <b>Regulatory Specialist</b>	Date <b>August 13, 2012</b>	
Email Address <b>bterry@oasispetroleum.com</b>		

### FOR STATE USE ONLY

<input type="checkbox"/> Received	<input checked="" type="checkbox"/> Approved
Date <b>8-13-2012</b>	
By 	
Title <b>Richard A. Suggs Geologist</b>	



# Oil and Gas Division

Lynn D. Helms - Director

Bruce E. Hicks - Assistant Director

## Department of Mineral Resources

Lynn D. Helms - Director

## North Dakota Industrial Commission

[www.dmr.nd.gov/oilgas](http://www.dmr.nd.gov/oilgas)

23230

ROBIN E. HESKETH  
OASIS PETROLEUM NORTH AMERICA LLC  
1001 FANNIN, SUITE 1500  
HOUSTON, TX 77002 USA

Date: 7/9/2012

### RE: CORES AND SAMPLES

Well Name: **ASH FEDERAL 5300 11-18T** Well File No.: 23230  
Location: **LOT1 18-153-100** County: MCKENZIE  
Permit Type: **Development - HORIZONTAL**  
Field: **BAKER** Target Horizon: THREE FORKS

Dear ROBIN E. HESKETH:

North Dakota Century Code (NDCC) Section 38-08-04 provides for the preservation of cores and samples and their shipment to the State Geologist when requested. The following is required on the above referenced well:

- 1) All cores, core chips and samples must be submitted to the State Geologist as provided for the NDCC Section 38-08-04 and North Dakota Administrative Code 43-02-03-38.1.
- 2) Samples shall include all cuttings from:

#### Base of the Last Charles Salt

Samples of cuttings shall be taken at 30' maximum intervals through all vertical, build and horizontal sections. Samples must be washed, dried, packed in sample envelopes in correct order with labels showing operator, well name, location and depth, and forwarded in standard boxes to the State Geologist within 30 days of the completion of drilling operations.

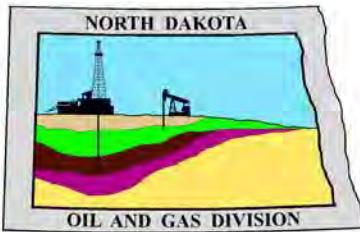
- 3) Cores: ALL CORES cut shall be preserved in correct order, properly boxed, and forwarded to the State Geologist within 90 days of completion of drilling operations. Any extension of time must have written approval from the State Geologist.
- 4) All cores, core chips, and samples must be shipped, prepaid, to the State Geologist at the following address:

**ND Geological Survey Core Library  
Campus Road and Cornell  
Grand Forks, ND 58202**

- 5) NDCC Section 38-08-16 allows for a civil penalty for any violation of Chapter 38 08 not to exceed \$12,500 for each offense, and each day's violation is a separate offense.

Sincerely

Richard A. Suggs  
Geologist



# Oil and Gas Division

Lynn D. Helms - Director      Bruce E. Hicks - Assistant Director

## Department of Mineral Resources

Lynn D. Helms - Director

## North Dakota Industrial Commission

[www.oilgas.nd.gov](http://www.oilgas.nd.gov)

June 28, 2012

Brandi Terry  
Regulatory Specialist  
OASIS PETROLEUM NORTH AMERICA LLC  
1001 Fannin Suite 202  
Houston, TX 77002

**RE: HORIZONTAL WELL  
ASH FEDERAL 5300 11-18T  
LOT1 Section 18-153N-100W  
McKenzie County  
Well File # 23230**

Dear Brandi:

Pursuant to Commission Order No. 19840, approval to drill the above captioned well is hereby given. The approval is granted on the condition that all portions of the well bore not isolated by cement, be no closer than the **500' setback** from the north & south boundaries and **200' setback** from the east & west boundaries within the 1280 acre spacing unit consisting of Sections 17 &18-T153N-R100W. **Tool error is not required pursuant to order.**

**PERMIT STIPULATIONS: OASIS PETRO NO AMER must contact NDIC Field Inspector Richard Dunn at 701-770-3554 prior to location construction.**

### Drilling pit

NDAC 43-02-03-19.4 states that "a pit may be utilized to bury drill cuttings and solids generated during well drilling and completion operations, providing the pit can be constructed, used and reclaimed in a manner that will prevent pollution of the land surface and freshwaters. Reserve and circulation of mud system through earthen pits are prohibited. All pits shall be inspected by an authorized representative of the director prior to lining and use. Drill cuttings and solids must be stabilized in a manner approved by the director prior to placement in a cuttings pit."

### Form 1 Changes & Hard Lines

Any changes, shortening of casing point or lengthening at Total Depth must have prior approval by the NDIC. The proposed directional plan is at a legal location. Based on the azimuth of the proposed lateral the maximum legal coordinates from the well head is: 300' N & 9994' E.

### Location Construction Commencement (Three Day Waiting Period)

Operators shall not commence operations on a drill site until the 3rd business day following publication of the approved drilling permit on the NDIC - OGD Daily Activity Report. If circumstances require operations to commence before the 3rd business day following publication on the Daily Activity Report, the waiting period may be waived by the Director. Application for a waiver must be by sworn affidavit providing the information necessary to evaluate the extenuating circumstances, the factors of NDAC 43-02-03-16.2 (1), (a)-(f), and any other information that would allow the Director to conclude that in the event another owner seeks revocation of the drilling permit, the applicant should retain the permit.

### Permit Fee & Notification

Payment was received in the amount of \$100 via credit card .The permit fee has been received. It is requested that notification be given immediately upon the spudding of the well. This information should be relayed to the Oil & Gas Division, Bismarck, via telephone. The following information must be included: Well name, legal location, permit number, drilling contractor, company representative, date and time of spudding. Office hours are 8:00 a.m. to 12:00 p.m. and 1:00 p.m. to 5:00 p.m. Central Time. Our telephone number is (701) 328-8020, leave a message if after hours or on the weekend.

### **Survey Requirements for Horizontal, Horizontal Re-entry, and Directional Wells**

NDAC Section 43-02-03-25 (Deviation Tests and Directional Surveys) states in part (that) the survey contractor shall file a certified copy of all surveys with the director free of charge within thirty days of completion. Surveys must be submitted as one electronic copy, or in a form approved by the director. However, the director may require the directional survey to be filed immediately after completion if the survey is needed to conduct the operation of the director's office in a timely manner. Certified surveys must be submitted via email in one adobe document, with a certification cover page to [certsurvey@nd.gov](mailto:certsurvey@nd.gov). Survey points shall be of such frequency to accurately determine the entire location of the well bore. Specifically, the Horizontal and Directional well survey frequency is 100 feet in the vertical, 30 feet in the curve (or when sliding) and 90 feet in the lateral.

### **Surface casing cement**

Tail cement utilized on surface casing must have a minimum compressive strength of 500 psi within 12 hours, and tail cement utilized on production casing must have a minimum compressive strength of 500 psi before drilling the plug or initiating tests.

### **Logs**

NDAC Section 43-02-03-31 requires the running of a Cement Bond Log from which the presence of cement can be determined in every well in which production or intermediate casing has been set and a Gamma Ray Log must be run from total depth to ground level elevation of the well bore. All logs must be submitted as one paper copy and one digital copy in LAS (Log ASCII) format, or a format approved by the Director. Image logs that include, but are not limited to, Mud Logs, Cement Bond Logs, and Cyberlook Logs, cannot be produced in their entirety as LAS (Log ASCII) files. To create a solution and establish a standard format for industry to follow when submitting image logs, the Director has given approval for the operator to submit an image log as a TIFF (\*.tif) formatted file. The TIFF (\*.tif) format will be accepted only when the log cannot be produced in its entirety as a LAS (Log ASCII) file format. The digital copy may be submitted on a 3.5" floppy diskette, a standard CD, or attached to an email sent to [digitallogs@nd.gov](mailto:digitallogs@nd.gov).

Thank you for your cooperation.

Sincerely,

David Tabor  
Engineering Technician IV



# APPLICATION FOR PERMIT TO DRILL HORIZONTAL WELL - FORM 1H

INDUSTRIAL COMMISSION OF NORTH DAKOTA  
OIL AND GAS DIVISION  
600 EAST BOULEVARD DEPT 405  
BISMARCK, ND 58505-0840  
SFN 54269 (08-2005)

PLEASE READ INSTRUCTIONS BEFORE FILLING OUT FORM.

PLEASE SUBMIT THE ORIGINAL AND ONE COPY.

Type of Work <b>New Location</b>	Type of Well <b>Oil &amp; Gas</b>	Approximate Date Work Will Start <b>06 / 15 / 2012</b>	Confidential Status <b>No</b>
Operator <b>OASIS PETROLEUM NORTH AMERICA LLC</b>		Telephone Number <b>281-404-9491</b>	
Address <b>1001 Fannin Suite 202</b>		City <b>Houston</b>	State <b>TX</b> Zip Code <b>77002</b>

Notice has been provided to the owner of any permanently occupied dwelling within 1,320 feet.

This well is not located within five hundred feet of an occupied dwelling.

## WELL INFORMATION (If more than one lateral proposed, enter data for additional laterals on page 2)

Well Name <b>ASH FEDERAL</b>				Well Number <b>5300 11-18T</b>			
Surface Footages <b>800 F N L      350 F W L</b>		Qtr-Qtr <b>LOT1</b>	Section <b>18</b>	Township <b>153 N</b>	Range <b>100 W</b>	County <b>McKenzie</b>	
Longstring Casing Point Footages <b>788 F N L      840 F W L</b>		Qtr-Qtr <b>LOT1</b>	Section <b>18</b>	Township <b>153 N</b>	Range <b>100 W</b>	County <b>McKenzie</b>	
Longstring Casing Point Coordinates From Well Head <b>12 N From WH      490 E From WH</b>		Azimuth <b>88.6 °</b>	Longstring Total Depth <b>11090 Feet MD      10805 Feet TVD</b>				
Bottom Hole Footages From Nearest Section Line <b>550 F N L      200 F E L</b>		Qtr-Qtr <b>NENE</b>	Section <b>17</b>	Township <b>153 N</b>	Range <b>100 W</b>	County <b>McKenzie</b>	
Bottom Hole Coordinates From Well Head <b>250 N From WH      9994 E From WH</b>		KOP Lateral 1 <b>10328 Feet MD</b>	Azimuth Lateral 1 <b>89.7 °</b>	Estimated Total Depth Lateral 1 <b>20597 Feet MD      10851 Feet TVD</b>			
Latitude of Well Head <b>48 ° 04 ' 47.25 "</b>	Longitude of Well Head <b>-103 ° 36 ' 09.72 "</b>	NAD Reference <b>NAD83</b>		Description of (Subject to NDIC Approval) <b>SPACING UNIT: Sections 17 &amp;18-T153N-R100W</b>			
Ground Elevation <b>2054 Feet Above S.L.</b>	Acres in Spacing/Drilling Unit <b>1280</b>	Spacing/Drilling Unit Setback Requirement <b>500 Feet N/S      200 Feet E/W</b>		Industrial Commission Order <b>19840</b>			
North Line of Spacing/Drilling Unit <b>10544 Feet</b>	South Line of Spacing/Drilling Unit <b>10489 Feet</b>	East Line of Spacing/Drilling Unit <b>5244 Feet</b>		West Line of Spacing/Drilling Unit <b>5256 Feet</b>			
Objective Horizons <b>Three Forks</b>						Pierre Shale Top <b>2028</b>	
Proposed Surface Casing	Size <b>9 - 5/8 "</b>	Weight <b>36 Lb./Ft.</b>	Depth <b>2130 Feet</b>	Cement Volume <b>638 Sacks</b>	NOTE: Surface hole must be drilled with fresh water and surface casing must be cemented back to surface.		
Proposed Longstring Casing	Size <b>7 - "</b>	Weight(s) <b>29/32 Lb./Ft.</b>	Longstring Total Depth <b>11090 Feet MD      10805 Feet TVD</b>		Cement Volume <b>912 Sacks</b>	Cement Top <b>3929 Feet</b>	Top Dakota Sand <b>5429 Feet</b>
Base Last Charles Salt (If Applicable) <b>9216 Feet</b>		NOTE: Intermediate or longstring casing string must be cemented above the top Dakota Group Sand.					
Proposed Logs <b>Triple Combo:KOP-KibbyGR/Res-BSCGR-SurfCND thru DakotaCBL/GR-TOCGR-Surface</b>							
Drilling Mud Type (Vertical Hole - Below Surface Casing) <b>Invert</b>				Drilling Mud Type (Lateral) <b>Salt Water Gel</b>			
Survey Type in Vertical Portion of Well <b>MWD Every 100 Feet</b>		Survey Frequency: Build Section <b>30 Feet</b>		Survey Frequency: Lateral <b>90 Feet</b>		Survey Contractor <b>Ryan</b>	

NOTE: A Gamma Ray log must be run to ground surface and a CBL must be run on intermediate or longstring casing string if set.

Surveys are required at least every 30 feet in the build section and every 90 feet in the lateral section of a horizontal well. Measurement inaccuracies are not considered when determining compliance with the spacing/drilling unit boundary setback requirement except in the following scenarios: 1) When the angle between the well bore and the respective boundary is 10 degrees or less; or 2) If Industry standard methods and equipment are not utilized. Consult the applicable field order for exceptions.

If measurement inaccuracies are required to be considered, a 2° MWD measurement inaccuracy will be applied to the horizontal portion of the well bore. This measurement inaccuracy is applied to the well bore from KOP to TD.

**REQUIRED ATTACHMENTS:** Certified surveyor's plat, horizontal section plat, estimated geological tops, proposed mud/cementing plan, directional plot/plan, \$100 fee.

See Page 2 for Comments section and signature block.

**COMMENTS, ADDITIONAL INFORMATION, AND/OR LIST OF ATTACHMENTS****Documents forwarded by email: Drill plan with drilling fluids, Well Summary with casing/cement plans, Directional Plan & Plot, Plats**

Lateral 2

KOP Lateral 2 Feet MD	Azimuth Lateral 2 °	Estimated Total Depth Lateral 2 Feet MD      Feet TVD			KOP Coordinates From Well Head From WH      From WH		
Formation Entry Point Coordinates From Well Head From WH		Bottom Hole Coordinates From Well Head From WH			From WH		
KOP Footages From Nearest Section Line F      L		Qtr-Qtr	Section	Township <b>N</b>	Range <b>W</b>	County	
Bottom Hole Footages From Nearest Section Line F      L		Qtr-Qtr	Section	Township <b>N</b>	Range <b>W</b>	County	

Lateral 3

KOP Lateral 3 Feet MD	Azimuth Lateral 3 °	Estimated Total Depth Lateral 3 Feet MD      Feet TVD			KOP Coordinates From Well Head From WH      From WH		
Formation Entry Point Coordinates From Well Head From WH		Bottom Hole Coordinates From Well Head From WH			From WH		
KOP Footages From Nearest Section Line F      L		Qtr-Qtr	Section	Township <b>N</b>	Range <b>W</b>	County	
Bottom Hole Footages From Nearest Section Line F      L		Qtr-Qtr	Section	Township <b>N</b>	Range <b>W</b>	County	

Lateral 4

KOP Lateral 4 Feet MD	Azimuth Lateral 4 °	Estimated Total Depth Lateral 4 Feet MD      Feet TVD			KOP Coordinates From Well Head From WH      From WH		
Formation Entry Point Coordinates From Well Head From WH		Bottom Hole Coordinates From Well Head From WH			From WH		
KOP Footages From Nearest Section Line F      L		Qtr-Qtr	Section	Township <b>N</b>	Range <b>W</b>	County	
Bottom Hole Footages From Nearest Section Line F      L		Qtr-Qtr	Section	Township <b>N</b>	Range <b>W</b>	County	

Lateral 5

KOP Lateral 5 Feet MD	Azimuth Lateral 5 °	Estimated Total Depth Lateral 5 Feet MD      Feet TVD			KOP Coordinates From Well Head From WH      From WH		
Formation Entry Point Coordinates From Well Head From WH		Bottom Hole Coordinates From Well Head From WH			From WH		
KOP Footages From Nearest Section Line F      L		Qtr-Qtr	Section	Township <b>N</b>	Range <b>W</b>	County	
Bottom Hole Footages From Nearest Section Line F      L		Qtr-Qtr	Section	Township <b>N</b>	Range <b>W</b>	County	

I hereby swear or affirm the information provided is true, complete and correct as determined from all available records.

Date

06 / 07 / 2012

ePermit

Printed Name  
**Brandi Terry**

Title

**Regulatory Specialist****FOR STATE USE ONLY**

Permit and File Number <b>23230</b>	API Number <b>33 - 053 - 04211</b>
Field <b>BAKER</b>	
Pool <b>BAKKEN</b>	Permit Type <b>DEVELOPMENT</b>

**FOR STATE USE ONLY**

Date Approved <b>6 / 28 / 2012</b>
By <b>David Tabor</b>
Title <b>Engineering Technician IV</b>



**Oasis Petroleum  
Well Summary  
Ash 5300 11-18T  
Section 18 T153N R100W  
McKenzie County, ND**

**SURFACE CASING AND CEMENT DESIGN**

Size	Interval	Weight	Grade	Coupling	I.D.	Drift	Make-up Torque (ft-lbs)		
							Minimum	Optimum	Max
9-5/8"	0' to 2,130'	36	J-55	LTC	8.921"	8.765"	3400	4530	5660

Interval	Description	Collapse	Burst	Tension	Cost per ft
		(psi) a	(psi) b	(1000 lbs) c	
0' to 2,130'	9-5/8", 36#, J-55, LTC, 8rd	2020 / 2.02	3520 / 3.53	453 / 2.72	

**API Rating & Safety Factor**

- a) Based on full casing evacuation with 9.0 ppg fluid on backside (2150' setting depth).
- b) Burst pressure based on 9 ppg fluid with no fluid on backside (2150' setting depth).
- c) Based on string weight in 9.0 ppg fluid at 2125' TVD plus 100k# overpull.  
(Buoyed weight equals 66k lbs.)

Cement volumes are based on 9-5/8" casing set in 13-1/2" hole with 55% excess to circulate cement back to surface.  
Mix and pump the following slurry.

**Pre-flush (Spacer):      20 bbls** fresh water

**Lead Slurry:**      **413 sks** (234 bbls) Conventional system with 94 lb/sk cement, 4% extender, 2% expanding agent, 2% CaCl<sub>2</sub> and 0.25 lb/sk lost circulation control agent

**Tail Slurry:**      **225 sks** (60 bbls) Conventional system with 94 lb/sk cement, 3% NaCl, and .25 lb/sk lost circulation control agent

**Oasis Petroleum  
Well Summary  
Ash 5300 11-18T  
Section 18 T153N R100W  
McKenzie County, ND**

**INTERMEDIATE CASING AND CEMENT DESIGN**

**Intermediate Casing Design**

<b>Size</b>	<b>Interval</b>	<b>Weight</b>	<b>Grade</b>	<b>Coupling</b>	<b>I.D.</b>	<b>Drift</b>	<b>Make-up Torque (ft-lbs)</b>		
							<b>Minimum</b>	<b>Optimum</b>	<b>Max</b>
7"	0' – 6,600'	29	P-110	LTC	6.184"	6.059"	5,980	7,970	8,770
7"	6,600' – 10,328'	32	HCP-110	LTC	6.094"	6.000***	6,730	8,970	9,870
7"	10,328' – 11,090'	29	P-110	LTC	6.184"	6.059"	5,980	7,970	8,770

\*\*Special Drift

<b>Interval</b>	<b>Length</b>	<b>Description</b>	<b>Collapse</b>	<b>Burst</b>	<b>Tension</b>
			(psi) a	(psi) b	(1000 lbs) c
0' – 6,600'	6,600'	7", 29#, P-110, LTC, 8rd	8530 / 2.41*	11220 / 1.19	797 / 2.08
6,600' – 10,328'	3,728'	7", 32#, HCP-110, LTC, 8rd	11820 / 2.20*	12460 / 1.29	
6,600' – 10,328'	3,728'	7", 32#, HCP-110, LTC, 8rd	11820 / 1.06**	12460 / 1.29	
10,328' – 11,090'	762'	7", 29 lb, P-110, LTC, 8rd	8530 / 1.51*	11220 / 1.15	

**API Rating & Safety Factor**

- a. \*Assume full casing evacuation with 10 ppg fluid on backside. \*\*Assume full casing evacuation with 1.2 psi/ft equivalent fluid gradient across salt intervals.
- b. Burst pressure based on 9,000 psig max press for stimulation plus 10.2 ppg fluid in casing and 9.0 ppg fluid on backside—to 10,805' TVD.
- c. Based on string weight in 10 ppg fluid, (281k lbs buoyed weight) plus 100k lbs overpull.

Cement volumes are estimates based on 7" casing set in an 8-3/4" hole with 30% excess. TOC targeted to 1,500' above Dakota (3,929').

**Pre-flush (Spacer):**      **125 bbls** Saltwater  
**20 sks Pozmix A**  
**10 bbls** Fresh Water

**Lead Slurry:**      **246 sks** (95 bbls) Conventional system with 47 lb/sk cement, 10% NaCl, 34 lb/sk extender, 10% D020 extender, 1% D079 extender, 1% anti-settling agent, 1% fluid loss agent, 0.2% anti-foam agent, 0.6% retarder, and 0.4% dispersant

**Tail Slurry:**      **666 sks** (196 bbls) Conventional system with 94 lb/sk cement, 10% NaCl, 35% Silica, 0.2% fluid loss agent, 0.8% dispersant and 0.3% retarder

**Oasis Petroleum  
Well Summary  
Ash 5300 11-18T  
Section 18 T153N R100W  
McKenzie County, ND**

**PRODUCTION LINER**

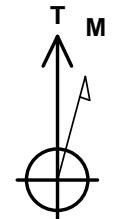
<b>Size</b>	<b>Interval</b>	<b>Weight</b>	<b>Grade</b>	<b>Coupling</b>	<b>I.D.</b>	<b>Drift</b>	<b>Make-up Torque (ft-lbs)</b>		
							<b>Minimum</b>	<b>Optimum</b>	<b>Max</b>
4-1/2"	9,976' to 20,448'	11.6	P-110	BTC	4.000"	3.875"	2,270	3,020	3,780

<b>Interval</b>	<b>Description</b>	<b>Collapse</b>	<b>Burst</b>	<b>Tension</b>	<b>Cost per ft</b>
		(psi) <b>a</b>	(psi) <b>b</b>	(1000 lbs) <b>c</b>	
9,976' to 20,448'	4-1/2", 11.6 lb, P-110, BTC, 8rd	7560 / 1.41	10690 / 1.10	385 / 1.91	

**API Rating & Safety Factor**

- a) Based on full casing evacuation with 9.5 ppg fluid on backside @ 10,851' TVD.
- b) Burst pressure based on 9,000 psi treating pressure with 10.2 ppg internal fluid gradient and 9.0 ppg external fluid gradient @ 10,851' TVD.
- c) Based on string weight in 9.5 ppg fluid (Buoyed weight: 101k lbs.) plus 100k lbs overpull.

DRILLING PLAN								
OPERATOR	Oasis Petroleum 5300 11-18T	COUNTY/STATE	McKenzie Co., ND RIG Nabors B-22					
WELL NAME	Horizontal Upper Three Forks							
WELL TYPE	NNNW 18-153N-100W		Surface Location (survey plat): 800' fnl 350' fwl					
LOCATION			GROUND ELEV: 2053 Finished Pad Elev. Sub Height: 25					
EST. T.D.	20,598'	KB ELEV:	2078					
TOTAL LATERA	9,508'							
PROGNOSIS:	Based on 2,078' KB(est)		LOGS:	Type	Interval			
MARKER	DEPTH (Surf Loc)	DATUM (Surf Loc)	OH Logs: Triple Combo KOP to Kirby (or min run of 1800' whichever is greater); GR/Res to BSC; GR to surf; CND through the Dakota CBL/GR: Above top of cement/GR to base of casing MWD GR: KOP to lateral TD					
Pierre	NDIC MAP	2,028	50'					
Greenhorn		4,615	-2,537'					
Mowry		5,025	-2,947'					
Dakota		5,429	-3,351'					
Rierdon		6,449	-4,371'					
Dunham Salt		6,784	-4,706'					
Dunham Salt Base		6,901	-4,823'					
Spearfish		6,985	-4,907'					
Pine Salt		7,250	-5,172'					
Pine Salt Base		7,297	-5,219'					
Opeche Salt		7,341	-5,263'					
Opeche Salt Base		7,372	-5,294'					
Broom Creek (Top of Minnelusa Gp.)		7,576	-5,498'					
Amsden		7,653	-5,575'					
Tyler		7,823	-5,745'					
Otter (Base of Minnelusa Gp.)		7,994	-5,916'					
Kibby Lime		8,368	-6,290'					
Charles Salt		8,516	-6,438'					
UB		9,140	-7,062'					
Base Last Salt		9,216	-7,138'					
Ratcliffe		9,262	-7,184'					
Mission Cyn		9,440	-7,362'					
Lodgepole		9,993	-7,915'					
Lodgepole Fracture Zone		10,209	-8,131'					
False Bakken		10,697	-8,619'					
Upper Bakken		10,706	-8,628'					
Middle Bakken		10,720	-8,642'					
Lower Bakken		10,766	-8,688'					
Three Forks		10,785	-8,707'					
Three Forks Target		10,805	-8,727'					
Base Target/Claystone		10,817	-8,739'					
Dip Rate:	<b>-0.28° or 0.50' drop in TVD per 100' drilled</b>							
Max. Anticipated BHP:	4687		Surface Formation: Glacial till					
MUD:	Interval	Type	WT	Vis	WL	Remarks		
Surface:	0' -	2,130' FW/Gel - Lime Sweeps	8.4-9.0	28-32	NC	Circ Mud Tanks		
Intermediate:	2,130' -	11,090' Invert	9.5-10.4	40-50	30+HtHp	Circ Mud Tanks		
Lateral:	11,090' -	20,598' Salt Water	9.8-10.2	28-32	NC	Circ Mud Tanks		
CASING:	Size	Wt ppf	Hole	Depth	Cement	WOC	Remarks	
Surface:	9-5/8"	36#	13-1/2"	2,130'	To Surface	12	100' into Pierre	
Intermediate:	7"	29/32#	8-3/4"	11,090'	3,929'	24	1500' above Dakota	
Production Liner:	4.5"	11.6#	6"	20,598'	<b>TOL @ 10,278'</b>		50' above KOP	
<b>PROBABLE PLUGS, IF REQ'D:</b>								
OTHER:	MD	TVD	FNL/FSL	FEL/FWL	S-T-R	AZI		
Surface:	2,130	2,130	800' FNL	350' FWL	Sec 18 T153N-R100W	Survey Company:		
KOP:	10,328'	10,328'	800' FNL	350' FWL	Sec 18 T153N-R100W	Build Rate:	<b>12 deg /100'</b>	
EOC:	11,075'	10,805'	788' FNL	825' FWL	Sec 18 T153N-R100W	88.6		
Casing Point:	11,090'	10,805'	788' FNL	840' FWL	Sec 18 T153N-R100W	88.6		
Middle Bakken Lateral TD:	20,598'	10,851'	550' FNL	200' FEL	Sec 17 T153N-R100W	88.6		
<b>Comments:</b>								
<b>Request Sundry for Open Hole Log Waiver</b>								
<b>Exception well:</b> Kline 5300 11-18H (33-053-03426); 153N/100W/S18; located 190' S and 45' W of Ash Surface location								
36 Stage Plug and Perf A frac string will be utilized on this well								
								
Geology: B. Gates 5/31/2012				Engineering: M. Brown 6/6/2012				

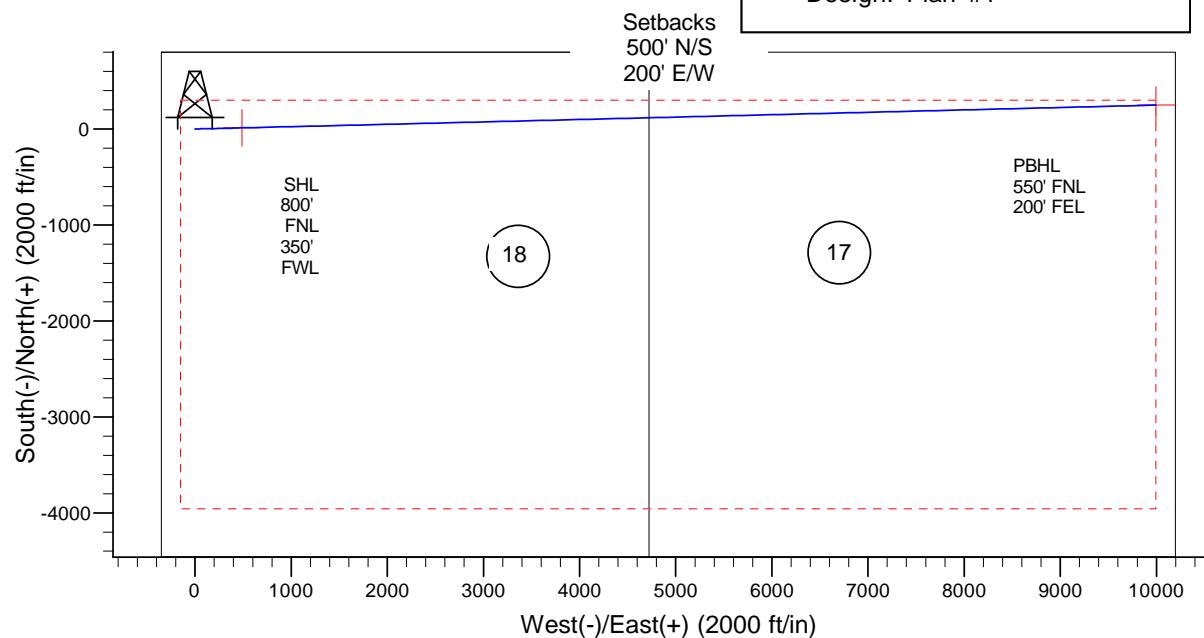


Azimuths to True North  
Magnetic North: 8.47°

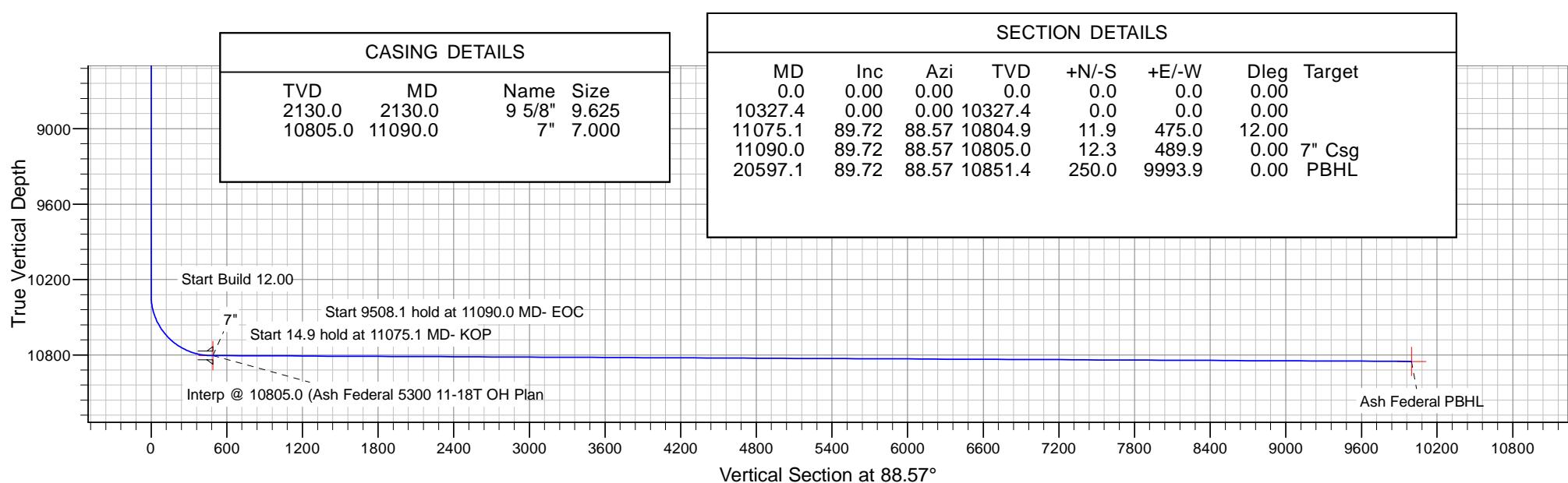
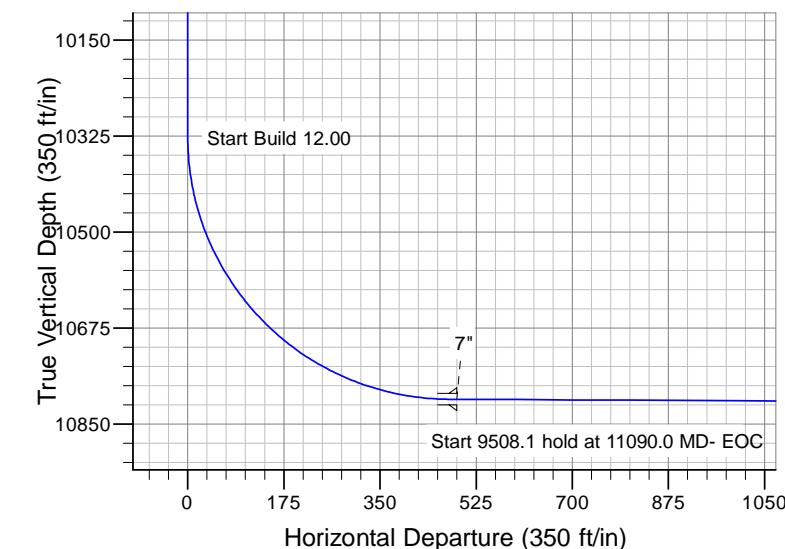
Magnetic Field  
Strength: 56673.3snT  
Dip Angle: 73.07°  
Date: 6/6/2012  
Model: IGRF200510



Project: Indian Hills  
Site: 153N-100W-18/17  
Well: Ash Federal 5300 11-18T  
Wellbore: OH  
Design: Plan #1



SITE DETAILS: 153N-100W-18/17	
Site Centre Latitude:	48° 4' 47.250 N
Longitude:	103° 36' 9.720 W
Positional Uncertainty:	0.0
Convergence:	-2.31
Local North:	True



# **Oasis**

**Indian Hills  
153N-100W-18/17  
Ash Federal 5300 11-18T**

**OH**

**Plan: Plan #1**

# **Standard Planning Report**

**28 June, 2012**

## Planning Report

<b>Database:</b>	OpenWellsCompass - EDM Prod	<b>Local Co-ordinate Reference:</b>	Well Ash Federal 5300 11-18T
<b>Company:</b>	Oasis	<b>TVD Reference:</b>	WELL @ 2078.0ft (Original Well Elev)
<b>Project:</b>	Indian Hills	<b>MD Reference:</b>	WELL @ 2078.0ft (Original Well Elev)
<b>Site:</b>	153N-100W-18/17	<b>North Reference:</b>	True
<b>Well:</b>	Ash Federal 5300 11-18T	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	OH		
<b>Design:</b>	Plan #1		

<b>Project</b>	Indian Hills		
<b>Map System:</b>	US State Plane 1983	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	North American Datum 1983		
<b>Map Zone:</b>	North Dakota Northern Zone		

<b>Site</b>	153N-100W-18/17			
<b>Site Position:</b>		<b>Northing:</b>	124,709.16 m	<b>Latitude:</b>
<b>From:</b>	Lat/Long	<b>Easting:</b>	368,894.57 m	<b>Longitude:</b>
<b>Position Uncertainty:</b>	0.0 ft	<b>Slot Radius:</b>	13.200 in	<b>Grid Convergence:</b>

<b>Well</b>	Ash Federal 5300 11-18T				
<b>Well Position</b>	+N/-S +E/-W	0.0 ft 0.0 ft	<b>Northing:</b> <b>Easting:</b>	124,709.16 m 368,894.57 m	<b>Latitude:</b> <b>Longitude:</b>
<b>Position Uncertainty</b>			<b>Wellhead Elevation:</b>		<b>Ground Level:</b>

<b>Wellbore</b>	OH				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination</b> (°)	<b>Dip Angle</b> (°)	<b>Field Strength</b> (nT)
	IGRF200510	6/6/2012	8.47	73.07	56,673

<b>Design</b>	Plan #1			
<b>Audit Notes:</b>				
<b>Version:</b>		<b>Phase:</b>	PROTOTYPE	<b>Tie On Depth:</b>
<b>Vertical Section:</b>		<b>Depth From (TVD)</b> (ft)	<b>+N/-S</b> (ft)	<b>+E/-W</b> (ft)
		0.0	0.0	0.0

Plan Sections										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00
10,327.4	0.00	0.00	10,327.4	0.0	0.0	0.00	0.00	0.00	0.00	0.00
11,075.1	89.72	88.57	10,804.9	11.9	475.0	12.00	12.00	0.00	88.57	
11,090.0	89.72	88.57	10,805.0	12.3	489.9	0.00	0.00	0.00	0.00	Interp @ 10805.0 (As
20,597.1	89.72	88.57	10,851.4	250.0	9,993.9	0.00	0.00	0.00	0.00	Ash Federal PBHL

## Planning Report

<b>Database:</b>	OpenWellsCompass - EDM Prod	<b>Local Co-ordinate Reference:</b>	Well Ash Federal 5300 11-18T
<b>Company:</b>	Oasis	<b>TVD Reference:</b>	WELL @ 2078.0ft (Original Well Elev)
<b>Project:</b>	Indian Hills	<b>MD Reference:</b>	WELL @ 2078.0ft (Original Well Elev)
<b>Site:</b>	153N-100W-18/17	<b>North Reference:</b>	True
<b>Well:</b>	Ash Federal 5300 11-18T	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	OH		
<b>Design:</b>	Plan #1		

Planned Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00	
2,028.0	0.00	0.00	2,028.0	0.0	0.0	0.0	0.00	0.00	0.00	
<b>Pierre</b>										
2,130.0	0.00	0.00	2,130.0	0.0	0.0	0.0	0.00	0.00	0.00	
<b>9 5/8"</b>										
4,615.0	0.00	0.00	4,615.0	0.0	0.0	0.0	0.00	0.00	0.00	
<b>Greenhorn</b>										
5,025.0	0.00	0.00	5,025.0	0.0	0.0	0.0	0.00	0.00	0.00	
<b>Mowry</b>										
5,429.0	0.00	0.00	5,429.0	0.0	0.0	0.0	0.00	0.00	0.00	
<b>Dakota</b>										
6,449.0	0.00	0.00	6,449.0	0.0	0.0	0.0	0.00	0.00	0.00	
<b>Rierdon</b>										
6,784.0	0.00	0.00	6,784.0	0.0	0.0	0.0	0.00	0.00	0.00	
<b>Dunham Salt</b>										
6,901.0	0.00	0.00	6,901.0	0.0	0.0	0.0	0.00	0.00	0.00	
<b>Dunham Salt Base</b>										
6,985.0	0.00	0.00	6,985.0	0.0	0.0	0.0	0.00	0.00	0.00	
<b>Spearfish</b>										
7,250.0	0.00	0.00	7,250.0	0.0	0.0	0.0	0.00	0.00	0.00	
<b>Pine Salt</b>										
7,297.0	0.00	0.00	7,297.0	0.0	0.0	0.0	0.00	0.00	0.00	
<b>Pine Salt Base</b>										
7,341.0	0.00	0.00	7,341.0	0.0	0.0	0.0	0.00	0.00	0.00	
<b>Opeche Salt</b>										
7,372.0	0.00	0.00	7,372.0	0.0	0.0	0.0	0.00	0.00	0.00	
<b>Opeche Salt Base</b>										
7,576.0	0.00	0.00	7,576.0	0.0	0.0	0.0	0.00	0.00	0.00	
<b>Broom Creek (Top of Minnelusa Gp.)</b>										
7,653.0	0.00	0.00	7,653.0	0.0	0.0	0.0	0.00	0.00	0.00	
<b>Amsden</b>										
7,823.0	0.00	0.00	7,823.0	0.0	0.0	0.0	0.00	0.00	0.00	
<b>Tyler</b>										
7,994.0	0.00	0.00	7,994.0	0.0	0.0	0.0	0.00	0.00	0.00	
<b>Otter (Base of Minnelusa Gp.)</b>										
8,368.0	0.00	0.00	8,368.0	0.0	0.0	0.0	0.00	0.00	0.00	
<b>Kibby Lime</b>										
8,516.0	0.00	0.00	8,516.0	0.0	0.0	0.0	0.00	0.00	0.00	
<b>Charles Salt</b>										
9,140.0	0.00	0.00	9,140.0	0.0	0.0	0.0	0.00	0.00	0.00	
<b>UB</b>										
9,216.0	0.00	0.00	9,216.0	0.0	0.0	0.0	0.00	0.00	0.00	
<b>Base Last Salt</b>										
9,262.0	0.00	0.00	9,262.0	0.0	0.0	0.0	0.00	0.00	0.00	
<b>Ratcliffe</b>										
9,440.0	0.00	0.00	9,440.0	0.0	0.0	0.0	0.00	0.00	0.00	
<b>Mission Cyn</b>										
9,993.0	0.00	0.00	9,993.0	0.0	0.0	0.0	0.00	0.00	0.00	
<b>Lodgepole</b>										
10,209.0	0.00	0.00	10,209.0	0.0	0.0	0.0	0.00	0.00	0.00	
<b>Lodgepole Fracture Zone</b>										

## Planning Report

<b>Database:</b> <b>Company:</b> <b>Project:</b> <b>Site:</b> <b>Well:</b> <b>Wellbore:</b> <b>Design:</b>	OpenWellsCompass - EDM Prod Oasis Indian Hills 153N-100W-18/17 Ash Federal 5300 11-18T OH Plan #1	<b>Local Co-ordinate Reference:</b> <b>TVD Reference:</b> <b>MD Reference:</b> <b>North Reference:</b> <b>Survey Calculation Method:</b>	Well Ash Federal 5300 11-18T WELL @ 2078.0ft (Original Well Elev) WELL @ 2078.0ft (Original Well Elev) True Minimum Curvature
--	---	--	---

Planned Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
10,327.4	0.00	0.00	10,327.4	0.0	0.0	0.0	0.00	0.00	0.00	
<b>Start Build 12.00</b>										
10,750.1	50.71	88.57	10,697.0	4.4	175.1	175.1	12.00	12.00	0.00	
<b>False Bakken</b>										
10,764.5	52.45	88.57	10,706.0	4.7	186.4	186.5	12.00	12.00	0.00	
<b>Upper Bakken</b>										
10,788.3	55.30	88.57	10,720.0	5.1	205.6	205.7	12.00	12.00	0.00	
<b>Middle Bakken</b>										
10,883.4	66.71	88.57	10,766.0	7.2	288.6	288.7	12.00	12.00	0.00	
<b>Lower Bakken</b>										
10,939.1	73.40	88.57	10,785.0	8.5	340.9	341.0	12.00	12.00	0.00	
<b>Three Forks</b>										
11,075.1	89.72	88.57	10,804.9	11.9	475.0	475.1	12.00	12.00	0.00	
<b>Start 14.9 hold at 11075.1 MD- KOP</b>										
11,090.0	89.72	88.57	10,805.0	12.3	489.9	490.0	0.00	0.00	0.00	
<b>Start 9508.1 hold at 11090.0 MD- EOC - 7"</b>										
11,094.9	89.72	88.57	10,805.0	12.4	494.8	494.9	0.00	0.00	0.00	
<b>Three Forks Target</b>										
20,597.1	89.72	88.57	10,851.4	250.0	9,993.9	9,997.0	0.00	0.00	0.00	

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (m)	Easting (m)	Latitude	Longitude
- hit/miss target	0.00	0.00	10,805.0	12.3	489.9	124,706.88	369,043.91	48° 4' 47.371 N	103° 36' 2.505 W
- Shape									
Interp @ 10805.0 (Ash F									
- plan hits target center									
- Point									
Ash Federal PBHL	0.00	0.00	10,851.4	250.0	9,993.9	124,662.58	371,941.30	48° 4' 49.691 N	103° 33' 42.533 W
- plan hits target center									
- Point									

Casing Points						
Measured Depth (ft)	Vertical Depth (ft)	Name			Casing Diameter (in)	Hole Diameter (in)
2,130.0	2,130.0 9 5/8"				9.625	13.500
11,090.0	10,805.0 7"				7.000	8.750

## Planning Report

<b>Database:</b>	OpenWellsCompass - EDM Prod	<b>Local Co-ordinate Reference:</b>	Well Ash Federal 5300 11-18T
<b>Company:</b>	Oasis	<b>TVD Reference:</b>	WELL @ 2078.0ft (Original Well Elev)
<b>Project:</b>	Indian Hills	<b>MD Reference:</b>	WELL @ 2078.0ft (Original Well Elev)
<b>Site:</b>	153N-100W-18/17	<b>North Reference:</b>	True
<b>Well:</b>	Ash Federal 5300 11-18T	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	OH		
<b>Design:</b>	Plan #1		

Formations						
Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)	
2,028.0	-50.0	Pierre				
4,615.0	2,537.0	Greenhorn				
5,025.0	2,947.0	Mowry				
5,429.0	3,351.0	Dakota				
6,449.0	4,371.0	Rierdon				
6,784.0	4,706.0	Dunham Salt				
6,901.0	4,823.0	Dunham Salt Base				
6,985.0	4,907.0	Spearfish				
7,250.0	5,172.0	Pine Salt				
7,297.0	5,219.0	Pine Salt Base				
7,341.0	5,263.0	Opeche Salt				
7,372.0	5,294.0	Opeche Salt Base				
7,576.0	5,498.0	Broom Creek (Top of Minnelusa Gp.)				
7,653.0	5,575.0	Amsden				
7,823.0	5,745.0	Tyler				
7,994.0	5,916.0	Otter (Base of Minnelusa Gp.)				
8,368.0	6,290.0	Kibby Lime				
8,516.0	6,438.0	Charles Salt				
9,140.0	7,062.0	UB				
9,216.0	7,138.0	Base Last Salt				
9,262.0	7,184.0	Ratcliffe				
9,440.0	7,362.0	Mission Cyn				
9,993.0	7,915.0	Lodgepole				
10,209.0	8,131.0	Lodgepole Fracture Zone				
10,750.1	8,619.0	False Bakken				
10,764.5	8,628.0	Upper Bakken				
10,788.3	8,642.0	Middle Bakken				
10,883.4	8,688.0	Lower Bakken				
10,939.1	8,707.0	Three Forks				
11,094.9	8,727.0	Three Forks Target				

Plan Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N-S (ft)	+E-W (ft)	Comment	
10,327.4	10,327.4	0.0	0.0	Start Build 12.00	
11,075.1	10,804.9	11.9	475.0	Start 14.9 hold at 11075.1 MD- KOP	
11,090.0	10,805.0	12.3	489.9	Start 9508.1 hold at 11090.0 MD- EOC	
20,598.1				TD at 20598.1	

## SECTION BREAKDOWN

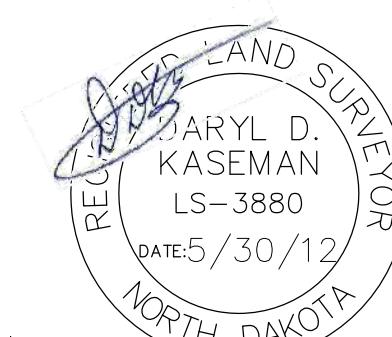
OASIS PETROLEUM NORTH AMERICA, LLC

ANNIN, SUITE 1500, HOUSTON, TX 770

"ASH FEDERAL 5300 11-18T"

800 FEET FROM NORTH LINE AND 350 FEET FROM WEST LINE  
SECTIONS 17 & 18, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA

THIS DOCUMENT WAS ORIGINALLY  
ISSUED AND SEALED BY DARYL D.  
KASEMAN, PLS, REGISTRATION NUMBER  
3880 ON 5/30/12 AND THE  
ORIGINAL DOCUMENTS ARE STORED AT  
THE OFFICES OF INTERSTATE  
ENGINEERING, INC.



ALL AZIMUTHS ARE BASED ON G.P.S. OBSERVATIONS. THE ORIGINAL SURVEY OF THIS AREA FOR THE GENERAL LAND OFFICE (G.L.O.) WAS 1891. THE CORNERS FOUND ARE AS INDICATED AND ALL OTHERS ARE COMPUTED FROM THOSE CORNERS FOUND AND BASED ON G.L.O. DATA. THE MAPPING ANGLE FOR THIS AREA IS APPROXIMATELY 0°03'.

 — MONUMENT — RECOVERED  
 — MONUMENT — NOT RECOVERED



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SHEET NO

QC-2020-EST-0001-Dates Performed: 01/15/2015 - 01/17/2015 Revision: 0001 Date Issued: 01/15/2015 Review Due Date: 01/15/2016

OASIS PETROLEUM NORTH AMERICA, LLC	
SECTION BREAKDOWN	
SECTIONS 17 & 18, T153N, R100W	
MKENZIE COUNTY, NORTH DAKOTA	
Drawn By:	B.H.H.
Checked By:	D.D.K.
Project No.:	S12-099-145
Date:	MAY 2012

**Interstate Engineering, Inc.**  
P.O. Box 648  
425 East Main Street  
Sidney, Montana 59270  
Ph (406) 433-5617  
Fax (406) 433-5618  
[www.leigl.com](http://www.leigl.com)

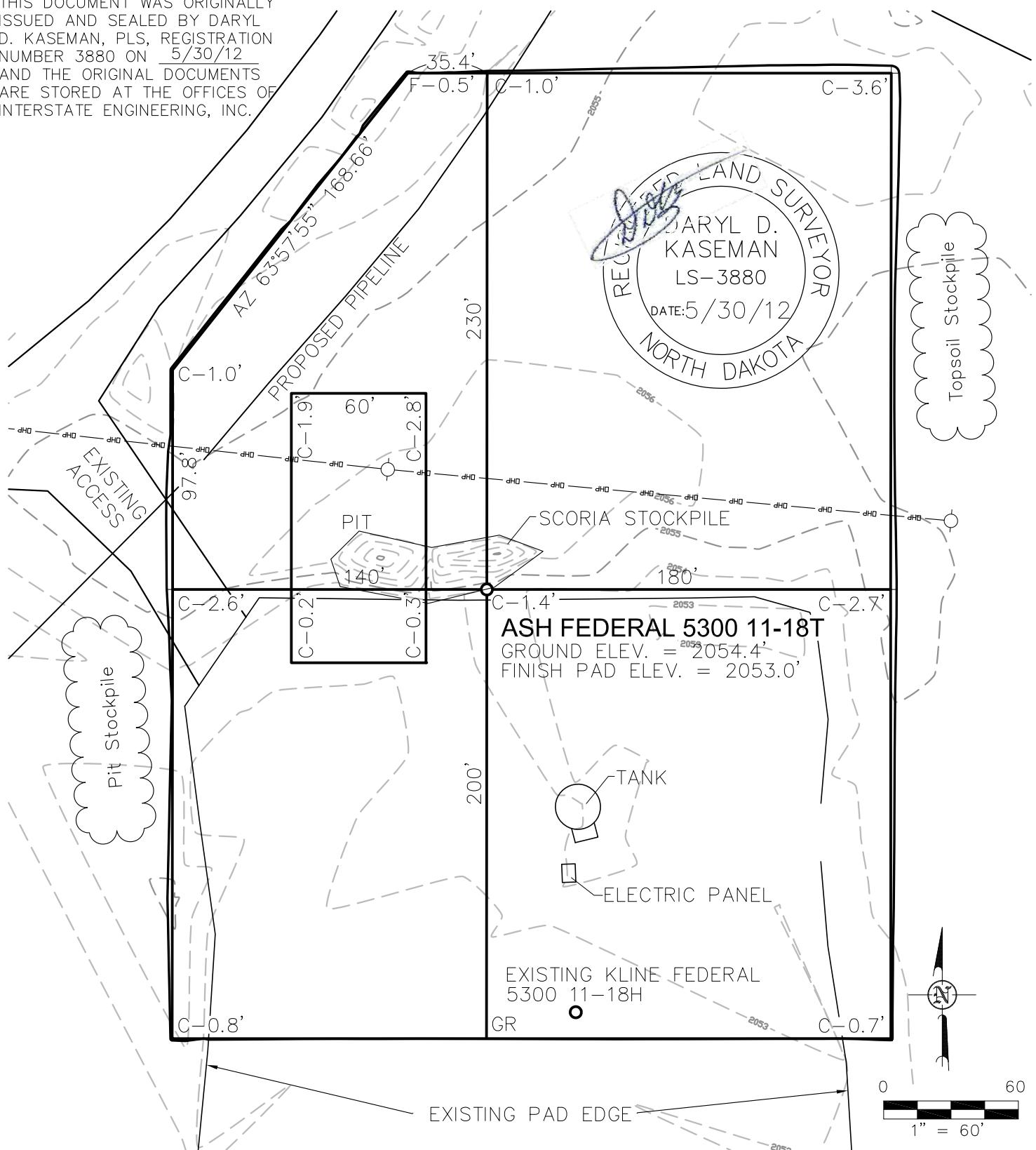
Other offices in Minnesota, North Dakota and South Dakota

## PAD LAYOUT

OASIS PETROLEUM NORTH AMERICA, LLC  
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002  
"ASH FEDERAL 5300 11-18T"

THIS DOCUMENT WAS ORIGINALLY  
ISSUED AND SEALED BY DARYL  
D. KASEMAN, PLS, REGISTRATION  
NUMBER 3880 ON 5/30/12  
AND THE ORIGINAL DOCUMENTS  
ARE STORED AT THE OFFICES OF  
INTERSTATE ENGINEERING, INC.

800 FEET FROM NORTH LINE AND 350 FEET FROM WEST LINE  
SECTION 18, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA



NOTE: All utilities shown are preliminary only, a complete utilities location is recommended before construction.

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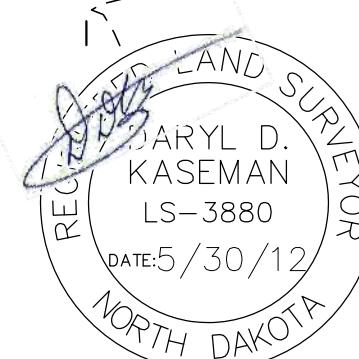
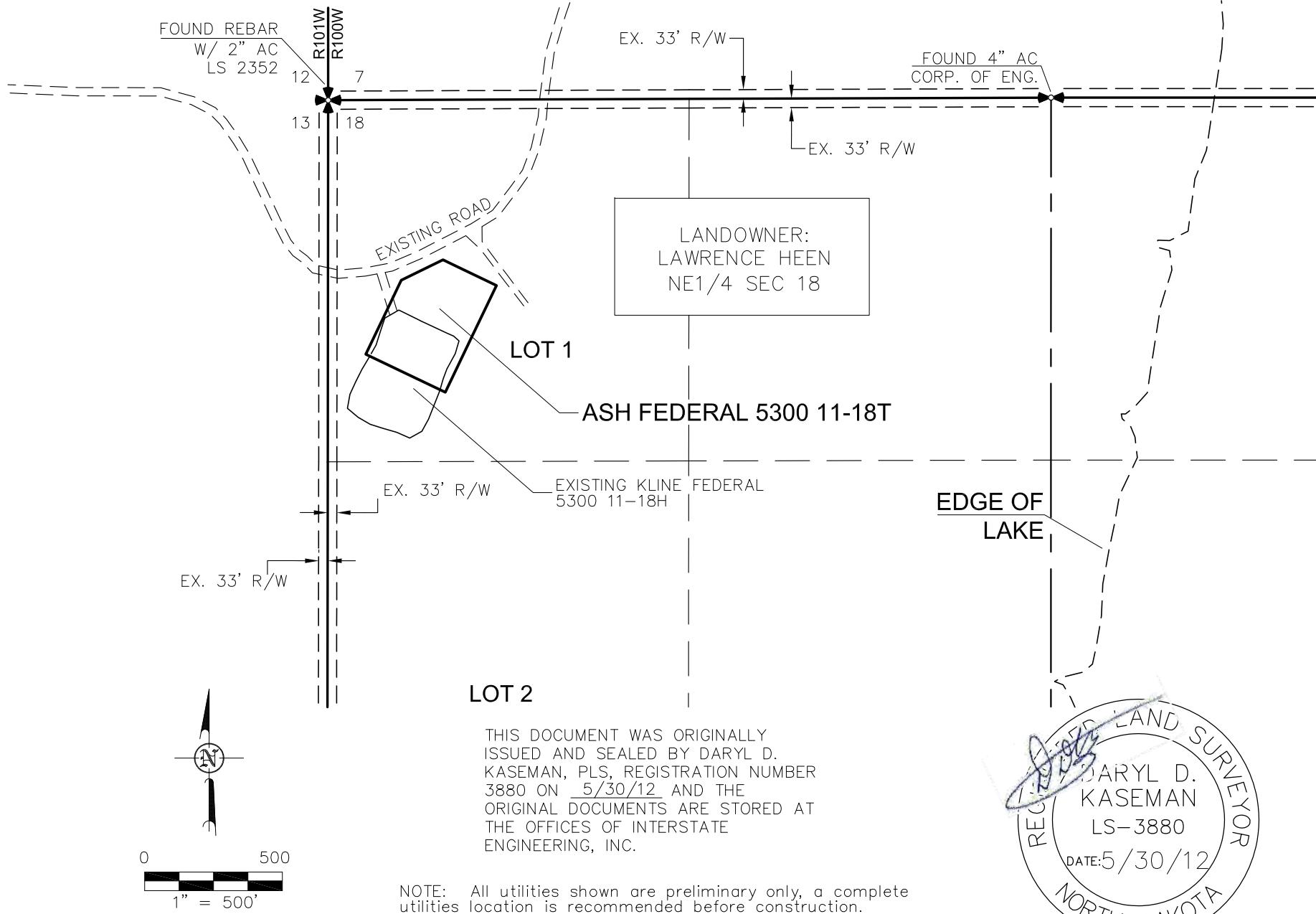
**Interstate Engineering, Inc.**  
P.O. Box 648  
425 East Main Street  
Sidney, Montana 59270  
Ph (406) 433-5617  
Fax (406) 433-5618  
[www.lengl.com](http://www.lengl.com)  
offices in Minnesota, North Dakota and South

<p><b>Interstate Engineering, Inc.</b>            P.O. Box 648            425 East Main Street            Sidney, Montana 59270            Ph (406) 433-5617            Fax (406) 433-5618  <a href="http://www.lengl.com">www.lengl.com</a></p> <p>Other offices in Minnesota, North Dakota and South Dakota</p>	<p><b>OASIS PETROLEUM NORTH AMERICA, LLC</b>  <b>PAD LAYOUT</b>  <b>SECTION 18, T153N, R100W</b></p> <p><b>MCKENZIE COUNTY, NORTH DAKOTA</b></p> <hr/> <table border="0"> <tr> <td>Drawn By:</td> <td>B.I.H.J.</td> <td>Project No.:</td> <td>S12-09-145</td> </tr> <tr> <td>Checked By:</td> <td>D.D.K.</td> <td>Date:</td> <td>MAY 2012</td> </tr> </table>	Drawn By:	B.I.H.J.	Project No.:	S12-09-145	Checked By:	D.D.K.	Date:	MAY 2012
Drawn By:	B.I.H.J.	Project No.:	S12-09-145						
Checked By:	D.D.K.	Date:	MAY 2012						

# ACCESS APPROACH

OASIS PETROLEUM NORTH AMERICA, LLC  
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002  
"ASH FEDERAL 5300 11-18T"

800 FEET FROM NORTH LINE AND 350 FEET FROM WEST LINE  
SECTION 18, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA



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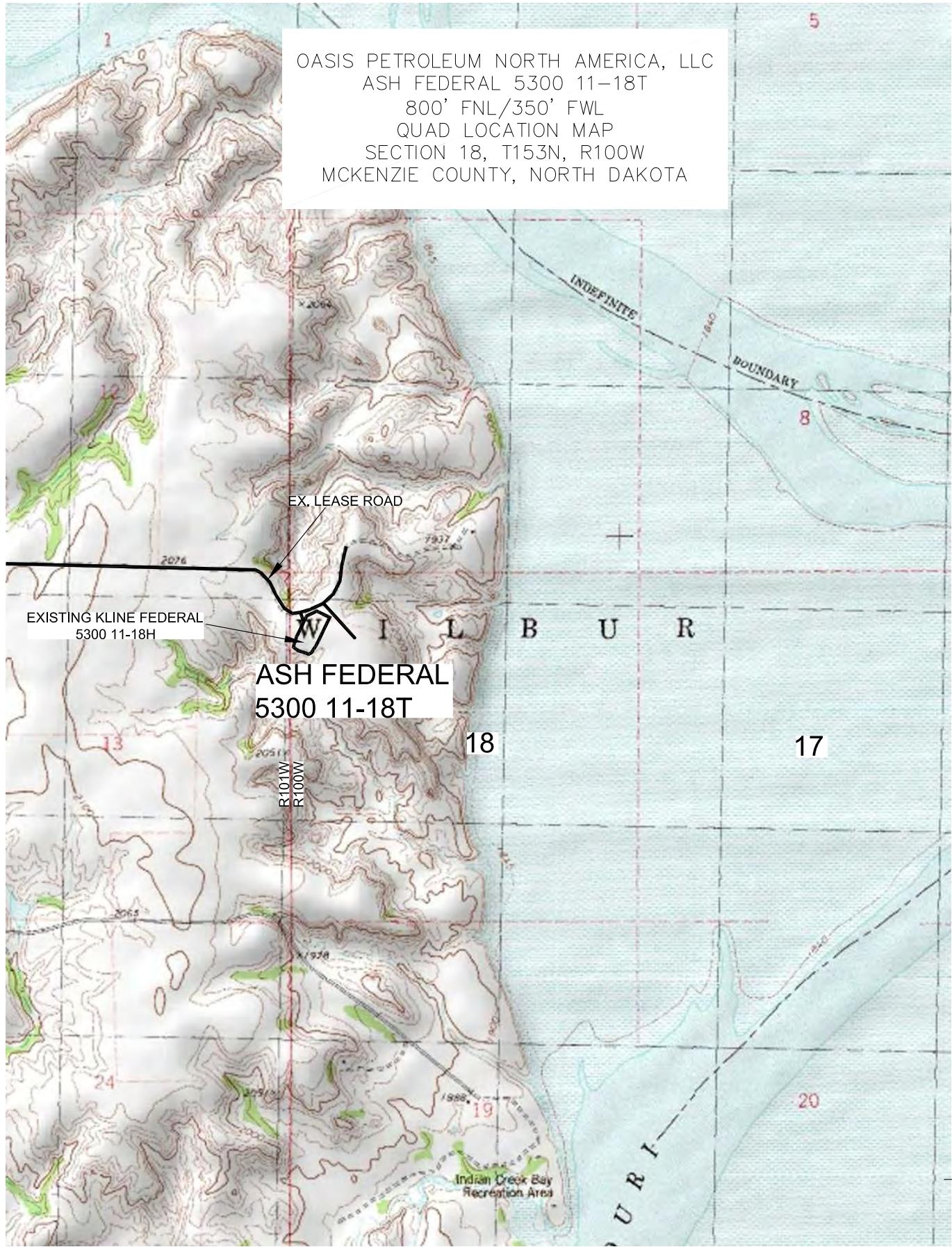


4/8

Other offices in Minnesota, North Dakota and South Dakota

Interstate Engineering, Inc.  
P.O. Box 6468  
425 East Main Street  
Sidney, Montana 59270  
Ph. (406) 433-5617  
Fax (406) 433-5618  
[www.lendi.com](http://www.lendi.com)

OASIS PETROLEUM NORTH AMERICA, LLC  
ACCESS APPROACH  
SECTION 18, T153N, R100W  
MCKENZIE COUNTY, NORTH DAKOTA  
Drawn By: B.H.H. Project No.: SI1209-145  
Checked By: D.D.K. Date: MAY 2012



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SHEET NO.

Interstate Engineering, Inc.  
 P.O. Box 648  
 Sidney, Montana 59270  
 Ph (406) 433-5617  
 Fax (406) 433-5618  
[www.ienj.com](http://www.ienj.com)  
Other offices in Minnesota, North Dakota and South Dakota

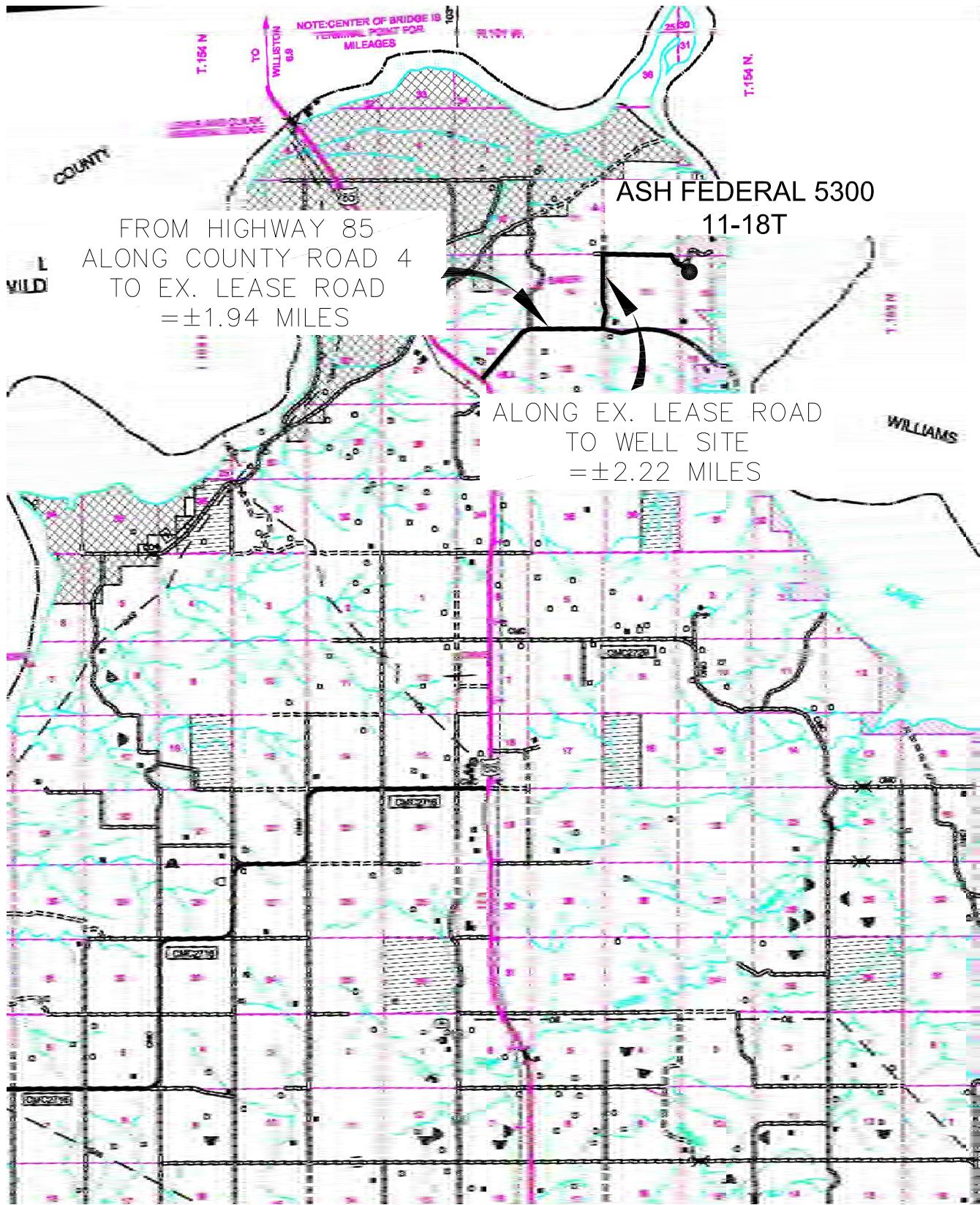
OASIS PETROLEUM NORTH AMERICA, LLC  
 QUAD LOCATION MAP  
 SECTION 18, T153N, R100W

MCKENZIE COUNTY, NORTH DAKOTA

Drawn By:	B.H.H.	Project No.:	S1209145
Checked By:	D.D.K.	Date:	MAY 2012

Revision No.	Date	By	Description
--------------	------	----	-------------

**COUNTY ROAD MAP**  
 OASIS PETROLEUM NORTH AMERICA, LLC  
 1001 FANNIN, SUITE 1500, HOUSTON, TX 77002  
 "ASH FEDERAL 5300 11-18T"  
 800 FEET FROM NORTH LINE AND 350 FEET FROM WEST LINE  
 SECTION 18, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA



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SCALE: 1" = 2 MILE

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P.O. Box 648  
425 East Main Street  
Sidney, Montana 59270  
Ph (406) 433-5617  
Fax (406) 433-5618  
[www.lengl.com](http://www.lengl.com)  
Other offices in Minnesota, North Dakota and South Dakota

OASIS PETROLEUM NORTH AMERICA, LLC  
COUNTY ROAD MAP  
SECTION 18, T153N, R100W  
MCKENZIE COUNTY, NORTH DAKOTA  
Drawn By: B.H.H. Project No.: S12-09-145  
Checked By: D.D.K. Date: MAY 2012

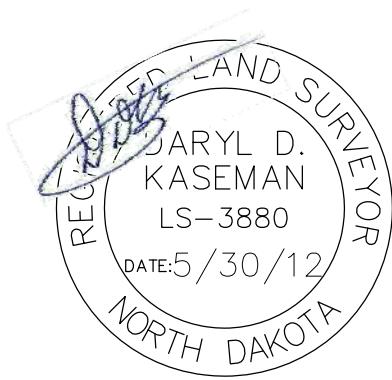
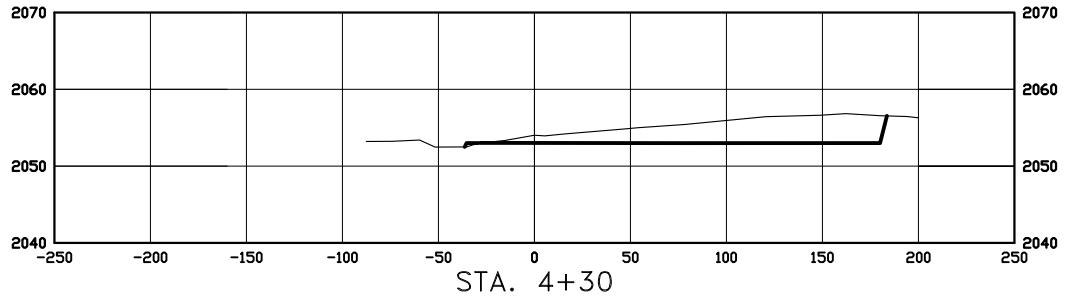
Revision No.	Date	By	Description

## CROSS SECTIONS

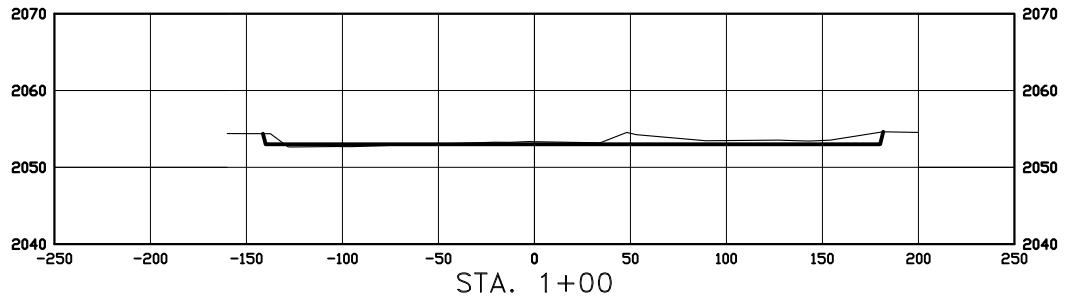
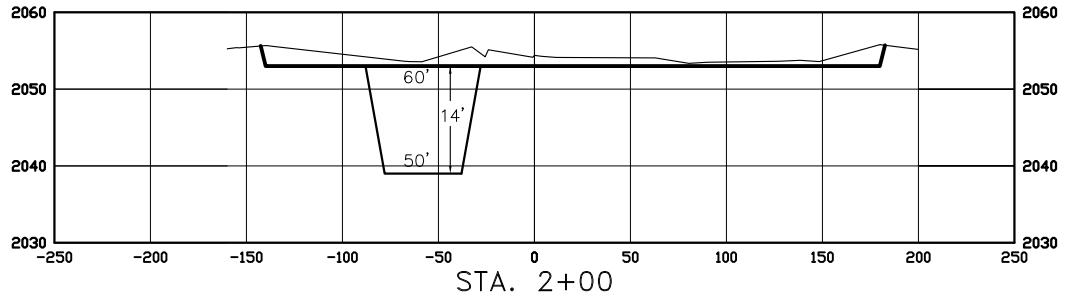
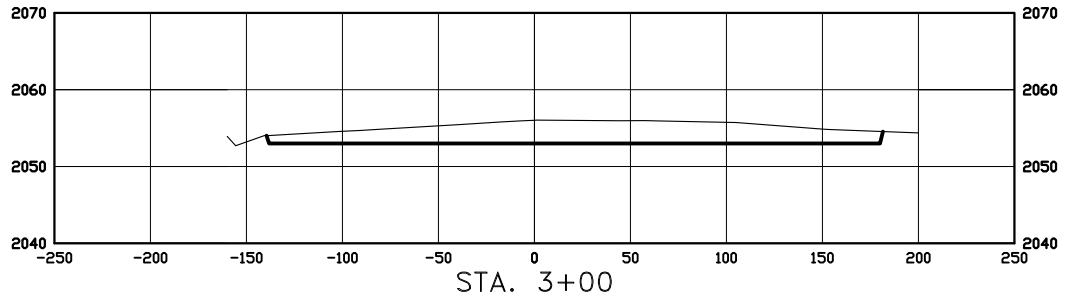
OASIS PETROLEUM NORTH AMERICA, LLC  
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002  
"ASL FEDERAL 5000-11-1ST"

"ASH FEDERAL 5300 11-18T"

800 FEET FROM NORTH LINE AND 350 FEET FROM WEST LINE  
SECTION 18, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA



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SCALE  
HORIZ 1" = 100'  
VERT 1" = 25'

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Interstate Engineering, Inc.  
P.O. Box 648  
425 East Main Street  
Sidney, Montana 59270  
Ph (406) 433-5617  
Fax (406) 433-5618  
[www.iengi.com](http://www.iengi.com)

OASIS PETROLEUM NORTH AMERICA, LLC  
PAD CROSS SECTIONS  
SECTION 18, T153N, R100W

**MCKENZIE COUNTY, NORTH DAKOTA**

Revision No.	Date	By	Description

**WELL LOCATION SITE QUANTITIES**  
 OASIS PETROLEUM NORTH AMERICA, LLC  
 1001 FANNIN, SUITE 1500, HOUSTON, TX 77002  
 "ASH FEDERAL 5300 11-18T"  
 800 FEET FROM NORTH LINE AND 350 FEET FROM WEST LINE  
 SECTION 18, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA

WELL SITE ELEVATION	2054.4
WELL PAD ELEVATION	2053.0

EXCAVATION	6,996
PLUS PIT	<u>3,150</u>
	<u>10,146</u>

EMBANKMENT	118
PLUS SHRINKAGE (30%)	<u>35</u>
	<u>153</u>

STOCKPILE PIT	3,150
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STOCKPILE TOP SOIL (6")	2,457
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STOCKPILE MATERIAL	4,386
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DISTURBED AREA FROM PAD	3.05 ACRES
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NOTE: ALL QUANTITIES ARE IN CUBIC YARDS (UNLESS NOTED)

CUT END SLOPES AT 1:1

FILL END SLOPES AT 1.5:1

**WELL SITE LOCATION**

800' FNL

350' FWL

