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)

Received
FEB 12 2016
ND Oil & Gas

Well File No. **28303**

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

- [ ] Notice of Intent — Approximate Start Date
- [x] Report of Work Done — Date Work Completed: **August 23, 2015**
- [ ] 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

- [ ] Drilling Prognosis
- [ ] Spill Report
- [ ] Redrilling or Repair
- [ ] Shooting
- [ ] Casing or Liner
- [ ] Acidizing
- [ ] Plug Well
- [ ] Fracture Treatment
- [ ] Supplemental History
- [x] Change Production Method
- [ ] Temporarily Abandon
- [ ] Reclamation
- [ ] Other **Well is now on pump**

Well Name and Number					
Wade Federal 5300 31-30 11T					
Footages	Qtr-Qtr	Section	Township	Range	
1955 F S L 350 F W L	**LOT3**	**30**	**153 N**	**100 W**	
Field	Pool	County			
Baker	**Bakken**	**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

DETAILS OF WORK

Effective 08/23/2015 the above referenced well is on pump.

End of Tubing: 2-7/8" L-80 tubing @ 10105'

Pump: ESP @ 9873'

Company		Telephone Number
Oasis Petroleum North America LLC		**281-404-9436**
Address		
1001 Fannin, Suite 1500		
City	State	Zip Code
Houston	**TX**	**77002**
Signature	Printed Name	
	Jennifer Swenson	
Title	Date	
Regulatory Specialist	**February 11, 2016**	
Email Address		
jswenson@oasispetroleum.com		

FOR STATE USE ONLY

- [x] Received
- [ ] Approved

Date: 3-3-2016

By: Taylor Roth

Title: TAYLOR ROTH
Engineering Technician

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)

RECEIVED SEP 2015 ND OIL & GAS DIVISION

Well File No.
28303
NDIC CTB No.
To be assigned

PLEASE READ INSTRUCTIONS BEFORE FILLING OUT FORM.
PLEASE SUBMIT THE ORIGINAL AND FOUR COPIES.

Well Name and Number	Qtr-Qtr	Section	Township	Range	County
WADE FEDERAL 5300 31-30 11T	LOT3	30	153	100	Mckenzie

Operator	Telephone Number	Field
Oasis Petroleum North America LLC	(281) 404-9573	BAKER

Address	City	State	Zip Code
1001 Fannin, Suite 1500	Houston	TX	77002

Name of First Purchaser	Telephone Number	% Purchased	Date Effective
Oasis Petroleum Marketing LLC	(281) 404-9627	100%	May 1, 2015

Principal Place of Business	City	State	Zip Code
1001 Fannin, Suite 1500	Houston	TX	77002
Field Address	**City**	**State**	**Zip Code**

Transporter	Telephone Number	% Transported	Date Effective
Hiland Crude, LLC	(580) 616-2058	75%	May 1, 2015

Address	City	State	Zip Code
P.O. Box 3886	Enid	OK	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
Power Crude Transport	25%	May 1, 2015
Other Transporters Transporting From This Lease	% Transported	Date Effective
		May 1, 2015

Comments

I hereby swear or affirm that the information provided is true, complete and correct as determined from all available records.		Date
		September 10, 2015
Signature	Printed Name	Title
Dina Barron	Dina Barron	Mktg. Contracts Administrator

Above Signature Witnessed By:

Signature	Printed Name	Title
	Jeremy Harris	Marketing Scheduler

FOR STATE USE ONLY

Date Approved	SEP 18 2015
By	Evie Roberson
Title	Oil & Gas Production Analyst

TH

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)

SEP 2015 RECEIVED ND OIL & GAS DIVISION

Well File No.
28303
NDIC CTB No.
To be assigned

228303

PLEASE READ INSTRUCTIONS BEFORE FILLING OUT FORM.
PLEASE SUBMIT THE ORIGINAL AND FOUR COPIES.

Well Name and Number	Qtr-Qtr	Section	Township	Range	County
WADE FEDERAL 5300 31-30 11T	LOT3	30	153	100	Mckenzie

Operator	Telephone Number	Field
Oasis Petroleum North America LLC	(281) 404-9573	BAKER

Address	City	State	Zip Code
1001 Fannin, Suite 1500	Houston	TX	77002

Name of First Purchaser	Telephone Number	% Purchased	Date Effective
Oasis Petroleum Marketing LLC	(281) 404-9627	100%	June 1, 2015

Principal Place of Business	City	State	Zip Code
1001 Fannin, Suite 1500	Houston	TX	77002

Field Address	City	State	Zip Code

Transporter	Telephone Number	% Transported	Date Effective
Hiland Crude, LLC	(580) 616-2058	75%	June 1, 2015

Address	City	State	Zip Code
P.O. Box 3886	Enid	OK	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
Power Crude Transport	25%	June 1, 2015
Other Transporters Transporting From This Lease	% Transported	Date Effective
		June 1, 2015

Comments

I hereby swear or affirm that the information provided is true, complete and correct as determined from all available records.		Date
Signature	Printed Name	Title
Dina Barron	Dina Barron	Mktg. Contracts Administrator

Above Signature Witnessed By:

Signature	Printed Name	Title
	Jeremy Harris	Marketing Scheduler

FOR STATE USE ONLY

Date Approved	SEP 18 2015
By	Erin Roberson
Title	Oil & Gas Production Analyst

WELL COMPLETION OR RECOMPLETION REPORT - FORM 6

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. **28303**

JUN 2015 RECEIVED ND OIL & GAS DIVISION

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

Designate Type of Completion
☑ Oil Well ☐ EOR Well ☐ Recompletion ☐ Deepened Well ☐ Added Horizontal Leg ☐ Extended Horizontal Leg
☐ Gas Well ☐ SWD Well ☐ Water Supply Well ☐ Other:

Well Name and Number **Wade Federal 5300 31-30 11T**			Spacing Unit Description **Sec. 29/30 T153N R100W**
Operator **Oasis Petroleum North America**		Telephone Number **(281) 404-9591**	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
1955 F **S** L **350** F **W** L	**LOT3**	**30**	**153 N**	**100 W**	**McKenzie**

Spud Date	Date TD Reached	Drilling Contractor and Rig Number	KB Elevation (Ft)	Graded Elevation (Ft)
November 27, 2015	**January 19, 2015**	**Nabors B25**	**2054**	**2029**

Type of Electric and Other Logs Run (See Instructions)
MWD/GR from KOP to TD; CBL from Int. TD to surface

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

Well Bore	String Type	String 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
Surface Hole	**Surface**	**13 3/8**	**0**	**2102**		**54.5**			**1110**	**0**
Surface Hole	**Surface**	**9 5/8**	**0**	**6020**	**13 1/2**	**36**			**1108**	**0**
Vertical Hole	**Intermediate**	**7**	**0**	**11080**	**8 3/4**	**32**			**849**	**5750**
Lateral1	**Liner**	**4 1/2**	**10191**	**20493**	**6**	**13.5**			**510**	

PERFORATION & OPEN HOLE INTERVALS

Well Bore	Well Bore TD Drillers Depth (MD Ft)	Completion Type	Open Hole/Perforated Interval (MD,Ft) Top	Bottom	Kick-off Point (MD Ft)	Top of Casing Window (MD Ft)	Date Perf'd or Drilled	Date Isolated	Isolation Method	Sacks Cement
Lateral1	**20500**	**Perforations**	**11080**	**20493**	**10241**		**03/29/2015**			

PRODUCTION

Current Producing Open Hole or Perforated Interval(s), This Completion, Top and Bottom, (MD Ft)							Name of Zone (If Different from Pool Name)
Lateral 1- 11080' to 20493'							
Date Well Completed (SEE INSTRUCTIONS) **May 21, 2015**	Producing Method **Flowing**	Pumping-Size & Type of Pump				Well Status (Producing or Shut-In) **Producing**	
Date of Test **05/27/2015**	Hours Tested **24**	Choke Size **19 /64**	Production for Test	Oil (Bbls) **451**	Gas (MCF) **434**	Water (Bbls) **853**	Oil Gravity-API (Corr.) **42.0 °**	Disposition of Gas **Sold**

Flowing Tubing Pressure (PSI)	Flowing Casing Pressure (PSI)	Calculated 24-Hour Rate	Oil (Bbls)	Gas (MCF)	Water (Bbls)	Gas-Oil Ratio
1690	**3025**		**451**	**434**	**853**	**962**

GEOLOGICAL MARKERS

Formation	MD (Ft)	TVD (Ft)
Dakota	**5393**	**5392**
Kibbey Lime	**8327**	**8326**
First Charles Salt	**8477**	**8476**
UB	**9085**	**9084**
Base Last Salt	**9152**	**9151**
Ratcliffe	**9193**	**9192**
Mission Canyon	**9365**	**9364**
Lodgepole	**9922**	**9921**
False Bakken	**10699**	**10648**
Scallion		
Upper Bakken	**10709**	**10656**
Middle Bakken	**10741**	**10673**
Lower Bakken	**10820**	**10711**
Pronghorn	**10853**	**10718**
Three Forks	**10897**	**10736**

PLUG BACK INFORMATION

Well Bore	Type of Plug	Top (Ft)	Bottom (Ft)	Sacks Cement

CORES CUT

Top (Ft)	Bottom (Ft)	Formation	Top (Ft)	Bottom (Ft)	Formation

Drill Stem Test

Test Date	Formation	Top (Ft)	Bottom (Ft)	BH Temp (°F)	CL ppm	H2S ppm	Shut-in 1 (PSIG)	Shut-in 2 (PSIG)
Drill Pipe Recovery								
Sample Chamber Recovery								
Test Date	Formation	Top (Ft)	Bottom (Ft)	BH Temp (°F)	CL ppm	H2S ppm	Shut-in 1 (PSIG)	Shut-in 2 (PSIG)
Drill Pipe Recovery								
Sample Chamber Recovery								
Test Date	Formation	Top (Ft)	Bottom (Ft)	BH Temp (°F)	CL ppm	H2S ppm	Shut-in 1 (PSIG)	Shut-in 2 (PSIG)
Drill Pipe Recovery								
Sample Chamber Recovery								
Test Date	Formation	Top (Ft)	Bottom (Ft)	BH Temp (°F)	CL ppm	H2S ppm	Shut-in 1 (PSIG)	Shut-in 2 (PSIG)
Drill Pipe Recovery								
Sample Chamber Recovery								
Test Date	Formation	Top (Ft)	Bottom (Ft)	BH Temp (°F)	CL ppm	H2S ppm	Shut-in 1 (PSIG)	Shut-in 2 (PSIG)
Drill Pipe Recovery								
Sample Chamber Recovery								

Well Specific Stimulations

Date Stimulated	Stimulated Formation	Top (Ft)	Bottom (Ft)	Stimulation Stages	Volume	Volume Units
03/29/2015	Three Forks	11080	20453	36	123705	Barrels

Type Treatment	Acid %	Lbs Proppant	Maximum Treatment Pressure (PSI)	Maximum Treatment Rate (BBLS/Min)
Sand Frac		3976880	8968	39.0

Details
100 Mesh White: 139800
40/70 White: 1396480
20/40 Ceramic: 1845780
20/40 Resin Coated: 594820

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	Date
	jswenson@oasispetroleum.com	06/09/2015
Signature	Printed Name	Title
	Jennifer Swenson	Regulatory Specialist

Industrial Commission of North Dakota
Oil and Gas Division
Verbal Approval To Purchase and Transport Oil

Well or Facility No **28303**

Tight Hole **Yes**

OPERATOR

Operator	Representative	Rep Phone
OASIS PETROLEUM NORTH AMERICA LL	**Todd Hanson**	**(701) 577-1632**

WELL INFORMATION

Well Name
WADE FEDERAL 5300 31-30 11T

Inspector
Richard Dunn

Well Location	QQ	Sec	Twp		Rng	
	LOT3	**30**	**153**	**N**	**100**	**W**

County
MCKENZIE

Field
BAKER

Footages
1955 Feet From the **S** Line
350 Feet From the **W** Line

Pool
BAKKEN

Date of First Production Through Permanent Wellhead **5/20/2015** **This Is Not The First Sales**

PURCHASER / TRANSPORTER

Purchaser	Transporter
OASIS PETROLEUM MARKETING LLC	**POWER CRUDE TRANSPORT, INC.**

TANK BATTERY

Central Tank Battery Number : 228303-01

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

ESTIMATED BARRELS TO BE SOLD		ACTUAL BARRELS SOLD		DATE
15000	BBLS	**228**	BBLS	**5/21/2015**
	BBLS		BBLS	
	BBLS		BBLS	
	BBLS		BBLS	
	BBLS		BBLS	
	BBLS		BBLS	
	BBLS		BBLS	
	BBLS		BBLS	
	BBLS		BBLS	

DETAILS

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	**5/20/2015**
Date Approved	**6/17/2015**
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)

APR 2015 RECEIVED ND OIL & GAS DIVISION

Well File No. **28303**

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

- [x] Notice of Intent — Approximate Start Date: **March 31, 2015**
- [ ] Report of Work Done — Date Work Completed:
- [ ] 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:

- [ ] Drilling Prognosis
- [ ] Redrilling or Repair
- [ ] Casing or Liner
- [ ] Plug Well
- [ ] Supplemental History
- [ ] Temporarily Abandon
- [ ] Spill Report
- [ ] Shooting
- [ ] Acidizing
- [ ] Fracture Treatment
- [ ] Change Production Method
- [ ] Reclamation
- [ ] Other **Waiver from tubing/packer requirement**

Well Name and Number				
Wade Federal 5300 31-30 11T				
Footages	Qtr-Qtr	Section	Township	Range
1955 F S L 350 F W L	**LOT3**	**30**	**153 N**	**100 W**
Field	Pool	County		
Baker	**Bakken**	**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

DETAILS OF WORK

Oasis Petroleum North America LLC requests a variance to NDAC 43-02-03-21 for the tubing/packer requirement: 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# and 32# casing at surface with an API burst rating of 11,220 psi;
2. The Frac design will ise 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 montioring equipement;
4. The casing is exposed to significantly lower rates and pressures during flowback 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		Telephone Number
Oasis Petroleum North America LLC		**281-404-9436**
Address		
1001 Fannin, Suite 1500		
City	State	Zip Code
Houston	**TX**	**77002**
Signature	Printed Name	
	Jennifer Swenson	
Title	Date	
Regulatory Specialist	**March 31, 2015**	
Email Address		
jswenson@oasispetroleum.com		

FOR STATE USE ONLY

- [ ] Received
- [x] Approved

Date: Apr 14, 2015

By:

Title: PETROLEUM ENGINEER

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)

APR 2015 RECEIVED ND OIL & GAS DIVISION

Well File No. **28303**

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

☑ Notice of Intent	Approximate Start Date **March 31, 2015**	☐ Drilling Prognosis	☐ Spill Report
☐ Report of Work Done	Date Work Completed	☐ Redrilling or Repair	☐ Shooting
☐ 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	☐ Casing or Liner	☐ Acidizing
		☐ Plug Well	☐ Fracture Treatment
		☐ Supplemental History	☐ Change Production Method
		☐ Temporarily Abandon	☐ Reclamation
		☑ Other	**Change well status to CONFIDENTIAL**

Well Name and Number				
Wade Federal 5300 31-30 11T				
Footages	Qtr-Qtr	Section	Township	Range
1955 F S L 350 F W L	**LOT3**	**30**	**153 N**	**100 W**
Field	Pool	County		
Baker	**BAKKEN**	**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

DETAILS OF WORK

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

This well has not been completed.

OFF CONFIDENTIAL 10/06/15

Company **Oasis Petroleum North America LLC**		Telephone Number **281-404-9436**
Address **1001 Fannin, Suite 1500**		
City **Houston**	State **TX**	Zip Code **77002**
Signature	Printed Name **Jennifer Swenson**	
Title **Regulatory Specialist**	Date **March 31, 2015**	
Email Address **jswenson@oasispetroleum.com**		

FOR STATE USE ONLY

☐ Received	☒ Approved
Date 4/08/15	
By Alice D. Webber	
Title **Engineering Technician**	

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)

FEB 2015
RECEIVED
ND OIL & GAS
DIVISION

Well File No.
28303

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

☐ Notice of Intent	Approximate Start Date	☐ Drilling Prognosis	☐ Spill Report
☑ Report of Work Done	Date Work Completed **February 6, 2015**	☐ Redrilling or Repair	☐ Shooting
☐ 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	☐ Casing or Liner	☐ Acidizing
		☐ Plug Well	☐ Fracture Treatment
		☐ Supplemental History	☐ Change Production Method
		☐ Temporarily Abandon	☑ Reclamation
		☐ Other **Reserve pit reclamation**	

Well Name and Number				
Wade Federal 5300 31-30 11T				
Footages	Qtr-Qtr	Section	Township	Range
1955 F S L 350 F W L	**LOT3**	**30**	**153 N**	**100 W**
Field	Pool	County		
Baker	**Bakken**	**McKenzie**		

24-HOUR PRODUCTION RATE

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

Name of Contractor(s)			
Neu Construction			
Address	City	State	Zip Code
602 W. 9th Street	**Fairview**	**MT**	**59221**

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 (NDIC) was notified on 01/30/2015

The surface owners, Wes Lindvig was contacted on 01/30/2015
Wes Lindvig, 14075 41st Street NW, Alexander ND 58831

Spread material out in pit, cut top edge of liner and fold over cuttings, cover entire pit with line, back fill with clay slope and contour well site to ensure proper drainage

Company		Telephone Number
Oasis Petroleum North America LLC		**281-404-9436**
Address		
1001 Fannin, Suite 1500		
City	State	Zip Code
Houston	**TX**	**77002**
Signature	Printed Name	
	Jennifer Swenson	
Title	Date	
Regulatory Specialist	**February 18, 2015**	
Email Address		
jswenson@oasispetroleum.com		

FOR STATE USE ONLY

☒ Received	☐ Approved
Date 3-25-15	
By	
Title	

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)

DEC 2014
RECEIVED
ND OIL & GAS
DIVISION

Well File No.
28303

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

☑ Notice of Intent — Approximate Start Date: December 2, 2014

☐ Report of Work Done — Date Work Completed:

☐ 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:

☐ Drilling Prognosis ☐ Spill Report
☐ Redrilling or Repair ☐ Shooting
☐ Casing or Liner ☐ Acidizing
☐ Plug Well ☐ Fracture Treatment
☐ Supplemental History ☐ Change Production Method
☐ Temporarily Abandon ☐ Reclamation
☑ Other **Off-site Cutting Pit Request**

Well Name and Number					
Wade Federal 5300 31-30 11T					
Footages	Qtr-Qtr	Section	Township	Range	
1955 F S L 350 F W L	LOT3	30	153 N	100 W	
Field	Pool	County			
Baker	Bakken	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

DETAILS OF WORK

Oasis Petroleum respectfully requests approval to utilize an off-site drill cutting pit. The pit would be located east of the well pad. See attached off-site cutting pit plat and landowner agreement.

* Must contact Richard Dunn @ 701-770-3554 prior to starting dirt work.

Company		Telephone Number
Oasis Petroleum North America LLC		**(281) 404-9500**
Address		
1001 Fannin Suite 1500		
City	State	Zip Code
Houston	**TX**	**77002**
Signature	Printed Name	
	Victoria Siemieniewski	
Title	Date	
Regulatory Specialist	**December 2, 2014**	
Email Address		
vsiemieniewski@oasispetroleum.com		

FOR STATE USE ONLY

☐ Received ☑ Approved w/ comment

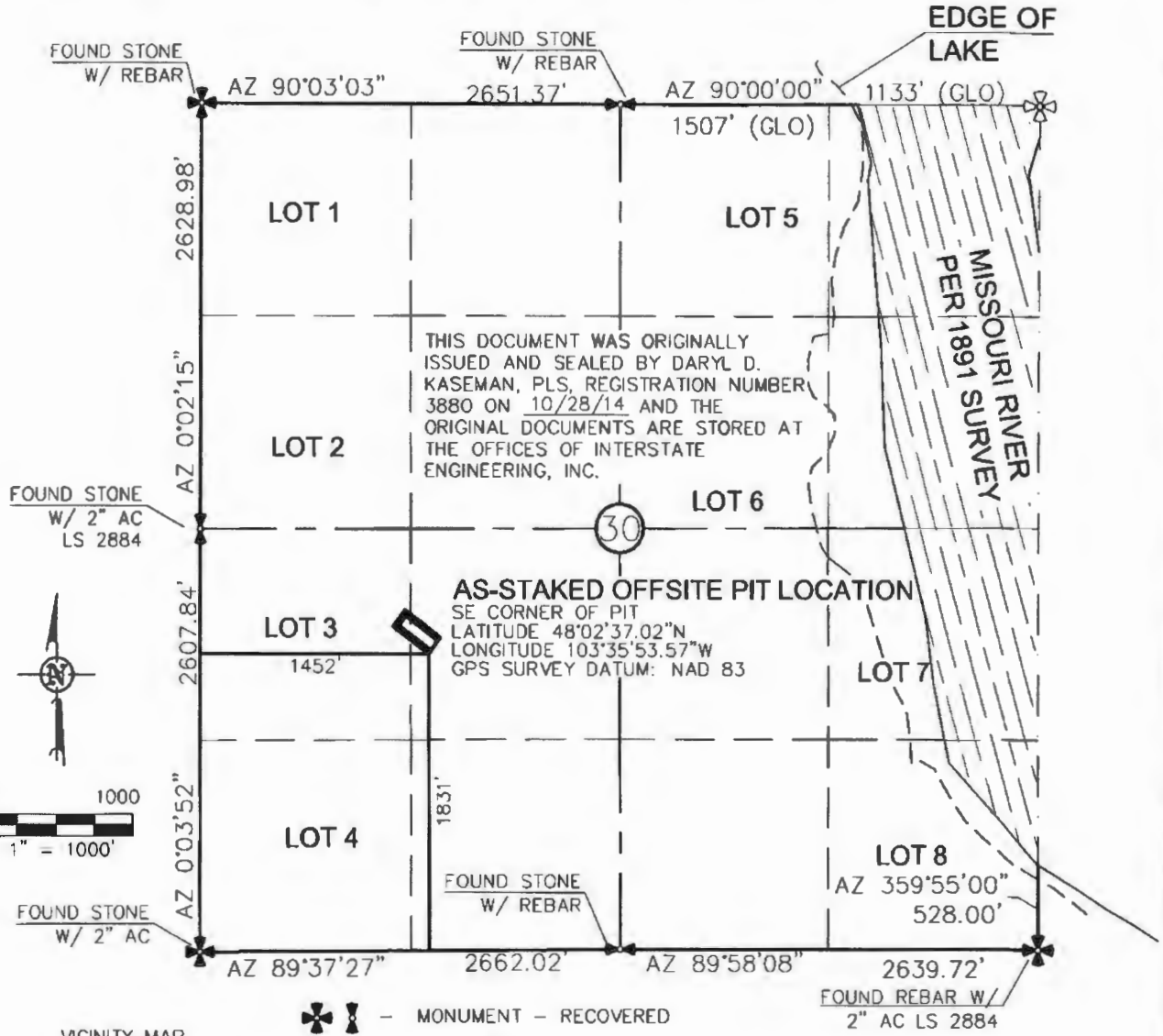
Date: 12-1-14

By: Ed Va

Title:

AS-STAKED OFFSITE PIT LOCATION PLAT

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
*AS-STAKED OFFSITE PIT FOR WADE FEDERAL 5300 31-30 10T2 & WADE FEDERAL 5300 31-30 11T
SECTION 30, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA



VICINITY MAP

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VERTICAL CONTROL DATUM WAS BASED UPON CONTROL POINT 16 WITH AN ELEVATION OF 2014.2'

THIS SURVEY AND PLAT IS BEING PROVIDED AT THE REQUEST OF ERIC BAYES OF OASIS PETROLEUM. I CERTIFY THAT THIS PLAT CORRECTLY REPRESENTS WORK PERFORMED BY ME OR UNDER MY SUPERVISION AND IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

DARYL D. KASEMAN LS-3880

REGISTERED LAND SURVEYOR
DARYL D. KASEMAN
LS-3880
DATE: 10/28/14
NORTH DAKOTA

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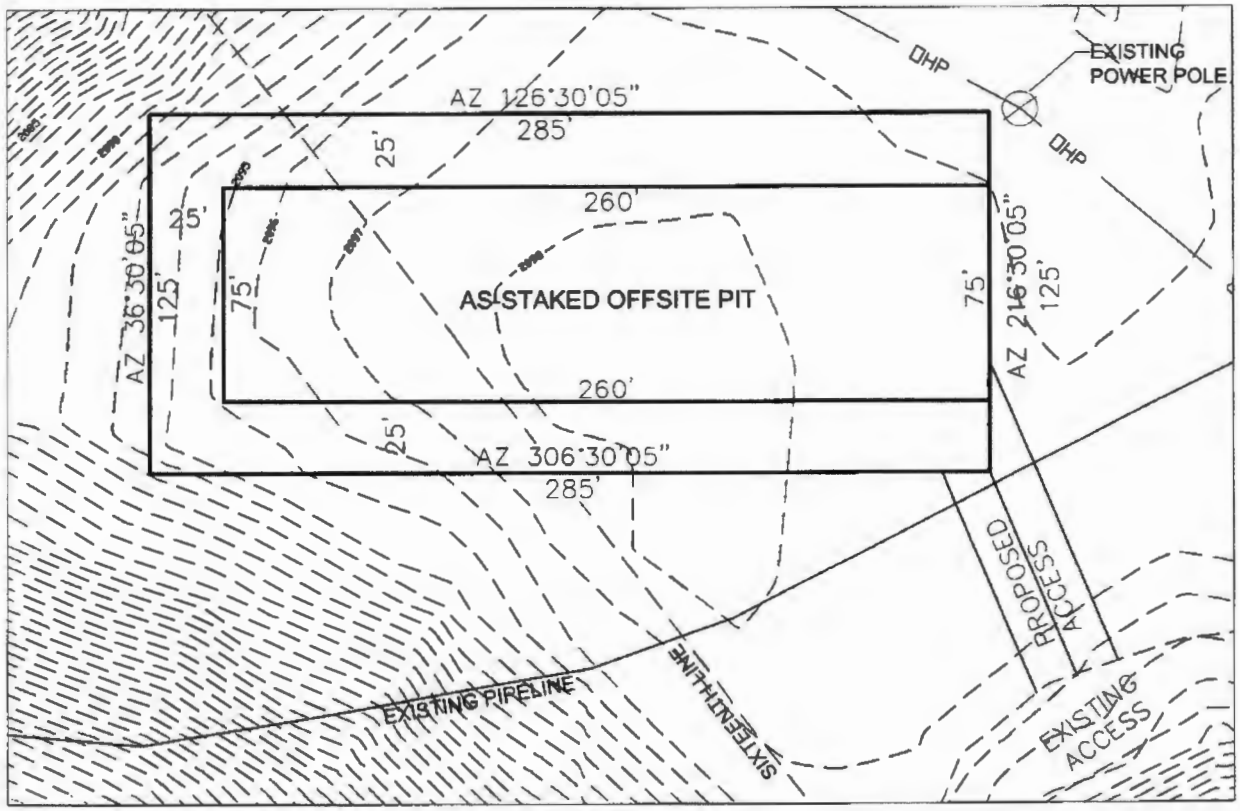
OASIS PETROLEUM NORTH AMERICA, LLC
OFFSITE PIT LOCATION PLAT
SECTION 30, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

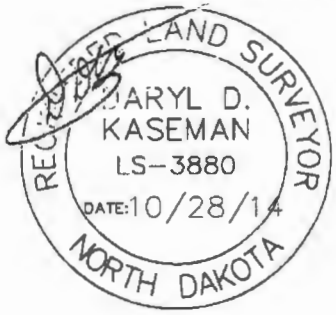
Drawn By: B.H.H.	Project No.: S14-09-019.04
Checked By: D.D.K.	Date: MAR. 2014

Revision No.	Date	By	Description
REV 1	10/28/14	JJS	CHANGED WELLS AND ACCESS

OFFSITE PIT LAYOUT

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"AS-STAKED OFFSITE PIT FOR WADE FEDERAL 5300 31-30 10T2 & WADE FEDERAL 5300 31-30 11T
SECTION 30, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA





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0 60
1" = 60'

NOTE: All utilities shown are preliminary only, a complete utilities location is recommended before construction.

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Revision No.	Date	By	Description
REV 1	1/28/14	JJS	CHANGED WELLS AND ACCESS

OASIS PETROLEUM NORTH AMERICA, LLC
OFFSITE PIT LAYOUT
SECTION 30, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. Project No.: S14-09-519.04
Checked By: D.D.K. Date: MAR. 2014

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ACCESS APPROACH

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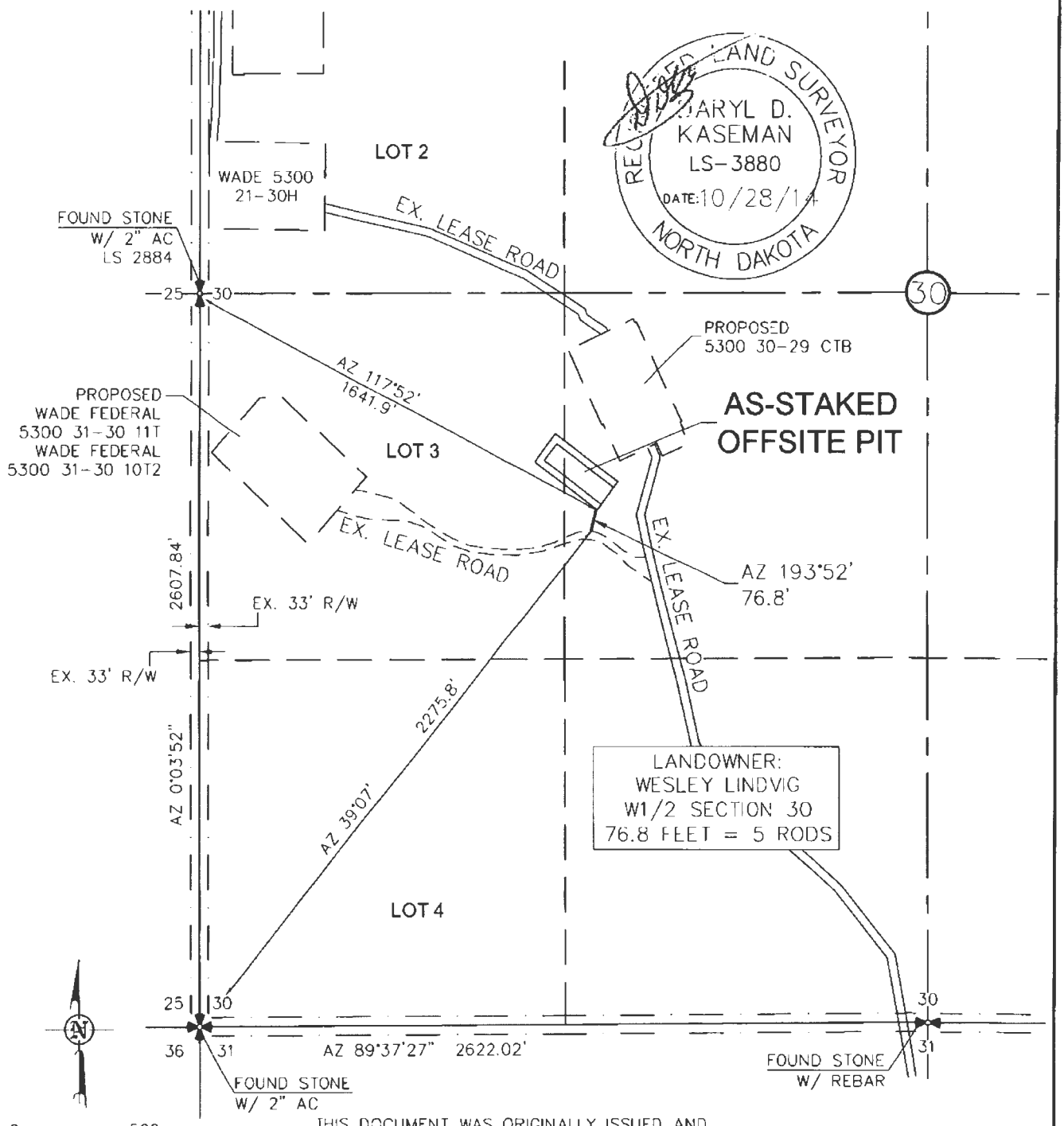
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"AS-STAKED OFFSITE PIT FOR WADE FEDERAL 5300 31-30 10T2 & WADE FEDERAL 5300 31-30 11T
SECTION 30, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA



REGISTERED LAND SURVEYOR
DARYL D.
KASEMAN
LS-3880
DATE: 10/28/14
NORTH DAKOTA

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ACCESS APPROACH
SECTION 30, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. | Project No.: S14-09-019.04
Checked By: D.D.K. | Date: MAR. 2014

Revision No.	Date	By	Description
REV 1	10/28/14	JJS	CHANGED WELLS AND ACCESS

OFF-SITE PIT AGREEMENT

In consideration of the sum of [redacted] paid by Oasis Petroleum North America LLC ("Oasis") the undersigned surface owners, Wesley and Barbara Lindvig, husband and wife, whose address is 14075 41st St. NW, Alexander, ND 5883 for themselves and their heirs, successors, administrators and assigns, hereby acknowledge the receipt and sufficiency of said payment in full and complete settlement for and as a release of all claim for loss, damage or injury to the hereafter described surface property arising out of the off-site cuttings pit, in which the cuttings from the Wade Federal 5300 31-30 10T2, Wade Federal 5300 31-30 11T wells will be buried, located on the approximately two and one half (2.5) acre tract of land identified on the plat attached hereto as Exhibit "A" and which is situated on the following described real property located in McKenzie County, State of North Dakota, towit:

Township 153 North, Range 100 West, 5th P.M.
Section 30: Lot 3 & 4 a/k/a W/2SW/4

The undersigned knows that Oasis Petroleum North America LLC is the operator and will be drilling the Wade Federal 5300 31-30 10T2, Wade Federal 5300 31-30 11T wells. The undersigned further states that they are fully aware that the cuttings generated from the drilling of the Wade Federal 5300 31-30 10T2, Wade Federal 5300 31-30 11T wells will be buried in the pit on the above described location.

Dated this 19th day of November, 2014.

SURFACE OWNER(S)

Wesley Lindvig

Wesley Lindvig

Barbara T. Lindvig

Barbara Lindvig

ACKNOWLEDGMENT INDIVIDUAL

State of North Dakota)
)
County of McKenzie)

BE IT REMEMBERED, That on this 19th day of November, 2014 before me, a Notary Public, in and for said County and State, personally appeared Wesley and Barbara Lindvig, husband and wife, to me known to be the identical persons described in and who executed the within and foregoing instrument and acknowledged to me to that they executed the same as their free and voluntary act and deed for the uses and purposes therein set forth.

IN WITNESS WHEREOF, I have hereunto set my official signature and affixed my notarial seal, the day and year last above written.

My Commission expires:

Kristy Aasheim

Notary Public

Kristy Aasheim Notarial SEAL State of Montana

Kristy Aasheim
NOTARY PUBLIC for the
State of Montana
Residing at Plentywood, Montana
My Commission Expires
January 17, 2017

Oasis Petroleum North America

Wade Federal 5300 31-30 11T

1,955' FSL & 350' FWL
Lot 3 Section 30, T153N, R100W
Baker Field / Three Forks
McKenzie County, North Dakota

BOTTOM HOLE LOCATION:
545' north & 9,858' east of surface location or approx.
2,500' FSL & 301' FEL, NE SE Section 29, T153N, R100W

Prepared for:
Kellie Rasmussen
Oasis Petroleum North America
1001 Fannin Street, Suite 1500
Houston, Texas 77002

Prepared by:
Hannah Thatcher, Daniel Haynes, Derry Callender
PO Box 80507; Billings, MT 59108
(406) 259-4124
geology@sunburstconsulting.com
www.sunburstconsulting.com

WELL EVALUATION

Wade Federal 5300 31-30 11T

Figure 1: Nabors B25 drilling the Oasis Petroleum North America Wade Federal 5300 31-30 11Tduring December 2014 and January 2015, south of Williston in McKenzie County, North Dakota. (Photos by Hannah Thatcher, wellsite geologist)

INTRODUCTION

The Oasis Petroleum North America, LLC Wade Federal 5300 31-30 11T [Lot 3 Section 30, T153N, R100W] is located approximately 5 miles south of Williston, North Dakota. The horizontal well was reentered on December 12, 2014 and represents a continuation of Oasis Petroleum's development of the Three Forks Formation within Baker Field. The Wade Federal 5300 31-30 11T was planned to drill an approximately 9,612' lateral along a proposed azimuth of 86.92°. The well bore will be enhanced for production by multistage fracture stimulation.

OFFSET CONTROL INFORMATION

The Oasis Wade Federal 5300 21-30 12T [SW NW Section 30, T153N, R100W] is located approximately 0.33 miles north of the subject well on the same pad as the other two offset wells. The Oasis Wade Federal 5300 21-30 12T was spud on the 30th of September 2014. The Oasis Wade Federal 5300 21-30 13B was spud on the 26th of September 2014. The Oasis Wade Federal 5300 21-30 14T2 [SW NW Section 30, T153N, R100W] was spud on the 28th of September, 2014.

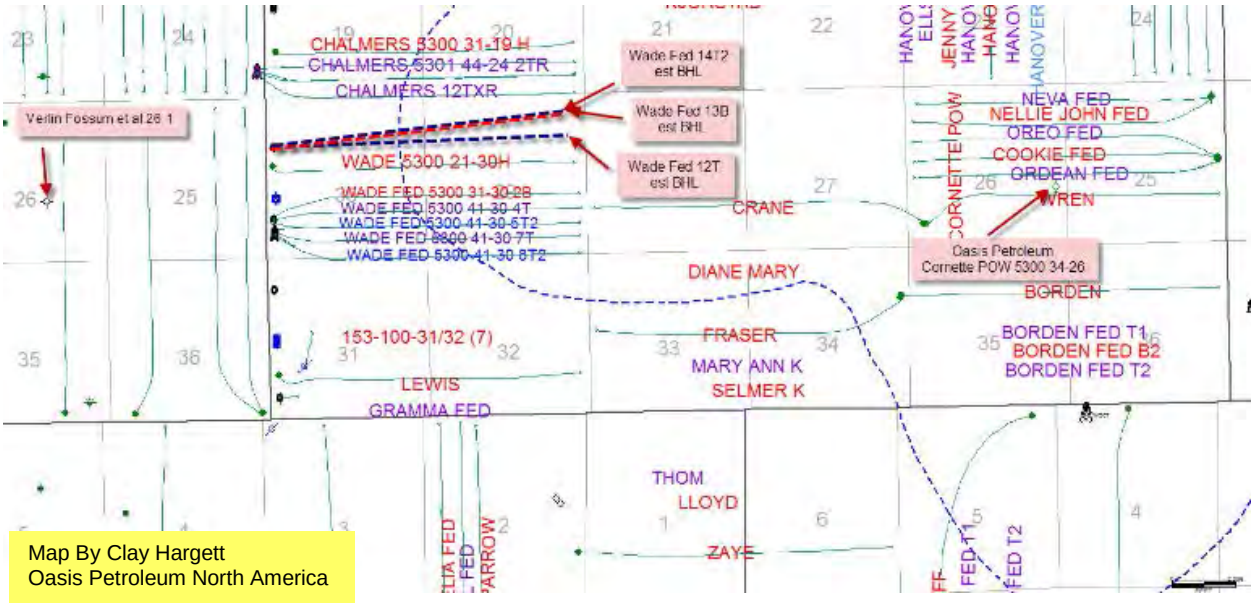


Figure 2: Offsetting control wells in relation to the Wade Federal 5300 31-30 11Twell.

GEOLOGIC EVALUATION

Methods:

Geologic supervision of the Wade Federal 5300 31-30 11T was provided by Sunburst Consulting, Inc. with two well site geologists. A digital gas detector and chromatograph were interfaced with a Pason electronic data recorder system. The unit of measure for gas on this well was units (u), which was defined as 100 units equaling 1% methane equivalent in air. The EDR provided drill rate, on-off bottom and pump strokes to the gas detection computer and received total gas information from Sunburst for viewing around location. Lagged samples were caught by the rig crew in 30' intervals from 4,600' MD to 10,870' MD, 10' intervals from 10,870' MD to 11,080' MD, and 30' intervals from 11,080' MD to 20,500' TD. Wet and dry cuttings were examined under a tri-ocular microscope and complete lithologic descriptions and sampling intervals are provided in the lithology document within this evaluation. The set of dry cuttings collected during the duration of the well were sent to the State of North Dakota. Evidence of light hydrocarbons present in the drilling fluid was reported by the gas chromatography equipment and documented on the mud log presented with this report.

Zones of Interest:

The Mission Canyon Formation (Mississippian; Madison Group) was drilled at 9,364' TVD (-7,310') and is comprised largely of light gray lime mudstone followed by gray to tan earthy textured argillaceous lime mudstone. Shows within the Mission Canyon ranged from 15 to 100 units against 9.8 ppg mud.

Figure 3 & 4: Wet cutting of the Lodgepole Formation (left) and False Bakken sub-interval (right) at 10X.

The top of the Lodgepole Formation was logged at 9,921' TVD (-7,867'). In general the Lodgepole can be described as a medium to dark gray brown argillaceous lime mudstone with a crystalline texture and trace amounts of disseminated pyrite (Figure 3). The False Bakken (Carrington Shale), drilled at 10,648' TVD (-8,594'), is comprised of very dark brown to black, slightly pyritic shale with an earthy texture, and was found to be soft to firm (Figure 4). Strong hydrocarbon shows in the lower 100' of the Lodgepole were as high as 158 total gas units; suggest that some of the oil and gas from the Upper Bakken Shale may be exploiting fractures thought to exist in the Lower Lodgepole.

The Bakken Formation (Devonian – Mississippian) has four formal members, an upper and lower black, fissile, organic-rich pyritic shale, separated by an arenaceous limestone, siltstone and silty sandstone middle member. These three members overlay a silty shale or siltstone of the Pronghorn Member toward the basin depositional center. The Upper Bakken Shale was drilled at 10,656' TVD (-8,602') with sample returns typically described as black, carbonaceous, *petroliferous* shale with trace amounts of disseminated pyrite (Figure 5). The Middle Bakken, penetrated at 10,673' TVD (-8,619'), consists of a varying thickness and sequence of interbedded siltstone, limestone and silty sandstone. *Trace spotty light brown oil staining* was present along with gas shows as high as 456 TGU. This light brown spotty oil staining was common. Penetrated at 10,711' TVD (-8,657'), the Lower Bakken Shale was described as a black to dark brown carbonaceous shale with trace amounts of disseminated pyrite (Figure 6). Gas shows encountered in the Lower Bakken read as high as 1356u (C1-C4). The Pronghorn was penetrated at 10,718' TVD (-8,664') and is commonly described as a dark to medium gray siltstone with calcite cement.

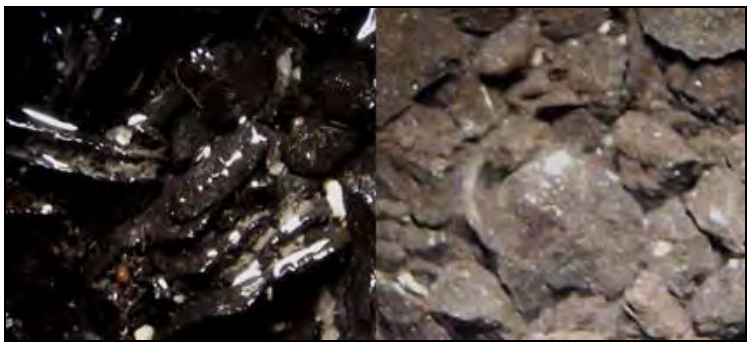


Figure 5 & 6: Wet cuttings of the Upper Bakken Shale (left), Lower Bakken Shale (right) at 10X.

The Three Forks Formation (Devonian; Kaskaskia Sequence.) represents a regressive sequence deposited in a supratidal sabkha environment. The top of the Three Forks was drilled at 10,736' TVD (-8,682') and is comprised of a light to medium gray, cream to off white sucrosic dolomite with trace to occasional amounts of disseminated pyrite and light green shale also with trace amounts of disseminated pyrite (Figure 8). Shows within the Three Forks Formation ranged from 50 to 431 units in a drilling mud of 9.6-9.9 ppg.

Figure 7 & 8: Wet cuttings of the Three Forks dolomite and shale (left and right) at 10X.

Geo-steering:

Kick-off point for the curve was established from the isopach of the "base last salt" marker to the Three Forks "target" in the offset wells. The Chalmers 5300 31-30 12T was used as the primary offset through the vertical and curve sections. While drilling the curve, measured gamma ray signatures were compared to those of the three offsets and aided in the landing of the curve. The landing target was confirmed by the depth of the False Bakken, which was consistent with the offset wells. The curve was successfully landed within the Three Forks Formation at a depth of 11,080' MD (10,753' TVD) placing the well bore approximately 17' below the top of the Three Forks Formation. Directional tools were then pulled out of the hole and a string of 7" casing was set (11,060' MD) and then cemented by Schlumberger.

Samples from the target zone varied in porosity, oil staining, color, cementation, and pyrite content. Stratigraphic location in the target zone was based on these sample observations along with gas shows, drill rates and gamma ray values. Severe doglegs were to be avoided so as to obtain the desired vertical section and aid in a successful completion liner run at TD.

The Oasis Petroleum North America, LLC prospect geologist defined the an initial target zone as an 10' zone that began 18' below the top of the Three Forks Formation and ended at the claystone member 28' below the Three Forks Formation. The upper target zone consisted of a dolomite and shale interval reading 90-120 count gamma (A marker). The center of the target interval was comprised of a warmer dolomite with greater amounts of shale reading 100-140 count gamma (B marker). The base of the target zone was characterized by a clean dolomite with trace amounts of shale with gamma readings of 35-90 (C marker). The A-C gamma markers were used for determining depth within the target interval and plotted on the Wade Federal 5300 31-30 11T dip profile (Figure 10).

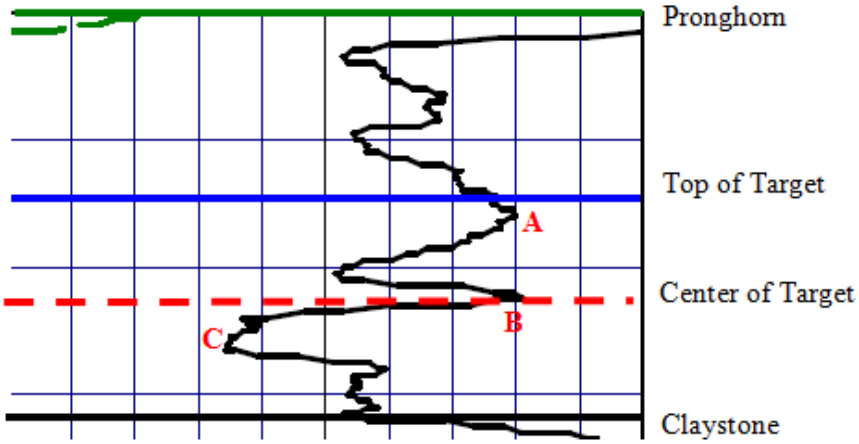


Figure 9: Offset gamma ray profile of the upper Three Forks (0-100 api. scale) *See dip profile (Figure 10) for marker presentation*

Using the aforementioned information gathered during drilling, offset log information and the structural data provided from Oasis Petroleum North America, LLC., well site geologists were able to anticipate, and interpret the local apparent dip during the drilling of the Wade Federal 5300 31-30 11T well. A total depth of 20,500' MD was reached on January 18, 2015 at 13:45 CDT. The target resultant was 100% within the Three Forks Formation. The resulting structure of the Three Forks was a drop in TVD of 86.80' over 9,525' MD; resulting in an overall down dip of 0.52º as portrayed on the Wade Federal 5300 31-30 11T dip profile (Figure 10).

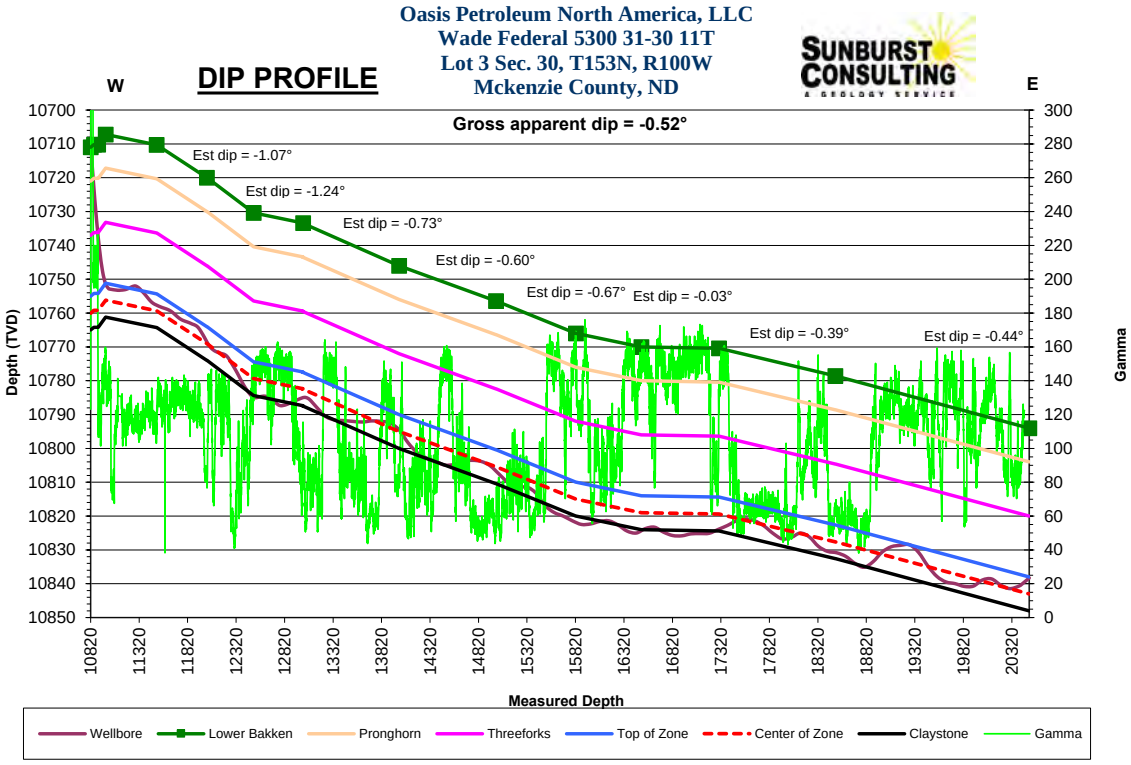


Figure 10: Well profile representing estimated dip value & gamma ray for the Wade Federal 5300 31-30 11Tlateral.

Hydrocarbons:

Gas monitoring and fluid gains were monitored to evaluate the viability of this reservoir during the drilling of the Wade Federal 5300 31-30 11T well. In the invert mud system, hydrostatic conditions were maintained near balance. This allowed for gas and fluid gains from the well to be monitored. Gas shows were encountered in vertical, curve and lateral drilling of the well.

Background gas observed during the drilling of the lateral ranged from 50 to 120 units. Invert drilling fluid was used throughout the drilling of the vertical and curve weighing 9.8-10.0 ppg. The lateral was drilled with saline drilling fluid with a mud weight of 9.6-9.9 ppg. Gas shows ranged up to 438 units and connection gases were observed up to 359 units. C1-C4 gas components were observed throughout the course of the lateral. Trip gases were observed as high as 1,482 units. Oil shows were very light throughout the lateral ranging from 0-3% in sample. When present it was a light brown spotty oil stain that yielded a slow to moderate streaming to diffuse light green cut fluorescence.

SUMMARY

The Nabors B25 drilling rig successfully drilled a two-section horizontal well bore within the Three Forks Formation at the Wade Federal 5300 31-30 11T. A net of 9,525' was drilled within the Three Forks. A mud program consisting of diesel invert (9.8 – 10.0 ppg), during the vertical and curve build sections, and salt water based mud (9.6 -9.9 ppg), during the lateral maintained stable hole conditions and permitted adequate analysis of gas concentrations.

Projections of dip were successfully used to maintain the well bore in the Three Forks Formation target zone for 86% of the lateral. Samples from the target consisted of a light to medium gray, cream to off white dolomite with trace to occasional amounts of disseminated pyrite and light green shale also with trace amounts of disseminated pyrite. Intercrystalline porosity was generally seen throughout the entire lateral. Hydrocarbon shows in the target zone were high throughout the lateral. Samples from the ideal zone contained a spotty light brown oil stain.

The Wade Federal 5300 31-30 11T will be fitted with a 4 ½" production liner and swell packers in preparation for a fracture stimulation that will determine the true commercial value of the well. The well currently awaits fracture stimulation.

Respectfully submitted,

Hannah Thatcher
Daniel Haynes
Sunburst Consulting, Inc.
January 18, 2015

WELL DATA SUMMARY

OPERATOR:	**Oasis Petroleum North America**
ADDRESS:	1001 Fannin Street, Suite 1500 Houston, Texas 77002
WELL NAME:	**Wade Federal 5300 31-30 11T**
API #:	33-053-05906-00-00
WELL FILE #:	28303
SURFACE LOCATION:	1,955' FSL & 350' FWL Lot 3 Section 30, T153N, R100W
FIELD/ OBJECTIVE:	Baker Field / Three Forks
COUNTY, STATE	McKenzie County, North Dakota
BASIN:	Williston
WELL TYPE:	Three Forks Horizontal
ELEVATION:	GL: 2,029' KB: 2,054'
SPUD/ RE-ENTRY DATE:	November 27, 2014
BOTTOM HOLE LOCATION:	545' north & 9,858' east of surface location or approx. 2,500' FSL & 301' FEL, NE SE Section 29, T153N, R100W
CLOSURE COORDINATES:	Closure Azimuth: 86.84° Closure Distance: 9,872.65'
TOTAL DEPTH / DATE:	20,500' on January 18, 2015 86% within target interval
TOTAL DRILLING DAYS:	20 days
CONTRACTOR:	Nabors B25

PUMPS:	H & H Triplex (stroke length - 12")
TOOLPUSHERS:	Casey Pippenger, Bruce Walter
FIELD SUPERVISORS:	Mike Crow, Travis Handran
CHEMICAL COMPANY:	Fluid Control
MUD ENGINEER:	Keith McCarty, Warren Carlson
MUD TYPE:	Fresh water in surface hole Diesel invert in curve; Salt water in lateral
MUD LOSSES:	Invert Mud: 942 bbls., Salt Water: Not tracked
PROSPECT GEOLOGIST:	Kellie Rasmussen
WELLSITE GEOLOGISTS:	Hannah Thatcher, Daniel Haynes, Derry Callender
GEOSTEERING SYSTEM:	Sunburst Digital Wellsite Geological System
ROCK SAMPLING:	30' from 4,000' - 10,870' 10' from 10,870' -11,080' 30' from 11,080' - 20,500' (TD)
SAMPLE EXAMINATION:	Trinocular microscope & fluoroscope
SAMPLE CUTS:	Trichloroethylene
GAS DETECTION:	MSI (Mudlogging Systems, Inc.) TGC - total gas with chromatograph Serial Number(s): ML-382
ELECTRIC LOGS:	n/a
DRILL STEM TESTS:	n/a
DIRECTIONAL DRILLERS:	RPM Mike Crow, Jordon Jensen, Will Wright
MWD:	Ryan Directional Service Inc. Daniel Ogden, Blair Hibert

CASING:

Surface: 13.375" 36# J-55 set to 2,060'
Intermediate Surface: 9 5/8" 40# HCL-180 set to 6,001'
Intermediate: 7" 32# HCP-110 set to 11,060'

SAFETY/ H_2S MONITORING:

Oilind Safety

KEY OFFSET WELLS:

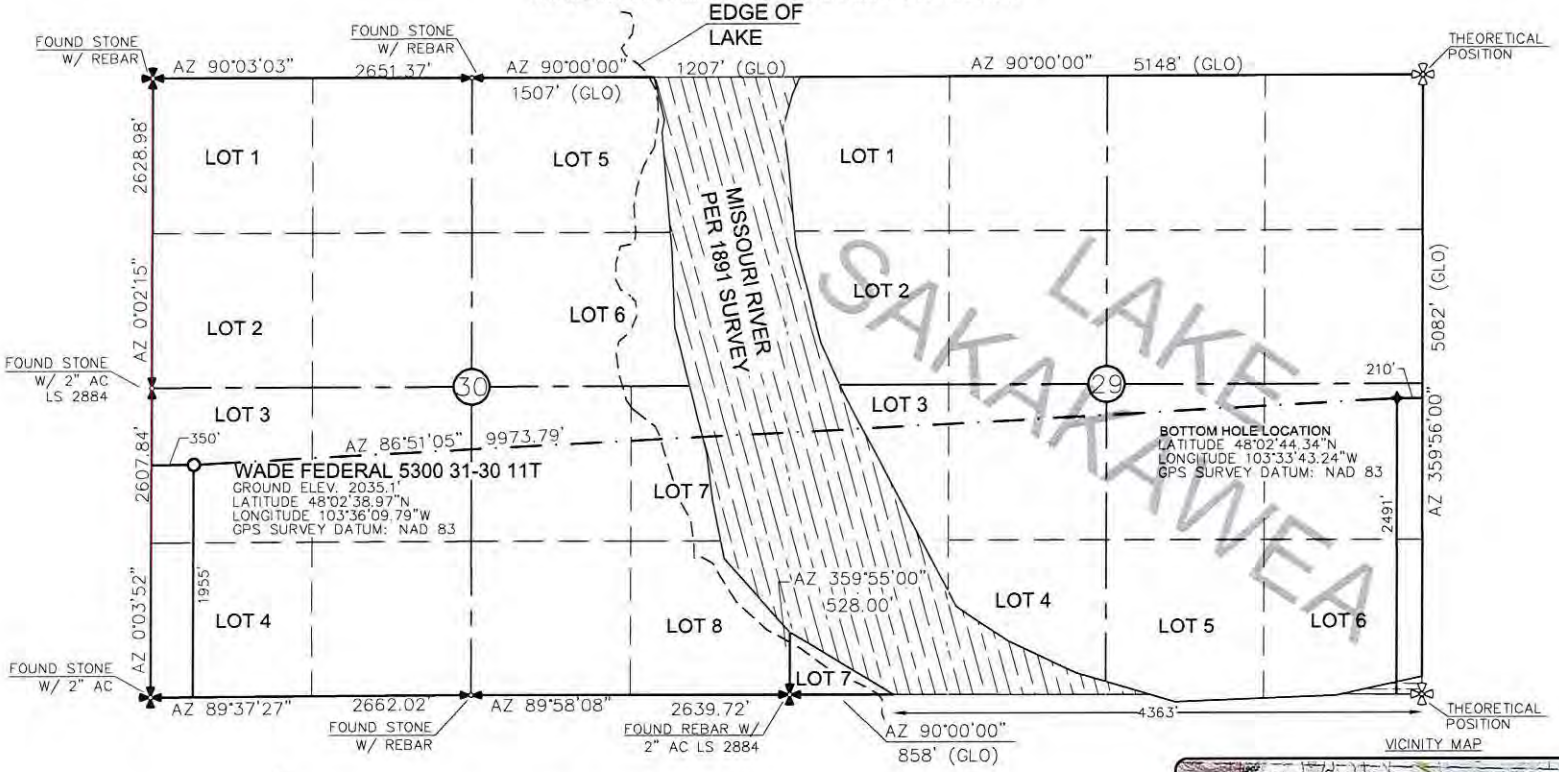
Oasis Petroleum North America
Wade Federal 5300 21-30 12T
SW NW Section 30, T153N, R100W
McKenzie Co., ND
KB: 2,024'

Oasis Petroleum North America
Wade Federal 5300 21-30 14T2
SW NW Section 30, T153N, R100W
McKenzie Co., ND
KB: 2,024'

Oasis Petroleum North America
Wade Federal 5300 21-30 13B
SW NW Section 30, T153N, R100W
McKenzie Co., ND
KB: 2,024'

WELL LOCATION PLAT

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"WADE FEDERAL 5300 31-30 11T"
1955 FEET FROM SOUTH LINE AND 350 FEET FROM WEST LINE
SECTION 30, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA



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STAKED ON 1/10/14
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DARYL D. KASEMAN LS-3880

REGISTERED LAND SURVEYOR
DARYL D. KASEMAN
LS-3880
DATE: 1/21/14
NORTH DAKOTA

VICINITY MAP

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Revision No.	Date	By	Description

OASIS PETROLEUM NORTH AMERICA, LLC
WELL LOCATION PLAT
SECTION 30, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. Project No.: S13-09-380.02
Checked By: D.D.K. Date: JAN. 2014

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SECTION BREAKDOWN

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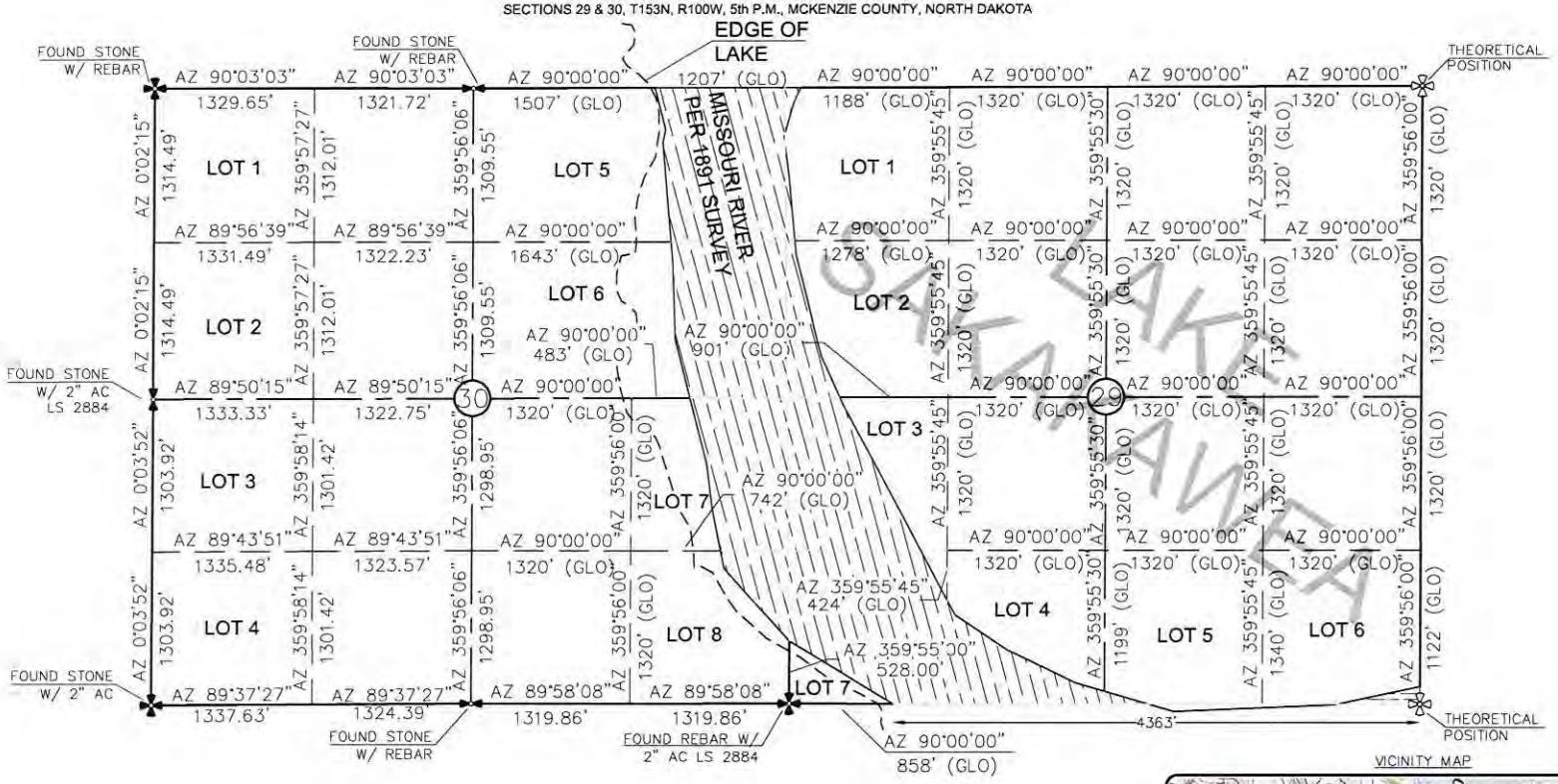
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"WADE FEDERAL 5300 31-30 11T"
1955 FEET FROM SOUTH LINE AND 350 FEET FROM WEST LINE
SECTIONS 29 & 30, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA



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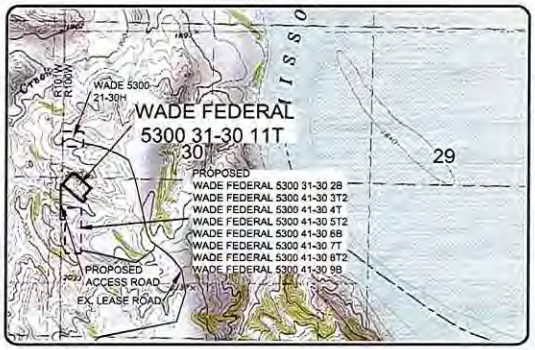
ALL AZIMUTHS ARE BASED ON G.P.S. OBSERVATIONS. THE ORIGINAL SURVEY OF THIS AREA FOR THE GENERAL LAND OFFICE (G.L.O.) WAS 1897. THE CORNERS FOUND ARE AS INDICATED AND ALL OTHERS ARE COMPUTED FROM THOSE CORNERS FOUND AND BASED ON G.L.O. DATA. THE MAPPING ANGLE FOR THIS AREA IS APPROXIMATELY 0°03'.

REGISTERED LAND SURVEYOR
DARYL D. KASEMAN
LS-3880
DATE: 1/21/14
NORTH DAKOTA

VICINITY MAP



– MONUMENT – RECOVERED
– MONUMENT – NOT RECOVERED

0 1000
1" = 1000'

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Revision No.	Date	By	Description

OASIS PETROLEUM NORTH AMERICA, LLC
SECTION BREAKDOWN
SECTIONS 29 & 30, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. Project No.: S13-29-30.02
Checked By: D.D.K. Date: JAN. 2014

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Other offices in Minnesota, North Dakota and South Dakota

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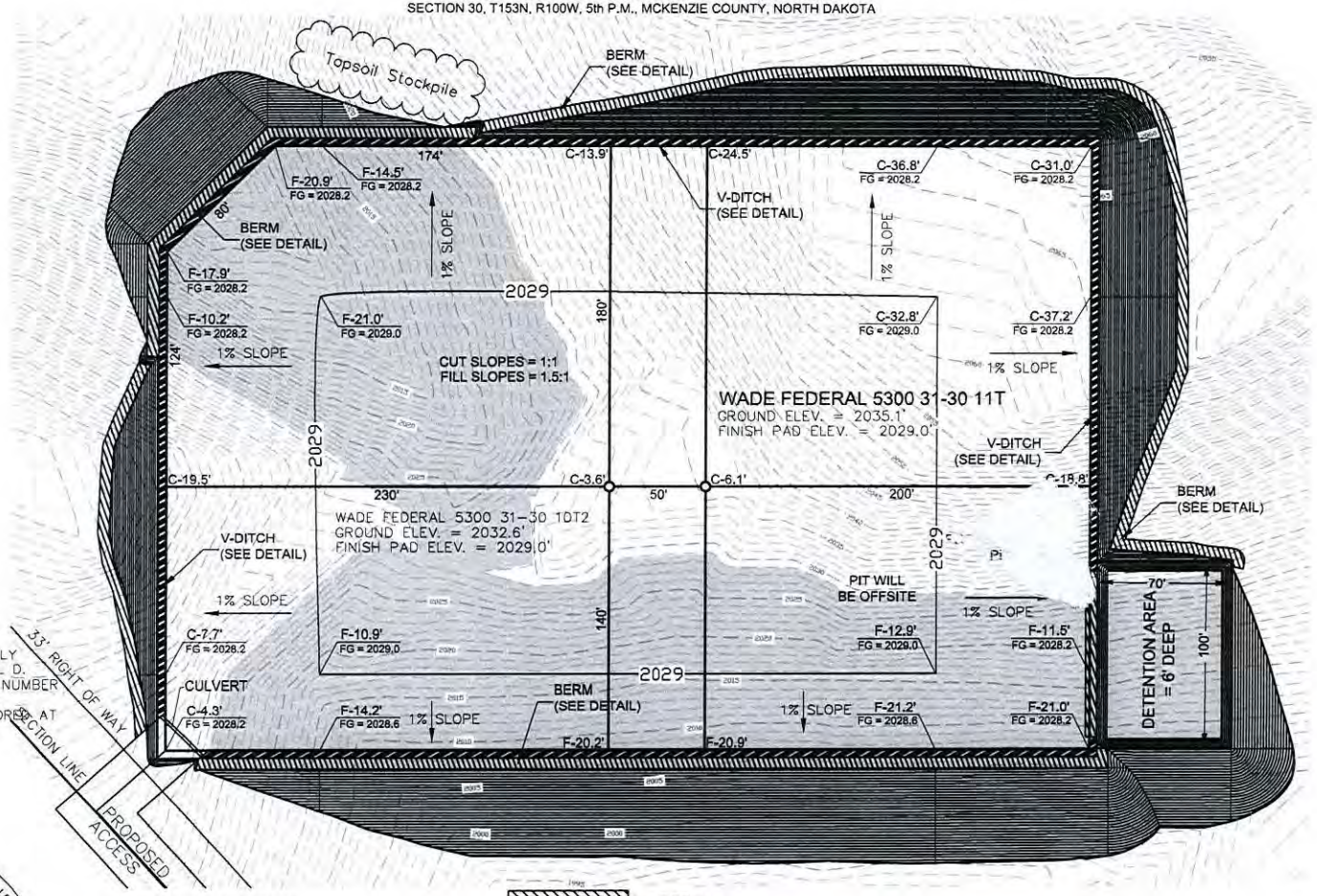
PAD LAYOUT

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"WADE FEDERAL 5300 31-30 11T"
1955 FEET FROM SOUTH LINE AND 350 FEET FROM WEST LINE
SECTION 30, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA



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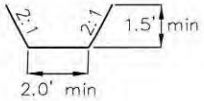
REGISTERED LAND SURVEYOR
DARYL D. KASEMAN
LS-3880
DATE: 1/21/14
NORTH DAKOTA

V-DITCH DETAIL



NOTE: All utilities shown are preliminary only, a complete utilities location is recommended before construction.

NOTE: Pad dimensions shown are to usable area, the v-ditch and berm areas shall be built to the outside of the pad dimensions.

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Revision No.	Date	By	Description

OASIS PETROLEUM NORTH AMERICA, LLC
PAD LAYOUT
SECTION 30, T153N, R100W
MKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. Project No.: S13-09-280.02
Checked By: D.D.K. Date: JAN. 2014

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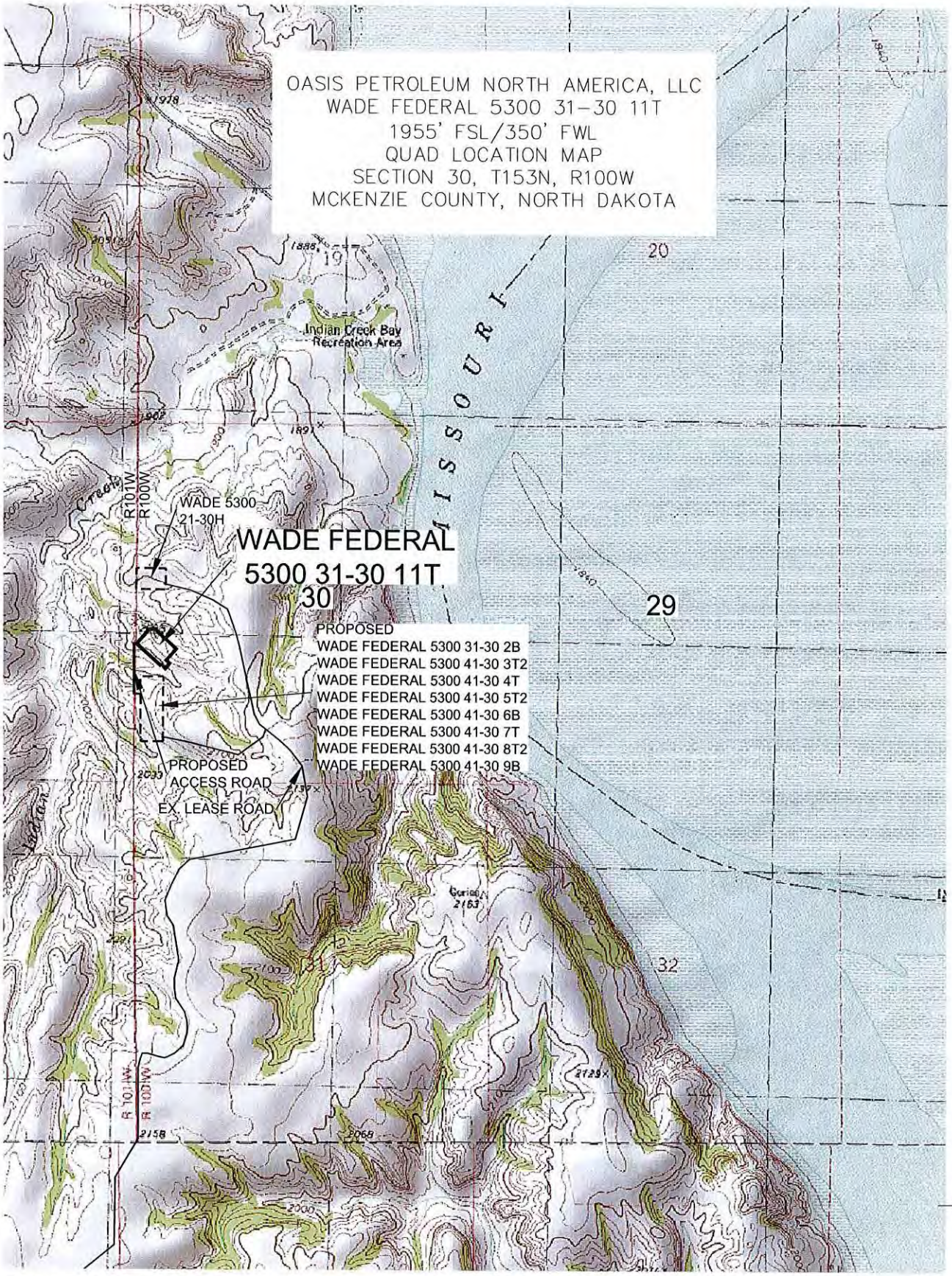

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5/8
SHEET NO.

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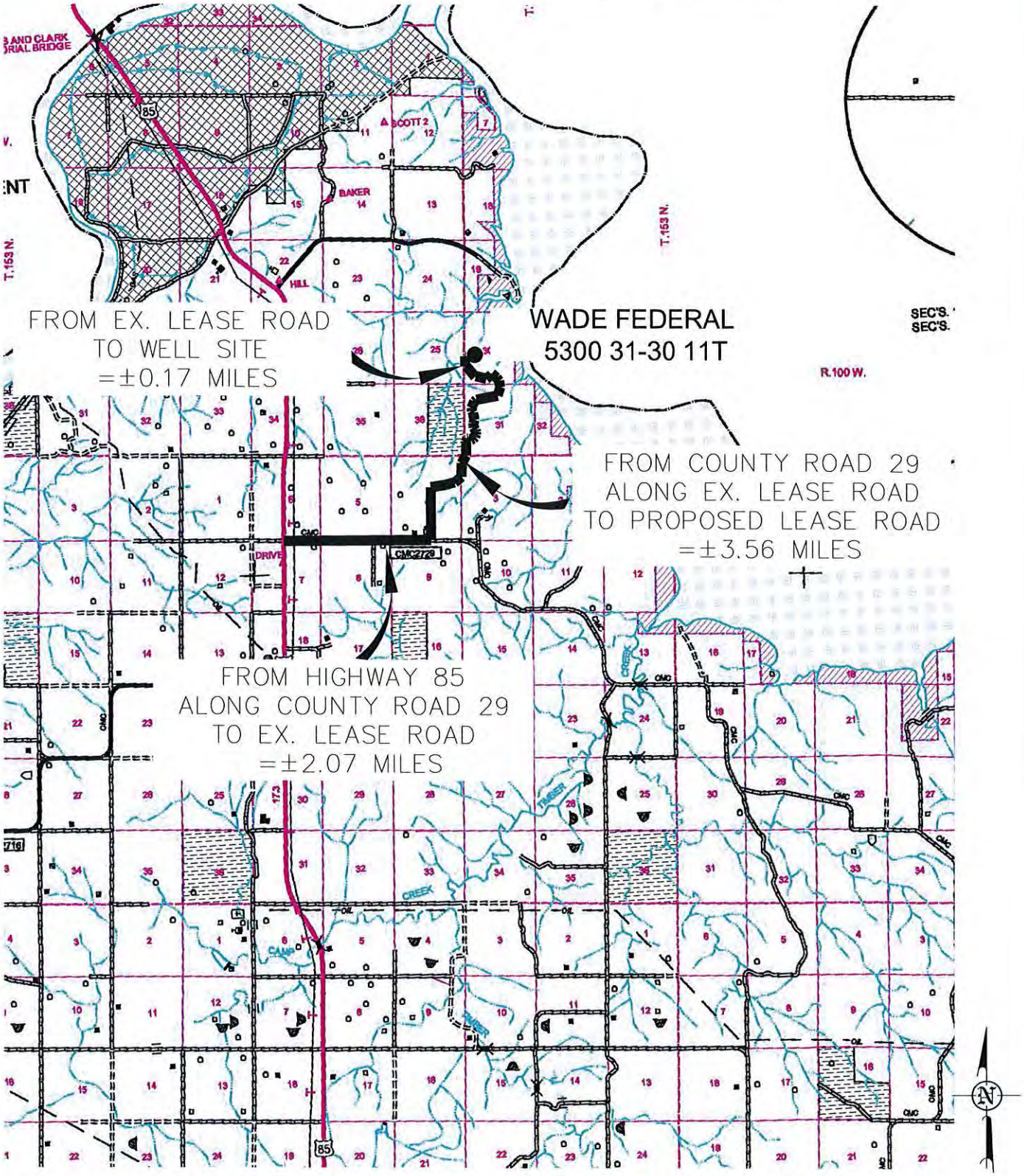
OASIS PETROLEUM NORTH AMERICA, LLC
QUAD LOCATION MAP
SECTION 30, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. | Project No.: S13-09-380.02
Checked By: D.D.K. | Date: JAN. 2014

Revision No.	Date	By	Description

COUNTY ROAD MAP

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"WADE FEDERAL 5300 31-30 11T"
1955 FEET FROM SOUTH LINE AND 350 FEET FROM WEST LINE
SECTION 30, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA



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SCALE: 1" = 2 MILE

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OASIS PETROLEUM NORTH AMERICA, LLC
COUNTY ROAD MAP
SECTION 30, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

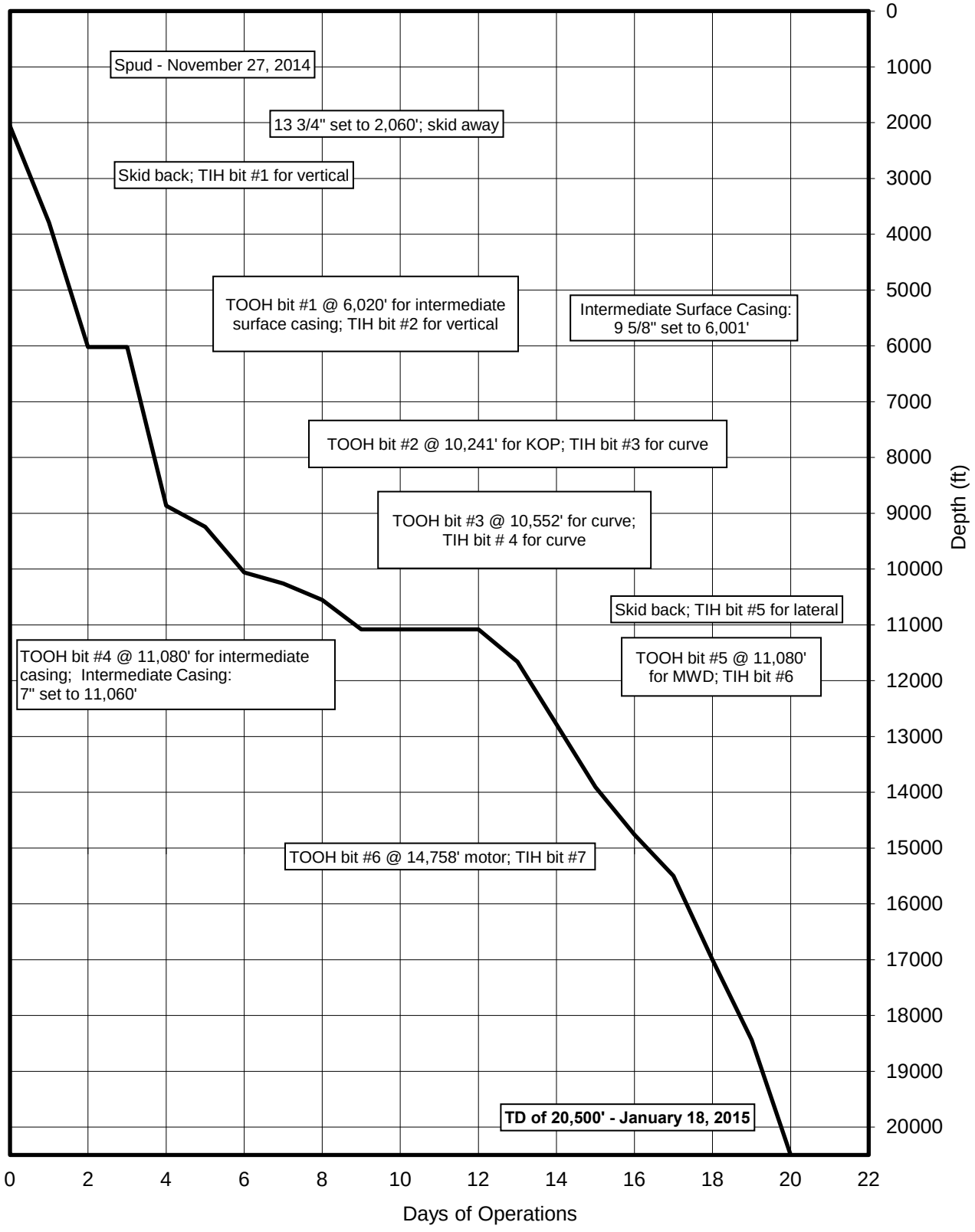
Drawn By:	B.H.H.	Project No.:	S13-09-380.02
Checked By:	D.D.K.	Date:	JAN. 2014

Revision No.	Date	By	Description

TIME VS. DEPTH

Oasis Petroleum North America

Wade Federal 5300 31-30 11T



MORNING REPORT SUMMARY

Day	Date 2014/ 2015	Depth (0600 Hrs)	24 Hr Footage	Bit #	WOB (Klbs) RT	RPM (RT)	WOB (Klbs) MM	RPM (MM)	PP	SPM 1	SPM 2	GPM	24 Hr Activity Summary	Formation
0	12/12	2,062'	0	1	15	60	25	258	2500	75	75	527	Nipple up BOP, test BOP, install/remove wear bushing, P/U BHA, P/U DP, change rotating head/rubber, P/U DP, service rig, displace to oil base	-
1	12/13	3,786'	1724	1	18	70	22	304	2600	90	90	620	Rotary drilling, service rig, rotary drilling, trip out of hole, downtime-mud system, trip in hole, reaming/washing	Pierre
2	12/14	6,020'	2234	1	15	60	25	304	3185	90	90	620	Drill F/3786 to 6,020', circulate and condition, TOOH, change rotating head/rubber, TOOH	Swift
3	12/15	6,020'	0	1	18	70	-	304	2600	90	90	620	TOOH, change rotating head/rubber, lay down BHA, install/remove wear bushing, rig up/down to run casing, run casing, circulate and condition, primary cementing.	Swift
4	12/16	8,864'	2844	2	22	60	25	270	3325	80	80	551	Drill F/8003 to 8,864".	Charles
5	12/17	9,242'	378	2	30	55	35	270	3445	80	80	551	Drill from 8947' to 9513', rig service, drill from 9513' to 9764'	Ratcliffe
6	12/18	10,061'	819	2	35	40	-	270	3745	80	80	551	Drill F/8003 to 10,061'.	Lodgepole
7	12/19	10,257'	196	3	35	40	20	270	3745	80	80	551	Drill F/9585 T/10241, TOOH, Change rotating head/rubber, TOOH, Open hole logs, trip into hole, drill from 10,241' to 10,257	Lodgepole
8	12/20	10,552'	295	3	30	40	45	270	3500	80	80	551	Drill from 10,241' to 10,552, trip out of hole, change rotating head/rubbers, trip into hole, Service rig, Reaming/washing	Lodgepole
9	12/21	11,080'	528	4	30	35	35	270	3545	80	80	551	Drill F/10552 T/11,080, circulate and condition, TOOH, change rotating head/rubber, TOOH	Three Forks
10	12/22	11,080'	0	4	30	35	35	270	3545	80	80	551	TOOH, Lay down BHA, Install/remove wear bushing, Downtime-powered catwalk, Rig up/down to run casing, Pre-job safety, Run casing, Service rig, Run casing, Rig up/down to run casing, Circulate and condition, Pre-job safety, Primary cementing	Three Forks
11	1/9	11,080'	0	5	-	-	-	-	-	-	-	-	Skid rig, Walk, Center, Level rig, Rig up, Nipple up BOPs, Stack BOPs, Nipple up BOPs, Change quill, stabbing guide, elevators, Change rotating head/rubber, Install pack off, finish pack off rig assembly down, Test BOPs, rig up tester, Working as directed by operator, Nipple down open pipe ram doors to retrieve test plug, Test BOPs, Retest, blinds, Pick up BHA	Three Forks
12	1/10	11,080'	0	5	-	-	-	-	-	-	-	-	Pick up BHA, Pick up drill pipe, Service rig, catwalk, R&R Blower fan motor, Pick up drill pipe, Change rotating head/rubber, Install rotating head remove trip nipple, Pick up drill pipe, Drilling cement, tag cement @10300, Pressure test csg/shoe, Casing test @2500 psi for 30 min., Drilling cement 10300-10367, trouble shoot pressuing up problem, TOOH, Change rotating head/rubber, remove rotating head, install trip nipple, TOOH	Three Forks
13	1/11	11,660'	580	6	35	20	35	270	2450	80	80	551	Lay down BHA, trouble shoot bit/replace bit, TIH 0-10367, Change rotating head/rubber, Reaming/washing, cement, float/shoe equipment, Formation integrity test (FIT) 1900 PSI/30 min @11098', Rotary drilling F/11080 T/11660	Three Forks

MORNING REPORT SUMMARY

Day	Date 2014/ 2015	Depth (0600 Hrs)	24 Hr Footage	Bit #	WOB (Klbs) RT	RPM (RT)	WOB (Klbs) MM	RPM (MM)	PP	SPM 1	SPM 2	GPM	24 Hr Activity Summary	Formation
14	1/12	12,782'	1122	6	18	50	25	135	3465	-	80	276	Rotary drilling F/11724 T/12782	Three Forks
15	1/13	13,905'	1123	6	15	50	35	135	3400	80	-	276	Rotary drilling F/12836 T/13331, Service top drive, Functioned annular, Drills-BOP etc., time 6 min. Drill F/13331 T/13905	Three Forks
16	1/14	14,758'	853	7	20	40	35	135	2700	-	80	276	Drill F/13735 T/14410, Service top drive/function pipe rams, Drill F/14410 T/14758,TOOH, Change rotating head/rubber, remove rotating head install trip nipple, TOOH	Three Forks
17	1/15	15,500'	742	7	20	40	30	135	3400	80	-	276	TIH, Change rotating head/rubber, TIH, Drill F/14758 T/15500	Three Forks
18	1/16	17,000'	1500	7	22	40	35	135	3700	80	-	276	Drill F/15500 to 17,000'.	Three Forks
19	1/17	18,440'	1440	7	21	28	40	135	3115	80	-	276	Drill F/15500 to 18,440'.	Three Forks
20	1/18	20,500'	2060	7	21	40	28	135	3115	80	-	276	Drill F/18440 to 19,982'	Three Forks

DAILY MUD SUMMARY

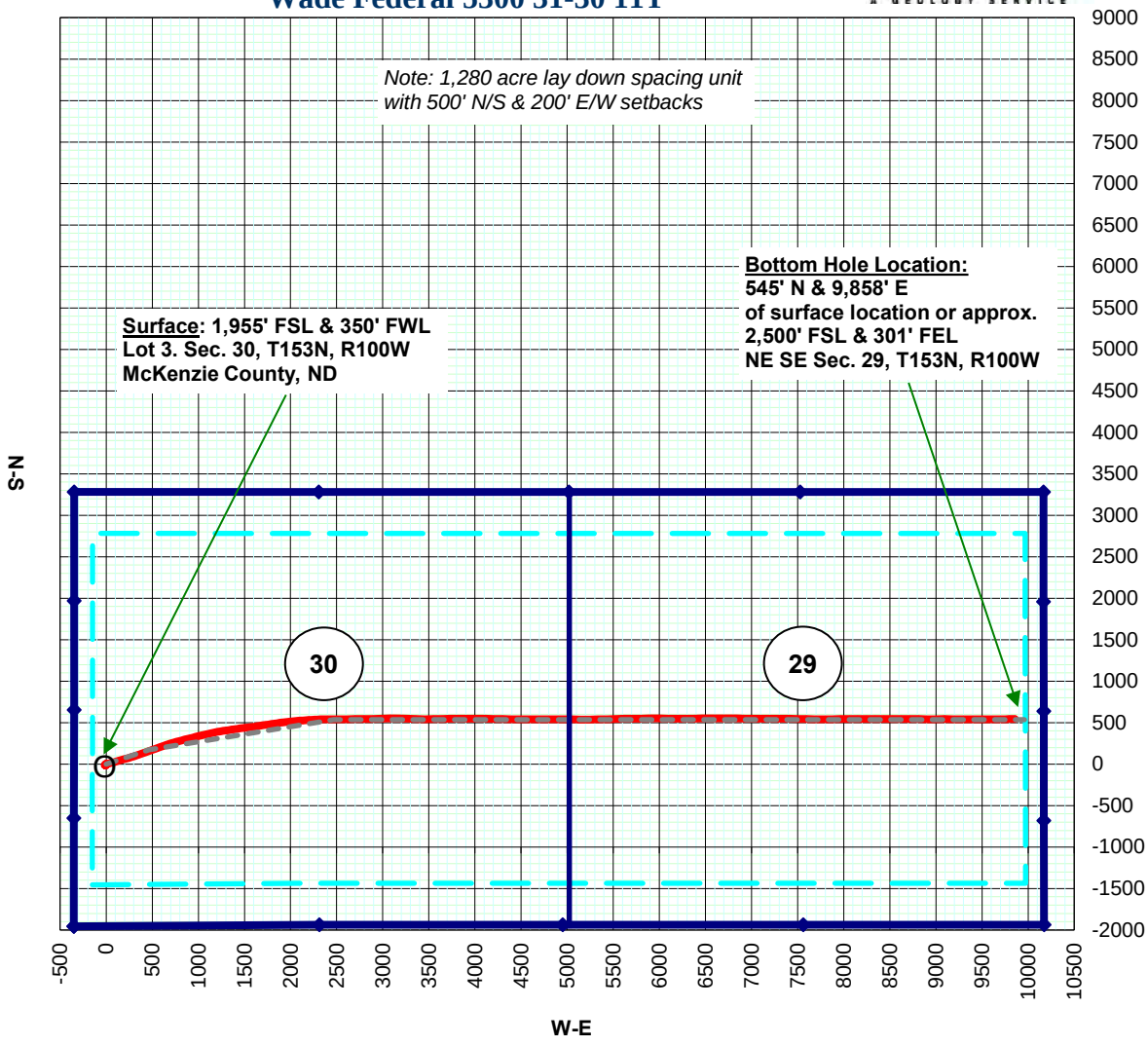
Date 2014/2015	Mud Depth	Mud WT (ppg)	VIS (sec/qt)	PV (cP)	YP (lbs/100 ft^2)	Gels (lbs/100 ft^2)	600/300	NAP/ H_20 (ratio)	NAP/ H_20 (% by vol)	Cake (API/HTHP)	Cor. Solids (%)	Oil/ H_20 (%)	Alk	pH	Excess Lime (lb/bbl)	Cl^- (mg/L)	LGS/HGS (%)	Salinity (ppm)	Electrical Stability	Gain/Loss (bbls)
12/11	233'	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-
12/12	3,168'	11.5	96	23	16	15/23/-	62/39	75.3/24.7	61/20	4.8	16.6	61/20	2.5	-	3.2	40k	12.2/4.4	257,580	650	-/165
12/13	5,300'	11.4	48	18	14	12/17/-	50/32	79/21	64/17	5.8	16.7	64/17	2.1	-	2.7	40k	12.2/4.3	264,320	960	-/125
12/14	5,964'	11.55	49	16	10	10/15/-	42/26	78.4/21.6	63.5/17.5	4.8	16.7	63.5/17.5	2.2	-	2.8	40k	12.8/4.2	264,320	725	-/353
12/15	6,047'	9.95	68	18	10	11/16/-	46/28	74.7/25.3	65/22	3	10.7	65/22	2.2	-	2.8	38k	6.1/4.7	221,581	525	-/72
12/16	8,290'	9.85	44	14	8	9/14/-	36/22	78/22	67.5/19	3	11.2	67.5/19	2	-	2.6	38k	5.8/5.4	247,894	515	-/124
12/17	9,436'	9.8	45	16	10	11/16/-	42/26	76.9/23.1	66.5/20	3	10.8	66.5/20	2.3	-	3	46k	5.9/5.2	264,320	775	-/62
12/18	10,241'	9.8	45	14	11	10/15/-	39/25	79.2/20.8	68.5/18	3	6.1/5.2	68.5/18	2.3	-	3	48k	5.2/6.1	264,320	835	-/41
12/19	10,411'	10.1	47	15	12	12/17/-	42/27	78.8/21.2	67/18	3	15	78.8/21.2	2.2	-	2.8	48k	5.6/7.0	264,320	725	-/-
12/20	10,552'	10.1	47	15	12	12/17/-	42/27	78.8/21.2	67/18	3	15	78.8/21.2	2.2	-	2.8	48k	5.6/7.0	264,320	725	-/-
12/21	11,080'	10.1	47	15	12	12/17/-	42/27	78.8/21.2	67/18	3	15	78.8/21.2	2.2	-	2.8	48k	5.6/7.0	264,320	725	-/-
12/22	11,080'	Change mud from diesel invert to salt water																		
01/09	11,080'	9.6	26	1	1	-	3/2	-	-/93	-	-	-/93	-	9	-	20k	-/0.6	-	-	-/-
01/10	11,080'	9.6	26	1	1	-	3/2	-	-/93	-	-	-/93	-	9	-	20k	-/0.6	-	-	-/-
01/11	11,660'	9.6	26	1	1	-	3/2	-	-/93	-	-	-/93	-	9	-	20k	-/0.6	-	-	-/-
01/12	12,782'	9.6	26	1	1	-	3/2	-	-/93	-	-	-/93	-	9	-	20k	-/0.6	-	-	-/-
01/13	14,290'	9.6	27	1	1	-	3/2	-	-/94	-	-	-/94	-	9	-	20.5k	-/0.4	-	-	-/-
01/14	14,758'	9.6	27	1	1	-	3/2	-	-/94	-	-	-/94	-	9	-	20.5k	-/0.4	-	-	-/-
01/15	15,851'	9.57	27	1	1	-	3/2	-	-/91.3	-	-	-/91.3	-	9.5	-	16k	-/0.6	-	-	-/-
01/16	17,000'	9.57	27	1	1	-	3/2	-	-/91.3	-	-	-/91.3	-	9.5	-	16k	-/0.6	-	-	-/-
01/17	18,998'	9.6	27	1	1	-	3/2	-	-/91.2	-	-	-/91.2	-	7.5	-	140k	-/0.4	-	-	-/-
01/18	19,982'	9.6	27	1	1	-	3/2	-	-/91.2	-	-	-/91.2	-	7.5	-	140k	-/0.4	-	-	-/-

BOTTOM HOLE ASSEMBLY RECORD

Bit Data											Motor Data				Reason For Removal
Bit #	Size (in.)	Type	Make	Model	Depth In	Depth Out	Footage	Hours	Σ hrs	Vert. Dev.	Make	Model	Bend	Rev/Gal	
1	12 1/4	Tri-cone	NOV	DS616D	2,060'	6,020'	3,960'	27.5	27.5	Surface	Baker	-	1.00°	0.29	TD surface
2	8 3/4	PDC	Varel	A09403	6,020'	10,241'	4,221'	68	95.5	Vertical	Baker	-	1.00°	0.29	TD vertical
3	8 3/4	Tri-cone	Security	MMD55C	10,241'	10,552'	311'	12	107.5	Curve	Baker	-	2.38°	0.29	Low builds
4	8 3/4	Tri-cone	Security	MMD55M	10,552'	11,080'	528'	17	124.5	Curve	Baker	-	2.50°	0.29	TD curve
5	6	PDC	Smith	Z613	11,080'	11,080'	0'	0	124.5	Lateral	Baker	-	1.50°	0.49	Low ROP
6	6	PDC	Varel	A09380	11,080'	14,758'	3,678'	78	202.5	Lateral	Baker	XLLS	1.50°	0.49	Motor Failure
7	6	PDC	Smith	Z613	14,758'	20,500'	5,742'	77	279.5	Lateral	Baker	XLLS	1.50°	0.49	TD well

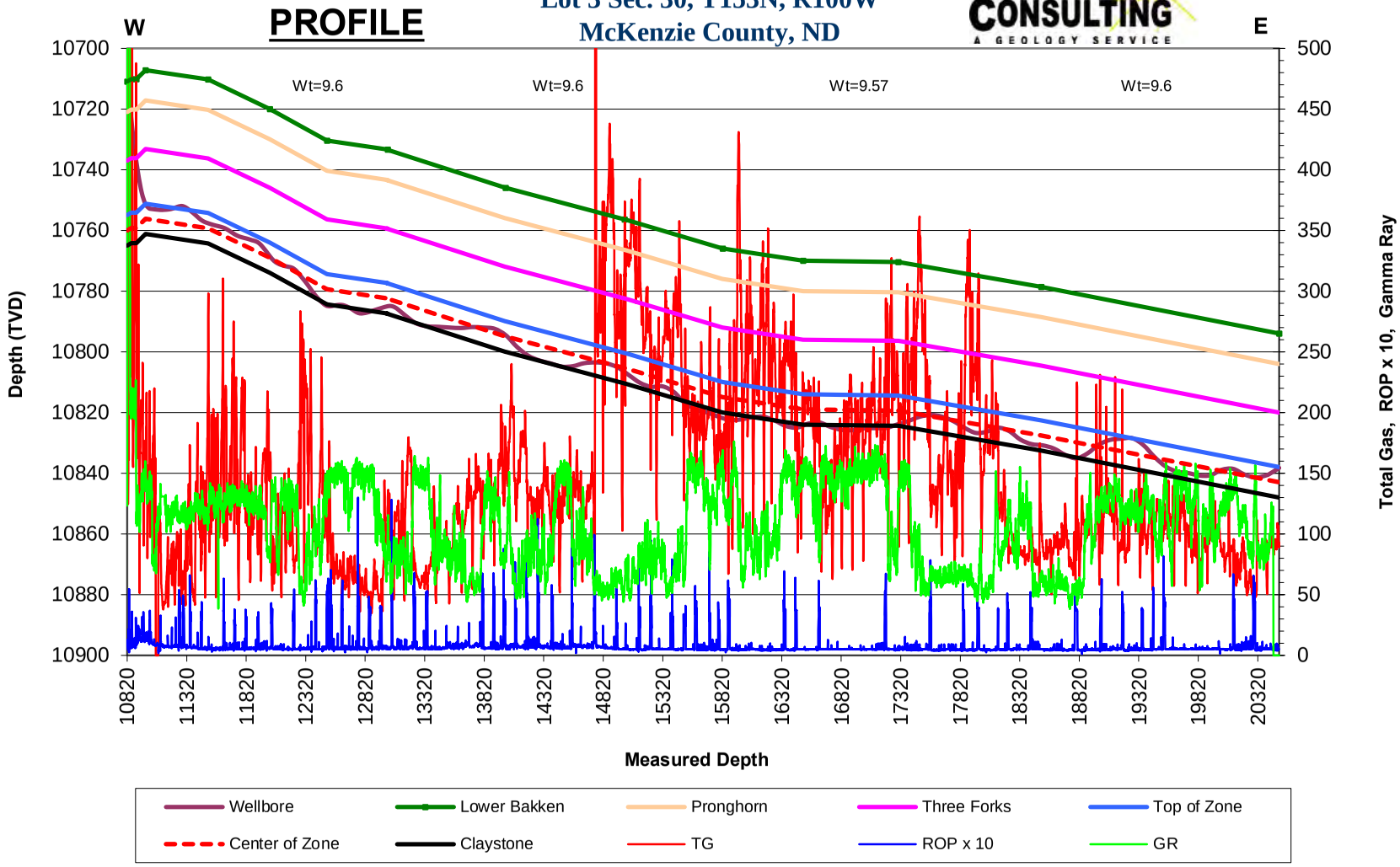
PLAN VIEW

Oasis Petroleum North America, LLC
Wade Federal 5300 31-30 11T



Oasis Petroleum North America, LLC
Wade Federal 5300 31-30 11T
Lot 3 Sec. 30, T153N, R100W
McKenzie County, ND

SUNBURST CONSULTING
A GEOLOGY SERVICE



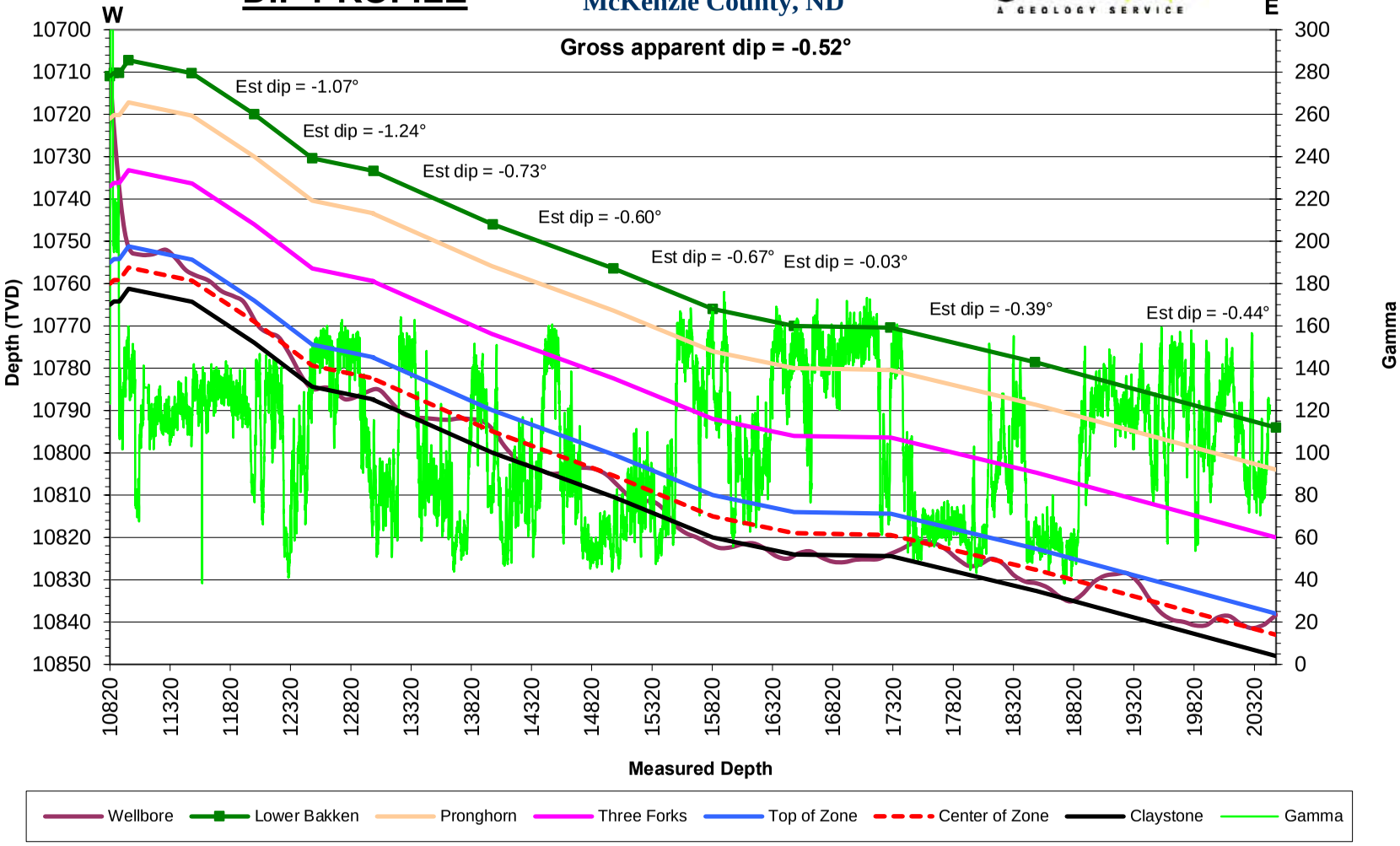
FORMATION MARKERS & DIP ESTIMATES

Oasis Petroleum North America, LLC - Wade Federal 5300 31-30 11T

Dip Change Points	MD	TVD	TVD diff.	MD diff.	Dip	Dipping up/down	Type of Marker
Marker							
	10,975'	10,707.20					Gamma
Top of Target Zone	11,500'	10,710.30	3.10	525.00	***-0.34***	Down	Gamma
Top of Target Zone	12,019'	10,720.00	9.70	519.00	***-1.07***	Down	Gamma
Center of Target Zone	12,500'	10,730.40	10.40	481.00	***-1.24***	Down	Gamma
Claystone	13,010'	10,733.40	3.00	510.00	***-0.34***	Down	Gamma
Center of Target Zone	14,000'	10,746.00	12.60	990.00	***-0.73***	Down	Gamma
Center of Target Zone	15,000'	10,756.40	10.40	1000.00	***-0.60***	Down	Gamma
Claystone	15,825'	10,766.00	9.60	825.00	***-0.67***	Down	Gamma
Claystone	16,500'	10770.00	4.00	675.00	***-0.34***	Down	Gamma
Claystone	17,300'	10,770.40	0.40	800.00	***-0.03***	Down	Gamma
Center of Target Zone	18,500'	10,778.60	8.20	1200.00	***-0.39***	Down	Gamma
TD	20,500'	10,794.00	15.40	2000.00	***-0.44***	Down	Gamma
Gross Dip							
Initial Target Contact	10,975'	10,707.20					
Projected Final Target Contact	20,500'	10,794.00	86.80	9525.00	***-0.52***	Down	Projection

Oasis Petroleum North America, LLC
Wade Federal 5300 31-30 11T
Lot 3 Sec. 30, T153N, R100W
McKenzie County, ND

DIP PROFILE



SUNBURST CONSULTING, INC.

Operator:	Oasis Petroleum North America, LLC			Kick-off:	12/19/2015
Well :	Wade Federal 5300 31-30 11T			Finish:	1/18/2015
County:	McKenzie	State:	ND	Directional Supervision:	
QQ:	Lot 3	Section:	30	RPM	
Township:	153	N/S:	N		
Range:	100	E/W:	W	Date:	1/22/2015
Footages:	1955	FN/SL:	S	Time:	10:28
	350	FE/WL:	W	**F9 to re-calculate**	
Minimum Curvature Method (SPE-3362)				Proposed dir:	86.92

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

No.	MD	INC	TRUE AZM	TVD	N-S	E-W	SECT	DLS/ 100
Tie	2064.00	1.20	232.10	2063.69	-2.48	3.03	2.89	1.03
1	2148.00	1.10	203.80	2147.67	-3.76	2.01	1.81	0.68
2	2179.00	1.10	208.70	2178.67	-4.29	1.75	1.51	0.30
3	2272.00	1.40	213.00	2271.65	-6.03	0.70	0.38	0.34
4	2365.00	1.10	217.80	2364.62	-7.69	-0.47	-0.88	0.34
5	2458.00	1.50	204.00	2457.60	-9.50	-1.51	-2.02	0.54
6	2551.00	1.20	212.40	2550.57	-11.44	-2.52	-3.14	0.39
7	2644.00	1.50	223.70	2643.55	-13.14	-3.89	-4.59	0.43
8	2738.00	1.60	222.80	2737.51	-14.99	-5.63	-6.43	0.11
9	2831.00	0.10	251.00	2830.50	-15.97	-6.59	-7.44	1.63
10	2924.00	0.40	346.30	2923.50	-15.68	-6.74	-7.57	0.45
11	3017.00	0.20	334.90	3016.50	-15.22	-6.89	-7.70	0.22
12	3111.00	0.30	25.20	3110.50	-14.85	-6.85	-7.64	0.25
13	3204.00	0.30	45.20	3203.50	-14.46	-6.58	-7.34	0.11
14	3297.00	0.20	53.30	3296.50	-14.19	-6.27	-7.03	0.11
15	3390.00	0.10	59.00	3389.50	-14.05	-6.07	-6.82	0.11
16	3484.00	0.10	336.10	3483.50	-13.93	-6.04	-6.78	0.14
17	3577.00	0.20	38.20	3576.50	-13.73	-5.97	-6.70	0.19
18	3670.00	0.40	348.30	3669.49	-13.28	-5.93	-6.64	0.33
19	3763.00	0.10	332.90	3762.49	-12.89	-6.04	-6.72	0.33
20	3856.00	0.40	9.80	3855.49	-12.50	-6.02	-6.68	0.35
21	3949.00	0.40	298.30	3948.49	-12.03	-6.25	-6.89	0.50
22	4043.00	0.40	308.90	4042.49	-11.67	-6.79	-7.41	0.08
23	4136.00	0.40	346.70	4135.49	-11.15	-7.12	-7.71	0.28
24	4229.00	0.30	359.10	4228.48	-10.59	-7.20	-7.76	0.13
25	4322.00	0.10	253.70	4321.48	-10.37	-7.28	-7.83	0.37
26	4415.00	0.50	281.30	4414.48	-10.31	-7.76	-8.30	0.45
27	4509.00	0.30	309.00	4508.48	-10.07	-8.35	-8.88	0.29
28	4602.00	0.40	304.10	4601.48	-9.74	-8.81	-9.32	0.11
29	4788.00	0.40	284.10	4787.47	-9.22	-9.98	-10.46	0.07
30	4881.00	0.20	219.40	4880.47	-9.26	-10.39	-10.88	0.39
31	4974.00	0.20	221.40	4973.47	-9.51	-10.60	-11.10	0.01
32	5068.00	0.40	192.50	5067.47	-9.95	-10.78	-11.30	0.26
33	5161.00	0.20	222.30	5160.47	-10.39	-10.96	-11.51	0.27
34	5254.00	0.40	190.20	5253.47	-10.83	-11.13	-11.70	0.27

SUNBURST CONSULTING, INC.

Operator:	Oasis Petroleum North America, LLC			Kick-off:	12/19/2015
Well :	Wade Federal 5300 31-30 11T			Finish:	1/18/2015
County:	McKenzie	State:	ND	Directional Supervision:	
QQ:	Lot 3	Section:	30	RPM	
Township:	153	N/S:	N		
Range:	100	E/W:	W	Date:	1/22/2015
Footages:	1955	FN/SL:	S	Time:	10:28
	350	FE/WL:	W	**F9 to re-calculate**	
Minimum Curvature Method (SPE-3362)				Proposed dir:	86.92

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

No.	MD	INC	TRUE AZM	TVD	N-S	E-W	SECT	DLS/ 100
35	5347.00	0.50	149.50	5346.47	-11.50	-10.98	-11.58	0.35
36	5440.00	0.60	159.80	5439.46	-12.31	-10.61	-11.25	0.15
37	5534.00	0.60	165.60	5533.46	-13.25	-10.31	-11.01	0.06
38	5627.00	0.40	14.20	5626.45	-13.40	-10.11	-10.82	1.04
39	5720.00	0.40	24.70	5719.45	-12.79	-9.90	-10.57	0.08
40	5813.00	0.50	6.80	5812.45	-12.09	-9.72	-10.35	0.18
41	5906.00	0.50	25.30	5905.45	-11.33	-9.49	-10.09	0.17
42	5965.00	0.50	24.60	5964.44	-10.86	-9.28	-9.85	0.01
43	6059.00	0.60	19.70	6058.44	-10.02	-8.94	-9.47	0.12
44	6091.00	0.30	49.00	6090.44	-9.81	-8.82	-9.33	1.15
45	6184.00	0.60	39.30	6183.44	-9.27	-8.33	-8.81	0.33
46	6277.00	0.70	20.40	6276.43	-8.36	-7.82	-8.26	0.25
47	6370.00	0.50	29.00	6369.42	-7.48	-7.43	-7.82	0.24
48	6463.00	0.80	27.60	6462.42	-6.55	-6.93	-7.27	0.32
49	6556.00	0.70	49.80	6555.41	-5.60	-6.19	-6.49	0.33
50	6649.00	0.80	35.80	6648.40	-4.71	-5.38	-5.63	0.22
51	6743.00	0.40	38.00	6742.40	-3.92	-4.80	-5.00	0.43
52	6836.00	0.20	131.50	6835.40	-3.77	-4.47	-4.67	0.49
53	6929.00	0.40	170.10	6928.40	-4.20	-4.30	-4.52	0.29
54	7022.00	0.40	182.20	7021.39	-4.84	-4.25	-4.51	0.09
55	7116.00	0.30	229.90	7115.39	-5.33	-4.45	-4.73	0.32
56	7209.00	0.10	14.50	7208.39	-5.41	-4.62	-4.90	0.41
57	7395.00	0.70	15.30	7394.39	-4.15	-4.28	-4.50	0.32
58	7489.00	0.70	9.60	7488.38	-3.03	-4.03	-4.19	0.07
59	7582.00	0.70	357.90	7581.37	-1.91	-3.96	-4.05	0.15
60	7675.00	0.90	12.60	7674.36	-0.63	-3.82	-3.85	0.31
61	7768.00	0.60	15.20	7767.35	0.56	-3.53	-3.50	0.32
62	7861.00	0.60	1.10	7860.35	1.51	-3.40	-3.31	0.16
63	7955.00	0.60	8.70	7954.34	2.49	-3.31	-3.17	0.08
64	8048.00	0.20	53.10	8047.34	3.07	-3.11	-2.94	0.51
65	8141.00	0.10	254.80	8140.34	3.15	-3.06	-2.88	0.32
66	8234.00	0.40	158.80	8233.34	2.82	-3.02	-2.86	0.45
67	8327.00	0.20	137.90	8326.34	2.40	-2.79	-2.66	0.24
68	8421.00	0.40	177.50	8420.34	1.95	-2.67	-2.56	0.29
69	8514.00	0.60	185.10	8513.34	1.14	-2.70	-2.63	0.23

SUNBURST CONSULTING, INC.

Operator:	Oasis Petroleum North America, LLC			Kick-off:	12/19/2015
Well :	Wade Federal 5300 31-30 11T			Finish:	1/18/2015
County:	McKenzie	State:	ND	Directional Supervision:	
QQ:	Lot 3	Section:	30	RPM	
Township:	153	N/S:	N		
Range:	100	E/W:	W	Date:	1/22/2015
Footages:	1955	FN/SL:	S	Time:	10:28
	350	FE/WL:	W	**F9 to re-calculate**	
Minimum Curvature Method (SPE-3362)				Proposed dir:	86.92

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

No.	MD	INC	TRUE AZM	TVD	N-S	E-W	SECT	DLS/ 100
70	8607.00	0.60	182.80	8606.33	0.17	-2.76	-2.75	0.03
71	8700.00	0.70	173.50	8699.32	-0.88	-2.72	-2.77	0.16
72	8794.00	0.60	178.90	8793.32	-1.94	-2.65	-2.75	0.12
73	8887.00	0.90	168.50	8886.31	-3.15	-2.49	-2.66	0.35
74	8980.00	1.00	180.30	8979.30	-4.67	-2.35	-2.60	0.24
75	9073.00	0.80	181.30	9072.29	-6.13	-2.37	-2.70	0.22
76	9166.00	1.00	207.80	9165.27	-7.50	-2.76	-3.16	0.49
77	9259.00	1.00	215.60	9258.26	-8.88	-3.62	-4.09	0.15
78	9352.00	1.10	232.30	9351.25	-10.08	-4.79	-5.33	0.34
79	9446.00	1.10	243.90	9445.23	-11.03	-6.32	-6.90	0.24
80	9539.00	0.70	243.20	9538.22	-11.68	-7.63	-8.24	0.43
81	9632.00	0.80	246.50	9631.21	-12.20	-8.73	-9.37	0.12
82	9725.00	0.80	253.00	9724.20	-12.65	-9.95	-10.61	0.10
83	9818.00	1.20	261.30	9817.19	-12.98	-11.53	-12.21	0.46
84	9911.00	0.70	279.30	9910.17	-13.04	-13.05	-13.73	0.62
85	10005.00	0.60	316.00	10004.17	-12.59	-13.96	-14.62	0.45
86	10098.00	0.80	307.50	10097.16	-11.85	-14.81	-15.43	0.24
87	10191.00	1.10	315.60	10190.15	-10.81	-15.95	-16.51	0.35
88	10196.00	1.20	323.20	10195.15	-10.74	-16.02	-16.57	3.64
89	10227.00	1.10	358.30	10226.14	-10.18	-16.22	-16.75	2.26
90	10258.00	2.40	46.50	10257.13	-9.44	-15.76	-16.24	5.99
91	10290.00	4.80	61.80	10289.06	-8.34	-14.09	-14.52	8.01
92	10321.00	7.90	68.60	10319.87	-6.95	-10.97	-11.32	10.27
93	10352.00	10.90	70.60	10350.45	-5.20	-6.22	-6.49	9.73
94	10383.00	13.90	70.80	10380.72	-3.00	0.07	-0.10	9.68
95	10414.00	16.90	71.20	10410.61	-0.32	7.85	7.82	9.68
96	10445.00	19.60	72.00	10440.04	2.74	17.06	17.18	8.75
97	10476.00	22.20	73.20	10469.00	6.04	27.61	27.90	8.50
98	10507.00	25.10	74.20	10497.39	9.52	39.55	40.00	9.44
99	10538.00	28.40	74.00	10525.07	13.34	52.97	53.61	10.65
100	10569.00	32.40	73.70	10551.81	17.71	68.03	68.88	12.91
101	10600.00	36.90	73.10	10577.30	22.75	84.92	86.02	14.56
102	10631.00	41.70	72.00	10601.28	28.64	103.64	105.03	15.65
103	10662.00	46.30	71.90	10623.58	35.31	124.11	125.83	14.84
104	10693.00	50.70	71.60	10644.11	42.58	146.15	148.23	14.21

SUNBURST CONSULTING, INC.

Operator:	Oasis Petroleum North America, LLC			Kick-off:	12/19/2015
Well :	Wade Federal 5300 31-30 11T			Finish:	1/18/2015
County:	McKenzie	State:	ND	Directional Supervision:	
QQ:	Lot 3	Section:	30	RPM	
Township:	153	N/S:	N		
Range:	100	E/W:	W	Date:	1/22/2015
Footages:	1955	FN/SL:	S	Time:	10:28
	350	FE/WL:	W	**F9 to re-calculate**	
Minimum Curvature Method (SPE-3362)				Proposed dir:	86.92

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

No.	MD	INC	TRUE AZM	TVD	N-S	E-W	SECT	DLS/ 100
105	10724.00	54.70	72.50	10662.90	50.18	169.61	172.06	13.11
106	10755.00	58.70	72.00	10679.91	58.08	194.28	197.12	12.97
107	10786.00	62.50	71.60	10695.13	66.51	219.93	223.18	12.31
108	10817.00	65.50	71.20	10708.71	75.40	246.33	250.03	9.75
109	10848.00	67.80	71.20	10721.00	84.57	273.27	277.42	7.42
110	10880.00	71.30	70.10	10732.18	94.51	301.56	306.20	11.40
111	10911.00	75.60	69.50	10741.01	104.77	329.44	334.59	13.99
112	10942.00	80.20	69.40	10747.50	115.41	357.81	363.50	14.84
113	10973.00	85.70	69.30	10751.31	126.25	386.59	392.82	17.74
114	11004.00	89.00	68.90	10752.74	137.30	415.52	422.29	10.72
115	11017.00	89.50	68.80	10752.91	141.99	427.64	434.65	3.92
116	11097.00	90.00	67.60	10753.26	171.70	501.92	510.42	1.62
117	11128.00	90.10	67.30	10753.23	183.58	530.55	539.64	1.02
118	11159.00	90.20	67.50	10753.15	195.50	559.16	568.86	0.72
119	11189.00	90.50	67.60	10752.97	206.95	586.89	597.16	1.05
120	11220.00	90.90	67.60	10752.59	218.76	615.55	626.41	1.29
121	11251.00	90.70	68.50	10752.16	230.35	644.30	655.75	2.97
122	11282.00	89.90	71.50	10751.99	240.95	673.43	685.40	10.02
123	11314.00	88.30	71.60	10752.50	251.08	703.78	716.25	5.01
124	11344.00	88.40	72.90	10753.36	260.22	732.34	745.26	4.34
125	11375.00	88.10	73.60	10754.31	269.15	762.01	775.37	2.46
126	11406.00	87.90	73.90	10755.39	277.82	791.75	805.53	1.16
127	11436.00	88.20	73.50	10756.41	286.23	820.53	834.72	1.67
128	11467.00	89.00	73.40	10757.17	295.06	850.23	864.86	2.60
129	11498.00	89.30	74.40	10757.63	303.66	880.01	895.06	3.37
130	11529.00	89.20	74.30	10758.03	312.02	909.86	925.31	0.46
131	11560.00	89.50	73.80	10758.39	320.54	939.67	955.53	1.88
132	11591.00	89.40	73.80	10758.68	329.19	969.43	985.72	0.32
133	11622.00	89.30	74.40	10759.03	337.68	999.25	1015.95	1.96
134	11652.00	88.80	75.10	10759.53	345.57	1028.19	1045.27	2.87
135	11683.00	88.50	75.00	10760.26	353.56	1058.13	1075.60	1.02
136	11714.00	88.50	75.70	10761.07	361.40	1088.11	1105.96	2.26
137	11745.00	89.00	77.00	10761.75	368.71	1118.23	1136.42	4.49
138	11776.00	89.30	76.90	10762.21	375.71	1148.42	1166.95	1.02
139	11808.00	89.50	77.40	10762.55	382.83	1179.62	1198.48	1.68

SUNBURST CONSULTING, INC.

Operator:	Oasis Petroleum North America, LLC			Kick-off:	12/19/2015
Well :	Wade Federal 5300 31-30 11T			Finish:	1/18/2015
County:	McKenzie	State:	ND	Directional Supervision:	
QQ:	Lot 3	Section:	30	RPM	
Township:	153	N/S:	N		
Range:	100	E/W:	W	Date:	1/22/2015
Footages:	1955	FN/SL:	S	Time:	10:28
	350	FE/WL:	W	**F9 to re-calculate**	
Minimum Curvature Method (SPE-3362)				Proposed dir:	86.92

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

No.	MD	INC	TRUE AZM	TVD	N-S	E-W	SECT	DLS/ 100
140	11838.00	89.30	78.90	10762.86	388.99	1208.98	1228.13	5.04
141	11869.00	89.20	79.80	10763.27	394.72	1239.44	1258.86	2.92
142	11900.00	89.50	79.70	10763.62	400.23	1269.94	1289.61	1.02
143	11930.00	87.90	80.60	10764.30	405.36	1299.49	1319.40	6.12
144	11961.00	87.30	80.40	10765.60	410.48	1330.04	1350.17	2.04
145	11992.00	87.10	81.00	10767.11	415.48	1360.60	1380.95	2.04
146	12022.00	86.90	80.40	10768.68	420.32	1390.16	1410.74	2.11
147	12053.00	88.10	81.20	10770.03	425.27	1420.73	1441.53	4.65
148	12084.00	88.80	81.60	10770.87	429.91	1451.37	1472.37	2.60
149	12115.00	89.20	81.50	10771.41	434.46	1482.03	1503.23	1.33
150	12145.00	89.50	82.00	10771.75	438.77	1511.72	1533.11	1.94
151	12177.00	89.50	82.10	10772.03	443.19	1543.41	1564.99	0.31
152	12208.00	89.30	82.00	10772.36	447.48	1574.11	1595.88	0.72
153	12239.00	87.40	81.00	10773.25	452.06	1604.76	1626.73	6.93
154	12271.00	87.30	80.20	10774.73	457.28	1636.29	1658.50	2.52
155	12302.00	87.30	80.50	10776.19	462.47	1666.82	1689.26	0.97
156	12334.00	86.90	80.90	10777.81	467.64	1698.36	1721.03	1.77
157	12365.00	86.80	81.30	10779.51	472.42	1728.94	1751.82	1.33
158	12397.00	87.10	80.60	10781.21	477.45	1760.49	1783.61	2.38
159	12429.00	87.70	80.30	10782.67	482.75	1792.02	1815.37	2.10
160	12460.00	87.90	79.70	10783.86	488.13	1822.53	1846.12	2.04
161	12491.00	88.70	80.60	10784.77	493.43	1853.05	1876.89	3.88
162	12523.00	90.40	81.80	10785.03	498.33	1884.67	1908.73	6.50
163	12555.00	90.40	82.60	10784.80	502.67	1916.38	1940.62	2.50
164	12586.00	90.30	82.30	10784.61	506.74	1947.11	1971.52	1.02
165	12618.00	89.90	83.00	10784.56	510.84	1978.84	2003.43	2.52
166	12649.00	89.10	84.40	10784.83	514.24	2009.66	2034.38	5.20
167	12681.00	88.90	84.40	10785.39	517.36	2041.50	2066.35	0.63
168	12712.00	88.60	83.70	10786.06	520.57	2072.32	2097.30	2.46
169	12744.00	88.40	84.00	10786.90	524.00	2104.13	2129.24	1.13
170	12775.00	89.90	85.50	10787.36	526.84	2134.99	2160.22	6.84
171	12806.00	90.30	84.80	10787.31	529.46	2165.88	2191.20	2.60
172	12838.00	90.60	85.70	10787.05	532.11	2197.77	2223.19	2.96
173	12870.00	90.80	86.30	10786.66	534.34	2229.69	2255.18	1.98
174	12901.00	90.70	87.10	10786.26	536.12	2260.64	2286.18	2.60

SUNBURST CONSULTING, INC.

Operator:	Oasis Petroleum North America, LLC			Kick-off:	12/19/2015
Well :	Wade Federal 5300 31-30 11T			Finish:	1/18/2015
County:	McKenzie	State:	ND	Directional Supervision:	
QQ:	Lot 3	Section:	30	RPM	
Township:	153	N/S:	N		
Range:	100	E/W:	W	Date:	1/22/2015
Footages:	1955	FN/SL:	S	Time:	10:28
	350	FE/WL:	W	**F9 to re-calculate**	
Minimum Curvature Method (SPE-3362)				Proposed dir:	86.92

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

No.	MD	INC	TRUE AZM	TVD	N-S	E-W	SECT	DLS/ 100
175	12933.00	90.70	87.20	10785.87	537.72	2292.59	2318.17	0.31
176	12964.00	90.70	88.60	10785.49	538.85	2323.57	2349.17	4.52
177	12995.00	90.60	88.60	10785.14	539.61	2354.56	2380.15	0.32
178	13027.00	90.20	87.90	10784.91	540.59	2386.54	2412.14	2.52
179	13058.00	88.90	89.80	10785.16	541.21	2417.53	2443.12	7.43
180	13090.00	88.50	90.00	10785.88	541.26	2449.52	2475.07	1.40
181	13153.00	87.80	89.30	10787.92	541.65	2512.49	2537.96	1.57
182	13247.00	88.90	90.20	10790.62	542.06	2606.45	2631.81	1.51
183	13342.00	89.90	89.30	10791.62	542.47	2701.44	2726.68	1.42
184	13436.00	89.90	89.30	10791.78	543.62	2795.43	2820.60	0.00
185	13531.00	89.80	88.50	10792.03	545.45	2890.41	2915.55	0.85
186	13625.00	90.00	88.40	10792.20	547.99	2984.38	3009.51	0.24
187	13720.00	90.40	89.10	10791.86	550.06	3079.36	3104.46	0.85
188	13814.00	89.40	90.10	10792.03	550.72	3173.35	3198.36	1.50
189	13908.00	90.10	92.30	10792.44	548.75	3267.32	3292.09	2.46
190	14002.00	87.30	92.30	10794.57	544.98	3361.21	3385.64	2.98
191	14096.00	88.00	90.90	10798.42	542.35	3455.09	3479.24	1.66
192	14191.00	88.50	88.80	10801.33	542.60	3550.04	3574.07	2.27
193	14284.00	89.60	88.60	10802.87	544.71	3643.01	3667.01	1.20
194	14378.00	89.20	88.90	10803.85	546.76	3736.98	3760.96	0.53
195	14472.00	89.50	90.10	10804.92	547.58	3830.97	3854.85	1.32
196	14566.00	90.70	90.00	10804.75	547.50	3924.97	3948.71	1.28
197	14660.00	90.50	89.40	10803.77	547.99	4018.96	4042.60	0.67
198	14754.00	89.80	90.90	10803.52	547.75	4112.95	4136.44	1.76
199	14848.00	89.80	91.50	10803.85	545.78	4206.93	4230.18	0.64
200	14942.00	88.60	90.90	10805.16	543.81	4300.90	4323.91	1.43
201	15036.00	88.30	91.00	10807.71	542.25	4394.85	4417.64	0.34
202	15130.00	88.60	89.60	10810.25	541.76	4488.82	4511.44	1.52
203	15224.00	89.80	90.00	10811.56	542.09	4582.80	4605.31	1.35
204	15318.00	90.40	90.30	10811.40	541.84	4676.80	4699.16	0.71
205	15412.00	87.40	90.40	10813.20	541.27	4770.77	4792.96	3.19
206	15506.00	88.10	90.00	10816.89	540.94	4864.70	4886.74	0.86
207	15600.00	89.40	90.00	10818.94	540.94	4958.67	4980.58	1.38
208	15695.00	89.30	90.60	10820.02	540.44	5053.67	5075.40	0.64
209	15789.00	89.00	91.70	10821.42	538.56	5147.64	5169.14	1.21

SUNBURST CONSULTING, INC.

Operator:	Oasis Petroleum North America, LLC			Kick-off:	12/19/2015
Well :	Wade Federal 5300 31-30 11T			Finish:	1/18/2015
County:	McKenzie	State:	ND	Directional Supervision:	
QQ:	Lot 3	Section:	30	RPM	
Township:	153	N/S:	N		
Range:	100	E/W:	W	Date:	1/22/2015
Footages:	1955	FN/SL:	S	Time:	10:28
	350	FE/WL:	W	**F9 to re-calculate**	
Minimum Curvature Method (SPE-3362)				Proposed dir:	86.92

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

No.	MD	INC	TRUE AZM	TVD	N-S	E-W	SECT	DLS/ 100
210	15883.00	89.70	89.30	10822.48	537.74	5241.62	5262.94	2.66
211	15977.00	90.50	88.60	10822.32	539.46	5335.60	5356.88	1.13
212	16072.00	90.40	88.60	10821.57	541.78	5430.57	5451.84	0.11
213	16165.00	89.80	88.60	10821.41	544.05	5523.54	5544.80	0.65
214	16260.00	88.70	88.40	10822.65	546.54	5618.50	5639.75	1.18
215	16353.00	89.10	88.90	10824.44	548.73	5711.46	5732.69	0.69
216	16447.00	90.20	89.90	10825.01	549.71	5805.45	5826.60	1.58
217	16541.00	91.40	89.40	10823.70	550.29	5899.43	5920.48	1.38
218	16635.00	89.10	90.50	10823.29	550.37	5993.42	6014.34	2.71
219	16729.00	89.10	90.70	10824.77	549.39	6087.41	6108.13	0.21
220	16823.00	89.70	90.00	10825.75	548.81	6181.40	6201.96	0.98
221	16917.00	90.20	90.20	10825.83	548.65	6275.40	6295.81	0.57
222	17011.00	90.50	89.40	10825.26	548.98	6369.40	6389.69	0.91
223	17105.00	89.60	89.30	10825.18	550.04	6463.39	6483.61	0.96
224	17198.00	90.50	90.00	10825.10	550.61	6556.39	6576.50	1.23
225	17292.00	90.90	90.20	10823.95	550.45	6650.38	6670.35	0.48
226	17386.00	90.50	90.00	10822.80	550.28	6744.37	6764.20	0.48
227	17481.00	91.20	89.90	10821.39	550.37	6839.36	6859.05	0.74
228	17574.00	89.50	90.80	10820.82	549.80	6932.35	6951.88	2.07
229	17668.00	89.80	90.60	10821.40	548.65	7026.34	7045.67	0.38
230	17763.00	88.40	90.00	10822.89	548.15	7121.33	7140.49	1.60
231	17857.00	88.90	90.10	10825.10	548.07	7215.30	7234.33	0.54
232	17951.00	89.10	90.50	10826.74	547.58	7309.29	7328.15	0.48
233	18044.00	91.40	90.60	10826.34	546.68	7402.27	7420.95	2.48
234	18138.00	90.20	90.60	10825.03	545.70	7496.26	7514.75	1.28
235	18232.00	88.40	91.70	10826.17	543.81	7590.23	7608.48	2.24
236	18326.00	88.20	91.30	10828.96	541.36	7684.15	7702.14	0.48
237	18420.00	90.00	89.50	10830.44	540.70	7778.13	7795.95	2.71
238	18514.00	89.50	89.10	10830.85	541.85	7872.12	7889.87	0.68
239	18608.00	89.20	89.30	10831.92	543.16	7966.11	7983.78	0.38
240	18702.00	88.30	89.00	10833.97	544.55	8060.07	8077.69	1.01
241	18796.00	90.30	90.00	10835.11	545.37	8154.06	8171.58	2.38
242	18890.00	91.70	89.50	10833.47	545.78	8248.04	8265.45	1.58
243	18983.00	91.80	90.20	10830.63	546.03	8341.00	8358.28	0.76
244	19078.00	90.10	90.70	10829.06	545.28	8435.98	8453.09	1.87

SUNBURST CONSULTING, INC.

Operator:	Oasis Petroleum North America, LLC			Kick-off:	12/19/2015
Well :	Wade Federal 5300 31-30 11T			Finish:	1/18/2015
County:	McKenzie	State:	ND	Directional Supervision:	
QQ:	Lot 3	Section:	30	RPM	
Township:	153	N/S:	N		
Range:	100	E/W:	W	Date:	1/22/2015
Footages:	1955	FN/SL:	S	Time:	10:28
	350	FE/WL:	W	**F9 to re-calculate**	

Minimum Curvature Method (SPE-3362) Proposed dir: 86.92

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

No.	MD	INC	TRUE AZM	TVD	N-S	E-W	SECT	DLS/ 100
245	19172.00	90.40	89.30	10828.65	545.28	8529.97	8546.95	1.52
246	19266.00	89.80	90.40	10828.48	545.53	8623.97	8640.82	1.33
247	19359.00	87.40	91.00	10830.76	544.39	8716.93	8733.59	2.66
248	19454.00	87.80	90.50	10834.73	543.15	8811.84	8828.29	0.67
249	19548.00	88.40	90.80	10837.85	542.08	8905.78	8922.04	0.71
250	19641.00	89.60	89.20	10839.47	542.08	8998.76	9014.89	2.15
251	19735.00	89.80	89.90	10839.97	542.82	9092.75	9108.79	0.77
252	19829.00	89.20	90.80	10840.79	542.25	9186.75	9202.61	1.15
253	19923.00	90.90	90.30	10840.70	541.35	9280.74	9296.42	1.89
254	20017.00	91.30	90.20	10838.90	540.94	9374.72	9390.24	0.44
255	20111.00	89.10	90.00	10838.57	540.77	9468.71	9484.09	2.35
256	20205.00	88.70	90.00	10840.38	540.77	9562.70	9577.94	0.43
257	20299.00	90.00	89.80	10841.44	540.94	9656.69	9671.80	1.40
258	20393.00	90.90	88.90	10840.70	542.00	9750.68	9765.71	1.35
259	20437.00	91.40	88.60	10839.82	542.96	9794.66	9809.68	1.33
260	20500.00	91.40	88.60	10838.28	544.50	9857.62	9872.64	0.00

FORMATION TOPS & STRUCTURAL RELATIONSHIPS

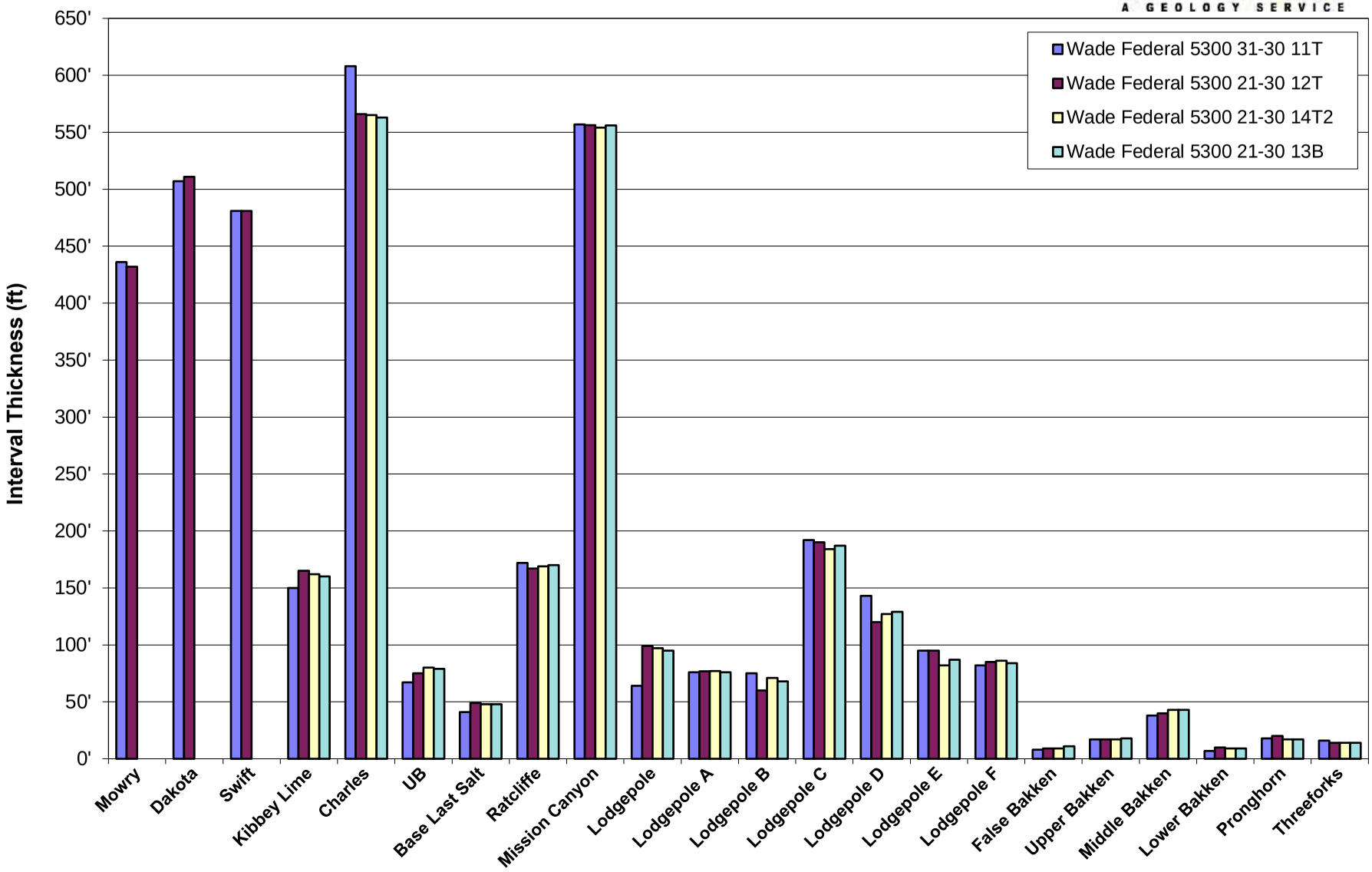
Operator:	Subject Well:									Offset Wells:		
Well Name:	Oasis Petroleum North America Wade Federal 5300 31-30 11T											
Location:	1,955' FSL & 350' FWL Lot 3 Section 30, T153N, R100W											
Elevation:	GL: 2,029' Sub: 25' KB: 2,054'											
Formation/ Marker	Prog. Top	Prog. Datum (MSL)	Driller's Depth Top (MD)	Driller's Depth Top (TVD)	E-Log Top (TVD)	Datum (MSL)	Interval Thickness	Thickness to Target	Dip To Prog.	Dip To Wade Federal 5300 21-30 12T	Dip To Wade Federal 5300 21-30 14T2	Dip To Wade Federal 5300 21-30 13B
Mowry	4,958'	-2,904'	4,957'	4,956'	-	-2,902'	436'	5,797'	2'	10'	-	-
Dakota	5,380'	-3,326'	5,393'	5,392'	-	-3,338'	507'	5,361'	-12'	6'	-	-
Swift	5,891'	-3,837'	5,900'	5,899'	-	-3,845'	481'	4,854'	-8'	10'	-	-
Kibbey Lime	8,325'	-6,271'	8,327'	8,326'	-	-6,272'	150'	2,427'	-1'	12'	12'	15'
Charles	8,473'	-6,419'	8,477'	8,476'	-	-6,422'	608'	2,277'	-3'	27'	24'	25'
UB	9,039'	-6,985'	9,085'	9,084'	-	-7,030'	67'	1,669'	-45'	-15'	-19'	-20'
Base Last Salt	9,152'	-7,098'	9,152'	9,151'	-	-7,097'	41'	1,602'	1'	-7'	-6'	-8'
Ratcliffe	9,201'	-7,147'	9,193'	9,192'	-	-7,138'	172'	1,561'	9'	1'	1'	-1'
Mission Canyon	9,366'	-7,312'	9,365'	9,364'	-	-7,310'	557'	1,389'	2'	-4'	-2'	-3'
Lodgepole	9,915'	-7,861'	9,922'	9,921'	-	-7,867'	64'	832'	-6'	-5'	-5'	-4'
Lodgepole A	9,983'	-7,929'	9,986'	9,985'	-	-7,931'	76'	768'	-2'	30'	28'	27'
Lodgepole B	10,060'	-8,006'	10,062'	10,061'	-	-8,007'	75'	692'	-1'	31'	29'	27'
Lodgepole C	10,132'	-8,078'	10,137'	10,136'	-	-8,082'	192'	617'	-4'	16'	25'	20'
Lodgepole D	10,335'	-8,281'	10,330'	10,328'	-	-8,274'	143'	425'	7'	14'	17'	15'
Lodgepole E	10,477'	-8,423'	10,485'	10,471'	-	-8,417'	95'	282'	6'	-9'	1'	1'
Lodgepole F	10,568'	-8,514'	10,587'	10,566'	-	-8,512'	82'	187'	2'	-9'	-12'	-7'
False Bakken	10,645'	-8,591'	10,699'	10,648'	-	-8,594'	8'	105'	-3'	-6'	-8'	-5'
Upper Bakken	10,657'	-8,603'	10,709'	10,656'	-	-8,602'	17'	97'	1'	-5'	-7'	-2'
Middle Bakken	10,672'	-8,618'	10,741'	10,673'	-	-8,619'	38'	80'	-1'	-5'	-7'	-1'
Lower Bakken	10,708'	-8,654'	10,820'	10,711'	-	-8,657'	7'	42'	-3'	-3'	-2'	4'
Pronghorn	10,717'	-8,663'	10,853'	10,718'	-	-8,664'	18'	35'	-1'	0'	0'	6'
Threeforks	10,733'	-8,679'	10,897'	10,736'	-	-8,682'	16'	17'	-3'	2'	-1'	5'
Top of Target	10,750'	-8,696'	10,975'	10,752'	-	-8,698'	-	1'	-2'	0'	-3'	3'
Landing Target	10,757'	-8,703'	11,080'	10,753'	-	-8,699'	-	0'	4'	0'	-3'	3'

CONTROL DATA

Operator:	Oasis Petroleum North America				Oasis Petroleum North America				Oasis Petroleum North America			
Well Name:	Wade Federal 5300 21-30 12T				Wade Federal 5300 21-30 14T2				Wade Federal 5300 21-30 13B			
Location:	SW NW Section 30, T153N, R100W McKenzie Co., ND 0.33 miles N of subject well				SW NW Section 30, T153N, R100W McKenzie Co., ND 0.33 miles N of subject well				SW NW Section 30, T153N, R100W McKenzie Co., ND 0.33 miles N of subject well			
Elevation:	KB: 2,024'				KB: 2,024'				KB: 2,024'			
Formation/ Zone	**E-Log Top**	**Datum (MSL)**	**Interval Thickness**	**Thickness to Target**	**E-Log Top**	**Datum (MSL)**	**Interval Thickness**	**Thickness to Target**	**E-Log Top**	**Datum (MSL)**	**Interval Thickness**	**Thickness to Target**
Mowry	4,936'	-2,912'	432'	5,787'	-	-	-	-	-	-	-	-
Dakota	5,368'	-3,344'	511'	5,355'	-	-	-	-	-	-	-	-
Swift	5,879'	-3,855'	481'	4,844'	-	-	-	-	-	-	-	-
Kibbey Lime	8,308'	-6,284'	165'	2,415'	8,308'	-6,284'	162'	2,411'	8,311'	-6,287'	160'	2,415'
Charles	8,473'	-6,449'	566'	2,250'	8,470'	-6,446'	565'	2,250'	8,471'	-6,447'	563'	2,255'
UB	9,039'	-7,015'	75'	1,684'	9,035'	-7,011'	80'	1,685'	9,034'	-7,010'	79'	1,692'
Base Last Salt	9,114'	-7,090'	49'	1,609'	9,115'	-7,091'	48'	1,605'	9,113'	-7,089'	48'	1,613'
Ratcliffe	9,163'	-7,139'	167'	1,560'	9,163'	-7,139'	169'	1,557'	9,161'	-7,137'	170'	1,565'
Mission Canyon	9,330'	-7,306'	556'	1,393'	9,332'	-7,308'	554'	1,388'	9,331'	-7,307'	556'	1,395'
Lodgepole	9,886'	-7,862'	99'	837'	9,886'	-7,862'	97'	834'	9,887'	-7,863'	95'	839'
Lodgepole A	9,985'	-7,961'	77'	738'	9,983'	-7,959'	77'	737'	9,982'	-7,958'	76'	744'
Lodgepole B	10,062'	-8,038'	60'	661'	10,060'	-8,036'	71'	660'	10,058'	-8,034'	68'	668'
Lodgepole C	10,122'	-8,098'	190'	601'	10,131'	-8,107'	184'	589'	10,126'	-8,102'	187'	600'
Lodgepole D	10,312'	-8,288'	120'	411'	10,315'	-8,291'	127'	405'	10,313'	-8,289'	129'	413'
Lodgepole E	10,432'	-8,408'	95'	291'	10,442'	-8,418'	82'	278'	10,442'	-8,418'	87'	284'
Lodgepole F	10,527'	-8,503'	85'	196'	10,524'	-8,500'	86'	196'	10,529'	-8,505'	84'	197'
False Bakken	10,612'	-8,588'	9'	111'	10,610'	-8,586'	9'	110'	10,613'	-8,589'	11'	113'
Upper Bakken	10,621'	-8,597'	17'	102'	10,619'	-8,595'	17'	101'	10,624'	-8,600'	18'	102'
Middle Bakken	10,638'	-8,614'	40'	85'	10,636'	-8,612'	43'	84'	10,642'	-8,618'	43'	84'
Lower Bakken	10,678'	-8,654'	10'	45'	10,679'	-8,655'	9'	41'	10,685'	-8,661'	9'	41'
Pronghorn	10,688'	-8,664'	20'	35'	10,688'	-8,664'	17'	32'	10,694'	-8,670'	17'	32'
Threeforks	10,708'	-8,684'	14'	15'	10,705'	-8,681'	14'	15'	10,711'	-8,687'	14'	15'
Top of Target	10,722'	-8,698'	1'	1'	10,719'	-8,695'	1'	1'	10,725'	-8,701'	1'	1'
Landing Target	10,723'	-8,699'	-	0'	10,720'	-8,696'	-	0'	10,726'	-8,702'	-	0'

INTERVAL THICKNESS

Oasis Petroleum North America - Wade Federal 5300 31-30 11T



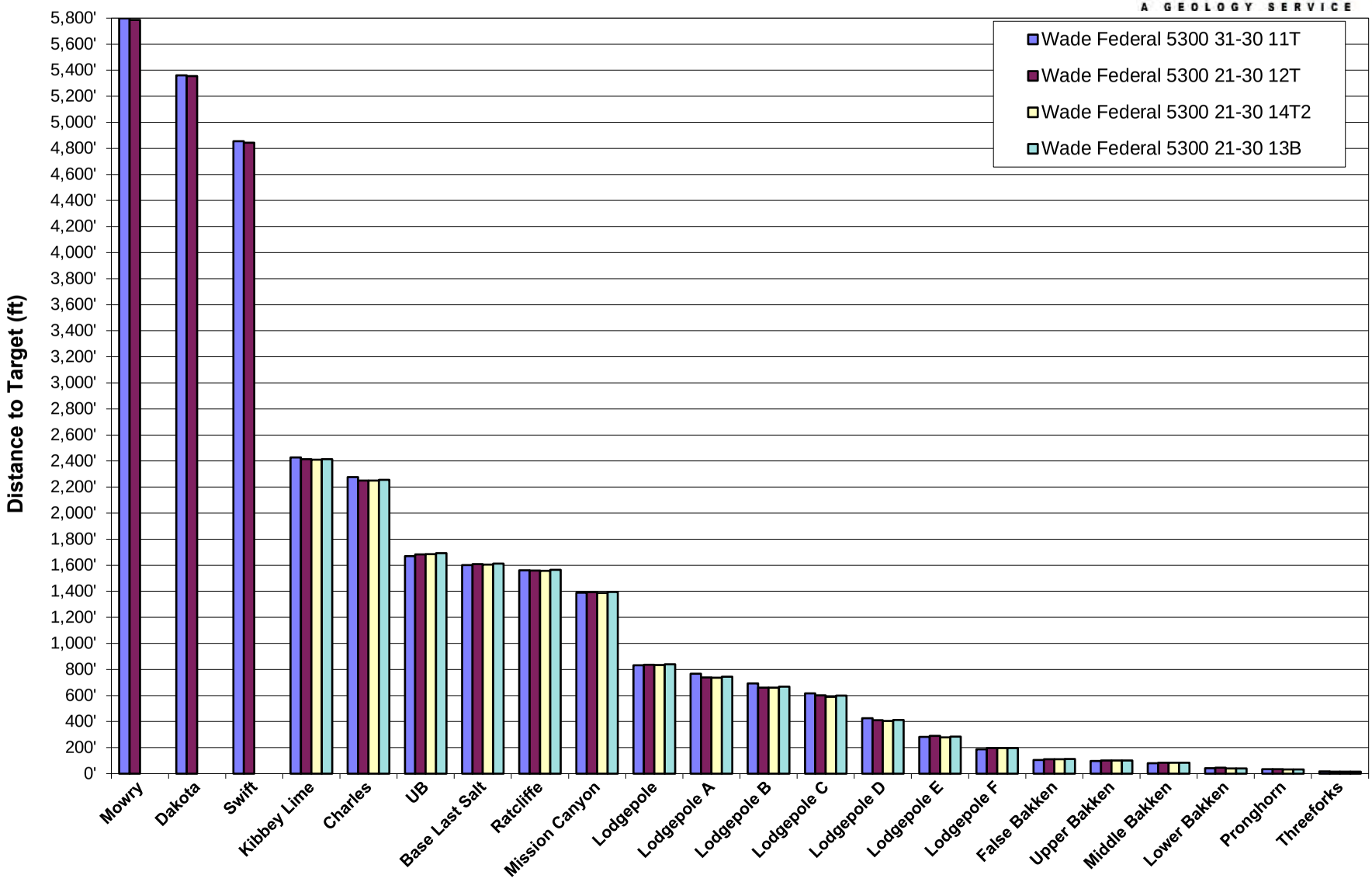
LANDING PROJECTION

Formation/ Zone:	Proposed Top of Target From:			
	Wade Federal 5300 21-30 12T	Wade Federal 5300 21-30 14T2	Wade Federal 5300 21-30 13B	Average of Offset Wells
Mowry	10,743'	-	-	10,743'
Dakota	10,747'	-	-	10,747'
Swift	10,743'	-	-	10,743'
Kibbey Lime	10,741'	10,737'	10,741'	10,740'
Charles	10,726'	10,726'	10,731'	10,728'
UB	10,768'	10,769'	10,776'	10,771'
Base Last Salt	10,760'	10,756'	10,764'	10,760'
Ratcliffe	10,752'	10,749'	10,757'	10,753'
Mission Canyon	10,757'	10,752'	10,759'	10,756'
Lodgepole	10,758'	10,755'	10,760'	10,758'
Lodgepole A	10,723'	10,722'	10,729'	10,725'
Lodgepole B	10,722'	10,721'	10,729'	10,724'
Lodgepole C	10,737'	10,725'	10,736'	10,733'
Lodgepole D	10,739'	10,733'	10,741'	10,738'
Lodgepole E	10,762'	10,749'	10,755'	10,755'
Lodgepole F	10,762'	10,762'	10,763'	10,762'
False Bakken	10,759'	10,758'	10,761'	10,759'
Upper Bakken	10,758'	10,757'	10,758'	10,758'
Middle Bakken	10,758'	10,757'	10,757'	10,757'
Lower Bakken	10,756'	10,752'	10,752'	10,753'
Pronghorn	10,753'	10,750'	10,750'	10,751'
Threeforks	10,751'	10,751'	10,751'	10,751'
Top of Target	10,753'	10,753'	10,753'	10,753'

Current Landing Target (35' below the base of the LBS): **10,753'**

ISOPACH TO TARGET

Oasis Petroleum North America - Wade Federal 5300 31-30 11T



LITHOLOGY

Rig crews caught lagged samples in 30' and 10' intervals under the supervision of Sunburst geologists. A detailed list of sampling intervals is included in the well data summary page. Sample or gamma ray marker tops have been inserted in the sample descriptions below for reference. Samples were examined wet and dry under a trinocular microscope. The drilling fluid was diesel-based invert from surface casing to intermediate casing, while salt water drilling fluid was used throughout the lateral. Sample collection began at 4,600' MD.

Drilling ahead in the Greenhorn

4,570-4,600 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

4,600-4,630 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

4,630-4,660 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, rare bentonite, trace disseminated pyrite, no visible porosity, no visible oil stain

4,660-4,690 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, rare bentonite, trace disseminated pyrite, no visible porosity, no visible oil stain

4,690-4,720 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, rare bentonite, trace disseminated pyrite, no visible porosity, no visible oil stain

4,720-4,750 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, rare bentonite, trace disseminated pyrite, no visible porosity, no visible oil stain

4,750-4,780 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, rare bentonite, trace disseminated pyrite, no visible porosity, no visible oil stain

4,780-4,810 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, rare bentonite, trace disseminated pyrite, no visible porosity, no visible oil stain

4,810-4,840 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, rare bentonite, trace disseminated pyrite, no visible porosity, no visible oil stain

4,840-4,870 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, rare bentonite, trace disseminated pyrite, no visible porosity, no visible oil stain

4,870-4,900 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

4,900-4,930 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

Mowry [4,957' MD, 4,956' TVD (-2,902')]

4,930-4,960 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

4,960-4,990 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

4,990-5,020 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

5,020-5,050 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

5,050-5,080 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

5,080-5,110 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

5,110-5,140 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

5,140-5,170 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

5,170-5,200 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain; trace SILTSTONE: light gray-brown, friable-firm, sub rounded, moderately cemented, possible intergranular porosity, no visible oil stain

5,200-5,230 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain; trace SILTSTONE: light gray-brown, friable-firm, sub rounded, moderately cemented, possible intergranular porosity, no visible oil stain

5,230-5,260 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain; trace SILTSTONE: light gray-brown, friable-firm, sub rounded, moderately cemented, possible intergranular porosity, no visible oil stain

5,260-5,290 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain; trace SILTSTONE: light gray-brown, friable-firm, sub rounded, moderately cemented, possible intergranular porosity, no visible oil stain

5,290-5,320 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain; trace SILTSTONE: as above, possible intergranular porosity, no visible oil stain

5,320-5,350 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain; trace SILTSTONE: as above, possible intergranular porosity, no visible oil stain

5,350-5,380 SHALE: medium gray, dark gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain; trace SILTSTONE: as above, possible intergranular porosity, no visible oil stain

<u>Dakota</u> [5,393’ MD, 5,392’ TVD (-3,338’)]

5,380-5,410 SHALE: medium gray, dark gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain; trace SILTSTONE: as above, possible intergranular porosity, no visible oil stain

5,410-5,440 SHALE: medium gray, medium brown, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain; trace SILTSTONE: as above, possible intergranular porosity, no visible oil stain

5,440-5,470 SHALE: medium-dark gray, medium brown, firm, sub blocky, earthy, calcareous, rare disseminated pyrite, no visible porosity, no visible oil stain; occasional LIMESTONE: mudstone, tan, off white, fine grain, earthy, sub angular, no visible oil stain

5,470-5,500 SHALE: medium-dark gray, medium brown, firm, sub blocky, earthy, calcareous, rare disseminated pyrite, no visible porosity, no visible oil stain; occasional LIMESTONE: mudstone, tan, off white, fine grain, earthy, sub angular, no visible oil stain

5,500-5,530 SHALE: medium-dark gray, medium brown, firm, sub blocky, earthy, calcareous, rare disseminated pyrite, no visible porosity, no visible oil stain

5,530-5,560 SHALE: medium-dark gray, medium brown, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

5,560-5,590 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, trace SILTY SANDSTONE: light gray-medium brown, very fine good, friable-firm, sub round, well sorted, moderately cemented, no visible porosity, no visible oil stain

5,590-5,620 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, trace SILTY SANDSTONE: light gray-medium brown, very fine good, friable-firm, sub round, well sorted, moderately cemented, no visible porosity, no visible oil stain

5,620-5,650 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

5,650-5,680 SILTY SANDSTONE: light-medium gray, friable, sub angular, earthy, calcareous; trace LIMESTONE: packstone, white to yellow, fine grained, possible intergranular porosity, no visible oil stain

5,680-5,710 SILTY SANDSTONE: light-medium gray, medium brown, friable-firm, sub angular, earthy, calcareous, trace; Trace LIMESTONE: packstone, white to yellow, fine grained, possible intergranular porosity, no visible oil stain

5,710-5,740 SHALE: abundant dark brown, common light gray, earthy, no visible porosity, no visible oil stain; common SILTY SANDSTONE: as above

5,740-5,770 SILTY SANDSTONE: light gray to medium gray, friable, calcareous, fine grained; trace LIMESTONE: packstone white to light yellow, fine grained, friable, possible intergranular porosity, no visible oil stain

5,770-5,800 SILTY SANDSTONE: light gray to medium gray, dark brown, friable-firm, calcareous, fine grained, no visible porosity; trace SHALE: brown, dark brown, earthy, no visible oil stain

5,800-5,830 SILTY SANDSTONE: light gray to medium gray, dark brown, friable-firm, calcareous, fine grained, no visible porosity; trace SHALE: brown, dark brown, earthy, no visible oil stain; trace LIMESTONE: packstone, white to light yellow, fine grained, possible intergranular porosity, no visible oil stain

5,830-5,860 SILTY SANDSTONE: light gray to medium gray, dark brown, friable-firm, calcareous, fine grained, no visible porosity; trace SHALE: brown, dark brown, earthy, no visible oil stain; trace LIMESTONE: packstone, white to light yellow, fine grained, possible intergranular porosity, no visible oil stain

5,860-5,890 SILTY SANDSTONE: light gray to medium gray, dark brown, friable-firm, calcareous, fine grained, no visible porosity; trace SHALE: brown, dark brown, earthy, no visible oil stain

<u>Swift</u> [5,900' MD, 5,899' TVD (-3,845')]

5,890-5,920 SILTY SANDSTONE: light gray to medium gray, dark brown, friable-firm, calcareous, fine grained, no visible porosity; common SHALE: brown, dark brown, earthy, no visible oil stain

5,920-5,950 SILTY SANDSTONE: light gray to medium gray, friable to firm, earthy, calcareous, very fine grained; trace LIMESTONE: packstone white to light gray, fine grained, sub angular, friable, possible intergranular porosity, no visible oil stain

5,950-5,980 SILTY SANDSTONE: light gray to medium gray, friable to firm, earthy, calcareous, very fine grained; trace LIMESTONE: packstone white to light gray, fine grained, sub angular, friable, possible intergranular porosity, no visible oil stain

5,980-6,020 SILTY SANDSTONE: light gray-medium brown, very fine good, friable-firm, sub rounded, well sorted, moderately cemented, calcareous, no visible porosity; trace SHALE: orange, firm, blocky, earthy, calcareous, no visible porosity, no visible oil stain

<u>Drilling in the Kibbey Formation</u>

8,200-8,230 SILTSTONE: red-brown, medium brown, friable, sub blocky, calcareous cement, very poor cemented; trace ANHYDRITE: off-white, pink, soft, amorphous, no visible oil stain, trace SILTY SANDSTONE: tan, very fine grained, sub rounded, well sorted, calcareous cement

8,230-8,260 SILTSTONE: red-brown, medium brown, friable, sub blocky, calcareous cement, very poor cemented; trace ANHYDRITE: off-white, pink, soft, amorphous, no visible oil stain

8,260-8,290 SILTSTONE: red-brown, dark orange, medium brown, friable, sub blocky, calcareous cement, very poor cemented; trace ANHYDRITE: off-white, pink, soft, amorphous, no visible oil stain

8,290-8,320 SILTSTONE: red-brown, dark orange, medium brown, friable, sub blocky, calcareous cement, very poor cemented; trace ANHYDRITE: off-white, pink, soft, amorphous, no visible oil stain

Kibbey "Lime" [8,327' MD, 8,326' TVD (-6,272')]

8,320-8,350 ANHYDRITE: off-white, pink, soft, amorphous, no visible oil stain; rare SILTSTONE: red-brown, dark orange, medium brown, friable, sub blocky, calcareous cement, very poor cemented;

8,350-8,380 ANHYDRITE: off-white, pink, soft, amorphous, no visible oil stain; rare SILTSTONE: red-brown, dark orange, medium brown, friable, sub blocky, calcareous cement, very poor cemented;

8,380-8,410 SILTSTONE: dark orange-light brown, tan, pink, soft, sub blocky, calcareous cement, poorly cemented; rare ANHYDRITE: off white, soft, amorphous texture; trace SILTY SANDSTONE: tan-off white, very fine grained, sub rounded, moderately sorted, calcareous cement, poorly cemented

8,410-8,440 SILTSTONE: dark orange-light brown, tan, pink, soft, sub blocky, calcareous cement, poorly cemented; rare ANHYDRITE: off white, soft, amorphous texture; trace SILTY SANDSTONE: tan-off white, very fine grained, sub rounded, moderately sorted, calcareous cement, poorly cemented

8,440-8,470 SILTSTONE: dark orange-light brown, tan pink, soft, sub blocky, calcareous cement, poorly cemented; occasional ANHYDRITE: off white, amorphous texture; trace SILTY SANDSTONE: as above

The First Charles Salt [8,477' MD, 8,476' TVD (-6,422')]

8,470-8,500 SILTSTONE: dark orange-light brown, tan pink, soft, sub blocky, calcareous cement, poorly cemented; occasional ANHYDRITE: off white, amorphous texture; trace SILTY SANDSTONE: as above

8,500-8,530 SILTSTONE: dark orange-light brown, tan pink, soft, sub blocky, calcareous cement, poorly cemented; occasional ANHYDRITE: off white, amorphous texture; trace SILTY SANDSTONE: as above

8,530-8,560 SILTSTONE: dark orange-light brown, tan pink, soft, sub blocky, calcareous cement, poorly cemented; occasional ANHYDRITE: off white, amorphous texture; trace SILTY SANDSTONE: as above

8,560-8,590 SILTSTONE: dark orange-light brown, tan pink, soft, sub blocky, calcareous cement, poorly cemented; occasional ANHYDRITE: off white, amorphous texture; trace SILTY SANDSTONE: as above

8,590-8,620 SALT: translucent, microcrystalline, anhedral, crystalline texture, hard, frosted; occasional LIMESTONE: mudstone, light-medium gray-gray brown, microcrystalline, firm-hard, argillaceous in part, dense, chalky texture, no visible porosity

8,620-8,650 SALT: translucent, microcrystalline, anhedral, crystalline texture, hard, frosted; occasional LIMESTONE: mudstone, light-medium gray-gray brown, microcrystalline, firm-hard, argillaceous in part, dense, chalky texture, no visible porosity

8,650-8,680 SALT: translucent, microcrystalline, anhedral, crystalline texture, hard, frosted; occasional LIMESTONE: mudstone, light-medium gray-gray brown, microcrystalline, firm-hard, argillaceous in part, dense, chalky texture, no visible porosity

8,680-8,710 SALT: translucent, microcrystalline, anhedral, crystalline texture, hard, frosted; occasional LIMESTONE: mudstone, light-medium gray-gray brown, microcrystalline, firm-hard, argillaceous in part, dense, chalky texture, no visible porosity

8,710-8,740 SALT: translucent, microcrystalline, anhedral, crystalline texture, hard, frosted; occasional LIMESTONE: mudstone, light-medium gray-gray brown, microcrystalline, firm-hard, argillaceous in part, dense, chalky texture, no visible porosity

8,740-8,770 SALT: translucent, microcrystalline, anhedral, crystalline texture, hard, frosted; common ANHYDRITE: white, off white, amorphous, no visible porosity; occasional LIMESTONE: mudstone, light-medium gray-gray brown, microcrystalline, firm-hard, argillaceous in part, dense, chalky texture, no visible porosity

8,770-8,800 SALT: translucent, microcrystalline, anhedral, crystalline texture, hard, frosted; common ANHYDRITE: white, off white, amorphous, no visible porosity; occasional LIMESTONE: mudstone, light-medium gray-gray brown, microcrystalline, firm-hard, argillaceous in part, dense, chalky texture, no visible porosity

8,800-8,830 SALT: translucent, microcrystalline, anhedral, crystalline texture, hard, frosted; common ANHYDRITE: white, off white, amorphous, no visible porosity; occasional LIMESTONE: mudstone, light-medium gray-gray brown, microcrystalline, firm-hard, argillaceous in part, dense, chalky texture, no visible porosity

8,830-8,860 SALT: translucent, microcrystalline, anhedral, crystalline texture, hard, frosted; trace ANHYDRITE: white, off white, amorphous, no visible porosity; occasional LIMESTONE: mudstone, light-medium gray-gray brown, microcrystalline, firm-hard, argillaceous in part, dense, chalky texture, no visible porosity

8,860-8,890 ARGILLACEOUS LIMESTONE: mudstone, tan, medium brown, light gray, microcrystalline, firm, dense-banded, earthy texture, no visible porosity; occasional SALT: clear-milky, off white, crystalline, hard, euhedral; trace ANHYDRITE: off white, soft, amorphous, no visible porosity

8,890-8,920 ARGILLACEOUS LIMESTONE: mudstone, tan, medium brown, light gray, microcrystalline, firm, dense-banded, earthy texture, no visible porosity; occasional SALT: clear-milky, off white, crystalline, hard, euhedral; trace ANHYDRITE: off white, soft, amorphous, no visible porosity

8,920-8,950 ARGILLACEOUS LIMESTONE: mudstone, tan, medium brown, light gray, medium gray, microcrystalline, firm, dense-banded, earthy texture, no visible porosity; rare SALT: clear-milky, off white, crystalline, hard, euhedral; trace ANHYDRITE: off white, soft, amorphous, no visible porosity

8,950-8,980 ARGILLACEOUS LIMESTONE: mudstone, tan, light gray, medium gray, microcrystalline, firm, dense-banded, earthy texture, no visible porosity; rare SALT: clear-milky, off white, crystalline, hard, euhedral; trace ANHYDRITE: off white, soft, amorphous, no visible porosity

8,980-9,010 ARGILLACEOUS LIMESTONE: mudstone, tan, light gray, microcrystalline, firm, dense-banded, earthy texture, no visible porosity; common SALT: clear-milky, off white, crystalline, hard, euhedral; trace ANHYDRITE: off white, soft, amorphous, no visible porosity

9,010-9,040 ARGILLACEOUS LIMESTONE: mudstone, tan, light brown, light gray, microcrystalline, firm, earthy texture, no visible porosity; trace SALT: clear-milky, off white, crystalline, hard, euhedral; rare ANHYDRITE: off white, soft, amorphous, no visible porosity

9,040-9,070 ARGILLACEOUS LIMESTONE: mudstone, tan, light brown, light gray, microcrystalline, firm, earthy texture, no visible porosity; rare ANHYDRITE: off white, soft, amorphous, no visible porosity

<u>UB</u> [9,085’ MD, 9,084’ TVD (-7,030’)]

9,070-9,100 ARGILLACEOUS LIMESTONE: mudstone, cream, tan, light gray, microcrystalline, firm, dense-banded, earthy texture, no visible porosity; occasional SALT: clear-milky, off white, crystalline, hard, euhedral; trace ANHYDRITE: off white, soft, amorphous, no visible porosity

9,100-9,130 SALT: translucent, microcrystalline, anhedral, crystalline texture, hard, frosted; occasional LIMESTONE: mudstone, light-medium gray-gray brown, microcrystalline, firm-hard, argillaceous in part, dense, chalky texture, no visible porosity

<u>Base Last Salt</u> [9,152’ MD, 9,151’ TVD (-7,097’)]

9,130-9,160 SALT: translucent, microcrystalline, anhedral, crystalline texture, hard, frosted; common LIMESTONE: mudstone, light-medium gray-gray brown, microcrystalline, firm-hard, argillaceous in part, dense, chalky texture, no visible porosity

9,160-9,190 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray, light brown, microcrystalline, firm-hard, trace banded, argillaceous in part, dense, chalky texture, no visible porosity; trace SALT: clear, milky white, crystalline, hard, euhedral

<u>Ratcliffe</u> [9,193’ MD, 9,192’ TVD (-7,138’)]

9,190-9,220 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray, light brown, microcrystalline, firm-hard, trace banded, argillaceous in part, dense, chalky texture, no visible porosity; trace SALT: clear, milky white, crystalline, hard, euhedral

9,220-9,250 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray, light brown, microcrystalline, firm-hard, trace banded, argillaceous in part, dense, chalky texture, no visible porosity; trace SALT: clear, milky white, crystalline, hard, euhedral

9,250-9,280 ARGILLACEOUS LIMESTONE: mudstone, cream, tan, light gray, microcrystalline, firm, dense-banded, earthy texture, no visible porosity; occasional SALT: clear-milky, off white, crystalline, hard, euhedral; trace ANHYDRITE: off white, soft, amorphous, no visible porosity

9,280-9,310 ARGILLACEOUS LIMESTONE: mudstone, cream, tan, light gray, microcrystalline, firm, dense-banded, earthy texture, no visible porosity; occasional SALT: clear-milky, off white, crystalline, hard, euhedral; trace ANHYDRITE: off white, soft, amorphous, no visible porosity

9,310-9,340 ARGILLACEOUS LIMESTONE: mudstone, cream, tan, light gray, microcrystalline, firm, dense-banded, earthy texture, no visible porosity; trace ANHYDRITE: off white, soft, amorphous, no visible porosity

<u>Mission Canyon</u> [9,365’ MD, 9,364’ TVD (-7,310’)]

9,340-9,370 ARGILLACEOUS LIMESTONE: mudstone, cream, tan, light gray, microcrystalline, firm, dense-banded, earthy texture, no visible porosity; trace ANHYDRITE: off white, soft, amorphous, no visible porosity

9,370-9,400 ARGILLACEOUS LIMESTONE: mudstone, cream, tan, light gray, microcrystalline, firm, dense-banded, earthy texture, no visible porosity; trace ANHYDRITE: as above

9,400-9,430 ARGILLACEOUS LIMESTONE: mudstone, cream, tan, light gray, microcrystalline, firm, dense-banded, earthy texture, no visible porosity; trace ANHYDRITE: off white, soft, amorphous, no visible porosity

9,430-9,460 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray brown, tan, microcrystalline, firm-friable, rare Algae material; rare ANHYDRITE: off white, massive, soft, amorphous texture

9,460-9,490 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray brown, tan, microcrystalline, firm-friable, rare Algae material; rare ANHYDRITE: off white, massive, soft, amorphous texture

9,490-9,520 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray brown, tan, microcrystalline, firm-friable, rare Algae material; rare ANHYDRITE: off white, massive, soft, amorphous texture

9,520-9,550 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray brown, tan, microcrystalline, firm-friable, rare Algae material; rare ANHYDRITE: off white, massive, soft, amorphous texture

9,550-9,580 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray brown, tan, microcrystalline, firm-friable, rare Algae material; rare ANHYDRITE: off white, massive, soft, amorphous texture

9,580-9,610 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray brown, tan, microcrystalline, firm-friable, rare Algae material; rare ANHYDRITE: off white, massive, soft, amorphous texture

9,610-9,640 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray brown, tan, microcrystalline, firm-friable, rare Algae material; rare ANHYDRITE: off white, massive, soft, amorphous texture

9,640-9,670 ARGILLACEOUS LIMESTONE: mudstone, light brown, medium gray-brown, occasional tan, microcrystalline, firm-friable, rare Algae material; rare ANHYDRITE: off white, massive, soft, amorphous texture

9,670-9,700 ARGILLACEOUS LIMESTONE: mudstone, light brown, medium gray-brown, occasional tan, microcrystalline, firm-friable, rare Algae material; rare ANHYDRITE: off white, massive, soft, amorphous texture

9,700-9,730 ARGILLACEOUS LIMESTONE: mudstone, light -medium brown, gray-brown, trace tan, microcrystalline, firm-friable, rare Algae material; trace ANHYDRITE: off white, massive, soft, amorphous texture

9,730-9,760 ARGILLACEOUS LIMESTONE: mudstone, light -medium brown, gray-brown, trace tan, microcrystalline, firm-friable, rare Algae material; trace ANHYDRITE: off white, massive, soft, amorphous texture

9,760-9,790 ARGILLACEOUS LIMESTONE: mudstone, medium brown, medium gray-brown, occasional tan, microcrystalline, firm-friable, rare Algae material; trace ANHYDRITE: off white, massive, soft, amorphous texture

9,790-9,820 ARGILLACEOUS LIMESTONE: mudstone, medium brown, medium gray-brown, occasional tan, microcrystalline, firm-friable; trace ANHYDRITE: off white, massive, soft, amorphous texture

9,820-9,850 ARGILLACEOUS LIMESTONE: mudstone, medium brown, medium gray-brown, occasional tan, microcrystalline, firm-friable; rare ANHYDRITE: off white, massive, soft, amorphous texture

9,850-9,880 ARGILLACEOUS LIMESTONE: mudstone, medium brown, medium gray-brown, occasional tan, microcrystalline, firm-friable; rare ANHYDRITE: off white, massive, soft, amorphous texture; sample contaminated well lube

9,880-9,910 ARGILLACEOUS LIMESTONE: mudstone, medium brown, medium gray-brown, occasional tan, microcrystalline, firm-friable; rare ANHYDRITE: off white, massive, soft, amorphous texture; sample contaminated well lube

<u>Lodgepole</u> [9,922’ MD, 9,921’ TVD (-7,867’)]

9,910-9,940 ARGILLACEOUS LIMESTONE: mudstone, medium brown, medium gray-brown, rare tan, microcrystalline, firm-friable; rare ANHYDRITE: off white, massive, soft, amorphous texture, no visible oil stain; sample contaminated well lube

9,940-9,970 ARGILLACEOUS LIMESTONE: mudstone, medium brown, medium gray-brown, rare tan, microcrystalline, firm-friable; rare ANHYDRITE: off white, massive, soft, amorphous texture, no visible oil stain; sample contaminated well lube

9,970-10,000 ARGILLACEOUS LIMESTONE: mudstone, medium brown, medium gray-brown, rare tan, microcrystalline, firm-friable; rare ANHYDRITE: off white, massive, soft, amorphous texture, no visible oil stain

10,000-10,030 ARGILLACEOUS LIMESTONE: mudstone, medium gray, dark gray, microcrystalline, firm; rare ANHYDRITE: off white, massive, soft, amorphous texture, no visible oil stain

10,030-10,060 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray, microcrystalline, firm - hard, rare Algae material, rare ANHYDRITE: off white, soft, amorphous

10,060-10,090 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray, microcrystalline, firm - hard, rare Algae material, rare ANHYDRITE: off white, soft, amorphous

10,090-10,120 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray, microcrystalline, firm - hard, rare Algae material, rare ANHYDRITE: off white, soft, amorphous

10,120-10,150 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray, microcrystalline, firm - hard, rare Algae material, rare ANHYDRITE: off white, soft, amorphous

10,150-10,180 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray, microcrystalline, firm - hard, rare Algae material, rare ANHYDRITE: off white, soft, amorphous

10,180-10,210 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray, microcrystalline, firm - hard, rare Algae material, rare ANHYDRITE: off white, soft, amorphous

10,210-10,240 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray, microcrystalline, firm - hard, rare Algae material, rare ANHYDRITE: off white, soft, amorphous

10,240-10,270 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray, microcrystalline, firm - hard, rare Algae material, rare ANHYDRITE: off white, soft, amorphous, trace disseminated pyrite, no visible porosity

10,270-10,300 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray, microcrystalline, firm - hard, rare Algae material, rare ANHYDRITE: off white, soft, amorphous, trace disseminated pyrite, no visible porosity

10,300-10,330 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray, microcrystalline, firm - hard, rare Algae material, rare ANHYDRITE: off white, soft, amorphous, trace disseminated pyrite, no visible porosity

10,330-10,360 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray, microcrystalline, firm - hard, rare Algae material, rare ANHYDRITE: off white, soft, amorphous, trace disseminated pyrite, no visible porosity

10,360-10,390 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray, microcrystalline, firm - hard, rare Algae material, rare ANHYDRITE: off white, soft, amorphous, trace disseminated pyrite, no visible porosity

10,390-10,420 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray, microcrystalline, firm - hard, rare Algae material, rare ANHYDRITE: off white, soft, amorphous, trace disseminated pyrite, no visible porosity

10,420-10,450 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray, microcrystalline, firm - hard, rare Algae material, rare ANHYDRITE: off white, soft, amorphous, trace disseminated pyrite, no visible porosity

10,450-10,480 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray, microcrystalline, firm - hard, rare Algae material, rare ANHYDRITE: off white, soft, amorphous, trace disseminated pyrite, no visible porosity

10,480-10,510 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray, microcrystalline, firm - hard, rare Algae material, rare ANHYDRITE: off white, soft, amorphous, trace disseminated pyrite, no visible porosity

10,510-10,540 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray, microcrystalline, firm - hard, rare Algae material, rare ANHYDRITE: off white, soft, amorphous, trace disseminated pyrite, no visible porosity

10,540-10,570 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray, microcrystalline, firm - hard, rare Algae material, rare ANHYDRITE: off white, soft, amorphous, trace disseminated pyrite, no visible porosity

10,570-10,600 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray, microcrystalline, firm - hard, rare Algae material, rare ANHYDRITE: off white, soft, amorphous, trace disseminated pyrite, no visible porosity

10,600-10,630 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray, microcrystalline, firm - hard, rare Algae material, rare ANHYDRITE: off white, soft, amorphous, trace disseminated pyrite, no visible porosity

10,630-10,660 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray, microcrystalline, firm - hard, rare Algae material, rare ANHYDRITE: off white, soft, amorphous, trace disseminated pyrite, no visible porosity

10,660-10,690 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray, microcrystalline, firm - hard, rare Algae material, rare ANHYDRITE: off white, soft, amorphous, trace disseminated pyrite, no visible porosity

False Bakken [10,699' MD, 10,648' TVD (-8,594')]
Upper Bakken [10,709' MD, 10,656' TVD (-8,602')]

10,690-10,720 ARGILLACEOUS LIMESTONE: mudstone, light-medium gray, microcrystalline, firm - hard, rare Algae material, rare ANHYDRITE: off white, soft, amorphous, trace disseminated pyrite, no visible porosity

Middle Bakken [10,741' MD, 10,673' TVD (-8,619')]

10,720-10,750 SHALE: black-very dark brown, firm, blocky, earthy texture, disseminated pyrite, petroliferous, carbonaceous, no visible porosity, abudant brown even oil stain

10,750-10,780 SHALE: black-very dark brown, firm, blocky, earthy texture, rare disseminated pyrite, petroliferous, carbonaceous, no visible porosity, abudant brown even oil stain

10,780-10,810 SHALE: black-very dark brown, firm, blocky, earthy texture, rare disseminated pyrite, petroliferous, carbonaceous, no visible porosity, abundant brown even oil stain

Lower Bakken [10,820' MD, 10,711' TVD (-8,657')]

10,810-10,840 SILTSTONE: medium-gray, dark gray, gray-brown, sub blocky, calcite cemented, possible intergranular porosity, occasional SHALE: black, firm, blocky, earthy texture, no visible porosity, common brown even oil stain

Pronghorn [10,853' MD, 10,718' TVD (-8,664')]

10,840-10,870 SILTSTONE: medium-gray, dark gray, gray-brown, sub blocky, calcite cemented, possible intergranular porosity, occasional SILTY SANDSTONE: light gray-tan, sub euhedral, calcite cemented, possible intergranular porosity, trace oil stain, light brown

10,870-10,880 SILTSTONE: medium-gray, dark gray, gray-brown, sub blocky, calcite cemented, possible intergranular porosity, occasional SILTY SANDSTONE: light gray-tan, sub euhedral, calcite cemented, possible intergranular porosity, trace oil stain, light brown

Three Forks [10,897' MD, 10,736' TVD (-8,682')]

10,880-10,890 SILTSTONE: medium-gray, dark gray, medium brown, occasional orange, sub blocky, calcite cemented, possible intergranular porosity, occasional SILTY SANDSTONE: light gray-tan, sub euhedral, calcite cemented, possible intergranular porosity, trace oil stain, light brown

10,900-10,910 SILTSTONE: medium gray, medium brown, sub blocky, calcite cemented, possible intergranular porosity, rare SILTY SANDSTONE: light gray, tan, sub euhedral, calcite cemented, possible intergranular porosity, trace oil stain

10,890-10,900 SILTSTONE: medium-gray, dark gray, medium brown, occasional orange, sub blocky, calcite cemented, possible intergranular porosity, occasional SILTY SANDSTONE: light gray-tan, sub euhedral, calcite cemented, possible intergranular porosity, trace oil stain, light brown

10,910-10,920 SILTSTONE: medium gray, medium brown, sub blocky, calcite cemented, possible intergranular porosity, rare SILTY SANDSTONE: light gray, tan, sub euhedral, calcite cemented, possible intergranular porosity, trace oil stain

10,920-10,930 SILTSTONE: medium gray, medium brown, sub blocky, calcite cemented, possible intergranular porosity, rare SILTY SANDSTONE: light gray, tan, sub euhedral, calcite cemented, possible intergranular porosity, trace oil stain

10,930-10,940 SILTSTONE: medium gray, medium brown, sub blocky, calcite cemented, possible intergranular porosity, rare SILTY SANDSTONE: light gray, tan, sub euhedral, calcite cemented, possible intergranular porosity, trace oil stain

10,940-10,950 SILTSTONE: light-medium gray, medium brown, sub blocky, calcite cemented, possible intergranular porosity, rare SILTY SANDSTONE: light gray, sub euhedral, calcite cemented, possible intergranular porosity, trace oil stain

10,950-10,960 SILTSTONE: light-medium gray, medium brown, sub blocky, calcite cemented, possible intergranular porosity, rare SILTY SANDSTONE: light gray, sub euhedral, calcite cemented, possible intergranular porosity, trace oil stain

10,960-10,970 ARGILLACEOUS DOLOMITE, mudstone, medium gray, medium brown, fine crystalline, friable-firm, earthy; occasional SILTSTONE: light gray, medium brown, sub blocky, calcite cemented, possible intergranular porosity

10,970-10,980 ARGILLACEOUS DOLOMITE, mudstone, medium gray, medium brown, fine crystalline, friable-firm, earthy; occasional SILTSTONE: light gray, medium brown, sub blocky, calcite cemented, possible intergranular porosity

10,980-10,990 ARGILLACEOUS DOLOMITE, mudstone, medium gray, medium brown, fine crystalline, friable-firm, earthy; occasional SILTSTONE: light gray, medium brown, sub blocky, calcite cemented, possible intergranular porosity

10,990-11,000 ARGILLACEOUS DOLOMITE, mudstone, medium gray, medium brown, fine crystalline, friable-firm, earthy; rare SILTSTONE: light gray, medium brown, sub blocky, calcite cemented, possible intergranular porosity; trace SHALE: light-pale green, firm-friable, earthy, light brown spotty oil stain

11,000-11,010 ARGILLACEOUS DOLOMITE, mudstone, medium gray, medium brown, fine crystalline, friable-firm, earthy; rare SILTSTONE: light gray, medium brown, sub blocky, calcite cemented, possible intergranular porosity; trace SHALE: light-pale green, firm-friable, earthy, light brown spotty oil stain

11,010-11,020 ARGILLACEOUS DOLOMITE, mudstone, medium gray, medium brown, fine crystalline, friable-firm, earthy; trace SHALE: light-pale green, firm-friable, earthy, light brown spotty oil stain

11,020-11,030 ARGILLACEOUS DOLOMITE, mudstone, medium gray, medium brown, fine crystalline, friable-firm, earthy; trace SHALE: light-pale green, firm-friable, earthy, light brown spotty oil stain

11,030-11,040 ARGILLACEOUS DOLOMITE, mudstone, light-medium gray, medium brown, crystalline, friable-firm, earthy texture, no visible porosity; trace SHALE: light-pale green, firm-friable, earthy, light brown spotty oil stain

11,040-11,050 ARGILLACEOUS DOLOMITE, mudstone, light-medium gray, medium brown, occasional light grain, crystalline, friable-firm, earthy texture, no visible porosity; trace SHALE: light-pale green, firm-friable, earthy, light brown spotty oil stain

11,050-11,060 ARGILLACEOUS DOLOMITE, mudstone, light-medium gray, medium brown, occasional light grain, crystalline, friable-firm, earthy texture, no visible porosity; trace SHALE: light-pale green, firm-friable, earthy, light brown spotty oil stain

11,060-11,070 ARGILLACEOUS DOLOMITE, mudstone, light-medium gray, occasional medium brown, occasional light grain, crystalline, friable-firm, earthy texture, sandy in part, silty in part, no visible porosity; trace SHALE: light-pale green, firm-friable, earthy, light brown spotty oil stain

11,070-11,100 ARGILLACEOUS DOLOMITE, mudstone, light-medium gray, occasional medium brown, occasional light grain, crystalline, friable-firm, earthy texture, sandy in part, silty in part, no visible porosity; trace SHALE: light-pale green, firm-friable, earthy, light brown spotty oil stain

11,100-11,130 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

11,130-11,160 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

11,160-11,190 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

11,190-11,220 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

11,220-11,250 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

11,250-11,280 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

11,280-11,310 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

11,310-11,340 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

11,340-11,370 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

11,370-11,400 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

11,400-11,430 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

11,430-11,460 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

11,460-11,490 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

11,490-11,520 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

11,520-11,550 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

11,550-11,580 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

11,580-11,610 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

11,610-11,640 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

11,640-11,670 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

11,670-11,700 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

11,700-11,730 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

11,730-11,760 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

11,760-11,790 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

11,790-11,820 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

11,820-11,850 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

11,850-11,880 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

11,880-11,910 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

11,910-11,940 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

11,940-11,970 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

11,970-12,000 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

12,000-12,030 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

12,030-12,060 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

12,060-12,090 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

12,090-12,120 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

12,120-12,150 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

12,150-12,180 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

12,180-12,210 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

12,210-12,240 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

12,240-12,270 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

12,270-12,300 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

12,300-12,330 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

12,330-12,360 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

12,360-12,390 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

12,390-12,420 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

12,420-12,450 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

12,450-12,480 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, occasional CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak diffuse pale green cut fluorescence

12,480-12,510 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, occasional CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

12,510-12,540 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, occasional CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

12,540-12,570 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, occasional CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

12,570-12,600 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, occasional CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

12,600-12,630 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, occasional CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

12,630-12,660 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, occasional CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

12,660-12,690 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, occasional CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

12,690-12,720 CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite; occasional DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity, fast weak cloudy pale green cut fluorescence

12,720-12,750 CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite; occasional DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity, fast weak cloudy pale green cut fluorescence

12,750-12,780 CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite; occasional DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity, fast weak cloudy pale green cut fluorescence

12,780-12,810 CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite; occasional DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity, fast weak cloudy pale green cut fluorescence

12,810-12,840 CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite; occasional DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity, fast weak cloudy pale green cut fluorescence

12,840-12,870 CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite; occasional DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity, fast weak cloudy pale green cut fluorescence

12,870-12,900 CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite; occasional DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity, fast weak cloudy pale green cut fluorescence

12,900-12,930 CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite; occasional DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity, fast weak cloudy pale green cut fluorescence

12,930-12,960 CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite; common DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity, fast weak cloudy pale green cut fluorescence

12,960-12,990 CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite; common DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity, fast weak cloudy pale green cut fluorescence

12,990-13,020 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace CLAYSTONE: as above; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, trace disseminated pyrite fast weak cloudy pale green cut fluorescence

13,020-13,050 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace CLAYSTONE: as above; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, trace disseminated pyrite fast weak cloudy pale green cut fluorescence

13,050-13,080 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: as above; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, trace disseminated pyrite fast weak cloudy pale green cut fluorescence

13,080-13,110 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: as above; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, trace disseminated pyrite fast weak cloudy pale green cut fluorescence

13,110-13,140 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, trace disseminated pyrite fast weak cloudy pale green cut fluorescence

13,140-13,170 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, trace disseminated pyrite fast weak cloudy pale green cut fluorescence

13,170-13,200 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain; rare CLAYSTONE: as above, trace disseminated pyrite fast weak cloudy pale green cut fluorescence

13,200-13,230 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain; rare CLAYSTONE: as above, trace disseminated pyrite fast weak cloudy pale green cut fluorescence

13,230-13,260 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain; CLAYSTONE: as above, trace disseminated pyrite fast weak cloudy pale green cut fluorescence

13,260-13,290 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain; occasional CLAYSTONE: as above, trace disseminated pyrite fast weak cloudy pale green cut fluorescence

13,290-13,320 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain; occasional CLAYSTONE: as above, trace disseminated pyrite fast weak cloudy pale green cut fluorescence

13,320-13,350 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain; occasional CLAYSTONE: as above, trace disseminated pyrite fast weak cloudy pale green cut fluorescence

13,350-13,380 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain; rare CLAYSTONE: as above, trace disseminated pyrite fast weak cloudy pale green cut fluorescence

13,380-13,410 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green,

firm-friable, earthy, light-brown spotty oil stain; rare CLAYSTONE: as above, trace disseminated pyrite fast weak cloudy pale green cut fluorescence

13,410-13,440 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain; rare CLAYSTONE: as above, trace disseminated pyrite fast weak cloudy pale green cut fluorescence

13,440-13,470 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain; rare CLAYSTONE: as above, trace disseminated pyrite fast weak cloudy pale green cut fluorescence

13,470-13,500 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain; trace CLAYSTONE: as above, trace disseminated pyrite fast weak cloudy pale green cut fluorescence

13,500-13,530 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain; trace CLAYSTONE: as above, trace disseminated pyrite fast weak cloudy pale green cut fluorescence

13,530-13,560 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale green cut fluorescence

13,560-13,590 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale green cut fluorescence

13,590-13,620 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale green cut fluorescence

13,620-13,650 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale green cut fluorescence

13,650-13,680 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale green cut fluorescence

13,680-13,710 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale green cut fluorescence

13,710-13,740 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale green cut fluorescence

13,740-13,770 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale green cut fluorescence

13,770-13,800 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale green cut fluorescence

13,800-13,830 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

13,830-13,860 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

13,860-13,890 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

13,890-13,920 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

13,920-13,950 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

13,950-13,980 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

13,980-14,010 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

14,010-14,040 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

14,040-14,070 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

14,070-14,100 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

14,100-14,130 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

14,130-14,160 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

14,160-14,190 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

14,190-14,220 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

14,220-14,250 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

14,250-14,280 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

14,280-14,310 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

14,310-14,340 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

14,340-14,370 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

14,370-14,400 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, occasional CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

14,400-14,430 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, occasional CLAYSTONE: as above, fast weak cloudy pale green cut fluorescence

14,430-14,460 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, occasional CLAYSTONE: as above, fast weak cloudy pale green cut fluorescence

14,460-14,490 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, occasional CLAYSTONE: as above, fast weak cloudy pale green cut fluorescence

14,490-14,520 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, occasional CLAYSTONE: as above, fast weak cloudy pale green cut fluorescence

14,520-14,550 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, occasional CLAYSTONE: as above, fast weak cloudy pale green cut fluorescence

14,550-14,580 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, trace CLAYSTONE: as above, fast weak cloudy pale green cut fluorescence

14,580-14,610 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, trace CLAYSTONE: as above, fast weak cloudy pale green cut fluorescence

14,610-14,640 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale green cut fluorescence

14,640-14,670 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale green cut fluorescence

14,670-14,700 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale green cut fluorescence

14,700-14,730 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale green cut fluorescence

14,730-14,760 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale green cut fluorescence

14,760-14,790 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale green cut fluorescence

14,790-14,820 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale green cut fluorescence

14,820-14,850 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale green cut fluorescence

14,850-14,880 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale green cut fluorescence

14,880-14,910 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale green cut fluorescence

14,910-14,940 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale green cut fluorescence

14,940-14,970 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale green cut fluorescence

14,970-15,000 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale green cut fluorescence

15,000-15,030 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale green cut fluorescence

15,030-15,060 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale yellow cut fluorescence

15,060-15,090 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale yellow cut fluorescence

15,090-15,120 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale yellow cut fluorescence

15,120-15,150 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale yellow cut fluorescence

15,150-15,180 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale yellow cut fluorescence

15,180-15,210 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale yellow cut fluorescence

15,210-15,240 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale yellow cut fluorescence

15,240-15,270 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale yellow cut fluorescence

15,270-15,300 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale yellow cut fluorescence

15,300-15,330 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale yellow cut fluorescence

15,330-15,360 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale yellow cut fluorescence

15,360-15,390 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale yellow cut fluorescence

15,390-15,420 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale yellow cut fluorescence

15,420-15,450 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale yellow cut fluorescence

15,450-15,480 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak cloudy pale yellow cut fluorescence

15,480-15,510 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, occasional CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

15,510-15,540 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, occasional CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

15,540-15,570 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, occasional CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

15,570-15,600 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, occasional CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

15,600-15,630 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: as above, occasional CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

15,630-15,660 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite; trace SHALE: as above, fast weak cloudy pale green cut fluorescence

15,660-15,690 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite; trace SHALE: as above, fast weak cloudy pale green cut fluorescence

15,690-15,720 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite; trace SHALE: as above, fast weak cloudy pale green cut fluorescence

15,720-15,750 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

15,750-15,780 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

15,780-15,810 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

15,810-15,840 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

15,840-15,870 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

15,870-15,900 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

15,900-15,930 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

15,930-15,960 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

15,960-15,990 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

15,990-16,020 DOLOMITE: mudstone, medium gray, light brown, occasional cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

16,020-16,050 DOLOMITE: mudstone, medium gray, light brown, occasional cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

16,050-16,080 DOLOMITE: mudstone, medium gray, light brown, occasional cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

16,080-16,110 DOLOMITE: mudstone, medium gray, light brown, common cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace CLAYSTONE: light gray, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

16,110-16,140 DOLOMITE: mudstone, medium gray, light brown, common cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace CLAYSTONE: light gray, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

16,140-16,170 DOLOMITE: mudstone, medium gray, light brown, common cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace CLAYSTONE: light gray, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

16,170-16,200 DOLOMITE: mudstone, medium gray, light brown, common cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace CLAYSTONE: light gray, massive, fine crystalline, dolomitic cement, trace disseminated pyrite

16,200-16,230 DOLOMITE: mudstone, medium gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, trace disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace CLAYSTONE: light gray, massive, fine crystalline, dolomitic cement, trace disseminated pyrite

16,230-16,260 DOLOMITE: mudstone, medium gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, trace disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace CLAYSTONE: light gray, massive, fine crystalline, dolomitic cement, trace disseminated pyrite

16,260-16,290 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

16,290-16,320 DOLOMITE: mudstone, medium gray-gray brown, cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

16,320-16,350 DOLOMITE: mudstone, medium gray, gray-brown, tan, fine crystalline, sucrosic texture, firm-friable, trace disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; common CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

16,350-16,380 DOLOMITE: mudstone, medium gray, gray-brown, tan, fine crystalline, sucrosic texture, firm-friable, trace disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; common CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

16,380-16,410 CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence common DOLOMITE: mudstone, medium gray, gray-brown, tan, fine crystalline, sucrosic texture, firm-friable, trace disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity

16,410-16,440 CLAYSTONE: light gray, medium gray-tan, occasional off white, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence common DOLOMITE: mudstone, medium gray, gray-brown, tan, fine crystalline, sucrosic texture, firm-friable, trace disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity

16,440-16,470 CLAYSTONE: light gray, medium gray-tan, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence common DOLOMITE: mudstone, medium gray, gray-brown, tan, fine crystalline, sucrosic texture, firm-friable, trace disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity

16,440-16,470 CLAYSTONE: light gray, medium gray-tan, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence occasional DOLOMITE: mudstone, medium gray, gray-brown, tan, fine crystalline, sucrosic texture, firm-friable, trace disseminated pyrite, silty in part, sandy in part

16,500-16,530 CLAYSTONE: light gray, gray-tan, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence trace DOLOMITE: mudstone, light gray, tan, fine crystalline, sucrosic texture, firm-friable, trace disseminated pyrite, silty in part, sandy in part

16,530-16,560 CLAYSTONE: light gray, gray-tan, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence trace DOLOMITE: mudstone, light gray, tan, fine crystalline, sucrosic texture, firm-friable, trace disseminated pyrite, silty in part, sandy in part

16,560-16,590 DOLOMITE: mudstone, medium gray, light brown, common cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace CLAYSTONE: light gray, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

16,590-16,620 DOLOMITE: mudstone, medium gray, light brown, common cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace CLAYSTONE: light gray, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

16,620-16,650 DOLOMITE: mudstone, medium gray, light brown, common cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace CLAYSTONE: light gray, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

16,650-16,680 DOLOMITE: mudstone, light gray, light brown, common cream-tan, fine crystalline, sucrosic texture, firm-friable, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, light brown, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, fast weak cloudy pale green cut fluorescence

16,680-16,710 DOLOMITE: mudstone, light gray, light-medium brown, tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, light brown, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, moderately weak cloudy pale green cut fluorescence

16,710-16,740 DOLOMITE: mudstone, light gray, light-medium brown, tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, light brown, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, moderately weak cloudy pale green cut fluorescence

16,740-16,770 DOLOMITE: mudstone, light gray, light-medium brown, tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, light brown, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, moderately weak cloudy pale green cut fluorescence

16,770-16,800 DOLOMITE: mudstone, light gray, light brown, occasional tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, light brown, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, moderately weak cloudy pale green cut fluorescence

16,800-16,830 DOLOMITE: mudstone, light gray, light brown, occasional tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, light brown, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, moderately weak cloudy pale green cut fluorescence

16,830-16,860 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, light brown, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, moderately weak cloudy pale green cut fluorescence

16,860-16,890 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, light brown, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, moderately weak cloudy pale green cut fluorescence

16,890-16,920 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, light brown, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, moderately weak cloudy pale green cut fluorescence

16,920-16,950 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, light brown, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, moderately weak cloudy pale green cut fluorescence

16,950-16,980 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, light brown, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, moderately weak cloudy pale green cut fluorescence

16,980-17,010 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, light brown, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, moderately weak cloudy pale green cut fluorescence

17,010-17,040 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, light brown, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, moderately weak cloudy pale green cut fluorescence

17,040-17,070 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, light brown, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, moderately weak cloudy pale green cut fluorescence

17,070-17,100 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, light brown, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, moderately weak cloudy pale green cut fluorescence

17,100-17,130 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, light brown, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, moderately weak cloudy pale green cut fluorescence

17,130-17,160 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, light brown, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, moderately weak cloudy pale green cut fluorescence

17,160-17,190 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, light brown, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, moderately weak cloudy pale green cut fluorescence

17,190-17,220 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, light brown, massive, fine crystalline, dolomitic cement, trace disseminated pyrite, moderately weak cloudy pale green cut fluorescence

17,220-17,250 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, light brown, massive, fine crystalline, dolomitic cement, trace disseminated pyrite; trace SHALE: as above, fast weak cloudy pale green cut fluorescence

17,250-17,280 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, light brown, massive, fine crystalline, dolomitic cement, trace disseminated pyrite; trace SHALE: as above, fast weak cloudy pale green cut fluorescence

17,280-17,310 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, light brown, massive, fine crystalline, dolomitic cement, trace disseminated pyrite; trace SHALE: as above, fast weak cloudy pale green cut fluorescence

17,310-17,340 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, light brown, massive, fine crystalline, dolomitic cement, trace disseminated pyrite; trace SHALE: as above, fast weak cloudy pale green cut fluorescence

17,340-17,370 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; occasional CLAYSTONE: light gray, light brown, massive, fine crystalline, dolomitic cement, trace disseminated pyrite; trace SHALE: as above, fast weak cloudy pale green cut fluorescence

17,370-17,400 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: as above; trace CLAYSTONE: light gray, light brown, massive, fine crystalline, dolomitic cement, trace disseminated pyrite; fast weak cloudy pale green cut fluorescence

17,400-17,430 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: as above; trace CLAYSTONE: light gray, light brown, massive, fine crystalline, dolomitic cement, trace disseminated pyrite; fast weak cloudy pale green cut fluorescence

17,430-17,460 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: as above; trace CLAYSTONE: light gray, light brown, massive, fine crystalline, dolomitic cement, trace disseminated pyrite; fast weak cloudy pale green cut fluorescence

17,460-17,490 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: as above, fast weak cloudy pale green cut fluorescence

17,490-17,520 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: as above, fast weak cloudy pale green cut fluorescence

17,520-17,550 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: as above, fast weak cloudy pale green cut fluorescence

17,550-17,580 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: as above, fast weak cloudy pale green cut fluorescence

17,580-17,610 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: as above, fast weak cloudy pale green cut fluorescence

17,610-17,640 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: as above, fast weak cloudy pale green cut fluorescence

17,640-17,670 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

17,670-17,700 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

17,700-17,730 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

17,730-17,760 DOLOMITE: mudstone, light gray, light brown, trace medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

17,760-17,790 DOLOMITE: mudstone, light gray, light brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

17,790-17,820 DOLOMITE: mudstone, light gray, light brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

17,820-17,850 DOLOMITE: mudstone, light gray, light brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

17,850-17,880 DOLOMITE: mudstone, light gray, light brown, occasional cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

17,880-17,910 DOLOMITE: mudstone, light gray, light brown, occasional cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

17,910-17,940 DOLOMITE: mudstone, light gray, light brown, occasional cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

17,940-17,970 DOLOMITE: mudstone, light gray, light brown, occasional cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; rare SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

17,970-18,000 DOLOMITE: mudstone, light gray, light brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, moderately weak diffuse pale green cut fluorescence

18,000-18,030 DOLOMITE: mudstone, light gray, light brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, moderately weak diffuse pale green cut fluorescence

18,030-18,060 DOLOMITE: mudstone, light gray, light-medium brown, occasional cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, moderately weak diffuse pale green cut fluorescence

18,060-18,090 DOLOMITE: mudstone, light gray, light-medium brown, occasional cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, moderately weak diffuse pale green cut fluorescence

18,090-18,120 DOLOMITE: mudstone, light gray, light-medium brown, occasional cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, moderately weak diffuse pale green cut fluorescence

18,120-18,150 DOLOMITE: mudstone, light gray, light brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, moderately weak diffuse pale green cut fluorescence

18,150-18,180 DOLOMITE: mudstone, light gray, light brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, moderately weak diffuse pale green cut fluorescence

18,180-18,210 DOLOMITE: mudstone, light gray, light-medium brown, rare cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

18,210-18,240 DOLOMITE: mudstone, light gray, light-medium brown, rare cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

18,240-18,270 DOLOMITE: mudstone, light gray, light-medium brown, rare cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

18,270-18,300 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

18,300-18,330 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

18,330-18,360 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

18,360-18,390 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

18,390-18,420 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

18,420-18,450 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

18,450-18,480 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

18,480-18,510 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

18,510-18,540 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

18,540-18,570 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

18,570-18,600 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

18,600-18,630 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

18,630-18,660 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

18,660-18,690 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

18,690-18,720 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

18,720-18,750 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

18,750-18,780 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

18,780-18,810 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

18,810-18,840 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

18,840-18,870 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

18,870-18,900 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

18,900-18,930 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

18,930-18,960 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

18,960-18,990 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

18,990-19,020 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,020-19,050 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,050-19,080 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,080-19,110 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,110-19,140 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,140-19,170 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,170-19,200 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,200-19,230 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,230-19,260 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,260-19,290 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,290-19,320 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,320-19,350 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,350-19,380 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,380-19,410 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,410-19,440 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,440-19,470 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,470-19,500 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,500-19,530 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,530-19,560 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,560-19,590 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,590-19,620 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,620-19,650 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,650-19,680 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,680-19,710 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,710-19,740 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,740-19,770 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,770-19,800 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,800-19,830 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,830-19,860 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,860-19,890 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,890-19,920 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,920-19,950 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,950-19,980 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

19,980-20,010 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

20,010-20,040 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

20,040-20,070 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

20,070-20,100 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

20,100-20,130 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

20,130-20,160 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

20,160-20,190 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

20,190-20,220 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

20,220-20,250 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

20,250-20,280 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

20,280-20,310 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

20,310-20,340 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

20,340-20,370 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

20,370-20,400 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

20,400-20,430 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

20,430-20,460 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

20,460-20,500 DOLOMITE: mudstone, light gray, light-medium brown, cream-tan, fine crystalline, sucrosic texture, firm, rare disseminated pyrite, silty in part, sandy in part, possible intercrystalline porosity; trace SHALE: light-pale green, firm-friable, earthy, light-brown spotty oil stain, fast weak diffuse pale green cut fluorescence

ENSECO
Directional Drilling

Directional Survey Certification

Operator: Oasis Petroleum LLC **Well Name:** Wade Federal 5300 31-30 11T **API:** 33-053-05906

Enseco Job#: ND1411-0010NOB2 **Job Type:** MWD D&I **County, State:** McKenzie County, N. Dakota

Well Surface Hole Location (SHL): Lot 3, Sec. 30, T153N, R100W (1,955' FSL – 350' FWL)

Latitude: 48° 02' 38.97 N **Longitude:** 103° 36' 09.79 W **Datum:** Nad 83

Final MWD Report Date: Nov. 28, 2014 **MWD Survey Run Date:** Nov. 26, 2014 to Nov. 28, 2014

Tied In to Surveys Provided By: Enseco Directional Drilling D&I MWD **MD:** Surface

MWD Surveyed from 00 **ft to** 2,064.0 **ft MD** **Survey Type:** Positive Pulse D&I MWD **Sensor to Bit:** 38 **ft**

Rig Contractor: Nabors **Rig Number:** B25 **RKB Height:** 2,054.0 **ft** **GL Elevation:** 2,029.0 **ft**

MWD Surveyor Name: David Hopper

"The data and calculations for this survey have been checked by me and conform to the calibration standards and operational procedures set forth by Enseco Energy Services USA Corp. I am authorized and qualified to review the data, calculations and this report and that the report represents a true and correct Directional Survey of this well based on the original data corrected to True North and obtained at the well site. Wellbore coordinates are calculated using the minimum curvature method."

Jonathan Hovland, Well Planner	Jonathan Hovland	December 3rd 2014
Enseco Representative Name, Title	**Signature**	**Date Signed**

On this the __day of ___, 20__, before me personally appeared First & Last Name, to me known as the person described in and who executed the foregoing instrument and acknowledged the (s)he executed the same as his/her free act and deed.

Seal: _____ _____

Notary Public **Commission Expiry**

Enseco Survey Report

03 December, 2014

Oasis Petroleum LLC

McKenzie County, North Dakota
Lot 3 Sec.30 Twp.153N Rge.100W
Wade Federal 5300 31-30 11T
Job # ND1411-0010NOB2
API#: 33-053-05906

Survey: Final Surveys Vertical Section

Company:	Oasis Petroleum LLC	**Local Co-ordinate Reference:**	Well Wade Federal 5300 31-30 11T
Project:	McKenzie County, North Dakota	**Ground Level Elevation:**	2,029.00usft
Site:	Lot 3 Sec.30 Twp.153N Rge.100W	**Wellhead Elevation:**	KB 25 @ 2054.00usft (Nabors B25)
Well:	Wade Federal 5300 31-30 11T	**North Reference:**	True
Wellbore:	Job # ND1411-0010NOB2	**Survey Calculation Method:**	Minimum Curvature
Design:	Final Surveys Vertical Section	**Database:**	EDM5000

Project	McKenzie County, North Dakota		
Map System:	US State Plane 1983	**System Datum:**	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	North Dakota Northern Zone		Using geodetic scale factor

Site	Lot 3 Sec.30 Twp.153N Rge.100W				
Site Position:		**Northing:**	395,540.20 usft	**Latitude:**	48° 2' 32.780 N
From:	Lat/Long	**Easting:**	1,209,617.95 usft	**Longitude:**	103° 36' 11.410 W
Position Uncertainty:	0.00 usft	**Slot Radius:**	13-3/16 "	**Grid Convergence:**	-2.309°

Well	Wade Federal 5300 31-30 11T | API#: 33-053-05906				
Well Position	**+N/-S** 627.25 usft	**Northing:**	396,162.46 usft	**Latitude:**	48° 2' 38.970 N
	+E/-W 110.08 usft	**Easting:**	1,209,753.20 usft	**Longitude:**	103° 36' 9.790 W
Position Uncertainty	0.00 usft	**Wellhead Elevation:**	2,054.00 usft	**Ground Level:**	2,029.00usft

Wellbore	Job # ND1411-0010NOB2				
Magnetics	**Model Name**	**Sample Date**	**Declination (°)**	**Dip Angle (°)**	**Field Strength (nT)**
	IGRF2010	12/3/2014	8.183	72.945	56,372

Design:	Final Surveys Vertical Section	**Survey Error Model:**	Standard ISCWSA MWD Tool
Audit Notes:			
Version: 1.0	**Phase:** ACTUAL	**Tie On Depth:**	0.00

Vertical Section:	**Depth From (TVD) (usft)**	**+N/-S (usft)**	**+E/-W (usft)**	**Direction (°)**
	0.00	0.00	0.00	129.31

Company:	Oasis Petroleum LLC	**Local Co-ordinate Reference:**	Well Wade Federal 5300 31-30 11T
Project:	McKenzie County, North Dakota	**Ground Level Elevation:**	2,029.00usft
Site:	Lot 3 Sec.30 Twp.153N Rge.100W	**Wellhead Elevation:**	KB 25 @ 2054.00usft (Nabors B25)
Well:	Wade Federal 5300 31-30 11T	**North Reference:**	True
Wellbore:	Job # ND1411-0010NOB2	**Survey Calculation Method:**	Minimum Curvature
Design:	Final Surveys Vertical Section	**Database:**	EDM5000

Survey

MD (usft)	Inc (°)	Azi (°)	TVD (usft)	SS (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
Tie-in from Surface										
0.00	**0.00**	**0.00**	**0.00**	**2,054.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
152.00	0.50	270.80	152.00	1,902.00	0.01	-0.66	-0.52	0.33	0.33	0.00
243.00	1.10	290.20	242.99	1,811.01	0.32	-1.88	-1.66	0.71	0.66	21.32
335.00	0.50	298.20	334.98	1,719.02	0.81	-3.06	-2.88	0.66	-0.65	8.70
423.00	0.90	288.70	422.97	1,631.03	1.21	-4.06	-3.91	0.47	0.45	-10.80
508.00	0.50	257.10	507.97	1,546.03	1.35	-5.05	-4.76	0.64	-0.47	-37.18
593.00	0.70	311.20	592.96	1,461.04	1.60	-5.80	-5.51	0.68	0.24	63.65
679.00	0.40	345.70	678.96	1,375.04	2.24	-6.27	-6.27	0.50	-0.35	40.12
765.00	0.50	16.60	764.96	1,289.04	2.89	-6.24	-6.66	0.30	0.12	35.93
852.00	0.40	0.50	851.95	1,202.05	3.56	-6.13	-7.00	0.18	-0.11	-18.51
937.00	0.40	321.40	936.95	1,117.05	4.09	-6.31	-7.47	0.31	0.00	-46.00
1,027.00	0.70	21.60	1,026.95	1,027.05	4.84	-6.30	-7.95	0.68	0.33	66.89
1,117.00	0.50	353.80	1,116.94	937.06	5.75	-6.14	-8.39	0.39	-0.22	-30.89
1,202.00	0.50	13.10	1,201.94	852.06	6.48	-6.10	-8.82	0.20	0.00	22.71
1,293.00	0.50	53.90	1,292.94	761.06	7.10	-5.69	-8.90	0.38	0.00	44.84
1,383.00	0.90	44.80	1,382.93	671.07	7.83	-4.87	-8.73	0.46	0.44	-10.11
1,469.00	1.10	93.70	1,468.92	585.08	8.26	-3.57	-7.99	0.99	0.23	56.86
1,557.00	1.50	97.10	1,556.90	497.10	8.06	-1.59	-6.33	0.46	0.45	3.86
1,648.00	1.80	111.60	1,647.86	406.14	7.39	0.92	-3.96	0.56	0.33	15.93
1,738.00	1.80	138.60	1,737.82	316.18	5.80	3.17	-1.22	0.93	0.00	30.00
1,828.00	1.70	172.40	1,827.78	226.22	3.42	4.28	1.15	1.14	-0.11	37.56
1,914.00	1.70	182.60	1,913.74	140.26	0.88	4.39	2.84	0.35	0.00	11.86
2,004.00	1.40	206.10	2,003.71	50.29	-1.44	3.85	3.89	0.77	-0.33	26.11
Last MWD Survey										
2,064.00	**1.20**	**232.10**	**2,063.69**	**-9.69**	**-2.48**	**3.03**	**3.92**	**1.03**	**-0.33**	**43.33**

Survey Annotations

MD (usft)	TVD (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
0.00	0.00	0.00	0.00	Tie-in from Surface
2,064.00	2,063.69	-2.48	3.03	Last MWD Survey

RYAN DIRECTIONAL SERVICES, INC.
A NABORS COMPANY

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

Tuesday, January 20, 2015

State of North Dakota

Subject: **Surveys**

Re: **Oasis**
Wade Federal 5300 31-30 11T
McKenzie, 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:

Surveyor Name	*Surveyor Title*	*Borehole Number*	*Start Depth*	*End Depth*	*Start Date*	*End Date*	*Type of*	*TD Straight Line Projection*
Sammy Hayman	MWD Operator	O.H.	2064'	11017'	12/09/14	12/20/14	MWD	11017'
Sammy Hayman	MWD Operator	O.H.	11017'	20437'	01/10/15	01/18/15	MWD	20500'

If any other information is required please contact the undersigned at the letterhead address or phone number.

Douglas Hudson
Well Planner

RYAN DIRECTIONAL SERVICES, INC.
A NABORS COMPANY

Ryan Directional Services, Inc.
19510 Oil Center Blvd.
Houston, Texas 77073
Bus: 281.443.1414
Fax: 281.443.1676

Saturday, December 20, 2014

State of North Dakota
County of McKenzie County

Subject: **Survey Certification Letter**

Survey Company: **Ryan Directional Services, Inc.**
Job Number: **8419**
Survey Job Type: **Ryan MWD**
Customer: **Oasis Petroleum**
Well Name: **Wade Federal 5300 31-30 11T**
Rig Name: **Nabors B-25**

Surface: **Lat.48 02 38.97N/Lon103 36 09.79W**
A.P.I. No: **33-053-05906**
Location: **McKenzie County, ND**
RKB Height: **25'**
Distance to Bit: **63'**

Surveyor Name	*Surveyor Title*	*Borehole Number*	*Start Depth*	*End Depth*	*Start Date*	*End Date*	*Type of*	*TD Straight Line Projection*
Sammy Hayman	MWD Supervisor	OH	2148'	11017'	12/09/14	12/20/14	MWD	11080'

The data and calculations for this survey have been checked by me and conform to the calibration standards and operational procedures set forth by Ryan Directional Services, Inc. I am authorized and qualified to review the data, calculations and these reports; the reports represents true and correct Directional Surveys of this well based on the original data, the minimum curvature method, corrected to True North and obtained at the well site.

Sammy Hayman
MWD Supervisor
Ryan Directional Services, Inc.

RYAN DIRECTIONAL SERVICES, INC.
A NABORS COMPANY

Ryan Directional Services, Inc.
19510 Oil Center Blvd.
Houston, Texas 77073
Bus: 281.443.1414
Fax: 281.443.1676

Sunday, January 18, 2015

State of North Dakota
County of Mc Kenzie

Subject: **Survey Certification Letter**

Survey Company:	**Ryan Directional Services, Inc.**		
Job Number:	**8423**	Surface:	**Lat.48 02 38.97N/Lon103 36 09.79W**
Survey Job Type:	**Ryan MWD**	A.P.I. No:	**33-053-05906**
Customer:	**Oasis Petroleum**	Location:	**Mc Kenzie, ND**
Well Name:	**Wade Federal 5300 31-30-11T**	RKB Height:	**2054'**
Rig Name:	**Nabors B25**	Distance to Bit:	**63'**

Surveyor Name	*Surveyor Title*	*Borehole Number*	*Start Depth*	*End Depth*	*Start Date*	*End Date*	*Type of*	*TD Straight Line Projection*
Sammy Hayman	MWD Supervisor	OH	11160'	20437'	01/10/15	01/18/15	MWD	20500'

The data and calculations for this survey have been checked by me and conform to the calibration standards and operational procedures set forth by Ryan Directional Services, Inc. I am authorized and qualified to review the data, calculations and these reports; the reports represents true and correct Directional Surveys of this well based on the original data, the minimum curvature method, corrected to True North and obtained at the well site.

Sammy Hayman
MWD Supervisor
Ryan Directional Services, Inc.

Report #: 1

Date: 22-Dec-15

RYAN DIRECTIONAL SERVICES, INC.

A NABORS COMPANY

Ryan Job # 8419

SURVEY REPORT

Customer: Oasis Petroleum

Well Name: Wade Federal 5300 31-30 11T

Rig #: Nabors B-25

API #: 33-053-05906

Calculation Method: Minimum Curvature Calculation

MWD Operator: Daniel Ogden

Directional Drillers: RPM

Survey Corrected To: True North

Vertical Section Direction: 86.92

Total Correction: 8.31

Temperature Forecasting Model (Chart Only): Logarithmic

Survey #	MD	Inc	Azm	Temp	TVD	VS	N/S	E/W	DLS
Tie in to Gyro Surveys									
Tie In	**2064**	**1.20**	**232.10**	**0.00**	**2063.69**	**2.89**	**-2.48**	**3.03**	**1.03**
1	2148	1.10	203.80	73.00	2147.67	1.81	-3.76	2.01	0.68
2	2179	1.10	208.70	73.00	2178.67	1.51	-4.29	1.75	0.30
3	2272	1.40	213.00	78.00	2271.65	0.38	-6.03	0.70	0.34
4	2365	1.10	217.80	84.00	2364.62	-0.88	-7.69	-0.47	0.34
5	**2458**	**1.50**	**204.00**	**84.00**	**2457.60**	**-2.02**	**-9.50**	**-1.51**	**0.54**
6	2551	1.20	212.40	87.00	2550.57	-3.14	-11.44	-2.52	0.39
7	2644	1.50	223.70	91.00	2643.55	-4.59	-13.14	-3.89	0.43
8	2738	1.60	222.80	93.00	2737.51	-6.43	-14.99	-5.63	0.11
9	2831	0.10	251.00	93.00	2830.50	-7.44	-15.97	-6.59	1.63
10	**2924**	**0.40**	**346.30**	**96.00**	**2923.50**	**-7.57**	**-15.68**	**-6.74**	**0.45**
11	3017	0.20	334.90	100.00	3016.50	-7.70	-15.22	-6.89	0.22
12	3111	0.30	25.20	102.00	3110.50	-7.64	-14.85	-6.85	0.25
13	3204	0.30	45.20	104.00	3203.50	-7.34	-14.46	-6.58	0.11
14	3297	0.20	53.30	104.00	3296.50	-7.03	-14.19	-6.27	0.11
15	**3390**	**0.10**	**59.00**	**107.00**	**3389.50**	**-6.82**	**-14.05**	**-6.07**	**0.11**
16	3484	0.10	336.10	111.00	3483.50	-6.78	-13.93	-6.04	0.14
17	3577	0.20	38.20	114.00	3576.50	-6.70	-13.73	-5.97	0.19
18	3670	0.40	348.30	116.00	3669.49	-6.64	-13.28	-5.93	0.33
19	3763	0.10	332.90	102.00	3762.49	-6.72	-12.89	-6.04	0.33
20	**3856**	**0.40**	**9.80**	**107.00**	**3855.49**	**-6.68**	**-12.50**	**-6.02**	**0.35**
21	3949	0.40	298.30	109.00	3948.49	-6.89	-12.03	-6.25	0.50
22	4043	0.40	308.90	113.00	4042.49	-7.41	-11.67	-6.79	0.08
23	4136	0.40	346.70	116.00	4135.49	-7.71	-11.15	-7.12	0.28
24	4229	0.30	359.10	120.00	4228.48	-7.76	-10.59	-7.20	0.13
25	**4322**	**0.10**	**253.70**	**122.00**	**4321.48**	**-7.83**	**-10.37**	**-7.28**	**0.37**
26	4415	0.50	281.30	125.00	4414.48	-8.30	-10.31	-7.76	0.45
27	4509	0.30	309.00	127.00	4508.48	-8.88	-10.07	-8.35	0.29
28	4602	0.40	304.10	129.00	4601.48	-9.32	-9.74	-8.81	0.11
29	4695	0.30	251.30	131.00	4694.48	-9.81	-9.64	-9.31	0.35
30	**4788**	**0.40**	**284.10**	**131.00**	**4787.48**	**-10.36**	**-9.63**	**-9.85**	**0.24**
31	4881	0.20	219.40	132.00	4880.47	-10.78	-9.68	-10.27	0.39
32	4974	0.20	221.40	134.00	4973.47	-11.00	-9.93	-10.48	0.01
33	5068	0.40	192.50	136.00	5067.47	-11.20	-10.37	-10.66	0.26
34	5161	0.20	222.30	138.00	5160.47	-11.41	-10.81	-10.84	0.27
35	**5254**	**0.40**	**190.20**	**138.00**	**5253.47**	**-11.60**	**-11.25**	**-11.01**	**0.27**
36	5347	0.50	149.50	136.00	5346.47	-11.48	-11.92	-10.86	0.35
37	5440	0.60	159.80	141.00	5439.46	-11.15	-12.72	-10.48	0.15
38	5534	0.60	165.60	143.00	5533.46	-10.91	-13.66	-10.19	0.06
39	5627	0.40	14.20	145.00	5626.46	-10.72	-13.82	-9.99	1.04
40	**5720**	**0.40**	**24.70**	**149.00**	**5719.45**	**-10.47**	**-13.21**	**-9.78**	**0.08**
41	5813	0.50	6.80	150.00	5812.45	-10.25	-12.51	-9.59	0.18
42	5906	0.50	25.30	152.00	5905.45	-9.99	-11.74	-9.37	0.17
43	5965	0.50	24.60	152.00	5964.45	-9.75	-11.28	-9.15	0.01
44	6059	0.60	19.70	113.00	6058.44	-9.37	-10.44	-8.82	0.12
45	**6091**	**0.30**	**49.00**	**114.00**	**6090.44**	**-9.23**	**-10.23**	**-8.70**	**1.15**
46	6184	0.60	39.30	120.00	6183.44	-8.71	-9.69	-8.21	0.33
47	6277	0.70	20.40	125.00	6276.43	-8.16	-8.78	-7.70	0.25
48	6370	0.50	29.00	131.00	6369.43	-7.72	-7.89	-7.30	0.24
49	6463	0.80	27.60	136.00	6462.42	-7.17	-6.96	-6.81	0.32
50	**6556**	**0.70**	**49.80**	**140.00**	**6555.41**	**-6.39**	**-6.02**	**-6.07**	**0.33**
51	6649	0.80	35.80	143.00	6648.40	-5.53	-5.13	-5.26	0.22
52	6743	0.40	38.00	147.00	6742.40	-4.90	-4.34	-4.67	0.43
53	6836	0.20	131.50	150.00	6835.40	-4.57	-4.19	-4.35	0.49
54	6929	0.40	170.10	154.00	6928.40	-4.42	-4.62	-4.17	0.29
55	**7022**	**0.40**	**182.20**	**158.00**	**7021.39**	**-4.41**	**-5.26**	**-4.13**	**0.09**
56	7116	0.30	229.90	159.00	7115.39	-4.63	-5.75	-4.33	0.32
57	7209	0.10	14.50	163.00	7208.39	-4.80	-5.82	-4.50	0.41
58	7302	0.30	20.40	165.00	7301.39	-4.68	-5.52	-4.39	0.22
59	7395	0.70	15.30	168.00	7394.39	-4.41	-4.74	-4.16	0.43
60	**7489**	**0.70**	**9.60**	**171.00**	**7488.38**	**-4.10**	**-3.62**	**-3.91**	**0.07**
61	7582	0.70	357.90	174.00	7581.37	-3.96	-2.49	-3.84	0.15
62	7675	0.90	12.60	176.00	7674.37	-3.76	-1.21	-3.70	0.31
63	7768	0.60	15.20	180.00	7767.36	-3.41	-0.03	-3.41	0.32
64	7861	0.60	1.10	179.00	7860.35	-3.22	0.93	-3.27	0.16
65	**7955**	**0.60**	**8.70**	**181.00**	**7954.35**	**-3.08**	**1.90**	**-3.19**	**0.08**

Report #: 1
Date: 22-Dec-15

RYAN DIRECTIONAL SERVICES, INC.
A NABORS COMPANY

Ryan Job # 8419

SURVEY REPORT

Customer: Oasis Petroleum
Well Name: Wade Federal 5300 31-30 11T
Rig #: Nabors B-25
API #: 33-053-05906
Calculation Method: Minimum Curvature Calculation

MWD Operator: Daniel Ogden
Directional Drillers: RPM
Survey Corrected To: True North
Vertical Section Direction: 86.92
Total Correction: 8.31
Temperature Forecasting Model (Chart Only): Logarithmic

Survey #	MD	Inc	Azm	Temp	TVD	VS	N/S	E/W	DLS
66	8048	0.20	53.10	183.00	8047.34	-2.85	2.48	-2.99	0.51
67	8141	0.10	254.80	179.00	8140.34	-2.79	2.56	-2.93	0.32
68	8234	0.40	158.80	183.00	8233.34	-2.77	2.24	-2.90	0.45
69	8327	0.20	137.90	186.00	8326.34	-2.57	1.81	-2.67	0.24
70	**8421**	**0.40**	**177.50**	**186.00**	**8420.34**	**-2.47**	**1.36**	**-2.55**	**0.29**
71	8514	0.60	185.10	188.00	8513.34	-2.54	0.55	-2.57	0.23
72	8607	0.60	182.80	190.00	8606.33	-2.66	-0.42	-2.64	0.03
73	8700	0.70	173.50	192.00	8699.33	-2.68	-1.47	-2.60	0.16
74	8794	0.60	178.90	192.00	8793.32	-2.66	-2.53	-2.53	0.12
75	**8887**	**0.90**	**168.50**	**194.00**	**8886.31**	**-2.57**	**-3.73**	**-2.37**	**0.35**
76	8980	1.00	180.30	197.00	8979.30	-2.51	-5.26	-2.23	0.24
77	9073	0.80	181.30	195.00	9072.29	-2.61	-6.72	-2.25	0.22
78	9166	1.00	207.80	194.00	9165.28	-3.07	-8.09	-2.64	0.49
79	9259	1.00	215.60	197.00	9258.26	-4.00	-9.47	-3.49	0.15
80	**9352**	**1.10**	**232.30**	**190.00**	**9351.25**	**-5.24**	**-10.67**	**-4.67**	**0.34**
81	9446	1.10	243.90	192.00	9445.23	-6.81	-11.62	-6.20	0.24
82	9539	0.70	243.20	195.00	9538.22	-8.15	-12.27	-7.50	0.43
83	9632	0.80	246.50	197.00	9631.21	-9.28	-12.78	-8.61	0.12
84	9725	0.80	253.00	199.00	9724.20	-10.52	-13.23	-9.82	0.10
85	**9818**	**1.20**	**261.30**	**201.00**	**9817.19**	**-12.12**	**-13.57**	**-11.41**	**0.46**
86	9911	0.70	279.30	203.00	9910.17	-13.64	-13.63	-12.93	0.62
87	10005	0.60	316.00	204.00	10004.17	-14.53	-13.18	-13.84	0.45
88	10098	0.80	307.50	199.00	10097.16	-15.34	-12.43	-14.69	0.24
89	10191	1.10	315.60	204.00	10190.15	-16.42	-11.40	-15.83	0.35
90	**10196**	**1.20**	**323.20**	**177.00**	**10195.15**	**-16.48**	**-11.32**	**-15.90**	**3.64**
91	10227	1.10	358.30	188.00	10226.14	-16.66	-10.77	-16.10	2.26
92	10258	2.40	46.50	188.00	10257.13	-16.15	-10.02	-15.64	5.99
93	10290	4.80	61.80	186.00	10289.06	-14.43	-8.93	-13.97	8.01
94	10321	7.90	68.60	194.00	10319.87	-11.23	-7.54	-10.84	10.27
95	**10352**	**10.90**	**70.60**	**194.00**	**10350.45**	**-6.40**	**-5.79**	**-6.10**	**9.73**
96	10383	13.90	70.80	194.00	10380.72	-0.01	-3.59	0.19	9.68
97	10414	16.90	71.20	194.00	10410.61	7.91	-0.91	7.97	9.68
98	10445	19.60	72.00	192.00	10440.05	17.27	2.15	17.18	8.75
99	10476	22.20	73.20	192.00	10469.00	27.99	5.45	27.74	8.50
100	**10507**	**25.10**	**74.20**	**186.00**	**10497.40**	**40.10**	**8.93**	**39.67**	**9.44**
101	10538	28.40	74.00	185.00	10525.08	53.70	12.76	53.09	10.65
102	10569	32.40	73.70	185.00	10551.81	68.98	17.12	68.15	12.91
103	10600	36.90	73.10	188.00	10577.30	86.11	22.16	85.04	14.56
104	10631	41.70	72.00	190.00	10601.29	105.12	28.05	103.76	15.65
105	**10662**	**46.30**	**71.90**	**192.00**	**10623.58**	**125.92**	**34.73**	**124.23**	**14.84**
106	10693	50.70	71.60	194.00	10644.12	148.32	42.00	146.27	14.21
107	10724	54.70	72.50	195.00	10662.90	172.15	49.59	169.73	13.11
108	10755	58.70	72.00	195.00	10679.91	197.21	57.49	194.40	12.97
109	10786	62.50	71.60	197.00	10695.13	223.28	65.93	220.05	12.31
110	**10817**	**65.50**	**71.20**	**197.00**	**10708.72**	**250.12**	**74.81**	**246.45**	**9.75**
111	10848	67.80	71.20	199.00	10721.00	277.51	83.98	273.40	7.42
112	10880	71.30	70.10	201.00	10732.18	306.29	93.92	301.68	11.40
113	10911	75.60	69.50	201.00	10741.01	334.68	104.18	329.56	13.99
114	10942	80.20	69.40	203.00	10747.51	363.59	114.82	357.93	14.84
115	**10973**	**85.70**	**69.30**	**204.00**	**10751.31**	**392.91**	**125.66**	**386.71**	**17.74**
116	11004	89.00	68.90	206.00	10752.74	422.38	136.71	415.64	10.72
117	11017	89.50	68.80	206.00	10752.91	434.74	141.40	427.76	3.92
118	11097	90.00	67.60	215.00	10753.26	510.51	171.11	502.04	1.62
119	11128	90.10	67.30	215.00	10753.24	539.73	183.00	530.67	1.02
120	**11159**	**90.20**	**67.50**	**215.00**	**10753.15**	**568.95**	**194.91**	**559.29**	**0.72**
121	11189	90.50	67.60	215.00	10752.97	597.25	206.37	587.01	1.05
122	11220	90.90	67.60	212.00	10752.59	626.50	218.18	615.67	1.29
123	11251	90.70	68.50	210.00	10752.16	655.84	229.76	644.42	2.97
124	11282	89.90	71.50	212.00	10752.00	685.49	240.36	673.55	10.02
125	**11314**	**88.30**	**71.60**	**212.00**	**10752.50**	**716.34**	**250.49**	**703.90**	**5.01**
126	11344	88.40	72.90	213.00	10753.36	745.35	259.63	732.46	4.34
127	11375	88.10	73.60	215.00	10754.31	775.46	268.56	762.13	2.46
128	11406	87.90	73.90	213.00	10755.39	805.62	277.23	791.87	1.16
129	11436	88.20	73.50	215.00	10756.41	834.81	285.65	820.65	1.67
130	**11467**	**89.00**	**73.40**	**217.00**	**10757.17**	**864.95**	**294.47**	**850.36**	**2.60**

Report #: 1
Date: 22-Dec-15

RYAN DIRECTIONAL SERVICES, INC.
A NABORS COMPANY

Ryan Job # 8419

SURVEY REPORT

Customer: Oasis Petroleum
Well Name: Wade Federal 5300 31-30 11T
Rig #: Nabors B-25
API #: 33-053-05906
Calculation Method: Minimum Curvature Calculation

MWD Operator: Daniel Ogden
Directional Drillers: RPM
Survey Corrected To: True North
Vertical Section Direction: 86.92
Total Correction: 8.31
Temperature Forecasting Model (Chart Only): Logarithmic

Survey #	MD	Inc	Azm	Temp	TVD	VS	N/S	E/W	DLS
131	11498	89.30	74.40	219.00	10757.63	895.15	303.07	880.14	3.37
132	11529	89.20	74.30	219.00	10758.04	925.40	311.43	909.98	0.46
133	11560	89.50	73.80	221.00	10758.39	955.62	319.95	939.79	1.88
134	11591	89.40	73.80	217.00	10758.69	985.81	328.60	969.56	0.32
135	**11622**	**89.30**	**74.40**	**219.00**	**10759.04**	**1016.04**	**337.09**	**999.37**	**1.96**
136	11652	88.80	75.10	221.00	10759.53	1045.36	344.98	1028.31	2.87
137	11683	88.50	75.00	221.00	10760.26	1075.69	352.98	1058.25	1.02
138	11714	88.50	75.70	222.00	10761.08	1106.05	360.81	1088.23	2.26
139	11745	89.00	77.00	221.00	10761.75	1136.51	368.13	1118.35	4.49
140	**11776**	**89.30**	**76.90**	**222.00**	**10762.21**	**1167.04**	**375.13**	**1148.54**	**1.02**
141	11808	89.50	77.40	222.00	10762.55	1198.57	382.24	1179.74	1.68
142	11838	89.30	78.90	222.00	10762.86	1228.22	388.40	1209.10	5.04
143	11869	89.20	79.80	224.00	10763.27	1258.95	394.13	1239.56	2.92
144	11900	89.50	79.70	224.00	10763.62	1289.70	399.65	1270.07	1.02
145	**11930**	**87.90**	**80.60**	**224.00**	**10764.30**	**1319.49**	**404.78**	**1299.61**	**6.12**
146	11961	87.30	80.40	224.00	10765.60	1350.26	409.89	1330.16	2.04
147	11992	87.10	81.00	224.00	10767.11	1381.04	414.89	1360.72	2.04
148	12022	86.90	80.40	224.00	10768.68	1410.83	419.73	1390.28	2.11
149	12053	88.10	81.20	224.00	10770.03	1441.62	424.69	1420.85	4.65
150	**12084**	**88.80**	**81.60**	**226.00**	**10770.87**	**1472.47**	**429.32**	**1451.49**	**2.60**
151	12115	89.20	81.50	226.00	10771.41	1503.32	433.87	1482.15	1.33
152	12145	89.50	82.00	228.00	10771.75	1533.20	438.18	1511.84	1.94
153	12177	89.50	82.10	226.00	10772.03	1565.08	442.60	1543.53	0.31
154	12208	89.30	82.00	226.00	10772.36	1595.97	446.89	1574.23	0.72
155	**12239**	**87.40**	**81.00**	**228.00**	**10773.25**	**1626.82**	**451.47**	**1604.88**	**6.93**
156	12271	87.30	80.20	230.00	10774.73	1658.59	456.69	1636.41	2.52
157	12302	87.30	80.50	230.00	10776.19	1689.35	461.88	1666.94	0.97
158	12334	86.90	80.90	231.00	10777.81	1721.12	467.05	1698.48	1.77
159	12365	86.80	81.30	226.00	10779.51	1751.91	471.84	1729.06	1.33
160	**12397**	**87.10**	**80.60**	**228.00**	**10781.22**	**1783.70**	**476.86**	**1760.62**	**2.38**
161	12429	87.70	80.30	230.00	10782.67	1815.46	482.17	1792.14	2.10
162	12460	87.90	79.70	226.00	10783.86	1846.21	487.55	1822.65	2.04
163	12491	88.70	80.60	224.00	10784.78	1876.98	492.85	1853.18	3.88
164	12523	90.40	81.80	228.00	10785.03	1908.82	497.74	1884.80	6.50
165	**12555**	**90.40**	**82.60**	**230.00**	**10784.81**	**1940.71**	**502.08**	**1916.50**	**2.50**
166	12586	90.30	82.30	226.00	10784.62	1971.61	506.16	1947.23	1.02
167	12618	89.90	83.00	230.00	10784.56	2003.52	510.25	1978.97	2.52
168	12649	89.10	84.40	231.00	10784.83	2034.47	513.65	2009.78	5.20
169	12681	88.90	84.40	231.00	10785.39	2066.44	516.77	2041.62	0.63
170	**12712**	**88.60**	**83.70**	**228.00**	**10786.07**	**2097.39**	**519.99**	**2072.45**	**2.46**
171	12744	88.40	84.00	230.00	10786.90	2129.33	523.41	2104.25	1.13
172	12775	89.90	85.50	231.00	10787.36	2160.31	526.25	2135.11	6.84
173	12806	90.30	84.80	230.00	10787.31	2191.29	528.87	2166.00	2.60
174	12838	90.60	85.70	231.00	10787.06	2223.28	531.52	2197.89	2.96
175	**12870**	**90.80**	**86.30**	**233.00**	**10786.67**	**2255.27**	**533.75**	**2229.81**	**1.98**
176	12901	90.70	87.10	230.00	10786.26	2286.27	535.54	2260.76	2.60
177	12933	90.70	87.20	233.00	10785.87	2318.26	537.13	2292.72	0.31
178	12964	90.70	88.60	233.00	10785.49	2349.26	538.26	2323.69	4.52
179	12995	90.60	88.60	235.00	10785.14	2380.24	539.02	2354.68	0.32
180	**13027**	**90.20**	**87.90**	**235.00**	**10784.92**	**2412.23**	**540.00**	**2386.66**	**2.52**
181	13058	88.90	89.80	235.00	10785.16	2443.21	540.62	2417.66	7.43
182	13090	88.50	90.00	235.00	10785.89	2475.16	540.68	2449.65	1.40
183	13153	87.80	89.30	237.00	10787.92	2538.05	541.06	2512.61	1.57
184	13247	88.90	90.20	237.00	10790.63	2631.90	541.47	2606.57	1.51
185	**13342**	**89.90**	**89.30**	**237.00**	**10791.62**	**2726.77**	**541.89**	**2701.56**	**1.42**
186	13436	89.90	89.30	240.00	10791.78	2820.69	543.03	2795.55	0.00
187	13531	89.80	88.50	240.00	10792.03	2915.64	544.86	2890.54	0.85
188	13625	90.00	88.40	240.00	10792.20	3009.60	547.40	2984.50	0.24
189	13720	90.40	89.10	240.00	10791.87	3104.55	549.47	3079.48	0.85
190	**13814**	**89.40**	**90.10**	**240.00**	**10792.03**	**3198.45**	**550.13**	**3173.47**	**1.50**
191	13908	90.10	92.30	240.00	10792.44	3292.18	548.16	3267.44	2.46
192	14002	87.30	92.30	242.00	10794.57	3385.73	544.39	3361.34	2.98
193	14096	88.00	90.90	240.00	10798.43	3479.33	541.77	3455.22	1.66
194	14191	88.50	88.80	242.00	10801.33	3574.16	542.02	3550.17	2.27
195	**14284**	**89.60**	**88.60**	**240.00**	**10802.87**	**3667.10**	**544.13**	**3643.13**	**1.20**

Report #: 1
Date: 22-Dec-15

RYAN DIRECTIONAL SERVICES, INC.
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Ryan Job # 8419

SURVEY REPORT

Customer: Oasis Petroleum
Well Name: Wade Federal 5300 31-30 11T
Rig #: Nabors B-25
API #: 33-053-05906
Calculation Method: Minimum Curvature Calculation

MWD Operator: Daniel Ogden
Directional Drillers: RPM
Survey Corrected To: True North
Vertical Section Direction: 86.92
Total Correction: 8.31
Temperature Forecasting Model (Chart Only): Logarithmic

Survey #	MD	Inc	Azm	Temp	TVD	VS	N/S	E/W	DLS
196	14378	89.20	88.90	242.00	10803.85	3761.05	546.18	3737.10	0.53
197	14472	89.50	90.10	244.00	10804.92	3854.95	547.00	3831.09	1.32
198	14566	90.70	90.00	244.00	10804.76	3948.80	546.91	3925.09	1.28
199	14660	90.50	89.40	244.00	10803.77	4042.69	547.41	4019.08	0.67
200	**14754**	**89.80**	**90.90**	**253.00**	**10803.53**	**4136.53**	**547.16**	**4113.08**	**1.76**
201	14848	89.80	91.50	251.00	10803.85	4230.27	545.19	4207.05	0.64
202	14942	88.60	90.90	249.00	10805.17	4324.00	543.22	4301.02	1.43
203	15036	88.30	91.00	249.00	10807.71	4417.73	541.67	4394.98	0.34
204	15130	88.60	89.60	249.00	10810.25	4511.53	541.17	4488.94	1.52
205	**15224**	**89.80**	**90.00**	**248.00**	**10811.56**	**4605.40**	**541.50**	**4582.93**	**1.35**
206	15318	90.40	90.30	248.00	10811.40	4699.25	541.26	4676.92	0.71
207	15412	87.40	90.40	249.00	10813.21	4793.05	540.68	4770.89	3.19
208	15506	88.10	90.00	249.00	10816.90	4886.83	540.35	4864.82	0.86
209	15600	89.40	90.00	249.00	10818.95	4980.67	540.35	4958.80	1.38
210	**15695**	**89.30**	**90.60**	**249.00**	**10820.02**	**5075.49**	**539.86**	**5053.79**	**0.64**
211	15789	89.00	91.70	251.00	10821.42	5169.23	537.97	5147.76	1.21
212	15883	89.70	89.30	251.00	10822.48	5263.03	537.15	5241.74	2.66
213	15977	90.50	88.60	253.00	10822.32	5356.97	538.87	5335.72	1.13
214	16072	90.40	88.60	255.00	10821.57	5451.93	541.19	5430.69	0.11
215	**16165**	**89.80**	**88.60**	**257.00**	**10821.41**	**5544.89**	**543.47**	**5523.66**	**0.65**
216	16260	88.70	88.40	257.00	10822.66	5639.84	545.95	5618.62	1.18
217	16353	89.10	88.90	255.00	10824.44	5732.78	548.14	5711.58	0.69
218	16447	90.20	89.90	255.00	10825.02	5826.69	549.13	5805.57	1.58
219	16541	91.40	89.40	257.00	10823.70	5920.57	549.70	5899.56	1.38
220	**16635**	**89.10**	**90.50**	**255.00**	**10823.29**	**6014.43**	**549.78**	**5993.55**	**2.71**
221	16729	89.10	90.70	258.00	10824.77	6108.22	548.80	6087.53	0.21
222	16823	89.70	90.00	258.00	10825.75	6202.05	548.23	6181.52	0.98
223	16917	90.20	90.20	258.00	10825.84	6295.90	548.06	6275.52	0.57
224	17011	90.50	89.40	260.00	10825.26	6389.78	548.39	6369.52	0.91
225	**17105**	**89.60**	**89.30**	**260.00**	**10825.18**	**6483.70**	**549.46**	**6463.51**	**0.96**
226	17198	90.50	90.00	258.00	10825.10	6576.59	550.02	6556.51	1.23
227	17292	90.90	90.20	260.00	10823.95	6670.44	549.86	6650.50	0.48
228	17386	90.50	90.00	260.00	10822.80	6764.29	549.70	6744.49	0.48
229	17481	91.20	89.90	262.00	10821.39	6859.14	549.78	6839.48	0.74
230	**17574**	**89.50**	**90.80**	**258.00**	**10820.82**	**6951.97**	**549.21**	**6932.47**	**2.07**
231	17668	89.80	90.60	260.00	10821.40	7045.76	548.06	7026.47	0.38
232	17763	88.40	90.00	262.00	10822.89	7140.58	547.56	7121.45	1.60
233	17857	88.90	90.10	260.00	10825.11	7234.42	547.48	7215.42	0.54
234	17951	89.10	90.50	258.00	10826.75	7328.24	546.99	7309.41	0.48
235	**18044**	**91.40**	**90.60**	**260.00**	**10826.34**	**7421.05**	**546.10**	**7402.40**	**2.48**
236	18138	90.20	90.60	260.00	10825.03	7514.84	545.11	7496.38	1.28
237	18232	88.40	91.70	260.00	10826.18	7608.57	543.23	7590.35	2.24
238	18326	88.20	91.30	262.00	10828.96	7702.23	540.77	7684.27	0.48
239	18420	90.00	89.50	262.00	10830.44	7796.04	540.11	7778.25	2.71
240	**18514**	**89.50**	**89.10**	**262.00**	**10830.85**	**7889.96**	**541.26**	**7872.24**	**0.68**
241	18608	89.20	89.30	264.00	10831.92	7983.87	542.57	7966.23	0.38
242	18702	88.30	89.00	264.00	10833.97	8077.78	543.97	8060.20	1.01
243	18796	90.30	90.00	262.00	10835.12	8171.67	544.79	8154.18	2.38
244	18890	91.70	89.50	264.00	10833.48	8265.54	545.20	8248.16	1.58
245	**18983**	**91.80**	**90.20**	**264.00**	**10830.64**	**8358.37**	**545.44**	**8341.12**	**0.76**
246	19078	90.10	90.70	266.00	10829.06	8453.18	544.69	8436.10	1.87
247	19172	90.40	89.30	264.00	10828.65	8547.04	544.69	8530.09	1.52
248	19266	89.80	90.40	266.00	10828.49	8640.91	544.94	8624.09	1.33
249	19359	87.40	91.00	266.00	10830.76	8733.68	543.80	8717.05	2.66
250	**19454**	**87.80**	**90.50**	**266.00**	**10834.74**	**8828.38**	**542.56**	**8811.96**	**0.67**
251	19548	88.40	90.80	266.00	10837.85	8922.13	541.50	8905.90	0.71
252	19641	89.60	89.20	266.00	10839.48	9014.98	541.50	8998.88	2.15
253	19735	89.80	89.90	268.00	10839.97	9108.88	542.23	9092.88	0.77
254	19829	89.20	90.80	267.00	10840.79	9202.70	541.66	9186.87	1.15
255	**19923**	**90.90**	**90.30**	**267.00**	**10840.71**	**9296.51**	**540.76**	**9280.86**	**1.89**
256	20017	91.30	90.20	269.00	10838.90	9390.33	540.35	9374.84	0.44
257	20111	89.10	90.00	267.00	10838.57	9484.18	540.18	9468.84	2.35
258	20205	88.70	90.00	269.00	10840.38	9578.03	540.18	9562.82	0.43
259	20299	90.00	89.80	267.00	10841.45	9671.89	540.35	9656.81	1.40
260	**20393**	**90.90**	**88.90**	**269.00**	**10840.71**	**9765.80**	**541.41**	**9750.80**	**1.35**
261	20437	91.40	88.60	267.00	10839.82	9809.77	542.37	9794.78	1.33
Projection	20500	91.40	88.60	PTB	10838.28	9872.73	543.91	9857.74	0.00

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)

NOV 2014
RECEIVED
ND OIL & GAS DIVISION

Well File No. **28303**

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

☑ Notice of Intent — Approximate Start Date: **January 1, 2015**

☐ Report of Work Done — Date Work Completed:

☐ 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:

☐ Drilling Prognosis ☐ Spill Report
☐ Redrilling or Repair ☐ Shooting
☐ Casing or Liner ☐ Acidizing
☐ Plug Well ☐ Fracture Treatment
☐ Supplemental History ☐ Change Production Method
☐ Temporarily Abandon ☐ Reclamation
☑ Other **Suspension of Drilling**

Well Name and Number					
Wade Federal 5300 31-30 11T					
Footages	Qtr-Qtr	Section	Township	Range	
1955 F S L 350 F WL	LOT3	30	153 N	100 W	
Field	Pool	County			
Baker	Bakken	McKenzie			

24-HOUR PRODUCTION RATE

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

Name of Contractor(s)			
Advanced Energy Services			
Address	City	State	Zip Code

DETAILS OF WORK

Oasis Petroleum North America LLC requests permission for suspension of drilling for up to 90 days for the referenced well under NDAC 43-02-03-55. Oasis Petroleum North America LLC intends to drill the surface hole with freshwater based drilling mud and set surface casing with a small drilling rig and move off within 3 to 5 days. The casing will be set at a depth pre-approved by the NDIC per the Application for Permit to Drill NDAC 43-02-03-21. No saltwater will be used in the drilling and cementing operations of the surface casing. Once the surface casing is cemented, a plug or mechanical seal will be placed at the top of the casing to prevent any foreign matter from getting into the well. A rig capable of drilling to TD will move onto the location within the 90 days previously outlined to complete the drilling and casing plan as per the APD. The undersigned states that this request for suspension of drilling operations in accordance with the Subsection 4 of Section 43-02-03-55 of the NDAC, is being requested to take advantage of the cost savings and time savings of using an initial rig that is smaller than the rig necessary to drill a well to total depth but is not intended to alter or extend the terms and conditions of, or suspend any obligation under, any oil and gas lease with acreage in or under the spacing or drilling unit for the above-referenced well. Oasis Petroleum North America LLC understands NDAC 43-02-03-31 requirements regarding confidentiality pertaining to this permit. The drilling pit will be fenced immediately after construction if the well pad is located in a pasture (NDAC 43-02-03-19 & 19.1). Oasis Petroleum North America LL will plug and abandon the well and reclaim the well site if the well is not drilled by the larger rotary rig within 90 days after spudding the well with the smaller drilling rig.

NOTIFY NDIC INSPECTOR RICHARD DUNN AT (701) 770-3554 WITH SPUD & TD INFO

Company		Telephone Number
Oasis Petroleum North America LLC		**(281) 404-9591**
Address		
1001 Fannin, Suite 1500		
City	State	Zip Code
Houston	**TX**	**77002**
Signature	Printed Name	
	Chelsea Covington	
Title	Date	
Regulatory Assistant	**November 3, 2014**	
Email Address		
ccovington@oasispetroleum.com		

FOR STATE USE ONLY

☐ Received ☒ Approved

Date 11/14/2014

By Matthew Messaros

Title **ENGINEERING TECHNICIAN**

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)

OCT 2014 RECEIVED ND OIL & GAS DIVISION

Well File No. **28303**

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

☑ Notice of Intent	Approximate Start Date **October 6, 2014**	☐ Drilling Prognosis	☐ Spill Report
☐ Report of Work Done	Date Work Completed	☐ Redrilling or Repair	☐ Shooting
☐ 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	☐ Casing or Liner	☐ Acidizing
		☐ Plug Well	☐ Fracture Treatment
		☐ Supplemental History	☐ Change Production Method
		☐ Temporarily Abandon	☐ Reclamation
		☑ Other **Casing Change**	

Well Name and Number				
Wade Federal 5300 31-30 11T				
Footages	Qtr-Qtr	Section	Township	Range
1955 F S L 350 F W L	**LOT3**	**30**	**153 N**	**100 W**
Field	Pool	County		
	Bakken	**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

DETAILS OF WORK

Oasis Petroleum respectfully requests approval to change the casing design for the above referenced well:

Surface Casing to 13 3/8" casing (previously 9 5/8" casing);
Contingency Surface Casing of 9 5/8" set at 6400';

7" Intermediate Casing and 4 1/2" liner will remain the same.

Attached are the revised GeoProg, 8 Point Drill plan, Plot and Plan.

Company **Oasis Petroleum North America LLC**		Telephone Number **281-404-9589**
Address **1001 Fannin, Suite 1500**		
City **Houston**	State **TX**	Zip Code **77002**
Signature Sonja Rolfes	Printed Name **Sonja Rolfes**	
Title **Regulatory Specialist**	Date **October 6, 2014**	
Email Address **srolfes@oasispetroleum.com**		

FOR STATE USE ONLY

☐ Received	☒ Approved
Date 10/13/14	
By Nathaniel Erbele	
Title Petroleum Resource Specialist	

DRILLING PLAN

OPERATOR	Oasis Petroleum	**COUNTY/STATE**	McKenzie Co., ND
WELL NAME	Wade Federal 5300 31-30 11T	**RIG**	B25
WELL TYPE	Horizontal Three Forks		
LOCATION	SW SW 30-153N-100W Surface Location (survey plat): 1955' FSL 350' FWL		
EST. T.D.	20,587'	**GROUND ELEV:**	2,029' **Sub Height:** 25'
	TOTAL LATERAL: 9,545'	**KB ELEV:**	2,054'

MARKER		TVD	Subsea TVD
Pierre	NDIC MAP	1,904	150
Greenhorn		4,555	-2,501
Mowry		4,958	-2,904
Dakota		5,380	-3,326
Rierdon		6,396	-4,342
Dunham Salt		6,885	-4,831
Dunham Salt Base		6,931	-4,877
Pine Salt		7,194	-5,140
Pine Salt Base		7,218	-5,164
Opeche Salt		7,280	-5,226
Opeche Salt Base		7,360	-5,306
Amsden		7,604	-5,550
Tyler		7,760	-5,706
Otter/Base Minnelusa		7,983	-5,929
Kibbey Lime		8,325	-6,271
Charles Salt		8,473	-6,419
Base Last Salt		9,152	-7,098
Mission Canyon		9,366	-7,312
Lodgepole		9,915	-7,861
False Bakken		10,645	-8,591
Upper Bakken Shale		10,657	-8,603
Middle Bakken		10,672	-8,618
Lower Bakken Shale		10,708	-8,654
Pronghorn		10,717	-8,663
Threeforks		10,733	-8,679
Threeforks(Top of Target)		10,750	-8,696
Threeforks(Base of Target)		10,759	-8,705
Claystone		10,759	-8,705

Est. Dip Rate:

Max. Anticipated BHP: 4662

LOGS:	**Type**	**Interval**
OH Logs:	Request Log waiver based on the Wade Federal 5300 21-30H 1,100' N of surface location	
CBL/GR:	Above top of cement/GR to base of casing	
MWD GR:	KOP to lateral TD	
DEVIATION:	Surf:	3 deg. max., 1 deg / 100'; srvy every 500'
	Prod:	5 deg. max., 1 deg / 100'; srvy every 100'
DST'S:	None planned	
CORES:	None planned	
MUDLOGGING:	Two-Man:	Begin 200' above Kibbey 30' samples in curve and lateral
BOP:	11" 5000 psi blind, pipe & annular	

Surface Formation: *Glacial till*

MUD:	Interval		Type	WT	Vis	WL	Remarks
Surface:	0' -	2,010'	FW	8.4-9.0	28-32	NC	Circ Mud Tanks
Intermediate:	2,010' -	11,042'	Invert	9.5-10.4	40-50	30+HtHp	Circ Mud Tanks
Lateral:	11,042' -	20,587'	Salt Water	9.8-10.2	28-32	NC	Circ Mud Tanks

CASING:	Size	Wt ppf	Hole	Depth		Cement	WOC	Remarks
Surface:	13-3/8"	54.5#	17-1/2"	2,010'		To Surface	12	100' into Pierre
Inermediate (Dakota):	9-5/8"	40#	12-1/4"	6,400'		To Surface	24	Set Casing across Dakota
Intermediate:	7"	32#	8-3/4"	11,042'		3880	24	1500' above Dakota
Production Liner:	4.5"	13.5#	6"	20,587'	TOL @ 10,229'			50' above KOP

PROBABLE PLUGS, IF REQ'D:

OTHER:	MD	TVD	FNL/FSL	FEL/FWL	S-T-R	AZI		
Surface:	2,010	2,010	1955' FSL	350' FWL	Sec. 30-T153N-R100W		Survey Company:	
KOP:	10,279'	10,279'	1955' FSL	350' FWL	Sec. 30-T153N-R100W		Build Rate:	12 deg /100'
EOC:	11,026'	10,757'	2121' FSL	794' FWL	Sec. 30-T153N-R100W	69.0	Turn Rate	1 deg /100'
Casing Point:	11,042'	10,757'	2127' FSL	809' FWL	Sec. 30-T153N-R100W	69.0		
Middle Bakken Lateral TD:	20,587'	10,815'	2491' FSL	200' FEL	Sec. 29-T153N-R100W	90.0		

Comments:

Request Log waiver based on the Wade Federal 5300 21-30H 1,100' N of surface location

No frac string planned
35 packers & 15 sleeves

OASIS PETROLEUM

Geology: N. Gabelman 1/23/2014 **Engineering:** M. Brown 2-6-2014

Oasis Petroleum
Drilling Program
Wade Federal 5300 31-30 11T
Section 30 T153N R100W
McKenzie County, ND

Oasis Petroleum intends to drill this well according to the planned program outlined below.

1. **Estimated Tops of Important Geologic Markers**

MARKER		TVD	Subsea TVD
Pierre	NDIC MAP	1,904	150
Greenhorn		4,555	-2,501
Mowry		4,958	-2,904
Dakota		5,380	-3,326
Rierdon		6,396	-4,342
Dunham Salt		6,885	-4,831
Dunham Salt Base		6,931	-4,877
Pine Salt		7,194	-5,140
Pine Salt Base		7,218	-5,164
Opeche Salt		7,280	-5,226
Opeche Salt Base		7,360	-5,306
Amsden		7,604	-5,550
Tyler		7,760	-5,706
Otter/Base Minnelusa		7,983	-5,929
Kibbey Lime		8,325	-6,271
Charles Salt		8,473	-6,419
Base Last Salt		9,152	-7,098
Mission Canyon		9,366	-7,312
Lodgepole		9,915	-7,861
False Bakken		10,645	-8,591
Upper Bakken Shale		10,657	-8,603
Middle Bakken		10,672	-8,618
Lower Bakken Shale		10,708	-8,654
Pronghorn		10,717	-8,663
Threeforks 1st Bench		10,733	-8,679
Claystone 1		10,759	-8,705
Three Forks 2nd Bench		10,776	-8,722
Target Top		10,780	-8,726
Target Base		10,799	-8,745

Oasis Petroleum
Drilling Program
Wade Federal 5300 31-30 11T
Section 30 T153N R100W
McKenzie County, ND

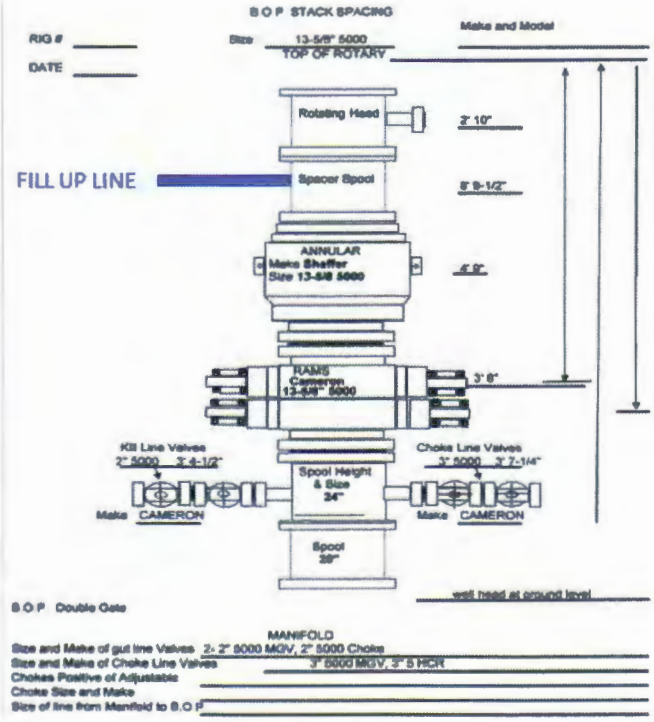
2. **Estimated Depths of Anticipated Water, Oil, Gas or Mineral Formations:**

Substance	Formation	Depth (TVD)
Water	Dakota	5380'
Oil	Mission Canyon (Potential H2S)	9366'
Oil	Lodgepole	9915'
Oil	2nd Bench Three Forks	10776'

3. **Pressure Control Equipment:**

After 13-3/8" casing will be set at 2,010' (at least 100' into the Pierre Shale), an 11", 5M, double ram BOP with annular preventer, 5M psi kill lines, choke manifold and rotating head will be used and installed on a 13-3/8" x 11", 5M wellhead (A-Section) to drill from 2,010' to 11,042' MD (7" intermediate casing point). See diagram below.

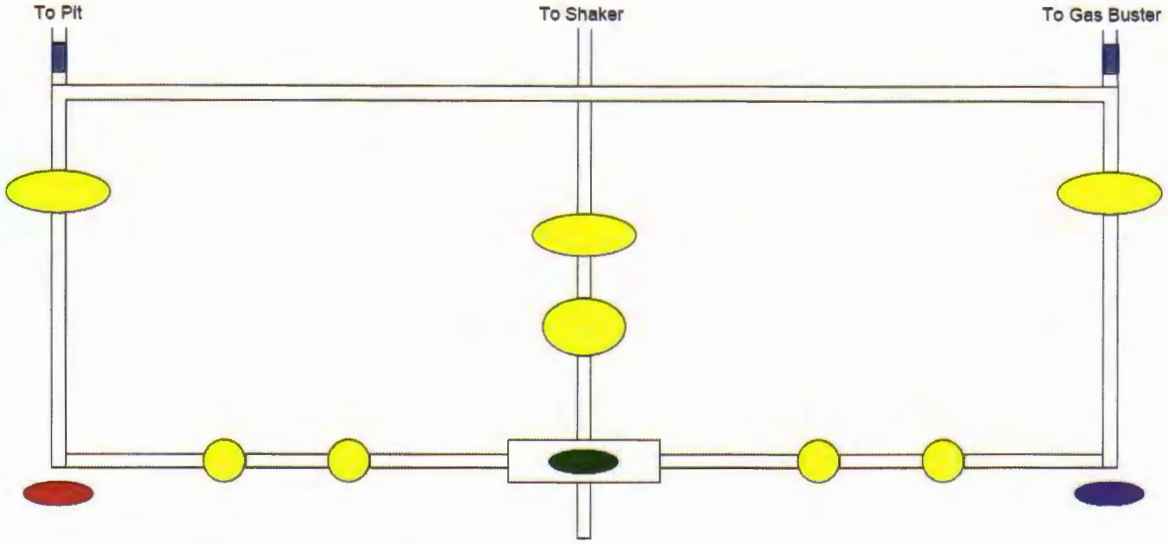
Note: 13-3/8" BOP to be rented as for hole size if 12-1/4" hole is necessary as contingency. See supplemental letter concerning 9-5/8" contingency.



Oasis Petroleum
Drilling Program
Wade Federal 5300 31-30 11T
Section 30 T153N R100W
McKenzie County, ND

At intermediate casing point, a 5M psi wellhead (B-section) will be installed. Pipe rams and Kelly will be changed out for 4" drill pipe and related equipment that will be used in the lateral from 11,042' to a total depth of 20,587'. The BOPE and related equipment will meet the requirements of the 5M psi system and as outlined in Onshore Order II.

Choke Manifold Diagram



Red is 5000# manual choke
Purple is 5000# remote controlled choke
Yellow are 5000# gate valves
Blue are ball valves
Green is a pressure guage

OPERATORS MINIMUM SPECIFICATIONS FOR BOPE:

Surface casing will be equipped with a flanged casing head of 5M psi working pressure. An 11" x 5M psi BOP and 5M psi annular will be nippled up on the surface casing. Install test plug and pressure test annular preventer to 250 psi low and 2500 psi high or 50% of rated working pressure and BOPE 250 psi low and to 5000 psi high for 10 minutes each prior to drill out. The surface casing will be tested to 1500 psi.

Intermediate casing will be tested to the greater of 1500 psi or .22 psi/ft. The choke manifold equipment, upper Kelly cock, floor safety valves will be tested to 5000 psi. The annular preventer will be tested to 250 psi low and 2500 psi high or 50% of rated working pressure. The BOPE will be hydraulically operated.

At minimum, the BOP equipment will be pressure tested after initial installation, after running intermediate casing, after any repairs to the equipment and at least once every 30 days.

Pipe and blind rams will be activated on each trip, annular preventer will be activated weekly and weekly BOP drills will be held with each crew. All BOP drills and tests will be recorded in the IADC driller's log.

Choke Manifold Equipment:

All choke lines will be straight lines. Whenever possible a turns, tee blocks will be used or will be targeted with running tees, and will be anchored to prevent whip and vibration.

Accumulator System and Location of Hydraulic Controls:

The accumulator will have sufficient capacity to open the hydraulically controlled choke line valve (if so equipped), close all rams plus the annular preventer, and retain a minimum of 200 psi above pre-charge on the closing manifold without the use of the closing unit pumps. The fluid reservoir capacity will be double the accumulator capacity and the fluid level will be maintained at the manufacturer's recommendations. The BOP system will have two (2) independent power sources to close the preventers. Nitrogen bottles (3 minimum) will be one (1) of these independent power sources and will maintain a charge equal to the manufacturer's specifications.

The accumulator pre-charge pressure test will be conducted prior to connecting the closing unit to the BOP stack and at least once every six (6) months thereafter. The accumulator pressure will be corrected if the measured pre-charge pressure is found to be above or below the maximum or minimum limits specified in *Onshore Oil & Gas Order Number 2.*

Auxiliary Equipment:

A) Mud logger with gas monitor –8273' (200' above Charles Salt to Intermediate TD)
B) Choke manifold with one manual and one hydraulic operated choke
C) Full opening floor valve with drill pipe thread
D) Upper and lower Kelly cock
E) Shale shakers and possible mud cleaner.

Miscellaneous Information:

Nabors B25 is being considered to be used at the proposed location. Operations will commence after approval of this application.

The blowout preventer and related pressure control equipment will be installed, tested and maintained in compliance with the specifications in and requirements of *Onshore Oil & Gas Order Number 2.*

The choke manifold and BOP extension rods with hand wheels will be located outside the rig substructure. The hydraulic BOP closing unit will be located at least twenty five (25) feet from the wellhead but readily accessible to the driller Exact locations and configurations of the hydraulic BOP closing unit will depend upon the particular rig contracted to drill this well.

A flare line will be installed after the choke manifold, connecting the manifold to a separate flare tank located at least 125 feet away from the wellbore and any existing production facilities.

Anticipated bottom hole temperature is 264° F.

Oasis Petroleum
Drilling Program
Wade Federal 5300 31-30 11T
Section 30 T153N R100W
McKenzie County, ND

4. **Proposed Casing & Cementing Program:**

a. Planned Program

SURFACE CASING AND CEMENT DESIGN

							Make-up Torque (ft-lbs)		
Size	**Interval**	**Weight**	**Grade**	**Coupling**	**I.D.**	**Drift**	**Minimum**	**Optimum**	**Max**
13-3/8"	0' to 2,010'	54.5	J-55	STC	12.615"	12.459"	4,100	5,470	6,840

Interval	**Description**	**Collapse**	**Burst**	**Tension**
		(psi) a	(psi) b	(1000 lbs) c
0' to 2,010'	13-3/8", 54.5#, J-55, STC, 8rd	1130 / 1.20	2730 / 2.90	514 / 2.64

API Rating & Safety Factor

a) Based on full casing evacuation with 9 ppg fluid on backside (2,010' setting depth).

b) Burst pressure based on 9 ppg fluid with no fluid on backside (2,010' setting depth).

c) Based on string weight in 9 ppg fluid at 2,010' TVD plus 100k# overpull. (Buoyed weight equals 94k lbs.)

Cement volumes are based on 13-3/8" casing set in 17-1/2" hole with 60% excess to circulate cement back to surface. Mix and pump the following slurry.

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

Lead Slurry: **637 sks** (337 bbls) 2.97 yield conventional system with 94 lb/sk cement, .25 lb/sk D130 Lost Circulation Control Agent, 2% $CaCl_2$, 4% D079 Extender and 2% D053 Expanding Agent.

Tail Slurry: **201 sks** (72 bbls) 2.01 yield conventional system with 94 lb/sk cement, .25 lb/sk D130 Lost Circulation Control Agent, 2% $CaCl_2$, 4% D079 Extender and 2% D053 Expanding Agent.

Oasis Petroleum
Drilling Program
Wade Federal 5300 31-30 11T
Section 30 T153N R100W
McKenzie County, ND

CONTINGENCY SURFACE CASING AND CEMENT DESIGN

							Make-up Torque (ft-lbs)		
Size	**Interval**	**Weight**	**Grade**	**Coupling**	**I.D.**	**Drift**	**Minimum**	**Optimum**	**Max**
9-5/8"	0' to 6,400'	40	L-80	LTC	8.835"	8.75"	5,450	7,270	9,090

Interval	Description	Collapse	Burst	Tension
		(psi) a	(psi) b	(1000 lbs) c
0' to 6,400'	9-5/8", 40#, L-80, LTC, 8rd	3090 / 3.71	5750 / 1.24	837 / 3.86

API Rating & Safety Factor

a) Collapse pressure based on 11.5 ppg fluid on the backside and 9 ppg fluid inside of casing.

b) Burst pressure calculated from a gas kick coming from the production zone (Bakken Pool) at 9,000 psi and a subsequent breakdown at the 9-5/8" shoe, based on a 13.5#/ft facture gradient. Backup of 9 ppg fluid.

c) Yield based on string weight in 10 ppg fluid, (217k lbs buoyed weight) plus 100k lbs overpull.

Cement volumes are based on 9-5/8" casing set in 12-1/4" hole with 10% excess in OH and 0% excess inside surface casing. TOC at surface.

Pre-flush (Spacer): **20 bbls** Chem wash

Lead Slurry: **592 sks** (210 bbls) Conventional system with 75 lb/sk cement, 0.5 lb/sk lost circulation, 10% expanding agent, 2% extender, 2% $CaCl_2$, 0.2% anti-foam and 0.4% fluid loss agent.

Tail Slurry: **521 sks** (108 bbls) Conventional system with 94 lb/sk cement, 0.3% anti-settling agent, 0.3% fluid loss agent, 0.3 lb/sk lost circulation control agent, 0.2% anti-foam and 0.1% retarder.

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Drilling Program
Wade Federal 5300 31-30 11T
Section 30 T153N R100W
McKenzie County, ND

INTERMEDIATE CASING AND CEMENT DESIGN

							Make-up Torque (ft-lbs)		
Size	**Interval**	**Weight**	**Grade**	**Coupling**	**I.D.**	**Drift**	**Minimum**	**Optimum**	**Max**
7"	0' – 11042'	32	HCP-110	LTC	6.094"	6.000"	6730	8970	9870

***Special drift

Interval	Length	Description	Collapse	Burst	Tension
			(psi) a	(psi) b	(1000 lbs) c
0' - 11042'	11042'	7", 32#, P-110, LTC, 8rd	11820 / 2.11*	12460 / 1.28	897 / 2.24
6700' - 9152'	2452'	7", 32#, HCP-110, LTC, 8rd	11820 / 1.17**	12460 / 1.30	

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 9000 psig max press for stimulation plus 10.2 ppg fluid in casing and 9 ppg fluid on backside-to 10,757' TVD.

c) Based on string weight in 10 ppg fluid, (299k lbs buoyed weight) plus 100k

Cement volumes are estimates based on 7" casing set in an 8-3/4" hole with 30% excess.

Pre-flush (Spacer): **50 bbls Saltwater**
40 bbls Weighted MudPush Express

Lead Slurry: **222 sks** (87 bbls) 2.21 yield conventional system with 47 lb/sk cement, 37 lb/sk D035 extender, 3.0% KCl, 3.0% D154 extender, 0.3% D208 viscosifier, 0.07% retarder, 0.2% anti-foam, 0.5 lb/sk, D130 LCM.

Tail Slurry: **605 sks** (166 bbls) 1.54 yield conventional system with 94 lb/sk cement, 3.0% KCl, 35.0% Silica, 0.5% retarder, 0.2% fluid loss, 0.2% anti-foam and 0.5 lb/sk LCM.

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PRODUCTION LINER

							Make-up Torque (ft-lbs)		
Size	Interval	Weight	Grade	Coupling	I.D.	Drift	Minimum	Optimum	Max
4-1/2"	10229' - 20587'	13.5	P-110	BTC	3.920"	3.795"	2270	3020	3780

Interval	Length	Description	Collapse	Burst	Tension
			(psi) a	(psi) b	(1000 lbs) c
10229' - 20587'	10358	4-1/2", 13.5 lb, P-110, BTC	10670 / 1.99	12410 / 1.28	443 / 2.01

API Rating & Safety Factor

a) Based on full casing evacuation with 9.5 ppg fluid on backside @ 10,815' TVD.

b) Burst pressure based on 9000 psi treating pressure with 10.2 ppg internal fluid gradient and 9 ppg external fluid gradient @ 10,815' TVD.

c) Based on string weight in 9.5 ppg fluid (Buoyed weight: 120k lbs.) plus 100k lbs overpull.

The liner will be placed un-cemented at total depth.

All casing strings will meet or exceed the following design safety factors:

- Collapse = 1.125
- Burst = 1.00
- Tension = 1.2 (including 100k overpull)

Casing Float Equipment:

PDC drillable float shoe, 1 joint casing, PDC drillable float collar, all to be thread locked.

Casing strings will be pressure tested to the greater of 0.22 psi/ft of casing string length or 1,500 psi (not to exceed 70% of the internal yield strength of the casing) after cementing and prior to drilling out from under the casing shoe.

Cement Designs:

Cement design calculations will be based on 60% (Surface) and 30% (Intermediate) excess over gauge hole volumes. Actual volumes pumped will be a minimum of 20% excess over caliper volume to designed tops of cement for any section logged.

All waiting on cement (WOC) times will be adequate to achieve a minimum of 500 psi compressive strength at the casing shoe prior to drilling out.

5. **Drilling Fluids Program:**

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Wade Federal 5300 31-30 11T
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Proposed Mud Program:

Interval	Type	Mud Weight	Fluid Loss
0' –2010'	FW/Gel	8.4 – 9.0	NC
2010' – 11042'	Invert Oil Based Mud	9.5 - 10.5	<20-10 cc's (vertical); <10 cc's (curve)
11042' – 20587'	Saltwater Brine	9.3 - 10.2	NC

Anticipated mud weights are based on actual offset well bottom hole pressure data plus trip margins. Mud weights utilized may be somewhat higher to allow for trip margin and to provide hole stability for running logs and casing.

Sufficient mud materials to maintain mud properties, control lost circulation and maintain well control will be stored at the well site during the entire drilling operation.

Visual mud monitoring equipment will be utilized.

6. **Evaluation Program**:

Logs:	GR/Res to base of surface casing; GR to surface; CND through Dakota
DSTs:	None currently planned.
Cores:	None currently planned.
Mudlogger:	Samples with gas monitor –8273' (200' above Charles Salt to Intermediate TD) 10' or 30' samples at the direction of the wellsite geologist.

The proposed Evaluation Program may change at the discretion of the Geologist, with prior approval from the Authorized Officer, Bureau of Land Management.

A Casing Bond Log on the Intermediate Casing will be run by the completion team after drilling moves off location.

Stimulation: A stimulation or frac treatment may be designed for completion of this well based on open hole log results. The drill site, as approved, will be of sufficient size to accommodate all completion activities.

Whether the well is a dry hole or completed as a producer, the Well Completion and Recompletion Report and Log (Form #3160-4) will be submitted no later than thirty (30) days after the completion of the well or after completion of operations being performed, in accordance with 43 CFR 3164.

Two (2) copies of all logs, core descriptions, core analyses, well test data, geologic summaries, sample descriptions, and all other surveys or data obtained and compiled during the drilling, workover, and/or completion operations will be filed on Form #3160-4. Samples (cuttings, fluids and/or gases) will be submitted when requested by the local Area Manager of BLM.

7. **Abnormal Conditions:**

No abnormal temperatures or pressures are anticipated.
No H_2S has been encountered in or is known to exist from previous wells drilled to similar depths in the general area. However, H2S is known to exist in the Mission Canyon in the Williston Basin. Preparations will be made to execute H2S contingency plan if needed.

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Maximum anticipated bottom hole pressure calculated at 10,815' TVD (base of projected target zone accounting for estimated formation dip rate throughout lateral) equals approximately 4,694 psi (calculated at 0.434 psi/ft).

Maximum anticipated surface pressure equals approximately 2,314 psi (bottom hole pressure minus the pressure of a partially evacuated hole calculated at 0.22 psi/ft).

8. **Anticipated Starting Date and Notification of Operations**

A. Anticipated Starting Date and Duration of Operations:

Anticipated Commencement Date:	Not Yet Determined
Drilling Days:	Approximately 30 days
Completions Days:	Approximately 20 days

B. Notification of Operations:

Bureau of Land Management North Dakota Field Office 99 23rd Avenue West Dickinson, ND 58601 Phone: 701-227-7700	North Dakota Industrial Commission 600 East Boulevard Ave Dept 405 Bismarck, ND 58505 701-328-8020

The spud date will be orally reported to the Authorized Officer Twenty Four (24) hours prior to spud, unless otherwise required in the site specific conditions of approval.

All wells, whether drilling, producing, suspended or abandoned shall be identified in accordance with 43 CFR 3162.6. This requires the name of the Operator, the lease number, the well number and the location of the well.

In accordance with *Onshore Oil & Gas Order Number 1,* this well will be reported on MMS Form #3160-6, *Monthly Report of Operations and Production*, starting with the month in which operations commence and continuing each month until the well is physically plugged and abandoned. This report will be filed directly with the Royalty Management Program, Minerals Management Service.

All undesirable events (fires, accidents, blowouts, spills, discharges) as specified in NTL-3A will be reported to the BLM Field Office. Major events will be reported verbally within twenty-four (24) hours and will be followed with a written report within fifteen (15) days. All other events will be reported in writing within fifteen (15) days. Minor events will be reported on the *Monthly Report of Operations and Production* (Form #3160-6).

No well abandonment operations will be commenced without prior approval of the Area Petroleum Engineer. A *Notice of Intention to Abandon* (Form #3160-5) will be filed with the Authorized Officer within five (5) days following the granting of oral approval to plug and abandon. Upon completion of approved plugging, a regulation marker will be erected in accordance with 49 CFR 3162.6. The following information will be permanently placed on the marker with a plate, cap, or beaded-on with a welding torch: Company Name, Well Name and Number, Location by Quarter/Quarter, Section, Township, Range, and the Federal Lease Number.

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Wade Federal 5300 31-30 11T
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A subsequent *Report of Abandonment* (Form #3160-5) will be submitted within thirty (30) days following the actual plugging of the well bore. This report will indicate where plugs are placed and the current status of surface restoration operations. If surface restoration has not been completed at that time, a follow-up report on Form #3160-5 will be filed when all surface restoration work has been completed and the location is ready for final inspection.

Pursuant to NTL-4A, lessees and operators are authorized to vent / flare gas during initial well evaluation tests, not exceeding a period of thirty (30) days or the production of fifty (50) MMCF of gas, whichever occurs first. An Application must filed with the Authorized Officer, and approval received for any venting / flaring of gas beyond the initial thirty (30) day or otherwise authorized test period.

Not later than the 5th business day after any well begins production on which royalty is due anywhere on a lease site or allocated to a lease site, or resumes production in the case of a well which has been off production for more than ninety (90) days, the Operator shall notify the Authorized Officer by letter or Sundry Notice of the date on which such production has begun or resumed. The notification shall provide as a minimum the following informational items;

a. Operator's name, address and telephone number.
b. Well name and number.
c. Well location (qtr/qtr, section, township, range, P.M)
d. Date well was placed in a producing status.
e. The nature of the wells' production (i.e. crude oil, casing gas or natural gas and entrained liquid hydrocarbons).
f. The OCS, Federal prefix and number on which the well is located.

Within sixty (60) days following construction of a new tank battery, a site facility diagram of the battery showing actual conditions and piping must be submitted to the Authorized Officer. Facility diagrams shall be filed within sixty (60) days after existing facilities are modified.

Pursuant to *Onshore Oil & Gas Order Number 1*, lessees and operators have the responsibility to see that their exploration, development, production and construction operations are conducted in such a manner which conforms with applicable federal laws and regulations, and with state and local laws and regulations to the extent that such state and local laws are applicable to operations on Federal and Indian lands.

Sean Gasser 4/2/13
Drilling Engineer

Azimuths to True North
Magnetic North: 8.31°

Magnetic Field
Strength: 56459.3snT
Dip Angle: 72.99°
Date: 2/5/2014
Model: IGRF2010

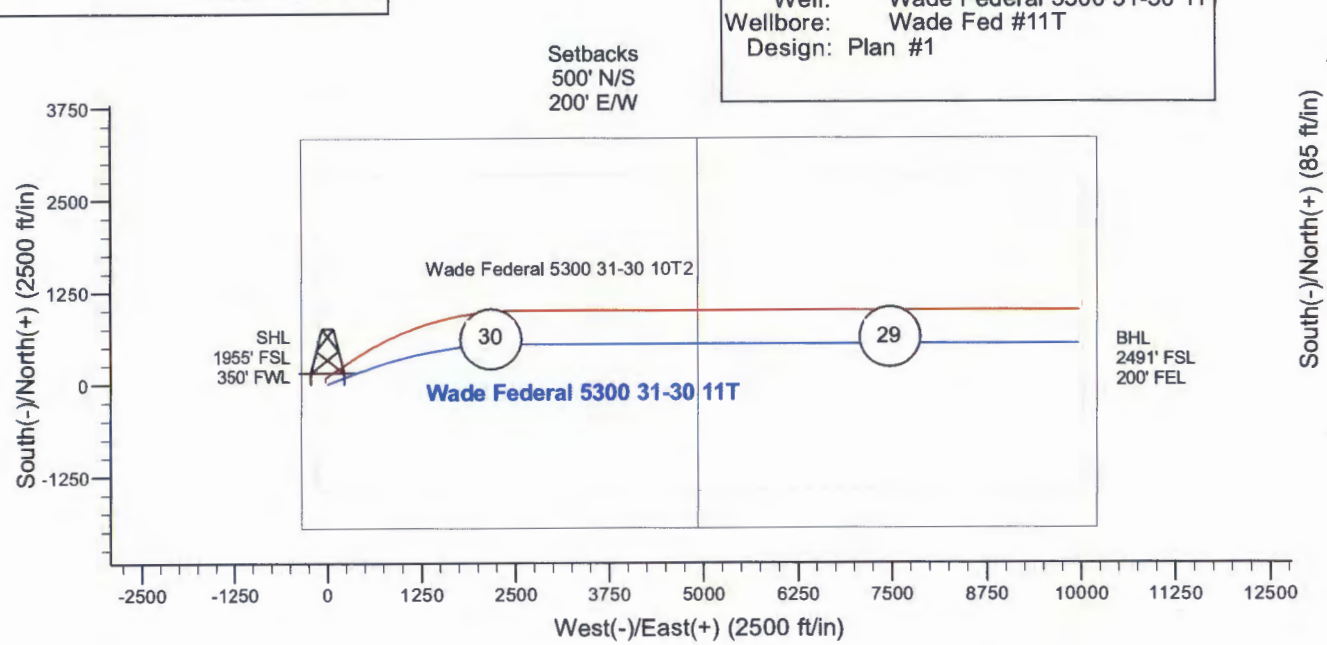
OASIS PETROLEUM

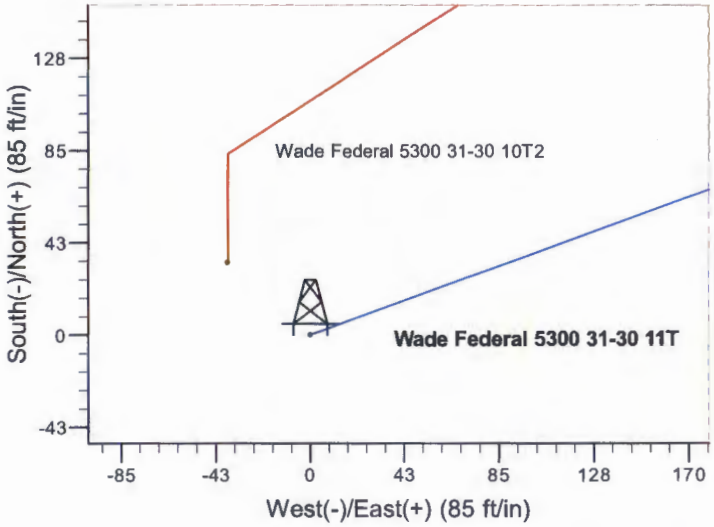
Project: Indian Hills
Site: 153N-100W-29/30
Well: Wade Federal 5300 31-30 11T
Wellbore: Wade Fed #11T
Design: Plan #1

SITE DETAILS: 153N-100W-29/30

Site Centre Latitude: 48° 2' 38.970 N
Longitude: 103° 36' 9.790 W

Positional Uncertainity: 0.0
Convergence: -2.31
Local North: True



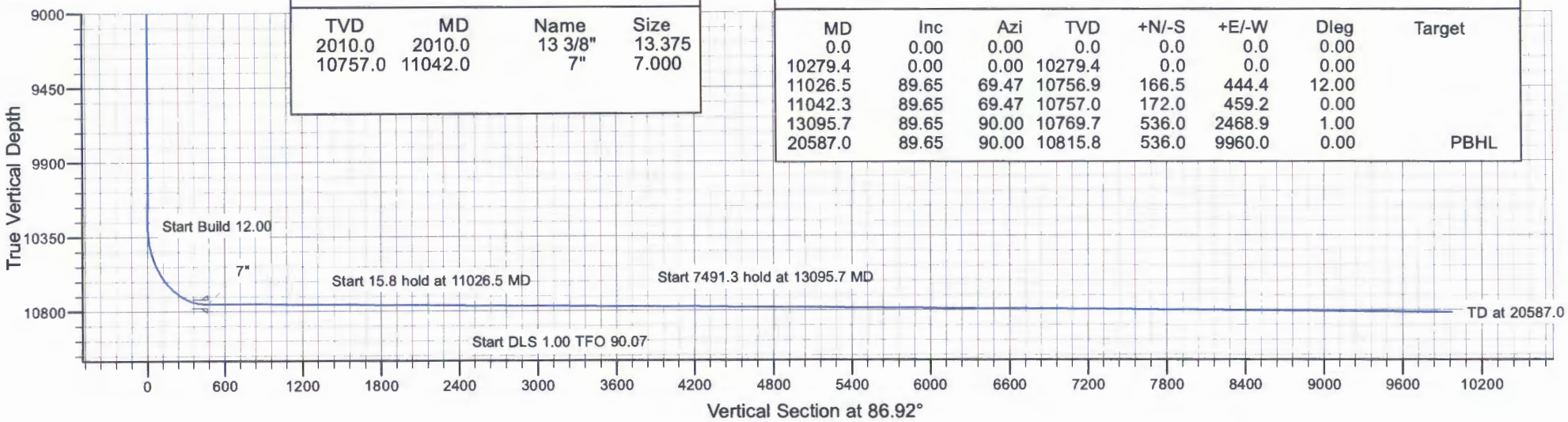


CASING DETAILS

TVD	MD	Name	Size
2010.0	2010.0	13 3/8"	13.375
10757.0	11042.0	7"	7.000

SECTION DETAILS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	
10279.4	0.00	0.00	10279.4	0.0	0.0	0.00	
11026.5	89.65	69.47	10756.9	166.5	444.4	12.00	
11042.3	89.65	69.47	10757.0	172.0	459.2	0.00	
13095.7	89.65	90.00	10769.7	536.0	2468.9	1.00	
20587.0	89.65	90.00	10815.8	536.0	9960.0	0.00	PBHL



Oasis

Indian Hills
153N-100W-29/30
Wade Federal 5300 31-30 11T

Wade Fed #11T

Plan: Plan #1

Standard Planning Report

05 February, 2014

Oasis Petroleum

Planning Report

Database:	OpenWellsCompass - EDM Prod	**Local Co-ordinate Reference:**	Well Wade Federal 5300 31-30 11T
Company:	Oasis	**TVD Reference:**	WELL @ 2054.0ft (Original Well Elev)
Project:	Indian Hills	**MD Reference:**	WELL @ 2054.0ft (Original Well Elev)
Site:	153N-100W-29/30	**North Reference:**	True
Well:	Wade Federal 5300 31-30 11T	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wade Fed #11T		
Design:	Plan #1		

Project Indian Hills

Map System:	US State Plane 1983	**System Datum:**	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	North Dakota Northern Zone		

Site 153N-100W-29/30

Site Position:		**Northing:**	395,521.43 ft	**Latitude:**	48° 2' 32.580 N
From:	Lat/Long	**Easting:**	1,209,621.64 ft	**Longitude:**	103° 36' 11.410 W
Position Uncertainty:	0.0 ft	**Slot Radius:**	13.200 in	**Grid Convergence:**	-2.31 °

Well Wade Federal 5300 31-30 11T

Well Position	**+N/-S**	647.5 ft	**Northing:**	396,163.94 ft	**Latitude:**	48° 2' 38.970 N
	+E/-W	110.1 ft	**Easting:**	1,209,757.72 ft	**Longitude:**	103° 36' 9.790 W
Position Uncertainty		0.0 ft	**Wellhead Elevation:**		**Ground Level:**	2,029.0 ft

Wellbore Wade Fed #11T

Magnetics	**Model Name**	**Sample Date**	**Declination (°)**	**Dip Angle (°)**	**Field Strength (nT)**
	IGRF2010	2/5/2014	8.32	72.99	56,459

Design Plan #1

Audit Notes:

Version:		**Phase:**	PROTOTYPE	**Tie On Depth:**	0.0

Vertical Section:	**Depth From (TVD) (ft)**	**+N/-S (ft)**	**+E/-W (ft)**	**Direction (°)**
	0.0	0.0	0.0	86.92

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	
10,279.4	0.00	0.00	10,279.4	0.0	0.0	0.00	0.00	0.00	0.00	
11,026.5	89.65	69.47	10,756.9	166.5	444.4	12.00	12.00	0.00	69.47	
11,042.3	89.65	69.47	10,757.0	172.0	459.2	0.00	0.00	0.00	0.00	
13,095.7	89.65	90.00	10,769.7	536.0	2,468.9	1.00	0.00	1.00	90.07	
20,587.0	89.65	90.00	10,815.8	536.0	9,960.0	0.00	0.00	0.00	0.00	Wade Fed #11T PBH

Oasis Petroleum

Planning Report

Database:	OpenWellsCompass - EDM Prod	**Local Co-ordinate Reference:**	Well Wade Federal 5300 31-30 11T
Company:	Oasis	**TVD Reference:**	WELL @ 2054.0ft (Original Well Elev)
Project:	Indian Hills	**MD Reference:**	WELL @ 2054.0ft (Original Well Elev)
Site:	153N-100W-29/30	**North Reference:**	True
Well:	Wade Federal 5300 31-30 11T	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wade Fed #11T		
Design:	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
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	0.00
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	0.00
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00
1,100.0	0.00	0.00	1,100.0	0.0	0.0	0.0	0.00	0.00	0.00
1,200.0	0.00	0.00	1,200.0	0.0	0.0	0.0	0.00	0.00	0.00
1,300.0	0.00	0.00	1,300.0	0.0	0.0	0.0	0.00	0.00	0.00
1,400.0	0.00	0.00	1,400.0	0.0	0.0	0.0	0.00	0.00	0.00
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	0.00	0.00	0.00
1,600.0	0.00	0.00	1,600.0	0.0	0.0	0.0	0.00	0.00	0.00
1,700.0	0.00	0.00	1,700.0	0.0	0.0	0.0	0.00	0.00	0.00
1,800.0	0.00	0.00	1,800.0	0.0	0.0	0.0	0.00	0.00	0.00
1,900.0	0.00	0.00	1,900.0	0.0	0.0	0.0	0.00	0.00	0.00
1,904.0	0.00	0.00	1,904.0	0.0	0.0	0.0	0.00	0.00	0.00
Pierre									
2,000.0	0.00	0.00	2,000.0	0.0	0.0	0.0	0.00	0.00	0.00
2,010.0	0.00	0.00	2,010.0	0.0	0.0	0.0	0.00	0.00	0.00
9 5/8"									
2,100.0	0.00	0.00	2,100.0	0.0	0.0	0.0	0.00	0.00	0.00
2,200.0	0.00	0.00	2,200.0	0.0	0.0	0.0	0.00	0.00	0.00
2,300.0	0.00	0.00	2,300.0	0.0	0.0	0.0	0.00	0.00	0.00
2,400.0	0.00	0.00	2,400.0	0.0	0.0	0.0	0.00	0.00	0.00
2,500.0	0.00	0.00	2,500.0	0.0	0.0	0.0	0.00	0.00	0.00
2,600.0	0.00	0.00	2,600.0	0.0	0.0	0.0	0.00	0.00	0.00
2,700.0	0.00	0.00	2,700.0	0.0	0.0	0.0	0.00	0.00	0.00
2,800.0	0.00	0.00	2,800.0	0.0	0.0	0.0	0.00	0.00	0.00
2,900.0	0.00	0.00	2,900.0	0.0	0.0	0.0	0.00	0.00	0.00
3,000.0	0.00	0.00	3,000.0	0.0	0.0	0.0	0.00	0.00	0.00
3,100.0	0.00	0.00	3,100.0	0.0	0.0	0.0	0.00	0.00	0.00
3,200.0	0.00	0.00	3,200.0	0.0	0.0	0.0	0.00	0.00	0.00
3,300.0	0.00	0.00	3,300.0	0.0	0.0	0.0	0.00	0.00	0.00
3,400.0	0.00	0.00	3,400.0	0.0	0.0	0.0	0.00	0.00	0.00
3,500.0	0.00	0.00	3,500.0	0.0	0.0	0.0	0.00	0.00	0.00
3,600.0	0.00	0.00	3,600.0	0.0	0.0	0.0	0.00	0.00	0.00
3,700.0	0.00	0.00	3,700.0	0.0	0.0	0.0	0.00	0.00	0.00
3,800.0	0.00	0.00	3,800.0	0.0	0.0	0.0	0.00	0.00	0.00
3,900.0	0.00	0.00	3,900.0	0.0	0.0	0.0	0.00	0.00	0.00
4,000.0	0.00	0.00	4,000.0	0.0	0.0	0.0	0.00	0.00	0.00
4,100.0	0.00	0.00	4,100.0	0.0	0.0	0.0	0.00	0.00	0.00
4,200.0	0.00	0.00	4,200.0	0.0	0.0	0.0	0.00	0.00	0.00
4,300.0	0.00	0.00	4,300.0	0.0	0.0	0.0	0.00	0.00	0.00
4,400.0	0.00	0.00	4,400.0	0.0	0.0	0.0	0.00	0.00	0.00
4,500.0	0.00	0.00	4,500.0	0.0	0.0	0.0	0.00	0.00	0.00
4,555.0	0.00	0.00	4,555.0	0.0	0.0	0.0	0.00	0.00	0.00
Greenhorn									
4,600.0	0.00	0.00	4,600.0	0.0	0.0	0.0	0.00	0.00	0.00
4,700.0	0.00	0.00	4,700.0	0.0	0.0	0.0	0.00	0.00	0.00
4,800.0	0.00	0.00	4,800.0	0.0	0.0	0.0	0.00	0.00	0.00

Oasis Petroleum

Planning Report

Database:	OpenWellsCompass - EDM Prod	**Local Co-ordinate Reference:**	Well Wade Federal 5300 31-30 11T
Company:	Oasis	**TVD Reference:**	WELL @ 2054.0ft (Original Well Elev)
Project:	Indian Hills	**MD Reference:**	WELL @ 2054.0ft (Original Well Elev)
Site:	153N-100W-29/30	**North Reference:**	True
Well:	Wade Federal 5300 31-30 11T	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wade Fed #11T		
Design:	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)
4,900.0	0.00	0.00	4,900.0	0.0	0.0	0.0	0.00	0.00	0.00
4,958.0	0.00	0.00	4,958.0	0.0	0.0	0.0	0.00	0.00	0.00
Mowry									
5,000.0	0.00	0.00	5,000.0	0.0	0.0	0.0	0.00	0.00	0.00
5,100.0	0.00	0.00	5,100.0	0.0	0.0	0.0	0.00	0.00	0.00
5,200.0	0.00	0.00	5,200.0	0.0	0.0	0.0	0.00	0.00	0.00
5,300.0	0.00	0.00	5,300.0	0.0	0.0	0.0	0.00	0.00	0.00
5,380.0	0.00	0.00	5,380.0	0.0	0.0	0.0	0.00	0.00	0.00
Dakota									
5,400.0	0.00	0.00	5,400.0	0.0	0.0	0.0	0.00	0.00	0.00
5,500.0	0.00	0.00	5,500.0	0.0	0.0	0.0	0.00	0.00	0.00
5,600.0	0.00	0.00	5,600.0	0.0	0.0	0.0	0.00	0.00	0.00
5,700.0	0.00	0.00	5,700.0	0.0	0.0	0.0	0.00	0.00	0.00
5,800.0	0.00	0.00	5,800.0	0.0	0.0	0.0	0.00	0.00	0.00
5,900.0	0.00	0.00	5,900.0	0.0	0.0	0.0	0.00	0.00	0.00
6,000.0	0.00	0.00	6,000.0	0.0	0.0	0.0	0.00	0.00	0.00
6,100.0	0.00	0.00	6,100.0	0.0	0.0	0.0	0.00	0.00	0.00
6,200.0	0.00	0.00	6,200.0	0.0	0.0	0.0	0.00	0.00	0.00
6,300.0	0.00	0.00	6,300.0	0.0	0.0	0.0	0.00	0.00	0.00
6,396.0	0.00	0.00	6,396.0	0.0	0.0	0.0	0.00	0.00	0.00
Rierdon									
6,400.0	0.00	0.00	6,400.0	0.0	0.0	0.0	0.00	0.00	0.00
6,500.0	0.00	0.00	6,500.0	0.0	0.0	0.0	0.00	0.00	0.00
6,600.0	0.00	0.00	6,600.0	0.0	0.0	0.0	0.00	0.00	0.00
6,700.0	0.00	0.00	6,700.0	0.0	0.0	0.0	0.00	0.00	0.00
6,800.0	0.00	0.00	6,800.0	0.0	0.0	0.0	0.00	0.00	0.00
6,885.0	0.00	0.00	6,885.0	0.0	0.0	0.0	0.00	0.00	0.00
Dunham Salt									
6,900.0	0.00	0.00	6,900.0	0.0	0.0	0.0	0.00	0.00	0.00
6,931.0	0.00	0.00	6,931.0	0.0	0.0	0.0	0.00	0.00	0.00
Dunham Salt Base									
7,000.0	0.00	0.00	7,000.0	0.0	0.0	0.0	0.00	0.00	0.00
7,100.0	0.00	0.00	7,100.0	0.0	0.0	0.0	0.00	0.00	0.00
7,194.0	0.00	0.00	7,194.0	0.0	0.0	0.0	0.00	0.00	0.00
Pine Salt									
7,200.0	0.00	0.00	7,200.0	0.0	0.0	0.0	0.00	0.00	0.00
7,218.0	0.00	0.00	7,218.0	0.0	0.0	0.0	0.00	0.00	0.00
Pine Salt Base									
7,280.0	0.00	0.00	7,280.0	0.0	0.0	0.0	0.00	0.00	0.00
Opeche Salt									
7,300.0	0.00	0.00	7,300.0	0.0	0.0	0.0	0.00	0.00	0.00
7,360.0	0.00	0.00	7,360.0	0.0	0.0	0.0	0.00	0.00	0.00
Opeche Salt Base									
7,400.0	0.00	0.00	7,400.0	0.0	0.0	0.0	0.00	0.00	0.00
7,500.0	0.00	0.00	7,500.0	0.0	0.0	0.0	0.00	0.00	0.00
7,600.0	0.00	0.00	7,600.0	0.0	0.0	0.0	0.00	0.00	0.00
7,604.0	0.00	0.00	7,604.0	0.0	0.0	0.0	0.00	0.00	0.00
Amsden									
7,700.0	0.00	0.00	7,700.0	0.0	0.0	0.0	0.00	0.00	0.00
7,760.0	0.00	0.00	7,760.0	0.0	0.0	0.0	0.00	0.00	0.00
Tyler									
7,800.0	0.00	0.00	7,800.0	0.0	0.0	0.0	0.00	0.00	0.00
7,900.0	0.00	0.00	7,900.0	0.0	0.0	0.0	0.00	0.00	0.00
7,983.0	0.00	0.00	7,983.0	0.0	0.0	0.0	0.00	0.00	0.00

Oasis Petroleum

Planning Report

Database:	OpenWellsCompass - EDM Prod	Local Co-ordinate Reference:	Well Wade Federal 5300 31-30 11T
Company:	Oasis	TVD Reference:	WELL @ 2054.0ft (Original Well Elev)
Project:	Indian Hills	MD Reference:	WELL @ 2054.0ft (Original Well Elev)
Site:	153N-100W-29/30	North Reference:	True
Well:	Wade Federal 5300 31-30 11T	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wade Fed #11T		
Design:	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)
Otter/Base Minnelusa									
8,000.0	0.00	0.00	8,000.0	0.0	0.0	0.0	0.00	0.00	0.00
8,100.0	0.00	0.00	8,100.0	0.0	0.0	0.0	0.00	0.00	0.00
8,200.0	0.00	0.00	8,200.0	0.0	0.0	0.0	0.00	0.00	0.00
8,300.0	0.00	0.00	8,300.0	0.0	0.0	0.0	0.00	0.00	0.00
8,325.0	0.00	0.00	8,325.0	0.0	0.0	0.0	0.00	0.00	0.00
Kibbey Lime									
8,400.0	0.00	0.00	8,400.0	0.0	0.0	0.0	0.00	0.00	0.00
8,473.0	0.00	0.00	8,473.0	0.0	0.0	0.0	0.00	0.00	0.00
Charles Salt									
8,500.0	0.00	0.00	8,500.0	0.0	0.0	0.0	0.00	0.00	0.00
8,600.0	0.00	0.00	8,600.0	0.0	0.0	0.0	0.00	0.00	0.00
8,700.0	0.00	0.00	8,700.0	0.0	0.0	0.0	0.00	0.00	0.00
8,800.0	0.00	0.00	8,800.0	0.0	0.0	0.0	0.00	0.00	0.00
8,900.0	0.00	0.00	8,900.0	0.0	0.0	0.0	0.00	0.00	0.00
9,000.0	0.00	0.00	9,000.0	0.0	0.0	0.0	0.00	0.00	0.00
9,100.0	0.00	0.00	9,100.0	0.0	0.0	0.0	0.00	0.00	0.00
9,152.0	0.00	0.00	9,152.0	0.0	0.0	0.0	0.00	0.00	0.00
Base Last Salt									
9,200.0	0.00	0.00	9,200.0	0.0	0.0	0.0	0.00	0.00	0.00
9,300.0	0.00	0.00	9,300.0	0.0	0.0	0.0	0.00	0.00	0.00
9,366.0	0.00	0.00	9,366.0	0.0	0.0	0.0	0.00	0.00	0.00
Mission Canyon									
9,400.0	0.00	0.00	9,400.0	0.0	0.0	0.0	0.00	0.00	0.00
9,500.0	0.00	0.00	9,500.0	0.0	0.0	0.0	0.00	0.00	0.00
9,600.0	0.00	0.00	9,600.0	0.0	0.0	0.0	0.00	0.00	0.00
9,700.0	0.00	0.00	9,700.0	0.0	0.0	0.0	0.00	0.00	0.00
9,800.0	0.00	0.00	9,800.0	0.0	0.0	0.0	0.00	0.00	0.00
9,900.0	0.00	0.00	9,900.0	0.0	0.0	0.0	0.00	0.00	0.00
9,915.0	0.00	0.00	9,915.0	0.0	0.0	0.0	0.00	0.00	0.00
Lodgepole									
10,000.0	0.00	0.00	10,000.0	0.0	0.0	0.0	0.00	0.00	0.00
10,100.0	0.00	0.00	10,100.0	0.0	0.0	0.0	0.00	0.00	0.00
10,200.0	0.00	0.00	10,200.0	0.0	0.0	0.0	0.00	0.00	0.00
10,279.4	0.00	0.00	10,279.4	0.0	0.0	0.0	0.00	0.00	0.00
Start Build 12.00									
10,300.0	2.47	69.47	10,300.0	0.2	0.4	0.4	12.00	12.00	0.00
10,325.0	5.47	69.47	10,324.9	0.8	2.0	2.1	12.00	12.00	0.00
10,350.0	8.47	69.47	10,349.7	1.8	4.9	5.0	12.00	12.00	0.00
10,375.0	11.47	69.47	10,374.4	3.3	8.9	9.1	12.00	12.00	0.00
10,400.0	14.47	69.47	10,398.7	5.3	14.2	14.4	12.00	12.00	0.00
10,425.0	17.47	69.47	10,422.8	7.7	20.6	21.0	12.00	12.00	0.00
10,450.0	20.47	69.47	10,446.4	10.6	28.2	28.8	12.00	12.00	0.00
10,475.0	23.47	69.47	10,469.6	13.9	37.0	37.7	12.00	12.00	0.00
10,500.0	26.47	69.47	10,492.2	17.6	46.9	47.7	12.00	12.00	0.00
10,525.0	29.47	69.47	10,514.3	21.7	57.8	58.9	12.00	12.00	0.00
10,550.0	32.47	69.47	10,535.8	26.2	69.9	71.2	12.00	12.00	0.00
10,575.0	35.47	69.47	10,556.5	31.1	83.0	84.5	12.00	12.00	0.00
10,600.0	38.47	69.47	10,576.5	36.3	97.0	98.9	12.00	12.00	0.00
10,625.0	41.47	69.47	10,595.6	42.0	112.1	114.2	12.00	12.00	0.00
10,650.0	44.47	69.47	10,613.9	48.0	128.0	130.4	12.00	12.00	0.00
10,675.0	47.47	69.47	10,631.3	54.3	144.9	147.6	12.00	12.00	0.00
10,695.8	49.96	69.47	10,645.0	59.7	159.5	162.5	12.00	12.00	0.00
False Bakken									

Oasis Petroleum

Planning Report

Database:	OpenWellsCompass - EDM Prod	Local Co-ordinate Reference:	Well Wade Federal 5300 31-30 11T
Company:	Oasis	TVD Reference:	WELL @ 2054.0ft (Original Well Elev)
Project:	Indian Hills	MD Reference:	WELL @ 2054.0ft (Original Well Elev)
Site:	153N-100W-29/30	North Reference:	True
Well:	Wade Federal 5300 31-30 11T	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wade Fed #11T		
Design:	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)
10,700.0	50.47	69.47	10,647.7	60.9	162.5	165.6	12.00	12.00	0.00
10,714.9	52.26	69.47	10,657.0	65.0	173.4	176.7	12.00	12.00	0.00
Upper Bakken Shale									
10,725.0	53.47	69.47	10,663.1	67.8	181.0	184.3	12.00	12.00	0.00
10,740.3	55.30	69.47	10,672.0	72.1	192.6	196.2	12.00	12.00	0.00
Middle Bakken									
10,750.0	56.47	69.47	10,677.4	75.0	200.1	203.9	12.00	12.00	0.00
10,775.0	59.47	69.47	10,690.7	82.4	220.0	224.1	12.00	12.00	0.00
10,800.0	62.47	69.47	10,702.8	90.1	240.4	244.9	12.00	12.00	0.00
10,811.4	63.84	69.47	10,708.0	93.6	250.0	254.7	12.00	12.00	0.00
Lower Bakken Shale									
10,825.0	65.47	69.47	10,713.8	97.9	261.5	266.4	12.00	12.00	0.00
10,832.8	66.41	69.47	10,717.0	100.4	268.2	273.2	12.00	12.00	0.00
Pronghorn									
10,850.0	68.47	69.47	10,723.6	106.0	283.0	288.3	12.00	12.00	0.00
10,875.0	71.47	69.47	10,732.1	114.2	305.0	310.7	12.00	12.00	0.00
10,877.7	71.79	69.47	10,733.0	115.1	307.4	313.1	12.00	12.00	0.00
Threeforks									
10,900.0	74.47	69.47	10,739.5	122.6	327.4	333.5	12.00	12.00	0.00
10,925.0	77.47	69.47	10,745.5	131.1	350.1	356.6	12.00	12.00	0.00
10,948.1	80.24	69.47	10,750.0	139.1	371.3	378.3	12.00	12.00	0.00
Threeforks(Top of Target)									
10,950.0	80.47	69.47	10,750.3	139.7	373.1	380.0	12.00	12.00	0.00
10,975.0	83.47	69.47	10,753.8	148.4	396.3	403.7	12.00	12.00	0.00
11,000.0	86.47	69.47	10,756.0	157.2	419.6	427.4	12.00	12.00	0.00
11,026.5	89.65	69.47	10,756.9	166.5	444.4	452.7	12.00	12.00	0.00
Start 15.8 hold at 11026.5 MD									
11,042.0	89.65	69.47	10,757.0	171.9	458.9	467.5	0.00	0.00	0.00
7"									
11,042.3	89.65	69.47	10,757.0	172.0	459.2	467.8	0.00	0.00	0.00
Start DLS 1.00 TFO 90.07									
11,100.0	89.65	70.04	10,757.4	192.0	513.3	522.9	1.00	0.00	1.00
11,200.0	89.65	71.04	10,758.0	225.3	607.6	618.8	1.00	0.00	1.00
11,300.0	89.65	72.04	10,758.6	256.9	702.4	715.2	1.00	0.00	1.00
11,400.0	89.65	73.04	10,759.2	286.9	797.8	812.1	1.00	0.00	1.00
11,500.0	89.65	74.04	10,759.8	315.3	893.7	909.4	1.00	0.00	1.00
11,600.0	89.64	75.04	10,760.4	341.9	990.1	1,007.1	1.00	0.00	1.00
11,700.0	89.64	76.04	10,761.1	366.9	1,086.9	1,105.1	1.00	0.00	1.00
11,800.0	89.64	77.04	10,761.7	390.1	1,184.2	1,203.4	1.00	0.00	1.00
11,900.0	89.64	78.04	10,762.3	411.7	1,281.8	1,302.1	1.00	0.00	1.00
12,000.0	89.64	79.04	10,762.9	431.6	1,379.8	1,401.0	1.00	0.00	1.00
12,100.0	89.64	80.04	10,763.5	449.7	1,478.2	1,500.2	1.00	0.00	1.00
12,200.0	89.64	81.04	10,764.2	466.2	1,576.8	1,599.6	1.00	0.00	1.00
12,300.0	89.64	82.04	10,764.8	480.9	1,675.7	1,699.1	1.00	0.00	1.00
12,400.0	89.64	83.04	10,765.4	493.8	1,774.9	1,798.8	1.00	0.00	1.00
12,500.0	89.64	84.04	10,766.0	505.1	1,874.2	1,898.7	1.00	0.00	1.00
12,600.0	89.64	85.04	10,766.7	514.6	1,973.8	1,998.6	1.00	0.00	1.00
12,700.0	89.64	86.04	10,767.3	522.4	2,073.5	2,098.5	1.00	0.00	1.00
12,800.0	89.65	87.04	10,767.9	528.4	2,173.3	2,198.5	1.00	0.00	1.00
12,900.0	89.65	88.04	10,768.5	532.7	2,273.2	2,298.5	1.00	0.00	1.00
13,000.0	89.65	89.04	10,769.1	535.2	2,373.2	2,398.5	1.00	0.00	1.00
13,095.7	89.65	90.00	10,769.7	536.0	2,468.9	2,494.1	1.00	0.00	1.00
Start 7491.3 hold at 13095.7 MD									
13,100.0	89.65	90.00	10,769.7	536.0	2,473.1	2,498.4	0.00	0.00	0.00

Oasis Petroleum

Planning Report

Database:	OpenWellsCompass - EDM Prod	Local Co-ordinate Reference:	Well Wade Federal 5300 31-30 11T
Company:	Oasis	TVD Reference:	WELL @ 2054.0ft (Original Well Elev)
Project:	Indian Hills	MD Reference:	WELL @ 2054.0ft (Original Well Elev)
Site:	153N-100W-29/30	North Reference:	True
Well:	Wade Federal 5300 31-30 11T	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wade Fed #11T		
Design:	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)
13,200.0	89.65	90.00	10,770.4	536.0	2,573.1	2,598.2	0.00	0.00	0.00
13,300.0	89.65	90.00	10,771.0	536.0	2,673.1	2,698.1	0.00	0.00	0.00
13,400.0	89.65	90.00	10,771.6	536.0	2,773.1	2,797.9	0.00	0.00	0.00
13,500.0	89.65	90.00	10,772.2	536.0	2,873.1	2,897.8	0.00	0.00	0.00
13,600.0	89.65	90.00	10,772.8	536.0	2,973.1	2,997.6	0.00	0.00	0.00
13,700.0	89.65	90.00	10,773.4	536.0	3,073.1	3,097.5	0.00	0.00	0.00
13,800.0	89.65	90.00	10,774.1	536.0	3,173.1	3,197.4	0.00	0.00	0.00
13,900.0	89.65	90.00	10,774.7	536.0	3,273.1	3,297.2	0.00	0.00	0.00
14,000.0	89.65	90.00	10,775.3	536.0	3,373.1	3,397.1	0.00	0.00	0.00
14,100.0	89.65	90.00	10,775.9	536.0	3,473.1	3,496.9	0.00	0.00	0.00
14,200.0	89.65	90.00	10,776.5	536.0	3,573.1	3,596.8	0.00	0.00	0.00
14,300.0	89.65	90.00	10,777.1	536.0	3,673.1	3,696.6	0.00	0.00	0.00
14,400.0	89.65	90.00	10,777.7	536.0	3,773.1	3,796.5	0.00	0.00	0.00
14,500.0	89.65	90.00	10,778.4	536.0	3,873.1	3,896.3	0.00	0.00	0.00
14,600.0	89.65	90.00	10,779.0	536.0	3,973.1	3,996.2	0.00	0.00	0.00
14,700.0	89.65	90.00	10,779.6	536.0	4,073.1	4,096.0	0.00	0.00	0.00
14,800.0	89.65	90.00	10,780.2	536.0	4,173.1	4,195.9	0.00	0.00	0.00
14,900.0	89.65	90.00	10,780.8	536.0	4,273.1	4,295.7	0.00	0.00	0.00
15,000.0	89.65	90.00	10,781.4	536.0	4,373.1	4,395.6	0.00	0.00	0.00
15,100.0	89.65	90.00	10,782.0	536.0	4,473.1	4,495.5	0.00	0.00	0.00
15,200.0	89.65	90.00	10,782.7	536.0	4,573.1	4,595.3	0.00	0.00	0.00
15,300.0	89.65	90.00	10,783.3	536.0	4,673.1	4,695.2	0.00	0.00	0.00
15,400.0	89.65	90.00	10,783.9	536.0	4,773.1	4,795.0	0.00	0.00	0.00
15,500.0	89.65	90.00	10,784.5	536.0	4,873.1	4,894.9	0.00	0.00	0.00
15,600.0	89.65	90.00	10,785.1	536.0	4,973.1	4,994.7	0.00	0.00	0.00
15,700.0	89.65	90.00	10,785.7	536.0	5,073.1	5,094.6	0.00	0.00	0.00
15,800.0	89.65	90.00	10,786.3	536.0	5,173.1	5,194.4	0.00	0.00	0.00
15,900.0	89.65	90.00	10,787.0	536.0	5,273.1	5,294.3	0.00	0.00	0.00
16,000.0	89.65	90.00	10,787.6	536.0	5,373.1	5,394.1	0.00	0.00	0.00
16,100.0	89.65	90.00	10,788.2	536.0	5,473.1	5,494.0	0.00	0.00	0.00
16,200.0	89.65	90.00	10,788.8	536.0	5,573.1	5,593.8	0.00	0.00	0.00
16,300.0	89.65	90.00	10,789.4	536.0	5,673.1	5,693.7	0.00	0.00	0.00
16,400.0	89.65	90.00	10,790.0	536.0	5,773.1	5,793.5	0.00	0.00	0.00
16,500.0	89.65	90.00	10,790.7	536.0	5,873.1	5,893.4	0.00	0.00	0.00
16,600.0	89.65	90.00	10,791.3	536.0	5,973.1	5,993.3	0.00	0.00	0.00
16,700.0	89.65	90.00	10,791.9	536.0	6,073.1	6,093.1	0.00	0.00	0.00
16,800.0	89.65	90.00	10,792.5	536.0	6,173.1	6,193.0	0.00	0.00	0.00
16,900.0	89.65	90.00	10,793.1	536.0	6,273.1	6,292.8	0.00	0.00	0.00
17,000.0	89.65	90.00	10,793.7	536.0	6,373.1	6,392.7	0.00	0.00	0.00
17,100.0	89.65	90.00	10,794.3	536.0	6,473.1	6,492.5	0.00	0.00	0.00
17,200.0	89.65	90.00	10,795.0	536.0	6,573.1	6,592.4	0.00	0.00	0.00
17,300.0	89.65	90.00	10,795.6	536.0	6,673.1	6,692.2	0.00	0.00	0.00
17,400.0	89.65	90.00	10,796.2	536.0	6,773.1	6,792.1	0.00	0.00	0.00
17,500.0	89.65	90.00	10,796.8	536.0	6,873.1	6,891.9	0.00	0.00	0.00
17,600.0	89.65	90.00	10,797.4	536.0	6,973.1	6,991.8	0.00	0.00	0.00
17,700.0	89.65	90.00	10,798.0	536.0	7,073.1	7,091.6	0.00	0.00	0.00
17,800.0	89.65	90.00	10,798.6	536.0	7,173.1	7,191.5	0.00	0.00	0.00
17,900.0	89.65	90.00	10,799.3	536.0	7,273.1	7,291.4	0.00	0.00	0.00
18,000.0	89.65	90.00	10,799.9	536.0	7,373.1	7,391.2	0.00	0.00	0.00
18,100.0	89.65	90.00	10,800.5	536.0	7,473.1	7,491.1	0.00	0.00	0.00
18,200.0	89.65	90.00	10,801.1	536.0	7,573.1	7,590.9	0.00	0.00	0.00
18,300.0	89.65	90.00	10,801.7	536.0	7,673.0	7,690.8	0.00	0.00	0.00
18,400.0	89.65	90.00	10,802.3	536.0	7,773.0	7,790.6	0.00	0.00	0.00
18,500.0	89.65	90.00	10,803.0	536.0	7,873.0	7,890.5	0.00	0.00	0.00
18,600.0	89.65	90.00	10,803.6	536.0	7,973.0	7,990.3	0.00	0.00	0.00

Database:	OpenWellsCompass - EDM Prod	**Local Co-ordinate Reference:**	Well Wade Federal 5300 31-30 11T
Company:	Oasis	**TVD Reference:**	WELL @ 2054.0ft (Original Well Elev)
Project:	Indian Hills	**MD Reference:**	WELL @ 2054.0ft (Original Well Elev)
Site:	153N-100W-29/30	**North Reference:**	True
Well:	Wade Federal 5300 31-30 11T	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wade Fed #11T		
Design:	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)
18,700.0	89.65	90.00	10,804.2	536.0	8,073.0	8,090.2	0.00	0.00	0.00
18,800.0	89.65	90.00	10,804.8	536.0	8,173.0	8,190.0	0.00	0.00	0.00
18,900.0	89.65	90.00	10,805.4	536.0	8,273.0	8,289.9	0.00	0.00	0.00
19,000.0	89.65	90.00	10,806.0	536.0	8,373.0	8,389.7	0.00	0.00	0.00
19,100.0	89.65	90.00	10,806.6	536.0	8,473.0	8,489.6	0.00	0.00	0.00
19,200.0	89.65	90.00	10,807.3	536.0	8,573.0	8,589.4	0.00	0.00	0.00
19,300.0	89.65	90.00	10,807.9	536.0	8,673.0	8,689.3	0.00	0.00	0.00
19,400.0	89.65	90.00	10,808.5	536.0	8,773.0	8,789.2	0.00	0.00	0.00
19,500.0	89.65	90.00	10,809.1	536.0	8,873.0	8,889.0	0.00	0.00	0.00
19,600.0	89.65	90.00	10,809.7	536.0	8,973.0	8,988.9	0.00	0.00	0.00
19,700.0	89.65	90.00	10,810.3	536.0	9,073.0	9,088.7	0.00	0.00	0.00
19,800.0	89.65	90.00	10,810.9	536.0	9,173.0	9,188.6	0.00	0.00	0.00
19,900.0	89.65	90.00	10,811.6	536.0	9,273.0	9,288.4	0.00	0.00	0.00
20,000.0	89.65	90.00	10,812.2	536.0	9,373.0	9,388.3	0.00	0.00	0.00
20,100.0	89.65	90.00	10,812.8	536.0	9,473.0	9,488.1	0.00	0.00	0.00
20,200.0	89.65	90.00	10,813.4	536.0	9,573.0	9,588.0	0.00	0.00	0.00
20,300.0	89.65	90.00	10,814.0	536.0	9,673.0	9,687.8	0.00	0.00	0.00
20,400.0	89.65	90.00	10,814.6	536.0	9,773.0	9,787.7	0.00	0.00	0.00
20,500.0	89.65	90.00	10,815.3	536.0	9,873.0	9,887.5	0.00	0.00	0.00
20,587.0	89.65	90.00	10,815.8	536.0	9,960.0	9,974.4	0.00	0.00	0.00

TD at 20587.0 - Wade Fed #11T PBHL

Casing Points

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (in)	Hole Diameter (in)
2,010.0	2,010.0	13 3/8"	13.375	17.500
11,042.0	10,757.0	7"	7.000	8.750

Oasis Petroleum

Planning Report

Database:	OpenWellsCompass - EDM Prod	**Local Co-ordinate Reference:**	Well Wade Federal 5300 31-30 11T
Company:	Oasis	**TVD Reference:**	WELL @ 2054.0ft (Original Well Elev)
Project:	Indian Hills	**MD Reference:**	WELL @ 2054.0ft (Original Well Elev)
Site:	153N-100W-29/30	**North Reference:**	True
Well:	Wade Federal 5300 31-30 11T	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wade Fed #11T		
Design:	Plan #1		

Formations

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
1,904.0	1,904.0	Pierre			
4,555.0	4,555.0	Greenhorn			
4,958.0	4,958.0	Mowry			
5,380.0	5,380.0	Dakota			
6,396.0	6,396.0	Rierdon			
6,885.0	6,885.0	Dunham Salt			
6,931.0	6,931.0	Dunham Salt Base			
7,194.0	7,194.0	Pine Salt			
7,218.0	7,218.0	Pine Salt Base			
7,280.0	7,280.0	Opeche Salt			
7,360.0	7,360.0	Opeche Salt Base			
7,604.0	7,604.0	Amsden			
7,760.0	7,760.0	Tyler			
7,983.0	7,983.0	Otter/Base Minnelusa			
8,325.0	8,325.0	Kibbey Lime			
8,473.0	8,473.0	Charles Salt			
9,152.0	9,152.0	Base Last Salt			
9,366.0	9,366.0	Mission Canyon			
9,915.0	9,915.0	Lodgepole			
10,695.8	10,645.0	False Bakken			
10,714.9	10,657.0	Upper Bakken Shale			
10,740.3	10,672.0	Middle Bakken			
10,811.4	10,708.0	Lower Bakken Shale			
10,832.8	10,717.0	Pronghorn			
10,877.7	10,733.0	Threeforks			
10,948.1	10,750.0	Threeforks(Top of Target)			

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	Local Coordinates +E/-W (ft)	Comment
10,279.4	10,279.4	0.0	0.0	Start Build 12.00
11,026.5	10,756.9	166.5	444.4	Start 15.8 hold at 11026.5 MD
11,042.3	10,757.0	172.0	459.2	Start DLS 1.00 TFO 90.07
13,095.7	10,769.7	536.0	2,468.9	Start 7491.3 hold at 13095.7 MD
20,587.0	10,815.8	536.0	9,960.0	TD at 20587.0

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

28303

BRANDI TERRY
OASIS PETROLEUM NORTH AMERICA LLC
1001 FANNIN STE 1500
HOUSTON, TX 77002 USA

Date: **5/12/2014**

RE: CORES AND SAMPLES

Well Name: **WADE FEDERAL 5300 31-30 11T** Well File No.: **28303**
Location: **LOT3 30-153-100** County: MCKENZIE
Permit Type: **Development - HORIZONTAL**
Field: **BAKER** Target Horizon: THREE FORKS B1

Dear BRANDI TERRY:

North Dakota Century Code 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 under North Dakota Century Code: Section 38-08-04 and North Dakota Administrative Code: Section 43-02-03-38.1.

2) Samples: The Operator is to begin collecting sample drill cuttings no lower than the:

Base of the Last Charles Salt

- Sample cuttings shall be collected at:
  - 30' maximum intervals through all vertical and build sections.
  - 100' maximum intervals through any horizontal sections.
- Samples must be washed, dried, placed in standard sample envelopes (3" x 4.5"), packed in the correct order into standard sample boxes (3.5" x 5.25" x 15.25").
- Samples boxes are to be carefully identified with a label that indicates the operator, well name, well file number, American Petroleum Institute (API) number, location and depth of samples; and forwarded in to the state core and sample library within 30 days of the completion of drilling operations.

3) Cores: Any cores cut shall be preserved in correct order, boxed in standard core boxes (4.5", 4.5", 35.75"), and the entire core forwarded to the state core and samples library within 180 days of completion of drilling operations. Any extension of time must have approval on a Form 4 Sundry Notice.

All cores, core chips, and samples must be shipped, prepaid, to the state core and samples library at the following address:

ND Geological Survey Core Library
2835 Campus Road, Stop 8156
Grand Forks, ND 58202

North Dakota Century Code 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

Stephen Fried
Geologist

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)

FEB 2014
RECEIVED
ND OIL & GAS
DIVISION

Well File No.
28303

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

☑ Notice of Intent	Approximate Start Date **August 1, 2014**	☐ Drilling Prognosis	☐ Spill Report
☐ Report of Work Done	Date Work Completed	☐ Redrilling or Repair	☐ Shooting
☐ 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	☐ Casing or Liner	☐ Acidizing
		☐ Plug Well	☐ Fracture Treatment
		☐ Supplemental History	☐ Change Production Method
		☐ Temporarily Abandon	☐ Reclamation
		☑ Other	**Waiver to rule Rule 43-02-03-31**

Well Name and Number				
Wade Federal 5300 31-30 11T				
Footages	Qtr-Qtr	Section	Township	Range
1955 F S L 350 F W L	LOT3	30	153 N	100 W
Field	Pool	County		
	Bakken	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

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 Wade Federal 5300 21-30H located within a mile of subject location
#20197

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 **Oasis Petroleum North America LLC**		Telephone Number **281-404-9491**
Address **1001 Fannin, Suite 1500**		
City **Houston**	State **TX**	Zip Code **77002**
Signature Brandi Terry	Printed Name **Brandi Terry**	
Title **Regulatory Specialist**	Date **February 11, 2014**	
Email Address **bterry@oasispetroleum.com**		

FOR STATE USE ONLY

☐ Received	☑ Approved
Date 5-5-2014	
By	
Title Stephen Fried 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

May 5, 2014

Brandi Terry
Regulatory Specialist
OASIS PETROLEUM NORTH AMERICA LLC
1001 Fannin Suite 1500
Houston, TX 77002

RE: HORIZONTAL WELL
WADE FEDERAL 5300 31-30 11T
LOT3 Section 30-153N-100W
McKenzie County
Well File # 28303

Dear Brandi:

Pursuant to Commission Order No. 23752, 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 29 & 30 T153N R100W. **Tool error is not required pursuant to order.**

PERMIT STIPULATIONS: Effective June 1, 2014, a covered leak-proof container (with placard) for filter sock disposal must be maintained on the well site beginning when the well is spud, and must remain on-site during clean-out, completion, and flow-back whenever filtration operations are conducted. OASIS PETROLEUM NORTH AMERICA LLC must take into consideration NDAC 43-02-03-28 (Safety Regulation) when contemplating simultaneous operations on the above captioned location. Pursuant to NDAC 43-02-03-28 (Safety Regulation) "No boiler, portable electric lighting generator, or treater shall be placed nearer than 150 feet to any producing well or oil tank." Due to drainage adjacent to the well site, a dike is required surrounding the entire location. Remote pit is NOT approved at this time. 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 coordinate from the well head is: 9972'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.

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 (1) a suite of open hole logs from which formation tops and porosity zones can be determined, (2) a Gamma Ray Log run from total depth to ground level elevation of the well bore, and (3) a log from which the presence and quality of cement can be determined (Standard CBL or Ultrasonic cement evaluation log) in every well in which production or intermediate casing has been set, this log must be run prior to completing the well. All logs run must be submitted free of charge, as one digital TIFF (tagged image file format) copy and one digital LAS (log ASCII) formatted copy. Digital logs may be submitted on a standard CD, DVD, or attached to an email sent to digitallogs@nd.gov

Thank you for your cooperation.

Sincerely,

Alice Webber
Engineering Tech

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	Type of Well	Approximate Date Work Will Start	Confidential Status
New Location	Oil & Gas	8 / 1 / 2014	No

Operator	Telephone Number
OASIS PETROLEUM NORTH AMERICA LLC	281-404-9491

Address	City	State	Zip Code
1001 Fannin Suite 1500	Houston	TX	77002

☑ 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	Well Number
WADE FEDERAL	5300 31-30 11T

Surface Footages	Qtr-Qtr	Section	Township	Range	County
1955 F S L 350 F W L	LOT3	30	153 N	100 W	McKenzie

Longstring Casing Point Footages	Qtr-Qtr	Section	Township	Range	County
2127 F S L 809 F W L	LOT3	30	153 N	100 W	McKenzie

Longstring Casing Point Coordinates From Well Head	Azimuth	Longstring Total Depth
172 N From WH 459 E From WH	69.47 º	11042 Feet MD 10757 Feet TVD

Bottom Hole Footages From Nearest Section Line	Qtr-Qtr	Section	Township	Range	County
2491 F S L 212 F E L	NESE	29	153 N	100 W	Williams

Bottom Hole Coordinates From Well Head	KOP Lateral 1	Azimuth Lateral 1	Estimated Total Depth Lateral 1
536 N From WH 9960 E From WH	10279 Feet MD	90.0 º	20587 Feet MD 10816 Feet TVD

Latitude of Well Head	Longitude of Well Head	NAD Reference	Description of (Subject to NDIC Approval)
48 ° 02 ' 38.97 "	-103 ° 36 ' 09.79 "	NAD83	Spacing Unit: Sections 29 & 30 T153N R100W

Ground Elevation	Acres in Spacing/Drilling Unit	Spacing/Drilling Unit Setback Requirement	Industrial Commission Order
2035 Feet Above S.L.	1280	500 Feet N/S 200 Feet E/W	23752

North Line of Spacing/Drilling Unit	South Line of Spacing/Drilling Unit	East Line of Spacing/Drilling Unit	West Line of Spacing/Drilling Unit
10513 Feet	10522 Feet	5082 Feet	5236 Feet

Objective Horizons	Pierre Shale Top
Three Forks B1	1904

Proposed	Size	Weight	Depth	Cement Volume	
Surface Casing	9 - 5/8 "	36 Lb./Ft.	2010 Feet	768 Sacks	NOTE: Surface hole must be drilled with fresh water and surface casing must be cemented back to surface.

Proposed	Size	Weight(s)	Longstring Total Depth	Cement Volume	Cement Top	Top Dakota Sand
Longstring Casing	7 - "	29/32 Lb./Ft.	11042 Feet MD 10757 Feet TVD	791 Sacks	3880 Feet	5380 Feet

Base Last Charles Salt (If Applicable)	
9152 Feet	NOTE: Intermediate or longstring casing string must be cemented above the top Dakota Group Sand.

Proposed Logs
Triple Combo: KOP to Kibby GR/Res to BSC GR to surf CND through the Dakota

Drilling Mud Type (Vertical Hole - Below Surface Casing)	Drilling Mud Type (Lateral)
Invert	Salt Water Gel

Survey Type in Vertical Portion of Well	Survey Frequency: Build Section	Survey Frequency: Lateral	Survey Contractor
MWD Every 100 Feet	30 Feet	90 Feet	Ryan

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 / From WH		Bottom Hole Coordinates From Well Head From WH / From WH		
KOP Footages From Nearest Section Line F L / F L	Qtr-Qtr	Section	Township N	Range W / County
Bottom Hole Footages From Nearest Section Line F L / F L	Qtr-Qtr	Section	Township N	Range W / 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 / From WH		Bottom Hole Coordinates From Well Head From WH / From WH		
KOP Footages From Nearest Section Line F L / F L	Qtr-Qtr	Section	Township N	Range W / County
Bottom Hole Footages From Nearest Section Line F L / F L	Qtr-Qtr	Section	Township N	Range W / 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 / From WH		Bottom Hole Coordinates From Well Head From WH / From WH		
KOP Footages From Nearest Section Line F L / F L	Qtr-Qtr	Section	Township N	Range W / County
Bottom Hole Footages From Nearest Section Line F L / F L	Qtr-Qtr	Section	Township N	Range W / 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 / From WH		Bottom Hole Coordinates From Well Head From WH / From WH		
KOP Footages From Nearest Section Line F L / F L	Qtr-Qtr	Section	Township N	Range W / County
Bottom Hole Footages From Nearest Section Line F L / F L	Qtr-Qtr	Section	Township N	Range W / County

I hereby swear or affirm the information provided is true, complete and correct as determined from all available records.

Date **02 / 10 / 2014**

ePermit	Printed Name **Brandi Terry**	Title **Regulatory Specialist**

FOR STATE USE ONLY

Permit and File Number **28303**	API Number **33 - 053 - 05906**
Field **BAKER**	
Pool **BAKKEN**	Permit Type **DEVELOPMENT**

FOR STATE USE ONLY

Date Approved **5 / 5 / 2014**
By **Alice Webber**
Title **Engineering Tech**

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

April 9, 2014

RE: **Filter Socks and Other Filter Media**
Leakproof Container Required
Oil and Gas Wells

Dear Operator,

North Dakota Administrative Code Section 43-02-03-19.2 states in part that all waste material associated with exploration or production of oil and gas must be properly disposed of in an authorized facility in accord with all applicable local, state, and federal laws and regulations.

Filtration systems are commonly used during oil and gas operations in North Dakota. The Commission is very concerned about the proper disposal of used filters (including filter socks) used by the oil and gas industry.

Effective June 1, 2014, a container must be maintained on each well drilled in North Dakota beginning when the well is spud and must remain on-site during clean-out, completion, and flow-back whenever filtration operations are conducted. The on-site container must be used to store filters until they can be properly disposed of in an authorized facility. Such containers must be:

- leakproof to prevent any fluids from escaping the container
- covered to prevent precipitation from entering the container
- placard to indicate only filters are to be placed in the container

If the operator will not utilize a filtration system, a waiver to the container requirement will be considered, but only upon the operator submitting a Sundry Notice (Form 4) justifying their request.

As previously stated in our March 13, 2014 letter, North Dakota Administrative Code Section 33-20-02.1-01 states in part that every person who transports solid waste (which includes oil and gas exploration and production wastes) is required to have a valid permit issued by the North Dakota Department of Health, Division of Waste Management. Please contact the Division of Waste Management at (701) 328-5166 with any questions on the solid waste program. Note oil and gas exploration and production wastes include produced water, drilling mud, invert mud, tank bottom sediment, pipe scale, filters, and fly ash.

Thank you for your cooperation.

Sincerely,

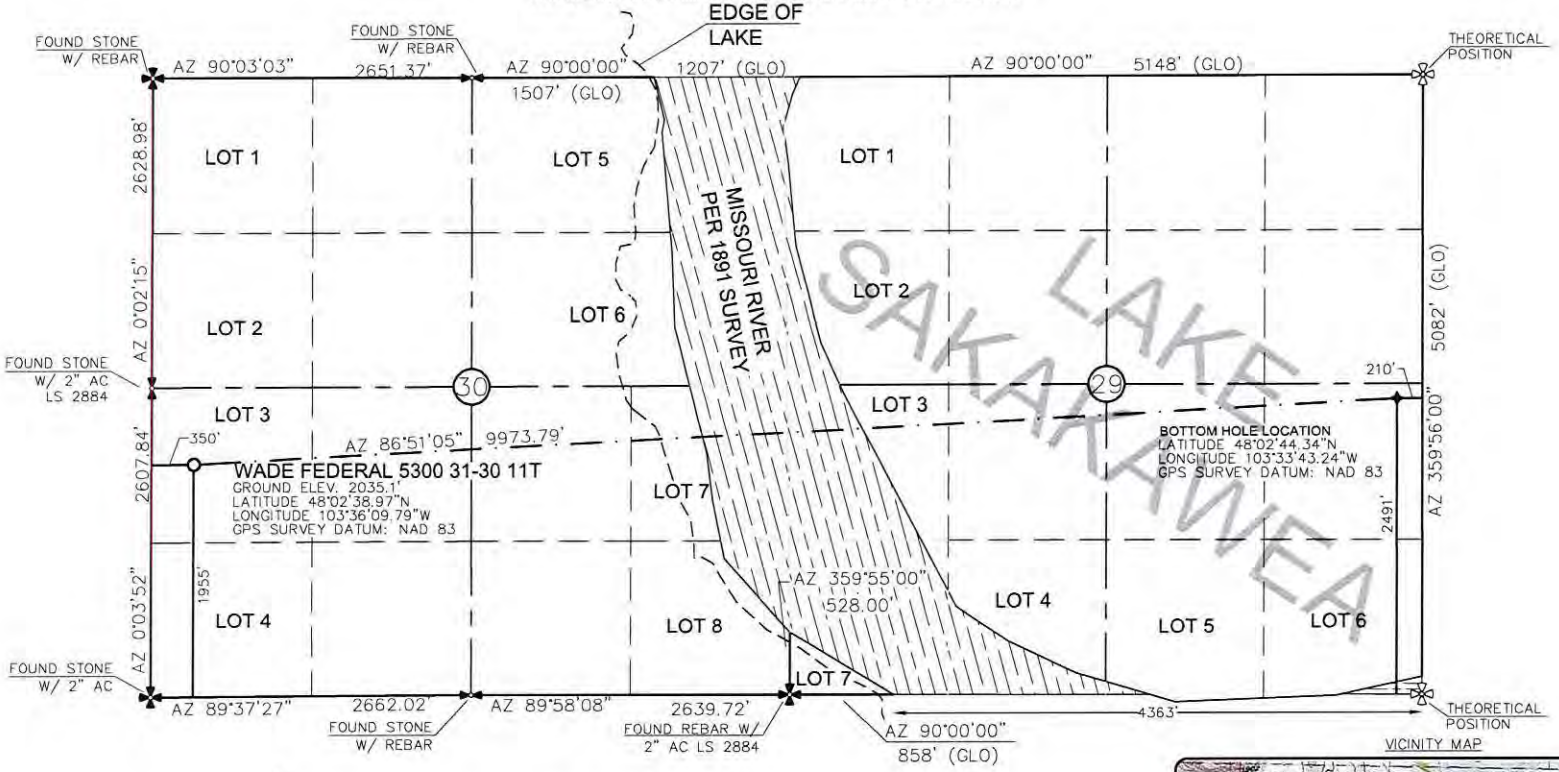
Bruce E. Hicks

Assistant Director

600 E Boulevard Ave - Dept 405, Bismarck, North Dakota 58505-0840 Phone (701)328-8020 Fax (701)328-8022

WELL LOCATION PLAT

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"WADE FEDERAL 5300 31-30 11T"
1955 FEET FROM SOUTH LINE AND 350 FEET FROM WEST LINE
SECTION 30, 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 1/21/14 AND THE ORIGINAL DOCUMENTS ARE STORED AT THE OFFICES OF INTERSTATE ENGINEERING, INC.

0 1000
1" = 1000'

✠ - MONUMENT - RECOVERED
✠ - MONUMENT - NOT RECOVERED

STAKED ON 1/10/14
VERTICAL CONTROL DATUM WAS BASED UPON CONTROL POINT 705 WITH AN ELEVATION OF 2158.3'

THIS SURVEY AND PLAT IS BEING PROVIDED AT THE REQUEST OF ERIC BAYES OF OASIS PETROLEUM. I CERTIFY THAT THIS PLAT CORRECTLY REPRESENTS WORK PERFORMED BY ME OR UNDER MY SUPERVISION AND IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

DARYL D. KASEMAN LS-3880

REGISTERED LAND SURVEYOR
DARYL D. KASEMAN
LS-3880
DATE: 1/21/14
NORTH DAKOTA

VICINITY MAP

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Revision No.	Date	By	Description

OASIS PETROLEUM NORTH AMERICA, LLC
WELL LOCATION PLAT
SECTION 30, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. Project No.: S13-09-380.02
Checked By: D.D.K. Date: JAN. 2014

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

INTERSTATE ENGINEERING
Professionally minded, people inspired

DRILLING PLAN

OPERATOR	Oasis Petroleum	**COUNTY/STATE**	McKenzie Co. , ND
WELL NAME	Wade Federal 5300 31-30 11T	**RIG**	B25
WELL TYPE	Horizontal Three Forks		
LOCATION	SW SW 30-153N-100W Surface Location (survey plat): 1955' FSL	350' FWL	
EST. T.D.	20,587'	**GROUND ELEV:** 2,029'	**Sub Height:** 25'
	TOTAL LATERAL: 9,545'	**KB ELEV:** 2,054'	

MARKER		TVD	Subsea TVD
Pierre	NDIC MAP	1,904	150
Greenhorn		4,555	-2,501
Mowry		4,958	-2,904
Dakota		5,380	-3,326
Rierdon		6,396	-4,342
Dunham Salt		6,885	-4,831
Dunham Salt Base		6,931	-4,877
Pine Salt		7,194	-5,140
Pine Salt Base		7,218	-5,164
Opeche Salt		7,280	-5,226
Opeche Salt Base		7,360	-5,306
Amsden		7,604	-5,550
Tyler		7,760	-5,706
Otter/Base Minnelusa		7,983	-5,929
Kibbey Lime		8,325	-6,271
Charles Salt		8,473	-6,419
Base Last Salt		9,152	-7,098
Mission Canyon		9,366	-7,312
Lodgepole		9,915	-7,861
False Bakken		10,645	-8,591
Upper Bakken Shale		10,657	-8,603
Middle Bakken		10,672	-8,618
Lower Bakken Shale		10,708	-8,654
Pronghorn		10,717	-8,663
Threeforks		10,733	-8,679
Threeforks(Top of Target)		10,750	-8,696
Threeforks(Base of Target)		10,759	-8,705
Claystone		10,759	-8,705

Est. Dip Rate: -0.35

Max. Anticipated BHP: 4662

LOGS:	Type	Interval
OH Logs:	Request Log waiver based on the Wade Federal 5300 21-30H 1,100' N of surface location	
CBL/GR:	Above top of cement/GR to base of casing	
MWD GR:	KOP to lateral TD	

DEVIATION:	Surf:	3 deg. max., 1 deg / 100'; srvy every 500'
	Prod:	5 deg. max., 1 deg / 100'; srvy every 100'
DST'S:	None planned	
CORES:	None planned	
MUDLOGGING:	Two-Man:	Begin 200' above Kibbey 30' samples in curve and lateral
BOP:	11" 5000 psi blind, pipe & annular	

Surface Formation: *Glacial till*

MUD:	Interval		Type	WT	Vis	WL	Remarks
Surface:	0' -	2,010'	FW	8.4-9.0	28-32	NC	Circ Mud Tanks
Intermediate:	2,010' -	11,042'	Invert	9.5-10.4	40-50	30+HtHp	Circ Mud Tanks
Lateral:	11,042' -	20,587'	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"	2,010'		To Surface	12	100' into Pierre
Intermediate:	7"	29/32#	8-3/4"	11,042'		3880	24	1500' above Dakota
Production Liner:	4.5"	11.6#	6"	20,587'	**TOL @ 10,229'**			50' above KOP

PROBABLE PLUGS, IF REQ'D:

OTHER:	MD	TVD	FNL/FSL	FEL/FWL	S-T-R	AZI		
Surface:	2,010	2,010	1955' FSL	350' FWL	Sec. 30-T153N-R100W		Survey Company:	
KOP:	10,279'	10,279'	1955' FSL	350' FWL	Sec. 30-T153N-R100W		Build Rate:	12 deg /100'
EOC:	11,026'	10,757'	2121' FSL	794' FWL	Sec. 30-T153N-R100W	69.0	Turn Rate	1 deg /100'
Casing Point:	11,042'	10,757'	2127' FSL	809' FWL	Sec. 30-T153N-R100W	69.0		
Middle Bakken Lateral TD:	20,587'	10,815'	2491' FSL	200' FEL	Sec. 29-T153N-R100W	90.0		

Comments:

Request Log waiver based on the Wade Federal 5300 21-30H 1,100' N of surface location

No frac string planned
35 packers & 15 sleeves

Geology: N. Gabelman 1/23/2014 **Engineering:** M. Brown 2-6-2014

Oasis Petroleum
Well Summary
Wade Federal 5300 31-30 11T
Section 30 T153N R100W
McKenzie County, ND

SURFACE CASING AND CEMENT DESIGN

							Make-up Torque (ft-lbs)		
Size	**Interval**	**Weight**	**Grade**	**Coupling**	**I.D.**	**Drift**	**Minimum**	**Optimum**	**Max**
9-5/8”	0’ to 2010	36	J-55	LTC	8.921"	8.765"	3400	4530	5660

Interval	Description	Collapse	Burst	Tension
		(psi) a	(psi) b	(1000 lbs) c
0’ to 2010	9-5/8", 36#, J-55, LTC, 8rd	2020 / 2.14	3520 / 3.74	453 / 2.78

API Rating & Safety Factor

a) Based on full casing evacuation with 9 ppg fluid on backside (2010' setting depth).
b) Burst pressure based on 9 ppg fluid with no fluid on backside (2010' setting depth).
c) Based on string weight in 9 ppg fluid at 2010' TVD plus 100k# overpull. (Buoyed weight equals 62k lbs.)

Cement volumes are based on 9-5/8" casing set in 13-1/2" hole with 60% excess to circulate cement back to surface.
Mix and pump the following slurry.

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

Lead Slurry: **518 sks** (220 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: **250 sks** (65 bbls) Conventional system with 94 lb/sk cement, 3% NaCl, and .25 lb/sk lost circulation control agent

Oasis Petroleum
Well Summary
Wade Federal 5300 31-30 11T
Section 30 T153N R100W
McKenzie County, ND

INTERMEDIATE CASING AND CEMENT DESIGN

Intermediate Casing Design

							Make-up Torque (ft-lbs)		
Size	**Interval**	**Weight**	**Grade**	**Coupling**	**I.D.**	**Drift**	**Minimum**	**Optimum**	**Max**
7”	0' - 11042'	32	HCP-110	LTC	6.094”	6.000”**	6,730	8,970	9,870

**Special Drift

Interval	Description	Collapse	Burst	Tension
		(psi) a	(psi) b	(1000 lbs) c
0' - 11042'	7”, 32#, HCP-110, LTC, 8rd	11820 / 2.11*	12460 / 1.28	897 / 2.24
6700' - 9152'	7”, 32#, HCP-110, LTC, 8rd	11820 / 1.17**	12460 / 1.30	

API Rating & Safety Factor

a) *Assume full casing evacuation with 10 ppg fluid on backside. **Assume full casing evacuation with 1.1 psi/ft equivalent fluid gradient across salt intervals.
b) Burst pressure based on 9000 psig max press for stimulation plus 10.2 ppg fluid in casing and 9 ppg fluid on backside-to 10757' TVD.
c) Based on string weight in 10 ppg fluid, (299k 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.

Pre-flush (Spacer): **20 bbls** Chem wash
70 bbls 10.6# Scavenger

Lead Slurry: **189 sks** (87 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, 0.7% retarder, 0.125 lb/sk lost circulation control agent, and 0.3% dispersant

Tail Slurry: **602 sks** (166 bbls) Conventional system with 94 lb/sk cement, 10% NaCl, 35% Silica, 0.2% fluid loss agent, 0.8% dispersant, 0.125 lb/sk lost circulation control agent and 0.3% retarder

Oasis Petroleum
Well Summary
Wade Federal 5300 31-30 11T
Section 30 T153N R100W
McKenzie County, ND

PRODUCTION LINER

							Make-up Torque (ft-lbs)		
Size	**Interval**	**Weight**	**Grade**	**Coupling**	**I.D.**	**Drift**	**Minimum**	**Optimum**	**Max**
4-1/2”	10229' - 20587'	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**	
10229' - 20587'	4-1/2”, 13.5 lb, P-110, BTC, 8rd	10670 / 1.99	12410 / 1.28	443 / 2.01	

API Rating & Safety Factor

a) Based on full casing evacuation with 9.5 ppg fluid on backside @ 10815' TVD.
b) Burst pressure based on 9000 psi treating pressure with 10.2 ppg internal fluid gradient and 9 ppg external fluid gradient @ 10815' TVD.
c) Based on string weight in 9.5 ppg fluid (Buoyed weight: 120k lbs.) plus 100k lbs overpull.

OASIS PETROLEUM

3/18/2014

Michael Kukuk
Regulatory Supervisor
Oasis Petroleum
1001 Fannin St.
Suite 1500
Houston, TX 77002

Todd Holweger
Mineral Resources Permit Manager
North Dakota Industrial Commission
600 East Boulevard Avenue Dept. 405
Bismarck, ND 58505-0840

RE: Diesel Fuel Statement for all pending permits

Dear Mr. Holweger:

Oasis Petroleum does not use Diesel Fuel, as defined by the US EPA in the list below, in our hydraulic fracture operations. This statement applies to all of the wells listed in **Attachment 1**.

68334-30-5 (Primary Name: Fuels, diesel)
68476-34-6 (Primary Name: Fuels, diesel, No. 2)
68476-30-2 (Primary Name: Fuel oil No. 2)
68476-31-3 (Primary Name: Fuel oil, No. 4)
8008-20-6 (Primary Name: Kerosene)

Thank you for your consideration.

Respectfully,

Michael Kukuk

Michael Kukuk
Regulatory Supervisor
Oasis Petroleum

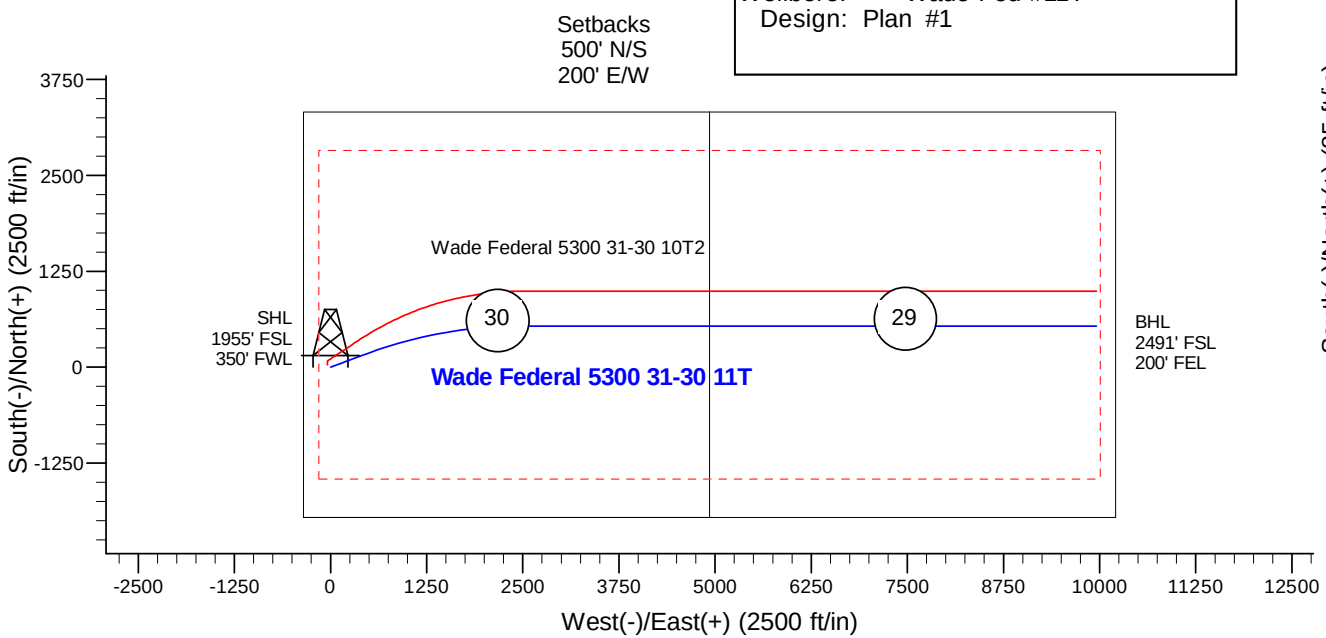
Azimuths to True North
Magnetic North: 8.31°

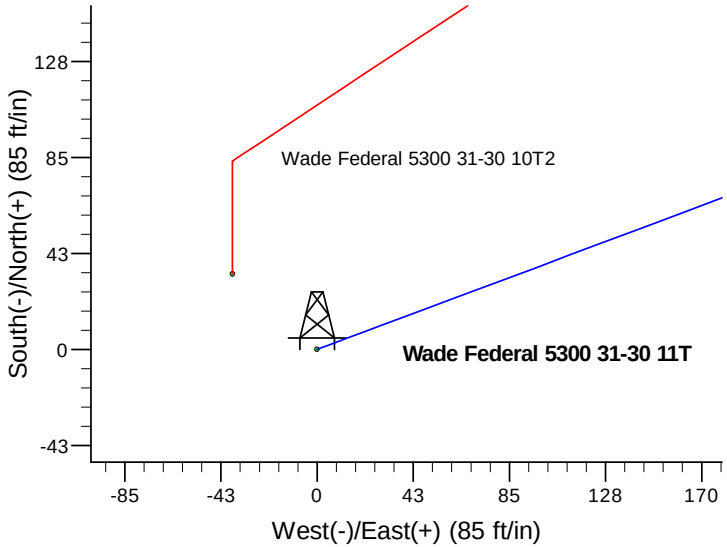
Magnetic Field
Strength: 56459.3snT
Dip Angle: 72.99°
Date: 2/5/2014
Model: IGRF2010

OASIS PETROLEUM

SITE DETAILS: 153N-100W-29/30	
Site Centre Latitude:	48° 2' 38.970 N
Longitude:	103° 36' 9.790 W
Positional Uncertainity:	0.0
Convergence:	-2.31
Local North:	True

Project: Indian Hills
Site: 153N-100W-29/30
Well: Wade Federal 5300 31-30 11T
Wellbore: Wade Fed #11T
Design: Plan #1



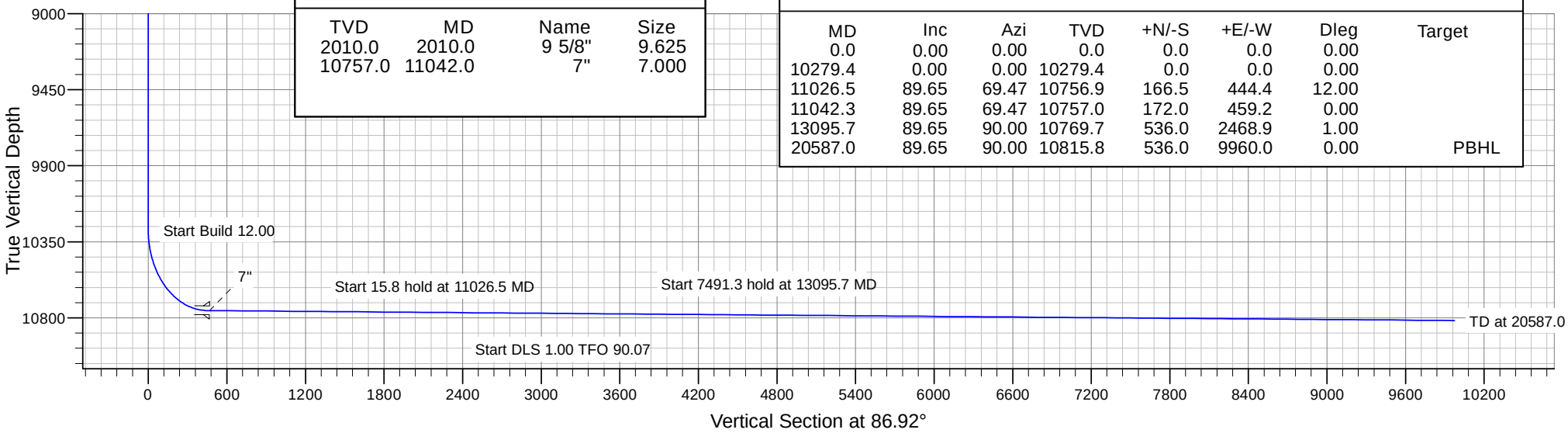


CASING DETAILS

TVD	MD	Name	Size
2010.0	2010.0	9 5/8"	9.625
10757.0	11042.0	7"	7.000

SECTION DETAILS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	
10279.4	0.00	0.00	10279.4	0.0	0.0	0.00	
11026.5	89.65	69.47	10756.9	166.5	444.4	12.00	
11042.3	89.65	69.47	10757.0	172.0	459.2	0.00	
13095.7	89.65	90.00	10769.7	536.0	2468.9	1.00	
20587.0	89.65	90.00	10815.8	536.0	9960.0	0.00	PBHL



Oasis

Indian Hills
153N-100W-29/30
Wade Federal 5300 31-30 11T

Wade Fed #11T

Plan: Plan #1

Standard Planning Report

05 February, 2014

Oasis Petroleum

Planning Report

Database:	OpenWellsCompass - EDM Prod	**Local Co-ordinate Reference:**	Well Wade Federal 5300 31-30 11T
Company:	Oasis	**TVD Reference:**	WELL @ 2054.0ft (Original Well Elev)
Project:	Indian Hills	**MD Reference:**	WELL @ 2054.0ft (Original Well Elev)
Site:	153N-100W-29/30	**North Reference:**	True
Well:	Wade Federal 5300 31-30 11T	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wade Fed #11T		
Design:	Plan #1		

Project Indian Hills

Map System:	US State Plane 1983	**System Datum:**	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	North Dakota Northern Zone		

Site 153N-100W-29/30

Site Position:		**Northing:**	395,521.43 ft	**Latitude:**	48° 2' 32.580 N
From:	Lat/Long	**Easting:**	1,209,621.64 ft	**Longitude:**	103° 36' 11.410 W
Position Uncertainty:	0.0 ft	**Slot Radius:**	13.200 in	**Grid Convergence:**	-2.31 °

Well Wade Federal 5300 31-30 11T

Well Position	**+N/-S**	647.5 ft	**Northing:**	396,163.94 ft	**Latitude:**	48° 2' 38.970 N
	+E/-W	110.1 ft	**Easting:**	1,209,757.72 ft	**Longitude:**	103° 36' 9.790 W
Position Uncertainty		0.0 ft	**Wellhead Elevation:**		**Ground Level:**	2,029.0 ft

Wellbore Wade Fed #11T

Magnetics	**Model Name**	**Sample Date**	**Declination (°)**	**Dip Angle (°)**	**Field Strength (nT)**
	IGRF2010	2/5/2014	8.32	72.99	56,459

Design Plan #1

Audit Notes:

Version:		**Phase:**	PROTOTYPE	**Tie On Depth:**	0.0

Vertical Section:	**Depth From (TVD) (ft)**	**+N/-S (ft)**	**+E/-W (ft)**	**Direction (°)**
	0.0	0.0	0.0	86.92

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	
10,279.4	0.00	0.00	10,279.4	0.0	0.0	0.00	0.00	0.00	0.00	
11,026.5	89.65	69.47	10,756.9	166.5	444.4	12.00	12.00	0.00	69.47	
11,042.3	89.65	69.47	10,757.0	172.0	459.2	0.00	0.00	0.00	0.00	
13,095.7	89.65	90.00	10,769.7	536.0	2,468.9	1.00	0.00	1.00	90.07	
20,587.0	89.65	90.00	10,815.8	536.0	9,960.0	0.00	0.00	0.00	0.00	Wade Fed #11T PBH

Oasis Petroleum

Planning Report

Database:	OpenWellsCompass - EDM Prod	**Local Co-ordinate Reference:**	Well Wade Federal 5300 31-30 11T
Company:	Oasis	**TVD Reference:**	WELL @ 2054.0ft (Original Well Elev)
Project:	Indian Hills	**MD Reference:**	WELL @ 2054.0ft (Original Well Elev)
Site:	153N-100W-29/30	**North Reference:**	True
Well:	Wade Federal 5300 31-30 11T	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wade Fed #11T		
Design:	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
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	0.00
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	0.00
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00
1,100.0	0.00	0.00	1,100.0	0.0	0.0	0.0	0.00	0.00	0.00
1,200.0	0.00	0.00	1,200.0	0.0	0.0	0.0	0.00	0.00	0.00
1,300.0	0.00	0.00	1,300.0	0.0	0.0	0.0	0.00	0.00	0.00
1,400.0	0.00	0.00	1,400.0	0.0	0.0	0.0	0.00	0.00	0.00
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	0.00	0.00	0.00
1,600.0	0.00	0.00	1,600.0	0.0	0.0	0.0	0.00	0.00	0.00
1,700.0	0.00	0.00	1,700.0	0.0	0.0	0.0	0.00	0.00	0.00
1,800.0	0.00	0.00	1,800.0	0.0	0.0	0.0	0.00	0.00	0.00
1,900.0	0.00	0.00	1,900.0	0.0	0.0	0.0	0.00	0.00	0.00
1,904.0	0.00	0.00	1,904.0	0.0	0.0	0.0	0.00	0.00	0.00
Pierre									
2,000.0	0.00	0.00	2,000.0	0.0	0.0	0.0	0.00	0.00	0.00
2,010.0	0.00	0.00	2,010.0	0.0	0.0	0.0	0.00	0.00	0.00
9 5/8"									
2,100.0	0.00	0.00	2,100.0	0.0	0.0	0.0	0.00	0.00	0.00
2,200.0	0.00	0.00	2,200.0	0.0	0.0	0.0	0.00	0.00	0.00
2,300.0	0.00	0.00	2,300.0	0.0	0.0	0.0	0.00	0.00	0.00
2,400.0	0.00	0.00	2,400.0	0.0	0.0	0.0	0.00	0.00	0.00
2,500.0	0.00	0.00	2,500.0	0.0	0.0	0.0	0.00	0.00	0.00
2,600.0	0.00	0.00	2,600.0	0.0	0.0	0.0	0.00	0.00	0.00
2,700.0	0.00	0.00	2,700.0	0.0	0.0	0.0	0.00	0.00	0.00
2,800.0	0.00	0.00	2,800.0	0.0	0.0	0.0	0.00	0.00	0.00
2,900.0	0.00	0.00	2,900.0	0.0	0.0	0.0	0.00	0.00	0.00
3,000.0	0.00	0.00	3,000.0	0.0	0.0	0.0	0.00	0.00	0.00
3,100.0	0.00	0.00	3,100.0	0.0	0.0	0.0	0.00	0.00	0.00
3,200.0	0.00	0.00	3,200.0	0.0	0.0	0.0	0.00	0.00	0.00
3,300.0	0.00	0.00	3,300.0	0.0	0.0	0.0	0.00	0.00	0.00
3,400.0	0.00	0.00	3,400.0	0.0	0.0	0.0	0.00	0.00	0.00
3,500.0	0.00	0.00	3,500.0	0.0	0.0	0.0	0.00	0.00	0.00
3,600.0	0.00	0.00	3,600.0	0.0	0.0	0.0	0.00	0.00	0.00
3,700.0	0.00	0.00	3,700.0	0.0	0.0	0.0	0.00	0.00	0.00
3,800.0	0.00	0.00	3,800.0	0.0	0.0	0.0	0.00	0.00	0.00
3,900.0	0.00	0.00	3,900.0	0.0	0.0	0.0	0.00	0.00	0.00
4,000.0	0.00	0.00	4,000.0	0.0	0.0	0.0	0.00	0.00	0.00
4,100.0	0.00	0.00	4,100.0	0.0	0.0	0.0	0.00	0.00	0.00
4,200.0	0.00	0.00	4,200.0	0.0	0.0	0.0	0.00	0.00	0.00
4,300.0	0.00	0.00	4,300.0	0.0	0.0	0.0	0.00	0.00	0.00
4,400.0	0.00	0.00	4,400.0	0.0	0.0	0.0	0.00	0.00	0.00
4,500.0	0.00	0.00	4,500.0	0.0	0.0	0.0	0.00	0.00	0.00
4,555.0	0.00	0.00	4,555.0	0.0	0.0	0.0	0.00	0.00	0.00
Greenhorn									
4,600.0	0.00	0.00	4,600.0	0.0	0.0	0.0	0.00	0.00	0.00
4,700.0	0.00	0.00	4,700.0	0.0	0.0	0.0	0.00	0.00	0.00
4,800.0	0.00	0.00	4,800.0	0.0	0.0	0.0	0.00	0.00	0.00

Database:	OpenWellsCompass - EDM Prod	**Local Co-ordinate Reference:**	Well Wade Federal 5300 31-30 11T
Company:	Oasis	**TVD Reference:**	WELL @ 2054.0ft (Original Well Elev)
Project:	Indian Hills	**MD Reference:**	WELL @ 2054.0ft (Original Well Elev)
Site:	153N-100W-29/30	**North Reference:**	True
Well:	Wade Federal 5300 31-30 11T	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wade Fed #11T		
Design:	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)
4,900.0	0.00	0.00	4,900.0	0.0	0.0	0.0	0.00	0.00	0.00
4,958.0	0.00	0.00	4,958.0	0.0	0.0	0.0	0.00	0.00	0.00
Mowry									
5,000.0	0.00	0.00	5,000.0	0.0	0.0	0.0	0.00	0.00	0.00
5,100.0	0.00	0.00	5,100.0	0.0	0.0	0.0	0.00	0.00	0.00
5,200.0	0.00	0.00	5,200.0	0.0	0.0	0.0	0.00	0.00	0.00
5,300.0	0.00	0.00	5,300.0	0.0	0.0	0.0	0.00	0.00	0.00
5,380.0	0.00	0.00	5,380.0	0.0	0.0	0.0	0.00	0.00	0.00
Dakota									
5,400.0	0.00	0.00	5,400.0	0.0	0.0	0.0	0.00	0.00	0.00
5,500.0	0.00	0.00	5,500.0	0.0	0.0	0.0	0.00	0.00	0.00
5,600.0	0.00	0.00	5,600.0	0.0	0.0	0.0	0.00	0.00	0.00
5,700.0	0.00	0.00	5,700.0	0.0	0.0	0.0	0.00	0.00	0.00
5,800.0	0.00	0.00	5,800.0	0.0	0.0	0.0	0.00	0.00	0.00
5,900.0	0.00	0.00	5,900.0	0.0	0.0	0.0	0.00	0.00	0.00
6,000.0	0.00	0.00	6,000.0	0.0	0.0	0.0	0.00	0.00	0.00
6,100.0	0.00	0.00	6,100.0	0.0	0.0	0.0	0.00	0.00	0.00
6,200.0	0.00	0.00	6,200.0	0.0	0.0	0.0	0.00	0.00	0.00
6,300.0	0.00	0.00	6,300.0	0.0	0.0	0.0	0.00	0.00	0.00
6,396.0	0.00	0.00	6,396.0	0.0	0.0	0.0	0.00	0.00	0.00
Rierdon									
6,400.0	0.00	0.00	6,400.0	0.0	0.0	0.0	0.00	0.00	0.00
6,500.0	0.00	0.00	6,500.0	0.0	0.0	0.0	0.00	0.00	0.00
6,600.0	0.00	0.00	6,600.0	0.0	0.0	0.0	0.00	0.00	0.00
6,700.0	0.00	0.00	6,700.0	0.0	0.0	0.0	0.00	0.00	0.00
6,800.0	0.00	0.00	6,800.0	0.0	0.0	0.0	0.00	0.00	0.00
6,885.0	0.00	0.00	6,885.0	0.0	0.0	0.0	0.00	0.00	0.00
Dunham Salt									
6,900.0	0.00	0.00	6,900.0	0.0	0.0	0.0	0.00	0.00	0.00
6,931.0	0.00	0.00	6,931.0	0.0	0.0	0.0	0.00	0.00	0.00
Dunham Salt Base									
7,000.0	0.00	0.00	7,000.0	0.0	0.0	0.0	0.00	0.00	0.00
7,100.0	0.00	0.00	7,100.0	0.0	0.0	0.0	0.00	0.00	0.00
7,194.0	0.00	0.00	7,194.0	0.0	0.0	0.0	0.00	0.00	0.00
Pine Salt									
7,200.0	0.00	0.00	7,200.0	0.0	0.0	0.0	0.00	0.00	0.00
7,218.0	0.00	0.00	7,218.0	0.0	0.0	0.0	0.00	0.00	0.00
Pine Salt Base									
7,280.0	0.00	0.00	7,280.0	0.0	0.0	0.0	0.00	0.00	0.00
Opeche Salt									
7,300.0	0.00	0.00	7,300.0	0.0	0.0	0.0	0.00	0.00	0.00
7,360.0	0.00	0.00	7,360.0	0.0	0.0	0.0	0.00	0.00	0.00
Opeche Salt Base									
7,400.0	0.00	0.00	7,400.0	0.0	0.0	0.0	0.00	0.00	0.00
7,500.0	0.00	0.00	7,500.0	0.0	0.0	0.0	0.00	0.00	0.00
7,600.0	0.00	0.00	7,600.0	0.0	0.0	0.0	0.00	0.00	0.00
7,604.0	0.00	0.00	7,604.0	0.0	0.0	0.0	0.00	0.00	0.00
Amsden									
7,700.0	0.00	0.00	7,700.0	0.0	0.0	0.0	0.00	0.00	0.00
7,760.0	0.00	0.00	7,760.0	0.0	0.0	0.0	0.00	0.00	0.00
Tyler									
7,800.0	0.00	0.00	7,800.0	0.0	0.0	0.0	0.00	0.00	0.00
7,900.0	0.00	0.00	7,900.0	0.0	0.0	0.0	0.00	0.00	0.00
7,983.0	0.00	0.00	7,983.0	0.0	0.0	0.0	0.00	0.00	0.00

Database:	OpenWellsCompass - EDM Prod	**Local Co-ordinate Reference:**	Well Wade Federal 5300 31-30 11T
Company:	Oasis	**TVD Reference:**	WELL @ 2054.0ft (Original Well Elev)
Project:	Indian Hills	**MD Reference:**	WELL @ 2054.0ft (Original Well Elev)
Site:	153N-100W-29/30	**North Reference:**	True
Well:	Wade Federal 5300 31-30 11T	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wade Fed #11T		
Design:	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)
Otter/Base Minnelusa									
8,000.0	0.00	0.00	8,000.0	0.0	0.0	0.0	0.00	0.00	0.00
8,100.0	0.00	0.00	8,100.0	0.0	0.0	0.0	0.00	0.00	0.00
8,200.0	0.00	0.00	8,200.0	0.0	0.0	0.0	0.00	0.00	0.00
8,300.0	0.00	0.00	8,300.0	0.0	0.0	0.0	0.00	0.00	0.00
8,325.0	0.00	0.00	8,325.0	0.0	0.0	0.0	0.00	0.00	0.00
Kibbey Lime									
8,400.0	0.00	0.00	8,400.0	0.0	0.0	0.0	0.00	0.00	0.00
8,473.0	0.00	0.00	8,473.0	0.0	0.0	0.0	0.00	0.00	0.00
Charles Salt									
8,500.0	0.00	0.00	8,500.0	0.0	0.0	0.0	0.00	0.00	0.00
8,600.0	0.00	0.00	8,600.0	0.0	0.0	0.0	0.00	0.00	0.00
8,700.0	0.00	0.00	8,700.0	0.0	0.0	0.0	0.00	0.00	0.00
8,800.0	0.00	0.00	8,800.0	0.0	0.0	0.0	0.00	0.00	0.00
8,900.0	0.00	0.00	8,900.0	0.0	0.0	0.0	0.00	0.00	0.00
9,000.0	0.00	0.00	9,000.0	0.0	0.0	0.0	0.00	0.00	0.00
9,100.0	0.00	0.00	9,100.0	0.0	0.0	0.0	0.00	0.00	0.00
9,152.0	0.00	0.00	9,152.0	0.0	0.0	0.0	0.00	0.00	0.00
Base Last Salt									
9,200.0	0.00	0.00	9,200.0	0.0	0.0	0.0	0.00	0.00	0.00
9,300.0	0.00	0.00	9,300.0	0.0	0.0	0.0	0.00	0.00	0.00
9,366.0	0.00	0.00	9,366.0	0.0	0.0	0.0	0.00	0.00	0.00
Mission Canyon									
9,400.0	0.00	0.00	9,400.0	0.0	0.0	0.0	0.00	0.00	0.00
9,500.0	0.00	0.00	9,500.0	0.0	0.0	0.0	0.00	0.00	0.00
9,600.0	0.00	0.00	9,600.0	0.0	0.0	0.0	0.00	0.00	0.00
9,700.0	0.00	0.00	9,700.0	0.0	0.0	0.0	0.00	0.00	0.00
9,800.0	0.00	0.00	9,800.0	0.0	0.0	0.0	0.00	0.00	0.00
9,900.0	0.00	0.00	9,900.0	0.0	0.0	0.0	0.00	0.00	0.00
9,915.0	0.00	0.00	9,915.0	0.0	0.0	0.0	0.00	0.00	0.00
Lodgepole									
10,000.0	0.00	0.00	10,000.0	0.0	0.0	0.0	0.00	0.00	0.00
10,100.0	0.00	0.00	10,100.0	0.0	0.0	0.0	0.00	0.00	0.00
10,200.0	0.00	0.00	10,200.0	0.0	0.0	0.0	0.00	0.00	0.00
10,279.4	0.00	0.00	10,279.4	0.0	0.0	0.0	0.00	0.00	0.00
Start Build 12.00									
10,300.0	2.47	69.47	10,300.0	0.2	0.4	0.4	12.00	12.00	0.00
10,325.0	5.47	69.47	10,324.9	0.8	2.0	2.1	12.00	12.00	0.00
10,350.0	8.47	69.47	10,349.7	1.8	4.9	5.0	12.00	12.00	0.00
10,375.0	11.47	69.47	10,374.4	3.3	8.9	9.1	12.00	12.00	0.00
10,400.0	14.47	69.47	10,398.7	5.3	14.2	14.4	12.00	12.00	0.00
10,425.0	17.47	69.47	10,422.8	7.7	20.6	21.0	12.00	12.00	0.00
10,450.0	20.47	69.47	10,446.4	10.6	28.2	28.8	12.00	12.00	0.00
10,475.0	23.47	69.47	10,469.6	13.9	37.0	37.7	12.00	12.00	0.00
10,500.0	26.47	69.47	10,492.2	17.6	46.9	47.7	12.00	12.00	0.00
10,525.0	29.47	69.47	10,514.3	21.7	57.8	58.9	12.00	12.00	0.00
10,550.0	32.47	69.47	10,535.8	26.2	69.9	71.2	12.00	12.00	0.00
10,575.0	35.47	69.47	10,556.5	31.1	83.0	84.5	12.00	12.00	0.00
10,600.0	38.47	69.47	10,576.5	36.3	97.0	98.9	12.00	12.00	0.00
10,625.0	41.47	69.47	10,595.6	42.0	112.1	114.2	12.00	12.00	0.00
10,650.0	44.47	69.47	10,613.9	48.0	128.0	130.4	12.00	12.00	0.00
10,675.0	47.47	69.47	10,631.3	54.3	144.9	147.6	12.00	12.00	0.00
10,695.8	49.96	69.47	10,645.0	59.7	159.5	162.5	12.00	12.00	0.00
False Bakken									

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Site:	153N-100W-29/30	**North Reference:**	True
Well:	Wade Federal 5300 31-30 11T	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wade Fed #11T		
Design:	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)
10,700.0	50.47	69.47	10,647.7	60.9	162.5	165.6	12.00	12.00	0.00
10,714.9	52.26	69.47	10,657.0	65.0	173.4	176.7	12.00	12.00	0.00
Upper Bakken Shale									
10,725.0	53.47	69.47	10,663.1	67.8	181.0	184.3	12.00	12.00	0.00
10,740.3	55.30	69.47	10,672.0	72.1	192.6	196.2	12.00	12.00	0.00
Middle Bakken									
10,750.0	56.47	69.47	10,677.4	75.0	200.1	203.9	12.00	12.00	0.00
10,775.0	59.47	69.47	10,690.7	82.4	220.0	224.1	12.00	12.00	0.00
10,800.0	62.47	69.47	10,702.8	90.1	240.4	244.9	12.00	12.00	0.00
10,811.4	63.84	69.47	10,708.0	93.6	250.0	254.7	12.00	12.00	0.00
Lower Bakken Shale									
10,825.0	65.47	69.47	10,713.8	97.9	261.5	266.4	12.00	12.00	0.00
10,832.8	66.41	69.47	10,717.0	100.4	268.2	273.2	12.00	12.00	0.00
Pronghorn									
10,850.0	68.47	69.47	10,723.6	106.0	283.0	288.3	12.00	12.00	0.00
10,875.0	71.47	69.47	10,732.1	114.2	305.0	310.7	12.00	12.00	0.00
10,877.7	71.79	69.47	10,733.0	115.1	307.4	313.1	12.00	12.00	0.00
Threeforks									
10,900.0	74.47	69.47	10,739.5	122.6	327.4	333.5	12.00	12.00	0.00
10,925.0	77.47	69.47	10,745.5	131.1	350.1	356.6	12.00	12.00	0.00
10,948.1	80.24	69.47	10,750.0	139.1	371.3	378.3	12.00	12.00	0.00
Threeforks(Top of Target)									
10,950.0	80.47	69.47	10,750.3	139.7	373.1	380.0	12.00	12.00	0.00
10,975.0	83.47	69.47	10,753.8	148.4	396.3	403.7	12.00	12.00	0.00
11,000.0	86.47	69.47	10,756.0	157.2	419.6	427.4	12.00	12.00	0.00
11,026.5	89.65	69.47	10,756.9	166.5	444.4	452.7	12.00	12.00	0.00
Start 15.8 hold at 11026.5 MD									
11,042.0	89.65	69.47	10,757.0	171.9	458.9	467.5	0.00	0.00	0.00
7"									
11,042.3	89.65	69.47	10,757.0	172.0	459.2	467.8	0.00	0.00	0.00
Start DLS 1.00 TFO 90.07									
11,100.0	89.65	70.04	10,757.4	192.0	513.3	522.9	1.00	0.00	1.00
11,200.0	89.65	71.04	10,758.0	225.3	607.6	618.8	1.00	0.00	1.00
11,300.0	89.65	72.04	10,758.6	256.9	702.4	715.2	1.00	0.00	1.00
11,400.0	89.65	73.04	10,759.2	286.9	797.8	812.1	1.00	0.00	1.00
11,500.0	89.65	74.04	10,759.8	315.3	893.7	909.4	1.00	0.00	1.00
11,600.0	89.64	75.04	10,760.4	341.9	990.1	1,007.1	1.00	0.00	1.00
11,700.0	89.64	76.04	10,761.1	366.9	1,086.9	1,105.1	1.00	0.00	1.00
11,800.0	89.64	77.04	10,761.7	390.1	1,184.2	1,203.4	1.00	0.00	1.00
11,900.0	89.64	78.04	10,762.3	411.7	1,281.8	1,302.1	1.00	0.00	1.00
12,000.0	89.64	79.04	10,762.9	431.6	1,379.8	1,401.0	1.00	0.00	1.00
12,100.0	89.64	80.04	10,763.5	449.7	1,478.2	1,500.2	1.00	0.00	1.00
12,200.0	89.64	81.04	10,764.2	466.2	1,576.8	1,599.6	1.00	0.00	1.00
12,300.0	89.64	82.04	10,764.8	480.9	1,675.7	1,699.1	1.00	0.00	1.00
12,400.0	89.64	83.04	10,765.4	493.8	1,774.9	1,798.8	1.00	0.00	1.00
12,500.0	89.64	84.04	10,766.0	505.1	1,874.2	1,898.7	1.00	0.00	1.00
12,600.0	89.64	85.04	10,766.7	514.6	1,973.8	1,998.6	1.00	0.00	1.00
12,700.0	89.64	86.04	10,767.3	522.4	2,073.5	2,098.5	1.00	0.00	1.00
12,800.0	89.65	87.04	10,767.9	528.4	2,173.3	2,198.5	1.00	0.00	1.00
12,900.0	89.65	88.04	10,768.5	532.7	2,273.2	2,298.5	1.00	0.00	1.00
13,000.0	89.65	89.04	10,769.1	535.2	2,373.2	2,398.5	1.00	0.00	1.00
13,095.7	89.65	90.00	10,769.7	536.0	2,468.9	2,494.1	1.00	0.00	1.00
Start 7491.3 hold at 13095.7 MD									
13,100.0	89.65	90.00	10,769.7	536.0	2,473.1	2,498.4	0.00	0.00	0.00

Database:	OpenWellsCompass - EDM Prod	**Local Co-ordinate Reference:**	Well Wade Federal 5300 31-30 11T
Company:	Oasis	**TVD Reference:**	WELL @ 2054.0ft (Original Well Elev)
Project:	Indian Hills	**MD Reference:**	WELL @ 2054.0ft (Original Well Elev)
Site:	153N-100W-29/30	**North Reference:**	True
Well:	Wade Federal 5300 31-30 11T	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wade Fed #11T		
Design:	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)
13,200.0	89.65	90.00	10,770.4	536.0	2,573.1	2,598.2	0.00	0.00	0.00
13,300.0	89.65	90.00	10,771.0	536.0	2,673.1	2,698.1	0.00	0.00	0.00
13,400.0	89.65	90.00	10,771.6	536.0	2,773.1	2,797.9	0.00	0.00	0.00
13,500.0	89.65	90.00	10,772.2	536.0	2,873.1	2,897.8	0.00	0.00	0.00
13,600.0	89.65	90.00	10,772.8	536.0	2,973.1	2,997.6	0.00	0.00	0.00
13,700.0	89.65	90.00	10,773.4	536.0	3,073.1	3,097.5	0.00	0.00	0.00
13,800.0	89.65	90.00	10,774.1	536.0	3,173.1	3,197.4	0.00	0.00	0.00
13,900.0	89.65	90.00	10,774.7	536.0	3,273.1	3,297.2	0.00	0.00	0.00
14,000.0	89.65	90.00	10,775.3	536.0	3,373.1	3,397.1	0.00	0.00	0.00
14,100.0	89.65	90.00	10,775.9	536.0	3,473.1	3,496.9	0.00	0.00	0.00
14,200.0	89.65	90.00	10,776.5	536.0	3,573.1	3,596.8	0.00	0.00	0.00
14,300.0	89.65	90.00	10,777.1	536.0	3,673.1	3,696.6	0.00	0.00	0.00
14,400.0	89.65	90.00	10,777.7	536.0	3,773.1	3,796.5	0.00	0.00	0.00
14,500.0	89.65	90.00	10,778.4	536.0	3,873.1	3,896.3	0.00	0.00	0.00
14,600.0	89.65	90.00	10,779.0	536.0	3,973.1	3,996.2	0.00	0.00	0.00
14,700.0	89.65	90.00	10,779.6	536.0	4,073.1	4,096.0	0.00	0.00	0.00
14,800.0	89.65	90.00	10,780.2	536.0	4,173.1	4,195.9	0.00	0.00	0.00
14,900.0	89.65	90.00	10,780.8	536.0	4,273.1	4,295.7	0.00	0.00	0.00
15,000.0	89.65	90.00	10,781.4	536.0	4,373.1	4,395.6	0.00	0.00	0.00
15,100.0	89.65	90.00	10,782.0	536.0	4,473.1	4,495.5	0.00	0.00	0.00
15,200.0	89.65	90.00	10,782.7	536.0	4,573.1	4,595.3	0.00	0.00	0.00
15,300.0	89.65	90.00	10,783.3	536.0	4,673.1	4,695.2	0.00	0.00	0.00
15,400.0	89.65	90.00	10,783.9	536.0	4,773.1	4,795.0	0.00	0.00	0.00
15,500.0	89.65	90.00	10,784.5	536.0	4,873.1	4,894.9	0.00	0.00	0.00
15,600.0	89.65	90.00	10,785.1	536.0	4,973.1	4,994.7	0.00	0.00	0.00
15,700.0	89.65	90.00	10,785.7	536.0	5,073.1	5,094.6	0.00	0.00	0.00
15,800.0	89.65	90.00	10,786.3	536.0	5,173.1	5,194.4	0.00	0.00	0.00
15,900.0	89.65	90.00	10,787.0	536.0	5,273.1	5,294.3	0.00	0.00	0.00
16,000.0	89.65	90.00	10,787.6	536.0	5,373.1	5,394.1	0.00	0.00	0.00
16,100.0	89.65	90.00	10,788.2	536.0	5,473.1	5,494.0	0.00	0.00	0.00
16,200.0	89.65	90.00	10,788.8	536.0	5,573.1	5,593.8	0.00	0.00	0.00
16,300.0	89.65	90.00	10,789.4	536.0	5,673.1	5,693.7	0.00	0.00	0.00
16,400.0	89.65	90.00	10,790.0	536.0	5,773.1	5,793.5	0.00	0.00	0.00
16,500.0	89.65	90.00	10,790.7	536.0	5,873.1	5,893.4	0.00	0.00	0.00
16,600.0	89.65	90.00	10,791.3	536.0	5,973.1	5,993.3	0.00	0.00	0.00
16,700.0	89.65	90.00	10,791.9	536.0	6,073.1	6,093.1	0.00	0.00	0.00
16,800.0	89.65	90.00	10,792.5	536.0	6,173.1	6,193.0	0.00	0.00	0.00
16,900.0	89.65	90.00	10,793.1	536.0	6,273.1	6,292.8	0.00	0.00	0.00
17,000.0	89.65	90.00	10,793.7	536.0	6,373.1	6,392.7	0.00	0.00	0.00
17,100.0	89.65	90.00	10,794.3	536.0	6,473.1	6,492.5	0.00	0.00	0.00
17,200.0	89.65	90.00	10,795.0	536.0	6,573.1	6,592.4	0.00	0.00	0.00
17,300.0	89.65	90.00	10,795.6	536.0	6,673.1	6,692.2	0.00	0.00	0.00
17,400.0	89.65	90.00	10,796.2	536.0	6,773.1	6,792.1	0.00	0.00	0.00
17,500.0	89.65	90.00	10,796.8	536.0	6,873.1	6,891.9	0.00	0.00	0.00
17,600.0	89.65	90.00	10,797.4	536.0	6,973.1	6,991.8	0.00	0.00	0.00
17,700.0	89.65	90.00	10,798.0	536.0	7,073.1	7,091.6	0.00	0.00	0.00
17,800.0	89.65	90.00	10,798.6	536.0	7,173.1	7,191.5	0.00	0.00	0.00
17,900.0	89.65	90.00	10,799.3	536.0	7,273.1	7,291.4	0.00	0.00	0.00
18,000.0	89.65	90.00	10,799.9	536.0	7,373.1	7,391.2	0.00	0.00	0.00
18,100.0	89.65	90.00	10,800.5	536.0	7,473.1	7,491.1	0.00	0.00	0.00
18,200.0	89.65	90.00	10,801.1	536.0	7,573.1	7,590.9	0.00	0.00	0.00
18,300.0	89.65	90.00	10,801.7	536.0	7,673.0	7,690.8	0.00	0.00	0.00
18,400.0	89.65	90.00	10,802.3	536.0	7,773.0	7,790.6	0.00	0.00	0.00
18,500.0	89.65	90.00	10,803.0	536.0	7,873.0	7,890.5	0.00	0.00	0.00
18,600.0	89.65	90.00	10,803.6	536.0	7,973.0	7,990.3	0.00	0.00	0.00

Database:	OpenWellsCompass - EDM Prod	**Local Co-ordinate Reference:**	Well Wade Federal 5300 31-30 11T
Company:	Oasis	**TVD Reference:**	WELL @ 2054.0ft (Original Well Elev)
Project:	Indian Hills	**MD Reference:**	WELL @ 2054.0ft (Original Well Elev)
Site:	153N-100W-29/30	**North Reference:**	True
Well:	Wade Federal 5300 31-30 11T	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wade Fed #11T		
Design:	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)
18,700.0	89.65	90.00	10,804.2	536.0	8,073.0	8,090.2	0.00	0.00	0.00
18,800.0	89.65	90.00	10,804.8	536.0	8,173.0	8,190.0	0.00	0.00	0.00
18,900.0	89.65	90.00	10,805.4	536.0	8,273.0	8,289.9	0.00	0.00	0.00
19,000.0	89.65	90.00	10,806.0	536.0	8,373.0	8,389.7	0.00	0.00	0.00
19,100.0	89.65	90.00	10,806.6	536.0	8,473.0	8,489.6	0.00	0.00	0.00
19,200.0	89.65	90.00	10,807.3	536.0	8,573.0	8,589.4	0.00	0.00	0.00
19,300.0	89.65	90.00	10,807.9	536.0	8,673.0	8,689.3	0.00	0.00	0.00
19,400.0	89.65	90.00	10,808.5	536.0	8,773.0	8,789.2	0.00	0.00	0.00
19,500.0	89.65	90.00	10,809.1	536.0	8,873.0	8,889.0	0.00	0.00	0.00
19,600.0	89.65	90.00	10,809.7	536.0	8,973.0	8,988.9	0.00	0.00	0.00
19,700.0	89.65	90.00	10,810.3	536.0	9,073.0	9,088.7	0.00	0.00	0.00
19,800.0	89.65	90.00	10,810.9	536.0	9,173.0	9,188.6	0.00	0.00	0.00
19,900.0	89.65	90.00	10,811.6	536.0	9,273.0	9,288.4	0.00	0.00	0.00
20,000.0	89.65	90.00	10,812.2	536.0	9,373.0	9,388.3	0.00	0.00	0.00
20,100.0	89.65	90.00	10,812.8	536.0	9,473.0	9,488.1	0.00	0.00	0.00
20,200.0	89.65	90.00	10,813.4	536.0	9,573.0	9,588.0	0.00	0.00	0.00
20,300.0	89.65	90.00	10,814.0	536.0	9,673.0	9,687.8	0.00	0.00	0.00
20,400.0	89.65	90.00	10,814.6	536.0	9,773.0	9,787.7	0.00	0.00	0.00
20,500.0	89.65	90.00	10,815.3	536.0	9,873.0	9,887.5	0.00	0.00	0.00
20,587.0	89.65	90.00	10,815.8	536.0	9,960.0	9,974.4	0.00	0.00	0.00

TD at 20587.0 - Wade Fed #11T PBHL

Casing Points

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (in)	Hole Diameter (in)
2,010.0	2,010.0	9 5/8"	9.625	13.500
11,042.0	10,757.0	7"	7.000	8.750

Database:	OpenWellsCompass - EDM Prod	**Local Co-ordinate Reference:**	Well Wade Federal 5300 31-30 11T
Company:	Oasis	**TVD Reference:**	WELL @ 2054.0ft (Original Well Elev)
Project:	Indian Hills	**MD Reference:**	WELL @ 2054.0ft (Original Well Elev)
Site:	153N-100W-29/30	**North Reference:**	True
Well:	Wade Federal 5300 31-30 11T	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wade Fed #11T		
Design:	Plan #1		

Formations

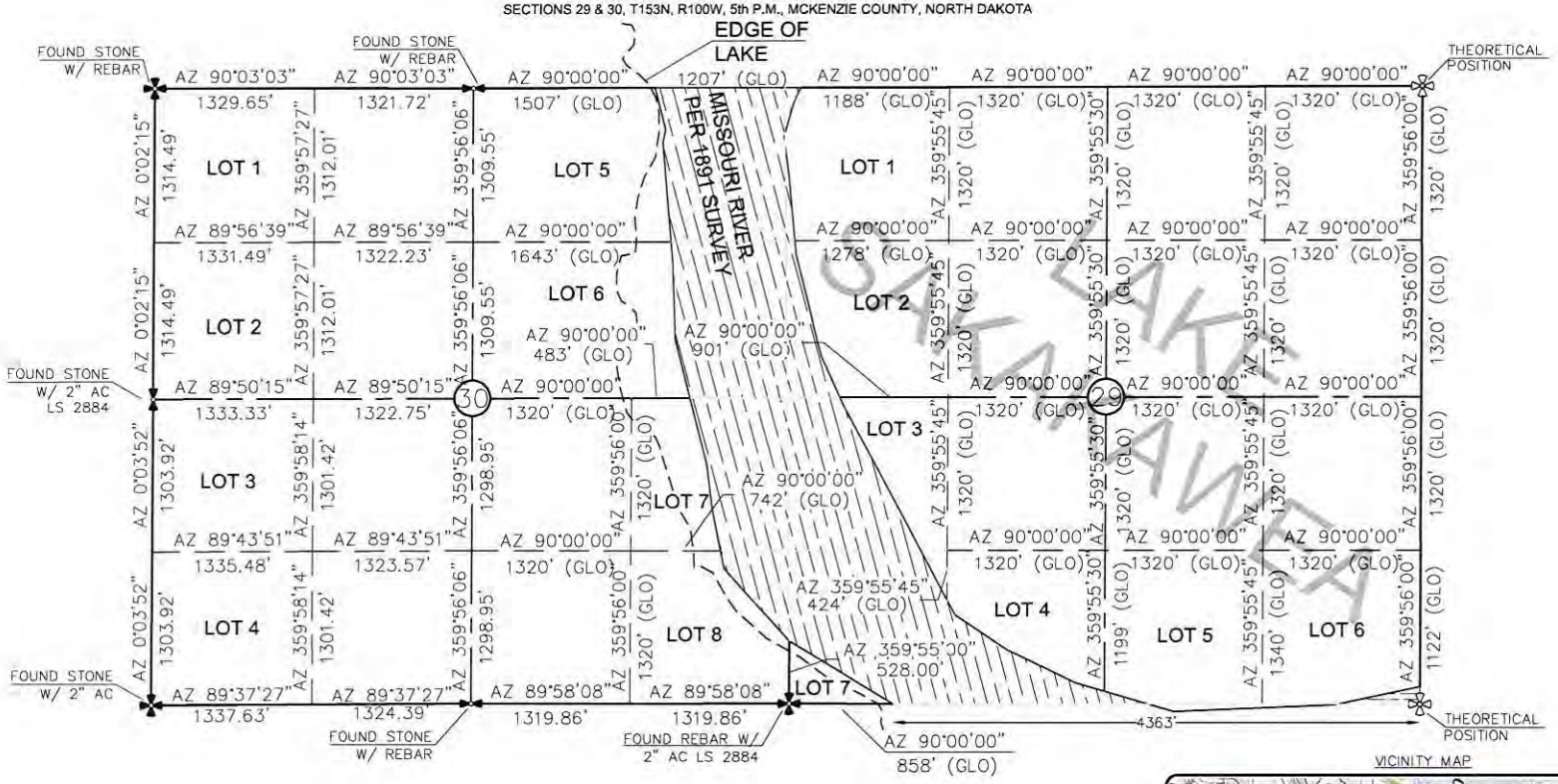
Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
1,904.0	1,904.0	Pierre			
4,555.0	4,555.0	Greenhorn			
4,958.0	4,958.0	Mowry			
5,380.0	5,380.0	Dakota			
6,396.0	6,396.0	Rierdon			
6,885.0	6,885.0	Dunham Salt			
6,931.0	6,931.0	Dunham Salt Base			
7,194.0	7,194.0	Pine Salt			
7,218.0	7,218.0	Pine Salt Base			
7,280.0	7,280.0	Opeche Salt			
7,360.0	7,360.0	Opeche Salt Base			
7,604.0	7,604.0	Amsden			
7,760.0	7,760.0	Tyler			
7,983.0	7,983.0	Otter/Base Minnelusa			
8,325.0	8,325.0	Kibbey Lime			
8,473.0	8,473.0	Charles Salt			
9,152.0	9,152.0	Base Last Salt			
9,366.0	9,366.0	Mission Canyon			
9,915.0	9,915.0	Lodgepole			
10,695.8	10,645.0	False Bakken			
10,714.9	10,657.0	Upper Bakken Shale			
10,740.3	10,672.0	Middle Bakken			
10,811.4	10,708.0	Lower Bakken Shale			
10,832.8	10,717.0	Pronghorn			
10,877.7	10,733.0	Threeforks			
10,948.1	10,750.0	Threeforks(Top of Target)			

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	Local Coordinates +E/-W (ft)	Comment
10,279.4	10,279.4	0.0	0.0	Start Build 12.00
11,026.5	10,756.9	166.5	444.4	Start 15.8 hold at 11026.5 MD
11,042.3	10,757.0	172.0	459.2	Start DLS 1.00 TFO 90.07
13,095.7	10,769.7	536.0	2,468.9	Start 7491.3 hold at 13095.7 MD
20,587.0	10,815.8	536.0	9,960.0	TD at 20587.0

SECTION BREAKDOWN

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"WADE FEDERAL 5300 31-30 11T"
1955 FEET FROM SOUTH LINE AND 350 FEET FROM WEST LINE
SECTIONS 29 & 30, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA



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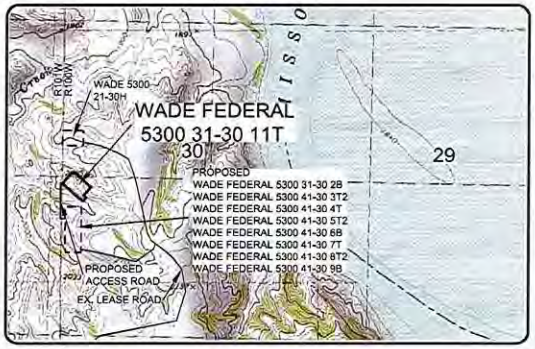
- MONUMENT – RECOVERED
- MONUMENT – NOT RECOVERED

0 1000
1" = 1000'

ALL AZIMUTHS ARE BASED ON G.P.S. OBSERVATIONS. THE ORIGINAL SURVEY OF THIS AREA FOR THE GENERAL LAND OFFICE (G.L.O.) WAS 1897. 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'.

REGISTERED LAND SURVEYOR
DARYL D. KASEMAN
LS-3880
DATE: 1/21/14
NORTH DAKOTA

VICINITY MAP



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Revision No.	Date	By	Description

OASIS PETROLEUM NORTH AMERICA, LLC
SECTION BREAKDOWN
SECTIONS 29 & 30, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. Project No.: S13-29-360.02
Checked By: D.D.K. Date: JAN. 2014

Interstate Engineering, Inc.
P.O. Box 648
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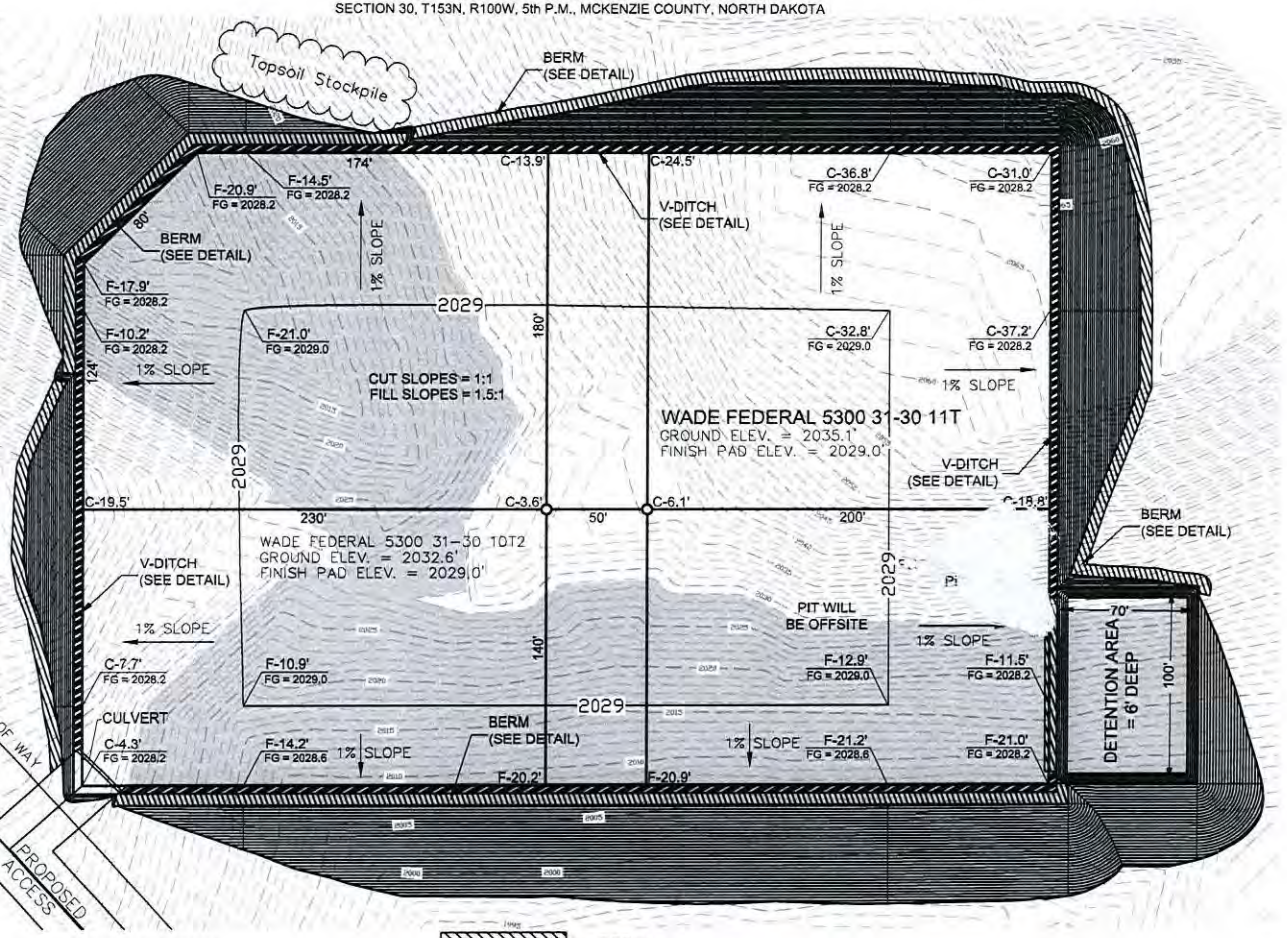
Sidney, Montana 59270
Phone (406) 433-5617
Fax (406) 433-5618
www.interstateeng.com
Other offices in Minnesota, North Dakota and South Dakota

INTERSTATE ENGINEERING
Professionally yours, read carefully your mail

PAD LAYOUT

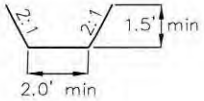
OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"WADE FEDERAL 5300 31-30 11T"
1955 FEET FROM SOUTH LINE AND 350 FEET FROM WEST LINE
SECTION 30, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA



THIS DOCUMENT WAS ORIGINALLY ISSUED AND SEALED BY DARYL D. KASEMAN, PLS, REGISTRATION NUMBER 3880 ON 1/21/14 AND THE ORIGINAL DOCUMENTS ARE STORED AT THE OFFICES OF INTERSTATE ENGINEERING, INC.

REGISTERED LAND SURVEYOR
DARYL D. KASEMAN
LS-3880
DATE: 1/21/14
NORTH DAKOTA

V-DITCH DETAIL



BERM

DITCH

Proposed Contours

Original Contours

NOTE: All utilities shown are preliminary only, a complete utilities location is recommended before construction.

NOTE: Pad dimensions shown are to usable area, the v-ditch and berm areas shall be built to the outside of the pad dimensions.

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Revision No.	Date	By	Description

OASIS PETROLEUM NORTH AMERICA, LLC
PAD LAYOUT
SECTION 30, T153N, R100W
MKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. Project No.: S13-09-280.02
Checked By: D.D.K. Date: JAN. 2014

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Other offices in Minnesota, North Dakota and South Dakota

INTERSTATE ENGINEERING
Professionally yours, creative people, practical results

SHEET NO. 3/8

WELL LOCATION SITE QUANTITIES

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"WADE FEDERAL 5300 31-30 11T"
1955 FEET FROM SOUTH LINE AND 350 FEET FROM WEST LINE
SECTION 30, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA

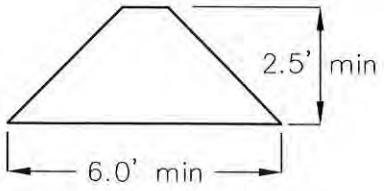
WELL SITE ELEVATION	2035.1
WELL PAD ELEVATION	2029.0

EXCAVATION	61,724
PLUS PIT	0
	61,724
EMBANKMENT	47,438
PLUS SHRINKAGE (25%)	11,860
	59,298
STOCKPILE PIT	0
STOCKPILE TOP SOIL (6")	4,081
BERMS	1,671 LF = 542 CY
DITCHES	1,481 LF = 226 CY
DETENTION AREA	1,322 CY
ADDITIONAL MATERIAL NEEDED	649
DISTURBED AREA FROM PAD	5.06 ACRES

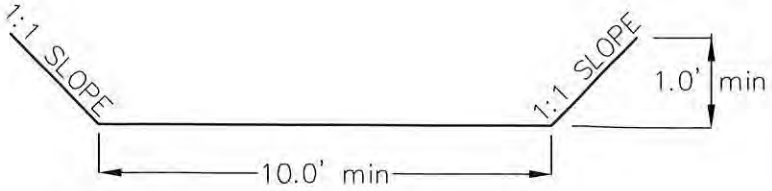
NOTE: ALL QUANTITIES ARE IN CUBIC YARDS (UNLESS NOTED)
CUT END SLOPES AT 1:1
FILL END SLOPES AT 1.5:1

WELL SITE LOCATION
1955' FSL
350' FWL

BERM DETAIL



DITCH DETAIL



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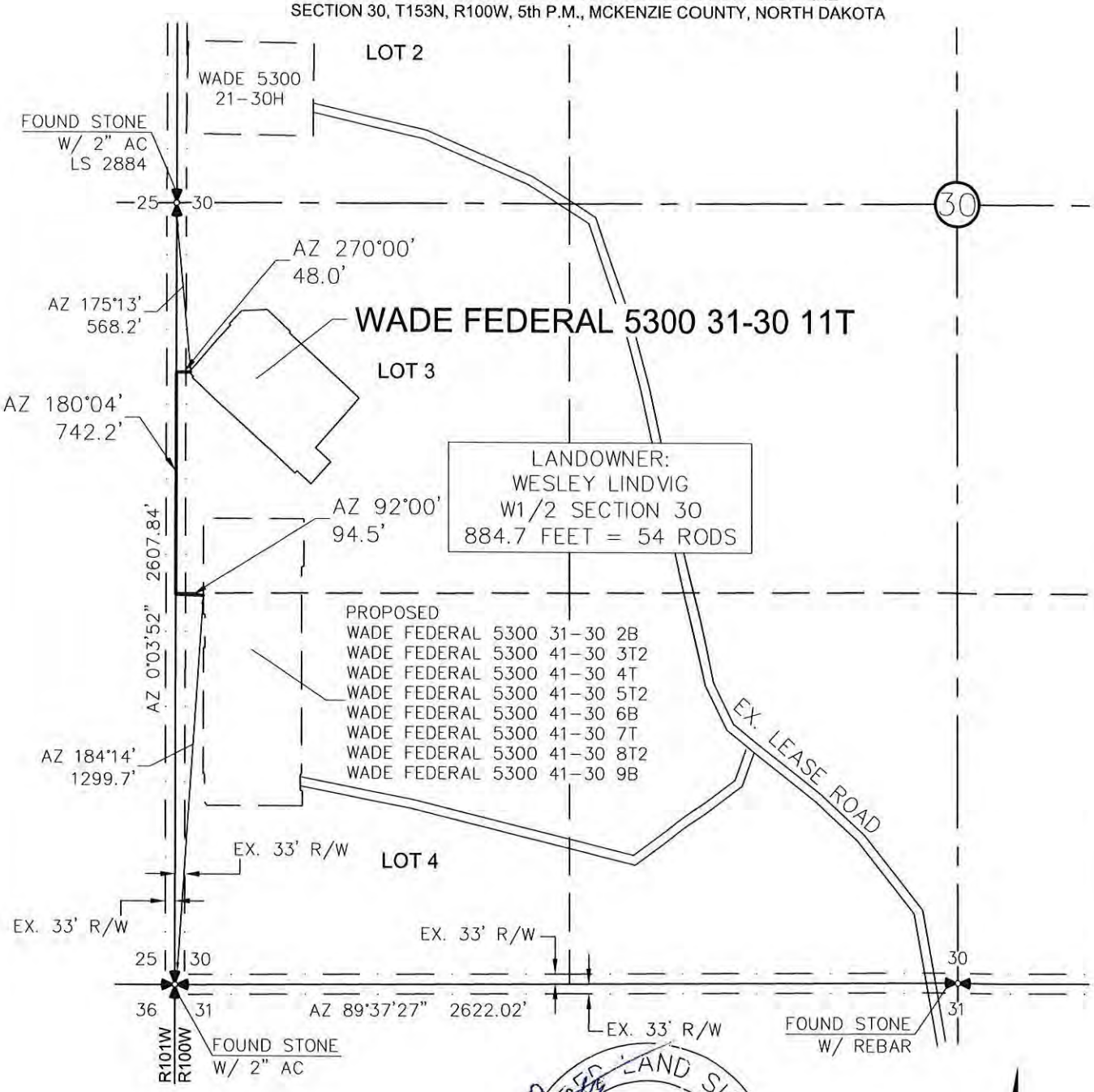
OASIS PETROLEUM NORTH AMERICA, LLC
QUANTITIES
SECTION 30, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. | Project No.: S13-09-380.02
Checked By: D.D.K. | Date: JAN. 2014

Revision No.	Date	By	Description

ACCESS APPROACH

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"WADE FEDERAL 5300 31-30 11T"
1955 FEET FROM SOUTH LINE AND 350 FEET FROM WEST LINE
SECTION 30, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA



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ACCESS APPROACH
SECTION 30, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

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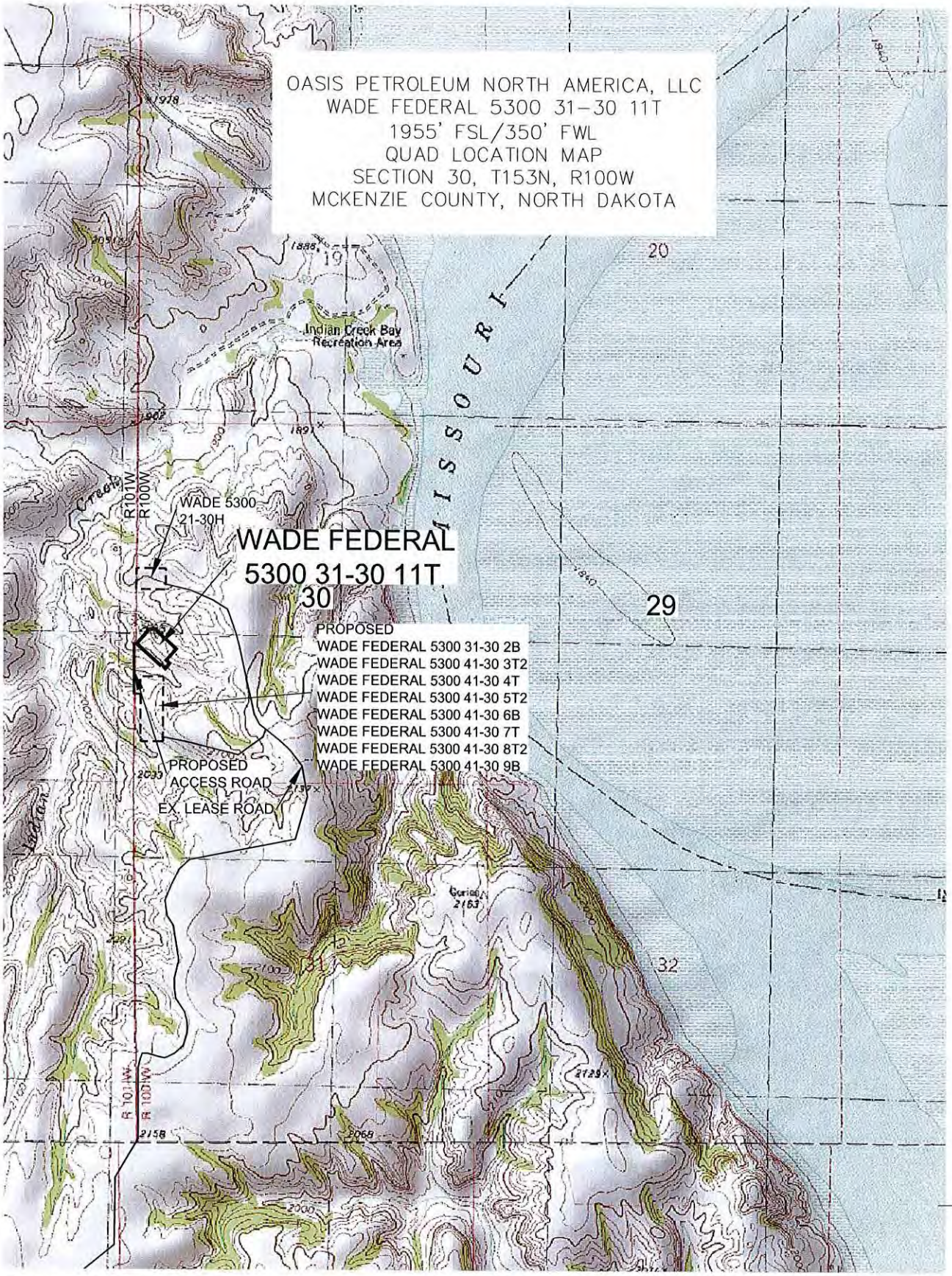

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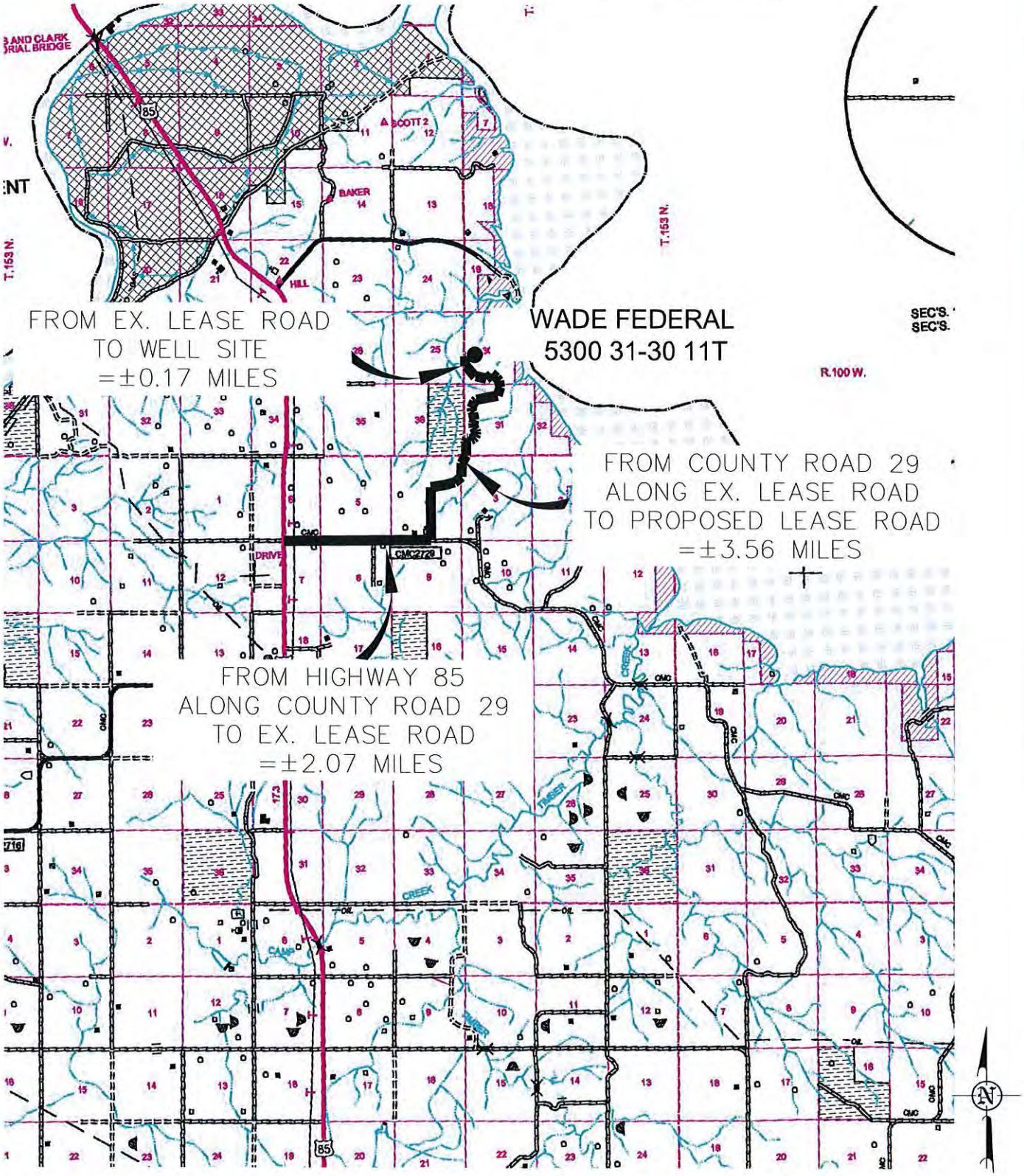
OASIS PETROLEUM NORTH AMERICA, LLC
QUAD LOCATION MAP
SECTION 30, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By:	B.H.H.	Project No.:	S13-09-380.02
Checked By:	D.D.K.	Date:	JAN. 2014

Revision No.	Date	By	Description

COUNTY ROAD MAP

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"WADE FEDERAL 5300 31-30 11T"
1955 FEET FROM SOUTH LINE AND 350 FEET FROM WEST LINE
SECTION 30, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA



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SCALE: 1" = 2 MILE

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OASIS PETROLEUM NORTH AMERICA, LLC
COUNTY ROAD MAP
SECTION 30, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By:	B.H.H.	Project No.:	S13-09-380.02
Checked By:	D.D.K.	Date:	JAN. 2014

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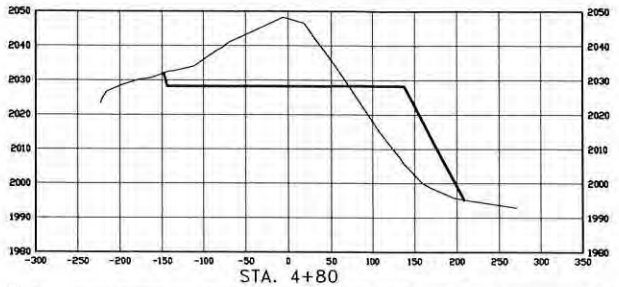
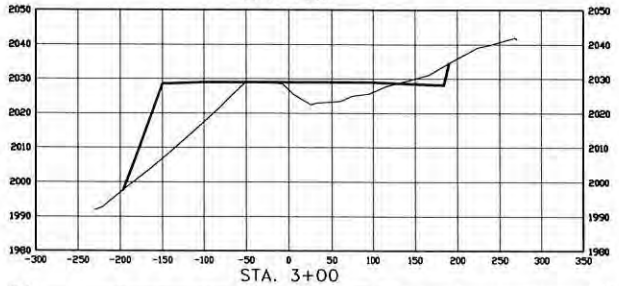
CROSS SECTIONS

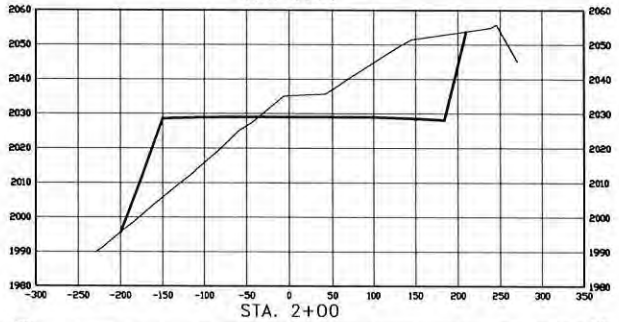
OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"WADE FEDERAL 5300 31-30 11T"
1955 FEET FROM SOUTH LINE AND 350 FEET FROM WEST LINE
SECTION 30, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA



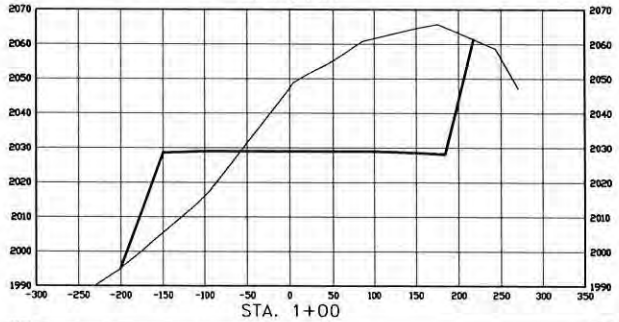
STA. 4+80



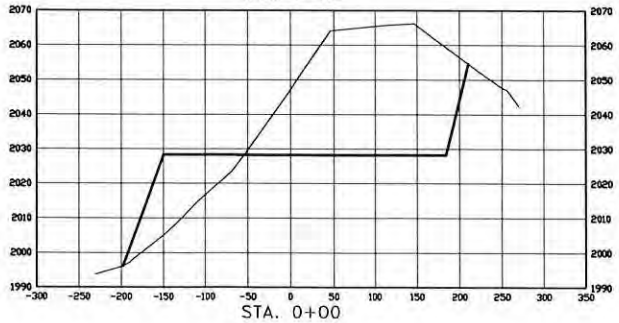
STA. 3+00



STA. 2+00



STA. 1+00



STA. 0+00

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REGISTERED LAND SURVEYOR
DARYL D. KASEMAN
LS-3880
DATE: 1/21/14
NORTH DAKOTA

SCALE
HORIZ 1"=140'
VERT 1"=35'

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CROSS SECTIONS
SECTION 30, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. | Project No.: S13-09-380.02
Checked By: D.D.K. | Date: JAN. 2014

Revision No.	Date	By	Description

OASIS PETROLEUM

STATEMENT

This statement is being sent in order to comply with NDAC 43-02-03-16 (Application for permit to drill and recomplete) which states (in part that) "confirmation that a legal street address has been requested for the well site, and well facility if separate from the well site, and the proposed road access to the nearest existing public road". On the date noted below a legal street address was requested from the appropriate county office.

McKenzie County
Aaron Chisolm – McKenzie County Dept.

Wade Federal 5300 31-30 10T2
Wade Federal 5300 31-30 11T

Brandi Terry

Brandi Terry
Regulatory Specialist
Oasis Petroleum North America, LLC

From:	Brandi Terry
To:	Webber, Alice D.
Subject:	RE: Wade Federal 5300 31-30 11T & 10T2
Date:	Monday, May 05, 2014 12:33:55 PM
Attachments:	image001.png REVISED WADE FEDERAL 5300 41-30 3T2.pdf ATT00001.txt

---

They will be going to the pit for the Wade 8 well pad. Page 3 in the attached.

Brandi Terry
Regulatory Specialist
1001 Fannin, Suite 1500
Houston, TX 77002
Direct: 281-404-9491

From: Webber, Alice D. [mailto:adwebber@nd.gov]
Sent: Monday, May 05, 2014 11:23 AM
To: Brandi Terry
Subject: RE: Wade Federal 5300 31-30 11T & 10T2

Brandi,

The pad layout states "Pit Will Be Offsite" and there is not pit shown on the pad. Therefore, we need to know where the cuttings are going.

Thanks,
Alice

From: Brandi Terry [mailto:bterry@oasispetroleum.com]
Sent: Monday, May 05, 2014 10:53 AM
To: Webber, Alice D.
Subject: RE: Wade Federal 5300 31-30 11T & 10T2

Hi Alice,

What indicated that we were hauling cuttings off?

Yes we have requested fed permits.

Brandi Terry
Regulatory Specialist
1001 Fannin, Suite 1500
Houston, TX 77002
Direct: 281-404-9491

From: Webber, Alice D. [mailto:adwebber@nd.gov]
Sent: Monday, May 05, 2014 10:28 AM
To: Brandi Terry
Subject: Wade Federal 5300 31-30 11T & 10T2

Good morning Brandi,

Could you please tell me what facility the cuttings will be hauled to from this pad?

Also, since the lateral penetrates BLM lands has Oasis requested the appropriate permit(s)?

Thanks,
Alice

Alice D. Webber
Engineering Technician IV
North Dakota Industrial Commission
Department of Mineral Resources
Oil and Gas Division
600 E. Boulevard Avenue Dept 405
Bismarck, ND 58501
adwebber@nd.gov
701-328-7996

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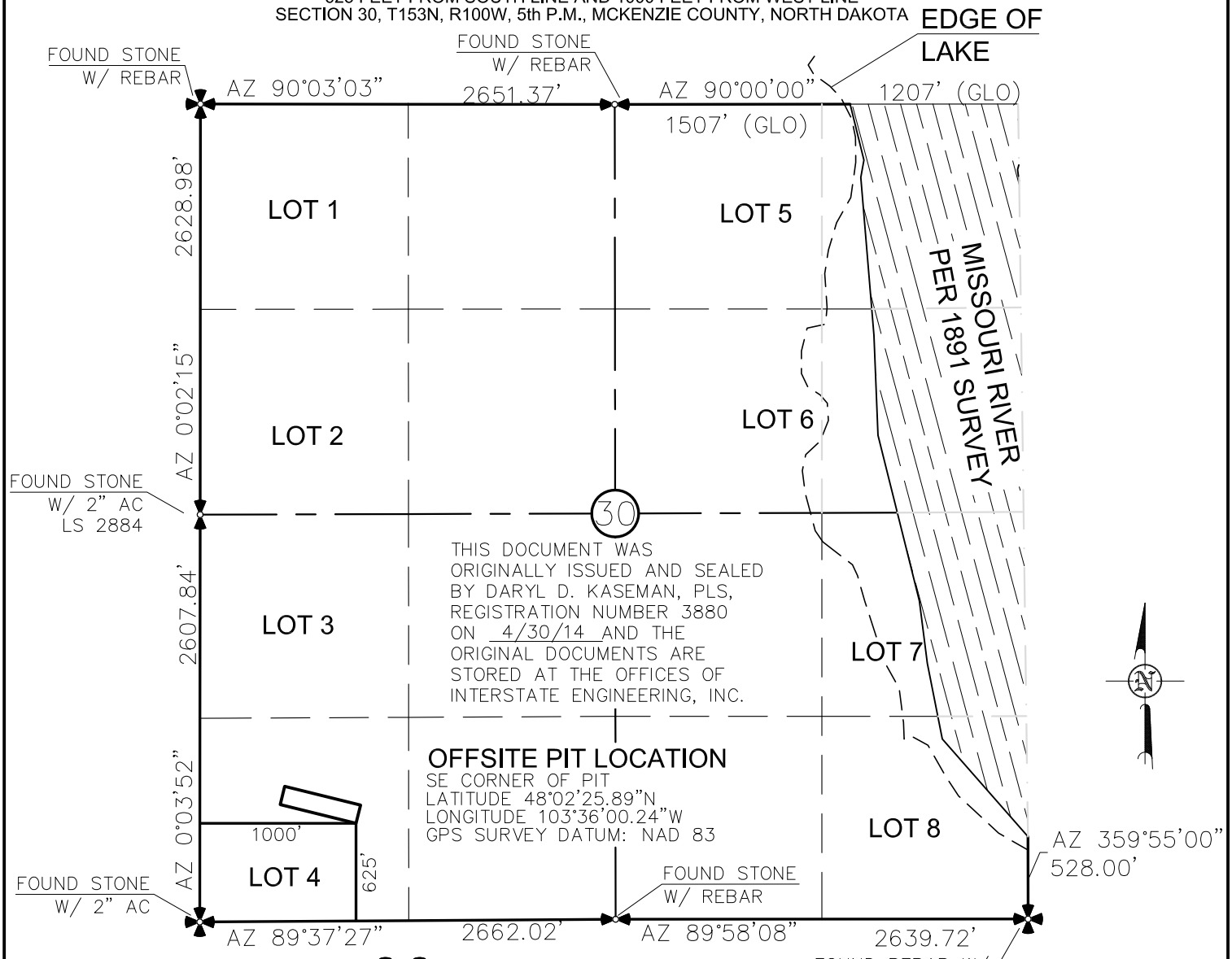
OFFSITE PIT LOCATION PLAT

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"AS-STAKED OFFSITE PIT FOR WADE FEDERAL 5300 31-30 2B, WADE FEDERAL 5300 41-30 3T2, WADE FEDERAL 5300 41-30 4T, WADE FEDERAL 5300 41-30 5T2, WADE FEDERAL 5300 41-30 6B, WADE FEDERAL 5300 41-30 7T, WADE FEDERAL 5300 41-30 8T2, & WADE FEDERAL 5300 41-30 9B"
625 FEET FROM SOUTH LINE AND 1000 FEET FROM WEST LINE
SECTION 30, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA



– MONUMENT – RECOVERED

– MONUMENT – NOT RECOVERED

0 1000
1" = 1000'

STAKED ON 4/30/14
VERTICAL CONTROL DATUM WAS BASED UPON CONTROL POINT 705 WITH AN ELEVATION OF 2158.3'

THIS SURVEY AND PLAT IS BEING PROVIDED AT THE REQUEST OF ERIC BAYES OF OASIS PETROLEUM. I CERTIFY THAT THIS PLAT CORRECTLY REPRESENTS WORK PERFORMED BY ME OR UNDER MY SUPERVISION AND IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

DARYL D. KASEMAN LS-3880

VICINITY MAP

RECORDED LAND SURVEYOR
DARYL D. KASEMAN
LS-3880
DATE: 4/30/14
NORTH DAKOTA

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OASIS PETROLEUM NORTH AMERICA, LLC
OFFSITE PIT LOCATION PLAT
SECTION 30, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H.		Project No.: S13-09-381.09	
Checked By: D.D.K.		Date: APRIL 2014	

Revision No.	Date	By	Description

PAD LAYOUT

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"AS-STAKED OFFSITE PIT FOR WADE FEDERAL 5300 31-30 2B, WADE FEDERAL 5300 41-30 3T2, WADE FEDERAL 5300 41-30 4T, WADE FEDERAL 5300 41-30 5T2, WADE FEDERAL 5300 41-30 6B, WADE FEDERAL 5300 41-30 7T, WADE FEDERAL 5300 41-30 8T2, & WADE FEDERAL 5300 41-30 9B"
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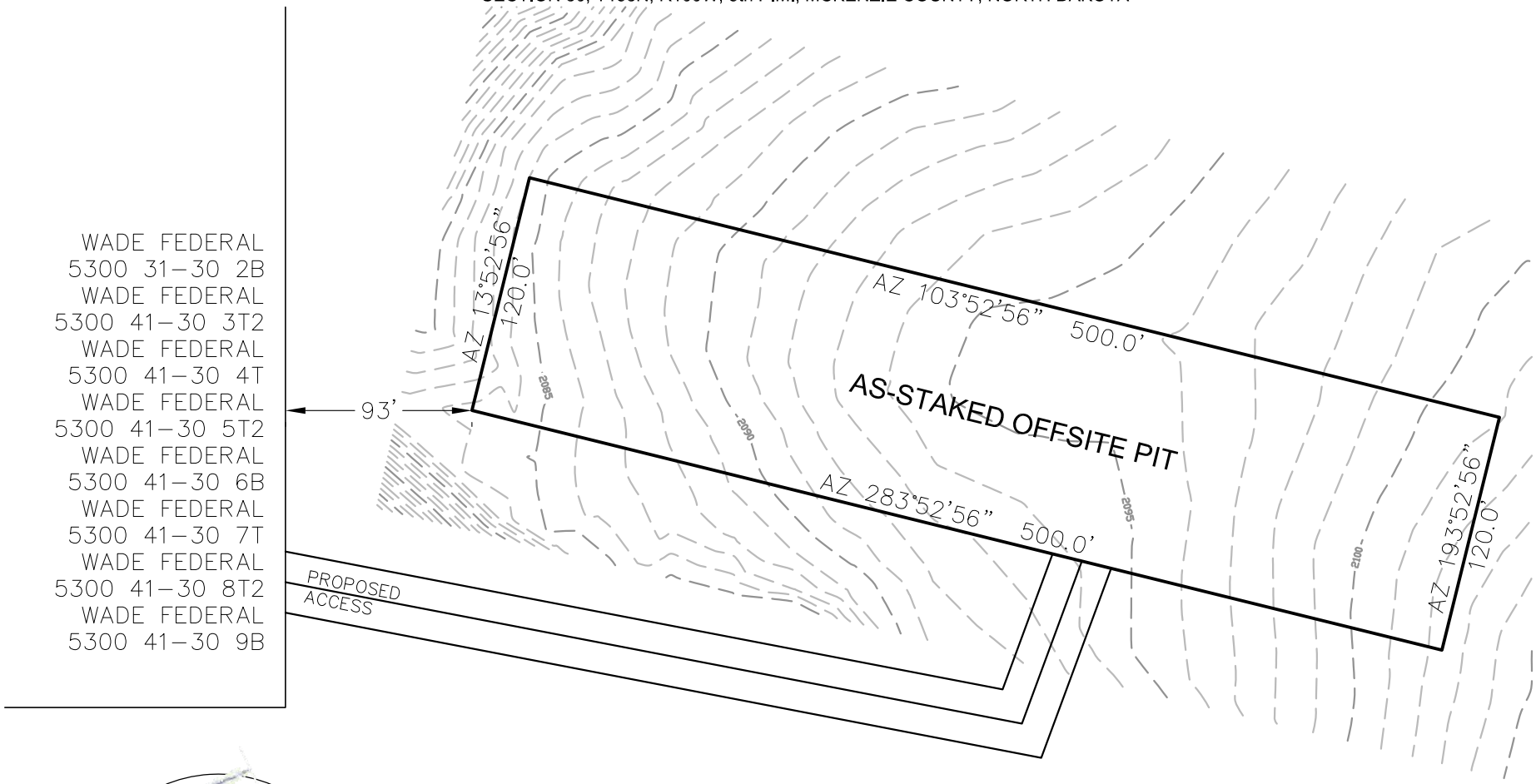

REGISTERED LAND SURVEYOR
DARYL D. KASEMAN
LS-3880
DATE: 4/30/14
NORTH DAKOTA

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0 80
1" = 80'

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OASIS PETROLEUM NORTH AMERICA, LLC
PAD LAYOUT
SECTION 30, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. Project No.: S13-09-381.09
Checked By: D.D.K. Date: APRIL 2014

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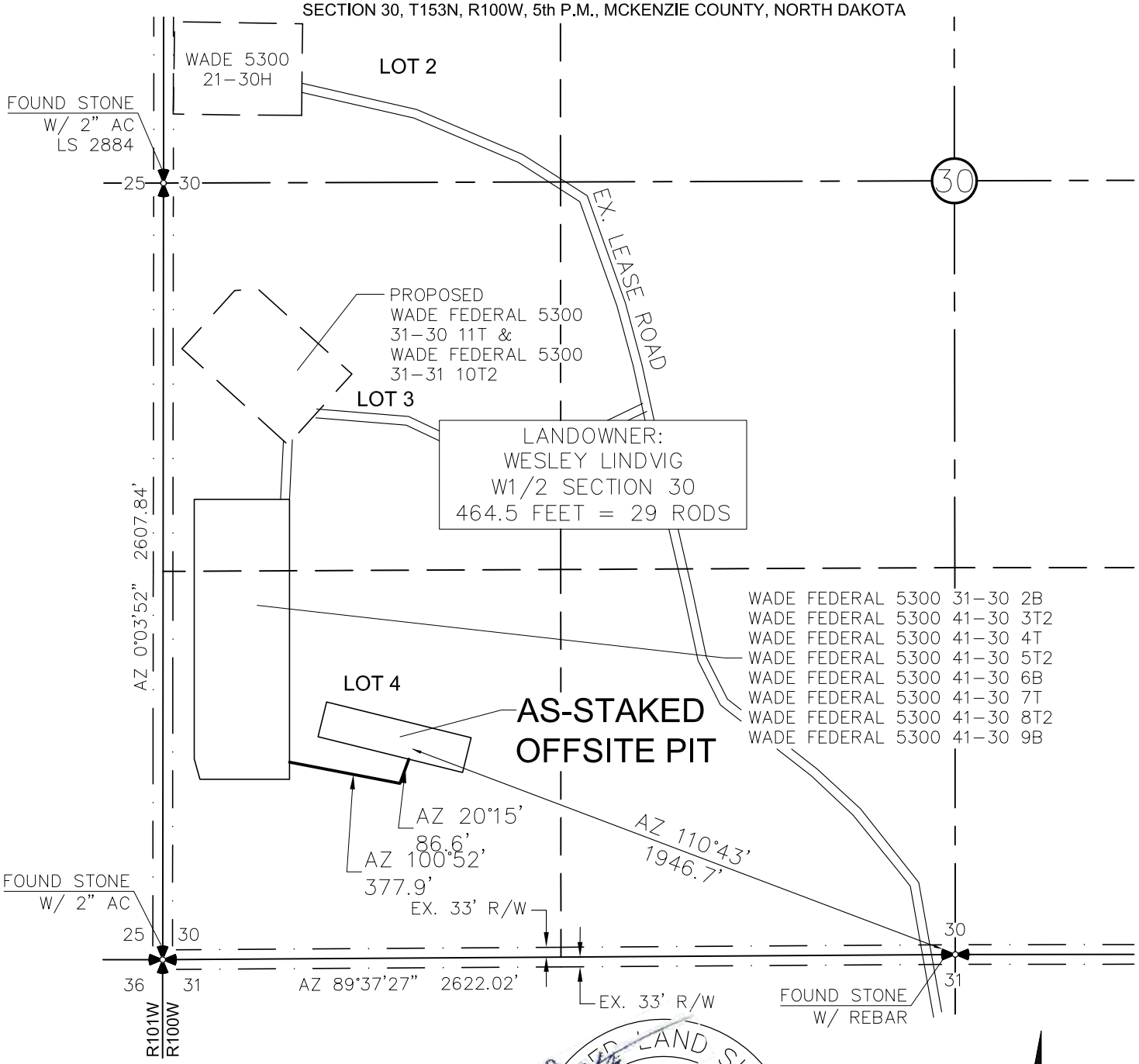

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