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 15 2018
ND OIL & GAS DIVISION

Well File No.
28633

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 5, 2018**	☐ 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	**Well is now on rod pump**

Well Name and Number					
Chalmers 5300 21-19 5T					
Footages		Qtr-Qtr	Section	Township	Range
2127 F N L	**327 F W L**	**LOT2**	**19**	**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 2/5/2018, the above referenced well was equipped with a rod pump. Previously well was on ESP (effective 12/21/2015).

End of Tubing: 2-7/8" L-80 tubing @ 10054'

Pump: 2-1/2" x 2.0" x 24' insert pump @ 9937'

Company		Telephone Number
Oasis Petroleum North America LLC		**281 404-9494**
Address		
1001 Fannin, Suite 1500		
City	State	Zip Code
Houston	**TX**	**77002**
Signature	Printed Name	
Sadie Goodrum	**Sadie Goodrum**	
Title	Date	
Regulatory Specialist	**February 14, 2018**	
Email Address		
sgoodrum@oasispetroleum.com		

FOR STATE USE ONLY

☑ Received	☐ Approved
Date: 3-7-2018	
By:	
Title: JARED THUNE 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)

Received
MAR 1 2016
ND Oil & Gas Division

Well File No.
28633

PLEASE READ INSTRUCTIONS BEFORE FILLING OUT FORM.
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☐ Notice of Intent	Approximate Start Date	☐ Drilling Prognosis	☐ Spill Report
☑ Report of Work Done	Date Work Completed: **December 21, 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 **Well is now on pump**	

Well Name and Number	Qtr-Qtr	Section	Township	Range
Chalmers 5300 21-19 5T				
Footages: **2127 F N L 327 F W L**	**LOT2**	**19**	**153 N**	**100 W**
Field: **Baker**	Pool: **Bakken**		County: **McKenzie**	

24-HOUR PRODUCTION RATE

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

Name of Contractor(s)			
Address	City	State	Zip Code

DETAILS OF WORK

Effective 12/21/2015 the above referenced well was converted to ESP.

End of Tubing: 2-7/8" L-80 tubing @ 10243'

Pump: ESP @ 9825.97'

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: **February 29, 2016**	
Email Address: **jswenson@oasispetroleum.com**		

FOR STATE USE ONLY

☑ Received	☐ Approved
Date: 3-9-16	
By:	
Title: JARED THUNE 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)

Received
FEB 18 2016
ND Oil & Gas Division

Well File No.
28633

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

- ☐ Notice of Intent — Approximate Start Date
- ☑ Report of Work Done — Date Work Completed: **October 16, 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
- ☐ Redrilling or Repair
- ☐ Casing or Liner
- ☐ Plug Well
- ☐ Supplemental History
- ☐ Temporarily Abandon
- ☐ Other **Well is now on pump**
- ☐ Spill Report
- ☐ Shooting
- ☐ Acidizing
- ☐ Fracture Treatment
- ☐ Change Production Method
- ☐ Reclamation

Well Name and Number: **Chalmers 5300 21-19 5T**

Footages	Qtr-Qtr	Section	Township	Range
2127 F N L 327 F W L	**LOT2**	**19**	**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 10/16/2015 the above referenced well is on pump.

End of Tubing: 2-3/8" L-80 tubing @ 10082'

Pump: 2-1/2" x 2.0" x 24' insert pump @ 9810'

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 17, 2016**

Email Address: **jswenson@oasispetroleum.com**

FOR STATE USE ONLY

☒ Received ☐ Approved

Date: 3-3-2016

By: Taylor Roth

Title: **TAYLOR ROTH**
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)

Well File No. 28633TH
28634TH
28635
28636TH
28648TH
28637TH
28649TH

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: **March 14, 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: **See below**

Footages	Qtr-Qtr	Section	Township	Range
F N L F E L	LOT2	19	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 below referenced wells as follows:
Chalmers 5300 21-19 5T (28633)
Chalmers 5300 21-19 6B (28634)
Chalmers 5300 21-19 7T2 (28635)
Chalmers 5300 21-19 8T (28636)
Chalmers 5300 21-19 9B (28648)
Chalmers 5300 21-19 10T (28637)
Chalmers 5300 21-19 11T (28649)

The NDIC field inspector, Rick Dunn (NDIC) was notified on 03/06/2015

The surface owners, Wesley and BArbara Lindvig, 14075 41st Street NW, Alexander, ND 58831, were contacted on 03/06/2015

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: Houston	State: TX	Zip Code: 77002

Signature	Printed Name
	Jennifer Swenson
Title: Regulatory Specialist	Date: June 4, 2015
Email Address: jswenson@oasispetroleum.com	

FOR STATE USE ONLY

☒ Received	☐ Approved
Date: 9-23-15	
By: Cod Wall	
Title:	

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)

RECEIVED
AUG 2015
ND OIL & GAS DIVISION

Well File No. 28633

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	Spacing Unit Description
Chalmers 5300 21-19 5T	Sec. 19/20 T153N R100W

Operator	Telephone Number	Field
Oasis Petroleum North America	(281) 404-9591	Baker

Address	Pool
1001 Fannin, Suite 1500	Bakken

City	State	Zip Code	Permit Type
Houston	TX	77002	☐ Wildcat ☑ Development ☐ Extension

LOCATION OF WELL

At Surface	Qtr-Qtr	Section	Township	Range	County
2127 F N L 327 F WL	LOT2	19	153 N	100 W	McKenzie

Spud Date	Date TD Reached	Drilling Contractor and Rig Number	KB Elevation (Ft)	Graded Elevation (Ft)
September 27, 2014	December 1, 2014	Nabors B22	2076	2051

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	2301	17 1/2	13.5			1015	0
Vertical Hole	Intermediate	9 5/8	0	6095	13 1/2	36			903	450
Vertical Hole	Intermediate	7	0	11140	8 3/4	32			855	4700
Lateral1	Liner	4 1/2	10243	20904	6	13.5			605	10243

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	20928	Perforations	11140	20904	10327		04/25/2015			

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- 11140' to 20904'	

Date Well Completed (SEE INSTRUCTIONS)	Producing Method	Pumping-Size & Type of Pump	Well Status (Producing or Shut-In)
July 14, 2015	Flowing		Producing

Date of Test	Hours Tested	Choke Size	Production for Test	Oil (Bbls)	Gas (MCF)	Water (Bbls)	Oil Gravity-API (Corr.)	Disposition of Gas
07/15/2015	24	36 /64		1575	1809	3397	°	Sold

Flowing Tubing Pressure (PSI)	Flowing Casing Pressure (PSI)	Calculated 24-Hour Rate	Oil (Bbls)	Gas (MCF)	Water (Bbls)	Gas-Oil Ratio
	1550		1575	1809	3397	1148

GEOLOGICAL MARKERS

Formation	MD (Ft)	TVD (Ft)
Dakota	5454	5454
Kibbey Lime	8391	8390
First Charles Salt	8535	8534
UB		
Base Last Salt	9214	9213
Ratcliffe		
Mission Canyon	9432	9431
Lodgepole	9996	9995
False Bakken	10773	10714
Scallion	10782	10720
Upper Bakken	10790	10726
Middle Bakken	10820	10742
Lower Bakken	10898	10783
Pronghorn	10930	10795
Three Forks	10986	10813

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
04/25/2015	**Three Forks**	**11140**	**20904**	**36**	**206323**	**Barrels**

Type Treatment	Acid %	Lbs Proppant	Maximum Treatment Pressure (PSI)	Maximum Treatment Rate (BBLS/Min)
Sand Frac		**4332421**	**9320**	**72.0**

Details
100 Mesh White: 276871
40/70 Ceramic: 1760490
30/50 Ceramic: 2295360

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 **jswenson@oasispetroleum.com**	Date **08/20/2015**
Signature	Printed Name **Jennifer Swenson**	Title **Regulatory Specialist**

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)

Well File No.
28633
NDIC CTB No.
~~To be assigned~~ 22861 33

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

Well Name and Number	Qtr-Qtr	Section	Township	Range	County
CHALMERS 5300 21-19 5T	LOT2	19	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%	July 14, 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%	July 14, 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
Hofmann Trucking	25%	July 14, 2015
Other Transporters Transporting From This Lease	% Transported	Date Effective
		July 14, 2015

Comments

I hereby swear or affirm that the information provided is true, complete and correct as determined from all available records. Date: August 13, 2015

Signature	Printed Name	Title
	Brianna Salinas	Marketing Assistant

Above Signature Witnessed By:

Signature	Printed Name	Title
	Dina Barron	Mktg. Contracts Administrator

RECEIVED
AUG 2015
ND OIL & GAS DIVISION

FOR STATE USE ONLY

Date Approved	AUG 28 2015
By	
Title	Oil & Gas Production Analyst

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

Well or Facility No **28633**

Tight Hole **Yes**

OPERATOR

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

WELL INFORMATION

Well Name
CHALMERS 5300 21-19 5T

Inspector
Richard Dunn

Well Location	QQ	Sec	Twp		Rng	
	LOT2	**19**	**153**	**N**	**100**	**W**

County
MCKENZIE

Field
BAKER

Footages		
2127	Feet From the **N**	Line
327	Feet From the **W**	Line

Pool
BAKKEN

Date of First Production Through Permanent Wellhead **7/15/2015** **This Is Not The First Sales**

PURCHASER / TRANSPORTER

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

TANK BATTERY

Central Tank Battery Number : 228633-01

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

ESTIMATED BARRELS TO BE SOLD		ACTUAL BARRELS SOLD		DATE
15000	BBLS	**236**	BBLS	**7/16/2015**
	BBLS		BBLS	
	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	**7/15/2015**
Date Approved	**9/1/2015**
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)

MAY 2015
RECEIVED
ND OIL & GAS
DIVISION

Well File No.
28633

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

☑ Notice of Intent	Approximate Start Date: **May 1, 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	**Waiver from tubing/packer requirement**

Well Name and Number: **Chalmers 5300 21-19 5T** Lot 2

Footages	Qtr-Qtr	Section	Township	Range
~~2127~~ **1925** F N L ~~327~~ **286** F W L	**SWNW**	**19**	**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: **Houston**	State: **TX** Zip Code: **77002**
Signature	Printed Name: **Jennifer Swenson**
Title: **Regulatory Specialist**	Date: **April 30, 2015**
Email Address: **jswenson@oasispetroleum.com**	

FOR STATE USE ONLY

☐ Received	☑ Approved
Date: May 6, 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)

MAY 2015
RECEIVED
ND OIL & GAS
DIVISION

Well File No.
28633

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

- [x] Notice of Intent — Approximate Start Date: **May 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
- [ ] Redrilling or Repair
- [ ] Casing or Liner
- [ ] Plug Well
- [ ] Supplemental History
- [ ] Temporarily Abandon
- [ ] Spill Report
- [ ] Shooting
- [ ] Acidizing
- [ ] Fracture Treatment
- [ ] Change Production Method
- [ ] Reclamation
- [x] Other **Change well status to CONFIDENTIAL**

Well Name and Number: **Chalmers 5300 21-19 5T** Lot 2

Footages	Qtr-Qtr	Section	Township	Range
~~1925~~ 2127 F N L ~~286~~ 327 F W L	~~SWNW~~	9	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 11/01/15.

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	April 30, 2015

Email Address: **jswenson@oasispetroleum.com**

FOR STATE USE ONLY

- [ ] Received
- [x] Approved

Date: 5/07/15

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)

SEP 2014
RECEIVED
ND OIL & GAS
DIVISION

Well File No.
28633

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

☑ Notice of Intent	Approximate Start Date **September 2, 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 **Physical Address**	

Well Name and Number					
Chalmers 5300 21-19 5T					
Footages		Qtr-Qtr	Section	Township	Range
2127 F N L	**327 F W L**	**LOT2**	**19**	**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 submits the physical address for the above referenced well:

13762 45th Street NW
Alexander, ND 58831

Company		Telephone Number
Oasis Petroleum North America LLC		**281-404-9563**
Address		
1001 Fannin, Suite 1500		
City	State	Zip Code
Houston	**TX**	**77002**
Signature	Printed Name	
Heather McCowan	**Heather McCowan**	
Title	Date	
Regulatory Assistant	**September 2, 2014**	
Email Address		
hmccowan@oasispetroleum.com		

FOR STATE USE ONLY

☒ Received	☐ Approved
Date 3/12/2015	
By Matthew Messana	
Title **ENGINEERING TECHNICIAN**	

SUNBURST CONSULTING
A GEOLOGY SERVICE

Oasis Petroleum North America, LLC
Chalmers 5300 21-19 5T
2,127' FNL & 327' FWL
Lot 2 Section 19, 153N, 100W
Baker / Three Forks
McKenzie County, North Dakota

BOTTOM HOLE LOCATION:

1,298.5' north & 9,900.01' east of surface location or approx.
828.5' FNL & 262.14' FEL, Lot 2 Section 20, T153N, R100W

Prepared for:
Nathan Gabelman
Oasis Petroleum North America, LLC
1001 Fannin Suite 1500
Houston, TX 77002

Prepared by:
G. Wayne Peterson, Michelle Baker
PO Box 80507; Billings, MT 59108
(406) 259-4124
geology@sunburstconsulting.com
www.sunburstconsulting.com

WELL EVALUATION

Figure 1. Nabors B22 drilling the Oasis Petroleum North America, LLC - Chalmers 5300 21-19 5T during September-November, 2014 in the Camp Field, McKenzie County, North Dakota. (G. Wayne Peterson, Sunburst Consulting)

INTRODUCTION

The **Oasis Petroleum North America, LLC Chalmers 5300 21-19 5T** [Lot 2 Section 19, T153N, R100W] is located approximately 7 miles south of the town of Williston in McKenzie County, North Dakota. The Chalmers 5300 21-19 5T is a horizontal Three Forks well within the Williston Basin consisting of one 9,730' lateral drilled toward the east. The vertical hole was planned to be drilled to approximately 10,341'. The curve would be built at 12 degrees per 100' to land within the Three Forks. This well is a two section lateral which originates in the northwest quarter of section 19, then drilled east to the northeast quarter of section 20. Directional drilling technologies and geo-steering techniques were used to land in the Three Forks reservoir and maintain exposure to the ideal target rock.

OFFSET WELLS

Offset well data used for depth correlation during curve operations are found in the 'Control Data' section appended to this report. Offset well control was essential in curve operations, to successfully land within the Three Forks. Formation thicknesses expressed by gamma ray signatures in these wells were compared to gamma data collected during drilling operations in order to successfully land the curve. The target landing true vertical depth (TVD) was periodically updated during drilling to ensure accurate landing of the curve.

GEOLOGY

The Charles Formation [Mississippian Madison Group] was logged 8,535' MD 8,534' TVD (-6,458' SS). Samples in the lower portion of the Charles Formation consisted of a limestone mudstone, which was light brown, light gray brown, off white in color. It was microcrystalline, friable, laminated, with an earthy texture. A trace of intercrystalline porosity, as was *rare spotty light brown oil stain* Occasionally noted was a dolomite mudstone, which was light brown, light gray brown in color. It was microcrystalline, friable-firm, laminated, with an earthy texture. Also noted was a trace of intercrystalline porosity, and *occasional spotty light brown oil stain.* Rarely noted was anhydrite, which was off white, cream in color. It was soft, microcrystalline, and massive with an earthy to amorphous texture. Following connections or periods of non-circulation, gas peaks of 12 to 33 units were noted, as were drilling gas shows of 15 to 36 units.

The Mission Canyon Formation [Mississippian Madison Group] was logged 9,432' MD 9,431' TVD (-7,355' SS). The Mission Canyon Formation consisted of a lime mudstone that was described as light gray, light brown, gray brown, trace dark gray in color. The lime mudstone was predominately friable to firm, with an earthy to rarely crystalline in texture. Some intervals contained a trace of black-brown algal material, a trace of fossil fragments, and traces of disseminated pyrite. Also present was an argillaceous lime mudstone that was described as light gray, occasional medium gray, rare gray tan, rare off white, trace dark gray in color. The argillaceous lime mudstone was predominately firm to friable, crystalline to chalky texture. Some intervals contained a trace of disseminated pyrite. Following connections or periods of non-circulation, gas peaks of 28 to 45 units were noted, as were drilling gas shows of 35 to 83 units. Rare intercrystalline porosity was noted as well as traces to occasional *spotty light brown oil stain* was occasionally observed while logging the Mission Canyon Formation.

Figure 2. Limestone with spotty light to medium brown staining from the Mission Canyon Formation.

The Upper Shale Member [Mississippian-Bakken Formation] was drilled at 10,790' MD 10,726' TVD (-8,650' SS). Entry into this member was characterized by high gamma, elevated background gas and increased rates of penetration. The black to black gray carbonaceous and *petroliferous* shale was hard with a splintery to smooth texture. Fracture porosity was noted, and trace minerals were observed to include disseminated pyrite and calcite fracture fill. Hydrocarbons evaluated in this interval reached a maximum of 546 units drilling gas, with a connection gas of 552 units.

The Middle Member [Mississippian-Devonian Bakken Formation] was drilled at 10,820' MD 10,742' TVD (-8,666' SS). Samples in the Middle Bakken Member were predominantly silty sandstone which was described as light gray brown, light brown, trace light gray in color. It was very fine grained, friable, subround, smooth, moderately sorted, with calcite cement, moderately cemented. A trace of disseminated and nodular pyrite was noted as was fair intergranular porosity. Also noted was *common light to medium brown spotty to even oil stain*. Hydrocarbons evaluated in this interval reached a maximum of 118 units drilling gas, with a survey gas of 80 units.

The Lower Shale Member [Mississippian-Bakken Formation] was drilled at 10,898' MD 10,783' TVD (-8,707' SS). Entry into this interval was characterized by high gamma, elevated background gas and increased rates of penetration. The carbonaceous black, black gray shale is *petroliferous*, hard, splintery, smooth and exhibits possible fracture porosity. Trace minerals included disseminated pyrite. Drilling gas in this interval reached a maximum of 132 units.

The Pronghorn Member [Devonian-Bakken Formation] was reached at 10,930' MD 10,795' TVD (-8,719' SS). Entry into this interval was characterized by lower gamma, and slightly slower penetration rates. Samples from the Pronghorn were described as siltstone which was dark gray trace gray black, friable to firm, subblocky to subsplit. This siltstone was moderately dolomite cemented and included disseminated and nodular pyrite. Also noted was a trace of *spotty light brown oil stain*. Drilling gas in this interval reached a maximum of 94 units with a survey gas of 76 units.

Figure 3. Black carbonaceous and petroliferous shale from the Lower Member of the Bakken Formation and gray siltstone from the underlying Pronghorn Member.

The Three Forks [Devonian] was reached at 10,986' MD 10,813' TVD (-8,737' SS) which was 3’ low to the Oasis Petroleum NA LLC Chalmers 5300 21-19 7T2. The target zone of the Three Forks was to be drilled in a predominately 10 foot zone beginning 16 feet into the Three Forks.

Samples in the Three Forks were predominantly dolomite which was described as light brown-light brown gray, tan-cream, trace pink in color. It was firm, laminated, with a microsucrosic texture. Rare disseminated pyrite was noted as was occasional intercrystalline porosity. Also noted was *common spotty to rare even light brown oil stain*. Also observed was light green-light gray green, mint green shale that was firm, subblocky, with an earthy texture. Occasional disseminated pyrite was noted as was possible intergranular porosity.

Figures 4, 5, & 6. A predominately dolomitic sample low in the preferred drilling zone of the Three Forks (left); a predominately dolomitic sample high in the preferred drilling zone of the Three Forks (middle); and sample of the underlying claystone (right).

Gas Show

Gas monitoring and fluid gains provided evidence of a hydrocarbon saturated reservoir during the drilling of the Chalmers 5300 21-19 5T. Oil and gas shows at the shakers and in samples were continuously monitored. In the closed mud system, hydrostatic conditions were maintained near balance, this allowed for gas and fluid gains from the well to be evaluated. Gas on the Chalmers 5300 21-19 5T varied according to stratigraphic position and penetration rates which may have reflected increased porosity. During the vertical, connection gas peaks of 12 to 45 units were noted, as were drilling gas shows of 12 to 83 units, against a 10.34-11.4 lb/gal diesel-invert mud weight. Background concentrations in the lateral ranged from 100 to 1,800 units, against a 9.65-9.75 lb/gal saltwater gel drilling fluid. Connection peaks of 400 to 800 units were observed, coinciding with the best shows. Drilling out of casing at 11,198 MD' yielded a trip gas of 2,259 units, and trips at 17,104' MD, and 17,182' MD and 19,990' MD yielded trip gas of 4,819 units, and 1,618 units, respectively. After a trip at 19,990' MD, due to problems associated with the extreme cold weather the flow was diverted from the shakers and no trip gasses were noted. Chromatography of gas revealed typical concentrations of methane, characteristic of Three Forks gas.

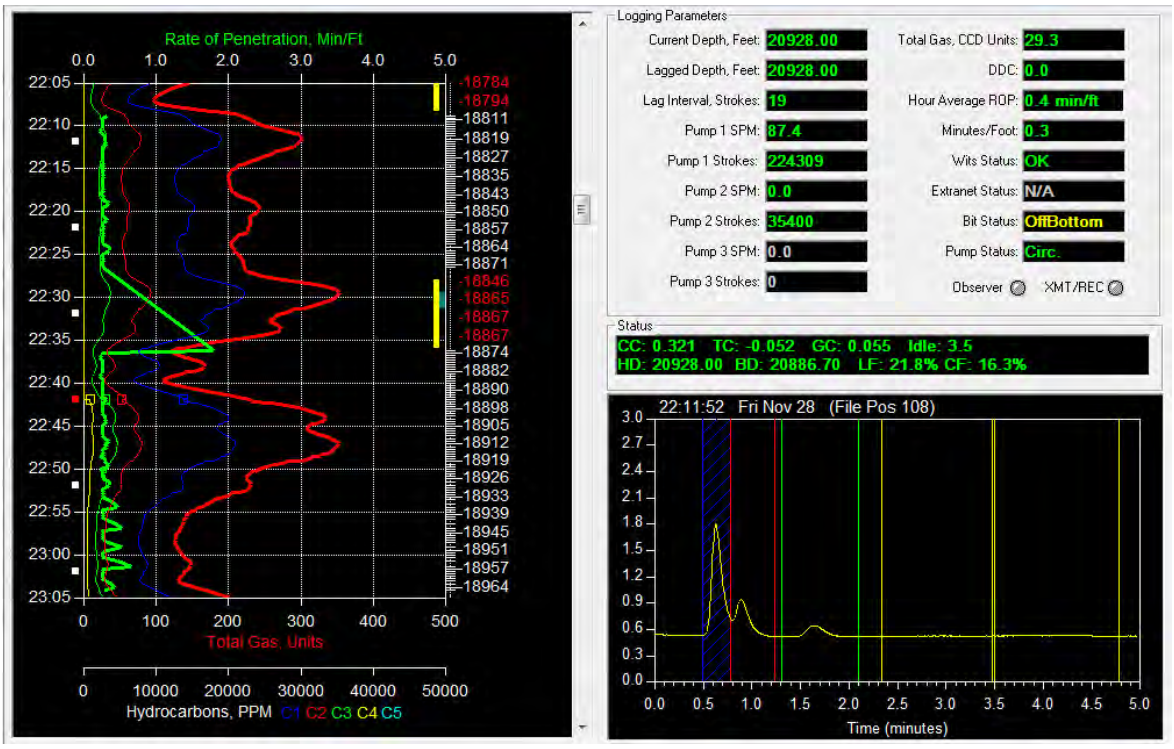


Figure 7. Gas chromatography of a 350 unit gas show.

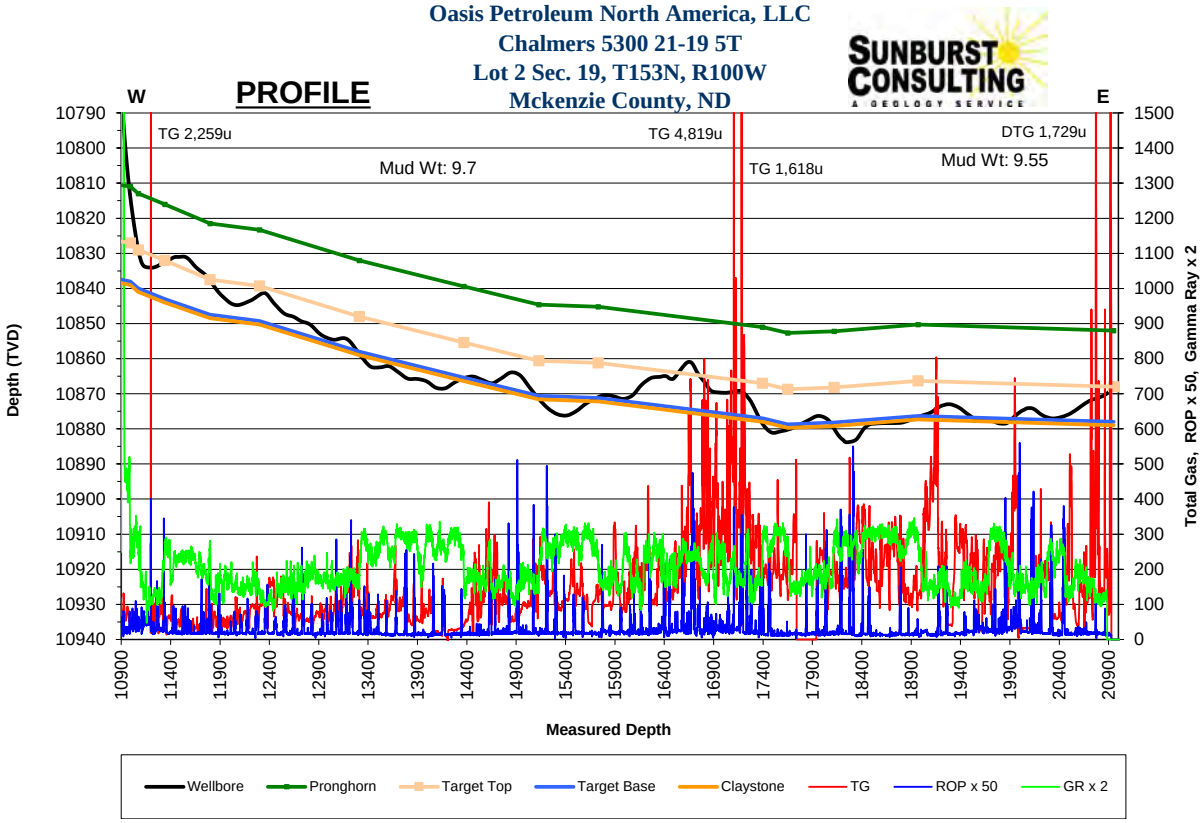


Figure 8. Profile displaying total gas, gamma ray and rate of penetration.

Geosteering

Ryan Energy Technologies provided personnel and equipment for measurement-while-drilling (MWD) services. The RP directional drillers and MWD, and Sunburst Consulting personnel worked closely together throughout the project to evaluate data and make steering decisions to maximize the amount of borehole in the targeted zones and increase rate of penetration (ROP) of the formation.

The 913' curve was drilled in 23 hours with a bottom hole assembly (BHA) consisting of bit #4, a Security MMD55M PDC bit, attached to a 2.38 degree fixed NOV 7/8 5.0 motor and MWD tools. The curve was successfully landed at 11,198' MD and 10,834' TVD, approximately 21' into the Three Forks Formation. Seven inch diameter 32# HCP-110 casing was set to 11,150' MD.

Geologic structure maps of the Chalmers 5300 21-19 5T and surrounding control wells had estimated formation dip to be a down dip at approximately -0.5º down to the TD of the lateral. The preferred drilling interval of the Chalmers 5300 21-19 5T consisted of a ten foot zone located approximately sixteen feet into the Three Forks Formation. Penetration rates, gas shows, gamma ray data, and sample observations were utilized to keep the wellbore in the preferred stratigraphic position in the target zone. Using offset well data provided by Oasis representatives, projected porosity zones were identified in the preferred drilling areas.

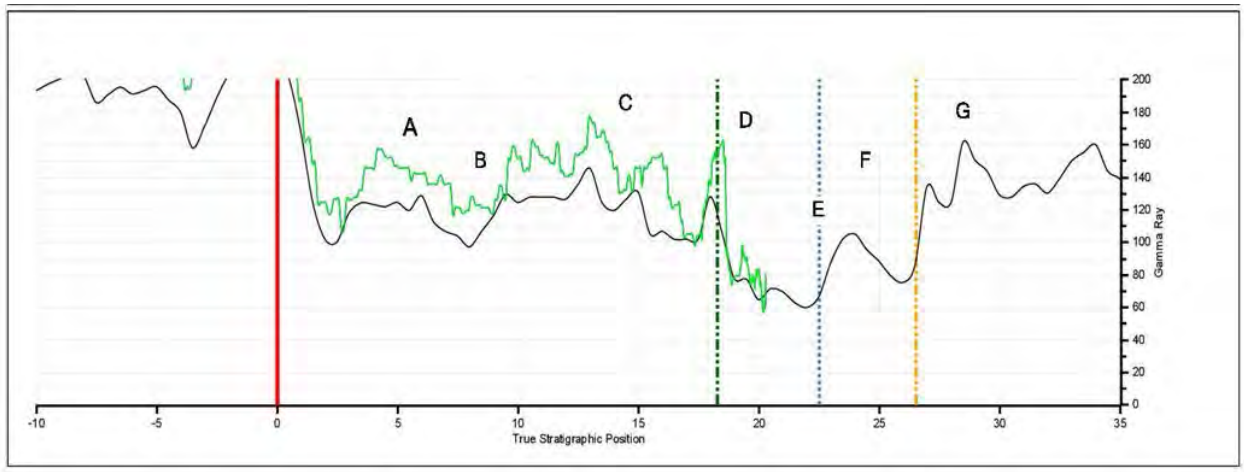


Figure 9. Offset Well Target Definition, Indian Hills Prospect (Oasis).

Steering decisions were made by using the low gamma in the lower portion of the target zone to establish the well-bore's position in the target zone. If the well-bore moved lower, the higher gamma of the underlying claystone (G) was observed, as was the presence of claystone in collected samples. Slides were then utilized to move the well-bore back up into the target zone. As the well-bore moved higher, approaching the top of the target zone the high to medium fluctuating gamma (D) was noted. Samples in the lower gamma portion of the target zone contained noticeably greater concentrations of the light brown-light brown gray, tan-cream, trace pink dolomite; as the well-bore moved higher in zone the samples tended to have more of the light gray, off white, gray brown dolomite. The TD of 20,928' MD was achieved at 03:30 hours CDT December 1, 2014. The well site team worked together to maintain the well bore in the

desired target interval for 72% of the lateral, opening 9,730’ of potentially productive reservoir rock. The hole was then circulated and reamed for completion.

SUMMARY

The Chalmers 5300 21-19 5T is a successful well in Oasis Petroleum’s horizontal Three Forks development program in Baker Field. The project was drilled from surface casing to TD in 26 days. The TD of 20,928’ MD was achieved at 03:30 hours CST December 1, 2014. The well site team worked together to maintain the well bore in the desired target interval for 72% of the lateral, opening 9,730’ of potentially productive reservoir rock.

Samples in the Three Forks were predominantly dolomite which was described as light brown-light brown gray, tan-cream, trace pink in color. It was firm, laminated, with a microsucrosic texture. Rare disseminated pyrite was noted as was occasional intercrystalline porosity. Also noted was *common spotty to rare even light brown oil stain*. Also observed was light green-light gray green, mint green shale that was firm, subblocky, with an earthy texture. Occasional disseminated pyrite was noted as was possible intergranular porosity.

Gas on the Chalmers 5300 21-19 5T varied according to stratigraphic position and penetration rates which may have reflected increased porosity. The overall gas and hydrocarbon shows were encouraging and indicate a hydrocarbon rich system in the Three Forks.

The Oasis Petroleum North America, LLC. Chalmers 5300 21-19 5T awaits completion operations to determine its ultimate production potential.

Respectfully submitted,

G. Wayne Peterson
Sunburst Consulting, Inc.
2 December, 2014

WELL DATA SUMMARY

OPERATOR:	**Oasis Petroleum North America, LLC**
ADDRESS:	1001 Fannin Suite 1500 Houston, TX 77002
WELL NAME:	**Chalmers 5300 21-19 5T**
API #:	33-053-06018
WELL FILE #:	28633
SURFACE LOCATION:	2,127' FNL & 327' FWL Lot 2 Section 19, 153N, 100W
FIELD/ PROSPECT:	Baker / Three Forks
COUNTY, STATE	McKenzie County, North Dakota
BASIN:	Williston
WELL TYPE:	Three Forks Member Horizontal Lateral
ELEVATION:	GL: 2,051' KB: 2,076'
SPUD/ RE-ENTRY DATE:	September 27, 2014
BOTTOM HOLE LOCATION	1,298.5' north & 9,900.01' east of surface location or approx. 828.5' FNL & 262.14' FEL, Lot 2 Section 20, T153N, R100W
CLOSURE COORDINATE	Closure Direction: 82.53° Closure Distance: 9,984.80'
TOTAL DEPTH / DATE:	20,928' on December 1, 2014 72% within target interval
TOTAL DRILLING DAYS:	26 days
CONTRACTOR:	Nabors #B22

PUMPS:	H&H Triplex (stroke length - 12")
TOOLPUSHERS:	Jessie Tibbets, Mark Rollins
FIELD SUPERVISORS:	John Gordon, Doug Rakstad
CHEMICAL COMPANY:	NOV
MUD ENGINEER:	Joe Vaith, Joe Stander
MUD TYPE:	Fresh water in surface hole Diesel invert in curve; Salt water in lateral
MUD LOSSES:	Invert Mud: 112 bbls, Salt Water: 0 bbls
PROSPECT GEOLOGIST:	Nathan Gabelman
WELLSITE GEOLOGISTS:	G. Wayne Peterson, Michelle Baker
GEOSTEERING SYSTEM:	Sunburst Digital Wellsite Geological System
ROCK SAMPLING:	30' from 8,240' - 20,928' TD
SAMPLE EXAMINATION:	Binocular microscope & fluoroscope
SAMPLE CUTS:	Trichloroethylene (Carbo-Sol)
GAS DETECTION:	MSI (Mudlogging Systems, Inc.) TGC - total gas with chromatograph Serial Number(s): ML-134
DIRECTIONAL DRILLERS:	RPM, Inc. John Gordon, Doug Rakstad, Robert Jervis
MWD:	Ryan Mike McCammond, Ronald Maddalena, Alex Smith
CASING:	Surface: 13 3/8" 54# J-55 set to 2,310' Second: 9 5/8" 40# HCL-80 set to 6,095' Intermediate: 7" 32# P-110 set to 11,150'

KEY OFFSET WELLS:

Oasis Petroleum North America, LLC
Chalmers 5300 31-19H
NW SW Sec. 19 T153N R100W
McKenzie County, ND

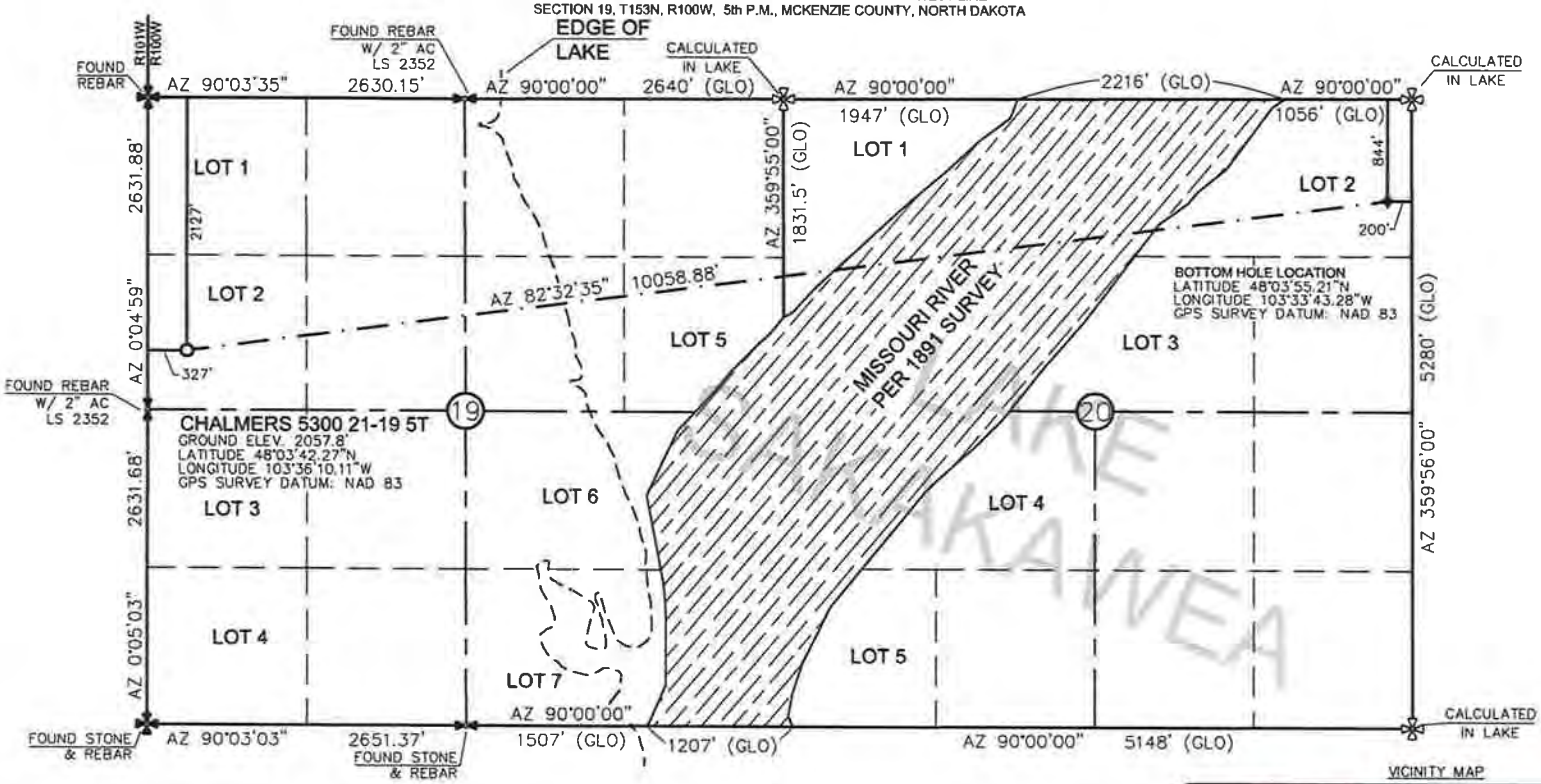
Oasis Petroleum North America, LLC
Chalmers 5300 21-19 7T2
Lot 2 Sec. 19, 153N, 100W
McKenzie County, ND

Oasis Petroleum North America, LLC
Chalmers 5300 21-19 8T
Lot 2 Sec. 19, 153N, 100W
McKenzie County, ND

Oasis Petroleum North America, LLC
Chalmers 5301 44-24 4T2R
SE SE Sec. 24 T153N R101W
McKenzie County, ND

WELL LOCATION PLAT

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"CHALMERS 5300 21-19 5T"
2127 FEET FROM NORTH LINE AND 327 FEET FROM WEST LINE
SECTION 19, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA



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0 1000
1" = 1000'

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- MONUMENT - NOT RECOVERED

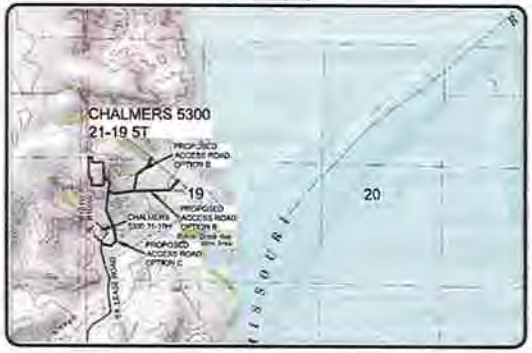
STAKED ON 1/29/14
VERTICAL CONTROL DATUM WAS BASED UPON CONTROL POINT 16 WITH AN ELEVATION OF 2014.2'

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: 5/07/14
NORTH DAKOTA

VICINITY MAP



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

OASIS PETROLEUM NORTH AMERICA, LLC
WELL LOCATION PLAT
SECTION 19, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

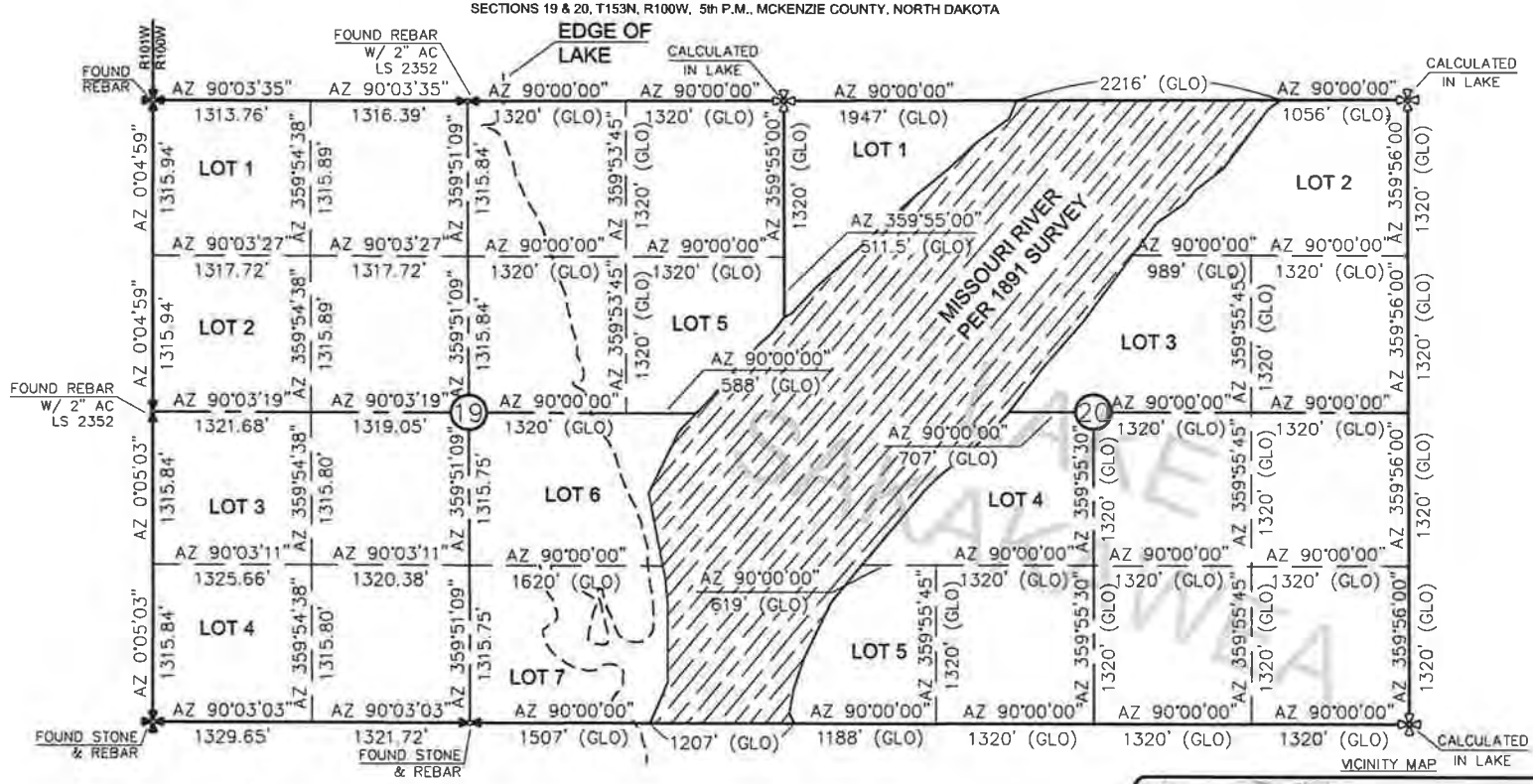
Drawn By: BAH | Project No.: 513-09-292
Checked By: DDK | Date: JAN 2014

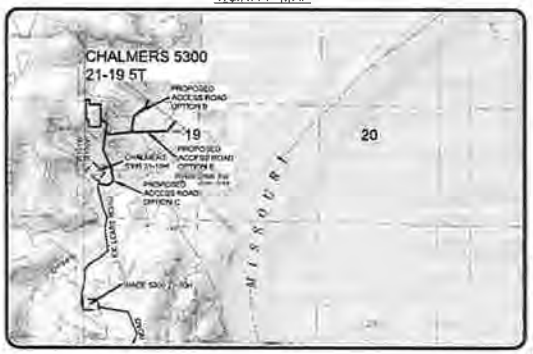
Revision No.	Date	By	Description
REV 1	3/7/14	LLR	ADDED WELLS ON PAD
REV 2	4/30/14	BAH	ADDED WELLS ON PAD/REVISED PAD
REV 3	5/2/14	BAH	REVISED WELLS ON PAD/REVISED PAD

1/8

SECTION BREAKDOWN

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"CHALMERS 5300 21-19 5T"
2127 FEET FROM NORTH LINE AND 327 FEET FROM WEST LINE
SECTIONS 19 & 20, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA





VICINITY MAP

0 1000
1" = 1000'

- MONUMENT – RECOVERED
- MONUMENT – NOT RECOVERED

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ALL AZIMUTHS ARE BASED ON G.P.S. OBSERVATIONS. THE ORIGINAL SURVEY OF THIS AREA FOR THE GENERAL LAND OFFICE (G.L.O.) WAS 1891. THE CORNERS FOUND ARE AS INDICATED AND ALL OTHERS ARE COMPUTED FROM THOSE CORNERS FOUND AND BASED ON G.L.O. DATA. THE MAPPING ANGLE FOR THIS AREA IS APPROXIMATELY -0°03'.

REGISTERED LAND SURVEYOR
DARYL D. KASEMAN
LS-3880
DATE: 5/07/14
NORTH DAKOTA

Revision No.	Date	By	Description
REV 1	3/31/14	HF	ADDED WELLS ON PAD AND MOVED PAD
REV 2	4/22/14	BAS	ADDED WELLS ON PAD AND MOVED PAD
REV 3	5/7/14	BAS	ADDED WELLS ON PAD AND MOVED PAD

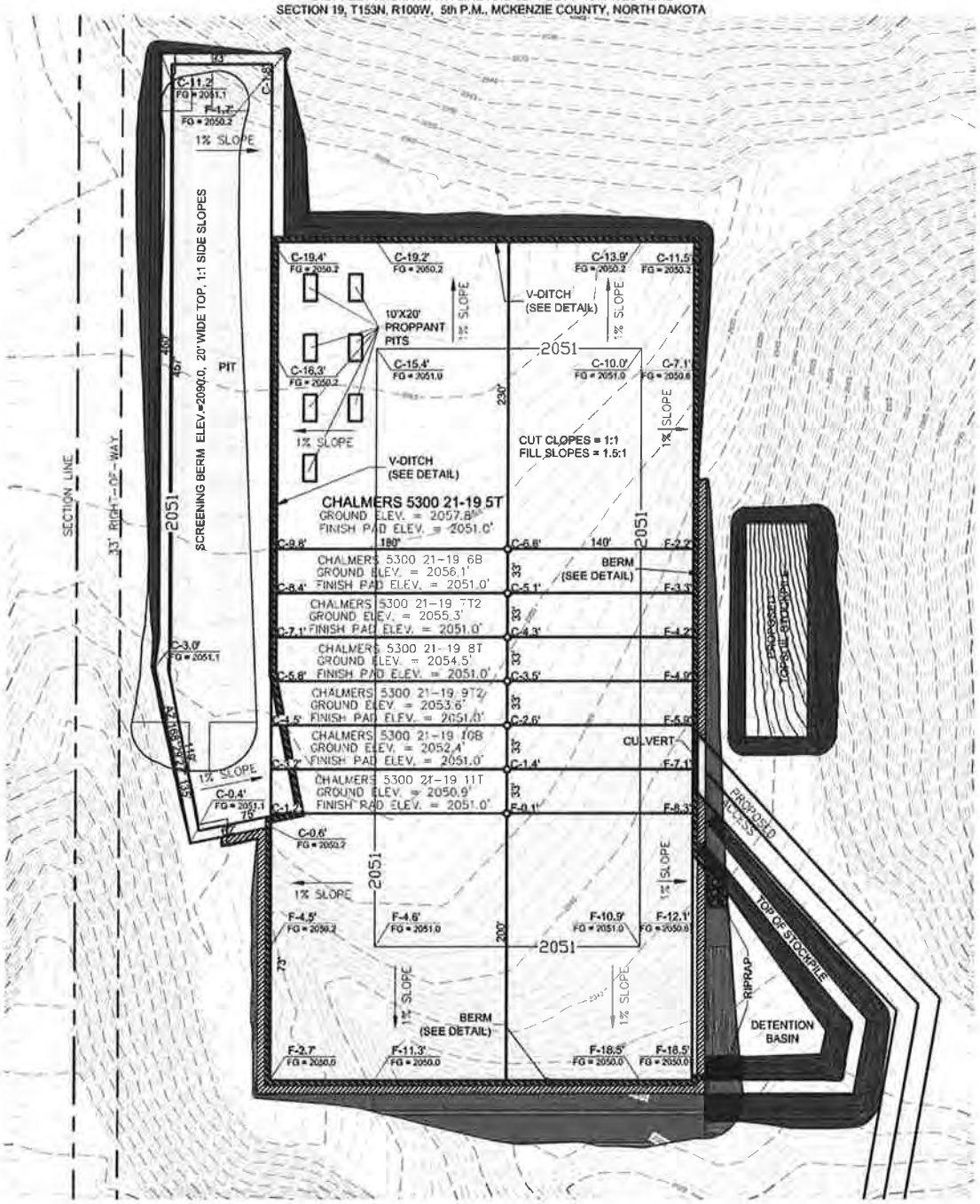
OASIS PETROLEUM NORTH AMERICA, LLC
SECTION BREAKDOWN
SECTIONS 19 & 20, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA
Drawn By: BAS Project No.: S12-08-280
Checked By: JLD/K Date: JAN. 2014

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
Professionals you need, people you trust

PAD LAYOUT

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"CHALMERS 5300 21-19 5T"
2127 FEET FROM NORTH LINE AND 327 FEET FROM WEST LINE
SECTION 19, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA



NOTE 1: Pad dimensions shown are to usable area, the v-ditch and berm areas shall be built to the outside of the pad dimensions.

NOTE 2 : Screening berm is to be built after drilling operations are complete.

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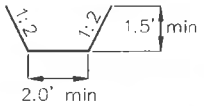
REGISTERED LAND SURVEYOR
DARYL D. KASEMAN
LS-3880
DATE: 5/07/14
NORTH DAKOTA

0 80
1" = 80'

V-DITCH DETAIL



Proposed Contours — BERM
Original Contours — DITCH

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

3/8

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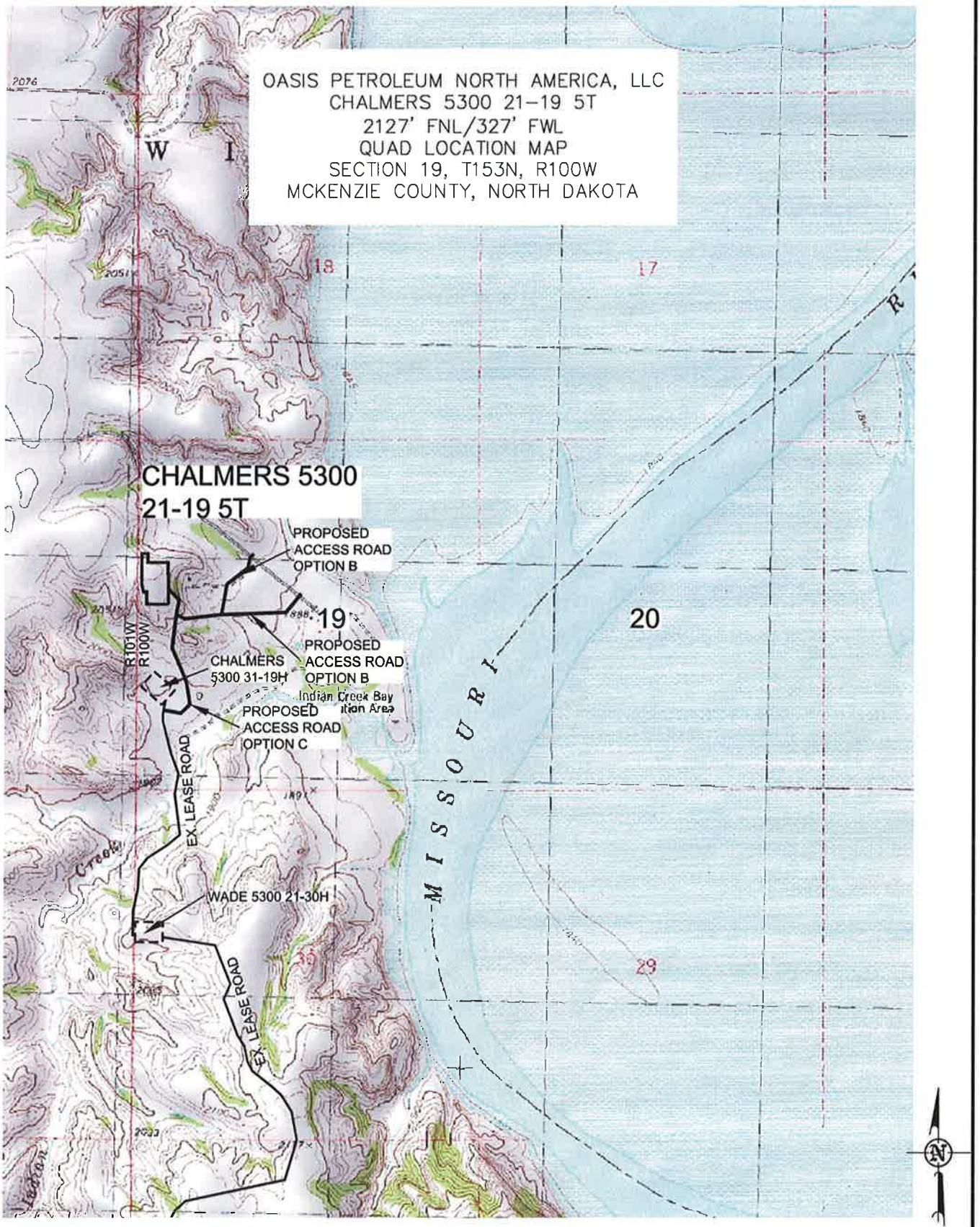
Interstate Engineering, Inc.
P.O. Box 648
425 East Main Street
Sidney, Montana 59270
Ph (406) 433-5617
Fax (406) 433-5618
www.interstateeng.com
Other offices in Minnesota, North Dakota and South Dakota

OASIS PETROLEUM NORTH AMERICA, LLC
PAD LAYOUT
SECTION 19, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. | Project No.: 513-08-282
Checked By: D.D.K. | Date: JAN. 2014

Revision No.	Date	By	Description
REV 1	3/12/14	JLS	MOVED WELLS ON PAD
REV 2	4/22/14	BHH	MOVED WELLS ON PAD/REVISED PAD
REV 3	5/2/14	BHH	MOVED WELLS ON PAD/REVISED PAD



5/8
SHEET NO.

INTERSTATE ENGINEERING
Professionals you need, people you trust

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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

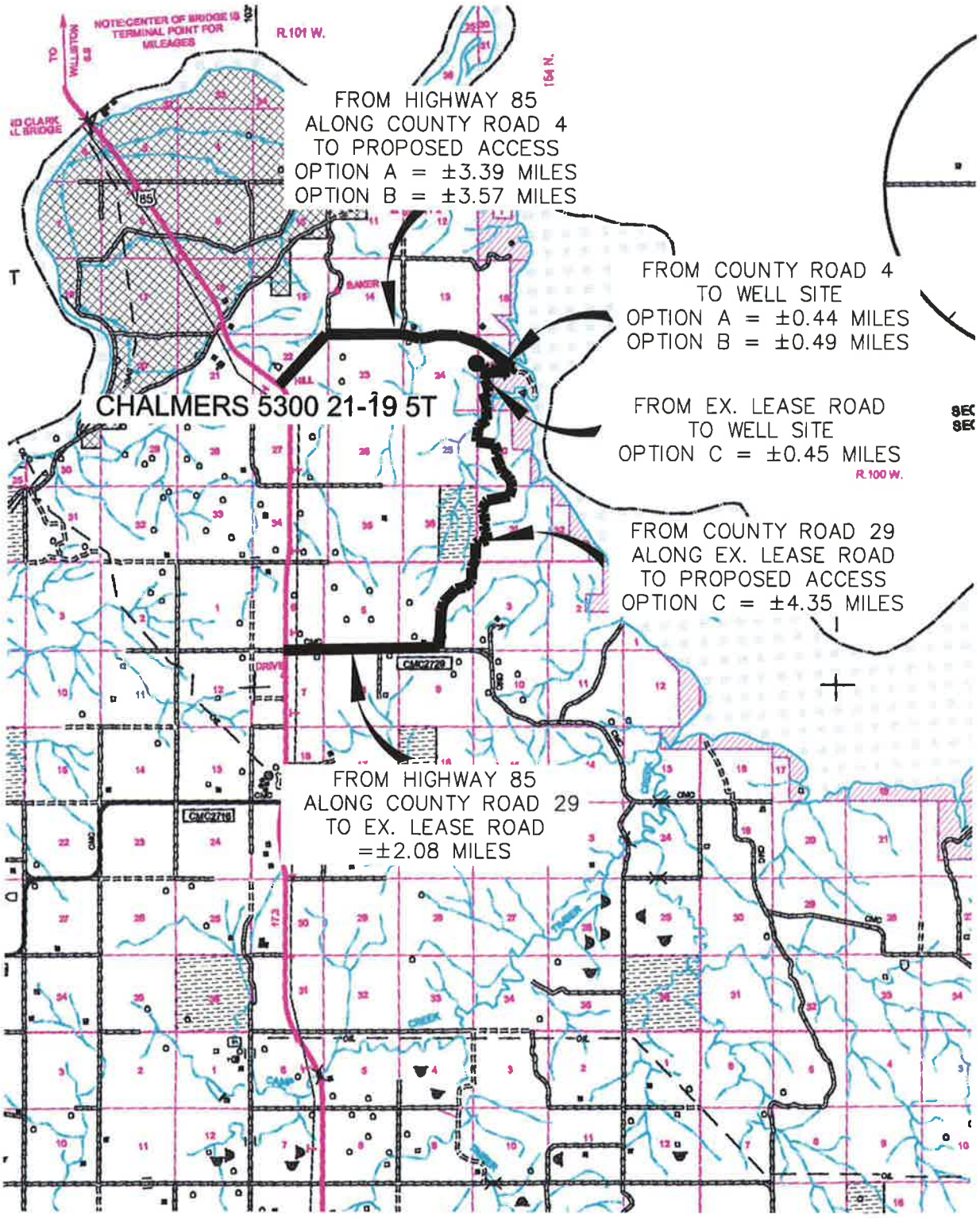
OASIS PETROLEUM NORTH AMERICA, LLC
QUAD LOCATION MAP
SECTION 19, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. | Project No.: S13-09-282
Checked By: D.D.K. | Date: JAN. 2014

Revision No.	Date	By	Description
REV 1	3/13/14	JJS	MOVED WELLS ON PAD
REV 2	4/23/14	BHH	MOVED WELLS ON PAD/REVISED PAD
REV 3	5/2/14	BHH	MOVED WELLS ON PAD/REVISED PAD

COUNTY ROAD MAP

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"CHALMERS 5300 21-19 5T"
2127 FEET FROM NORTH LINE AND 327 FEET FROM WEST LINE
SECTION 19, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA



SCALE: 1" = 2 MILE

6/8
SHEET NO.

INTERSTATE ENGINEERING
Professionals you need, people you trust

Interstate Engineering, Inc.
P.O. Box 648
425 East Main Street
Sidney, Montana 59270
Ph (406) 433-5617
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Other offices in Minnesota, North Dakota and South Dakota

OASIS PETROLEUM NORTH AMERICA, LLC
COUNTY ROAD MAP
SECTION 19, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

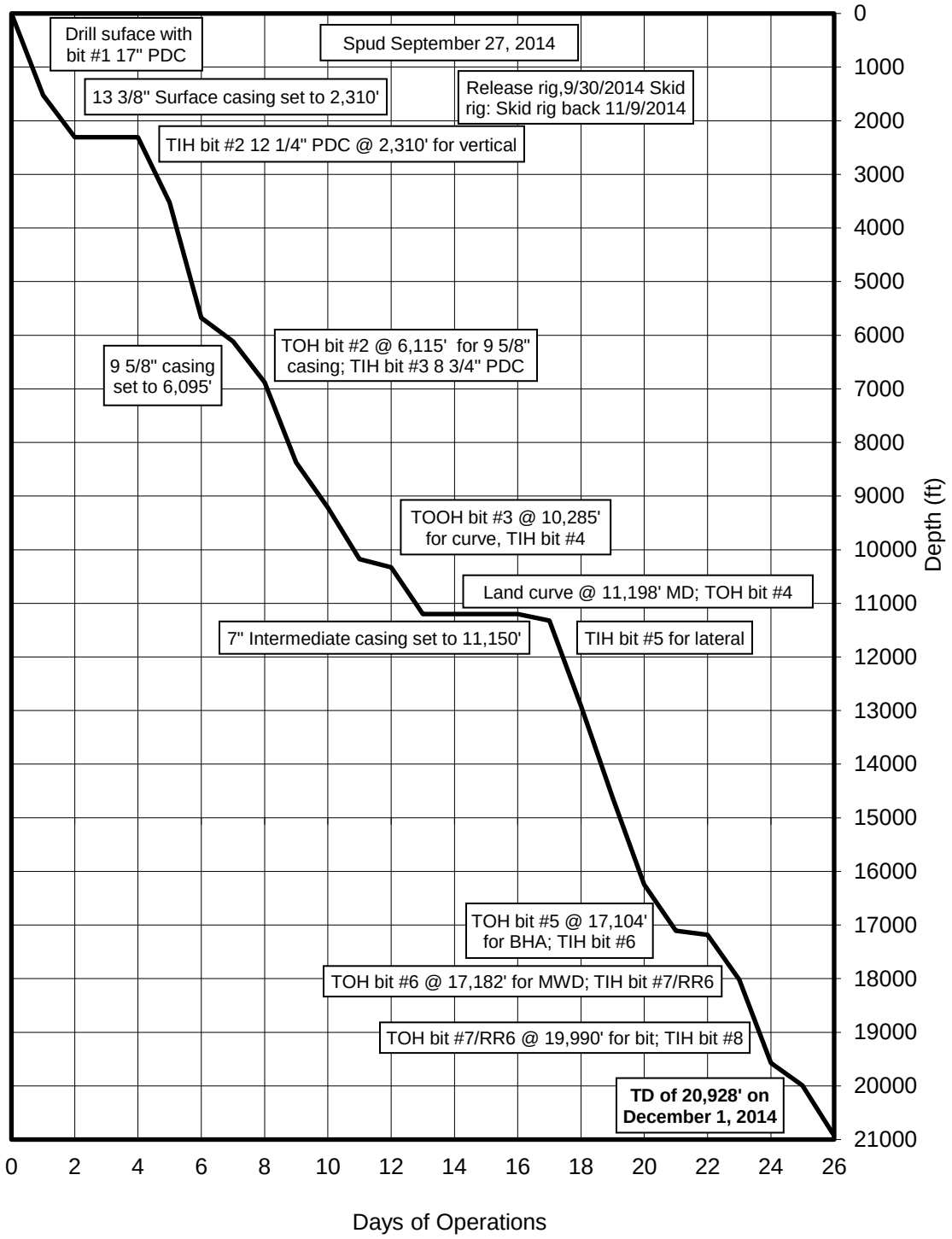
Drawn By: B.H.H. | Project No.: S13-09-282
Checked By: D.D.K. | Date: JAN. 2014

Revision No.	Date	By	Description
REV 1	3/12/14	JJS	MOVED WELLS ON PAD
REV 2	4/22/14	BHH	MOVED WELLS ON PAD/REVISED PAD
REV 3	5/2/14	BHH	MOVED WELLS ON PAD/REVISED PAD

TIME VS DEPTH

Oasis Petroleum North America, LLC

Chalmers 5300 21-19 5T



DAILY DRILLING SUMMARY

Day	Date 2014	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	Formation
0	9/27	0		-	-	-	-	-	-	-	-	-	Rig Accepted on company time at 06:00 9/27/2014. Rig up.Pre spud checklist. Top drive commissioning checklist.	Surface
1	9/28	1,523'	1,523	1	25	50	-	-	3,850	100	100	704	Change liners to 6.5" and complete pre spud inspection. Service rig. Pick up BHA. Drill 0'-422'. Service rig. Drill 422'-1,523'. Service rig.	Surface
2	9/29	2,310'	787	1	26	50	-	-	3,900	97	97	700	Rotery drilling 1,523'-2,310'. Service rig. Circulate and condition. Short trip. TIH. Circulate and condition. TOH. Pick up 3RD party tools, rig up Noble PJSM. Run casing. Service rig.	Surface
3	9/30	2,310'	0	-	-	-	-	-	-	-	-	-	Run casing, wash to bottom. Rig down casing crew. Circulate hole. Rig up cementers. Cement. Wait on cement. Cut off conductor and 13 5/8". Install wellheads with Weatherford and welder. Install whllheads. B Section. Rig released @ 04:00 9/30/2014	Pierre
4	11/9	2,310'	0	-	-	-	-	-	-	-	-	-	Skid rig. Remove well cap with Weatherford. Nipple up BOPS. Function test BOPS. Make up test plug. Held safety meeting with tester. Test BOPS.	Pierre
5	11/10	3,528'	1,218	2	18	50	-	-	1550	90	90	633	Rig down testers. Center stack install cellar. Install mud line. Service rig. Install wear bushing. Pick up BHA, bit, motor 2 monels, UBHO, MWD. TIH. Wash to bottom. Fix leak on flow line. Change shaker screens. Drill cement 2,235'-2,342' Float @ 2,248', Shoe @ 2,297'. Fit test. Drill 2,342'-3,528'. Function pipes.	Pierre
6	11/11	5,675'	2,147	2	25	40	-	-	1550	90	90	633	Drill and survey, sliding when needed from 3,528'-4,087'. Service rig. Function HCR. Downtime electrical. Drill and survey, sliding when needed from 4,087'-4,369'. Drill and survey, sliding when needed from 4,369'-5,675'.	Rierdon
7	11/12	6,115'	440	2	25	40	-	-	1550	90	90	633	Drill and survey, sliding when needed from 5,675'-6,115'. Circulate and condition. Circulate bottoms up, pump driy job. TOH. Remove rotating head. Ins" collars. Lay down BHA. Pull wear bushing. Rig up to run casing Held safety meeting. Rig up casing crew. Run 9 5/8" casing. Run chasing. Make up landing joint and verify landing with Weatherford. Circulate and condition.	Rierdon
8	11/13	6,880'	765	3	35	60	-	102	1800	-	104	366	Rig up cementers. Held safety meeting. Cement. Rig down cementers. Lay down landing joint. Install pack off. Install wear bushiong. Pick up BHA, bit motor, 2 monels, UBHO, MWD. TIH. Drill cement 6,048'-6133', float @ 6,051', shoe @ 6,095'. Fit test @ 6,113'. Drill 6,133'-6,880'.	Rierdon
9	11/14	8,373'	1,493	3	35	60	-	102	1800	-	104	366	Rotary drilling sliding as needed 6,880'-7,533'. Service rig. Rotary drilling sliding as needed 7,533'-8,373'. Service rig.	Charles
10	11/15	9,214'	841	3	35	55	15	150	3600	76	76	535	Rotary drilling sliding as needed 8,373'-8,560'. Service rig. Rotary drilling sliding as needed 8,560'-9,214'. Service rig.	BLS
11	11/16	10,178'	964	3	45	55	15	150	3800	76	76	535	Rotary drilling sliding as needed 9,214'-9,680'. Service rig. Rotary drilling sliding as needed 9,680'-10,178'. Service rig.	Lodgepole

DAILY DRILLING SUMMARY

Day	Date 2014	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	Formation
12	11/17	10,327'	149	3	45	55	15	150	3800	76	76	535	Rotary drilling sliding as needed 10,178'-10,285'. Circulate and condition, pump dry job. TOH. Remove rotating head and install trip nipple. TOH. Lay down BHA. Service rig and hold BOP drill. Rig up Schlumberger and run bond logs. Rig down wireline. Slip and cut. Pick up BHA. TIH. Orientate curve from 10,285'-10,327'. Service rig.	Lodgepole
13	11/18	11,198'	871	4	20	25	40	150	3800	76	76	535	Orientate curve from 10,327'-10,732'. Service rig. Drill curve from 10,732'-11.198'. Rig service. Wiper trip. Prepare to come out of the hole to set casing.	Three Forks
14	11/19	11,198'	0	4	-	-	-	-	-	-	-	-	Lay down drill pipe. Service top drive. Lay down Drill pipe. Lay down BHA. Remove wear bushing. Safety stand down. Put salt down on ice. Rig up to run casing. Rig up held safety meeting. Run 7" casing. Rig up CRT run casing. Wash casing 10,600'-10,864'.	Three Forks
15	11/20	11,198'	0	4	-	-	-	-	-	-	-	-	Run casing, wash to bottom. Circulate and condition. Work pipe. Ease flow up to 70 SPM. Rig up cementers. Held safety meeting. Cement first stage. Drop bomb for stage tool. Circulate and condition. Cement. Rig down cementers. Nipple down BOPS. Rig up BOPS winches, pick up BOPS. Set slips with Weatherford, cut off casing and dress casing with welder.	Three Forks
16	11/21	11,198'	0	4	-	-	-	-	-	-	-	-	Dress up casing with welder. Nipple up BOPS, set BOP with greens. Tighten up boltw with Weatherford. Bolted up flowline. Install wearbushing and pack off. Test BOPS. Gather XO and fill stack. Start to test. Service rig. Downtime BOP. Bolt up HCR and function test. Test BOPS. Downtime top drive. Replace backup wrench.	Three Forks
17	11/22	11,321'	123	5	10	40	-	138	2400	80	-	282	Service top drive. Pick up BHA. Strap BHA. TIH. Pick up drill pipe DV tool at 10,385' and wash to bottom. Shoe @ 11,144' MD Fit rest. Drill 15' Test. Service rig. Drill 11,198'-11,321'.	Three Forks
18	11/23	12,915'	1,594	5	20	50	45	145	2800	-	84	296	Drill and survey lateral, sliding as needed, from 11,321'-12,036'. BOP drill. Rig service. Drill 12,036'-12,915. Rig service.	Three Forks
19	11/24	14,630'	1,715	5	20	50	45	145	2800	-	84	296	Drill and survey lateral, sliding as needed, from 12,915'-13,484'. Rig service. Drill 13,484'-14,630. Rig service.	Three Forks
20	11/25	16,247'	1,617	5	35	50	50	145	3200	84	0	296	Drill and survey lateral, sliding as needed, from 14,630'-15,305'. Rig service. Drill 15,305'-16,247'. Rig service.	Three Forks
21	11/26	17,104'	857	5	35	50	50	145	3200	84	0	296	Drill and survey lateral, sliding as needed, from 16,247'-16,706'. Rig service. Drill 16,706'-17,104'. Rig service. Circulate bottoms up. Condition mud and fill trip tanks. Mix and send dry job. TOOH.	Three Forks
22	11/27	17,182'	78	6	35	50	50	145	3200	84	0	296	TOOH. Strap pipe on the way out. Lay down BHA. Pick up BHA. TIH. Service rig. Slip and cut. TIH. Remove trip nipple, install rotating head rubber. Drill and survey from 17,104'-17,182'. Trouble shoot pumps. Trouble shoot MWD tool. Service rig. Spot pill and fill trip tanks. Mix and send dry job. TOH.	Three Forks

DAILY DRILLING SUMMARY

Day	Date 2014	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	Formation
23	11/28	18,016'	834	7/RR6	20	40	30	0	3700	0	81	285	Lay down BHA. Pick up BHA.TIH. Install rotating head rubber. Drill and survey from 17,182'-17,258'. Service top drive. Drill and surveyfrom 17,258-18,016'	Three Forks
24	11/29	19,570'	1,554	7/RR6	25	30	55	148	3800	86	-	303	Drill and survey from 18,016'-18,459'. Service top drive. Drill and survey from 18,459'-19,570. Rig service.	Three Forks
25	11/30	19,990'	420	7/RR6	25	30	55	148	3800	86	-	303	Drill and survey from 19,570'-19,990'. BOP drill. TOOH. Build and pump dry jump. Remove rotating head rubber. Service rig. TOH. BOP drill. Lay down BHA. Pick up BHA. TIH. Slip and cut. Service rig. TIH.	Three Forks
26	12/1	20,928'	938	8	20	40	40	0	3900	86	-	303	TIH. Drill and survey lateral from 19,990'-20,323'. Rig service. Drill and survey from 19,900'-20,323'. Service top drive. Drill and survey from 20,323'-20,928'. Reach TD. Circulate and condition. Short trip 15 stands. Circulate and condition. Service rig.	Three Forks

DAILY MUD SUMMARY

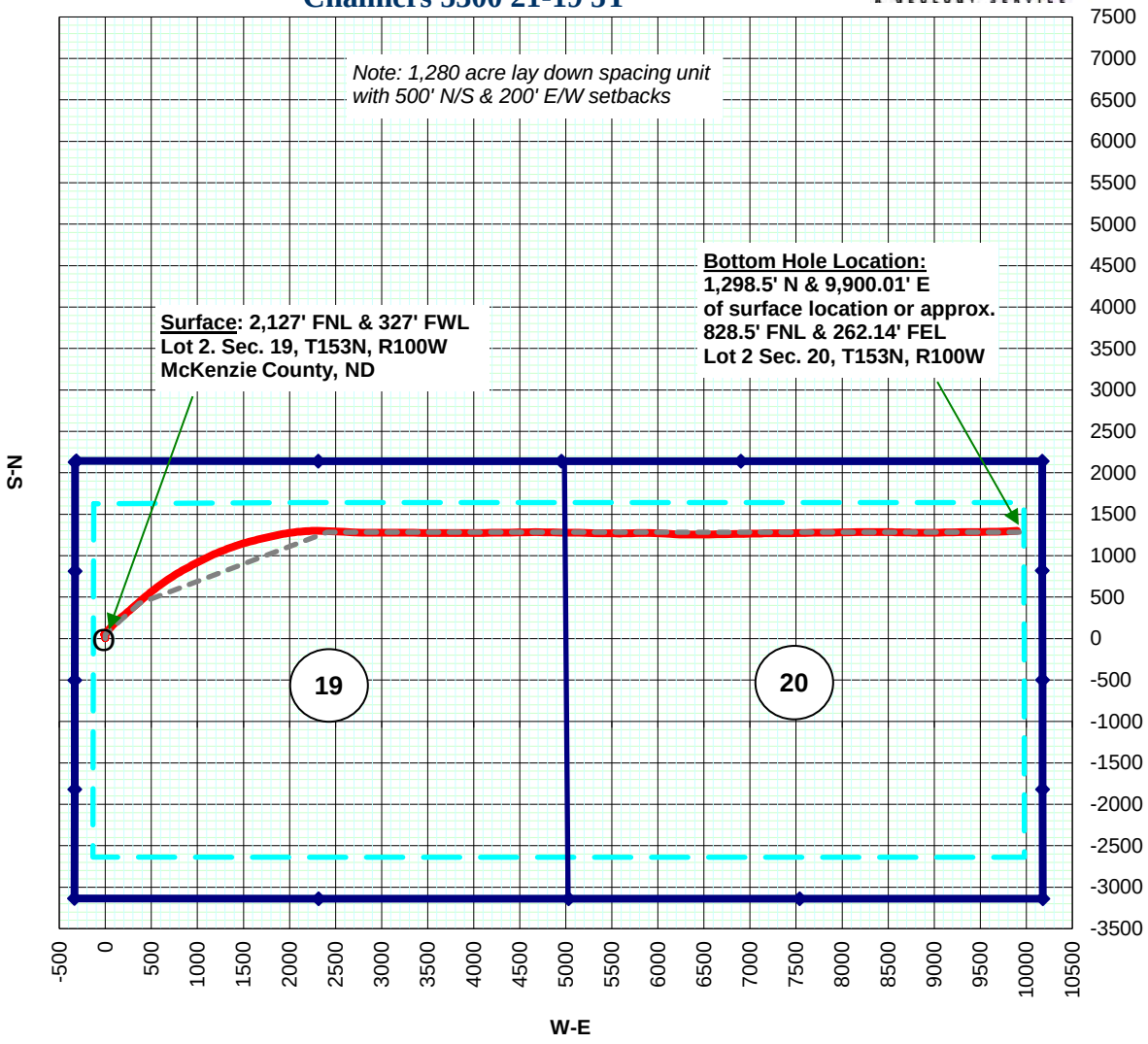
Day	Date 2014	Mud Depth	Drilling Fluid	Mud WT (ppg)	VIS (sec/ qt)	PV (cP)	YP (lbs/ 100 ft2)	Gels (lbs/ 100 ft^2)	600/ 300	NAP/ H_20 (ratio)	NAP/ H20 (% by vol)	Cake (API/ HTHP)	Cor. Solids (%)	Alk	pH	Excess Lime (lb/bbl)	Cl^- (mg/L)	HGS/ LGS (%)	Salinity (ppm)	ES	Gain/ Loss (bbls)
0	09/27	-	fresh water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	09/28	1,523'	fresh water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	09/29	2,310'	fresh water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	09/30	2,310'	fresh water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	11/09	2,310'	fresh water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	11/10	2,368'	invert	11	71	22	10	8/15/-	54/32	25.0/75.0	21/63	2	12.3	2	-	2.6	60k	6.3/5.9	135,660	408	-
6	11/11	3,094'	invert	11	69	26	11	8/15/-	63/37	74.4/25.3	62/21	2	14.9	2	-	2.6	35k	9.5/5.4	207,721	438	-/13
7	11/12	6,142'	invert	11.2	68	28	12	10/14/-	68/40	75.6/24.4	62.20	2	15.9	2.6	-	3.4	35.5k	10.8/5.2	226,318	489	-/11
8	11/13	6,142'	invert	11.4	9.	29	12	40/15/-	70/41	74.4/25.6	61/21	2	15.9	2.6	-	3.4	34k	12.7/3.3	210,621	460	-/-
9	11/14	8,373'	invert	10.45	56	18	8	7/10/-	44/26	75.1/24.9	63.5/21	2	13.4	2.5	-	3.2	34k	7.2/6.2	210,621	489	-/-
10	11/15	8,377'	invert	10.45	56	18	8	7/10/-	44/26	75.1/24.9	63.5/21	2	13.4	2.5	-	3.2	34k	7.2/6.2	210,621	489	-/10
11	11/16	9,324'	invert	10.35	48	18	10	7/10/-	46/28	76.8/23.2	64.5/19.5	2	13.5	2.8	-	3.6	41k	7.0/6.5	252,526	568	-/9
12	11/17	10,423'	invert	10.4	54	18	9	7/12/-	45/27	76.2/23.8	64/20	2	13.3	2.7	-	3.5	51k	7.6/5.7	264,320	566	-/-
13	11/18	11,198'	invert	10.4	61	19	10	7/11/-	48/29	77.2/22.8	64.5/19	2	14	2.6	-	3.4	47k	7.1/6.9	264,320	655	-/-
14	11/19	11,198'	invert	10.4	61	19	10	7/11/-	48/29	77.2/22.8	64.5/19	2	14	2.6	-	3.4	47k	7.1/6.9	264,320	655	-/-
15	11/20	11,198'	invert	10.4	61	19	10	7/11/-	48/29	77.2/22.8	64.5/19	2	14	2.6	-	3.4	47k	7.1/6.9	264,320	655	-/-
16	11/21	11,198'	invert	10.4	61	19	10	7/11/-	48/29	77.2/22.8	64.5/19	2	14	2.6	-	3.4	47k	7.1/6.9	264,320	655	-/-
17	11/22	11,198'	saltwater	9.7	27	1	1	-	3/2	-	1/91	-	8	-	7.5	-	168k	-/0.1	-	-	-/-
18	11/23	12,915'	saltwater	9.7	27	1	1	-	3/2	-	1/91	-	8	-	7.5	-	168k	-/0.1	-	-	-/-
19	11/24	13,100'	saltwater	9.65	27	1	1	-	3/3	-	0.5/91.5	-	8	-	9	-	150k	-/0.8	-	-	-/-
20	11/25	16,247'	saltwater	9.7	27	1	1	-	3/3	-	0.5/91.5	-	8	-	9	-	150k	-/0.8	-	-	-/-
21	11/26	16,400'	saltwater	9.7	27	1	1	-	3/2	-	0.5/91.5	-	8	-	7.5	-	153k	-/0.9	-	-	-/-
22	11/27	17,182'	saltwater	9.7	27	1	1	-	3/2	-	0.5/91.5	-	8	-	7.5	-	153k	-/0.9	-	-	-/-
23	11/28	18,016'	saltwater	9.6	27	1	1	-	3/2	-	1/92	-	7	-	7.5	-	151k	-/0.4	-	-	-/-
24	11/29	19,800'	saltwater	9.55	27	1	1	-	3/2	-	0.5/92.5	-	7	-	8	-	143k	-/0.5	-	-	-/-
25	11/30	19,990'	saltwater	9.55	27	1	1	-	3/2	-	0.5/92.5	-	7	-	8	-	143k	-/0.5	-	-	-/-
26	12/01	20,928'	saltwater	9.55	27	1	1	-	3/2	-	0.5/92.5	-	7	-	8	-	143k	-/0.5	-	-	-/-

BOTTOM HOLE ASSEMBLY RECORD

BHA Run	Depth In	Depth Out	Footage	Hours	Accum. Hours	Vert. Dev.	Bit Data								Motor Data					
							Bit #	Size (in.)	Type	Make	Model	Serial #	Jets	Hours	Motor #	Make	Model	Bend	Hours	Rev/Gal
1	0'	2,310'	2,310'	22.5	24.00	Surface	1	17 1/2	PDC	Hughes	PDC	PR3138	Open	22.5	-	-	-	-	-	-
2	2,175'	6,115'	3,940'	42	64.50	Vertical	2	12 1/4	PDC	Halliburton	FX65D	12138203	6x22	42	2	NOV	6/5 5.0	2.12°	42	0.13
3	6,115'	10,285'	4,170'	79	143.50	Vertical	3	8 3/4	PDC	Varel	R616	4006374	6x16	79	3	Predator	7/8 5.6	1.50°	79	0.29
4	10,285'	11,198'		23	166.50	Curve	4	8 3/4	PDC	Security	MMD55M	1248219	5x18	23	4	NOV	7/8 5.0	2.38°	23	0.29
5	11,198'	17,104'	5,906'	85	251.50	Lateral	5	6	PDC	Baker	T406X	7154045	6x18	85	5	Baker	XLP/LS	1.50°	85	0.49
6	17,104'	17,182'	78'	2.5	254.00	Lateral	6	6	PDC	Varel	R616	4007666	6x18	2.5	6	Baker	XLP/LS	1.50°	2.5	0.49
7	17,182'	19,990'	2,808'	47	301.00	Lateral	7/RR6	6	PDC	Varel	R616	4007666	6x18	47	7/RR6	Baker	XLP/LS	1.50°	47	0.49
8	19,990'	20,928'	938'	18	319.00	Lateral	8	6	PDC	Varel	BM613P2	4006199	6x18	18	8	Baker	XLP/LS	1.50°	18	0.49

PLAN VIEW

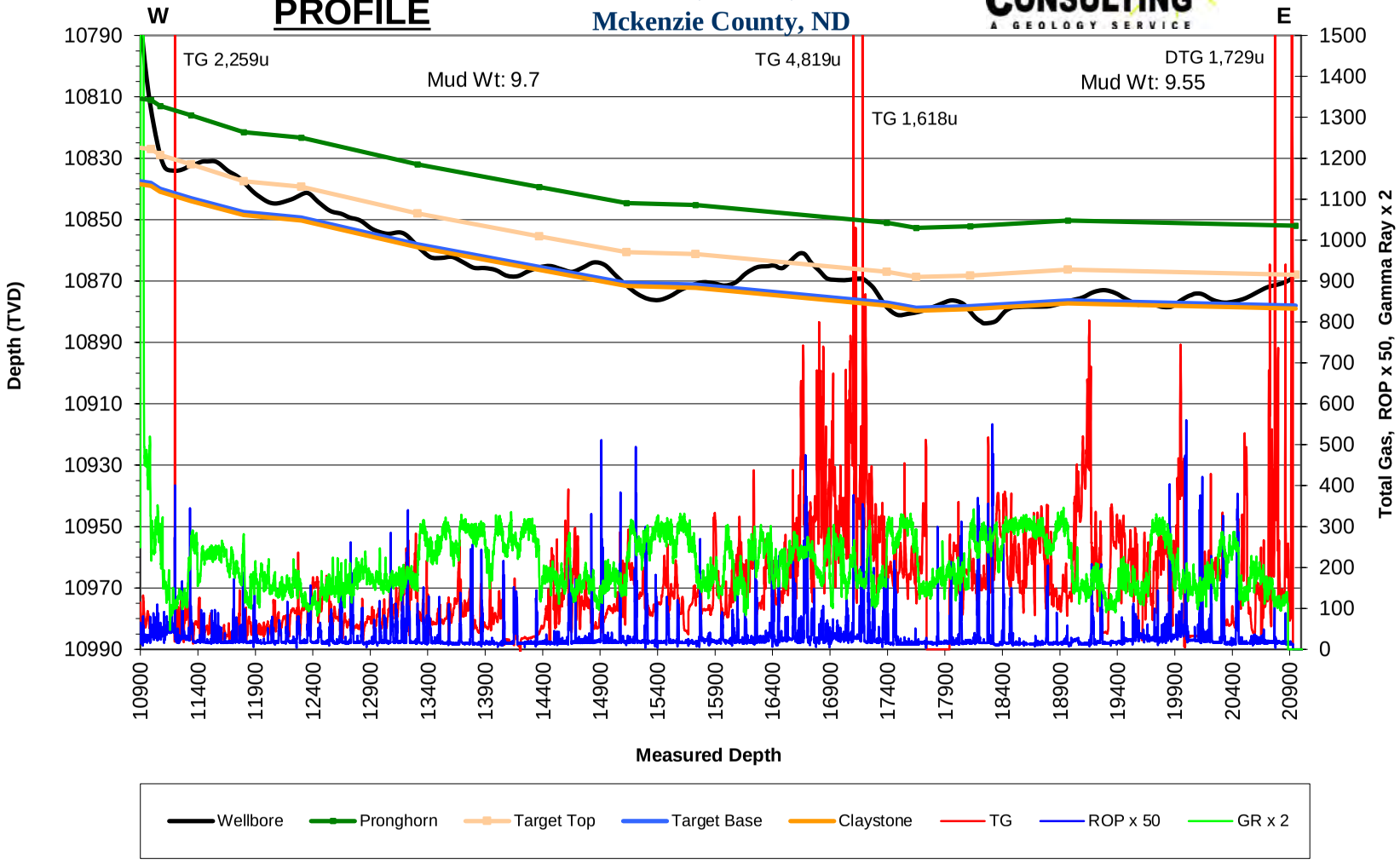
Oasis Petroleum North America, LLC
Chalmers 5300 21-19 5T



Oasis Petroleum North America, LLC
Chalmers 5300 21-19 5T
Lot 2 Sec. 19, T153N, R100W
Mckenzie County, ND

SUNBURST CONSULTING
A GEOLOGY SERVICE

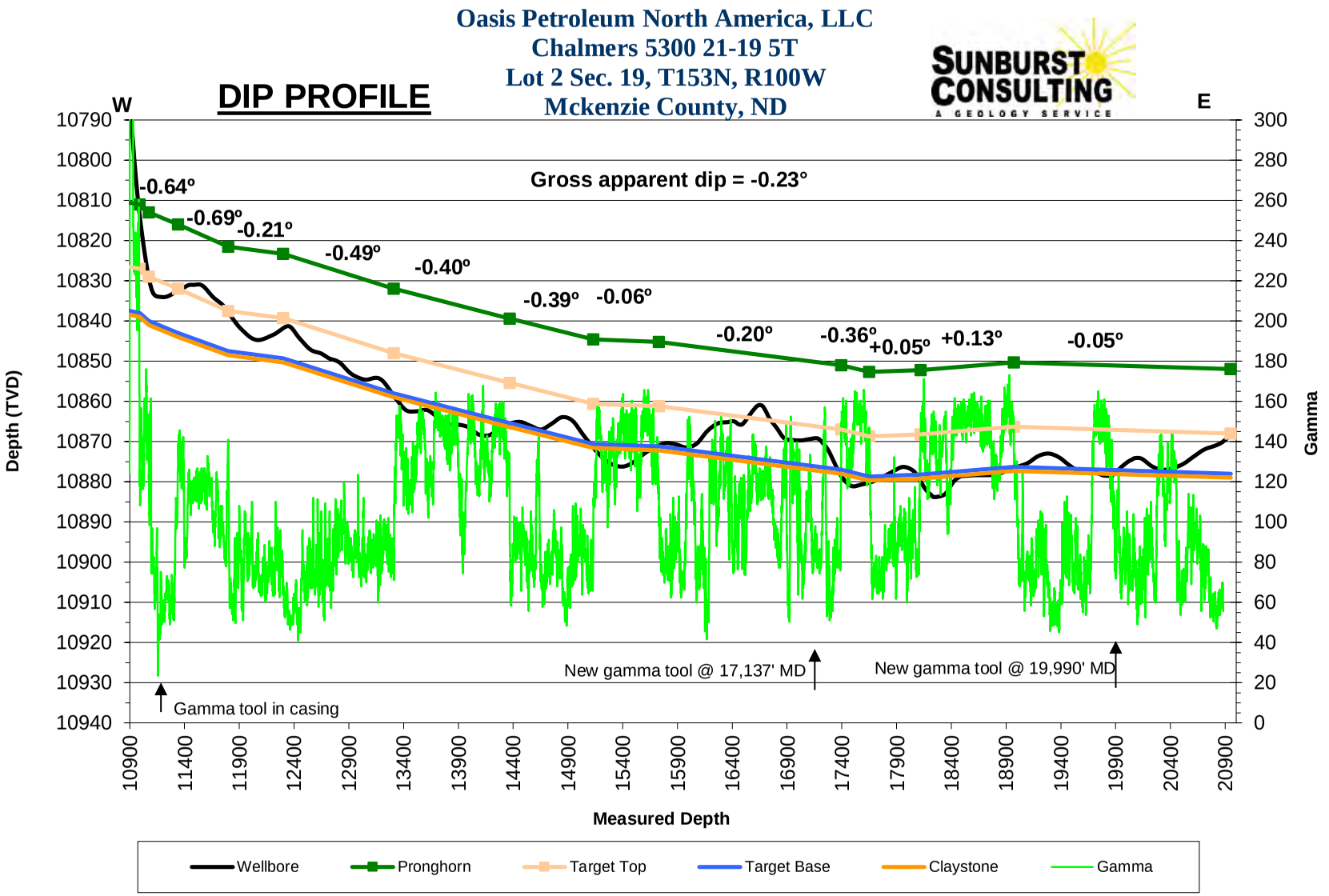
PROFILE



FORMATION MARKERS & DIP ESTIMATES

Oasis Petroleum North America, LLC - Chalmers 5300 21-19 5T

Dip Change Points	MD	TVD	TVD diff.	MD diff.	Dip	Dipping up/down	Type of Marker
Marker							
Zone entry	10,991'	10,827.00					Gamma
Target top	11,073'	10,829.00	2.00	82.00	***-1.40***	Down	Gamma
Target top	11,340'	10,832.00	3.00	267.00	***-0.64***	Down	Gamma
Target top	11,800'	10,837.50	5.50	460.00	***-0.69***	Down	Gamma
Target top	12,300'	10,839.30	1.80	500.00	***-0.21***	Down	Gamma
Claystone	13,310'	10,848.00	8.70	1010.00	***-0.49***	Down	Gamma
Claystone	14,369'	10,855.40	7.40	1059.00	***-0.40***	Down	Gamma
Claystone	15,130'	10,860.60	5.20	761.00	***-0.39***	Down	Gamma
Claystone	15,730'	10,861.20	0.60	600.00	***-0.06***	Down	Gamma
Claystone	17,394'	10,867.00	5.80	1664.00	***-0.20***	Down	Gamma
Claystone	17,650'	10,868.60	1.60	256.00	***-0.36***	Down	Gamma
Claystone	18,120'	10,868.20	-0.40	470.00	***0.05***	Up	Gamma
Claystone	18,970'	10,866.30	-1.90	850.00	***0.13***	Up	Gamma
TD	20,928'	10,868.00	1.70	1958.00	***-0.05***	Down	Gamma
Gross Dip							
Initial Target Contact	11,073'	10,829.00					
Projected Final Target Contact	20,928'	10,868.00	39.00	9855.00	***-0.23***	Down	Projection


Oasis Petroleum North America, LLC
Chalmers 5300 21-19 5T
Lot 2 Sec. 19, T153N, R100W
Mckenzie County, ND
DIP PROFILE
SUNBURST CONSULTING
A GEOLOGY SERVICE
W
E
Gross apparent dip = -0.23°
-0.64°
-0.69°
-0.21°
-0.49°
-0.40°
-0.39°
-0.06°
-0.20°
-0.36°
+0.05°
+0.13°
-0.05°
Gamma tool in casing
New gamma tool @ 17,137' MD
New gamma tool @ 19,990' MD
Depth (TVD)
Gamma
Measured Depth
10790
10800
10810
10820
10830
10840
10850
10860
10870
10880
10890
10900
10910
10920
10930
10940
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
10900
11400
11900
12400
12900
13400
13900
14400
14900
15400
15900
16400
16900
17400
17900
18400
18900
19400
19900
20400
20900
Wellbore
Pronghorn
Target Top
Target Base
Claystone
Gamma

SUNBURST CONSULTING, INC.

Operator:	Oasis Petroleum North America, LLC			Kick-off:	11/22/2014
Well :	Chalmers 5300 21-19 5T			Finish:	12/1/2014
County:	Mckenzie	State:	ND	Directional Supervision:	
QQ:	Lot 2	Section:	19	Ryan Directional Services	
Township:	153	N/S:	N		
Range:	100	E/W:	W	Date:	12/12/2014
Footages:	2127	FN/SL:	N	Time:	10:09
	327	FE/WL:	W	**F9 to re-calculate**	

Minimum Curvature Method (SPE-3362) Proposed dir: 82.65

[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	2243.00	0.70	155.50	2242.93	6.16	-0.85	-0.04	0.34
1	2329.00	1.10	151.30	2328.92	4.96	-0.24	0.40	0.47
2	2360.00	0.70	142.30	2359.92	4.55	0.02	0.60	1.36
3	2453.00	0.90	358.70	2452.91	4.83	0.35	0.97	1.64
4	2546.00	0.80	358.10	2545.90	6.21	0.32	1.11	0.11
5	2639.00	0.50	359.50	2638.90	7.26	0.29	1.22	0.32
6	2733.00	0.40	351.70	2732.89	8.00	0.24	1.26	0.12
7	2826.00	0.40	6.20	2825.89	8.64	0.23	1.33	0.11
8	2920.00	0.60	1.30	2919.89	9.46	0.27	1.48	0.22
9	3013.00	0.70	356.80	3012.88	10.51	0.25	1.60	0.12
10	3107.00	0.40	354.70	3106.88	11.41	0.19	1.65	0.32
11	3200.00	0.50	7.90	3199.87	12.14	0.22	1.77	0.15
12	3293.00	0.30	357.00	3292.87	12.78	0.26	1.89	0.23
13	3387.00	0.50	357.40	3386.87	13.44	0.23	1.95	0.21
14	3480.00	0.70	348.70	3479.86	14.40	0.10	1.94	0.24
15	3573.00	0.40	345.50	3572.86	15.27	-0.09	1.86	0.32
16	3667.00	0.70	336.10	3666.85	16.11	-0.41	1.66	0.33
17	3760.00	0.70	341.60	3759.85	17.17	-0.82	1.39	0.07
18	3854.00	0.50	338.40	3853.84	18.10	-1.15	1.17	0.22
19	3947.00	1.00	359.10	3946.83	19.29	-1.31	1.17	0.60
20	4040.00	0.90	355.70	4039.82	20.83	-1.38	1.30	0.12
21	4134.00	0.80	355.80	4133.81	22.22	-1.48	1.37	0.11
22	4227.00	0.70	342.90	4226.80	23.41	-1.70	1.31	0.21
23	4321.00	0.70	337.30	4320.80	24.49	-2.09	1.06	0.07
24	4413.00	0.50	355.40	4412.79	25.41	-2.34	0.93	0.30
25	4507.00	0.70	337.40	4506.79	26.35	-2.59	0.80	0.29
26	4600.00	0.60	320.10	4599.78	27.24	-3.12	0.39	0.24
27	4693.00	0.40	329.60	4692.78	27.90	-3.60	0.00	0.23
28	4787.00	0.40	286.30	4786.77	28.27	-4.08	-0.43	0.31
29	4880.00	0.40	266.20	4879.77	28.34	-4.71	-1.05	0.15
30	4973.00	1.10	31.30	4972.77	29.08	-4.57	-0.82	1.47
31	5067.00	0.90	30.40	5066.75	30.49	-3.73	0.20	0.21
32	5160.00	1.00	25.70	5159.74	31.85	-3.01	1.09	0.14
33	5253.00	0.80	39.50	5252.73	33.08	-2.25	2.01	0.32
34	5347.00	0.60	22.10	5346.72	34.05	-1.64	2.73	0.31

SUNBURST CONSULTING, INC.

Operator:	Oasis Petroleum North America, LLC			Kick-off:	11/22/2014
Well :	Chalmers 5300 21-19 5T			Finish:	12/1/2014
County:	Mckenzie	State:	ND	Directional Supervision:	
QQ:	Lot 2	Section:	19	Ryan Directional Services	
Township:	153	N/S:	N		
Range:	100	E/W:	W	Date:	12/12/2014
Footages:	2127	FN/SL:	N	Time:	10:09
	327	FE/WL:	W	**F9 to re-calculate**	

Minimum Curvature Method (SPE-3362) Proposed dir: 82.65

[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	5440.00	0.50	22.90	5439.72	34.87	-1.30	3.17	0.11
36	5533.00	0.70	358.00	5532.71	35.81	-1.16	3.43	0.35
37	5627.00	0.80	353.90	5626.70	37.04	-1.25	3.49	0.12
38	5720.00	0.60	328.10	5719.70	38.10	-1.58	3.31	0.40
39	5814.00	0.50	319.00	5813.69	38.83	-2.11	2.87	0.14
40	5907.00	0.70	341.60	5906.69	39.67	-2.55	2.54	0.33
41	6000.00	0.70	322.90	5999.68	40.66	-3.08	2.15	0.24
42	6067.00	0.70	316.70	6066.68	41.29	-3.60	1.71	0.11
43	6178.00	0.40	318.90	6177.67	42.07	-4.32	1.09	0.27
44	6271.00	0.40	289.20	6270.67	42.42	-4.84	0.62	0.22
45	6365.00	0.40	289.30	6364.67	42.64	-5.46	0.04	0.00
46	6458.00	0.60	302.50	6457.66	43.01	-6.18	-0.63	0.25
47	6552.00	0.60	274.10	6551.66	43.31	-7.09	-1.49	0.31
48	6645.00	0.40	295.00	6644.65	43.48	-7.87	-2.24	0.29
49	6738.00	0.40	242.20	6737.65	43.47	-8.45	-2.82	0.38
50	6832.00	0.80	87.40	6831.65	43.34	-8.08	-2.47	1.25
51	6925.00	0.70	111.30	6924.64	43.17	-6.90	-1.33	0.35
52	7018.00	0.50	105.70	7017.64	42.85	-5.98	-0.45	0.22
53	7112.00	0.80	101.60	7111.63	42.61	-4.95	0.54	0.32
54	7205.00	0.40	132.40	7204.63	42.26	-4.07	1.37	0.54
55	7298.00	0.50	88.50	7297.62	42.05	-3.43	1.98	0.38
56	7392.00	0.50	80.60	7391.62	42.13	-2.61	2.80	0.07
57	7485.00	0.30	2.70	7484.62	42.44	-2.20	3.25	0.57
58	7578.00	0.30	360.00	7577.62	42.92	-2.19	3.32	0.02
59	7672.00	0.30	349.30	7671.62	43.41	-2.23	3.34	0.06
60	7765.00	0.20	240.10	7764.62	43.57	-2.42	3.17	0.44
61	7859.00	0.20	158.60	7858.61	43.34	-2.50	3.06	0.28
62	7952.00	0.30	179.70	7951.61	42.94	-2.44	3.07	0.14
63	8045.00	0.30	204.90	8044.61	42.48	-2.54	2.91	0.14
64	8138.00	0.50	220.90	8137.61	41.95	-2.91	2.48	0.24
65	8232.00	0.60	225.20	8231.61	41.29	-3.53	1.78	0.12
66	8325.00	0.60	226.00	8324.60	40.61	-4.22	1.01	0.01
67	8419.00	0.20	293.60	8418.60	40.33	-4.73	0.47	0.59
68	8512.00	0.40	252.80	8511.60	40.30	-5.19	0.01	0.30
69	8605.00	0.10	38.80	8604.60	40.27	-5.45	-0.25	0.52

SUNBURST CONSULTING, INC.

Operator:	Oasis Petroleum North America, LLC			Kick-off:	11/22/2014
Well :	Chalmers 5300 21-19 5T			Finish:	12/1/2014
County:	Mckenzie	State:	ND	Directional Supervision:	
QQ:	Lot 2	Section:	19	Ryan Directional Services	
Township:	153	N/S:	N		
Range:	100	E/W:	W	Date:	12/12/2014
Footages:	2127	FN/SL:	N	Time:	10:09
	327	FE/WL:	W	**F9 to re-calculate**	

Minimum Curvature Method (SPE-3362) Proposed dir: 82.65

[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	8699.00	0.10	120.50	8698.60	40.29	-5.33	-0.13	0.14
71	8792.00	0.30	354.30	8791.60	40.49	-5.28	-0.06	0.40
72	8885.00	0.50	335.50	8884.59	41.11	-5.47	-0.17	0.25
73	8979.00	0.50	324.20	8978.59	41.81	-5.88	-0.48	0.10
74	9072.00	0.50	318.80	9071.59	42.45	-6.39	-0.90	0.05
75	9166.00	0.40	302.10	9165.58	42.93	-6.93	-1.39	0.17
76	9259.00	0.60	321.50	9258.58	43.48	-7.51	-1.89	0.28
77	9352.00	0.50	319.70	9351.58	44.17	-8.08	-2.36	0.11
78	9445.00	1.30	1.80	9444.56	45.54	-8.31	-2.41	1.06
79	9539.00	1.60	4.80	9538.53	47.91	-8.16	-1.97	0.33
80	9632.00	0.70	346.50	9631.52	49.76	-8.19	-1.76	1.03
81	9725.00	0.30	155.80	9724.51	50.09	-8.22	-1.75	1.07
82	9818.00	0.40	195.40	9817.51	49.55	-8.21	-1.80	0.27
83	9912.00	0.50	199.10	9911.51	48.85	-8.43	-2.11	0.11
84	10005.00	0.60	205.10	10004.50	48.02	-8.77	-2.55	0.12
85	10098.00	0.70	218.30	10097.50	47.14	-9.33	-3.22	0.19
86	10192.00	0.70	215.30	10191.49	46.22	-10.01	-4.02	0.04
87	10237.00	0.60	212.50	10236.49	45.79	-10.30	-4.36	0.23
88	10300.00	0.60	209.50	10299.49	45.23	-10.64	-4.77	0.05
89	10331.00	0.90	46.00	10330.48	45.26	-10.54	-4.67	4.79
90	10362.00	4.60	39.80	10361.44	46.38	-9.57	-3.56	11.96
91	10393.00	8.30	37.30	10392.24	49.12	-7.42	-1.08	11.97
92	10424.00	12.00	34.90	10422.75	53.54	-4.22	2.66	12.01
93	10456.00	15.40	35.40	10453.84	59.74	0.15	7.79	10.63
94	10487.00	18.90	36.30	10483.45	67.14	5.50	14.05	11.32
95	10518.00	22.70	37.70	10512.43	75.92	12.14	21.75	12.36
96	10549.00	26.20	38.70	10540.64	86.00	20.08	30.91	11.37
97	10580.00	29.50	39.10	10568.05	97.27	29.17	41.37	10.66
98	10611.00	33.10	38.90	10594.53	109.78	39.30	53.02	11.62
99	10643.00	36.40	38.80	10620.82	123.98	50.74	66.19	10.31
100	10674.00	39.60	39.50	10645.25	138.78	62.79	80.03	10.42
101	10705.00	43.40	40.20	10668.46	154.54	75.96	95.10	12.35
102	10736.00	46.90	40.50	10690.32	171.29	90.19	111.36	11.31
103	10767.00	50.20	41.90	10710.84	188.76	105.49	128.78	11.17
104	10798.00	52.70	44.80	10730.16	206.38	122.14	147.54	10.89

SUNBURST CONSULTING, INC.

Operator:	Oasis Petroleum North America, LLC			Kick-off:	11/22/2014
Well :	Chalmers 5300 21-19 5T			Finish:	12/1/2014
County:	Mckenzie	State:	ND	Directional Supervision:	
QQ:	Lot 2	Section:	19	Ryan Directional Services	
Township:	153	N/S:	N		
Range:	100	E/W:	W	Date:	12/12/2014
Footages:	2127	FN/SL:	N	Time:	10:09
	327	FE/WL:	W	**F9 to re-calculate**	
Minimum Curvature Method (SPE-3362)				Proposed dir:	82.65

[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	10829.00	55.30	46.50	10748.38	223.91	140.08	167.57	9.49
106	10860.00	59.00	47.00	10765.19	241.75	159.04	188.66	12.01
107	10891.00	63.90	47.40	10780.00	260.24	179.02	210.84	15.85
108	10923.00	67.70	47.80	10793.12	279.92	200.57	234.73	11.93
109	10954.00	71.80	47.10	10803.85	299.58	221.99	258.49	13.39
110	10985.00	76.20	46.40	10812.39	320.00	243.69	282.62	14.36
111	11016.00	78.50	46.50	10819.18	340.83	265.61	307.03	7.43
112	11047.00	79.80	45.80	10825.01	361.93	287.56	331.50	4.74
113	11078.00	82.30	44.90	10829.84	383.44	309.34	355.86	8.56
114	11109.00	86.70	45.30	10832.81	405.22	331.20	380.32	14.25
115	11140.00	89.60	45.90	10833.81	426.90	353.33	405.04	9.55
116	11199.00	89.90	45.80	10834.06	467.99	395.67	452.28	0.54
117	11229.00	90.30	46.10	10834.01	488.85	417.23	476.34	1.67
118	11261.00	90.80	46.70	10833.70	510.92	440.40	502.14	2.44
119	11293.00	91.00	47.40	10833.20	532.72	463.82	528.16	2.27
120	11324.00	91.40	47.50	10832.55	553.68	486.65	553.48	1.33
121	11356.00	90.30	49.30	10832.08	574.92	510.58	579.93	6.59
122	11388.00	90.70	49.70	10831.80	595.70	534.91	606.72	1.77
123	11420.00	91.10	49.70	10831.30	616.39	559.31	633.57	1.25
124	11450.00	90.00	51.00	10831.01	635.54	582.41	658.93	5.68
125	11480.00	89.90	51.20	10831.03	654.37	605.75	684.49	0.75
126	11511.00	90.40	51.60	10830.95	673.71	629.98	710.99	2.07
127	11542.00	89.60	52.70	10830.95	692.74	654.46	737.70	4.39
128	11573.00	88.70	54.00	10831.41	711.24	679.33	764.73	5.10
129	11605.00	88.10	55.00	10832.31	729.81	705.37	792.94	3.64
130	11636.00	88.10	54.80	10833.33	747.63	730.72	820.36	0.64
131	11668.00	88.60	54.60	10834.26	766.11	756.82	848.61	1.68
132	11700.00	88.90	54.80	10834.95	784.60	782.93	876.87	1.13
133	11731.00	88.70	56.30	10835.60	802.13	808.49	904.46	4.88
134	11762.00	88.20	57.70	10836.44	819.01	834.48	932.40	4.79
135	11793.00	87.80	58.30	10837.52	835.43	860.75	960.55	2.33
136	11823.00	87.60	59.30	10838.73	850.95	886.39	987.97	3.40
137	11854.00	87.90	59.10	10839.94	866.81	913.00	1016.39	1.16
138	11884.00	88.00	59.30	10841.02	882.17	938.75	1043.89	0.74
139	11914.00	88.50	60.00	10841.93	897.32	964.63	1071.49	2.87

SUNBURST CONSULTING, INC.

Operator:	Oasis Petroleum North America, LLC			Kick-off:	11/22/2014
Well :	Chalmers 5300 21-19 5T			Finish:	12/1/2014
County:	Mckenzie	State:	ND	Directional Supervision:	
QQ:	Lot 2	Section:	19	Ryan Directional Services	
Township:	153	N/S:	N		
Range:	100	E/W:	W	Date:	12/12/2014
Footages:	2127	FN/SL:	N	Time:	10:09
	327	FE/WL:	W	**F9 to re-calculate**	

Minimum Curvature Method (SPE-3362) Proposed dir: 82.65

[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	11946.00	88.50	59.90	10842.77	913.34	992.32	1101.01	0.31
141	11976.00	88.60	59.70	10843.53	928.42	1018.24	1128.64	0.75
142	12007.00	89.00	59.80	10844.18	944.03	1045.01	1157.19	1.33
143	12038.00	89.50	60.60	10844.59	959.44	1071.91	1185.84	3.04
144	12070.00	89.90	61.00	10844.75	975.05	1099.84	1215.54	1.77
145	12101.00	90.50	61.70	10844.65	989.91	1127.04	1244.42	2.97
146	12132.00	90.50	63.40	10844.37	1004.20	1154.55	1273.53	5.48
147	12162.00	90.80	64.20	10844.03	1017.45	1181.47	1301.92	2.85
148	12194.00	90.60	65.00	10843.64	1031.17	1210.37	1332.34	2.58
149	12226.00	90.90	65.00	10843.22	1044.69	1239.37	1362.84	0.94
150	12256.00	91.20	66.20	10842.67	1057.09	1266.69	1391.51	4.12
151	12286.00	91.00	67.60	10842.10	1068.85	1294.28	1420.38	4.71
152	12318.00	91.10	67.30	10841.51	1081.12	1323.82	1451.25	0.99
153	12349.00	89.80	67.60	10841.27	1093.01	1352.45	1481.17	4.30
154	12381.00	88.20	68.20	10841.83	1105.05	1382.10	1512.11	5.34
155	12413.00	87.60	68.30	10843.00	1116.90	1411.80	1543.08	1.90
156	12444.00	88.20	69.80	10844.14	1127.97	1440.73	1573.19	5.21
157	12476.00	88.30	71.30	10845.11	1138.62	1470.89	1604.46	4.70
158	12508.00	88.20	71.50	10846.09	1148.83	1501.20	1635.84	0.70
159	12539.00	88.80	72.40	10846.90	1158.43	1530.66	1666.29	3.49
160	12571.00	89.20	74.20	10847.46	1167.62	1561.31	1697.85	5.76
161	12602.00	89.80	73.60	10847.73	1176.22	1591.09	1728.49	2.74
162	12634.00	89.40	74.70	10847.95	1184.96	1621.87	1760.14	3.66
163	12666.00	89.10	75.30	10848.37	1193.24	1652.78	1791.85	2.10
164	12697.00	88.80	74.60	10848.94	1201.29	1682.71	1822.57	2.46
165	12729.00	89.50	75.50	10849.42	1209.54	1713.63	1854.28	3.56
166	12760.00	89.60	76.30	10849.66	1217.09	1743.69	1885.07	2.60
167	12792.00	89.30	75.80	10849.97	1224.81	1774.74	1916.85	1.82
168	12824.00	88.70	76.50	10850.53	1232.47	1805.81	1948.64	2.88
169	12855.00	88.20	76.80	10851.36	1239.62	1835.96	1979.46	1.88
170	12887.00	88.40	76.70	10852.31	1246.95	1867.09	2011.28	0.70
171	12918.00	88.80	76.80	10853.07	1254.05	1897.26	2042.10	1.33
172	12950.00	89.20	78.10	10853.63	1261.01	1928.49	2073.97	4.25
173	12981.00	89.30	79.00	10854.03	1267.16	1958.87	2104.88	2.92
174	13013.00	89.50	79.80	10854.37	1273.05	1990.32	2136.83	2.58

SUNBURST CONSULTING, INC.

Operator:	Oasis Petroleum North America, LLC			Kick-off:	11/22/2014
Well :	Chalmers 5300 21-19 5T			Finish:	12/1/2014
County:	Mckenzie	State:	ND	Directional Supervision:	
QQ:	Lot 2	Section:	19	Ryan Directional Services	
Township:	153	N/S:	N		
Range:	100	E/W:	W	Date:	12/12/2014
Footages:	2127	FN/SL:	N	Time:	10:09
	327	FE/WL:	W	**F9 to re-calculate**	

Minimum Curvature Method (SPE-3362) Proposed dir: 82.65

[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	13045.00	89.70	81.00	10854.59	1278.38	2021.87	2168.80	3.80
176	13076.00	90.40	81.70	10854.57	1283.04	2052.52	2199.79	3.19
177	13108.00	90.40	83.20	10854.34	1287.25	2084.24	2231.79	4.69
178	13139.00	90.30	84.50	10854.15	1290.57	2115.06	2262.79	4.21
179	13171.00	89.40	85.40	10854.24	1293.39	2146.94	2294.76	3.98
180	13203.00	88.70	86.00	10854.77	1295.79	2178.84	2326.71	2.88
181	13234.00	87.90	87.60	10855.69	1297.52	2209.78	2357.61	5.77
182	13266.00	87.70	88.00	10856.92	1298.74	2241.73	2389.46	1.40
183	13297.00	87.90	88.30	10858.11	1299.74	2272.69	2420.29	1.16
184	13329.00	87.70	89.90	10859.33	1300.25	2304.66	2452.07	5.04
185	13424.00	88.80	93.10	10862.24	1297.76	2399.57	2545.88	3.56
186	13518.00	90.90	93.20	10862.48	1292.59	2493.43	2638.30	2.24
187	13613.00	89.50	93.10	10862.15	1287.37	2588.28	2731.71	1.48
188	13708.00	88.40	92.90	10863.89	1282.40	2683.13	2825.14	1.18
189	13802.00	89.40	91.30	10865.70	1278.96	2777.05	2917.85	2.01
190	13897.00	90.50	90.70	10865.78	1277.30	2872.03	3011.84	1.32
191	13992.00	88.70	90.10	10866.44	1276.64	2967.02	3105.96	2.00
192	14087.00	89.10	90.10	10868.27	1276.47	3062.00	3200.14	0.42
193	14181.00	90.70	90.30	10868.43	1276.14	3156.00	3293.32	1.72
194	14276.00	91.30	89.60	10866.77	1276.23	3250.98	3387.54	0.97
195	14371.00	90.20	90.80	10865.53	1275.90	3345.97	3481.70	1.71
196	14466.00	90.30	89.90	10865.11	1275.32	3440.97	3575.85	0.95
197	14561.00	88.50	89.70	10866.11	1275.65	3535.96	3670.10	1.91
198	14655.00	90.40	90.50	10867.01	1275.48	3629.95	3763.29	2.19
199	14750.00	91.30	90.30	10865.60	1274.82	3724.94	3857.42	0.97
200	14845.00	90.70	90.40	10863.94	1274.24	3819.92	3951.54	0.64
201	14940.00	88.30	90.00	10864.77	1273.91	3914.91	4045.71	2.56
202	15035.00	87.60	90.20	10868.17	1273.74	4009.85	4139.85	0.77
203	15130.00	88.40	89.00	10871.49	1274.40	4104.78	4234.09	1.52
204	15224.00	88.30	88.90	10874.19	1276.13	4198.73	4327.48	0.15
205	15319.00	89.70	89.50	10875.85	1277.45	4293.70	4421.85	1.60
206	15414.00	89.90	88.20	10876.18	1279.36	4388.68	4516.29	1.38
207	15508.00	91.60	88.80	10874.95	1281.82	4482.64	4609.79	1.92
208	15603.00	90.90	89.60	10872.88	1283.15	4577.60	4704.14	1.12
209	15698.00	90.90	89.90	10871.39	1283.56	4672.59	4798.40	0.32

SUNBURST CONSULTING, INC.

Operator:	Oasis Petroleum North America, LLC			Kick-off:	11/22/2014
Well :	Chalmers 5300 21-19 5T			Finish:	12/1/2014
County:	Mckenzie	State:	ND	Directional Supervision:	
QQ:	Lot 2	Section:	19	Ryan Directional Services	
Township:	153	N/S:	N		
Range:	100	E/W:	W	Date:	12/12/2014
Footages:	2127	FN/SL:	N	Time:	10:09
	327	FE/WL:	W	**F9 to re-calculate**	

Minimum Curvature Method (SPE-3362) Proposed dir: 82.65

[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	15793.00	90.30	91.60	10870.39	1282.32	4767.57	4892.45	1.90
211	15887.00	89.30	91.10	10870.72	1280.10	4861.54	4985.36	1.19
212	15982.00	89.80	90.20	10871.47	1279.02	4956.53	5079.43	1.08
213	16077.00	91.40	90.50	10870.47	1278.44	5051.52	5173.57	1.71
214	16172.00	92.30	91.40	10867.41	1276.87	5146.46	5267.52	1.34
215	16267.00	90.00	91.50	10865.50	1274.47	5241.40	5361.38	2.42
216	16361.00	90.40	92.20	10865.17	1271.43	5335.35	5454.17	0.86
217	16393.00	90.40	91.00	10864.95	1270.54	5367.34	5485.78	3.75
218	16425.00	89.20	90.20	10865.06	1270.20	5399.34	5517.47	4.51
219	16456.00	88.50	90.30	10865.68	1270.07	5430.33	5548.19	2.28
220	16488.00	91.20	91.10	10865.77	1269.68	5462.32	5579.87	8.80
221	16520.00	92.00	91.10	10864.87	1269.06	5494.31	5611.51	2.50
222	16551.00	92.40	91.00	10863.68	1268.50	5525.28	5642.16	1.33
223	16614.00	91.60	89.70	10861.48	1268.11	5588.24	5704.55	2.42
224	16646.00	90.40	88.90	10860.92	1268.50	5620.23	5736.33	4.51
225	16678.00	88.60	88.50	10861.20	1269.23	5652.22	5768.15	5.76
226	16709.00	86.30	88.90	10862.58	1269.93	5683.18	5798.94	7.53
227	16741.00	87.60	89.30	10864.29	1270.43	5715.13	5830.69	4.25
228	16804.00	88.30	87.50	10866.54	1272.19	5778.06	5893.33	3.06
229	16835.00	87.00	88.20	10867.81	1273.35	5809.01	5924.18	4.76
230	16867.00	88.70	90.30	10869.01	1273.77	5840.98	5955.94	8.44
231	16899.00	89.70	91.10	10869.46	1273.38	5872.97	5987.62	4.00
232	16930.00	89.90	91.10	10869.57	1272.79	5903.97	6018.28	0.65
233	17025.00	89.90	91.80	10869.73	1270.38	5998.94	6112.17	0.74
234	17103.00	90.60	94.00	10869.39	1266.44	6076.83	6188.91	2.96
235	17169.00	89.80	94.20	10869.16	1261.72	6142.66	6253.60	1.25
236	17201.00	88.60	94.00	10869.61	1259.43	6174.58	6284.96	3.80
237	17264.00	87.70	92.00	10871.64	1256.13	6237.45	6346.90	3.48
238	17296.00	86.80	91.10	10873.18	1255.27	6269.40	6378.48	3.98
239	17391.00	86.90	89.40	10878.40	1254.86	6364.26	6472.50	1.79
240	17485.00	89.90	89.50	10881.02	1255.76	6458.20	6565.79	3.19
241	17580.00	90.50	89.20	10880.69	1256.83	6553.20	6660.14	0.71
242	17675.00	90.30	88.90	10880.03	1258.41	6648.18	6754.54	0.38
243	17770.00	91.10	88.90	10878.87	1260.23	6743.16	6848.97	0.84
244	17864.00	90.60	88.90	10877.47	1262.04	6837.13	6942.40	0.53

SUNBURST CONSULTING, INC.

Operator:	Oasis Petroleum North America, LLC			Kick-off:	11/22/2014
Well :	Chalmers 5300 21-19 5T			Finish:	12/1/2014
County:	Mckenzie	State:	ND	Directional Supervision:	
QQ:	Lot 2	Section:	19	Ryan Directional Services	
Township:	153	N/S:	N		
Range:	100	E/W:	W	Date:	12/12/2014
Footages:	2127	FN/SL:	N	Time:	10:09
	327	FE/WL:	W	**F9 to re-calculate**	

Minimum Curvature Method (SPE-3362) Proposed dir: 82.65

[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	17959.00	90.80	89.00	10876.31	1263.78	6932.11	7036.82	0.24
246	18054.00	88.00	88.70	10877.31	1265.68	7027.07	7131.25	2.96
247	18117.00	87.40	88.60	10879.83	1267.17	7090.00	7193.85	0.97
248	18149.00	87.50	88.60	10881.26	1267.95	7121.96	7225.65	0.31
249	18180.00	88.30	89.00	10882.39	1268.60	7152.93	7256.45	2.88
250	18212.00	88.90	89.20	10883.18	1269.10	7184.92	7288.24	1.98
251	18244.00	88.80	89.40	10883.82	1269.49	7216.91	7320.02	0.70
252	18338.00	92.00	90.00	10883.16	1269.98	7310.90	7413.29	3.46
253	18402.00	92.40	89.40	10880.71	1270.32	7374.85	7476.76	1.13
254	18433.00	91.70	89.60	10879.60	1270.59	7405.83	7507.52	2.35
255	18483.00	90.40	89.00	10878.68	1271.20	7455.81	7557.17	2.86
256	18528.00	90.00	89.00	10878.52	1271.98	7500.80	7601.90	0.89
257	18623.00	90.20	88.70	10878.36	1273.89	7595.79	7696.34	0.38
258	18718.00	89.80	88.60	10878.36	1276.13	7690.76	7790.82	0.43
259	18812.00	90.40	89.30	10878.19	1277.85	7784.74	7884.25	0.98
260	18907.00	90.70	89.10	10877.28	1279.18	7879.73	7978.63	0.38
261	19002.00	90.50	89.00	10876.29	1280.75	7974.71	8073.03	0.24
262	19096.00	90.60	88.20	10875.38	1283.05	8068.68	8166.52	0.86
263	19191.00	91.50	89.90	10873.64	1284.62	8163.64	8260.91	2.02
264	19286.00	89.30	90.40	10872.98	1284.38	8258.63	8355.08	2.37
265	19381.00	89.60	90.30	10873.89	1283.80	8353.63	8449.22	0.33
266	19476.00	88.00	89.60	10875.88	1283.88	8448.60	8543.43	1.84
267	19571.00	89.90	91.10	10877.62	1283.30	8543.58	8637.55	2.55
268	19602.00	90.00	91.20	10877.65	1282.68	8574.57	8668.21	0.46
269	19665.00	90.00	90.90	10877.65	1281.52	8637.56	8730.53	0.48
270	19697.00	89.90	91.50	10877.68	1280.85	8669.55	8762.18	1.90
271	19729.00	89.50	91.10	10877.84	1280.12	8701.55	8793.81	1.77
272	19760.00	89.40	91.00	10878.14	1279.56	8732.54	8824.48	0.46
273	19792.00	89.50	91.10	10878.45	1278.97	8764.53	8856.13	0.44
274	19855.00	90.40	91.40	10878.50	1277.60	8827.52	8918.43	1.51
275	19887.00	91.20	90.90	10878.06	1276.95	8859.51	8950.07	2.95
276	19918.00	91.60	91.10	10877.30	1276.41	8890.49	8980.73	1.44
277	19950.00	91.70	89.70	10876.38	1276.19	8922.48	9012.43	4.38
278	20013.00	90.80	89.50	10875.00	1276.63	8985.46	9074.95	1.46
279	20045.00	90.80	88.90	10874.56	1277.08	9017.45	9106.74	1.87

SUNBURST CONSULTING, INC.

Operator:	Oasis Petroleum North America, LLC			Kick-off:	11/22/2014
Well :	Chalmers 5300 21-19 5T			Finish:	12/1/2014
County:	Mckenzie	State:	ND	Directional Supervision:	
QQ:	Lot 2	Section:	19	Ryan Directional Services	
Township:	153	N/S:	N		
Range:	100	E/W:	W	Date:	12/12/2014
Footages:	2127	FN/SL:	N	Time:	10:09
	327	FE/WL:	W	**F9 to re-calculate**	

Minimum Curvature Method (SPE-3362) Proposed dir: 82.65

[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
280	20076.00	90.80	88.20	10874.12	1277.86	9048.44	9137.57	2.26
281	20139.00	88.90	88.80	10874.29	1279.51	9111.42	9200.24	3.16
282	20234.00	88.80	87.90	10876.20	1282.24	9206.36	9294.75	0.95
283	20329.00	90.20	88.90	10877.03	1284.90	9301.31	9389.26	1.81
284	20424.00	90.30	89.60	10876.61	1286.14	9396.30	9483.63	0.74
285	20519.00	91.00	89.60	10875.53	1286.80	9491.29	9577.93	0.74
286	20613.00	91.20	89.60	10873.73	1287.46	9585.27	9671.22	0.21
287	20708.00	90.90	88.50	10871.99	1289.03	9680.24	9765.61	1.20
288	20808.00	90.20	87.30	10871.03	1292.70	9780.17	9865.18	1.39
289	20871.00	91.30	87.20	10870.20	1295.72	9843.09	9927.97	1.75
290	20928.00	91.30	87.20	10868.91	1298.50	9900.01	9984.78	0.00

DEVIATION SURVEYS

Depth	Inclination	Azimuth
179	0.20	0.30
241	0.10	313.20
303	0.30	353.10
365	0.20	342.40
427	0.30	341.00
489	0.20	289.20
551	0.30	317.30
612	0.10	287.80
671	0.20	336.50
759	0.30	338.00
849	0.50	335.10
940	0.70	340.90
1032	0.60	336.80
1123	0.70	331.70
1217	0.60	327.80
1310	0.80	306.20
1403	0.40	319.70
1497	0.50	268.90
1590	0.10	215.60
1684	0.20	103.60
1777	0.40	86.30
1870	0.70	72.80
1964	0.50	119.50
2056	0.60	115.70
2149	0.70	129.50
2243	0.70	155.50
2310	0.70	155.50

FORMATION TOPS & STRUCTURAL RELATIONSHIPS

	Subject Well:								Offset Wells:			
Operator:	**Oasis Petroleum North America, LLC**											
Well Name:	**Chalmers 5300 21-19 5T**											
Location:	2,127' FNL & 327' FWL											
	Lot 2 Section 19, 153N, 100W											
Elevation:	GL: 2,051' Sub: 25' KB: 2,076'											
Formation/ Zone	**Prog. Top**	**Prog. Datum (MSL)**	**Driller's Depth Top (MD)**	**Driller's Depth Top (TVD)**	**Datum (MSL)**	**Interval Thickness**	**Thickness to Target Landing**	**Dip To Prog.**	**Dip To Chalmers 5300 31-19H**	**Dip To Chalmers 5300 21-19 7T2**	**Dip To Chalmers 5300 21-19 8T**	**Dip To Chalmers 5301 44-24 4T2R**
Kibbey Lime	8,384'	-6,308'	8,391'	8,390'	-6,314'	144'	2,444'	-6'	0'	-2'	-4'	-124'
Charles Salt	8,534'	-6,458'	8,535'	8,534'	-6,458'	679'	2,300'	0'	5'	0'	-1'	-96'
Base of Last Salt	9,209'	-7,133'	9,214'	9,213'	-7,137'	218'	1,621'	-4'	-6'	-4'	-4'	-146'
Mission Canyon	9,427'	-7,351'	9,432'	9,431'	-7,355'	564'	1,403'	-4'	-4'	-2'	-1'	-143'
Lodgepole	9,993'	-7,917'	9,996'	9,995'	-7,919'		839'	-2'	-2'	-2'	-3'	-149'
LP A	-	-	-	-	-	-	-	-	-	-	-	-
LP B	-	-	-	-	-	-	-	-	-	-	-	-
LP Fracture Zone	-	-	-	-	-	-	-	-	-	-	-	-
LP D	-	-	10,404'	10,403'	-8,327'	164'	431'	-	-	-2'	0'	-152'
LP E	-	-	10,568'	10,567'	-8,491'	102'	267'	-	-	-5'	-3'	-137'
LP F	-	-	10,707'	10,669'	-8,593'	45'	165'	-	-	-3'	-2'	-125'
False Bakken	10,706'	-8,630'	10,773'	10,714'	-8,638'	6'	120'	-8'	-11'	0'	-1'	-142'
Scallion	-	-	10,782'	10,720'	-8,644'	6'	114'	-	-13'	-3'	-4'	-145'
Upper Bakken Shale	10,716'	-8,640'	10,790'	10,726'	-8,650'	16'	108'	-10'	-13'	-2'	-3'	-143'
Middle Bakken	10,732'	-8,656'	10,820'	10,742'	-8,666'	41'	92'	-10'	-12'	-2'	-3'	-143'
Lower Bakken	10,766'	-8,690'	10,898'	10,783'	-8,707'	12'	51'	-17'	-20'	-1'	1'	-144'
Pronghorn	10,780'	-8,704'	10,930'	10,795'	-8,719'	18'	39'	-15'	-18'	-5'	0'	-144'
Three Forks	10,799'	-8,723'	10,986'	10,813'	-8,737'	14'	21'	-14'	-17'	-3'	0'	-146'
Target Top	10,811'	-8,735'	11,056'	10,827'	-8,751'	7'	7'	-16'	-18'	-3'	0'	-150'
Target Landing	10,818'	-8,742'	11,198'	10,834'	-8,758'	4'	0'	-16'	-19'	-3'	-1'	-149'
Target Base/Claystone	10,822'	-8,746'	-	10,838'	-8,762'	-	-	-	-19'	-4'	-1'	-149'
Claystone	10,823'	-8,747'	-	-	-	-	-	-	-	-	-	-

CONTROL DATA

Operator:	Oasis Petroleum North America, LLC				Oasis Petroleum North America, LLC				Oasis Petroleum North America, LLC				Oasis Petroleum North America, LLC			
Well Name:	Chalmers 5300 31-19H				Chalmers 5300 21-19 7T2				Chalmers 5300 21-19 8T				Chalmers 5301 44-24 4T2R			
Location:	NW SW Sec. 19 T153N R100W McKenzie County, ND ~1/4 mile S of subject well				Lot 2 Sec. 19, 153N, 100W McKenzie County, ND Shares pad with subject well				Lot 2 Sec. 19, 153N, 100W McKenzie County, ND Shares pad with subject well				SE SE Sec. 24 T153N R101W McKenzie County, ND ~1/2 mile SSW of subject well			
Elevation:	KB: 1,929'				KB: 2,076'				KB: 2,076'				KB: 2,039'			
Formation/ Zone	**E-Log Top**	**Datum (MSL)**	**Interval Thickness**	**Thickness to Target Landing**	**E-Log Top**	**Datum (MSL)**	**Interval Thickness**	**Thickness to Target Landing**	**TVD Top**	**Datum (MSL)**	**Interval Thickness**	**Thickness to Target Landing**	**TVD Top**	**Datum (MSL)**	**Interval Thickness**	**Thickness to Target Landing**
Kibbey Lime	8,243'	-6,314'	149'	2,425'	8,388'	-6,312'	146'	2,443'	8,386'	-6,310'	147'	2,447'	8,266'	-6,190'	172'	2,419'
Charles Salt	8,392'	-6,463'	668'	2,276'	8,534'	-6,458'	675'	2,297'	8,533'	-6,457'	676'	2,300'	8,438	-6,362'	629'	2,247'
Base of Last Salt	9,060'	-7,131'	220'	1,608'	9,209'	-7,133'	220'	1,622'	9,209'	-7,133'	221'	1,624'	9,067	-6,991'	221'	1,618'
Mission Canyon	9,280'	-7,351'	566'	1,388'	9,429'	-7,353'	564'	1,402'	9,430'	-7,354'	562'	1,403'	9,288	-7,212'	558'	1,397'
Lodgepole	9,846'	-7,917'	-	822'	9,993'	-7,917'	-	838'	9,992'	-7,916'	62'	841'	9,846	-7,770'	82'	839'
LP A	-	-	-	-	-	-	-	-	10,054'	-7,978'	132'	779'	9,928	-7,852'	99'	757'
LP B	-	-	-	-	-	-	-	-	10,186'	-8,110'	52'	647'	10,027	-7,951'	33'	658'
LP Fracture Zone	-	-	-	-	-	-	-	-	10,238'	-8,162'	165'	595'	10,060'	-7,984'	191'	625'
LP D	-	-	-	-	10,401'	-8,325'	161'	430'	10,403'	-8,327'	161'	430'	10,251'	-8,175'	179'	434'
LP E	-	-	-	-	10,562'	-8,486'	104'	269'	10,564'	-8,488'	103'	269'	10,430'	-8,354'	114'	255'
LP F	-	-	-	-	10,666'	-8,590'	48'	165'	10,667'	-8,591'	46'	166'	10,544'	-8,468'	28'	141'
False Bakken	10,556'	-8,627'	4'	112'	10,714'	-8,638'	3'	117'	10,713'	-8,637'	3'	120'	10,572'	-8,496'	3'	113'
Scallion	10,560'	-8,631'	6'	108'	10,717'	-8,641'	7'	114'	10,716'	-8,640'	7'	117'	10,575'	-8,499'	8'	110'
Upper Bakken Shale	10,566'	-8,637'	17'	102'	10,724'	-8,648'	16'	107'	10,723'	-8,647'	16'	110'	10,583	-8,507'	16'	102'
Middle Bakken	10,583'	-8,654'	33'	85'	10,740'	-8,664'	42'	91'	10,739'	-8,663'	45'	94'	10,599'	-8,523'	40'	86'
Lower Bakken	10,616'	-8,687'	14'	52'	10,782'	-8,706'	8'	49'	10,784'	-8,708'	11'	49'	10,639'	-8,563'	12'	46'
Pronghorn	10,630'	-8,701'	19'	38'	10,790'	-8,714'	20'	41'	10,795'	-8,719'	18'	38'	10,651'	-8,575'	16'	34'
Three Forks	10,649'	-8,720'	13'	19'	10,810'	-8,734'	14'	21'	10,813'	-8,737'	14'	20'	10,667'	-8,591'	10'	18'
Target Top	10,662'	-8,733'	6'	6'	10,824'	-8,748'	7'	7'	10,827'	-8,751'	6'	6'	10,677'	-8,601'	8'	8'
Target Landing	10,668'	-8,739'	4'	0'	10,831'	-8,755'	3'	0'	10,833'	-8,757'	4'	0'	10,685	-8,609'	4'	0'
Target Base/Claystone	10,672'	-8,743'	1'	-	10,834'	-8,758'	4'	-	10,837'	-8,761'	1'	-	10,689'	-8,613'	-	-
Claystone	10,673'	-8,744'	-	-	10,838'	-8,762'	-	-	10,838'	-8,762'	-	-	-	-	-	-

LANDING PROJECTION

Formation/ Zone:	Proposed Target Landing From:				
	Chalmers 5300 31-19H	Chalmers 5300 21-19 7T2	Chalmers 5300 21-19 8T	Chalmers 5301 44-24 4T2R	Average of Offset Wells
Kibbey Lime	10,815'	10,833'	10,837'	10,809'	10,824'
Charles Salt	10,810'	10,831'	10,834'	10,781'	10,814'
Base of Last Salt	10,821'	10,835'	10,837'	10,831'	10,831'
Mission Canyon	10,819'	10,833'	10,834'	10,828'	10,829'
Lodgepole	10,817'	10,833'	10,836'	10,834'	10,830'
LP A	-	-	-	-	-
LP B	-	-	-	-	-
LP Fracture Zone	-	-	-	-	-
LP D	-	10,833'	10,833'	10,837'	10,834'
LP E	-	10,836'	10,836'	10,822'	10,831'
LP F	-	10,834'	10,835'	10,810'	10,826'
False Bakken	10,826'	10,831'	10,834'	10,827'	10,830'
Scallion	10,828'	10,834'	10,837'	10,830'	10,832'
Upper Bakken Shale	10,828'	10,833'	10,836'	10,828'	10,831'
Middle Bakken	10,827'	10,833'	10,836'	10,828'	10,831'
Lower Bakken	10,835'	10,832'	10,832'	10,829'	10,832'
Pronghorn	10,833'	10,836'	10,833'	10,829'	10,833'
Three Forks	10,832'	10,834'	10,833'	10,831'	10,833'
Target Landing	10,833'	10,834'	10,833'	10,835'	10,834'

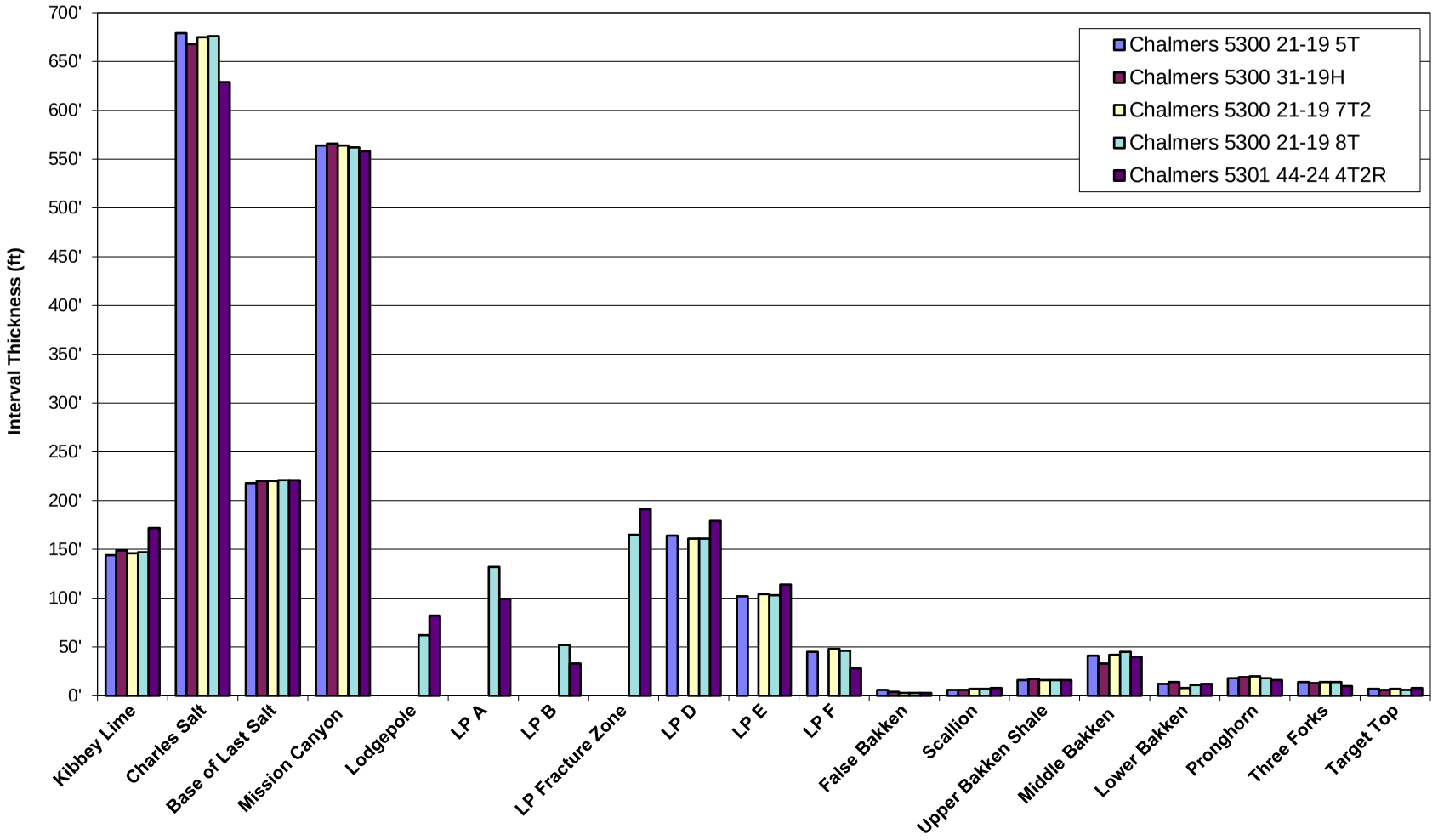
Current Landing Target (4' from target base): **10,834'**

Landing targets are subject to change as new formation tops are available

INTERVAL THICKNESS

Oasis Petroleum North America, LLC - Chalmers 5300 21-19 5T

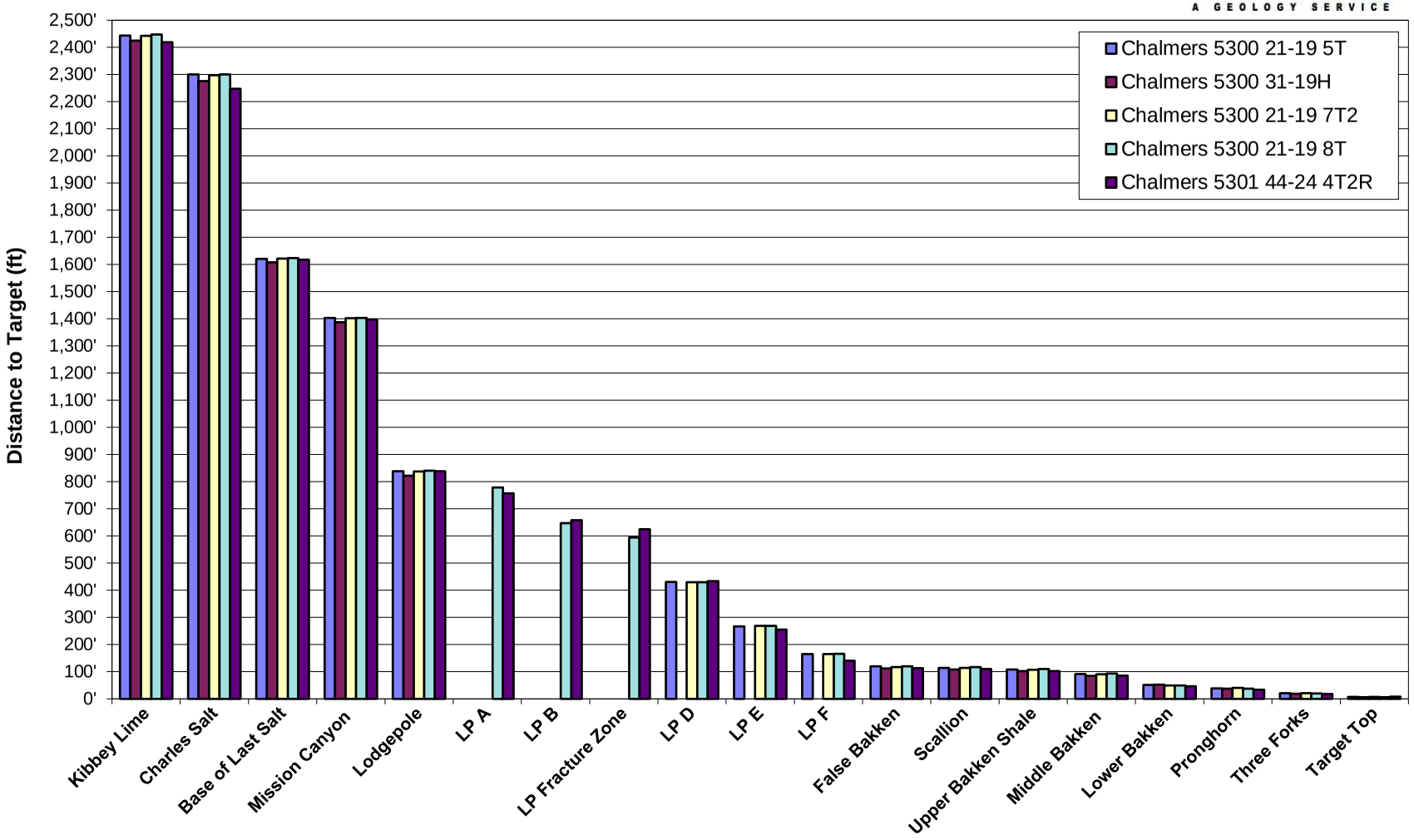
SUNBURST CONSULTING
A GEOLOGY SERVICE



ISOPACH TO TARGET

Oasis Petroleum North America, LLC - Chalmers 5300 21-19 5T

SUNBURST CONSULTING
A GEOLOGY SERVICE



LITHOLOGY

Chalmers 5300 21-19 5T

Rig crews caught 30' sample intervals, under the supervision of Sunburst geologists, from 8,240' to the TD of the lateral at 20,928'. Formation tops and lithologic markers have been inserted into the sample descriptions below for reference. Sample descriptions begin in the Kibbey Formation just prior to the Kibbey Lime. Samples were examined wet and dry under a binocular microscope. Sample fluorescent cuts are masked by invert mud through intermediate casing. Quantifiers in order of increasing abundance are trace, rare, occasional, common and abundant.

Vertical Log Descriptions: MD / TVD (MSL Datum)

Drilling in the Kibbey Formation [Mississippian Big Snowy Group]

8,240-8,270 SILTSTONE: brick orange-red brown, soft, sub blocky, calcareous cement, poorly cemented, no visible porosity, no visible oil stain; rare ANHYDRITE: milky pink, crystalline, soft, massive, earthy

8,270-8,300 SILTSTONE: brick orange-red brown, soft, platy, calcareous cement, poorly cemented, no visible porosity, no visible oil stain; trace SILTY SANDSTONE: tan-off white, very fine grained, sub rounded, moderately sorted, calcite cement, poorly cemented

8,300-8,330 SILTSTONE: brick orange-red brown, soft, platy, calcareous cement, poorly cemented, no visible porosity, no visible oil stain; trace SILTY SANDSTONE: tan-off white, very fine grained, sub rounded, moderately sorted, calcite cement, poorly cemented

8,330-8,360 SILTSTONE: brick orange-red brown, soft, platy, calcareous cement, poorly cemented, no visible porosity, no visible oil stain; trace SILTY SANDSTONE: tan-off white, very fine grained, sub rounded, moderately sorted, calcite cement, poorly cemented

8,360-8,390 SILTSTONE: brick orange-red brown, soft, platy, calcareous cement, poorly cemented, no visible porosity, no visible oil stain; trace SILTY SANDSTONE: tan-off white, very fine grained, sub rounded, moderately sorted, calcite cement, poorly cemented

Kibbey Lime 8,391' MD / 8,390' TVD (-6,314')

8,390-8,420 LIMESTONE: mudstone, light brown, light gray-gray brown, micro crystalline, firm-hard, argillaceous in part, dense, crystalline-chalky texture, no visible porosity; rare ANHYDRITE: off white, light gray, soft, amorphous texture; trace SILTSTONE: dark orange-light brown, tan, pink, soft, sub blocky, calcite cement, poorly cemented

8,420-8,450 SILTSTONE: dark orange-light brown, tan, pink, soft, sub blocky, calcite cement, poorly cement; trace SILTY SANDSTONE: tan-off white, very fine grained, sub rounded, moderately sorted, calcite cement, poorly cemented

8,450-8,480 SILTSTONE: dark orange-light brown, tan, pink, soft, sub blocky, calcite cement, poorly cement; trace SILTY SANDSTONE: tan-off white, very fine grained, sub rounded, moderately sorted, calcite cement, poorly cemented

8,480-8,510 SILTSTONE: dark orange-light brown, tan, soft, sub blocky, calcite cement, poorly cement; trace SILTY SANDSTONE: tan-off white, very fine grained, sub rounded, moderately sorted, calcite cement, poorly cemented

Charles Formation [Mississippian Madison Group] 8,535' MD / 8,534' TVD (-6,458')

8,510-8,540 SALT: clear-translucent, rarely frosted, crystalline, firm, euhedral, crystalline; trace LIMESTONE: mudstone, off white, gray, rare tan, fine crystalline, firm, laminated, crystalline-chalky texture, no visible porosity, no visible oil stain; trace SILTSTONE and SILTY SANDSTONE: as above

8,540-8,570 SALT: clear-translucent, rarely frosted, crystalline, firm, euhedral, crystalline; trace ARGILLACEOUS LIMESTONE: mudstone-wackestone, light-medium brown, tan, rare light-medium gray, rare gray tan, micro crystalline, friable, earthy

8,570-8,600 SALT: clear-translucent, rarely frosted, crystalline, firm, euhedral, crystalline

8,600-8,630 SALT: clear-translucent, rarely frosted, crystalline, firm, euhedral, crystalline

8,630-8,660 SALT: clear-translucent, rarely frosted, crystalline, firm, euhedral, crystalline

8,660-8,690 SALT: clear-translucent, rarely frosted, crystalline, firm, euhedral, crystalline

8,690-8,720 SALT: as above; ANHYDRITE: off white, soft, amorphous texture; occasional ARGILLACEOUS LIMESTONE: mudstone-wackestone, light-medium brown, tan, rare light-medium gray, rare gray tan, micro crystalline, friable, earthy

8,720-8,750 ARGILLACEOUS LIMESTONE: mudstone-wackestone, light-medium brown, tan, rare light-medium gray, rare gray tan, micro crystalline, friable, earthy; rare SALT: as above; trace ANHYDRITE: off white, soft, amorphous texture

8,750-8,780 LIMESTONE: mudstone, gray, off white, rare cream-tan, very fine crystalline, firm, laminated, crystalline-chalky texture, possible intercrystalline porosity, no visible oil stain; SALT: as above

8,780-8,810 SALT: as above; occasional LIMESTONE: mudstone, gray, off white, rare cream-tan, very fine crystalline, firm, laminated, crystalline-chalky texture, possible intercrystalline porosity, no visible oil stain

8,810-8,840 LIMESTONE: mudstone-wackestone, tan, cream, light brown, very fine crystalline, firm, laminated, crystalline, rare intercrystalline porosity, occasional even-spotty light-medium brown oil stain; trace DOLOMITE: medium-light brown, micro crystalline, firm, crystalline, occasional intercrystalline porosity, common medium-light brown spotty oil stain; trace: ANHYDRITE: off white, cream, soft, micro crystalline, anhedral, earthy

8,840-8,870 SALT: clear-translucent, rarely frosted, crystalline, firm, euhedral, crystalline

8,870-8,900 SALT: as above; occasional ANHYDRITE: off white, cream, soft, microcrystalline, anhedral, earthy; rare LIMESTONE: mudstone-wackestone, tan, cream, light brown, very fine crystalline, firm, laminated, crystalline, rare intercrystalline porosity, occasional spotty light-medium brown oil stain

8,900-8,930 LIMESTONE: mudstone, light brown, light gray brown, off white, microcrystalline, friable, laminated, earthy, trace intercrystalline porosity, rare even-spotty light-medium brown oil stain; common DOLOMITE: mudstone, light brown, light gray brown, microcrystalline, friable-firm, laminated, earthy trace intercrystalline porosity, occasional even-spotty light-medium brown oil stain; trace ANHYDRITE: off white, cream-light orange, soft, microcrystalline, anhedral, earthy

8,930-8,960 LIMESTONE: mudstone, light brown, light gray brown, off white, microcrystalline, friable, laminated, earthy, trace intercrystalline porosity, rare even-spotty light-medium brown oil stain; common DOLOMITE: mudstone, light brown, light gray brown, microcrystalline, friable-firm, laminated, earthy trace intercrystalline porosity, occasional even-spotty light-medium brown oil stain; trace ANHYDRITE: off white, cream, soft, microcrystalline, anhedral, earthy

8,960-8,990 LIMESTONE: mudstone, light brown, light gray brown, off white, microcrystalline, friable, laminated, earthy, trace intercrystalline porosity, rare even-spotty light-medium brown oil stain; common DOLOMITE: mudstone, light brown, light gray brown, microcrystalline, friable-firm, laminated, earthy trace intercrystalline porosity, occasional even-spotty light-medium brown oil stain; trace ANHYDRITE: off white, cream, soft, microcrystalline, anhedral, earthy

8,990-9,020 SALT: clear-translucent, rarely frosted, crystalline, firm, euhedral, crystalline

9,020-9,050 ANHYDRITE: off white, cream-light orange, soft, microcrystalline, anhedral, earthy; occasional DOLOMITE: mudstone, light brown, light gray brown, microcrystalline, friable-firm, laminated, earthy trace intercrystalline porosity, occasional spotty light-medium brown oil stain; trace SALT: as above

9,050-9,080 ANHYDRITE: off white, cream, soft, microcrystalline, massive, earthy-amorphous; occasional DOLOMITE: mudstone, light brown, light gray brown, microcrystalline, friable-firm, laminated, earthy trace intercrystalline porosity, occasional spotty light-medium brown oil stain; rare LIMESTONE: mudstone, light brown, light gray brown, off white, microcrystalline, friable, laminated, earthy, trace intercrystalline porosity, trace spotty light-medium brown oil stain

9,080-9,110 LIMESTONE: mudstone, light brown, light gray brown, off white, microcrystalline, friable, laminated, earthy, trace intercrystalline porosity, rare spotty light brown oil stain; occasional DOLOMITE: mudstone, light brown, light gray brown, microcrystalline, friable-firm, laminated, earthy trace intercrystalline porosity, occasional spotty light brown oil stain

9,110-9,140 LIMESTONE: mudstone, light brown, light gray brown, off white, microcrystalline, friable, laminated, earthy, trace intercrystalline porosity, rare spotty light brown oil stain; occasional DOLOMITE: mudstone, light brown, light gray brown, microcrystalline, friable-firm, laminated, earthy trace intercrystalline porosity, occasional spotty light brown oil stain; rare ANHYDRITE: off white, cream, soft, microcrystalline, massive, earthy-amorphous

9,140-9,170 LIMESTONE: mudstone, light brown, light gray brown, off white, microcrystalline, friable, laminated, earthy, trace intercrystalline porosity, trace spotty light brown oil stain; occasional DOLOMITE: mudstone, light brown, light gray brown, microcrystalline, friable-firm, laminated, earthy trace intercrystalline porosity, trace spotty light brown oil stain; rare ANHYDRITE: off white, cream, soft, microcrystalline, massive, earthy-amorphous

9,170-9,200 SALT: clear-translucent, rarely frosted, crystalline, firm, euhedral, crystalline

Base Last Salt [Charles Formation] 9,214' MD / 9,213' TVD (-7,137')

9,200-9,230 ANHYDRITE: off white, cream, soft, microcrystalline, massive, earthy-amorphous; DOLOMITE: mudstone, light brown, light gray brown, rare light gray, microcrystalline, friable-firm, laminated, earthy trace intercrystalline porosity, occasional spotty light brown oil stain

9,230-9,260 ANHYDRITE: off white, cream, soft, microcrystalline, massive, earthy-amorphous; occasional DOLOMITE: mudstone, light brown, light gray brown, microcrystalline, friable-firm, laminated, earthy trace intercrystalline porosity, occasional spotty light-medium brown oil stain; rare LIMESTONE: mudstone, light brown, light gray brown, off white, microcrystalline, friable, laminated, earthy, trace intercrystalline porosity, trace spotty light-medium brown oil stain

9,260-9,290 DOLOMITE: mudstone, light brown, light gray, light gray brown, microcrystalline, friable-firm, laminated, earthy trace intercrystalline porosity, occasional spotty light brown oil stain; ANHYDRITE: off white, cream, soft, microcrystalline, massive, earthy-amorphous

9,290-9,320 LIMESTONE: mudstone, light brown-brown, microcrystalline, firm, earthy-crystalline texture, trace intercrystalline porosity, trace spotty light brown oil stain; rare ANHYDRITE: off white, cream, soft, microcrystalline, massive, earthy-amorphous

9,320-9,350 LIMESTONE: mudstone, light gray, light gray brown, rare light brown, firm, earthy-crystalline texture, trace intercrystalline porosity, trace disseminated pyrite, trace spotty light brown oil stain; trace ANHYDRITE: off white, cream, soft, microcrystalline, massive, earthy-amorphous

9,350-9,380 LIMESTONE: mudstone, gray-light gray, gray brown, rare light brown, firm-friable, earthy-crystalline texture, trace intercrystalline porosity, trace disseminated pyrite, no visible oil stain; trace ANHYDRITE: off white, cream, soft, microcrystalline, massive, earthy-amorphous

9,380-9,410 LIMESTONE: mudstone, gray-light gray, gray brown, rare light brown, firm-friable, earthy-crystalline texture, trace intercrystalline porosity, trace disseminated pyrite, no visible oil stain; trace ANHYDRITE: off white, cream, soft, microcrystalline, massive, earthy-amorphous

Mission Canyon Formation [Mississippian Madison Group] 9,432' MD / 9,431' TVD (-7,355')

9,410-9,440 LIMESTONE: mudstone, light brown-off white, light gray brown, trace gray, firm-friable, earthy-crystalline texture, possible intercrystalline porosity, trace disseminated pyrite, argillaceous in part, no visible oil stain; trace ANHYDRITE: off white, cream, soft, microcrystalline, massive, earthy-amorphous

9,440-9,470 LIMESTONE: mudstone, light brown-brown, gray brown, trace gray, firm-friable, earthy-crystalline texture, trace disseminated pyrite, possible intercrystalline porosity, trace spotty light brown oil stain; trace ANHYDRITE: off white, cream, soft, microcrystalline, massive, earthy-amorphous

9,470-9,500 LIMESTONE: mudstone, light gray, light brown, gray brown, trace dark gray, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite, trace fossil fragments, trace spotty light brown oil stain

9,500-9,530 ARGILLACEOUS LIMESTONE: mudstone, light gray, occasional medium gray, rare gray tan, rare off white, trace dark gray, firm-friable, crystalline-chalky texture, trace disseminated pyrite, possible intercrystalline porosity, trace light brown spotty oil stain

9,530-9,560 LIMESTONE: mudstone, light gray, light brown, gray brown, trace dark gray, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite, trace fossil fragments, trace spotty light brown oil stain

9,560-9,590 LIMESTONE: mudstone, light gray, light brown, gray brown, trace dark gray, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite, trace fossil fragments, trace spotty light brown oil stain

9,590-9,620 ARGILLACEOUS LIMESTONE: mudstone, light gray, occasional medium gray, rare gray tan, rare off white, trace dark gray, firm-friable, crystalline-chalky texture, trace disseminated pyrite, trace fossil fragments, trace light brown spotty oil stain

9,620-9,650 LIMESTONE: mudstone, light gray, light brown, gray brown, trace dark gray, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite, trace fossil fragments, trace spotty light brown oil stain

9,650-9,680 LIMESTONE: mudstone, light gray, light brown, gray brown, trace dark gray, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite, trace fossil fragments, trace spotty light brown oil stain

9,680-9,710 LIMESTONE: mudstone, gray-brown, trace dark gray, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite, trace fossil fragments, trace spotty light brown oil stain

9,710-9,740 LIMESTONE: mudstone, light gray-brown, trace dark gray, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite, trace fossil fragments, trace spotty light brown oil stain

9,740-9,770 LIMESTONE: mudstone, light gray-brown, trace dark gray, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite, trace fossil fragments, trace spotty light brown oil stain

9,770-9,800 LIMESTONE: mudstone, light gray-brown, trace dark gray, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite, trace fossil fragments, trace spotty light brown oil stain

9,800-9,830 DOLOMITE: tan-light brown gray, off white, microcrystalline to fine crystalline, rare intercrystalline porosity, argillaceous in part, trace light brown spotty oil stain; rare LIMESTONE: mudstone, cream-tan, gray, trace off white, micro crystalline, friable-firm, dense, massive, trace laminated, occasional Algal laminated, earthy, trace calcite, trace pyrite, no visible porosity, trace dead oil stain

9,830-9,860 LIMESTONE: mudstone, light gray-brown, trace dark gray, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite, trace fossil fragments, trace spotty light brown oil stain

9,860-9,890 LIMESTONE: mudstone, light gray-brown, trace dark gray, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite, trace fossil fragments, trace spotty light brown oil stain

9,890-9,920 ARGILLACEOUS LIMESTONE: mudstone, light gray, occasional medium gray, rare gray tan, rare off white, trace dark gray, firm-friable, crystalline-chalky texture, trace disseminated pyrite, no visible porosity, no visible oil stain; LIMESTONE: mudstone, light-gray, rare off white, trace dark gray, trace brown, friable-firm, dense, earthy, possible intercrystalline porosity, trace light brown spotty oil stain

9,920-9,950 LIMESTONE: mudstone, light-gray, rare off white, trace brown, friable-firm, dense, earthy, trace spotty light brown oil stain; occasional ARGILLACEOUS LIMESTONE: mudstone, light gray, occasional medium gray, rare gray tan, rare off white, trace dark gray, firm-friable, crystalline-chalky texture, trace disseminated pyrite, no visible porosity, no visible oil stain

9,950-9,980 LIMESTONE: mudstone, light gray-brown, trace dark gray, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite, trace fossil fragments

Lodgepole [Mississippian Madison Group] 9,996' MD / 9,995' TVD (-7,919')

9,980-10,010 LIMESTONE: mudstone, light gray-brown, trace dark gray, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite, trace fossil fragments, no visible porosity, no visible oil stain

10,010-10,040 LIMESTONE: mudstone, light gray-brown, trace dark gray, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite, no visible porosity, no visible oil stain

10,040-10,070 LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite, no visible porosity, no visible oil stain

10,070-10,100 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite, no visible porosity, no visible oil stain

10,100-10,130 LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite, no visible porosity, no visible oil stain

10,130-10,160 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite, no visible porosity, no visible oil stain

10,160-10,190 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite, no visible porosity, no visible oil stain

10,190-10,220 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite, no visible porosity, no visible oil stain

10,220-10,250 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite, no visible porosity, no visible oil stain

10,250-10,280 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite, no visible porosity, no visible oil stain

10,280-10,310 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite, no visible porosity, no visible oil stain

10,310-10,340 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite, no visible porosity, no visible oil stain

10,340-10,370 LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite, no visible porosity, no visible oil stain

10,285-10,310 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite

10,310-10,340 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite

10,340-10,370 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite

10,370-10,400 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite

10,400-10,430 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite

10,430-10,460 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite

10,460-10,490 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite

10,490-10,520 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite

10,520-10,550 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy-crystalline texture, trace disseminated pyrite

10,550-10,580 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy-crystalline texture, trace disseminated pyrite

10,580-10,610 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy-crystalline texture, trace disseminated pyrite

10,610-10,640 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy-crystalline texture, trace disseminated pyrite

10,640-10,670 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy-crystalline texture, trace disseminated pyrite

10,670-10,700 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy- crystalline texture, trace disseminated pyrite

10,700-10,730 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy- crystalline texture, trace disseminated pyrite

10,730-10,760 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, firm, earthy texture, trace disseminated pyrite, no visible porosity, no visible oil stain

False Bakken Member [Devonian Period] 10,773' MD / 10,714' TVD (-8,638')

10,760-10,790 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, firm, earthy texture, trace disseminated pyrite, no visible porosity, no visible oil stain; trace SHALE: black, black gray, hard, splintery, smooth, pyritic, carbonaceous, fracture porosity

Scallion [Devonian Period] 10,782' MD / 10,720' TVD (-8,644')

10,760-10,790 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, firm, earthy texture, trace disseminated pyrite, no visible porosity, no visible oil stain; trace SHALE: black, black gray, hard, splintery, smooth, pyritic, carbonaceous, fracture porosity

Upper Bakken Shale [Bakken Formation Devonian Period] 10,790' MD / 10,726' TVD (-8,650')

10,790-10,820 SHALE: black, black gray, hard, splintery, smooth, pyritic, carbonaceous, fracture porosity

Middle Bakken Member [Bakken Formation Devonian Period] 10,820' MD / 10,742' TVD (-8,666')

10,820-10,850 SILTY SANDSTONE: light gray brown, light brown, trace light gray, very fine grained, friable sub rounded, smooth, moderately sorted, calcite cement moderately cemented, trace disseminated and nodular pyrite, fair intercrystalline porosity, occasional light brown spotty oil stain

10,850-10,880 SILTY SANDSTONE: light gray brown, light brown, trace light gray, very fine grained, friable sub rounded, smooth, moderately sorted, calcite cement moderately cemented, trace disseminated and nodular pyrite, fair intercrystalline porosity, occasional light brown spotty oil stain

Lower Bakken Shale [Bakken Formation Devonian Period] 10,898' MD / 10,783' TVD (-8,707')

10,880-10,910 SILTY SANDSTONE: light gray brown, light brown, trace light gray, very fine grained, friable sub rounded, smooth, moderately sorted, calcite cement moderately cemented, trace disseminated and nodular pyrite, fair intercrystalline porosity, occasional light brown spotty oil stain; occasional SHALE: black, black gray, hard, splintery, smooth, pyritic, carbonaceous, fracture porosity

Pronghorn [Bakken Formation Devonian Period] 10,930' MD / 10,795' TVD (-8,719')

10,910-10,940 SHALE: black, black gray, hard, splintery, smooth, pyritic, carbonaceous, fracture porosity; rare SILTSTONE: dark gray, trace gray black, friable-firm, sub blocky-sub splintery, moderately dolomite cemented, trace disseminated and nodular pyrite, trace spotty light brown oil stain

10,940-10,970 SILTSTONE: dark gray, trace gray black, friable-firm, sub blocky-sub split, moderately dolomite cemented, trace disseminated and nodular pyrite, trace spotty light brown oil stain

Three Forks [Three Forks Formation Devonian Period] 10,986' MD / 10,813' TVD (-8,737')

10,970-11,000 SILTSTONE: dark gray, trace gray black, friable-firm, sub blocky-sub split, moderately dolomite cemented, trace disseminated and nodular pyrite, trace spotty light brown oil stain; common DOLOMITE: mudstone, light brown-gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, possible intercrystalline porosity, trace light brown spotty oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain

11,000-11,030 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace light brown spotty oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain

11,030-11,060 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace light brown spotty oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain

11,060-11,090 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace light brown spotty oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain

11,090-11,120 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace light brown spotty oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain

11,120-11,150 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace light brown spotty oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain

11,150-11,180 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace light brown spotty oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain

11,180-11,210 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace light brown spotty oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain

11,210-11,240 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace light brown spotty oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain

11,240-11,270 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace light brown spotty oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain

11,270-11,300 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace light brown spotty oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,300-11,330 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace light brown spotty oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,330-10,360 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace light brown spotty oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,360-11,390 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common light brown spotty oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,390-11,420 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common light brown spotty oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,420-11,450 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common light brown spotty oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,450-11,480 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common light brown spotty oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,480-11,510 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain;

rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,510-11,540 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,540-11,570 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,570-11,600 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,600-11,630 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,630-10,660 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,660-11,690 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,690-11,720 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,720-11,750 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,750-11,780 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,780-11,810 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,810-11,840 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

11,840-11,870 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

11,870-11,900 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

11,900-11,930 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

11,930-11,960 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

11,960-11,990 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

11,990-12,020 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,020-12,050 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,050-12,080 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,080-12,110 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,110-12,140 DOLOMITE: mudstone, light brown, light brown gray, tan-cream, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,140-12,170 DOLOMITE: mudstone, light brown, light brown gray, tan-cream, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,170-12,200 DOLOMITE: mudstone, light brown, light brown gray, tan-cream, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light

green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,200-12,230 DOLOMITE: mudstone, light brown, light brown gray, tan-cream, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,230-12,260 DOLOMITE: mudstone, light brown, light brown gray, tan-cream, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,260-12,290 DOLOMITE: mudstone, light brown, light brown gray, tan-cream, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,290-12,320 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,320-12,350 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,350-12,380 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,380-12,410 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,410-12,440 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,440-12,470 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,470-12,500 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,500-12,530 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,530-12,560 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,560-12,590 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,590-12,620 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,620-12,650 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,650-12,680 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,680-12,710 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,710-12,740 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,740-12,770 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,770-12,800 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,800-10,830 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,830-12,860 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,860-10,890 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light

gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,890-12,920 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,920-12,950 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,950-12,980 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,980-13,010 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

13,010-13,040 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

13,040-13,070 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

13,070-13,100 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

13,100-13,130 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

13,130-13,160 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

13,160-13,190 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

13,190-13,220 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

13,220-13,250 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

13,250-13,280 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

13,280-13,310 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

13,310-13,340 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

13,340-13,370 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain

13,370-13,400 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain

13,400-13,430 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain

13,430-13,460 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

13,460-1,340 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

13,490-13,520 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence; occasional CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain

13,520-13,550 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence; CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain

13,550-13,580 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

13,580-13,610 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

13,610-13,640 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

13,640-13,670 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence; occasional CLAYSTONE: as above

13,670-13,700 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

13,700-13,730 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

13,730-13,760 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain

13,760-13,790 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain

13,790-13,820 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain

13,820-13,850 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

13,850-13,880 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

13,880-13,910 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

13,910-13,940 DOLOMITE: as above; CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain

13,940-13,970 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence; occasional CLAYSTONE: as above

13,970-14,000 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence; occasional CLAYSTONE: as above

14,000-14,030 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

14,030-14,060 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

14,060-14,090 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

14,090-14,120 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

14,120-14,150 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

14,150-14,180 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

14,180-14,210 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

14,210-14,240 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

14,240-14,270 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

14,270-14,300 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

14,300-14,330 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

14,330-14,360 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

14,360-14,390 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,390-14,420 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,420-14,450 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,450-14,480 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,480-14,510 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,510-14,540 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,540-14,570 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,570-14,600 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,600-14,630 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,630-14,660 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,660-14,690 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,690-14,720 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,720-14,750 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,750-14,780 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,780-14,810 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,810-14,840 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,840-14,870 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,870-14,900 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light

gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,900-14,930 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,930-14,960 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,960-14,990 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,990-15,020 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

15,020-15,050 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

15,050-15,080 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

15,080-15,110 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

15,110-15,140 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

15,140-15,170 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

15,170-15,200 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

15,200-15,230 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

15,230-15,260 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

15,260-15,290 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

15,290-15,320 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

15,320-15,350 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

15,350-15,380 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

15,380-15,410 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

15,410-15,440 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain

15,440-15,470 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain

15,470-15,500 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain

15,500-15,530 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

15,530-15,560 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

15,560-15,590 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

15,590-15,620 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

15,620-15,650 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

15,650-15,680 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

15,680-15,710 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

15,710-15,740 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence; rare CLAYSTONE: as above

15,740-15,770 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

15,770-15,800 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

15,800-15,830 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

15,830-15,860 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

15,860-15,890 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

15,890-15,920 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

15,920-15,950 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

15,950-15,980 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

15,980-16,010 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

16,010-16,040 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

16,040-16,070 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

16,070-16,100 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

16,100-16,130 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light

gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

16,130-16,260 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

16,190-16,190 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

16,190-16,220 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

16,220-16,250 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

16,250-16,280 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

16,280-16,310 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

16,310-16,340 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

16,340-16,370 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

16,370-10,400 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

10,400-10,430 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite

10,430-10,460 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite

10,460-10,490 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite

10,490-10,520 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy, rarely crystalline texture, trace disseminated pyrite

10,520-10,550 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy-crystalline texture, trace disseminated pyrite

10,550-10,580 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy-crystalline texture, trace disseminated pyrite

10,580-10,610 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy-crystalline texture, trace disseminated pyrite

10,610-10,640 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy-crystalline texture, trace disseminated pyrite

10,640-10,670 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy-crystalline texture, trace disseminated pyrite

10,670-10,700 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy- crystalline texture, trace disseminated pyrite

10,700-10,730 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, trace light brown, firm-friable, earthy- crystalline texture, trace disseminated pyrite

10,730-10,760 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, firm, earthy texture, trace disseminated pyrite, no visible porosity, no visible oil stain

10,760-10,790 ARGILLACEOUS LIMESTONE: mudstone, light gray-gray, gray brown, firm, earthy texture, trace disseminated pyrite, no visible porosity, no visible oil stain; trace SHALE: black, black gray, hard, splintery, smooth, pyritic, carbonaceous, fracture porosity

10,790-10,820 SHALE: black, black gray, hard, splintery, smooth, pyritic, carbonaceous, fracture porosity

10,820-10,850 SILTY SANDSTONE: light gray brown, light brown, trace light gray, very fine grained, friable sub rounded, smooth, moderately sorted, calcite cement moderately cemented, trace disseminated and nodular pyrite, fair intercrystalline porosity, occasional light brown spotty oil stain

10,850-10,880 SILTY SANDSTONE: light gray brown, light brown, trace light gray, very fine grained, friable sub rounded, smooth, moderately sorted, calcite cement moderately cemented, trace disseminated and nodular pyrite, fair intercrystalline porosity, occasional light brown spotty oil stain

10,880-10,910 SILTY SANDSTONE: light gray brown, light brown, trace light gray, very fine grained, friable sub rounded, smooth, moderately sorted, calcite cement moderately cemented, trace disseminated and nodular pyrite, fair intercrystalline porosity, occasional light brown spotty oil stain; occasional SHALE: black, black gray, hard, splintery, smooth, pyritic, carbonaceous, fracture porosity

10,910-10,940 SHALE: black, black gray, hard, splintery, smooth, pyritic, carbonaceous, fracture porosity; rare SILTSTONE: dark gray, trace gray black, friable-firm, sub blocky-sub splintery, moderately dolomite cemented, trace disseminated and nodular pyrite, trace spotty light brown oil stain

10,940-10,970 SILTSTONE: dark gray, trace gray black, friable-firm, sub blocky-sub splintery, moderately dolomite cemented, trace disseminated and nodular pyrite, trace spotty light brown oil stain

10,970-11,000 SILTSTONE: dark gray, trace gray black, friable-firm, sub blocky-sub splintery, moderately dolomite cemented, trace disseminated and nodular pyrite, trace spotty light brown oil stain; common DOLOMITE: mudstone, light brown-gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, possible intercrystalline porosity, trace light brown spotty oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain

11,000-11,030 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace light brown spotty oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain

11,030-11,060 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace light brown spotty oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain

11,060-11,090 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace light brown spotty oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain

11,090-11,120 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace light brown spotty oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain

11,120-11,150 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace light brown spotty oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain

11,150-11,180 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace light brown spotty oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain

11,180-11,210 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace light brown spotty oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain

11,210-11,240 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace light brown spotty oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain

11,240-11,270 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace light brown spotty oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain

11,270-11,300 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace light brown spotty oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,300-11,330 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace light brown spotty oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,330-10,360 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace light brown spotty oil stain; rare SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,360-11,390 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common light brown spotty oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,390-11,420 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common light brown spotty oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,420-11,450 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common light brown spotty oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,450-11,480 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common light brown spotty oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,480-11,510 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,510-11,540 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,540-11,570 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,570-11,600 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,600-11,630 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,630-10,660 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,660-11,690 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,690-11,720 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain;

occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,720-11,750 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,750-11,780 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,780-11,810 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

11,810-11,840 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

11,840-11,870 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

11,870-11,900 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

11,900-11,930 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

11,930-11,960 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

11,960-11,990 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

11,990-12,020 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,020-12,050 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,050-12,080 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,080-12,110 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,110-12,140 DOLOMITE: mudstone, light brown, light brown gray, tan-cream, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,140-12,170 DOLOMITE: mudstone, light brown, light brown gray, tan-cream, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,170-12,200 DOLOMITE: mudstone, light brown, light brown gray, tan-cream, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,200-12,230 DOLOMITE: mudstone, light brown, light brown gray, tan-cream, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,230-12,260 DOLOMITE: mudstone, light brown, light brown gray, tan-cream, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,260-12,290 DOLOMITE: mudstone, light brown, light brown gray, tan-cream, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,290-12,320 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,320-12,350 DOLOMITE: mudstone, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,350-12,380 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,380-12,410 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light

gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,410-12,440 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,440-12,470 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,470-12,500 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,500-12,530 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,530-12,560 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,560-12,590 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,590-12,620 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,620-12,650 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,650-12,680 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,680-12,710 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,710-12,740 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,740-12,770 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,770-12,800 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,800-10,830 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,830-12,860 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,860-10,890 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,890-12,920 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,920-12,950 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,950-12,980 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

12,980-13,010 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

13,010-13,040 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

13,040-13,070 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

13,070-13,100 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light

gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

13,100-13,130 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

13,130-13,160 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

13,160-13,190 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

13,190-13,220 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

13,220-13,250 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

13,250-13,280 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

13,280-13,310 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

13,310-13,340 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

13,340-13,370 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain

13,370-13,400 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain

13,400-13,430 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain

13,430-13,460 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

13,460-1,340 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

13,490-13,520 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence; occasional CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain

13,520-13,550 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence; CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain

13,550-13,580 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

13,580-13,610 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

13,610-13,640 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

13,640-13,670 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence; occasional CLAYSTONE: as above

13,670-13,700 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

13,700-13,730 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

13,730-13,760 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain

13,760-13,790 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain

13,790-13,820 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain

13,820-13,850 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

13,850-13,880 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

13,880-13,910 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

13,910-13,940 DOLOMITE: as above; CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain

13,940-13,970 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence; occasional CLAYSTONE: as above

13,970-14,000 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence; occasional CLAYSTONE: as above

14,000-14,030 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

14,030-14,060 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

14,060-14,090 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

14,090-14,120 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

14,120-14,150 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

14,150-14,180 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

14,180-14,210 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

14,210-14,240 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

14,240-14,270 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

14,270-14,300 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

14,300-14,330 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

14,330-14,360 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

14,360-14,390 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,390-14,420 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,420-14,450 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light

gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,450-14,480 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,480-14,510 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,510-14,540 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,540-14,570 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,570-14,600 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,600-14,630 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,630-14,660 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,660-14,690 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,690-14,720 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,720-14,750 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,750-14,780 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,780-14,810 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,810-14,840 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,840-14,870 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,870-14,900 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,900-14,930 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,930-14,960 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,960-14,990 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,990-15,020 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

15,020-15,050 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

15,050-15,080 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

15,080-15,110 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

15,110-15,140 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light

gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

15,140-15,170 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

15,170-15,200 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

15,200-15,230 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

15,230-15,260 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

15,260-15,290 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

15,290-15,320 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

15,320-15,350 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

15,350-15,380 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

15,380-15,410 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

15,410-15,440 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain

15,440-15,470 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain

15,470-15,500 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain

15,500-15,530 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

15,530-15,560 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

15,560-15,590 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

15,590-15,620 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

15,620-15,650 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

15,650-15,680 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

15,680-15,710 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

15,710-15,740 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence; rare CLAYSTONE: as above

15,740-15,770 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

15,770-15,800 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

15,800-15,830 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

15,830-15,860 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

15,860-15,890 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

15,890-15,920 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

15,920-15,950 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

15,950-15,980 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

15,980-16,010 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

16,010-16,040 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light

gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

16,040-16,070 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

16,070-16,100 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

16,100-16,130 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

16,130-16,260 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

16,190-16,190 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

16,190-16,220 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

16,220-16,250 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

16,250-16,280 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

16,280-16,310 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

16,310-16,340 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

16,340-16,370 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

16,370-10,400 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

10,400-10,430 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

10,430-16,460 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

16,460-16,490 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

16,490-16,520 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

16,520-16,550 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

16,550-16,580 DOLOMITE: mudstone, light gray, light brown-light brown gray, tan-cream, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

16,580-16,610 DOLOMITE: mudstone, tan, light brown-light brown gray, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

16,610-16,640 DOLOMITE: mudstone, tan, light brown-light brown gray, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

16,640-16,670 DOLOMITE: mudstone, tan, light brown-light brown gray, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

16,670-16,700 DOLOMITE: mudstone, tan, light brown-light brown gray, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

16,700-16,730 DOLOMITE: mudstone, light brown-tan, light brown gray, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty light brown oil stain; occasional SHALE: light

green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

16,730-16,760 DOLOMITE: mudstone, light brown-tan, light brown gray, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

16,760-16,790 DOLOMITE: mudstone, light brown-tan, light brown gray, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

10,790-16,820 DOLOMITE: mudstone, light brown-tan, light brown gray, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

16,820-16,850 DOLOMITE: mudstone, light brown-tan, light brown gray, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

16,850-16,880 DOLOMITE: mudstone, light brown-tan, light brown gray, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

16,880-16,910 DOLOMITE: mudstone, light brown-tan, light brown gray, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

16,910-16,940 DOLOMITE: mudstone, light brown-tan, light brown gray, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty light brown oil stain; occasional SHALE: light green-light gray green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

16,940-16,970 DOLOMITE: mudstone, light brown-tan, light brown gray, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

16,970-17,000 DOLOMITE: mudstone, light brown-tan, light brown gray, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

17,000-17,030 DOLOMITE: mudstone, light brown-tan, light brown gray, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

17,030-17,060 DOLOMITE: mudstone, light brown-tan, light brown gray, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

17,060-17,090 DOLOMITE: mudstone, light brown-tan, light brown gray, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

17,090-17,120 DOLOMITE: mudstone, light brown-tan, light brown gray, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

17,120-17,150 DOLOMITE: mudstone, light brown-tan, light brown gray, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

17,150-17,180 DOLOMITE: mudstone, light brown-tan, light brown gray, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

17,180-17,210 DOLOMITE: mudstone, light brown-tan, occasional light brown gray, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

17,210-17,240 DOLOMITE: mudstone, light brown-tan, occasional light brown gray, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

17,240-17,270 DOLOMITE: mudstone, light brown-tan, occasional light brown gray, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

17,270-17,300 DOLOMITE: mudstone, light brown-tan, occasional light brown gray, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

17,300-17,330 DOLOMITE: mudstone, light brown-tan, occasional light brown gray, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

17,330-17,360 DOLOMITE: mudstone, light brown-tan, occasional light brown gray, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

17,360-17,390 DOLOMITE: mudstone, light brown-tan, occasional light brown gray, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

17,390-17,420 DOLOMITE: mudstone, light brown-tan, occasional light brown gray, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty light brown oil stain; occasional

SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; rare CLAYSTONE; slow pale yellow streaming cut fluorescence

17,420-17,450 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

17,450-17,480 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain

17,480-17,510 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

17,510-17,540 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

17,540-17,570 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

17,570-17,600 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

17,600-17,630 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

17,630-17,660 CLAYSTONE: as above; common DOLOMITE: mudstone, light brown-tan, occasional light brown gray, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow yellow streaming cut fluorescence

17,660-17,690 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

17,690-17,720 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

17,720-17,750 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

17,750-17,780 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

17,780-17,810 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

17,810-17,840 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

17,840-17,870 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

17,870-17,900 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

17,900-17,030 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

17,930-17,960 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

17,960-17,990 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

17,990-18,020 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

18,020-18,050 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

18,050-18,080 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

18,080-18,110 DOLOMITE: mudstone, light brown, tan, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; rare SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

18,110-18,140 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

18,140-18,170 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

18,170-18,200 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

18,200-18,230 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

18,230-18,260 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

18,260-18,290 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

18,290-18,320 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

18,320-18,350 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

18,350-18,380 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

18,380-18,410 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

18,410-18,440 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

18,440-18,470 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

18,470-18,500 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

18,500-18,530 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

18,530-18,560 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

18,560-18,590 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

18,590-18,620 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

18,620-18,650 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

18,650-18,680 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

18,680-18,710 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

18,710-18,740 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

18,740-18,770 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

18,770-18,800 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

18,800-18,830 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

18,830-18,860 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

18,860-18,890 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

18,890-18,920 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

18,920-18,950 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

18,950-18,980 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

18,980-19,010 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

19,010-19,040 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

19,040-19,070 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

19,070-19,100 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

19,100-19,130 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

19,130-19,160 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

19,160-19,190 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

19,190-19,220 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

19,220-19,250 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

19,250-19,280 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

19,280-19,310 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

19,310-19,340 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

19,340-19,370 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

19,370-19,400 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

19,400-19,430 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

19,430-19,460 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

19,460-19,490 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

19,490-19,520 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

19,520-19,550 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

19,550-19,580 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

19,580-19,610 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain;

occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

19,610-19,640 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

19,640-19,670 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

19,670-19,700 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

19,700-19,730 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

19,730-19,760 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

19,760-19,790 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

19,790-19,820 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

19,820-19,850 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

19,850-19,880 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; common DOLOMITE: as above

19,880-19,910 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

19,910-19,940 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

19,940-19,970 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

19,970-20,000 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

20,000-20,030 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

20,030-20,060 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

20,060-20,090 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

20,090-20,120 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

20,120-20,150 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

20,150-20,180 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

20,180-20,210 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

2,021,020,240 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

20,240-20,270 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

20,270-20,300 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

20,300-20,330 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

20,330-20,360 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

20,360-20,390 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain;

occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

20,390-20,420 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

20,420-20,450 DOLOMITE: mudstone, light brown-tan, trace light gray brown, trace pink, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty-rare even light brown oil stain; occasional SHALE: light green-light gray green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

20,450-20,480 DOLOMITE: mudstone, light-medium brown, common tan, firm, laminated, micro sucrosic, trace disseminated pyrite, common intercrystalline porosity, common spotty-even light brown oil stain; occasional SHALE: light green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

20,480-20,510 DOLOMITE: mudstone, light-medium brown, common tan, firm, laminated, micro sucrosic, trace disseminated pyrite, common intercrystalline porosity, common spotty-even light brown oil stain; occasional SHALE: light green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

20,510-20,540 DOLOMITE: mudstone, light-medium brown, common tan, firm, laminated, micro sucrosic, trace disseminated pyrite, common intercrystalline porosity, common spotty-even light brown oil stain; occasional SHALE: light green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

20,540-20,570 DOLOMITE: mudstone, light-medium brown, common tan, firm, laminated, micro sucrosic, trace disseminated pyrite, common intercrystalline porosity, common spotty-even light brown oil stain; occasional SHALE: light green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

20,570-20,600 DOLOMITE: mudstone, light-medium brown, common tan, firm, laminated, micro sucrosic, trace disseminated pyrite, common intercrystalline porosity, common spotty-even light brown oil stain; occasional SHALE: light green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

20,600-20,630 DOLOMITE: mudstone, light-medium brown, common tan, firm, laminated, micro sucrosic, trace disseminated pyrite, common intercrystalline porosity, common spotty-even light brown oil stain; occasional SHALE: light green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

20,630-20,660 DOLOMITE: mudstone, light-medium brown, common tan, firm, laminated, micro sucrosic, trace disseminated pyrite, common intercrystalline porosity, common spotty-even light brown oil stain; occasional SHALE: light green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

20,660-20,690 DOLOMITE: mudstone, light-medium brown, common tan, firm, laminated, micro sucrosic, trace disseminated pyrite, common intercrystalline porosity, common spotty-even light brown oil stain; occasional SHALE: light green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

20,690-20,720 DOLOMITE: mudstone, light-medium brown, common tan, firm, laminated, micro sucrosic, trace disseminated pyrite, common intercrystalline porosity, common spotty-even light brown oil stain; occasional SHALE: light green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

20,720-20,750 DOLOMITE: mudstone, light-medium brown, common tan, firm, laminated, micro sucrosic, trace disseminated pyrite, common intercrystalline porosity, common spotty-even light brown oil stain; occasional SHALE: light green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

20,750-20,780 DOLOMITE: mudstone, light-medium brown, common tan, firm, laminated, micro sucrosic, trace disseminated pyrite, common intercrystalline porosity, common spotty-even light brown oil stain; occasional SHALE: light green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

20,780-20,810 DOLOMITE: mudstone, light-medium brown, common tan, firm, laminated, micro sucrosic, trace disseminated pyrite, common intercrystalline porosity, common spotty-even light brown oil stain; occasional SHALE: light green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

20,810-20,840 DOLOMITE: mudstone, light-medium brown, common tan, firm, laminated, micro sucrosic, trace disseminated pyrite, common intercrystalline porosity, common spotty-even light brown oil stain; occasional SHALE: light green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

20,840-20,870 DOLOMITE: mudstone, light-medium brown, common tan, firm, laminated, micro sucrosic, trace disseminated pyrite, common intercrystalline porosity, common spotty-even light brown oil stain; occasional SHALE: light green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

20,870-20,900 DOLOMITE: mudstone, light-medium brown, common tan, firm, laminated, micro sucrosic, trace disseminated pyrite, common intercrystalline porosity, common spotty-even light brown oil stain; occasional SHALE: light green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

20,900-20,928 DOLOMITE: mudstone, light-medium brown, common tan, firm, laminated, micro sucrosic, trace disseminated pyrite, common intercrystalline porosity, common spotty-even light brown oil stain; occasional SHALE: light green, mint green, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; fast yellow streaming cut fluorescence

RYAN DIRECTIONAL SERVICES, INC.
A NABORS COMPANY

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

Tuesday, December 02, 2014

State of North Dakota

Subject: **Surveys**

Re: **Oasis**
Chalmers 5300 21-19 5T
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*
Maddalena, Ronald	MWD Operator	O.H.	2243'	20871'	11/09/14	12/01/14	MWD	20928'
McCammond, Mike	MWD Operator	O.H.	0'	2243'	09/27/14	09/28/14	MWD	2243'

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

Douglas Hudson

Hudson, Douglas
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

Sunday, September 28, 2014

State of North Dakota
County of McKenzie

Subject: **Survey Certification Letter**

Survey Company:	**Ryan Directional Services, Inc.**		
Job Number:	**8056**	Surface:	**48 3' 42.270 N / 103 36' 10.110 W**
Survey Job Type:	**Ryan MWD**	A.P.I. No:	**33-053-06018**
Customer:	**Oasis Petroleum**	Location:	**McKenzie, ND**
Well Name:	**Chalmers 5300 21-19 5T**	RKB Height:	**2076'**
Rig Name:	**Nabors B-22**	Distance to Bit:	**57'**

Surveyor Name	*Surveyor Title*	*Borehole Number*	*Start Depth*	*End Depth*	*Start Date*	*End Date*	*Type of*	*TD Straight Line Projection*
Mike McCammond	MWD Supervisor	OH	0'	2243'	09/27/14	09/28/14	MWD	2310'

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.

Mike McCammond
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

Monday, December 01, 2014

State of North Dakota
County of McKENZIE

Subject: **Survey Certification Letter**

Survey Company:	**Ryan Directional Services, Inc.**		
Job Number:	**8274**	Surface:	
Survey Job Type:	**Ryan MWD**	A.P.I. No:	**33-053-06018**
Customer:	**Oasis Petroleum**	Location:	**McKENZIE, ND**
Well Name:	**Chalmers 5300 21-19 5T**	RKB Height:	**25'**
Rig Name:	**NABORS B22**	Distance to Bit:	**57'**

Surveyor Name	*Surveyor Title*	*Borehole Number*	*Start Depth*	*End Depth*	*Start Date*	*End Date*	*Type of*	*TD Straight Line Projection*
RONALD MADDALENA	MWD Supervisor	OH	2329'	20871'	11/09/14	12/01/14	MWD	20928'

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.

RONALD MADDALENA
MWD Supervisor
Ryan Directional Services, Inc.

Report #: 1
Date: 26-Sep-14

RYAN DIRECTIONAL SERVICES, INC.
A NABORS COMPANY

Ryan Job # 8056

SURVEY REPORT

Customer: Oasis Petroleum
Well Name: Chalmers 5300 21-19 5T
Rig #: Nabors B-22
API #: 33-053-06018
Calculation Method: Minimum Curvature Calculation

MWD Operator: M McCammond / R Maddalena
Directional Drillers: RPM
Survey Corrected To: True North
Vertical Section Direction: 82.56
Total Correction: 8.17
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	**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
1	179	0.20	0.30	71.00	179.00	0.04	0.31	0.00	0.11
2	241	0.10	313.20	75.00	241.00	0.02	0.46	-0.04	0.24
3	303	0.30	353.10	80.00	303.00	-0.01	0.66	-0.10	0.37
4	365	0.20	342.40	80.00	365.00	-0.03	0.92	-0.15	0.18
5	**427**	**0.30**	**341.00**	**84.00**	**427.00**	**-0.08**	**1.18**	**-0.23**	**0.16**
6	489	0.20	289.20	89.00	489.00	-0.21	1.37	-0.39	0.38
7	551	0.30	317.30	95.00	551.00	-0.40	1.52	-0.60	0.25
8	612	0.10	287.80	93.00	612.00	-0.54	1.65	-0.76	0.36
9	671	0.20	336.50	98.00	671.00	-0.61	1.76	-0.85	0.26
10	**759**	**0.30**	**338.00**	**100.00**	**759.00**	**-0.72**	**2.12**	**-1.00**	**0.11**
11	849	0.50	335.10	100.00	848.99	-0.89	2.69	-1.25	0.22
12	940	0.70	340.90	107.00	939.99	-1.12	3.58	-1.60	0.23
13	1032	0.60	336.80	118.00	1031.98	-1.37	4.55	-1.97	0.12
14	1123	0.70	331.70	118.00	1122.98	-1.70	5.48	-2.43	0.13
15	**1217**	**0.60**	**327.80**	**122.00**	**1216.97**	**-2.11**	**6.40**	**-2.96**	**0.12**
16	1310	0.80	306.20	123.00	1309.96	-2.78	7.20	-3.74	0.35
17	1403	0.40	319.70	127.00	1402.96	-3.43	7.83	-4.48	0.45
18	1497	0.50	268.90	129.00	1496.96	-4.01	8.07	-5.10	0.42
19	1590	0.10	215.60	127.00	1589.95	-4.47	8.00	-5.55	0.48
20	**1684**	**0.20**	**103.60**	**132.00**	**1683.95**	**-4.37**	**7.89**	**-5.44**	**0.27**
21	1777	0.40	86.30	132.00	1776.95	-3.90	7.87	-4.96	0.23
22	1870	0.70	72.80	136.00	1869.95	-3.01	8.06	-4.09	0.35
23	1964	0.50	119.50	131.00	1963.94	-2.12	8.03	-3.19	0.54
24	2056	0.60	115.70	132.00	2055.94	-1.40	7.63	-2.40	0.12
25	**2149**	**0.70**	**129.50**	**134.00**	**2148.93**	**-0.60**	**7.05**	**-1.53**	**0.20**
26	2243	0.70	155.50	140.00	2242.93	-0.04	6.16	-0.85	0.34
27	2329	1.10	151.30	78.00	2328.92	0.41	4.96	-0.23	0.47
28	2360	0.70	142.30	82.00	2359.91	0.62	4.55	0.03	1.36
29	2453	0.90	358.70	86.00	2452.91	0.98	4.83	0.36	1.64
30	**2546**	**0.80**	**358.10**	**89.00**	**2545.90**	**1.12**	**6.21**	**0.32**	**0.11**
31	2639	0.50	359.50	89.00	2638.89	1.23	7.27	0.30	0.32
32	2733	0.40	351.70	89.00	2732.89	1.28	8.00	0.24	0.12
33	2826	0.40	6.20	89.00	2825.89	1.35	8.65	0.23	0.11
34	2920	0.60	1.30	89.00	2919.88	1.50	9.46	0.28	0.22
35	**3013**	**0.70**	**356.80**	**89.00**	**3012.88**	**1.62**	**10.52**	**0.26**	**0.12**
36	3107	0.40	354.70	89.00	3106.87	1.67	11.42	0.20	0.32
37	3200	0.50	7.90	89.00	3199.87	1.79	12.14	0.22	0.15
38	3293	0.30	357.00	91.00	3292.87	1.92	12.79	0.27	0.23
39	3387	0.50	357.40	93.00	3386.87	1.97	13.44	0.23	0.21
40	**3480**	**0.70**	**348.70**	**98.00**	**3479.86**	**1.97**	**14.41**	**0.10**	**0.24**
41	3573	0.40	345.50	104.00	3572.86	1.89	15.28	-0.09	0.32
42	3667	0.70	336.10	107.00	3666.85	1.69	16.12	-0.40	0.33
43	3760	0.70	341.60	107.00	3759.84	1.42	17.18	-0.81	0.07
44	3854	0.50	338.40	104.00	3853.84	1.21	18.10	-1.15	0.22
45	**3947**	**1.00**	**359.10**	**109.00**	**3946.83**	**1.20**	**19.29**	**-1.31**	**0.60**
46	4040	0.90	355.70	113.00	4039.82	1.33	20.83	-1.37	0.12
47	4134	0.80	355.80	111.00	4133.81	1.41	22.22	-1.48	0.11
48	4227	0.70	342.90	113.00	4226.80	1.35	23.41	-1.69	0.21
49	4321	0.70	337.30	116.00	4320.79	1.11	24.49	-2.08	0.07
50	**4413**	**0.50**	**355.40**	**120.00**	**4412.79**	**0.98**	**25.41**	**-2.33**	**0.30**
51	4507	0.70	337.40	122.00	4506.78	0.85	26.35	-2.59	0.29
52	4600	0.60	320.10	125.00	4599.78	0.44	27.25	-3.12	0.24
53	4693	0.40	329.60	127.00	4692.77	0.05	27.90	-3.59	0.23
54	4787	0.40	286.30	131.00	4786.77	-0.38	28.28	-4.07	0.31
55	**4880**	**0.40**	**266.20**	**131.00**	**4879.77**	**-1.00**	**28.35**	**-4.71**	**0.15**
56	4973	1.10	31.30	129.00	4972.76	-0.76	29.09	-4.57	1.47
57	5067	0.90	30.40	131.00	5066.75	0.25	30.50	-3.73	0.21
58	5160	1.00	25.70	132.00	5159.74	1.14	31.86	-3.01	0.14
59	5253	0.80	39.50	134.00	5252.73	2.06	33.09	-2.24	0.32
60	**5347**	**0.60**	**22.10**	**136.00**	**5346.72**	**2.78**	**34.05**	**-1.64**	**0.31**
61	5440	0.50	22.90	138.00	5439.71	3.23	34.88	-1.30	0.11
62	5533	0.70	358.00	141.00	5532.71	3.49	35.82	-1.16	0.35
63	5627	0.80	353.90	143.00	5626.70	3.56	37.04	-1.25	0.12
64	5720	0.60	328.10	145.00	5719.69	3.37	38.10	-1.58	0.40
65	**5814**	**0.50**	**319.00**	**147.00**	**5813.69**	**2.94**	**38.83**	**-2.10**	**0.14**

Report #: 1
Date: 26-Sep-14

RYAN DIRECTIONAL SERVICES, INC.
A NABORS COMPANY

Ryan Job # 8056

SURVEY REPORT

Customer: Oasis Petroleum
Well Name: Chalmers 5300 21-19 5T
Rig #: Nabors B-22
API #: 33-053-06018
Calculation Method: Minimum Curvature Calculation

MWD Operator: M McCammond / R Maddalena
Directional Drillers: RPM
Survey Corrected To: True North
Vertical Section Direction: 82.56
Total Correction: 8.17
Temperature Forecasting Model (Chart Only): Logarithmic

Survey #	MD	Inc	Azm	Temp	TVD	VS	N/S	E/W	DLS
66	5907	0.70	341.60	149.00	5906.68	2.61	39.68	-2.55	0.33
67	6000	0.70	322.90	150.00	5999.68	2.22	40.67	-3.07	0.24
68	6067	0.70	316.70	149.00	6066.67	1.78	41.29	-3.60	0.11
69	6178	0.40	318.90	120.00	6177.67	1.17	42.08	-4.32	0.27
70	**6271**	**0.40**	**289.20**	**125.00**	**6270.67**	**0.70**	**42.43**	**-4.84**	**0.22**
71	6365	0.40	289.30	131.00	6364.66	0.11	42.65	-5.46	0.00
72	6458	0.60	302.50	136.00	6457.66	-0.55	43.01	-6.18	0.25
73	6552	0.60	274.10	136.00	6551.65	-1.41	43.31	-7.08	0.31
74	6645	0.40	295.00	143.00	6644.65	-2.16	43.49	-7.86	0.29
75	**6738**	**0.40**	**242.20**	**149.00**	**6737.65**	**-2.74**	**43.47**	**-8.44**	**0.38**
76	6832	0.80	87.40	154.00	6831.65	-2.40	43.35	-8.08	1.25
77	6925	0.70	111.30	158.00	6924.64	-1.25	43.17	-6.90	0.35
78	7018	0.50	105.70	161.00	7017.63	-0.38	42.86	-5.98	0.22
79	7112	0.80	101.60	163.00	7111.63	0.62	42.61	-4.94	0.32
80	**7205**	**0.40**	**132.40**	**167.00**	**7204.62**	**1.44**	**42.26**	**-4.07**	**0.54**
81	7298	0.50	88.50	168.00	7297.62	2.05	42.05	-3.42	0.38
82	7392	0.50	80.60	170.00	7391.62	2.87	42.13	-2.61	0.07
83	7485	0.30	2.70	172.00	7484.61	3.32	42.44	-2.19	0.57
84	7578	0.30	360.00	176.00	7577.61	3.39	42.93	-2.18	0.02
85	**7672**	**0.30**	**349.30**	**176.00**	**7671.61**	**3.41**	**43.42**	**-2.23**	**0.06**
86	7765	0.20	240.10	177.00	7764.61	3.25	43.57	-2.41	0.44
87	7859	0.20	158.60	181.00	7858.61	3.14	43.34	-2.50	0.28
88	7952	0.30	179.70	183.00	7951.61	3.14	42.95	-2.44	0.14
89	8045	0.30	204.90	185.00	8044.61	2.98	42.48	-2.54	0.14
90	**8138**	**0.50**	**220.90**	**183.00**	**8137.61**	**2.55**	**41.95**	**-2.91**	**0.24**
91	8232	0.60	225.20	179.00	8231.60	1.85	41.30	-3.52	0.12
92	8325	0.60	226.00	174.00	8324.60	1.07	40.62	-4.22	0.01
93	8419	0.20	293.60	177.00	8418.60	0.54	40.34	-4.72	0.59
94	8512	0.40	252.80	176.00	8511.59	0.08	40.31	-5.18	0.30
95	**8605**	**0.10**	**38.80**	**176.00**	**8604.59**	**-0.18**	**40.28**	**-5.44**	**0.52**
96	8699	0.10	120.50	176.00	8698.59	-0.06	40.30	-5.32	0.14
97	8792	0.30	354.30	177.00	8791.59	0.01	40.50	-5.27	0.40
98	8885	0.50	335.50	177.00	8884.59	-0.10	41.11	-5.47	0.25
99	8979	0.50	324.20	183.00	8978.59	-0.41	41.82	-5.88	0.10
100	**9072**	**0.50**	**318.80**	**186.00**	**9071.58**	**-0.83**	**42.45**	**-6.38**	**0.05**
101	9166	0.40	302.10	188.00	9165.58	-1.31	42.93	-6.93	0.17
102	9259	0.60	321.50	192.00	9258.58	-1.81	43.49	-7.51	0.28
103	9352	0.50	319.70	195.00	9351.57	-2.28	44.18	-8.07	0.11
104	9445	1.30	1.80	192.00	9444.56	-2.34	45.54	-8.30	1.06
105	**9539**	**1.60**	**4.80**	**195.00**	**9538.53**	**-1.89**	**47.92**	**-8.16**	**0.33**
106	9632	0.70	346.50	197.00	9631.51	-1.67	49.76	-8.18	1.03
107	9725	0.30	155.80	199.00	9724.51	-1.66	50.09	-8.22	1.07
108	9818	0.40	195.40	201.00	9817.51	-1.72	49.56	-8.20	0.27
109	9912	0.50	199.10	201.00	9911.51	-2.03	48.85	-8.42	0.11
110	**10005**	**0.60**	**205.10**	**203.00**	**10004.50**	**-2.47**	**48.03**	**-8.76**	**0.12**
111	10098	0.70	218.30	204.00	10097.50	-3.14	47.14	-9.32	0.19
112	10192	0.70	215.30	204.00	10191.49	-3.94	46.22	-10.01	0.04
113	10237	0.60	212.50	206.00	10236.49	-4.28	45.80	-10.30	0.23
114	10300	0.60	209.50	165.00	10299.48	-4.69	45.23	-10.63	0.05
115	**10331**	**0.90**	**46.00**	**167.00**	**10330.48**	**-4.59**	**45.26**	**-10.54**	**4.79**
116	10362	4.60	39.80	170.00	10361.44	-3.48	46.39	-9.57	11.96
117	10393	8.30	37.30	174.00	10392.24	-0.99	49.12	-7.42	11.97
118	10424	12.00	34.90	179.00	10422.75	2.75	53.55	-4.22	12.01
119	10456	15.40	35.40	177.00	10453.83	7.89	59.74	0.15	10.63
120	**10487**	**18.90**	**36.30**	**181.00**	**10483.45**	**14.16**	**67.14**	**5.51**	**11.32**
121	10518	22.70	37.70	183.00	10512.42	21.87	75.93	12.14	12.36
122	10549	26.20	38.70	183.00	10540.64	31.05	86.00	20.08	11.37
123	10580	29.50	39.10	185.00	10568.05	41.53	97.27	29.18	10.66
124	10611	33.10	38.90	183.00	10594.53	53.19	109.79	39.31	11.62
125	**10643**	**36.40**	**38.80**	**183.00**	**10620.82**	**66.38**	**123.99**	**50.75**	**10.31**
126	10674	39.60	39.50	183.00	10645.24	80.24	138.78	62.80	10.42
127	10705	43.40	40.20	183.00	10668.46	95.34	154.55	75.96	12.35
128	10736	46.90	40.50	186.00	10690.32	111.61	171.29	90.19	11.31
129	10767	50.20	41.90	186.00	10710.84	129.05	188.77	105.50	11.17
130	**10798**	**52.70**	**44.80**	**188.00**	**10730.16**	**147.84**	**206.39**	**122.14**	**10.89**

Report #: 1
Date: 26-Sep-14

RYAN DIRECTIONAL SERVICES, INC.
A NABORS COMPANY

Ryan Job # 8056

SURVEY REPORT

Customer: Oasis Petroleum
Well Name: Chalmers 5300 21-19 5T
Rig #: Nabors B-22
API #: 33-053-06018
Calculation Method: Minimum Curvature Calculation

MWD Operator: M McCammond / R Maddalena
Directional Drillers: RPM
Survey Corrected To: True North
Vertical Section Direction: 82.56
Total Correction: 8.17
Temperature Forecasting Model (Chart Only): Logarithmic

Survey #	MD	Inc	Azm	Temp	TVD	VS	N/S	E/W	DLS
131	10829	55.30	46.50	186.00	10748.38	167.89	223.91	140.08	9.49
132	10860	59.00	47.00	188.00	10765.19	189.01	241.75	159.05	12.01
133	10891	63.90	47.40	186.00	10780.00	211.21	260.24	179.02	15.85
134	10923	67.70	47.80	186.00	10793.12	235.13	279.92	200.57	11.93
135	**10954**	**71.80**	**47.10**	**186.00**	**10803.84**	**258.92**	**299.59**	**221.99**	**13.39**
136	10985	76.20	46.40	186.00	10812.39	283.07	320.00	243.69	14.36
137	11016	78.50	46.50	186.00	10819.17	307.51	340.84	265.61	7.43
138	11047	79.80	45.80	186.00	10825.01	332.01	361.93	287.57	4.74
139	11078	82.30	44.90	186.00	10829.83	356.40	383.45	309.35	8.56
140	**11109**	**86.70**	**45.30**	**190.00**	**10832.80**	**380.89**	**405.23**	**331.20**	**14.25**
141	11140	89.60	45.90	190.00	10833.80	405.64	426.90	353.34	9.55
142	11199	89.90	45.80	213.00	10834.06	452.94	468.00	395.67	0.54
143	11229	90.30	46.10	206.00	10834.01	477.02	488.85	417.23	1.67
144	11261	90.80	46.70	206.00	10833.70	502.85	510.92	440.40	2.44
145	**11293**	**91.00**	**47.40**	**203.00**	**10833.20**	**528.90**	**532.72**	**463.82**	**2.27**
146	11324	91.40	47.50	203.00	10832.55	554.25	553.68	486.66	1.33
147	11356	90.30	49.30	203.00	10832.07	580.73	574.92	510.58	6.59
148	11388	90.70	49.70	203.00	10831.80	607.55	595.70	534.91	1.77
149	11420	91.10	49.70	203.00	10831.29	634.42	616.40	559.32	1.25
150	**11450**	**90.00**	**51.00**	**203.00**	**10831.00**	**659.80**	**635.54**	**582.41**	**5.68**
151	11480	89.90	51.20	203.00	10831.03	685.39	654.38	605.76	0.75
152	11511	90.40	51.60	203.00	10830.95	711.92	673.72	629.99	2.07
153	11542	89.60	52.70	203.00	10830.95	738.66	692.74	654.46	4.39
154	11573	88.70	54.00	204.00	10831.41	765.71	711.24	679.33	5.10
155	**11605**	**88.10**	**55.00**	**206.00**	**10832.30**	**793.94**	**729.82**	**705.37**	**3.64**
156	11636	88.10	54.80	206.00	10833.33	821.38	747.63	730.72	0.64
157	11668	88.60	54.60	206.00	10834.25	849.66	766.12	756.83	1.68
158	11700	88.90	54.80	206.00	10834.95	877.94	784.60	782.94	1.13
159	11731	88.70	56.30	206.00	10835.60	905.55	802.14	808.49	4.88
160	**11762**	**88.20**	**57.70**	**208.00**	**10836.44**	**933.51**	**819.01**	**834.48**	**4.79**
161	11793	87.80	58.30	210.00	10837.52	961.69	835.43	860.76	2.33
162	11823	87.60	59.30	212.00	10838.72	989.12	850.96	886.40	3.40
163	11854	87.90	59.10	212.00	10839.94	1017.56	866.82	913.00	1.16
164	11884	88.00	59.30	212.00	10841.01	1045.08	882.17	938.76	0.74
165	**11914**	**88.50**	**60.00**	**213.00**	**10841.93**	**1072.70**	**897.32**	**964.63**	**2.87**
166	11946	88.50	59.90	213.00	10842.77	1102.23	913.34	992.32	0.31
167	11976	88.60	59.70	213.00	10843.53	1129.89	928.43	1018.24	0.75
168	12007	89.00	59.80	213.00	10844.18	1158.46	944.04	1045.01	1.33
169	12038	89.50	60.60	213.00	10844.58	1187.12	959.44	1071.91	3.04
170	**12070**	**89.90**	**61.00**	**215.00**	**10844.75**	**1216.84**	**975.06**	**1099.84**	**1.77**
171	12101	90.50	61.70	215.00	10844.64	1245.74	989.92	1127.05	2.97
172	12132	90.50	63.40	217.00	10844.37	1274.87	1004.21	1154.56	5.48
173	12162	90.80	64.20	217.00	10844.03	1303.27	1017.45	1181.47	2.85
174	12194	90.60	65.00	217.00	10843.64	1333.71	1031.18	1210.38	2.58
175	**12226**	**90.90**	**65.00**	**219.00**	**10843.22**	**1364.22**	**1044.70**	**1239.38**	**0.94**
176	12256	91.20	66.20	219.00	10842.67	1392.91	1057.09	1266.69	4.12
177	12286	91.00	67.60	219.00	10842.10	1421.79	1068.86	1294.28	4.71
178	12318	91.10	67.30	219.00	10841.51	1452.68	1081.13	1323.83	0.99
179	12349	89.80	67.60	219.00	10841.27	1482.60	1093.01	1352.46	4.30
180	**12381**	**88.20**	**68.20**	**219.00**	**10841.82**	**1513.56**	**1105.05**	**1382.10**	**5.34**
181	12413	87.60	68.30	221.00	10843.00	1544.54	1116.90	1411.80	1.90
182	12444	88.20	69.80	221.00	10844.13	1574.66	1127.98	1440.73	5.21
183	12476	88.30	71.30	221.00	10845.11	1605.95	1138.63	1470.89	4.70
184	12508	88.20	71.50	221.00	10846.09	1637.33	1148.83	1501.21	0.70
185	**12539**	**88.80**	**72.40**	**222.00**	**10846.90**	**1667.79**	**1158.43**	**1530.67**	**3.49**
186	12571	89.20	74.20	221.00	10847.46	1699.36	1167.63	1561.31	5.76
187	12602	89.80	73.60	222.00	10847.73	1730.01	1176.22	1591.10	2.74
188	12634	89.40	74.70	222.00	10847.95	1761.66	1184.96	1621.88	3.66
189	12666	89.10	75.30	222.00	10848.37	1793.38	1193.24	1652.79	2.10
190	**12697**	**88.80**	**74.60**	**224.00**	**10848.94**	**1824.10**	**1201.29**	**1682.72**	**2.46**
191	12729	89.50	75.50	224.00	10849.41	1855.82	1209.55	1713.63	3.56
192	12760	89.60	76.30	224.00	10849.66	1886.61	1217.10	1743.69	2.60
193	12792	89.30	75.80	226.00	10849.96	1918.41	1224.81	1774.75	1.82
194	12824	88.70	76.50	226.00	10850.52	1950.20	1232.47	1805.81	2.88
195	**12855**	**88.20**	**76.80**	**224.00**	**10851.36**	**1981.02**	**1239.63**	**1835.97**	**1.88**

Report #: 1
Date: 26-Sep-14

RYAN DIRECTIONAL SERVICES, INC.
A NABORS COMPANY

Ryan Job # 8056

SURVEY REPORT

Customer:	Oasis Petroleum
Well Name:	Chalmers 5300 21-19 5T
Rig #:	Nabors B-22
API #:	33-053-06018
Calculation Method:	Minimum Curvature Calculation

MWD Operator:	M McCammond / R Maddalena
Directional Drillers:	RPM
Survey Corrected To:	True North
Vertical Section Direction:	82.56
Total Correction:	8.17
Temperature Forecasting Model (Chart Only):	Logarithmic

Survey #	MD	Inc	Azm	Temp	TVD	VS	N/S	E/W	DLS
196	12887	88.40	76.70	224.00	10852.31	2012.85	1246.96	1867.10	0.70
197	12918	88.80	76.80	224.00	10853.07	2043.68	1254.06	1897.27	1.33
198	12950	89.20	78.10	224.00	10853.63	2075.55	1261.01	1928.50	4.25
199	12981	89.30	79.00	224.00	10854.03	2106.47	1267.16	1958.88	2.92
200	**13013**	**89.50**	**79.80**	**224.00**	**10854.37**	**2138.42**	**1273.05**	**1990.33**	**2.58**
201	13045	89.70	81.00	224.00	10854.59	2170.39	1278.39	2021.88	3.80
202	13076	90.40	81.70	224.00	10854.56	2201.38	1283.05	2052.52	3.19
203	13108	90.40	83.20	224.00	10854.34	2233.38	1287.25	2084.25	4.69
204	13139	90.30	84.50	224.00	10854.15	2264.37	1290.57	2115.07	4.21
205	**13171**	**89.40**	**85.40**	**224.00**	**10854.23**	**2296.34**	**1293.39**	**2146.94**	**3.98**
206	13203	88.70	86.00	224.00	10854.76	2328.29	1295.79	2178.85	2.88
207	13234	87.90	87.60	224.00	10855.68	2359.19	1297.52	2209.78	5.77
208	13266	87.70	88.00	226.00	10856.91	2391.03	1298.75	2241.74	1.40
209	13297	87.90	88.30	226.00	10858.10	2421.86	1299.75	2272.70	1.16
210	**13329**	**87.70**	**89.90**	**226.00**	**10859.33**	**2453.63**	**1300.25**	**2304.67**	**5.04**
211	13424	88.80	93.10	226.00	10862.23	2547.42	1297.76	2399.58	3.56
212	13518	90.90	93.20	230.00	10862.48	2639.81	1292.60	2493.43	2.24
213	13613	89.50	93.10	230.00	10862.15	2733.19	1287.38	2588.28	1.48
214	13708	88.40	92.90	231.00	10863.89	2826.60	1282.41	2683.14	1.18
215	**13802**	**89.40**	**91.30**	**231.00**	**10865.69**	**2919.28**	**1278.96**	**2777.05**	**2.01**
216	13897	90.50	90.70	231.00	10865.78	3013.25	1277.31	2872.03	1.32
217	13992	88.70	90.10	233.00	10866.44	3107.36	1276.64	2967.03	2.00
218	14087	89.10	90.10	233.00	10868.26	3201.52	1276.48	3062.01	0.42
219	14181	90.70	90.30	233.00	10868.43	3294.68	1276.15	3156.00	1.72
220	**14276**	**91.30**	**89.60**	**235.00**	**10866.77**	**3388.88**	**1276.23**	**3250.99**	**0.97**
221	14371	90.20	90.80	235.00	10865.53	3483.02	1275.90	3345.98	1.71
222	14466	90.30	89.90	239.00	10865.11	3577.14	1275.32	3440.97	0.95
223	14561	88.50	89.70	239.00	10866.11	3671.38	1275.65	3535.96	1.91
224	14655	90.40	90.50	237.00	10867.01	3764.55	1275.49	3629.95	2.19
225	**14750**	**91.30**	**90.30**	**239.00**	**10865.60**	**3858.65**	**1274.82**	**3724.94**	**0.97**
226	14845	90.70	90.40	239.00	10863.94	3952.76	1274.24	3819.92	0.64
227	14940	88.30	90.00	237.00	10864.77	4046.91	1273.91	3914.91	2.56
228	15035	87.60	90.20	237.00	10868.17	4141.03	1273.75	4009.85	0.77
229	15130	88.40	89.00	239.00	10871.48	4235.25	1274.41	4104.79	1.52
230	**15224**	**88.30**	**88.90**	**239.00**	**10874.19**	**4328.63**	**1276.13**	**4198.73**	**0.15**
231	15319	89.70	89.50	239.00	10875.85	4422.97	1277.46	4293.71	1.60
232	15414	89.90	88.20	240.00	10876.18	4517.40	1279.36	4388.68	1.38
233	15508	91.60	88.80	240.00	10874.95	4610.88	1281.82	4482.64	1.92
234	15603	90.90	89.60	240.00	10872.88	4705.22	1283.15	4577.61	1.12
235	**15698**	**90.90**	**89.90**	**242.00**	**10871.38**	**4799.46**	**1283.57**	**4672.59**	**0.32**
236	15793	90.30	91.60	242.00	10870.39	4893.48	1282.32	4767.58	1.90
237	15887	89.30	91.10	244.00	10870.72	4986.38	1280.11	4861.55	1.19
238	15982	89.80	90.20	244.00	10871.46	5080.43	1279.03	4956.54	1.08
239	16077	91.40	90.50	242.00	10870.47	5174.54	1278.45	5051.53	1.71
240	**16172**	**92.30**	**91.40**	**244.00**	**10867.40**	**5268.48**	**1276.88**	**5146.46**	**1.34**
241	16267	90.00	91.50	244.00	10865.50	5362.31	1274.47	5241.41	2.42
242	16361	90.40	92.20	242.00	10865.17	5455.08	1271.44	5335.36	0.86
243	16393	90.40	91.00	244.00	10864.94	5486.68	1270.54	5367.34	3.75
244	16425	89.20	90.20	244.00	10865.06	5518.36	1270.21	5399.34	4.51
245	**16456**	**88.50**	**90.30**	**244.00**	**10865.68**	**5549.08**	**1270.07**	**5430.33**	**2.28**
246	16488	91.20	91.10	244.00	10865.76	5580.75	1269.68	5462.33	8.80
247	16520	92.00	91.10	244.00	10864.87	5612.38	1269.07	5494.31	2.50
248	16551	92.40	91.00	244.00	10863.68	5643.02	1268.50	5525.28	1.33
249	16614	91.60	89.70	244.00	10861.48	5705.40	1268.12	5588.24	2.42
250	**16646**	**90.40**	**88.90**	**244.00**	**10860.92**	**5737.17**	**1268.51**	**5620.23**	**4.51**
251	16678	88.60	88.50	246.00	10861.20	5768.99	1269.23	5652.22	5.76
252	16709	86.30	88.90	246.00	10862.58	5799.78	1269.94	5683.18	7.53
253	16741	87.60	89.30	246.00	10864.28	5831.52	1270.44	5715.13	4.25
254	16804	88.30	87.50	246.00	10866.54	5894.15	1272.20	5778.06	3.06
255	**16835**	**87.00**	**88.20**	**246.00**	**10867.81**	**5924.99**	**1273.36**	**5809.01**	**4.76**
256	16867	88.70	90.30	248.00	10869.01	5956.75	1273.78	5840.99	8.44
257	16899	89.70	91.10	248.00	10869.45	5988.42	1273.39	5872.98	4.00
258	16930	89.90	91.10	248.00	10869.56	6019.08	1272.79	5903.97	0.65
259	17025	89.90	91.80	248.00	10869.73	6112.94	1270.39	5998.94	0.74
260	**17103**	**90.60**	**94.00**	**251.00**	**10869.39**	**6189.66**	**1266.44**	**6076.84**	**2.96**

Report #: 1
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Ryan Job # 8056

SURVEY REPORT

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Rig #: Nabors B-22
API #: 33-053-06018
Calculation Method: Minimum Curvature Calculation

MWD Operator: M McCammond / R Maddalena
Directional Drillers: RPM
Survey Corrected To: True North
Vertical Section Direction: 82.56
Total Correction: 8.17
Temperature Forecasting Model (Chart Only): Logarithmic

Survey #	MD	Inc	Azm	Temp	TVD	VS	N/S	E/W	DLS
261	17169	89.80	94.20	248.00	10869.16	6254.33	1261.72	6142.67	1.25
262	17201	88.60	94.00	246.00	10869.60	6285.68	1259.43	6174.58	3.80
263	17264	87.70	92.00	248.00	10871.64	6347.60	1256.14	6237.46	3.48
264	17296	86.80	91.10	248.00	10873.17	6379.17	1255.27	6269.41	3.98
265	**17391**	**86.90**	**89.40**	**248.00**	**10878.39**	**6473.17**	**1254.86**	**6364.26**	**1.79**
266	17485	89.90	89.50	248.00	10881.02	6566.44	1255.76	6458.21	3.19
267	17580	90.50	89.20	249.00	10880.69	6660.78	1256.84	6553.20	0.71
268	17675	90.30	88.90	249.00	10880.02	6755.16	1258.41	6648.19	0.38
269	17770	91.10	88.90	251.00	10878.86	6849.58	1260.24	6743.16	0.84
270	**17864**	**90.60**	**88.90**	**251.00**	**10877.47**	**6942.99**	**1262.04**	**6837.13**	**0.53**
271	17959	90.80	89.00	251.00	10876.31	7037.39	1263.78	6932.11	0.24
272	18054	88.00	88.70	251.00	10877.30	7131.81	1265.69	7027.08	2.96
273	18117	87.40	88.60	251.00	10879.83	7194.40	1267.17	7090.01	0.97
274	18149	87.50	88.60	249.00	10881.25	7226.19	1267.95	7121.97	0.31
275	**18180**	**88.30**	**89.00**	**249.00**	**10882.39**	**7256.99**	**1268.60**	**7152.94**	**2.88**
276	18212	88.90	89.20	251.00	10883.17	7288.77	1269.10	7184.92	1.98
277	18244	88.80	89.40	249.00	10883.82	7320.54	1269.50	7216.92	0.70
278	18338	92.00	90.00	251.00	10883.16	7413.80	1269.99	7310.90	3.46
279	18402	92.40	89.40	251.00	10880.70	7477.25	1270.32	7374.85	1.13
280	**18433**	**91.70**	**89.60**	**251.00**	**10879.59**	**7508.01**	**1270.59**	**7405.83**	**2.35**
281	18483	90.40	89.00	251.00	10878.68	7557.65	1271.20	7455.82	2.86
282	18528	90.00	89.00	253.00	10878.52	7602.37	1271.99	7500.81	0.89
283	18623	90.20	88.70	253.00	10878.35	7696.80	1273.90	7595.79	0.38
284	18718	89.80	88.60	253.00	10878.35	7791.26	1276.13	7690.76	0.43
285	**18812**	**90.40**	**89.30**	**253.00**	**10878.19**	**7884.67**	**1277.86**	**7784.75**	**0.98**
286	18907	90.70	89.10	255.00	10877.28	7979.03	1279.18	7879.73	0.38
287	19002	90.50	89.00	257.00	10876.28	8073.42	1280.76	7974.71	0.24
288	19096	90.60	88.20	257.00	10875.38	8166.89	1283.05	8068.68	0.86
289	19191	91.50	89.90	255.00	10873.64	8261.26	1284.63	8163.65	2.02
290	**19286**	**89.30**	**90.40**	**255.00**	**10872.98**	**8355.42**	**1284.38**	**8258.64**	**2.37**
291	19381	89.60	90.30	257.00	10873.89	8449.54	1283.80	8353.63	0.33
292	19476	88.00	89.60	257.00	10875.88	8543.73	1283.88	8448.61	1.84
293	19571	89.90	91.10	255.00	10877.62	8637.83	1283.30	8543.58	2.55
294	19602	90.00	91.20	257.00	10877.65	8668.48	1282.68	8574.58	0.46
295	**19665**	**90.00**	**90.90**	**257.00**	**10877.65**	**8730.79**	**1281.53**	**8637.57**	**0.48**
296	19697	89.90	91.50	257.00	10877.67	8762.43	1280.86	8669.56	1.90
297	19729	89.50	91.10	257.00	10877.84	8794.05	1280.13	8701.55	1.77
298	19760	89.40	91.00	257.00	10878.14	8824.71	1279.56	8732.54	0.46
299	19792	89.50	91.10	257.00	10878.45	8856.36	1278.98	8764.54	0.44
300	**19855**	**90.40**	**91.40**	**255.00**	**10878.50**	**8918.64**	**1277.60**	**8827.52**	**1.51**
301	19887	91.20	90.90	255.00	10878.05	8950.27	1276.96	8859.51	2.95
302	19918	91.60	91.10	257.00	10877.30	8980.93	1276.42	8890.50	1.44
303	19950	91.70	89.70	253.00	10876.38	9012.62	1276.19	8922.48	4.38
304	20013	90.80	89.50	255.00	10875.00	9075.13	1276.63	8985.47	1.46
305	**20045**	**90.80**	**88.90**	**257.00**	**10874.55**	**9106.91**	**1277.08**	**9017.46**	**1.87**
306	20076	90.80	88.20	255.00	10874.12	9137.73	1277.87	9048.45	2.26
307	20139	88.90	88.80	257.00	10874.29	9200.39	1279.51	9111.42	3.16
308	20234	88.80	87.90	257.00	10876.19	9294.89	1282.25	9206.36	0.95
309	20329	90.20	88.90	257.00	10877.02	9389.39	1284.90	9301.32	1.81
310	**20424**	**90.30**	**89.60**	**257.00**	**10876.61**	**9483.74**	**1286.14**	**9396.31**	**0.74**
311	20519	91.00	89.60	257.00	10875.53	9578.02	1286.81	9491.30	0.74
312	20613	91.20	89.60	258.00	10873.73	9671.29	1287.46	9585.28	0.21
313	20708	90.90	88.50	260.00	10871.98	9765.67	1289.04	9680.25	1.20
314	20804	90.20	87.30	258.00	10871.06	9861.24	1292.56	9776.18	1.45
315	**20871**	**91.30**	**87.20**	**260.00**	**10870.19**	**9928.01**	**1295.77**	**9843.09**	**1.65**
Projection	20928	91.30	87.20	PTB	10868.89	9984.81	1298.55	9900.01	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)

JUL 2014 RECEIVED ND OIL & GAS DIVISION

Well File No.
28633

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

- [x] Notice of Intent — Approximate Start Date: **July 29, 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
- [ ] Redrilling or Repair
- [x] Casing or Liner
- [ ] Plug Well
- [ ] Supplemental History
- [ ] Temporarily Abandon
- [ ] Other **Change casing**
- [ ] Spill Report
- [ ] Shooting
- [ ] Acidizing
- [ ] Fracture Treatment
- [ ] Change Production Method
- [ ] Reclamation

Well Name and Number: **Chalmers 5300 21-19 5T**

Footages	Qtr-Qtr	Section	Township	Range
1925 F N L 286 F W L	**SWNW**	**19**	**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 permission to make the following changes to the above referenced well:

- **Surface casing changed to 13 3/8"**
- **Contingency 9 5/8" casing added**
- **7' casing changed to all 32#**

Attached are revised drill plan, well summary, directional plan and plot

Company	Telephone Number
Oasis Petroleum North America LLC	**281-404-9563**

Address: **1001 Fannin, Suite 1500**

City	State	Zip Code
Houston	**TX**	**77002**

Signature	Printed Name
Heather McCowan	**Heather McCowan**
Title: **Regulatory Assistant**	Date: **July 29, 2014**

Email Address: **hmccowan@oasispetroleum.com**

FOR STATE USE ONLY

- [ ] Received
- [x] Approved

Date: 8-15-14

By: Nathaniel Erbele

Title: Petroleum Resource Specialist

Oasis Petroleum
Well Summary
Chalmers 5300 21-19 5T
Sec. 19 T153N R100W
McKenzie County, North Dakota

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 2,126'	54.5	J-55	STC	12.615"	12.459"	4,100	5,470	6,840

Interval	**Description**	**Collapse**	**Burst**	**Tension**	**Cost per ft**
		(psi) a	(psi) b	(1000 lbs) c	
0' to 2,126'	13-3/8", 54.5#, J-55, STC, 8rd	1130 / 1.14	2730 / 2.74	514 / 2.57	

API Rating & Safety Factor

a) Collapse pressure based on full casing evacuation with 9 ppg fluid on backside (2126' setting depth).

b) Burst pressure based on 9 ppg fluid with no fluid on backside (2126' setting depth).

c) Tension based on string weight in 9 ppg fluid at 2126' TVD plus 100k# overpull. (Buoyed weight equals 100k lbs.)

Cement volumes are based on 13-3/8" casing set in 17-1/2" hole with 50% excess to circulate cement back to surface. Mix and pump the following slurry.

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

Lead Slurry: **629 sks** (325 bbls) 2.9 yield conventional system with 94 lb/sk cement, .25 lb/sk D130 Lost Circulation Control Agent, 2% CaCL2, 4% D079 Extender, and 2% D053 Expanding Agent.

Tail Slurry: **374 sks** (77 bbls) 1.16 yield conventional system with 94 lb/sk cement, .25 lb/sk Lost Circulation Control Agent, and .25% CaCL2.

Oasis Petroleum
Well Summary
Chalmers 5300 21-19 5T
Sec. 19 T153N R100W
McKenzie County, North Dakota

INTERMEDIATE CASING AND CEMENT DESIGN

Intermediate Casing Design

							Make-up Torque (ft-lbs)		
Size	**Interval**	**Weight**	**Grade**	**Coupling**	**I.D.**	**Drift**	**Minimum**	**Optimum**	**Max**
9-5/8"	0' - 6000'	40	HCL-80	LTC	8.835"	8.75"**	5,450	7,270	9,090

**Special Drift

Interval	Description	Collapse	Burst	Tension
		(psi) a	(psi) b	(1000 lbs) c
0' - 6000'	9-5/8", 40#, HCL-80, LTC, 8rd	3090 / 3.96*	5750 / 1.23	837 / 2.75

API Rating & Safety Factor

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

e) Burst pressure calculated from a gas kick coming from the production zone (Bakken Pool) at 9,000psi and a subsequent breakdown at the 9-5/8" shoe, based on a 13.5#/ft fracture gradient. Backup of 9 ppg fluid.

f) Tension based on string weight in 10 ppg fluid, (217k lbs buoyed weight) plus 100k lbs overpull.

Cement volumes are estimates based on 9-5/8" casing set in an 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: **540 sks** (280 bbls) Conventional system with 75 lb/sk cement, 0.5lb/sk lost circulation, 10% expanding agent, 2% extender, 2% CaCl2, 0.2% anti foam, and 0.4% fluid loss

Tail Slurry: **373 sks** (77 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

Oasis Petroleum
Well Summary
Chalmers 5300 21-19 5T
Sec. 19 T153N R100W
McKenzie County, North Dakota

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' - 11133'	32	HCP-110	LTC	6.094"	6.000"**	6,730	8,970	11210

**Special Drift

Interval	Description	Collapse	Burst	Tension
		(psi) a	(psi) b	(1000 lbs) c
0' - 11133'	7", 32#, P-110, LTC, 8rd	11820 / 2.10*	12460 / 1.28	897 / 2.23
6746' - 9214'	7", 32#, HCP-110, LTC, 8rd	11820 / 1.28**	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 10,818' TVD.

c. Based on string weight in 10 ppg fluid, 302k 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): **50 bbls** Saltwater
40 bbls Weighted MudPush Express

Lead Slurry: **219 sks** (86 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, 0.5lb/sk D130 LCM

Tail Slurry: **617 sks** (169 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, 0.5 lb/sk LCM

Well Summary
Chalmers 5300 21-19 5T
Sec. 19 T153N R100W
McKenzie County, North Dakota

PRODUCTION LINER

Size	Interval	Weight	Grade	Coupling	I.D.	Drift	Torque
4-1/2"	10291' - 20954'	13.5	P-110	BTC	3.920"	3.795"	2270

Interval	Description	Collapse	Burst	Tension
		(psi) a	(psi) b	(1000 lbs) c
10291' - 20954'	4-1/2", 13.5 lb, P-110, BTC	10670 / 1.98	12410 / 1.28	443 / 1.98

API Rating & Safety Factor

a) Based on full casing evacuation with 9.5 ppg fluid on backside @ 10879' TVD.

b) Burst pressure based on 9000 psi treating pressure with 10.2 ppg internal fluid gradient and 9 ppg external fluid gradient @ 10879' TVD.

c) Based on string weight in 9.5 ppg fluid (Buoyed weight: 123k lbs.) plus 100k lbs overpull.

Oasis Petroleum does not use Diesel Fuel, as defined by the US EPA in the list below, in our hydraulic fracture operations.

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)

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

28633

BRANDI TERRY
OASIS PETROLEUM NORTH AMERICA LLC
1001 FANNIN STE 1500
HOUSTON, TX 77002 USA

Date: **6/23/2014**

RE: CORES AND SAMPLES

Well Name: **CHALMERS 5300 21-19 5T** Well File No.: **28633**
Location: **LOT2 19-153-100** 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)

JUN 2014
RECEIVED
ND OIL & GAS DIVISION

Well File No. 28633

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

☑ Notice of Intent	Approximate Start Date: May 30, 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					
Chalmers 5300 21-19 5T					
Footages		Qtr-Qtr	Section	Township	Range
2127 F N L	327 F W L	LOT2	19	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:

Oasis Petroleum' Chalmers 5300 31-19H (#20407) which is located 1850' to S sec 19 T153N R100W (NDIC# 20407)

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	Telephone Number		
Oasis Petroleum North America LLC	281-404-9491		
Address			
1001 Fannin, Suite 1500			
City	State	Zip Code	
Houston	TX	77002	
Signature	Printed Name		
	Chelsea Covington		
Title	Date		
Regulatory Specialist	May 16, 2014		
Email Address			
bterry@oasispetroleum.com			

FOR STATE USE ONLY

☐ Received	☒ Approved
Date: 6-16-2014	
By:	
Title: 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)

Well File No. 28633

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

☑ Notice of Intent — Approximate Start Date: May 30, 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
☐ Redrilling or Repair
☐ Casing or Liner
☐ Plug Well
☐ Supplemental History
☐ Temporarily Abandon
☑ Other **Suspension of Drilling**
☐ Spill Report
☐ Shooting
☐ Acidizing
☐ Fracture Treatment
☐ Change Production Method
☐ Reclamation

Well Name and Number					
Chalmers 5300 21-19 5T					
Footages	Qtr-Qtr	Section	Township	Range	
2127 F N L 327 F WL	**LOT2**	**19**	**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)			
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 and TD info.

Company		Telephone Number
Oasis Petroleum North America LLC		**(281) 404-9491**
Address		
1001 Fannin, Suite 1500		
City	State	Zip Code
Houston	**TX**	**77002**
Signature	Printed Name	
	Brandi Terry	
Title	Date	
Regulatory Specialist	**May 16, 2014**	
Email Address		
bterry@oasispetroleum.com		

FOR STATE USE ONLY

☐ Received ☒ Approved

Date: 6/16/14

By: Nathaniel Erbele

Title: Petroleum Resource Specialist

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

June 16, 2014

Brandi Terry
Regulatory Specialist
OASIS PETROLEUM NORTH AMERICA LLC
1001 Fannin Suite 1500
Houston, TX 77002

RE: HORIZONTAL WELL
CHALMERS 5300 21-19 5T
LOT2 Section 19-153N-100W
McKenzieCounty
Well File # 28633

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 19 & 20 T153N R100W.

PERMIT STIPULATIONS: Due to the proximity of Lake Sakakawea to the well site, a dike is required surrounding the entire location. 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 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: 9971' east.

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,

Nathaniel Erbele
Petroleum Resource Specialist

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**	**05 / 30 / 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
CHALMERS	**5300 21-19 5T**

Surface Footages	Qtr-Qtr	Section	Township	Range	County
2127 F **N** L **327** F **W** L	**LOT2**	**19**	**153 N**	**100 W**	**McKenzie**
Longstring Casing Point Footages	**Qtr-Qtr**	**Section**	**Township**	**Range**	**County**
1705 F **N** L **691** F **W** L	**LOT 2**	**19**	**153 N**	**100 W**	**McKenzie**

Longstring Casing Point Coordinates From Well Head	Azimuth	Longstring Total Depth	
422 N From WH **364 E** From WH	**44.38 º**	**11133** Feet MD	**10818** Feet TVD

Bottom Hole Footages From Nearest Section Line	Qtr-Qtr	Section	Township	Range	County
844 F **N** L **220** F **E** L	**LOT 2**	**20**	**153 N**	**100 W**	**Williams**

Bottom Hole Coordinates From Well Head	KOP Lateral 1	Azimuth Lateral 1	Estimated Total Depth Lateral 1
1283 N From WH **9951 E** From WH	**10341** Feet MD	**90.0 º**	**20954** Feet MD **10879** Feet TVD

Latitude of Well Head	Longitude of Well Head	NAD Reference	Description of (Subject to NDIC Approval)
48 ° 03 ' 42.27 "	**-103 ° 36 ' 10.11 "**	**NAD83**	**Spacing Unit: Sections 19 & 20 T153N R100W**

Ground Elevation	Acres in Spacing/Drilling Unit	Spacing/Drilling Unit Setback Requirement	Industrial Commission Order
2058 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
10489 Feet	**10513** Feet	**5280** Feet	**5263** Feet

Objective Horizons	Pierre Shale Top
Three Forks B1	**2026**

Proposed	Size	Weight	Depth	Cement Volume	
Surface Casing	**9 - 5/8 "**	**36** Lb./Ft.	**2126** Feet	**626** 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.	**11133** Feet MD	**10818** Feet TVD	**851** Sacks	**3922** Feet	**5422** Feet

Base Last Charles Salt (If Applicable)	
9214 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 05 / 16 / 2014
ePermit	Printed Name **Brandi Terry**	Title **Regulatory Specialist**

FOR STATE USE ONLY

Permit and File Number **28633**	API Number **33 - 053 - 06018**
Field **BAKER**	
Pool **BAKKEN**	Permit Type **DEVELOPMENT**

FOR STATE USE ONLY

Date Approved **6 / 16 / 2014**
By **Nathaniel Erbele**
Title **Petroleum Resource Specialist**

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

WELL LOCATION PLAT

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"CHALMERS 5300 21-19 5T"
2127 FEET FROM NORTH LINE AND 327 FEET FROM WEST LINE
SECTION 19, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA

THIS DOCUMENT WAS ORIGINALLY ISSUED AND SEALED BY DARYL D. KASEMAN, PLS, REGISTRATION NUMBER 3880 ON 5/07/14 AND THE ORIGINAL DOCUMENTS ARE STORED AT THE OFFICES OF INTERSTATE ENGINEERING, INC.

0 1000
1" = 1000'

- MONUMENT - RECOVERED
- MONUMENT - NOT RECOVERED

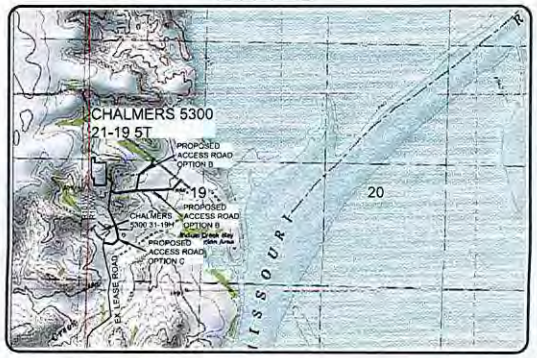
STAKED ON 1/29/14
VERTICAL CONTROL DATUM WAS BASED UPON CONTROL POINT 16 WITH AN ELEVATION OF 2014.2'

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: 5/07/14
NORTH DAKOTA

VICINITY MAP



Revision No.	Date	By	Description
REV 1	3/13/14	JAS	MOVED WELLS ON PAD
REV 2	4/22/14	BH	MOVED WELLS ON PAD/REVISED PAD
REV 3	5/7/14	BH	MOVED WELLS ON PAD/REVISED PAD

OASIS PETROLEUM NORTH AMERICA, LLC
WELL LOCATION PLAT
SECTION 19, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. | Project No.: 513-09-282
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
Professionals you need, people you trust

SHEET NO. 1/8

DRILLING PLAN

OPERATOR	Oasis Petroleum	**COUNTY/STATE**	McKenzie Co., ND
WELL NAME	Chalmers 5300 21-19 5T	**RIG**	B 22
WELL TYPE	Horizontal Three Forks		
LOCATION	SW NW 19-153N-100W	Surface Location (survey plat): 2127' FNL	327' FWL
EST. T.D.	20,954'	**GROUND ELEV:**	2,051' **Sub Height:** 25'
	TOTAL LATERAL: 9,821'	**KB ELEV:**	2,076'

MARKER		TVD	Subsea TVD
Pierre	NDIC MAP	2,026	50
Greenhorn		4,629	-2,553
Mowry		5,034	-2,958
Dakota		5,422	-3,346
Rierdon		6,468	-4,392
Dunham Salt		6,896	-4,820
Dunham Salt Base		6,965	-4,889
Pine Salt		7,262	-5,186
Pine Salt Base		7,295	-5,219
Opeche Salt		7,356	-5,280
Opeche Salt Base		7,431	-5,355
Amsden		7,667	-5,591
Tyler		7,833	-5,757
Otter/Base Minnelusa		8,037	-5,961
Kibbey Lime		8,389	-6,313
Charles Salt		8,539	-6,463
Base Last Salt		9,214	-7,138
Mission Canyon		9,434	-7,358
Lodgepole		9,998	-7,922
False Bakken		10,711	-8,635
Upper Bakken Shale		10,721	-8,645
Middle Bakken		10,737	-8,661
Lower Bakken Shale		10,771	-8,695
Pronghorn		10,785	-8,709
Threeforks		10,804	-8,728
Threeforks(Top of Target)		10,816	-8,740
Threeforks(Base of Target)		10,827	-8,751
Claystone		10,827	-8,751

Est. Dip Rate: -0.35

Max. Anticipated BHP: 4892

LOGS:	Type	Interval
	OH Logs:	Request a Sundry for an Open Hole Log Waiver: Oasis Chalmers 5300 31-19H 1,850' to S sec 19 153N 100W
	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' -	2,126'	FW	8.4-9.0	28-32	NC	Circ Mud Tanks
Intermediate:	2,126' -	11,133'	Invert	9.5-10.4	40-50	30+HtHp	Circ Mud Tanks
Lateral:	11,133' -	20,954'	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"	2,126'	To Surface	12	100' into Pierre
Intermediate:	7"	32#	8-3/4"	11,133'	3922	24	1500' above Dakota
Production Liner:	4.5"	13.5#	6"	20,954'	TOL @ 10,291'		50' above KOP

PROBABLE PLUGS, IF REQ'D:

OTHER:

	MD	TVD	FNL/FSL	FEL/FWL	S-T-R	AZI
Surface:	2,126	2,126	2127 FNL	327 FWL	SEC. 19 T153N R100W	Survey Company:
KOP:	10,341'	10,341'	2078 FNL	327 FWL	SEC. 19 T153N R100W	Build Rate: 12 deg /100'
EOC:	11,088'	10,818'	14911738	659 FWL	SEC. 19 T153N R100W	44.4
Casing Point:	11,133'	10,818'	1705 FNL	691 FWL	SEC. 19 T153N R100W	44.4
Three Forks Lateral TD:	20,954'	10,879'	844 FNL	200 FEL	SEC. 20 T153N R100W	90.0

Comments:

Request a Sundry for an Open Hole Log Waiver: Oasis Chalmers 5300 31-19H 1,850' to S sec 19 153N 100W

No frac string planned

35 packers and 25 sleeves planned 3.6MM lbs 30% ceramic

Oasis Petroleum does not use Diesel Fuel, as defined by the US EPA in the list below, in our hydraulic fracture operations.
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)

OASIS PETROLEUM

Geology: N. Gabelman 2/4/2014 **Engineering:** C. Gilbert 5/14/2014

Oasis Petroleum
Well Summary
Chalmers 5300 21-9 5T
Section 9 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' - 6696'	29	P-110	LTC	6.184"	6.059"	5980	7970	8770
7"	6696' - 10341'	32	HCP-110	LTC	6.094"	6.000"**	6730	8970	9870
7"	10341' - 11133'	29	P-110	LTC	6.184"	6.059"	5980	7970	8770

****Special Drift 7" 32# to 6.0"**

Interval	Length	Description	Collapse	Burst	Tension
			(psi) a	(psi) b	(1000 lbs) c
0' - 6696'	6696'	7", 29#, P-110, LTC, 8rd	8530 / 2.44*	11220 / 1.19	797 / 2.08
6696' - 10341'	3645'	7", 32#, HCP-110, LTC, 8rd	11820 / 2.19*	12460 / 1.29	
6696' - 10341'	3645'	7", 32#, HCP-110, LTC, 8rd	11820 / 1.04**	12460 / 1.29	
10341' - 11133'	792'	7", 29#, P-110, LTC, 8rd	8530 / 1.51*	11220 / 1.15	

API Rating & Safety Factor

a) *Assume full casing evacuation with 10 ppg fluid on backside. **Assume full casing evacuation with 1.2 psi/ft equivalent fluid gradient across salt intervals.

b) Burst pressure based on 9000 psig max press for stimulation plus 10.2 ppg fluid in casing and 9 ppg fluid on backside-to 10818' TVD.

c) Based on string weight in 10 ppg fluid, (283k 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.
Mix and pump the following slurry

Pre-flush (Spacer): **100 bbls** Saltwater
20bbls CW8
20bbls Fresh Water

Lead Slurry: **199 sks** (81 bbls), 11.8 ppg, 2.55 cu. ft./sk Econocem Cement with .3% Fe-2 and .25 lb/sk Lost Circulation Additive

Tail Slurry: **652 sks** (179 bbls), 14.0 ppg, 1.55 cu. ft./sk Extendcem System with .2% HR-5 Retarder and .25 lb/sk Lost Circulation Additive

Oasis Petroleum
Well Summary
Chalmers 5300 21-9 5T
Section 9 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"	10291' - 20954'	11.6	P-110	BTC	4.000"	3.875"	2270	3020	3780

Interval	Length	Desctiption	Collapse	Burst	Tension
			(psi) a	(psi) b	(1000 lbs) c
10291' - 20954'	10663	4-1/2", 11.6 lb, P-110, BTC	7560 / 1.40	10690 / 1.10	385 / 1.87

API Rating & Safety Factor

a) Based on full casing evacuation with 9.5 ppg fluid on backside @ 10879' TVD.

b) Burst pressure based on 9000 psi treating pressure with 10.2 ppg internal fluid gradient and 9 ppg external fluid gradient @ 10879' TVD.

c) Based on string weight in 9.5 ppg fluid (Buoyed weight: 106k lbs.) plus 100k lbs overpull.

Oasis Petroleum
Well Summary
Chalmers 5300 21-9 5T
Section 9 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' - 2126'	36	J-55	LTC	8.921"	8.765"	3400	4530	5660

Interval	Description	Collapse	Burst	Tension
		(psi) / a	(psi) / b	(1000 lbs) / c
0' - 2126'	9-5/8", 36#, J-55, LTC, 8rd	2020 / 2.03	3520 / 3.53	453 / 2.72

API Rating & Safety Factor

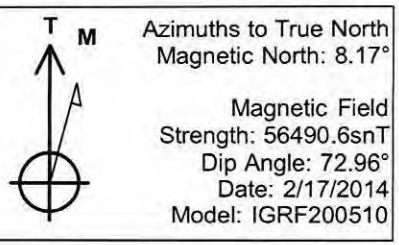
a) Based on full casing evacuation with 9 ppg fluid on backside (2126' setting depth).
b) Burst pressure based on 9 ppg fluid with no fluid on backside (2126' setting depth).
c) Based on string weight in 9 ppg fluid at 2126' TVD plus 100k# overpull. (Buoyed weight equals 66k lbs.)

Cement volumes are based on 9-5/8" casing set in 13-1/2 " hole with 60% excess to circulate cement back to surface.
Mix and pump the following slurry.

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

Lead Slurry: **453 sks** (240 bbls), 11.5 lb/gal, 2.97 cu. Ft./sk Varicem Cement with 0.125 il/sk Lost Circulation Additive

Tail Slurry: **173 sks** (62 bbls), 13.0 lb/gal, 2.01 cu.ft./sk Varicem with .125 lb/sk Lost Circulation Agent



Azimuths to True North
Magnetic North: 8.17°

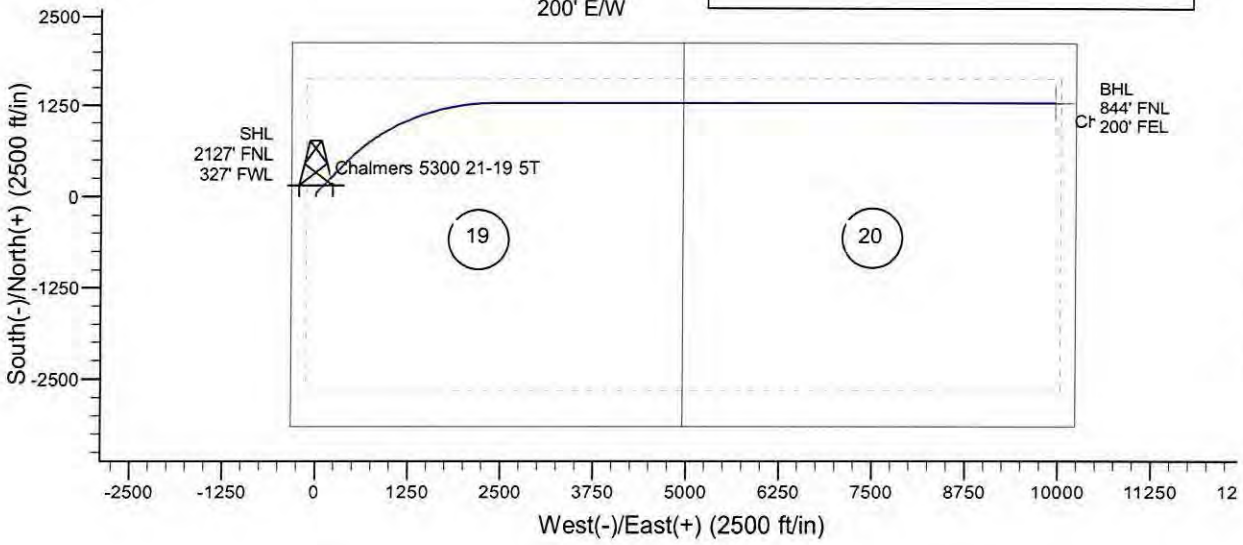
Magnetic Field
Strength: 56490.6snT
Dip Angle: 72.96°
Date: 2/17/2014
Model: IGRF200510

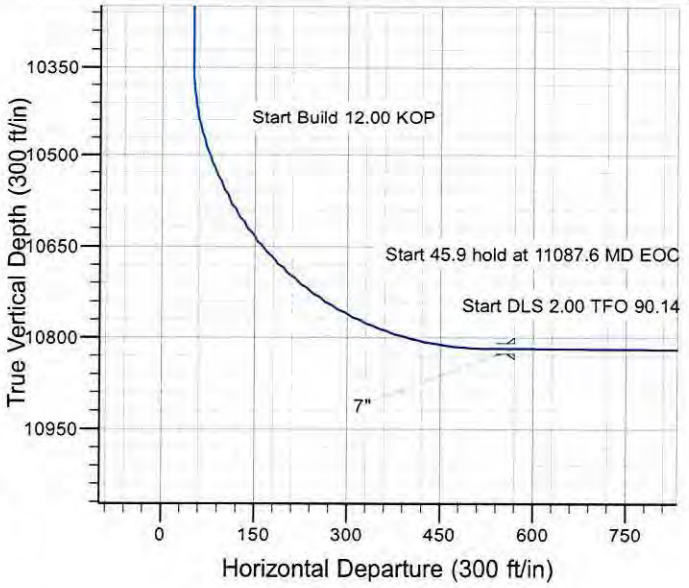
OASIS PETROLEUM

SITE DETAILS: 153N-100W-19/20	
Well Centre Latitude:	48° 3' 42.270 N
Longitude:	103° 36' 10.110 W
Positional Uncertainity:	0.0
Convergence:	-2.31
Local North:	True

Project: Indian Hills
Site: 153N-100W-19/20
Well: Chalmers 5300 21-19 5T
Wellbore: Chalmers 5300 21-19 5T
Design: Plan #2

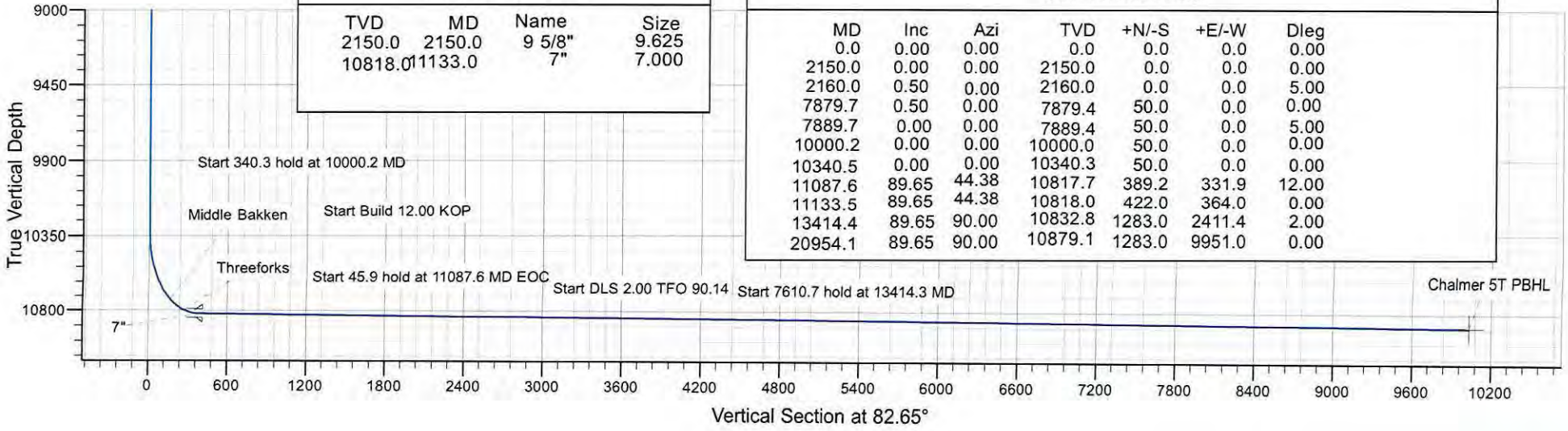
Setbacks
500' N/S
200' E/W





CASING DETAILS			
TVD	MD	Name	Size
2150.0	2150.0	9 5/8"	9.625
10818.0	11133.0	7"	7.000

SECTION DETAILS						
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg
0.0	0.00	0.00	0.0	0.0	0.0	0.00
2150.0	0.00	0.00	2150.0	0.0	0.0	0.00
2160.0	0.50	0.00	2160.0	0.0	0.0	5.00
7879.7	0.50	0.00	7879.4	50.0	0.0	0.00
7889.7	0.00	0.00	7889.4	50.0	0.0	5.00
10000.2	0.00	0.00	10000.0	50.0	0.0	0.00
10340.5	0.00	0.00	10340.3	50.0	0.0	0.00
11087.6	89.65	44.38	10817.7	389.2	331.9	12.00
11133.5	89.65	44.38	10818.0	422.0	364.0	0.00
13414.4	89.65	90.00	10832.8	1283.0	2411.4	2.00
20954.1	89.65	90.00	10879.1	1283.0	9951.0	0.00



Oasis

Indian Hills
153N-100W-19/20
Chalmers 5300 21-19 5T

Chalmers 5300 21-19 5T

Plan: Plan #2

Standard Planning Report

16 May, 2014

Oasis Petroleum

Planning Report

Database:	OpenWellsCompass - EDM Prod	**Local Co-ordinate Reference:**	Well Chalmers 5300 21-19 5T
Company:	Oasis	**TVD Reference:**	WELL @ 2076.0ft
Project:	Indian Hills	**MD Reference:**	WELL @ 2076.0ft
Site:	153N-100W-19/20	**North Reference:**	True
Well:	Chalmers 5300 21-19 5T	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Chalmers 5300 21-19 5T		
Design:	Plan #2		

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-19/20				
Site Position:		**Northing:**	402,777.74 ft	**Latitude:**	48° 3' 44.270 N
From:	Lat/Long	**Easting:**	1,209,962.51 ft	**Longitude:**	103° 36' 10.700 W
Position Uncertainty:	0.0 ft	**Slot Radius:**	13.200 in	**Grid Convergence:**	-2.31 °

Well	Chalmers 5300 21-19 5T					
Well Position	**+N/-S**	-202.7 ft	**Northing:**	402,573.63 ft	**Latitude:**	48° 3' 42.270 N
	+E/-W	40.1 ft	**Easting:**	1,209,994.39 ft	**Longitude:**	103° 36' 10.110 W
Position Uncertainty		0.0 ft	**Wellhead Elevation:**		**Ground Level:**	2,051.0 ft

Wellbore	Chalmers 5300 21-19 5T				
Magnetics	**Model Name**	**Sample Date**	**Declination (°)**	**Dip Angle (°)**	**Field Strength (nT)**
	IGRF200510	2/17/2014	8.17	72.96	56,491

Design	Plan #2				
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	82.65	

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	
2,150.0	0.00	0.00	2,150.0	0.0	0.0	0.00	0.00	0.00	0.00	
2,160.0	0.50	0.00	2,160.0	0.0	0.0	5.00	5.00	0.00	0.00	
7,879.7	0.50	0.00	7,879.4	50.0	0.0	0.00	0.00	0.00	0.00	
7,889.7	0.00	0.00	7,889.4	50.0	0.0	5.00	-5.00	0.00	180.00	
10,000.2	0.00	0.00	10,000.0	50.0	0.0	0.00	0.00	0.00	0.00	
10,340.5	0.00	0.00	10,340.3	50.0	0.0	0.00	0.00	0.00	0.00	
11,087.6	89.65	44.38	10,817.7	389.2	331.9	12.00	12.00	0.00	44.38	
11,133.5	89.65	44.38	10,818.0	422.0	364.0	0.00	0.00	0.00	0.00	
13,414.4	89.65	90.00	10,832.8	1,283.0	2,411.4	2.00	0.00	2.00	90.15	
20,954.1	89.65	90.00	10,879.1	1,283.0	9,951.0	0.00	0.00	0.00	0.00	Chalmer 5T PBHL

Database:	OpenWellsCompass - EDM Prod	**Local Co-ordinate Reference:**	Well Chalmers 5300 21-19 5T
Company:	Oasis	**TVD Reference:**	WELL @ 2076.0ft
Project:	Indian Hills	**MD Reference:**	WELL @ 2076.0ft
Site:	153N-100W-19/20	**North Reference:**	True
Well:	Chalmers 5300 21-19 5T	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Chalmers 5300 21-19 5T		
Design:	Plan #2		

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
2,000.0	0.00	0.00	2,000.0	0.0	0.0	0.0	0.00	0.00	0.00
2,021.0	0.00	0.00	2,021.0	0.0	0.0	0.0	0.00	0.00	0.00
Pierre									
2,100.0	0.00	0.00	2,100.0	0.0	0.0	0.0	0.00	0.00	0.00
2,150.0	0.00	0.00	2,150.0	0.0	0.0	0.0	0.00	0.00	0.00
Start Build 5.00 - 9 5/8"									
2,160.0	0.50	0.00	2,160.0	0.0	0.0	0.0	5.00	5.00	0.00
Start 5719.7 hold at 2160.0 MD									
2,200.0	0.50	0.00	2,200.0	0.4	0.0	0.1	0.00	0.00	0.00
2,300.0	0.50	0.00	2,300.0	1.3	0.0	0.2	0.00	0.00	0.00
2,400.0	0.50	0.00	2,400.0	2.1	0.0	0.3	0.00	0.00	0.00
2,500.0	0.50	0.00	2,500.0	3.0	0.0	0.4	0.00	0.00	0.00
2,600.0	0.50	0.00	2,600.0	3.9	0.0	0.5	0.00	0.00	0.00
2,700.0	0.50	0.00	2,700.0	4.8	0.0	0.6	0.00	0.00	0.00
2,800.0	0.50	0.00	2,800.0	5.6	0.0	0.7	0.00	0.00	0.00
2,900.0	0.50	0.00	2,900.0	6.5	0.0	0.8	0.00	0.00	0.00
3,000.0	0.50	0.00	3,000.0	7.4	0.0	0.9	0.00	0.00	0.00
3,100.0	0.50	0.00	3,100.0	8.2	0.0	1.1	0.00	0.00	0.00
3,200.0	0.50	0.00	3,200.0	9.1	0.0	1.2	0.00	0.00	0.00
3,300.0	0.50	0.00	3,300.0	10.0	0.0	1.3	0.00	0.00	0.00
3,400.0	0.50	0.00	3,400.0	10.9	0.0	1.4	0.00	0.00	0.00
3,500.0	0.50	0.00	3,499.9	11.7	0.0	1.5	0.00	0.00	0.00
3,600.0	0.50	0.00	3,599.9	12.6	0.0	1.6	0.00	0.00	0.00
3,700.0	0.50	0.00	3,699.9	13.5	0.0	1.7	0.00	0.00	0.00
3,800.0	0.50	0.00	3,799.9	14.4	0.0	1.8	0.00	0.00	0.00
3,900.0	0.50	0.00	3,899.9	15.2	0.0	1.9	0.00	0.00	0.00
4,000.0	0.50	0.00	3,999.9	16.1	0.0	2.1	0.00	0.00	0.00
4,100.0	0.50	0.00	4,099.9	17.0	0.0	2.2	0.00	0.00	0.00
4,200.0	0.50	0.00	4,199.9	17.8	0.0	2.3	0.00	0.00	0.00
4,300.0	0.50	0.00	4,299.9	18.7	0.0	2.4	0.00	0.00	0.00
4,400.0	0.50	0.00	4,399.9	19.6	0.0	2.5	0.00	0.00	0.00
4,500.0	0.50	0.00	4,499.9	20.5	0.0	2.6	0.00	0.00	0.00
4,600.0	0.50	0.00	4,599.9	21.3	0.0	2.7	0.00	0.00	0.00
4,624.1	0.50	0.00	4,624.0	21.5	0.0	2.8	0.00	0.00	0.00
Greenhorn									

Database:	OpenWellsCompass - EDM Prod	**Local Co-ordinate Reference:**	Well Chalmers 5300 21-19 5T
Company:	Oasis	**TVD Reference:**	WELL @ 2076.0ft
Project:	Indian Hills	**MD Reference:**	WELL @ 2076.0ft
Site:	153N-100W-19/20	**North Reference:**	True
Well:	Chalmers 5300 21-19 5T	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Chalmers 5300 21-19 5T		
Design:	Plan #2		

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)
4,700.0	0.50	0.00	4,699.9	22.2	0.0	2.8	0.00	0.00	0.00
4,800.0	0.50	0.00	4,799.9	23.1	0.0	3.0	0.00	0.00	0.00
4,900.0	0.50	0.00	4,899.9	24.0	0.0	3.1	0.00	0.00	0.00
5,000.0	0.50	0.00	4,999.9	24.8	0.0	3.2	0.00	0.00	0.00
5,029.1	0.50	0.00	5,029.0	25.1	0.0	3.2	0.00	0.00	0.00
Mowry									
5,100.0	0.50	0.00	5,099.9	25.7	0.0	3.3	0.00	0.00	0.00
5,200.0	0.50	0.00	5,199.9	26.6	0.0	3.4	0.00	0.00	0.00
5,300.0	0.50	0.00	5,299.9	27.4	0.0	3.5	0.00	0.00	0.00
5,400.0	0.50	0.00	5,399.9	28.3	0.0	3.6	0.00	0.00	0.00
5,417.1	0.50	0.00	5,417.0	28.5	0.0	3.6	0.00	0.00	0.00
Dakota									
5,500.0	0.50	0.00	5,499.9	29.2	0.0	3.7	0.00	0.00	0.00
5,600.0	0.50	0.00	5,599.9	30.1	0.0	3.8	0.00	0.00	0.00
5,700.0	0.50	0.00	5,699.9	30.9	0.0	4.0	0.00	0.00	0.00
5,800.0	0.50	0.00	5,799.9	31.8	0.0	4.1	0.00	0.00	0.00
5,900.0	0.50	0.00	5,899.9	32.7	0.0	4.2	0.00	0.00	0.00
6,000.0	0.50	0.00	5,999.9	33.6	0.0	4.3	0.00	0.00	0.00
6,100.0	0.50	0.00	6,099.8	34.4	0.0	4.4	0.00	0.00	0.00
6,200.0	0.50	0.00	6,199.8	35.3	0.0	4.5	0.00	0.00	0.00
6,300.0	0.50	0.00	6,299.8	36.2	0.0	4.6	0.00	0.00	0.00
6,400.0	0.50	0.00	6,399.8	37.0	0.0	4.7	0.00	0.00	0.00
6,463.2	0.50	0.00	6,463.0	37.6	0.0	4.8	0.00	0.00	0.00
Rierdon									
6,500.0	0.50	0.00	6,499.8	37.9	0.0	4.8	0.00	0.00	0.00
6,600.0	0.50	0.00	6,599.8	38.8	0.0	5.0	0.00	0.00	0.00
6,700.0	0.50	0.00	6,699.8	39.7	0.0	5.1	0.00	0.00	0.00
6,800.0	0.50	0.00	6,799.8	40.5	0.0	5.2	0.00	0.00	0.00
6,891.2	0.50	0.00	6,891.0	41.3	0.0	5.3	0.00	0.00	0.00
Dunham Salt									
6,900.0	0.50	0.00	6,899.8	41.4	0.0	5.3	0.00	0.00	0.00
6,960.2	0.50	0.00	6,960.0	41.9	0.0	5.4	0.00	0.00	0.00
Dunham Salt Base									
7,000.0	0.50	0.00	6,999.8	42.3	0.0	5.4	0.00	0.00	0.00
7,100.0	0.50	0.00	7,099.8	43.2	0.0	5.5	0.00	0.00	0.00
7,200.0	0.50	0.00	7,199.8	44.0	0.0	5.6	0.00	0.00	0.00
7,257.2	0.50	0.00	7,257.0	44.5	0.0	5.7	0.00	0.00	0.00
Pine Salt									
7,290.2	0.50	0.00	7,290.0	44.8	0.0	5.7	0.00	0.00	0.00
Pine Salt Base									
7,300.0	0.50	0.00	7,299.8	44.9	0.0	5.7	0.00	0.00	0.00
7,351.2	0.50	0.00	7,351.0	45.3	0.0	5.8	0.00	0.00	0.00
Opeche Salt									
7,400.0	0.50	0.00	7,399.8	45.8	0.0	5.9	0.00	0.00	0.00
7,426.2	0.50	0.00	7,426.0	46.0	0.0	5.9	0.00	0.00	0.00
Opeche Salt Base									
7,500.0	0.50	0.00	7,499.8	46.6	0.0	6.0	0.00	0.00	0.00
7,600.0	0.50	0.00	7,599.8	47.5	0.0	6.1	0.00	0.00	0.00
7,662.2	0.50	0.00	7,662.0	48.1	0.0	6.1	0.00	0.00	0.00
Amsden									
7,700.0	0.50	0.00	7,699.8	48.4	0.0	6.2	0.00	0.00	0.00
7,800.0	0.50	0.00	7,799.8	49.3	0.0	6.3	0.00	0.00	0.00
7,828.2	0.50	0.00	7,828.0	49.5	0.0	6.3	0.00	0.00	0.00
Tyler									

Database:	OpenWellsCompass - EDM Prod	**Local Co-ordinate Reference:**	Well Chalmers 5300 21-19 5T
Company:	Oasis	**TVD Reference:**	WELL @ 2076.0ft
Project:	Indian Hills	**MD Reference:**	WELL @ 2076.0ft
Site:	153N-100W-19/20	**North Reference:**	True
Well:	Chalmers 5300 21-19 5T	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Chalmers 5300 21-19 5T		
Design:	Plan #2		

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)
7,879.7	0.50	0.00	7,879.4	50.0	0.0	6.4	0.00	0.00	0.00
Start Drop -5.00									
7,889.7	0.00	0.00	7,889.4	50.0	0.0	6.4	5.00	-5.00	0.00
Start 2110.6 hold at 7889.7 MD									
7,900.0	0.00	0.00	7,899.8	50.0	0.0	6.4	0.00	0.00	0.00
8,000.0	0.00	0.00	7,999.8	50.0	0.0	6.4	0.00	0.00	0.00
8,032.2	0.00	0.00	8,032.0	50.0	0.0	6.4	0.00	0.00	0.00
Otter/Base Minnelusa									
8,100.0	0.00	0.00	8,099.8	50.0	0.0	6.4	0.00	0.00	0.00
8,200.0	0.00	0.00	8,199.8	50.0	0.0	6.4	0.00	0.00	0.00
8,300.0	0.00	0.00	8,299.8	50.0	0.0	6.4	0.00	0.00	0.00
8,384.2	0.00	0.00	8,384.0	50.0	0.0	6.4	0.00	0.00	0.00
Kibbey Lime									
8,400.0	0.00	0.00	8,399.8	50.0	0.0	6.4	0.00	0.00	0.00
8,500.0	0.00	0.00	8,499.8	50.0	0.0	6.4	0.00	0.00	0.00
8,534.2	0.00	0.00	8,534.0	50.0	0.0	6.4	0.00	0.00	0.00
Charles Salt									
8,600.0	0.00	0.00	8,599.8	50.0	0.0	6.4	0.00	0.00	0.00
8,700.0	0.00	0.00	8,699.8	50.0	0.0	6.4	0.00	0.00	0.00
8,800.0	0.00	0.00	8,799.8	50.0	0.0	6.4	0.00	0.00	0.00
8,900.0	0.00	0.00	8,899.8	50.0	0.0	6.4	0.00	0.00	0.00
9,000.0	0.00	0.00	8,999.8	50.0	0.0	6.4	0.00	0.00	0.00
9,100.0	0.00	0.00	9,099.8	50.0	0.0	6.4	0.00	0.00	0.00
9,200.0	0.00	0.00	9,199.8	50.0	0.0	6.4	0.00	0.00	0.00
9,209.2	0.00	0.00	9,209.0	50.0	0.0	6.4	0.00	0.00	0.00
Base Last Salt									
9,300.0	0.00	0.00	9,299.8	50.0	0.0	6.4	0.00	0.00	0.00
9,400.0	0.00	0.00	9,399.8	50.0	0.0	6.4	0.00	0.00	0.00
9,429.2	0.00	0.00	9,429.0	50.0	0.0	6.4	0.00	0.00	0.00
Mission Canyon									
9,500.0	0.00	0.00	9,499.8	50.0	0.0	6.4	0.00	0.00	0.00
9,600.0	0.00	0.00	9,599.8	50.0	0.0	6.4	0.00	0.00	0.00
9,700.0	0.00	0.00	9,699.8	50.0	0.0	6.4	0.00	0.00	0.00
9,800.0	0.00	0.00	9,799.8	50.0	0.0	6.4	0.00	0.00	0.00
9,900.0	0.00	0.00	9,899.8	50.0	0.0	6.4	0.00	0.00	0.00
9,993.2	0.00	0.00	9,993.0	50.0	0.0	6.4	0.00	0.00	0.00
Lodgepole									
10,000.2	0.00	0.00	10,000.0	50.0	0.0	6.4	0.00	0.00	0.00
Start 340.3 hold at 10000.2 MD									
10,100.0	0.00	0.00	10,099.8	50.0	0.0	6.4	0.00	0.00	0.00
10,200.0	0.00	0.00	10,199.8	50.0	0.0	6.4	0.00	0.00	0.00
10,300.0	0.00	0.00	10,299.8	50.0	0.0	6.4	0.00	0.00	0.00
10,340.5	0.00	0.00	10,340.3	50.0	0.0	6.4	0.00	0.00	0.00
Start Build 12.00 KOP									
10,350.0	1.14	44.38	10,349.8	50.1	0.1	6.5	12.00	12.00	0.00
10,375.0	4.14	44.38	10,374.8	50.9	0.9	7.4	12.00	12.00	0.00
10,400.0	7.14	44.38	10,399.6	52.6	2.6	9.3	12.00	12.00	0.00
10,425.0	10.14	44.38	10,424.3	55.3	5.2	12.2	12.00	12.00	0.00
10,450.0	13.14	44.38	10,448.8	58.9	8.7	16.2	12.00	12.00	0.00
10,475.0	16.14	44.38	10,473.0	63.4	13.2	21.2	12.00	12.00	0.00
10,500.0	19.14	44.38	10,496.8	68.9	18.5	27.1	12.00	12.00	0.00
10,525.0	22.14	44.38	10,520.2	75.2	24.6	34.0	12.00	12.00	0.00
10,550.0	25.14	44.38	10,543.1	82.3	31.6	41.9	12.00	12.00	0.00
10,575.0	28.14	44.38	10,565.5	90.3	39.5	50.7	12.00	12.00	0.00

Database:	OpenWellsCompass - EDM Prod	**Local Co-ordinate Reference:**	Well Chalmers 5300 21-19 5T
Company:	Oasis	**TVD Reference:**	WELL @ 2076.0ft
Project:	Indian Hills	**MD Reference:**	WELL @ 2076.0ft
Site:	153N-100W-19/20	**North Reference:**	True
Well:	Chalmers 5300 21-19 5T	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Chalmers 5300 21-19 5T		
Design:	Plan #2		

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)
10,600.0	31.14	44.38	10,587.2	99.2	48.1	60.4	12.00	12.00	0.00
10,625.0	34.14	44.38	10,608.2	108.8	57.5	71.0	12.00	12.00	0.00
10,650.0	37.14	44.38	10,628.6	119.2	67.7	82.4	12.00	12.00	0.00
10,675.0	40.14	44.38	10,648.1	130.4	78.7	94.7	12.00	12.00	0.00
10,700.0	43.14	44.38	10,666.8	142.2	90.3	107.7	12.00	12.00	0.00
10,725.0	46.14	44.38	10,684.6	154.8	102.6	121.5	12.00	12.00	0.00
10,750.0	49.14	44.38	10,701.4	168.0	115.5	136.0	12.00	12.00	0.00
10,757.1	50.00	44.38	10,706.0	171.9	119.3	140.3	12.00	12.00	0.00
False Bakken									
10,773.0	51.90	44.38	10,716.0	180.7	127.9	149.9	12.00	12.00	0.00
Upper Bakken Shale									
10,775.0	52.14	44.38	10,717.2	181.8	129.0	151.2	12.00	12.00	0.00
10,799.9	55.13	44.38	10,732.0	196.1	143.0	166.9	12.00	12.00	0.00
Middle Bakken									
10,800.0	55.14	44.38	10,732.1	196.2	143.1	167.0	12.00	12.00	0.00
10,825.0	58.14	44.38	10,745.8	211.1	157.7	183.4	12.00	12.00	0.00
10,850.0	61.14	44.38	10,758.4	226.5	172.8	200.3	12.00	12.00	0.00
10,866.2	63.08	44.38	10,766.0	236.8	182.8	211.5	12.00	12.00	0.00
Lower Bakken Shale									
10,875.0	64.14	44.38	10,769.9	242.4	188.3	217.7	12.00	12.00	0.00
10,899.4	67.07	44.38	10,780.0	258.3	203.8	235.2	12.00	12.00	0.00
Pronghorn									
10,900.0	67.14	44.38	10,780.2	258.7	204.2	235.6	12.00	12.00	0.00
10,925.0	70.14	44.38	10,789.4	275.3	220.5	253.9	12.00	12.00	0.00
10,950.0	73.14	44.38	10,797.2	292.3	237.1	272.5	12.00	12.00	0.00
10,956.3	73.90	44.38	10,799.0	296.6	241.3	277.3	12.00	12.00	0.00
Threeforks									
10,975.0	76.14	44.38	10,803.8	309.5	254.0	291.4	12.00	12.00	0.00
11,000.0	79.14	44.38	10,809.2	326.9	271.0	310.6	12.00	12.00	0.00
11,010.3	80.37	44.38	10,811.0	334.2	278.1	318.5	12.00	12.00	0.00
Threeforks(Top of Target)									
11,025.0	82.14	44.38	10,813.3	344.6	288.3	330.0	12.00	12.00	0.00
11,050.0	85.14	44.38	10,816.0	362.3	305.7	349.5	12.00	12.00	0.00
11,075.0	88.14	44.38	10,817.5	380.2	323.1	369.1	12.00	12.00	0.00
11,087.6	89.65	44.38	10,817.7	389.2	331.9	379.0	12.00	12.00	0.00
Start 45.9 hold at 11087.6 MD EOC									
11,100.0	89.65	44.38	10,817.8	398.0	340.6	388.7	0.00	0.00	0.00
11,133.0	89.65	44.38	10,818.0	421.6	363.7	414.6	0.00	0.00	0.00
7"									
11,133.5	89.65	44.38	10,818.0	422.0	364.0	415.0	0.00	0.00	0.00
Start DLS 2.00 TFO 90.14									
11,200.0	89.65	45.71	10,818.4	469.0	411.1	467.7	2.00	-0.01	2.00
11,300.0	89.64	47.71	10,819.1	537.5	483.9	548.6	2.00	0.00	2.00
11,400.0	89.64	49.71	10,819.7	603.5	559.0	631.6	2.00	0.00	2.00
11,500.0	89.63	51.71	10,820.3	666.8	636.4	716.4	2.00	0.00	2.00
11,600.0	89.63	53.71	10,821.0	727.4	716.0	803.1	2.00	0.00	2.00
11,700.0	89.63	55.71	10,821.6	785.2	797.6	891.4	2.00	0.00	2.00
11,800.0	89.62	57.71	10,822.3	840.0	881.2	981.3	2.00	0.00	2.00
11,900.0	89.62	59.71	10,822.9	892.0	966.6	1,072.7	2.00	0.00	2.00
12,000.0	89.62	61.71	10,823.6	940.9	1,053.8	1,165.5	2.00	0.00	2.00
12,100.0	89.62	63.71	10,824.2	986.7	1,142.7	1,259.5	2.00	0.00	2.00
12,200.0	89.62	65.71	10,824.9	1,029.4	1,233.1	1,354.6	2.00	0.00	2.00
12,300.0	89.62	67.71	10,825.6	1,069.0	1,324.9	1,450.8	2.00	0.00	2.00
12,400.0	89.62	69.71	10,826.2	1,105.3	1,418.1	1,547.8	2.00	0.00	2.00

Database:	OpenWellsCompass - EDM Prod	**Local Co-ordinate Reference:**	Well Chalmers 5300 21-19 5T
Company:	Oasis	**TVD Reference:**	WELL @ 2076.0ft
Project:	Indian Hills	**MD Reference:**	WELL @ 2076.0ft
Site:	153N-100W-19/20	**North Reference:**	True
Well:	Chalmers 5300 21-19 5T	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Chalmers 5300 21-19 5T		
Design:	Plan #2		

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)
12,500.0	89.62	71.71	10,826.9	1,138.3	1,512.5	1,645.6	2.00	0.00	2.00
12,600.0	89.62	73.71	10,827.6	1,168.0	1,608.0	1,744.1	2.00	0.00	2.00
12,700.0	89.62	75.71	10,828.2	1,194.4	1,704.4	1,843.2	2.00	0.00	2.00
12,800.0	89.63	77.71	10,828.9	1,217.4	1,801.7	1,942.6	2.00	0.00	2.00
12,900.0	89.63	79.71	10,829.5	1,236.9	1,899.8	2,042.4	2.00	0.00	2.00
13,000.0	89.63	81.71	10,830.2	1,253.1	1,998.5	2,142.3	2.00	0.00	2.00
13,100.0	89.63	83.71	10,830.8	1,265.8	2,097.7	2,242.3	2.00	0.00	2.00
13,200.0	89.64	85.71	10,831.4	1,275.0	2,197.2	2,342.2	2.00	0.00	2.00
13,300.0	89.64	87.71	10,832.1	1,280.7	2,297.1	2,442.0	2.00	0.00	2.00
13,400.0	89.65	89.71	10,832.7	1,283.0	2,397.0	2,541.4	2.00	0.00	2.00
13,414.4	89.65	90.00	10,832.8	1,283.0	2,411.4	2,555.7	2.00	0.01	2.00
Start 7610.7 hold at 13414.3 MD									
13,500.0	89.65	90.00	10,833.3	1,283.0	2,497.0	2,640.6	0.00	0.00	0.00
13,600.0	89.65	90.00	10,833.9	1,283.0	2,597.0	2,739.8	0.00	0.00	0.00
13,700.0	89.65	90.00	10,834.5	1,283.0	2,697.0	2,838.9	0.00	0.00	0.00
13,800.0	89.65	90.00	10,835.2	1,283.0	2,797.0	2,938.1	0.00	0.00	0.00
13,900.0	89.65	90.00	10,835.8	1,283.0	2,897.0	3,037.3	0.00	0.00	0.00
14,000.0	89.65	90.00	10,836.4	1,283.0	2,997.0	3,136.5	0.00	0.00	0.00
14,100.0	89.65	90.00	10,837.0	1,283.0	3,097.0	3,235.6	0.00	0.00	0.00
14,200.0	89.65	90.00	10,837.6	1,283.0	3,197.0	3,334.8	0.00	0.00	0.00
14,300.0	89.65	90.00	10,838.2	1,283.0	3,297.0	3,434.0	0.00	0.00	0.00
14,400.0	89.65	90.00	10,838.8	1,283.0	3,397.0	3,533.2	0.00	0.00	0.00
14,500.0	89.65	90.00	10,839.5	1,283.0	3,497.0	3,632.4	0.00	0.00	0.00
14,600.0	89.65	90.00	10,840.1	1,283.0	3,597.0	3,731.5	0.00	0.00	0.00
14,700.0	89.65	90.00	10,840.7	1,283.0	3,697.0	3,830.7	0.00	0.00	0.00
14,800.0	89.65	90.00	10,841.3	1,283.0	3,797.0	3,929.9	0.00	0.00	0.00
14,900.0	89.65	90.00	10,841.9	1,283.0	3,897.0	4,029.1	0.00	0.00	0.00
15,000.0	89.65	90.00	10,842.5	1,283.0	3,997.0	4,128.2	0.00	0.00	0.00
15,100.0	89.65	90.00	10,843.1	1,283.0	4,097.0	4,227.4	0.00	0.00	0.00
15,200.0	89.65	90.00	10,843.8	1,283.0	4,197.0	4,326.6	0.00	0.00	0.00
15,300.0	89.65	90.00	10,844.4	1,283.0	4,297.0	4,425.8	0.00	0.00	0.00
15,400.0	89.65	90.00	10,845.0	1,283.0	4,397.0	4,525.0	0.00	0.00	0.00
15,500.0	89.65	90.00	10,845.6	1,283.0	4,497.0	4,624.1	0.00	0.00	0.00
15,600.0	89.65	90.00	10,846.2	1,283.0	4,597.0	4,723.3	0.00	0.00	0.00
15,700.0	89.65	90.00	10,846.8	1,283.0	4,697.0	4,822.5	0.00	0.00	0.00
15,800.0	89.65	90.00	10,847.4	1,283.0	4,797.0	4,921.7	0.00	0.00	0.00
15,900.0	89.65	90.00	10,848.1	1,283.0	4,897.0	5,020.8	0.00	0.00	0.00
16,000.0	89.65	90.00	10,848.7	1,283.0	4,997.0	5,120.0	0.00	0.00	0.00
16,100.0	89.65	90.00	10,849.3	1,283.0	5,097.0	5,219.2	0.00	0.00	0.00
16,200.0	89.65	90.00	10,849.9	1,283.0	5,197.0	5,318.4	0.00	0.00	0.00
16,300.0	89.65	90.00	10,850.5	1,283.0	5,297.0	5,417.5	0.00	0.00	0.00
16,400.0	89.65	90.00	10,851.1	1,283.0	5,397.0	5,516.7	0.00	0.00	0.00
16,500.0	89.65	90.00	10,851.7	1,283.0	5,497.0	5,615.9	0.00	0.00	0.00
16,600.0	89.65	90.00	10,852.4	1,283.0	5,597.0	5,715.1	0.00	0.00	0.00
16,700.0	89.65	90.00	10,853.0	1,283.0	5,697.0	5,814.3	0.00	0.00	0.00
16,800.0	89.65	90.00	10,853.6	1,283.0	5,797.0	5,913.4	0.00	0.00	0.00
16,900.0	89.65	90.00	10,854.2	1,283.0	5,897.0	6,012.6	0.00	0.00	0.00
17,000.0	89.65	90.00	10,854.8	1,283.0	5,997.0	6,111.8	0.00	0.00	0.00
17,100.0	89.65	90.00	10,855.4	1,283.0	6,097.0	6,211.0	0.00	0.00	0.00
17,200.0	89.65	90.00	10,856.0	1,283.0	6,197.0	6,310.1	0.00	0.00	0.00
17,300.0	89.65	90.00	10,856.7	1,283.0	6,297.0	6,409.3	0.00	0.00	0.00
17,400.0	89.65	90.00	10,857.3	1,283.0	6,397.0	6,508.5	0.00	0.00	0.00
17,500.0	89.65	90.00	10,857.9	1,283.0	6,496.9	6,607.7	0.00	0.00	0.00
17,600.0	89.65	90.00	10,858.5	1,283.0	6,596.9	6,706.8	0.00	0.00	0.00
17,700.0	89.65	90.00	10,859.1	1,283.0	6,696.9	6,806.0	0.00	0.00	0.00

Oasis Petroleum

Planning Report

Database:	OpenWellsCompass - EDM Prod	**Local Co-ordinate Reference:**	Well Chalmers 5300 21-19 5T
Company:	Oasis	**TVD Reference:**	WELL @ 2076.0ft
Project:	Indian Hills	**MD Reference:**	WELL @ 2076.0ft
Site:	153N-100W-19/20	**North Reference:**	True
Well:	Chalmers 5300 21-19 5T	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Chalmers 5300 21-19 5T		
Design:	Plan #2		

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)
17,800.0	89.65	90.00	10,859.7	1,283.0	6,796.9	6,905.2	0.00	0.00	0.00
17,900.0	89.65	90.00	10,860.3	1,283.0	6,896.9	7,004.4	0.00	0.00	0.00
18,000.0	89.65	90.00	10,861.0	1,283.0	6,996.9	7,103.6	0.00	0.00	0.00
18,100.0	89.65	90.00	10,861.6	1,283.0	7,096.9	7,202.7	0.00	0.00	0.00
18,200.0	89.65	90.00	10,862.2	1,283.0	7,196.9	7,301.9	0.00	0.00	0.00
18,300.0	89.65	90.00	10,862.8	1,283.0	7,296.9	7,401.1	0.00	0.00	0.00
18,400.0	89.65	90.00	10,863.4	1,283.0	7,396.9	7,500.3	0.00	0.00	0.00
18,500.0	89.65	90.00	10,864.0	1,283.0	7,496.9	7,599.4	0.00	0.00	0.00
18,600.0	89.65	90.00	10,864.6	1,283.0	7,596.9	7,698.6	0.00	0.00	0.00
18,700.0	89.65	90.00	10,865.3	1,283.0	7,696.9	7,797.8	0.00	0.00	0.00
18,800.0	89.65	90.00	10,865.9	1,283.0	7,796.9	7,897.0	0.00	0.00	0.00
18,900.0	89.65	90.00	10,866.5	1,283.0	7,896.9	7,996.2	0.00	0.00	0.00
19,000.0	89.65	90.00	10,867.1	1,283.0	7,996.9	8,095.3	0.00	0.00	0.00
19,100.0	89.65	90.00	10,867.7	1,283.0	8,096.9	8,194.5	0.00	0.00	0.00
19,200.0	89.65	90.00	10,868.3	1,283.0	8,196.9	8,293.7	0.00	0.00	0.00
19,300.0	89.65	90.00	10,868.9	1,283.0	8,296.9	8,392.9	0.00	0.00	0.00
19,400.0	89.65	90.00	10,869.6	1,283.0	8,396.9	8,492.0	0.00	0.00	0.00
19,500.0	89.65	90.00	10,870.2	1,283.0	8,496.9	8,591.2	0.00	0.00	0.00
19,600.0	89.65	90.00	10,870.8	1,283.0	8,596.9	8,690.4	0.00	0.00	0.00
19,700.0	89.65	90.00	10,871.4	1,283.0	8,696.9	8,789.6	0.00	0.00	0.00
19,800.0	89.65	90.00	10,872.0	1,283.0	8,796.9	8,888.7	0.00	0.00	0.00
19,900.0	89.65	90.00	10,872.6	1,283.0	8,896.9	8,987.9	0.00	0.00	0.00
20,000.0	89.65	90.00	10,873.2	1,283.0	8,996.9	9,087.1	0.00	0.00	0.00
20,100.0	89.65	90.00	10,873.9	1,283.0	9,096.9	9,186.3	0.00	0.00	0.00
20,200.0	89.65	90.00	10,874.5	1,283.0	9,196.9	9,285.5	0.00	0.00	0.00
20,300.0	89.65	90.00	10,875.1	1,283.0	9,296.9	9,384.6	0.00	0.00	0.00
20,400.0	89.65	90.00	10,875.7	1,283.0	9,396.9	9,483.8	0.00	0.00	0.00
20,500.0	89.65	90.00	10,876.3	1,283.0	9,496.9	9,583.0	0.00	0.00	0.00
20,600.0	89.65	90.00	10,876.9	1,283.0	9,596.9	9,682.2	0.00	0.00	0.00
20,700.0	89.65	90.00	10,877.5	1,283.0	9,696.9	9,781.3	0.00	0.00	0.00
20,800.0	89.65	90.00	10,878.2	1,283.0	9,796.9	9,880.5	0.00	0.00	0.00
20,900.0	89.65	90.00	10,878.8	1,283.0	9,896.9	9,979.7	0.00	0.00	0.00
20,954.1	89.65	90.00	10,879.1	1,283.0	9,951.0	10,033.4	0.00	0.00	0.00

Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
Chalmer 5T PBHL	0.00	0.00	10,878.4	1,283.0	9,951.0	403,454.69	1,219,989.02	48° 3' 54.906 N	103° 33' 43.598 W
- plan misses target center by 0.7ft at 20954.1ft MD (10879.1 TVD, 1283.0 N, 9951.0 E)									
- Point									

Casing Points

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (in)	Hole Diameter (in)
2,150.0	2,150.0	9 5/8"	9.625	13.500
11,133.0	10,818.0	7"	7.000	8.750

Database:	OpenWellsCompass - EDM Prod	**Local Co-ordinate Reference:**	Well Chalmers 5300 21-19 5T
Company:	Oasis	**TVD Reference:**	WELL @ 2076.0ft
Project:	Indian Hills	**MD Reference:**	WELL @ 2076.0ft
Site:	153N-100W-19/20	**North Reference:**	True
Well:	Chalmers 5300 21-19 5T	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Chalmers 5300 21-19 5T		
Design:	Plan #2		

Formations

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
2,021.0	2,021.0	Pierre			
4,624.1	4,624.0	Greenhorn			
5,029.1	5,029.0	Mowry			
5,417.1	5,417.0	Dakota			
6,463.2	6,463.0	Rierdon			
6,891.2	6,891.0	Dunham Salt			
6,960.2	6,960.0	Dunham Salt Base			
7,257.2	7,257.0	Pine Salt			
7,290.2	7,290.0	Pine Salt Base			
7,351.2	7,351.0	Opeche Salt			
7,426.2	7,426.0	Opeche Salt Base			
7,662.2	7,662.0	Amsden			
7,828.2	7,828.0	Tyler			
8,032.2	8,032.0	Otter/Base Minnelusa			
8,384.2	8,384.0	Kibbey Lime			
8,534.2	8,534.0	Charles Salt			
9,209.2	9,209.0	Base Last Salt			
9,429.2	9,429.0	Mission Canyon			
9,993.2	9,993.0	Lodgepole			
10,757.1	10,706.0	False Bakken			
10,773.0	10,716.0	Upper Bakken Shale			
10,799.9	10,732.0	Middle Bakken			
10,866.2	10,766.0	Lower Bakken Shale			
10,899.4	10,780.0	Pronghorn			
10,956.3	10,799.0	Threeforks			
11,010.3	10,811.0	Threeforks(Top of Target)			

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	Local Coordinates +E/-W (ft)	Comment
2,150.0	2,150.0	0.0	0.0	Start Build 5.00
2,160.0	2,160.0	0.0	0.0	Start 5719.7 hold at 2160.0 MD
7,879.7	7,879.4	50.0	0.0	Start Drop -5.00
7,889.7	7,889.4	50.0	0.0	Start 2110.6 hold at 7889.7 MD
10,000.2	10,000.0	50.0	0.0	Start 340.3 hold at 10000.2 MD
10,340.5	10,340.3	50.0	0.0	Start Build 12.00 KOP
11,087.6	10,817.7	389.2	331.9	Start 45.9 hold at 11087.6 MD EOC
11,133.5	10,818.0	422.0	364.0	Start DLS 2.00 TFO 90.14
13,414.4	10,832.8	1,283.0	2,411.4	Start 7610.7 hold at 13414.3 MD
21,025.1				TD at 21025.1

WELL LOCATION PLAT

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"CHALMERS 5300 21-19 5T"
2127 FEET FROM NORTH LINE AND 327 FEET FROM WEST LINE
SECTION 19, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA

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0 1000
1" = 1000'

- MONUMENT - RECOVERED
- MONUMENT - NOT RECOVERED

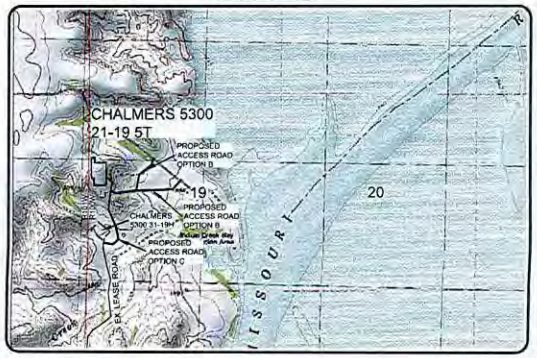
STAKED ON 1/29/14
VERTICAL CONTROL DATUM WAS BASED UPON CONTROL POINT 16 WITH AN ELEVATION OF 2014.2'

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: 5/07/14
NORTH DAKOTA

VICINITY MAP



Revision No.	Date	By	Description
REV 1	3/13/14	JAS	MOVED WELLS ON PAD
REV 2	4/22/14	BH	MOVED WELLS ON PAD/REVISED PAD
REV 3	5/7/14	BH	MOVED WELLS ON PAD/REVISED PAD

OASIS PETROLEUM NORTH AMERICA, LLC
WELL LOCATION PLAT
SECTION 19, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. | Project No.: 513-09-282
Checked By: D.D.K. | Date: JAN. 2014

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SHEET NO. 1/8

SECTION BREAKDOWN

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"CHALMERS 5300 21-19 5T"
2127 FEET FROM NORTH LINE AND 327 FEET FROM WEST LINE
SECTIONS 19 & 20, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA

VICINITY MAP

0 1000
1" = 1000'

- MONUMENT - RECOVERED
- MONUMENT - NOT RECOVERED

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ALL AZIMUTHS ARE BASED ON G.P.S. OBSERVATIONS. THE ORIGINAL SURVEY OF THIS AREA FOR THE GENERAL LAND OFFICE (G.L.O.) WAS 1891. THE CORNERS FOUND ARE AS INDICATED AND ALL OTHERS ARE COMPUTED FROM THOSE CORNERS FOUND AND BASED ON G.L.O. DATA. THE MAPPING ANGLE FOR THIS AREA IS APPROXIMATELY -0°03'.

REGISTERED LAND SURVEYOR
DARYL D. KASEMAN
LS-3880
DATE: 5/07/14
NORTH DAKOTA

Revision No.	Date	By	Description
REV 1	3/12/14	JJS	MOVED WELLS ON PAD
REV 2	4/22/14	BMH	MOVED WELLS ON PAD/REVISED PAD
REV 3	5/7/14	BMH	MOVED WELLS ON PAD/REVISED PAD

OASIS PETROLEUM NORTH AMERICA, LLC
SECTION BREAKDOWN
SECTIONS 19 & 20, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA
Drawn By: BJH/K Project No.: 513-09-282
Checked By: DDK Date: JAN 2014

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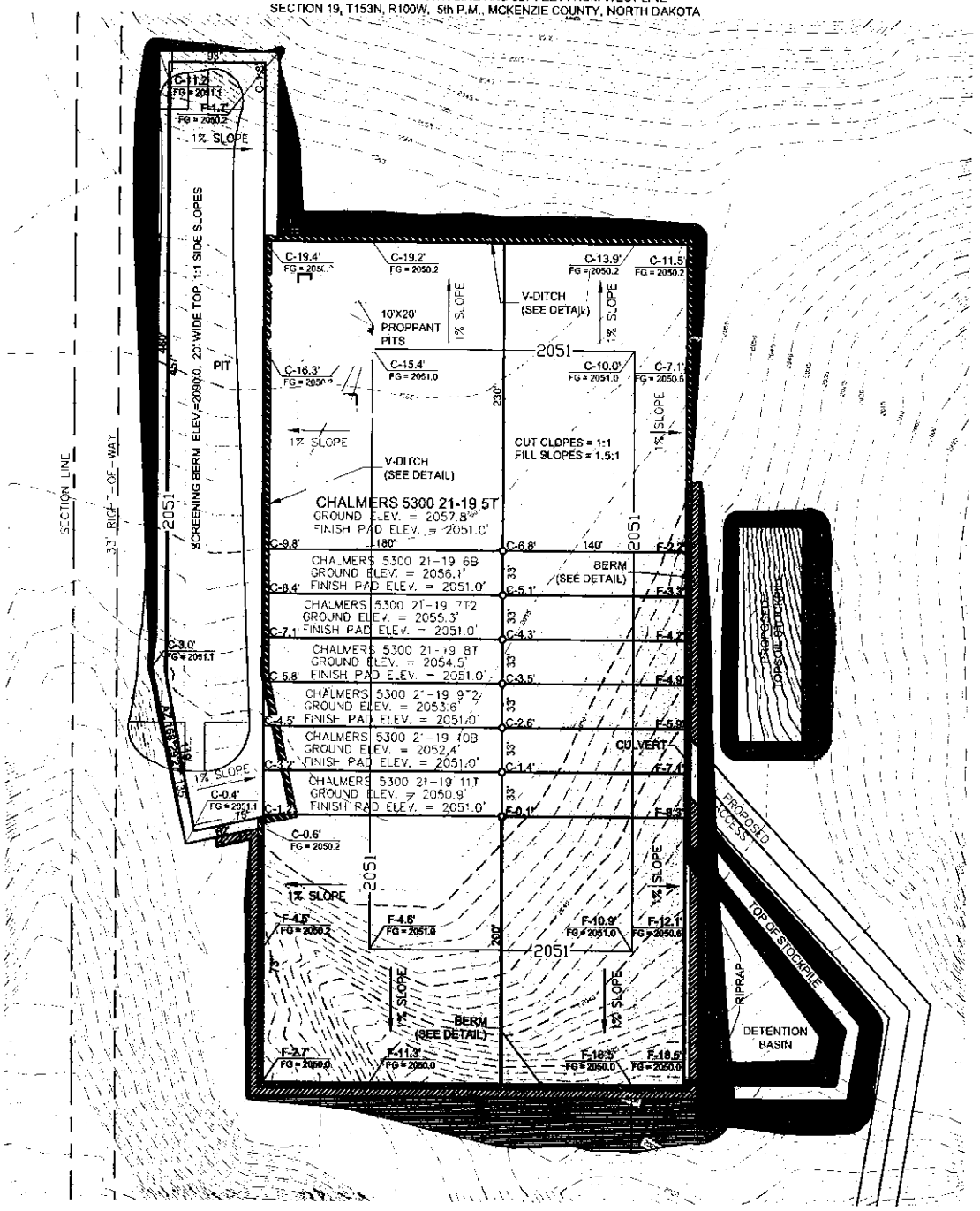
PAD LAYOUT

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"CHALMERS 5300 21-19 5T"
2127 FEET FROM NORTH LINE AND 327 FEET FROM WEST LINE
SECTION 19, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA



NOTE 1: Pad dimensions shown are to usable area, the v-ditch and berm areas shall be built to the outside of the pad dimensions.

NOTE 2 : Screening berm is to be built after drilling operations are complete.

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REGISTERED LAND SURVEYOR
DARYL D. KASEMAN
LS-3880
DATE: 5/07/14
NORTH DAKOTA

0 80
1" = 80'

V-DITCH DETAIL

1.5 : 1 : 1.5' min
2.0' min

Proposed Contours
Original Contours
BERM
DITCH

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

3/8
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OASIS PETROLEUM NORTH AMERICA, LLC
PAD LAYOUT
SECTION 19, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. | Project No.: 513-09-282
Checked By: D.D.K. | Date: JAN. 2014

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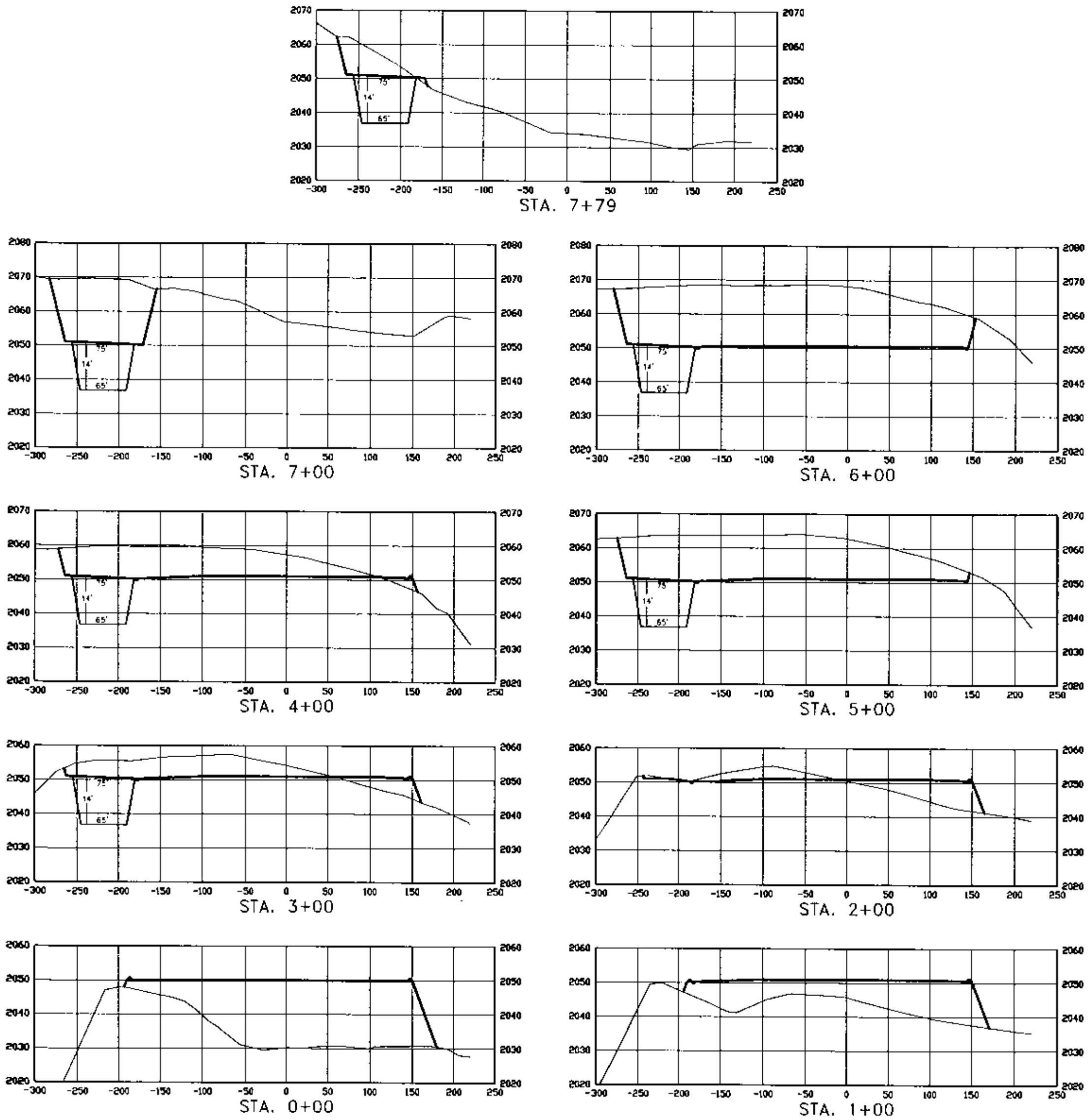
REV 2	4/22/14	BHH	MOVED WELLS ON PAD/REVISED PAD
REV 3	5/2/14	BHH	MOVED WELLS ON PAD/REVISED PAD

CROSS SECTIONS

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"CHALMERS 5300 21-19 5T"
2127 FEET FROM NORTH LINE AND 327 FEET FROM WEST LINE
SECTION 19, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA



REGISTERED LAND SURVEYOR
DARYL D. KASEMAN
LS-3880
DATE: 5/07/14
NORTH DAKOTA

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SCALE
HORIZ 1"=140'
VERT 1"=35'

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CROSS SECTIONS
SECTION 19, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H.	Project No.: S13-09-282
Checked By: D.D.K.	Date: JAN. 2014

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WELL LOCATION SITE QUANTITIES

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"CHALMERS 5300 21-19 5T"
2127 FEET FROM NORTH LINE AND 327 FEET FROM WEST LINE
SECTION 19, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA

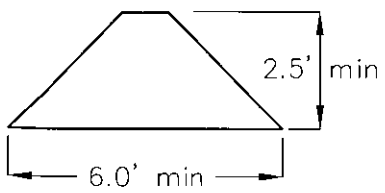
WELL SITE ELEVATION	2057.8
WELL PAD ELEVATION	2051.0

EXCAVATION	67,041
PLUS PIT	22,050
	89,091
EMBANKMENT	26,714
PLUS SHRINKAGE (25%)	6,679
	33,393
STOCKPILE PIT	22,050
STOCKPILE TOP SOIL (6")	5,434
BERMS	1,007 LF = 326 CY
DITCHES	1,768 LF = 270 CY
SCREENING BERM	27,464 CY
STOCKPILE MATERIAL	694
DISTURBED AREA FROM PAD	6.74 ACRES

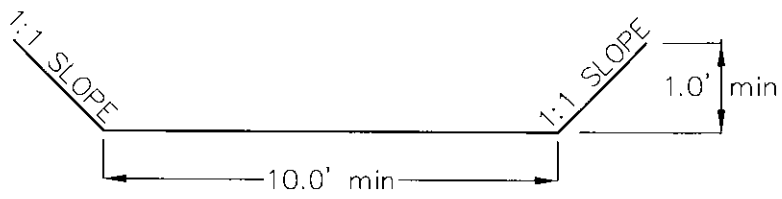
NOTE: ALL QUANTITIES ARE IN CUBIC YARDS (UNLESS NOTED)
CUT END SLOPES AT 1:1
FILL END SLOPES AT 1.5:1

WELL SITE LOCATION
2127' FNL
327' FWL

BERM DETAIL



DITCH DETAIL



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OASIS PETROLEUM NORTH AMERICA, LLC
QUANTITIES
SECTION 19, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

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ACCESS APPROACH

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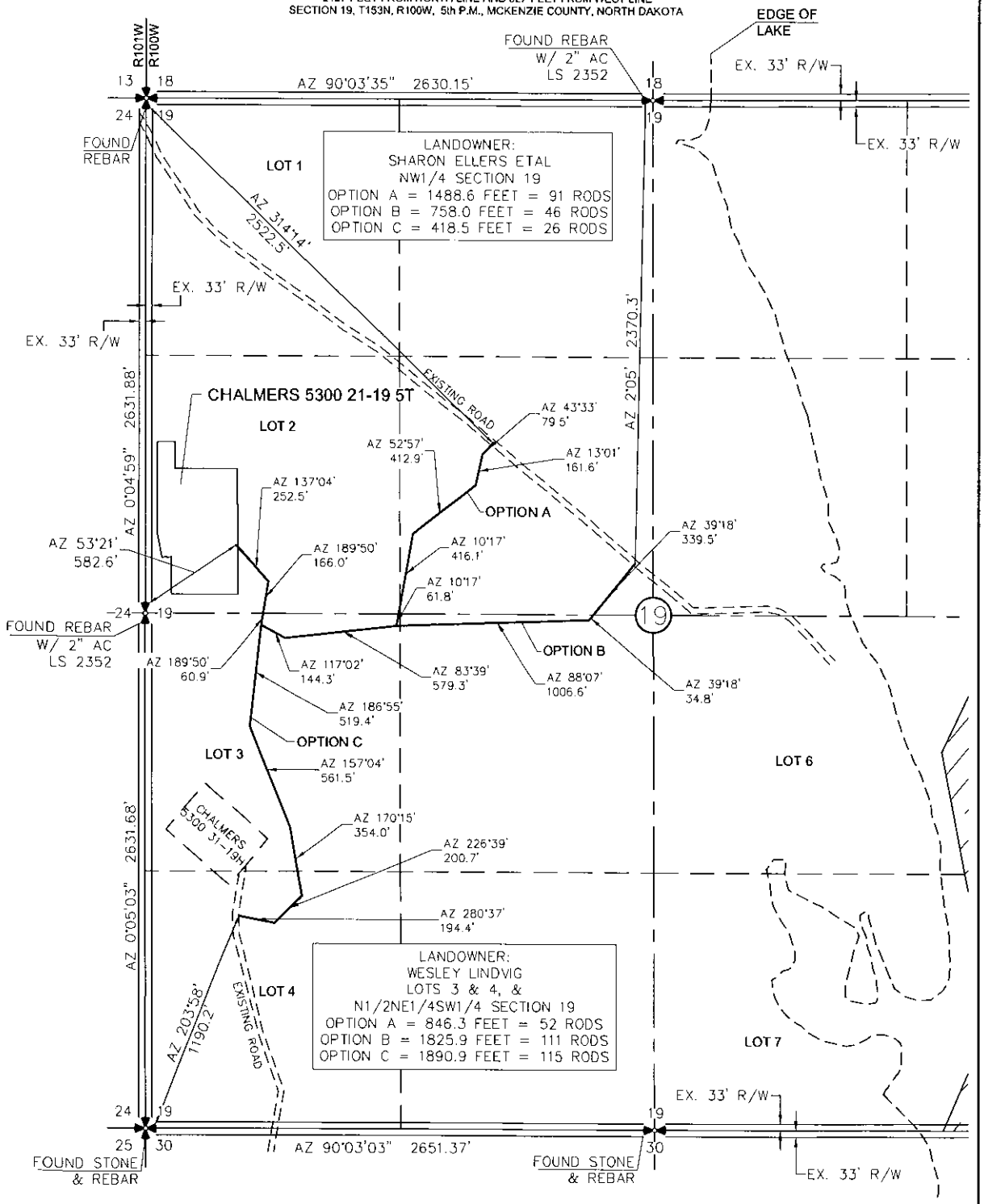

REGISTERED LAND SURVEYOR
DARYL D. KASEMAN
LS-3880
DATE: 5/07/14
NORTH DAKOTA

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

0 500
1" = 500'

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ACCESS APPROACH
SECTION 19, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

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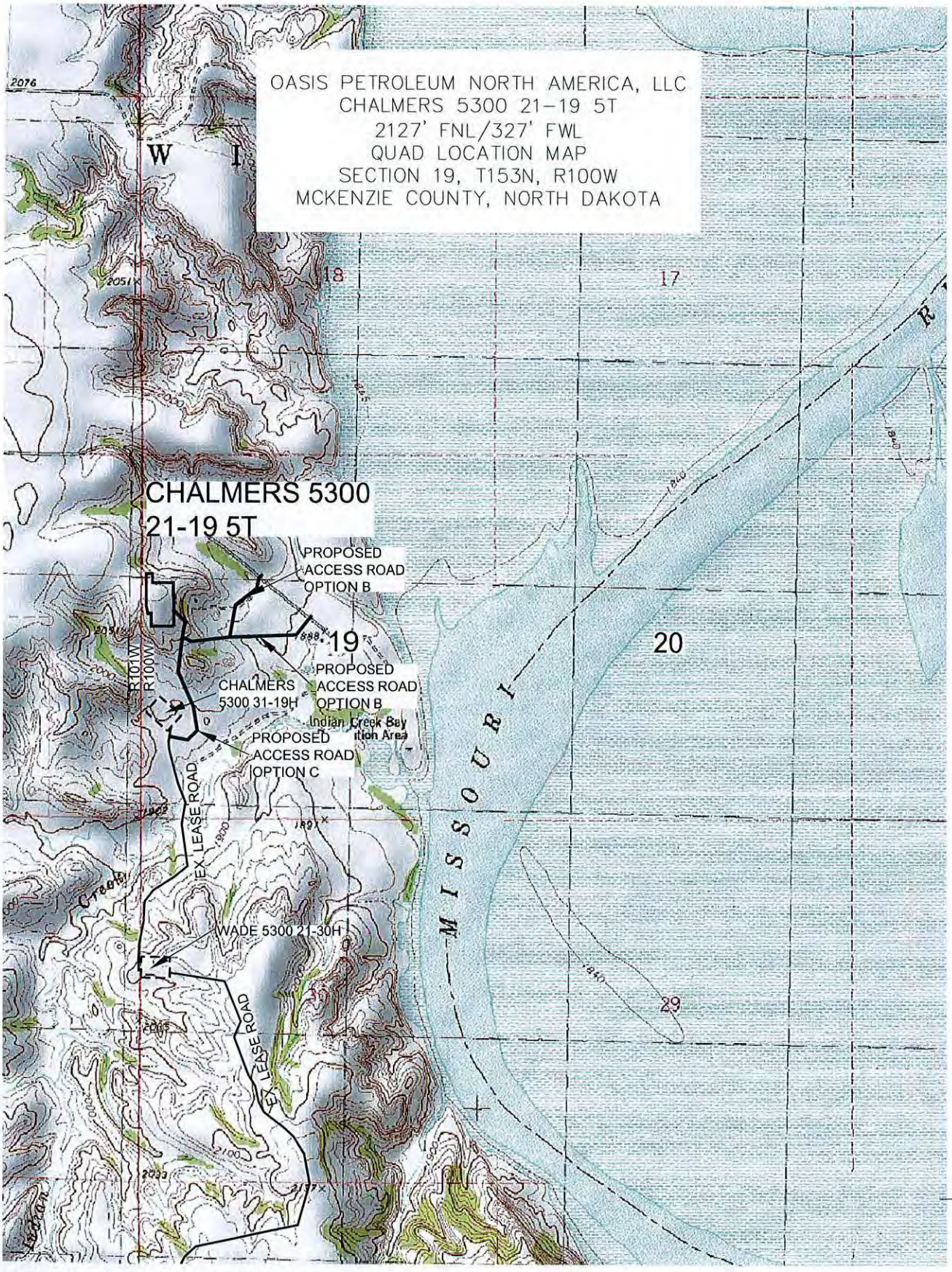

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OASIS PETROLEUM NORTH AMERICA, LLC
QUAD LOCATION MAP
SECTION 19, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. | Project No.: S13-09-282
Checked By: D.D.K. | Date: JAN. 2014

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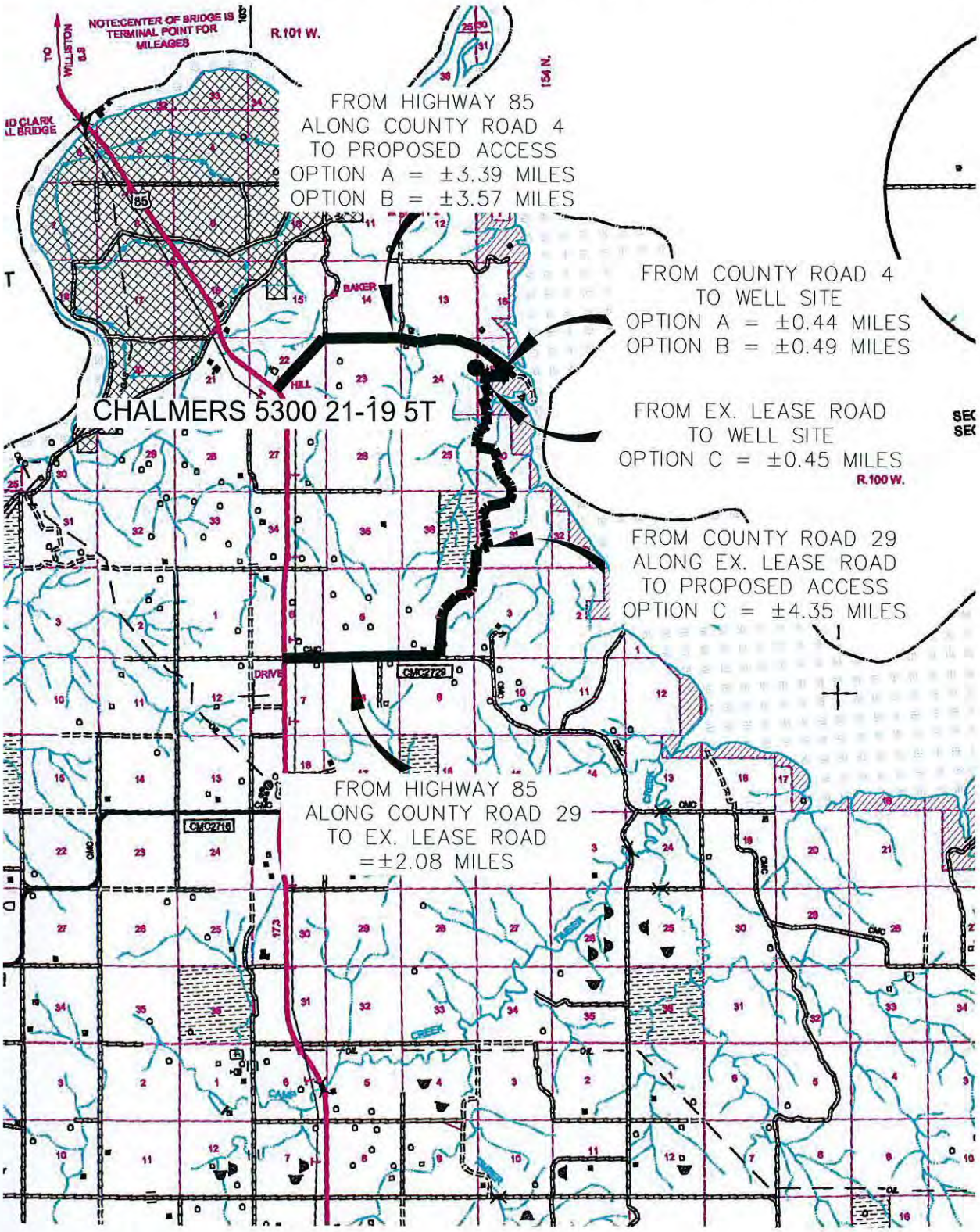
COUNTY ROAD MAP

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"CHALMERS 5300 21-19 5T"
2127 FEET FROM NORTH LINE AND 327 FEET FROM WEST LINE
SECTION 19, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA



SCALE: 1" = 2 MILE

6/8
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OASIS PETROLEUM NORTH AMERICA, LLC
COUNTY ROAD MAP
SECTION 19, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. | Project No.: S13-09-282
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REV 3	5/2/14	BHH	MOVED WELLS ON PAD/REVISED PAD

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.

April 3, 2014
McKenzie County
Aaron Chisolm – address@co.mckenzie.nd.us

Chalmers 5300 21-19 5T Lot 2 Section 19 T153N R100W
Chalmers 5300 21-19 6B Lot 2 Section 19 T153N R100W
Chalmers 5300 21-19 7T2 Lot 2 Section 19 T153N R100W
Chalmers 5300 21-19 8T Lot 2 Section 19 T153N R100W
Chalmers 5300 21-19 9T2 Lot 2 Section 19 T153N R100W
Chalmers 5300 21-19 10B Lot 2 Section 19 T153N R100W
Chalmers 5300 21-19 11T Lot 2 Sections 19 T153N R100W

CLCovington

Chelsea Covington
Regulatory Assistant
Oasis Petroleum North America, LLC

OASIS PETROLEUM

June 10, 2014

Re: Un-Occupied Trailer House and Seasonal Cabin.

Brandi,

Just to follow up with past conversations about the dwellings east of our proposed Chalmer 5300 21-19 well site. The white trailer is unlivable, it has no water, power or sewer. The cabin is seasonal at best and has not been used for several years. If I can be of further assistance please advise.

Thank you,

JD DeMorrett

Sr. Staff Landman for Oasis Petroleum North America, LLC

PO Box 1126 Williston ND- Office 701-577-1600 Fax 701-577-1692