# 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 18 2016
ND Oil & Gas Division

| Well File No. |
|---|
| 28636 |

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 **September 4, 2015** | ☐ Redrilling or Repair | ☐ Shooting |
| | | ☐ Casing or Liner | ☐ Acidizing |
| | | ☐ Plug Well | ☐ Fracture Treatment |
| ☐ 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 | ☐ Supplemental History | ☐ Change Production Method |
| | | ☐ Temporarily Abandon | ☐ Reclamation |
| | | ☐ Other | **Well is now on pump** |

| Well Name and Number | | | | | |
|---|---|---|---|---|---|
| **Chalmers 5300 21-19 8T** | | | | | |
| Footages | Qtr-Qtr | Section | Township | Range | |
| **2226 F N L 327 F W L** | **LOT 2** | **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 09/04/2015 the above referenced well is on pump.**

**End of Tubing: 2-7/8" L-80 tubing @ 10215.75'**

**Pump: 2-1/2" x 2.0" x 24' insert pump @ 10156.5'**

| Company | | Telephone Number |
|---|---|---|
| **Oasis Petroleum North America LLC** | | **281 404-9436** |
| Address | | |
| **1001 Fannin, Suite 1500** | | |
| City | State | Zip Code |
| **Houston** | **TX** | **77002** |
| Signature | Printed Name | |
| | **Jennifer Swenson** | |
| Title | Date | |
| **Regulatory Specialist** | **March 17, 2016** | |
| Email Address | | |
| **jswenson@oasispetroleum.com** | | |

**FOR STATE USE ONLY**

| | |
|---|---|
| ☑ Received | ☐ Approved |
| Date 4-7-2016 | |
| 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)

JUN 2015 RECEIVED NO OIL & GAS DIVISION

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
- [x] Report of Work Done — Date Work Completed: March 14, 2015
- [ ] Notice of Intent to Begin a Workover Project that may Qualify for a Tax Exemption Pursuant to NDCC Section 57-51.1-03. — Approximate Start Date

- [ ] Drilling Prognosis
- [ ] Spill Report
- [ ] Redrilling or Repair
- [ ] Shooting
- [ ] Casing or Liner
- [ ] Acidizing
- [ ] Plug Well
- [ ] Fracture Treatment
- [ ] Supplemental History
- [ ] Change Production Method
- [ ] Temporarily Abandon
- [x] 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 | State | Zip Code |
| Houston | TX | 77002 |
| Signature | Printed Name | |
| | Jennifer Swenson | |
| Title | Date | |
| Regulatory Specialist | June 4, 2015 | |
| Email Address | | |
| jswenson@oasispetroleum.com | | |

**FOR STATE USE ONLY**

| | |
|---|---|
| [x] Received | [ ] Approved |
| Date: 9-23-15 | |
| By: Cod Walk | |
| 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)

AUG 2015 RECEIVED ND OIL & GAS DIVISION

Well File No. **28636**

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<br>**Chalmers 5300 21-19 8T** | | | Spacing Unit Description<br>**Sec. 19/20 T153N R100W** |
| Operator<br>**Oasis Petroleum North America** | | Telephone Number<br>**(281) 404-9591** | Field<br>**Baker** |
| Address<br>**1001 Fannin, Suite 1500** | | | Pool<br>**Bakken** |
| City<br>**Houston** | State<br>**TX** | Zip Code<br>**77002** | Permit Type<br>☐ Wildcat ☑ Development ☐ Extension |

## LOCATION OF WELL

| At Surface | Qtr-Qtr | Section | Township | Range | County |
|---|---|---|---|---|---|
| **2226** F **N** L **327** F **W** L | **LOT2** | **19** | **153 N** | **100 W** | **McKenzie** |

| Spud Date | Date TD Reached | Drilling Contractor and Rig Number | KB Elevation (Ft) | Graded Elevation (Ft) |
|---|---|---|---|---|
| **October 5, 2014** | **December 28, 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** | **2175** | **17 1/2** | **54.5** | | | **1154** | **0** |
| **Vertical Hole** | **Intermediate** | **9 5/8** | **0** | **6158** | **13 1/2** | **36** | | | **905** | **4050** |
| **Vertical Hole** | **Intermediate** | **7** | **0** | **11165** | **8 3/4** | **32** | | | **789** | **3810** |
| **Lateral1** | **Liner** | **4 1/2** | **10255** | **20511** | **6** | **13.5** | | | **591** | **10255** |

## PERFORATION & OPEN HOLE INTERVALS

| Well Bore | Well Bore TD Drillers Depth (MD Ft) | Completion Type | Open Hole/Perforated Interval (MD,Ft) Top | Open Hole/Perforated Interval (MD,Ft) Bottom | Kick-off Point (MD Ft) | Top of Casing Window (MD Ft) | Date Perf'd or Drilled | Date Isolated | Isolation Method | Sacks Cement |
|---|---|---|---|---|---|---|---|---|---|---|
| **Lateral1** | **20524** | **Perforations** | **11165** | **20511** | | | **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- 11165' to 20511'** | | | | | | | |
| Date Well Completed (SEE INSTRUCTIONS)<br>**July 21, 2015** | | Producing Method | Pumping-Size & Type of Pump | | | | Well Status (Producing or Shut-In) |
| Date of Test<br>**07/22/2015** | Hours Tested<br>**24** | Choke Size<br>**36 /64** | Production for Test | Oil (Bbls)<br>**1456** | Gas (MCF)<br>**1887** | Water (Bbls)<br>**2849** | Oil Gravity-API (Corr.)<br>° | Disposition of Gas<br>**Sold** |

| Flowing Tubing Pressure (PSI) | Flowing Casing Pressure (PSI) | Calculated 24-Hour Rate | Oil (Bbls) | Gas (MCF) | Water (Bbls) | Gas-Oil Ratio |
|---|---|---|---|---|---|---|
| | **1300** | | **1456** | **1887** | **2849** | **1296** |

## GEOLOGICAL MARKERS

| Formation | MD (Ft) | TVD (Ft) |
|---|---|---|
| Dakota | 5484 | 5484 |
| Kibbey Lime | 8387 | 8386 |
| First Charles Salt | 8534 | 8533 |
| UB | | |
| Base Last Salt | 9210 | 9209 |
| Ratcliffe | | |
| Mission Canyon | 9431 | 9430 |
| Lodgepole | 9993 | 9992 |
| False Bakken | 10766 | 10713 |
| Scallion | 10770 | 10716 |
| Upper Bakken | 10782 | 10723 |
| Middle Bakken | 10808 | 10739 |
| Lower Bakken | 10892 | 10784 |
| Pronghorn | 10918 | 10795 |
| Three Forks | 10793 | 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 | 11165 | 20511 | 36 | 96178 | Barrels |

| Type Treatment | Acid % | Lbs Proppant | Maximum Treatment Pressure (PSI) | Maximum Treatment Rate (BBLS/Min) |
|---|---|---|---|---|
| Sand Frac | | 4011690 | 9390 | 40.0 |

Details
**100 Mesh White: 144690**
**40/70 White: 1554590**
**20/40 Ceramic: 2282410**

| 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

**This is a supplemental completion report.**

| I hereby swear or affirm that the information provided is true, complete and correct as determined from all available records. | Email Address | Date |
|---|---|---|
| | jswenson@oasispetroleum.com | 08/20/2015 |
| Signature | Printed Name | Title |
| | Jennifer Swenson | 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. |
|---|
| 28636 |
| NDIC CTB No. |
| ~~To be assigned~~ 228433 |

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 8T | 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 21, 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 21, 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 21, 2015 |

| Other Transporters Transporting From This Lease | % Transported | Date Effective |
|---|---|---|
| | | July 21, 2015 |

Comments

| I hereby swear or affirm that the information provided is true, complete and correct as determined from all available records. | | Date |
|---|---|---|
| Signature | Printed Name | Title |
| | Brianna Salinas | Marketing Assistant |

Above Signature Witnessed By:

| Signature | Printed Name | Title |
|---|---|---|
| | Dina Barron | Mktg. Contracts Administrator |

AUG 2015
RECEIVED
ND OIL & GAS DIVISION

FOR STATE USE ONLY

| | |
|---|---|
| Date Approved | AUG 28 2015 |
| By | Annette Frazier |
| Title | Oil & Gas Production Analyst |

TH

# 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)

JUL 2015 RECEIVED ND OIL & GAS DIVISION

Well File No. **28636**

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<br>**Chalmers 5300 21-19 8T** | | | Spacing Unit Description<br>**Sec. 19/20 T153N R100W** |
| Operator<br>**Oasis Petroleum North America** | | Telephone Number<br>**(281) 404-9591** | Field<br>**Baker** |
| Address<br>**1001 Fannin, Suite 1500** | | | Pool<br>**Bakken** |
| City<br>**Houston** | State<br>**TX** | Zip Code<br>**77002** | Permit Type<br>☐ Wildcat ☑ Development ☐ Extension |

## LOCATION OF WELL

| At Surface | Qtr-Qtr | Section | Township | Range | County |
|---|---|---|---|---|---|
| **2226** F **N** L **327** F **W**L | **LOT2** | **19** | **153 N** | **100 W** | **McKenzie** |

| Spud Date | Date TD Reached | Drilling Contractor and Rig Number | KB Elevation (Ft) | Graded Elevation (Ft) |
|---|---|---|---|---|
| **October 5, 2014** | **December 28, 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** | **2175** | **17 1/2** | **54.5** | | | **1154** | **0** |
| **Vertical Hole** | **Intermediate** | **9 5/8** | **0** | **6158** | **13 1/2** | **36** | | | **905** | **4050** |
| **Vertical Hole** | **Intermediate** | **7** | **0** | **11165** | **8 3/4** | **32** | | | **789** | |
| **Lateral1** | **Liner** | **4 1/2** | **10255** | **20511** | **6** | **13.5** | | | **591** | **10255** |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

## 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** | | **Perforations** | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
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| | | | | | | | | | | |
| | | | | | | | | | | |

## PRODUCTION

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Current Producing Open Hole or Perforated Interval(s), This Completion, Top and Bottom, (MD Ft)<br>**Lateral 1-** | | | | | | | Name of Zone (If Different from Pool Name) |
| Date Well Completed (SEE INSTRUCTIONS) | | Producing Method | Pumping-Size & Type of Pump | | | | Well Status (Producing or Shut-In) |
| Date of Test | Hours Tested | Choke Size<br>**/64** | Production for Test | Oil (Bbls) | Gas (MCF) | Water (Bbls) | Oil Gravity-API (Corr.)<br>° | Disposition of Gas |
| Flowing Tubing Pressure (PSI) | Flowing Casing Pressure (PSI) | | Calculated 24-Hour Rate | Oil (Bbls) | Gas (MCF) | Water (Bbls) | Gas-Oil Ratio |

## GEOLOGICAL MARKERS

| Formation | MD (Ft) | TVD (Ft) |
|---|---|---|
| Dakota | 5484 | 5484 |
| Kibbey Lime | 8387 | 8386 |
| First Charles Salt | 8534 | 8533 |
| UB | | |
| Base Last Salt | 9210 | 9209 |
| Ratcliffe | | |
| Mission Canyon | 9431 | 9430 |
| Lodgepole | 9993 | 9992 |
| False Bakken | 10766 | 10713 |
| Scallion | 10770 | 10716 |
| Upper Bakken | 10782 | 10723 |
| Middle Bakken | 10808 | 10739 |
| Lower Bakken | 10892 | 10784 |
| Pronghorn | 10918 | 10795 |
| Three Forks | 10793 | 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 |
|---|---|---|---|---|---|---|
| | | | | | | **Barrels** |

| Type Treatment | Acid % | Lbs Proppant | Maximum Treatment Pressure (PSI) | Maximum Treatment Rate (BBLS/Min) |
|---|---|---|---|---|
| **Sand Frac** | | | | |

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

| 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

**This is a preliminary completion report. A supplemental report will be filed upon first production of the well.**

| I hereby swear or affirm that the information provided is true, complete and correct as determined from all available records. | Email Address | Date |
|---|---|---|
| | **jswenson@oasispetroleum.com** | **07/21/2015** |
| Signature | Printed Name | Title |
| | **Jennifer Swenson** | **Regulatory Specialist** |

# 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. **28636**

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
- [ ] Spill Report
- [ ] Redrilling or Repair
- [ ] Shooting
- [ ] 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 8T** | | | | | |
| Footages | Qtr-Qtr | Section | Township | Range | |
| 2226 F N L 326 F W L (327) | 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 North America LLC requests a variance to NDAC 43-02-03-21 for the tubing/packer requirement: Casing, tubing, and cementing requirements during the completion period immediately following the upcoming fracture stimulation.**

**The following assurances apply:**

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

| Company | | Telephone Number |
|---|---|---|
| **Oasis Petroleum North America LLC** | | **281-404-9436** |
| Address | | |
| **1001 Fannin, Suite 1500** | | |
| City | State | Zip Code |
| **Houston** | **TX** | **77002** |
| Signature | Printed Name | |
| | **Jennifer Swenson** | |
| Title | Date | |
| **Regulatory Specialist** | **April 30, 2015** | |
| Email Address | | |
| **jswenson@oasispetroleum.com** | | |

**FOR STATE USE ONLY**

- [ ] Received
- [x] 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. **28636**

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
- [ ] Spill Report
- [ ] Redrilling or Repair
- [ ] Shooting
- [ ] Casing or Liner
- [ ] Acidizing
- [ ] Plug Well
- [ ] Fracture Treatment
- [ ] Supplemental History
- [ ] Change Production Method
- [ ] Temporarily Abandon
- [ ] Reclamation
- [x] Other **Change well status to CONFIDENTIAL**

| Well Name and Number | | | | | |
|---|---|---|---|---|---|
| **Chalmers 5300 21-19 8T** | | | | | |
| Footages | Qtr-Qtr | Section | Township | Range | |
| **2226** F **N** L ~~326~~ 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 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. **28636**

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 8T** | | | | | |
| Footages | Qtr-Qtr | Section | Township | Range | |
| **2226** 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 **Oasis Petroleum North America LLC** | | Telephone Number **281-404-9563** |
| Address **1001 Fannin, Suite 1500** | | |
| City **Houston** | State **TX** | Zip Code **77002** |
| Signature Heather McCowan | Printed Name **Heather McCowan** | |
| Title **Regulatory Assistant** | Date **September 2, 2014** | |
| Email Address **hmccowan@oasispetroleum.com** | | |

**FOR STATE USE ONLY**

| | |
|---|---|
| ☒ Received | ☐ Approved |
| Date 3/12/2015 | |
| By Matthew Marona | |
| Title **ENGINEERING TECHNICIAN** | |

# Oasis Petroleum North America, LLC
# Chalmers 5300 21-19 8T

## 2,226' FNL & 327' FWL
## Lot 2 Sec. 19, 153N, 100W
## Baker / Three Forks
## McKenzie County, North Dakota

**BOTTOM HOLE LOCATION:**
**173.80' N & 9,924.83' E of surface location or approx.**
**2,052.20' FNL & 237.32' FEL SE NE Sec. 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,
Zachary Moses, Molly Hagstrom
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 8T during October-December, 2014 in Baker Field, McKenzie County, North Dakota. (G. Wayne Peterson, Sunburst Consulting)**

## INTRODUCTION

The **Oasis Petroleum North America, LLC Chalmers 5300 21-19 8T** [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 8T is a horizontal Three Forks well within the Williston Basin consisting of one 9,358' 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 8,534' MD 8,533' TVD (-6,457' 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 68 to 113 units were noted, as were drilling gas shows of 82 to 138 units.

The Mission Canyon Formation [Mississippian Madison Group] was logged 9,431' MD 9,430' TVD (-7,354' 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 101 to 114 units were noted, as were drilling gas shows of 143 to 249 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 Bakken Shale [Mississippian-Bakken Formation] was drilled at 10,782' MD 10,723' TVD (-8,647' 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 334 units.

The Middle Bakken Member [Mississippian-Devonian Bakken Formation] was drilled at 10,808' MD 10,739' TVD (-8,663' 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 161 units drilling gas, with a connection gas of 206 units.

The Lower Bakken Shale [Devonian-Bakken Formation] was drilled at 10,892' MD 10,784' TVD (-8,708' 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 159 units.

The Pronghorn Member [Devonian-Bakken Formation] was reached at 10,918' MD 10,795' TVD (-8,719' SS). Entry into this interval was characterized by lower gamma then the Upper Bakken Shale, 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 215 units with a survey gas of 226 units.

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

The Three Forks Formation [Devonian] was reached at 10,973' MD 10,813' TVD (-8,737' SS) which was 17’ low to the Oasis Petroleum NA LLC Chalmers 5300 31-19H. The target zone of

the Three Forks was to be drilled in a predominately 10 foot zone beginning 17 feet into the Three Forks.

Samples in the Three Forks were predominantly dolomite which was described as light brown-tan, occasional cream, trace light gray brown in color. It was very fine crystalline, firm, laminated, with a microsucrosic texture. Occasional disseminated pyrite was noted as was occasional intercrystalline porosity. Also noted was *occasional spotty to trace even light brown oil stain*. Also observed was light green-light gray green, light gray blue 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 in the middle of 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 8T. 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 8T varied according to stratigraphic position and penetration rates which may have reflected increased porosity. During the vertical, connection gas peaks of 68 to 114 units were noted, as were drilling gas shows of 82 to 249 units, against a 9.75-10.7 lb/gal diesel-invert mud weight. Background concentrations in the lateral ranged from 161 to 466 units, against a 9.5 lb/gal saltwater gel drilling fluid. Connection peaks of 1,119 to 1,207 units were observed, coinciding with the best shows. Drilling out of casing at 11,185 MD' yielded a trip gas of 2,232 units. The lateral was completed with one BHA, consequently no other trip gasses were noted. Chromatography of gas revealed typical concentrations of methane, characteristic of Three Forks gas.

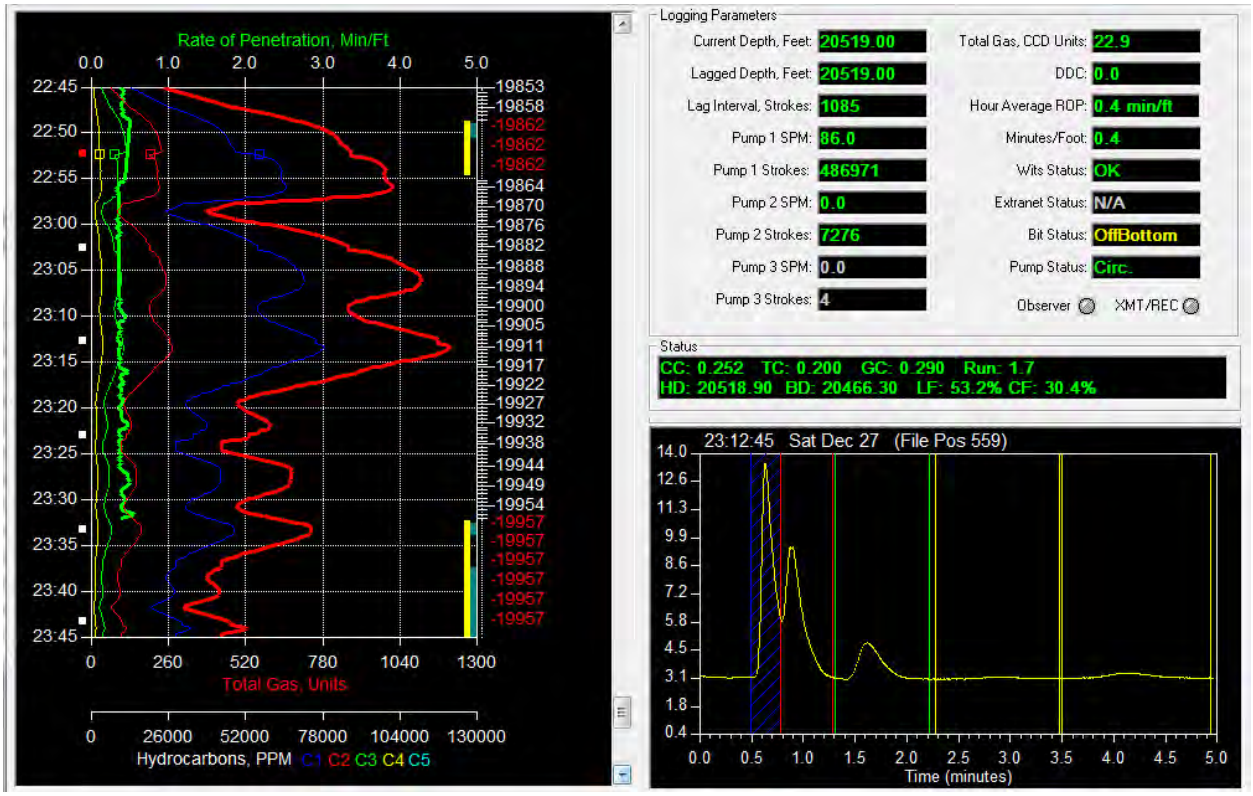



**Figure 7. Gas chromatography of a 1,200 unit gas show.**

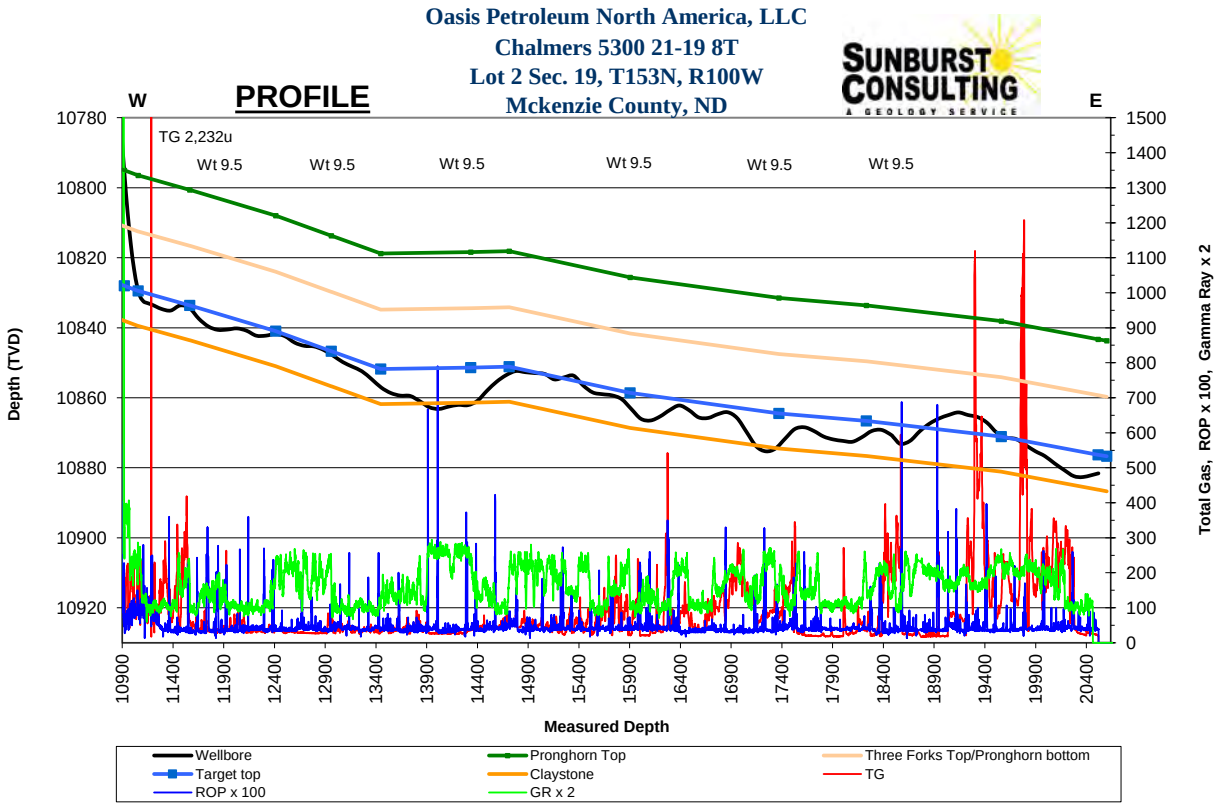



**Figure 8. Profile displaying total gas, gamma ray and rate of penetration.**

## Geosteering

Ryan Energy Technologies provided personnel and equipment for measurement-while-drilling (MWD) services. The RPM 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 875' curve was drilled in 23.5 hours with a bottom hole assembly (BHA) consisting of bit #4, a Smith MDI516 PDC bit, attached to a 2.38 degree fixed NOV 7/8 5.0 motor and MWD tools. The curve was successfully landed at 11,185' MD and 10,833' TVD, approximately 20' into the Three Forks Formation. Seven inch diameter 32# HCP-110 casing was set to 11,161' MD.

Geologic structure maps of the Chalmers 5300 21-19 8T and surrounding control wells had estimated formation dip to be a down dip at approximately -0.5º down for the length of the lateral. The preferred drilling interval of the Chalmers 5300 21-19 8T consisted of a ten foot zone located approximately seventeen 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.

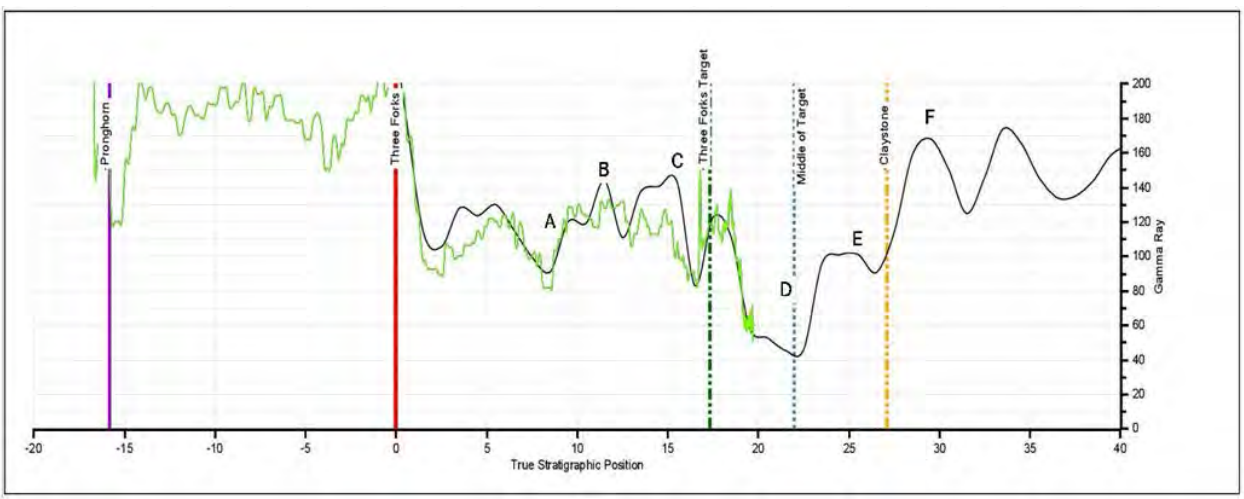



**Figure 9. Offset well target definition, Indian Hills Prospect (Oasis).**

Steering decisions were made by using target points and letter markers provided by Oasis personnel. The low gamma (D) in the middle of the target zone was often utilized to establish the well-bore's position in the target zone. If the well-bore moved toward the bottom of the target zone, the moderate gamma of marker (E) was observed. As the well-bore moved lower in formation, the higher gamma of the underlying claystone (F) 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. In accordance with the drilling plan, the well-bore was steered down into the underlying claystone at prescribed intervals in order to definitively establish the well-bore's position in formation. As the well-bore moved higher, approaching the top of the target zone the

high to medium fluctuating gamma between markers (C & D) was noted. Later in the lateral the well-bore moved up in formation, and the marker (B) was observed, before the directional staff was able to steer the well-bore back down into the target zone. The TD of 20,519' MD was achieved at 04:50 hours CDT December 28, 2014. The well site team worked together to maintain the well bore in the desired target interval for 87% of the lateral, opening 9,358' of potentially productive reservoir rock. The hole was then circulated and reamed for completion.

## SUMMARY

The Chalmers 5300 21-19 8T 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 20 days. The TD of 20,519' MD was achieved at 04:50 hours CDT December 28, 2014. The well site team worked together to maintain the well bore in the desired target interval for 87% of the lateral, opening 9,358' of potentially productive reservoir rock.

Samples in the Three Forks were predominantly dolomite which was described as light brown-tan, occasional cream, trace light gray brown in color. It was very fine crystalline, firm, laminated, with a microsucrosic texture. Occasional disseminated pyrite was noted as was occasional intercrystalline porosity. Also noted was *occasional spotty to trace even light brown oil stain*. Also observed was light green-light gray green, light gray blue 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 8T 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 8T awaits completion operations to determine its ultimate production potential.

Respectfully submitted,

*G. Wayne Peterson*
Sunburst Consulting, Inc.
29 December, 2014

# WELL DATA SUMMARY

| | |
|---|---|
| **OPERATOR:** | **Oasis Petroleum North America, LLC** |
| **ADDRESS:** | 1001 Fannin Suite 1500<br>Houston, TX 77002 |
| **WELL NAME:** | **Chalmers 5300 21-19 8T** |
| **API #:** | 33-053-06021 |
| **WELL FILE #:** | 28636 |
| **SURFACE LOCATION:** | 2,226' FNL & 327' FWL<br>Lot 2 Sec. 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'<br>KB: 2,076' |
| **SPUD/ RE-ENTRY DATE:** | October 5, 2014 |
| **BOTTOM HOLE LOCATION** | 173.80' N & 9,924.83' E of surface location or approx.<br>2,052.20' FNL & 237.32' FEL SE NE Sec. 20, T153N, R100W |
| **CLOSURE COORDINATE** | Closure Direction: 89.00°<br>Closure Distance: 9,926.35' |
| **TOTAL DEPTH / DATE:** | 20,519' on December 28, 2014<br>87% within target interval |
| **TOTAL DRILLING DAYS:** | 20 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, Ken Rockeman |
| **MUD TYPE:** | Fresh water in surface hole<br>Diesel invert in vertical/curve; Salt water in lateral |
| **MUD LOSSES:** | Invert Mud: 500 bbls, Salt Water: 0 bbls |
| **PROSPECT GEOLOGIST:** | Nathan Gabelman |
| **WELLSITE GEOLOGISTS:** | G. Wayne Peterson, Michelle Baker,<br>Zachary Moses, Molly Hagstrom |
| **GEOSTEERING SYSTEM:** | Sunburst Digital Wellsite Geological System |
| **ROCK SAMPLING:** | 100' from 4,700' - 8,200'<br>30' from 8,200' -20,519' (TD) |
| **SAMPLE EXAMINATION:** | Binocular microscope & fluoroscope |
| **SAMPLE CUTS:** | Trichloroethylene (Carbo-Sol) |
| **GAS DETECTION:** | MSI (Mudlogging Systems, Inc.) TGC - total gas with chromatograph<br>Serial Number(s): ML-134 |
| **ELECTRIC LOGS:** | n/a |
| **DRILL STEM TESTS:** | n/a |
| **DIRECTIONAL DRILLERS:** | RPM, Inc.<br>John Gordon, Doug Rakstad, Robert Jervis |
| **MWD:** | Ryan<br>Mike McCammond, Ronald Maddalena, Rebekah Hungerford |

**CASING:**

Surface: 13 3/8" 54# J-55 set to 2,175'
Second: 9 5/8" 40# HCL-80 set to 6,162'
Intermediate: 7" 32# P-110 set to 11,161'

**KEY OFFSET WELLS:**

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

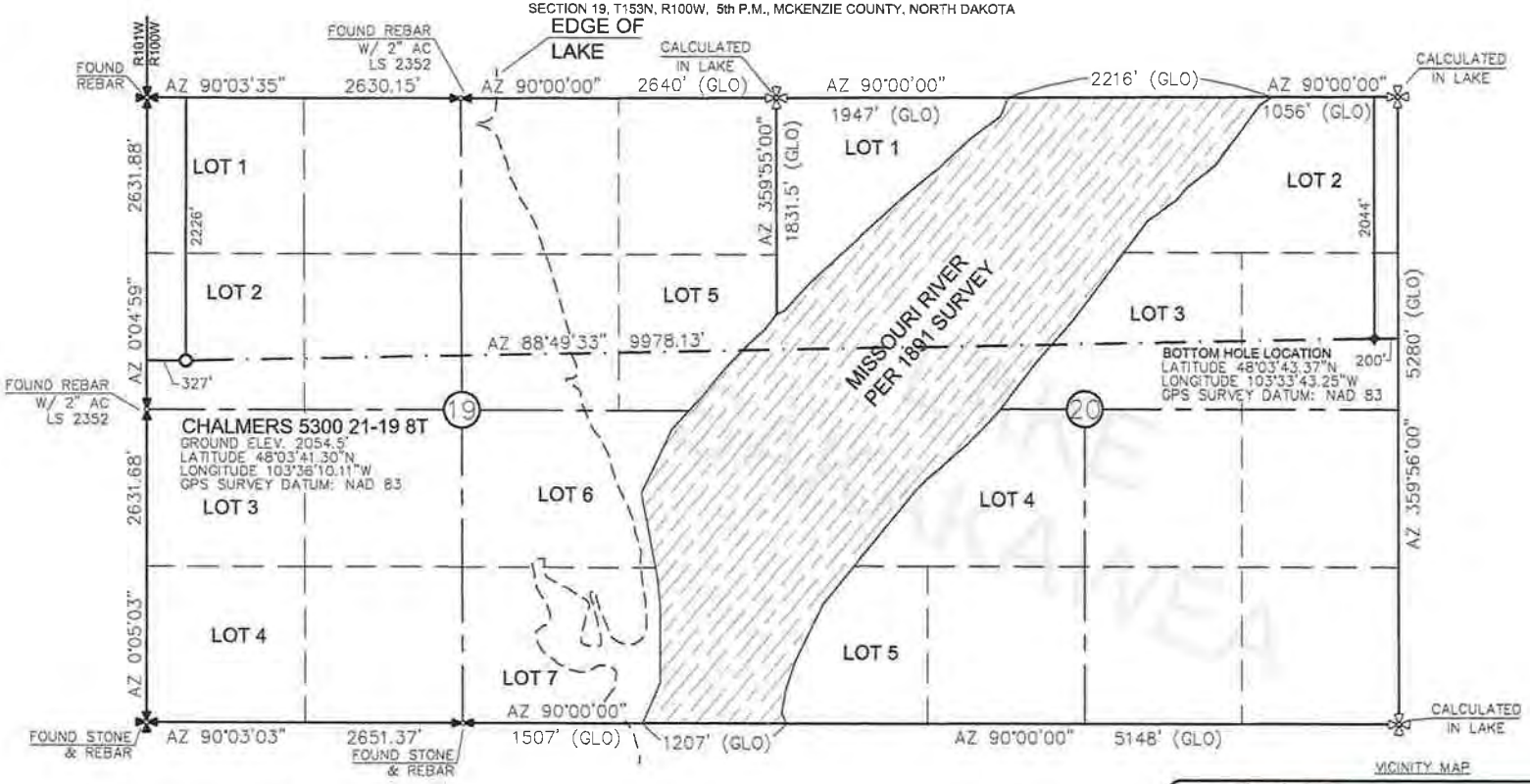
**Texas Gas Exploration Company**
**Lindvig 1-35**
SE SE Sec. 35 T153N R101W
McKenzie County, ND

**Mosbacher Production Company**
**Verlin Fossum ET AL No. 26-1**
NW SE Sec. 26, T153N R101W
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 8T"
2226 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

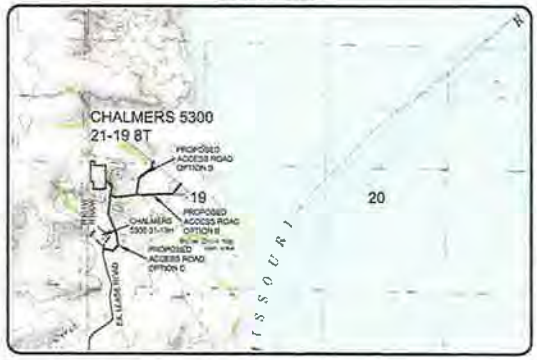
STAKED ON 1/29/14
VERTICAL CONTROL DATUM WAS BASED UPON CONTROL POINT 16 WITH AN ELEVATION OF 2014.2'

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

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| Revision No. | Date | By | Description |
|---|---|---|---|
| REV 1 | 5/16/14 | ADB | MOVED WELLS ON PAD |
| REV 2 | 4/22/14 | BRH | MOVED WELLS ON PAD/REVISED PAD |
| REV 3 | 3/7/14 | BRH | 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.: S13-06-292.03
Checked By: D.D.K. Date: JAN. 2014

Interstate Engineering, Inc.
P.O. Box 648
425 East Main Street
Sidney, Montana 59270
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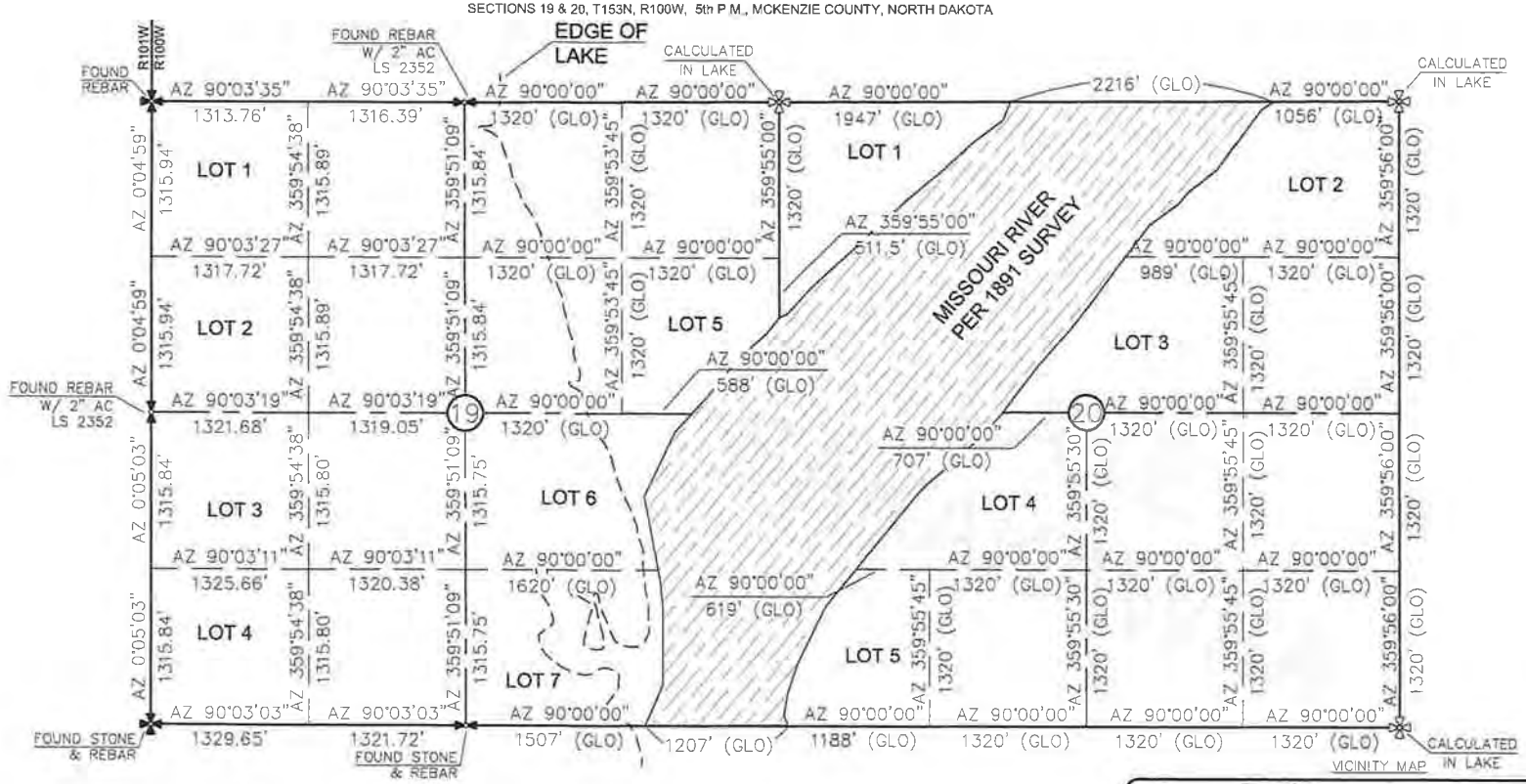
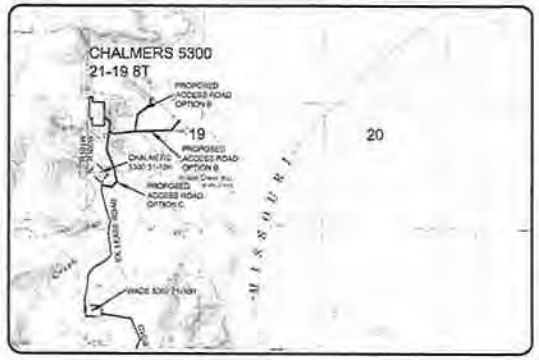
# SECTION BREAKDOWN

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"CHALMERS 5300 21-19 8T"
2226 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

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| Revision No. | Date | By | Description |
|---|---|---|---|
| REV. 1 | 1/18/14 | JLS | MOVED WELLS ON PAD |
| REV. 2 | 4/23/14 | BRH | MOVED WELLS ON PAD (REVISED PAD) |
| REV. 3 | 5/7/14 | BRH | MOVED WELLS ON PAD (REVISED PAD) |

OASIS PETROLEUM NORTH AMERICA, LLC
SECTION BREAKDOWN
SECTIONS 19 & 20, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. Project No.: S13-09-282.03
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
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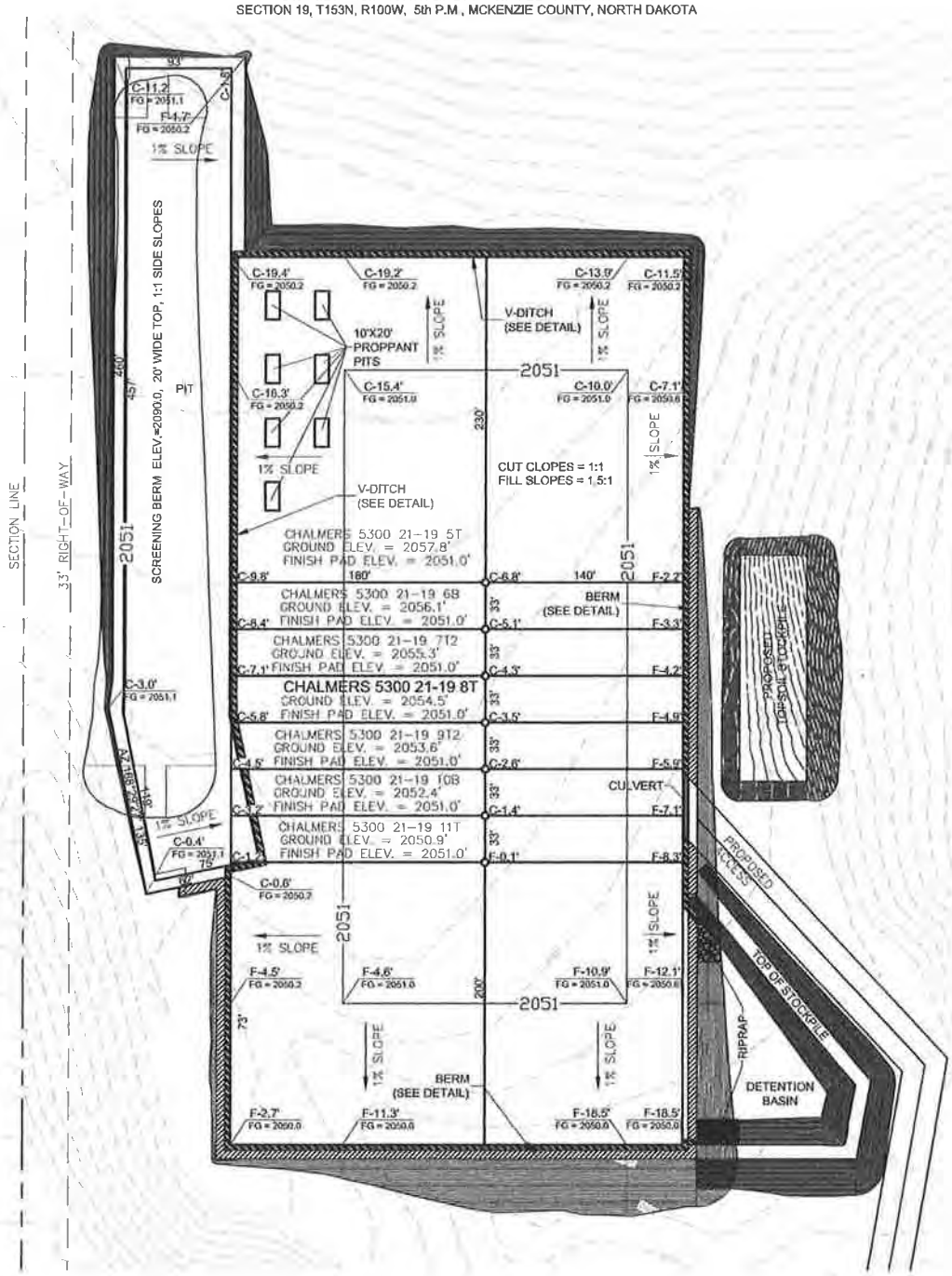
# PAD LAYOUT

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"CHALMERS 5300 21-19 8T"
2226 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
Original Contours
BERM
DITCH

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

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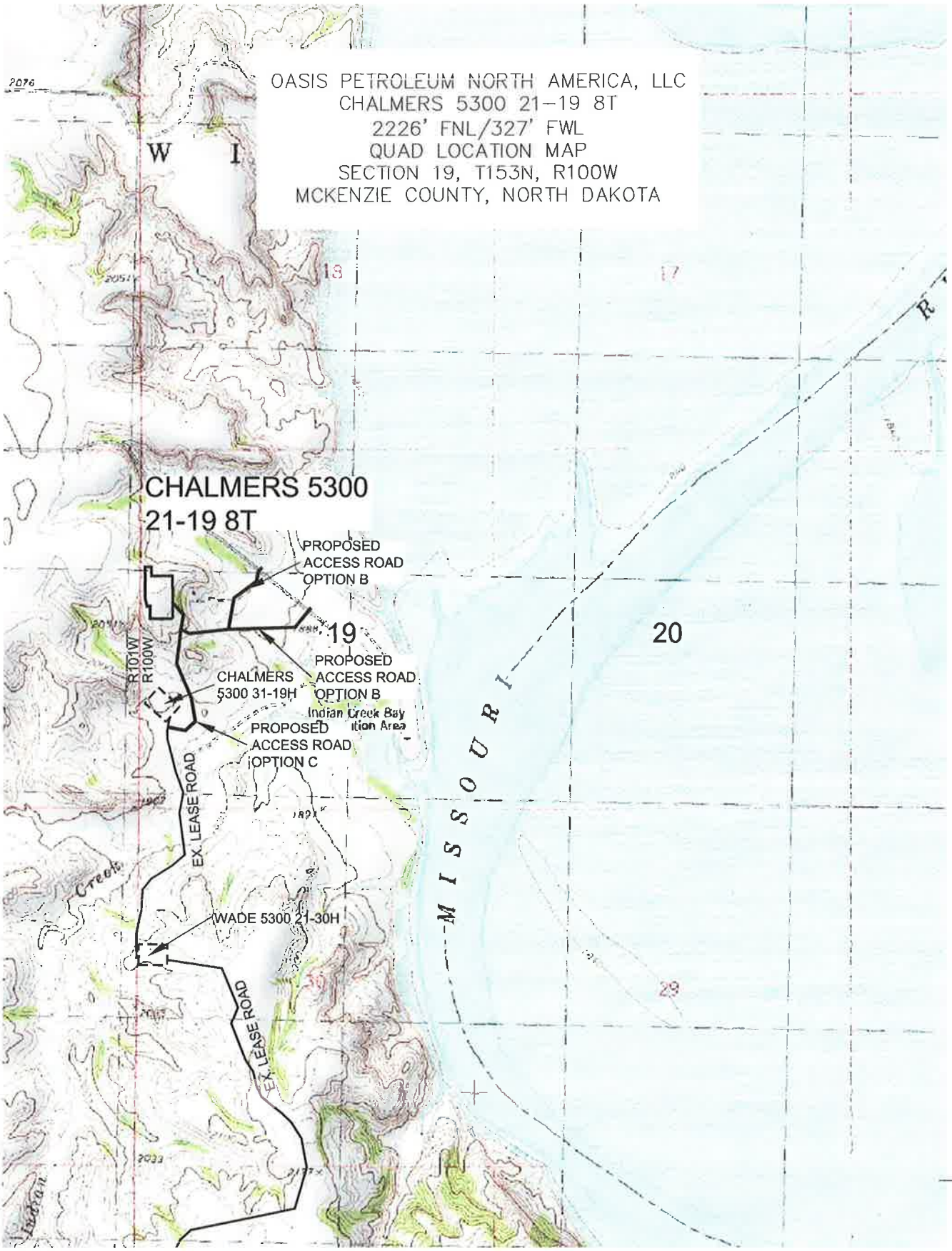
OASIS PETROLEUM NORTH AMERICA, LLC
PAD LAYOUT
SECTION 19, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

| | | | |
|---|---|---|---|
| Drawn By: | D.H.H. | Project No.: | S13-09-282.03 |
| Checked By: | D.D.K. | Date: | JAN. 2014 |

| Revision No. | Date | By | Description |
|---|---|---|---|
| REV 1 | 3/12/14 | AS | MOVED WELLS ON PAD |
| REV 2 | 4/22/14 | BRH | MOVED WELLS ON PAD/REVISED PAD |
| REV 3 | 5/2/14 | BRH | MOVED WELLS ON PAD/REVISED PAD |

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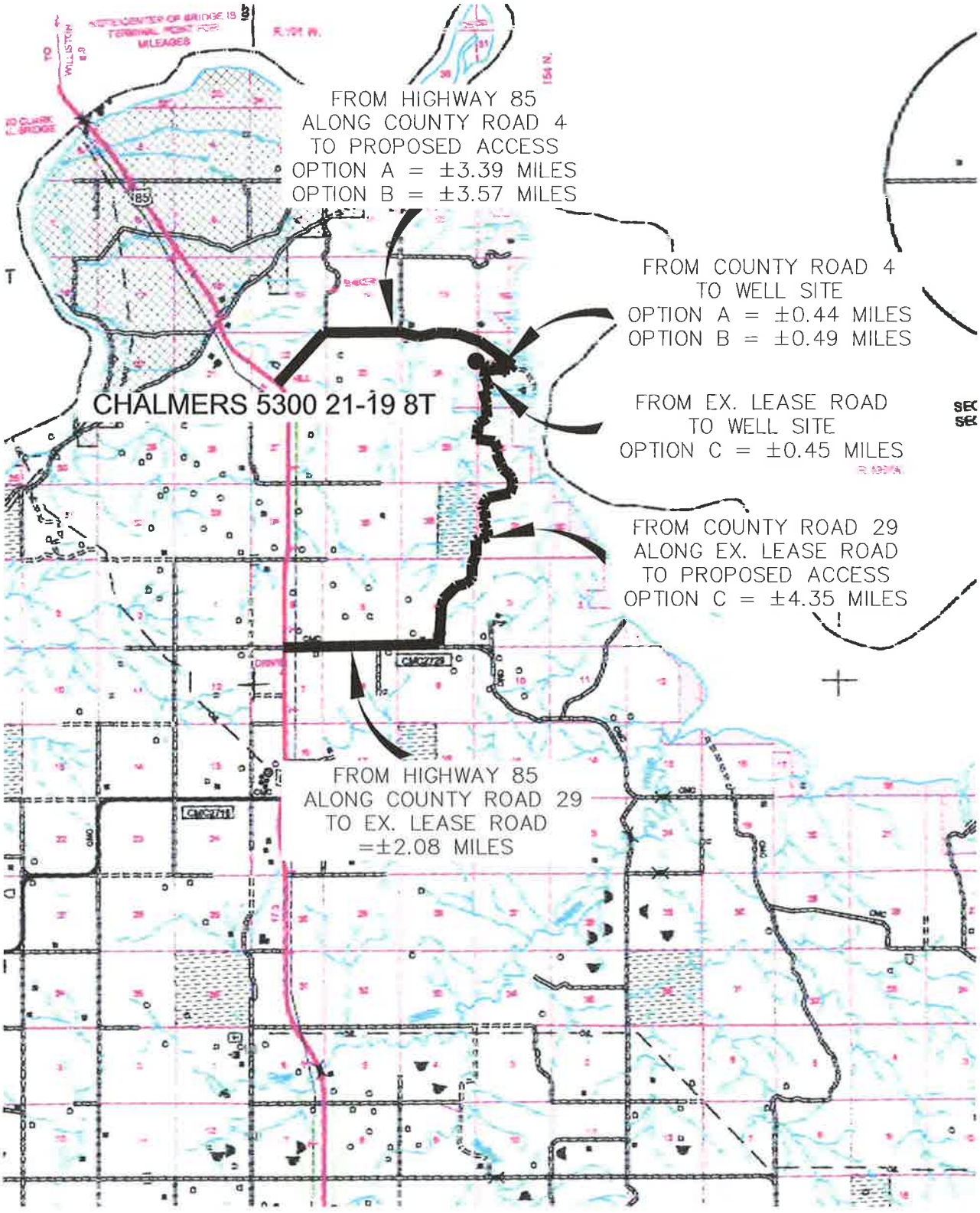
OASIS PETROLEUM NORTH AMERICA, LLC
QUAD LOCATION MAP
SECTION 19, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. | Project No.: S13-09-282.03
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 | BKH | MOVED WELLS ON PAD/REVISED PAD |
| REV 3 | 5/2/14 | BKH | 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 8T"**
**2226 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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SCALE: 1" = 2 MILE



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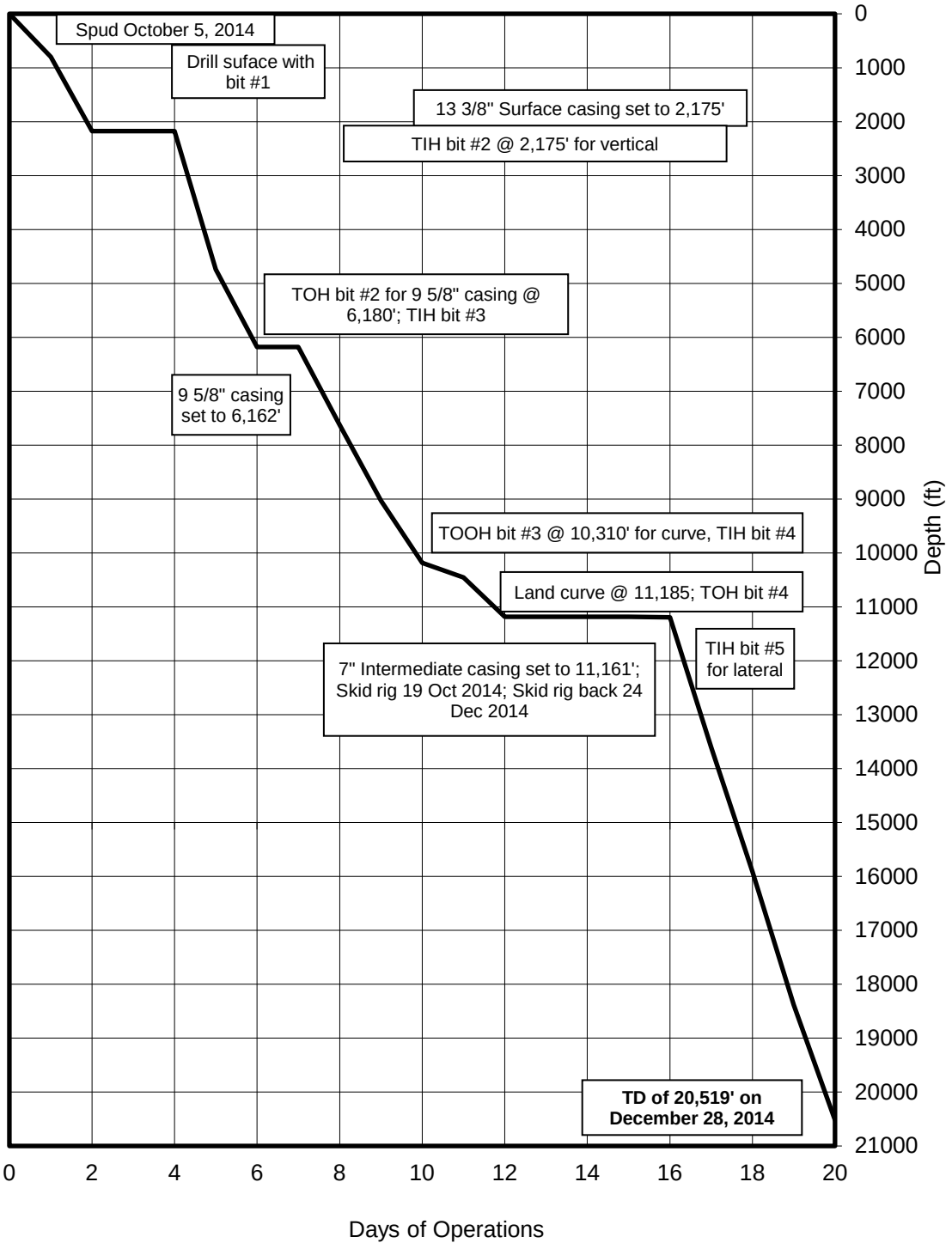
OASIS PETROLEUM NORTH AMERICA, LLC
COUNTY ROAD MAP
SECTION 19, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. | Project No.: S13-09-282.03
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 8T**



# 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 | 10/5 | 0 | | - | - | - | - | - | - | - | - | - | Rig released from Chalmers 7T2 @ 13:00 on 10/5/2014. Rig up. Set mats for new hole. Skid rig. Rig up clim assist. Catwalk. Cover old well. Derrick escape. | Surface |
| 1 | 10/6 | 800' | 800 | 1 | 5 | 50 | - | - | 1,800 | 100 | 100 | 704 | Rig up ground substructure, center stairs. Pre spud checklist. Pre spud safety neeting. Clean rig floor, take bail extensions off, casing elelators, lay down old bit and get ready for BHA, directional work. Rig up MWD main cable. Pick up BHA. Service rig. Rotary drilling 0-800'. | Surface |
| 2 | 10/7 | 2,175' | 1,375 | 1 | 10 | 50 | - | - | 3,650 | 100 | 100 | 704 | Rotery drilling 800'-2,175'. Circulate and condition. TOH. TIH. Circulate and condition, circulate for 1 hour. TOH Service rig. Lay down BHA, MWD. Bit, motor, UBHO. Rig up to run casing. Rig up casing crew. Hold safety meeting. Run 13 3/8" casing. | Surface |
| 3 | 10/8 | 2,175' | 0 | - | - | - | - | - | - | - | - | - | Run casing 13 3/8". Wash down last joint. Circulate and condition. Held safety meeting. Rig up cement head and pressure test head. Cement. Rig down cementers. Rig down cellar pumps. Install wellheads. Drain invert. Cut off conductor. Cut off casing. Weld on wellhead. Weatherford installed B section. Place BOP in sub. Remove mud cross. Stab BOP. Waiting on Weatherford to torque BOP to wellhead. Service rig. Nipple up BOPS choke line koomey lines, rotating head, mud cross. | Pierre |
| 4 | 10/9 | 2,175' | 0 | - | - | - | - | - | - | - | - | - | Nipple up BOPS. Hook up koomey lines, remove rotating head and spool. Finish choke line. Round up crossovers for test plug. Clean mud tanks. Test BOPS. Rig up flare line. Mokify spool for rotating head with welder. Install rotating head, flow line. Fill line, center stack. Service rig. Install wear bushing. Pick up BHA, bit, motor, 2 monels, UBHO, MWD. TIH. | Pierre |
| 5 | 10/10 | 4,741' | 2,566 | 2 | 16 | 30 | - | 85 | 3500 | 92 | 93 | 651 | TIH, and pick up 12 joints of heavy wt. Drilling cement from 2,142'-2,190'. Cement at 2,142', float at 2,146, shoe at 2,175'. Fit test at 2,190', 227 psi for 30 min. drilling and survey from 2,190'-3,061'. Drilling and survey from 3,061'-4,461'. Service rig- grease wash pipe. drilling and survey from 4,461'- 4,741' | Greenhorn |
| 6 | 10/11 | 6,180' | 1,439 | 2 | 16 | 30 | - | 85 | 3500 | 92 | 93 | 651 | Drill and survey, sliding when needed from 4,741'-5,581'. Service rig. Drill and survey, sliding when needed from 5,581'-6,150'. Circulate and condition- pump bottoms up. Short tip 11 stands. Build volume- weight- circulate bottoms up, pump dry job. TOH. TIH. Drill and survey, sliding when needed from 6,150'-6,180'. Circulate and condition due to lost circulation- circulate bottoms up, pump dry job. TOH. Remove rotating head and install trip nipple. Lay down BHA, bit, motor, two monels, UBHO, MWD. | Swift |

# 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 10/12 | 6,180' | 0 | - | - | - | - | - | - | - | - | - | Lay down BHA. Pull wear bushing. Rig up/down to run casing- held safety meeting. Run casing- 9 5/8. Circulate and condition- wait on pub joint. Run casing- make up pub joint and land casing. Rig up/down to run casing- rig down casing crew/ verify landed with weatherford. Circulate and condition. Circulate while waiting on rig crew. Rig up cementers. Hold safety meeting with cementers. Pump cement. rig down cement crew. Lay down landing joint. Take off bell extentions, elevators, install 5" elevators. Install pack off, install wear bushing. | Swift |
| 8 | 10/13 | 7,631' | 1,451 | 3 | 25 | 60 | 17 | 132 | 3300 | 78 | 78 | 549 | Install wear bushing with weatherford. Cut drilling line. Pick up BHA. TIH. Test casing 1500 psi for 30 min. Drilling cemnet from 6,110'-6,190', cement at 6,110', float at 6,112', shoe at 6,158'. Fit test 11.5 PPG, 345 psi at 6,190' for 30 min. Drill and survey, sliding when needed from 6,190'-6,697'. SPR #1- 324 psi at 40 strokes at 6,324', function pipes- 5 sec, blinds 6 sec. Rotary drilling sliding as needed 6,697'-7,444'. Service rig. Rotary drilling sliding as needed 7,444'-7,631'. | Opeche |
| 9 | 10/14 | 9,031' | 1,400 | 3 | 15 | 45 | 20 | 132 | 3500 | 78 | 78 | 549 | Rotary drilling sliding as needed 7,631'-8,097'. Service rig. Rotary drilling sliding as needed 8,097'-8,377'. Rotary drilling sliding as needed 8,377'-8,844'. Service rig. Function pipe 6 sec. Rotary drilling sliding as needed 8,844'-9,031'. | Charles |
| 10 | 10/15 | 10,182' | 1,151 | 3 | 43 | 60 | 40 | 132 | 3700 | 78 | 78 | 549 | Rotary drilling sliding as needed 9,031'-9,622'. Service rig. Rotary drilling sliding as needed 9,622'-9,964'. Service rig. Greased wash pipe, top drive, functioned pipes 6 seconds, slow pump rate 30 strokes @ 9,964' 310 PSI. Rotary drilling sliding as needed 9,964'-10,182'. | Lodgepole |
| 11 | 10/16 | 10,453' | 271 | 3/4 | 50 | 60 | 33 | 267 | 3900 | 73 | 73 | 514 | Rotary drilling sliding as needed 10,182'-10,310'. Circulate and condition. TOH. Lay down BHA. Cased hole logs- rig up wire line truck. Held safety meeting, cased hole logs. Multi-shot surveys- rig down wireline crew. Pick up BHA, bit motor, 2 monels, 2 ponys, MWD, UBHO. TIH Test MWD. TIH. Remove trip nipple, install rotating head. TIH. Slide drilling rotating as needed 10,310'-10,453'. Slow pump 40 strokes @ 10,453'. | Lodgepole |
| 12 | 10/17 | 11,185' | 732 | 4 | 50 | 60 | 33 | 267 | 3900 | 73 | 73 | 514 | Slide drilling build curve 10,453'-10,827'. Service rig. Slide drilling build curve 10,827'-11,185'. Circulate and condition. Circulate 30 min. Short trip. Service rig. Circulate and condition. Circulate bottoms up. TOH back reaming. TOH. | Three Forks |
| 13 | 10/18 | 11,185' | 0 | - | - | - | - | - | - | - | - | - | TOH. Lay down BHA. Pull wear bushing. Rig up to run casing. Held safety meeting. Run 7" casing. Pick up CRT. Run casing. Wash last 8 stands down. Circulate cement displace. Circulate and work casing. Put on casing slips, trouble shoot. Rig down CRT. Safety meeting with cementers. Hold safety meeting. Circulate cement displace. Rig up cementers. Cement. | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14 | 10/19 | 11,185' | 0 | - | - | - | - | - | - | - | - | - | Cement. Nipple down BOPS. Set casing slips with BOP winches. Install wellhead cap well with Weatherford. Rig released @ 15:00 10/19/2014 | Three Forks |
| 15 | 12/23 | 11,185' | 0 | - | - | - | - | - | - | - | - | - | Rig accepted to Chalmers 5300 21-19 8T @ 03:00 12/23/2014 | Three Forks |
| 16 | 12/24 | 11,195' | 10 | 5 | 20 | 40 | 20 | 264 | 2400 | 94 | - | 330 | Rig up floor for drilling. Stretch out counter weights and angel lift. Pre-spud checklist. Test BOPS. Install wear bushing. Cut drilling line. Service rig. Pick up BHA. Install BHA. TIH. Install rotating head. Adjust stack. Change slip dies. TIH, fill pipe. Level rig. Drilling cement, float @ 11,053', shoe @ 11,161'. Drilled 10' new hole to 11,195', fit test. | Three Forks |
| 17 | 12/25 | 13,609' | 2,414 | 5 | 21 | 40 | 50 | 265 | 3950 | 86 | 0 | 331 | Rotary drilling sliding as needed from 11,185'-12,283', service top drive. Rotary drilling sliding as needed 12,283'-13,609' | Three Forks |
| 18 | 12/26 | 15,915' | 2,306 | 5 | 25 | 40 | 51 | 242 | 3900 | 86 | 0 | 303 | Rotary drilling sliding as needed from 13,609' to 14,746', service rig. Rotary drilling sliding as needed from 14,746' to 15,915' | Three Forks |
| 19 | 12/27 | 18,380' | 2,465 | 5 | 25 | 40 | 54 | 226 | 4000 | 80 | 0 | 282 | Rotary drilling sliding as needed from 15,915'-17,147', service top drive, rotary drilling sliding as needed from 17,147'-18,380' | Three Forks |
| 20 | 12/28 | 20,519' | 2,139 | - | 25 | 40 | 50 | 209 | 3950 | 74 | 0 | 261 | Rotary drilling sliding as needed from 18,380'-19,370' Service rig. Rotary drilling sliding as needed from 19,370'-20519' TD Lateral. Circulate and condition. | Three Forks |

# DAILY MUD SUMMARY

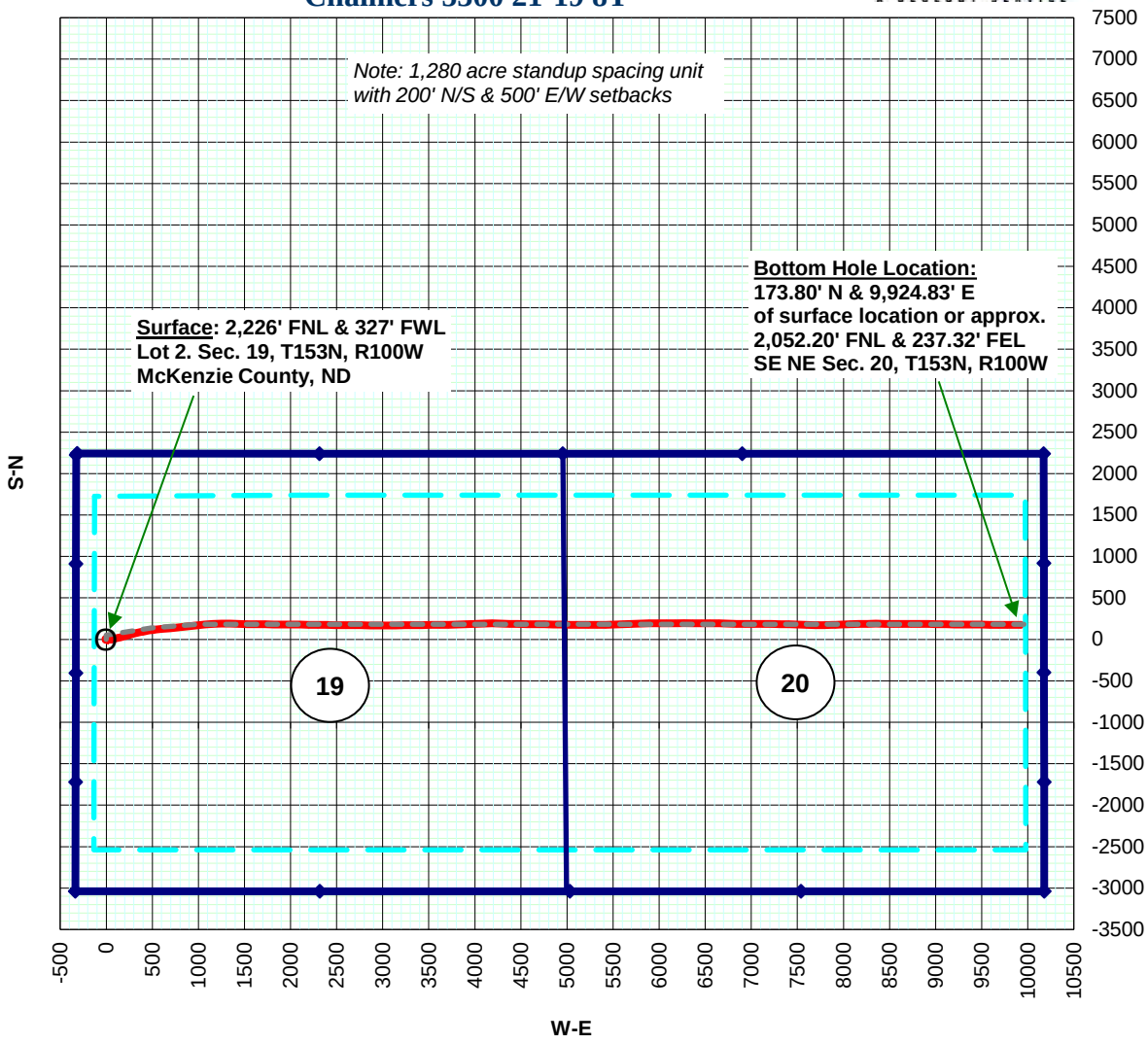
| Day | Date 2014 | Mud Depth | Drilling Fluid | Mud WT (ppg) | VIS (sec/ qt) | PV (cP) | YP (lbs/ 100 ft2) | Gels (lbs/ 100 $ft^2$) | 600/ 300 | NAP/ $H_20$ (ratio) | NAP/ H20 (% by vol) | Cake (API/ HTHP) | Cor. Solids (%) | Alk | pH | Excess Lime (lb/bbl) | $Cl^-$ (mg/L) | HGS/ LGS (%) | Salinity (ppm) | Electrical Stability | Gain/ Loss (bbls) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 10/05 | - | fresh water | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 1 | 10/06 | 800' | fresh water | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 2 | 10/07 | 2,175' | fresh water | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 3 | 10/08 | 2,175' | invert | 10.15 | 105 | 15 | 6 | 5/7/- | 36/21 | 76.7/23.3 | 66/20 | 3 | 14 | 1.4 | - | 1.8 | 32k | 7.1/5.0 | 264,320 | 461 | - |
| 4 | 10/09 | 2,175' | invert | 10.45 | 57 | 11 | 5 | 4/5/- | 27/16 | 82.4/17.6 | 64/22 | 2 | 13 | 1.8 | - | 2.3 | 35 | 8.6/4.4 | 264,320 | 371 | -/83 |
| 5 | 10/10 | 4,741' | invert | 10.45 | 57 | 11 | 5 | 4/5/- | 27/16 | 82.4/17.6 | 64/22 | 2 | 13 | 1.8 | - | 2.3 | 35 | 8.6/4.4 | 264,320 | 371 | -/- |
| 6 | 10/11 | 6,180' | invert | 10.75 | 50 | 17 | 12 | 7/11/- | 46/29 | 81.2/18.8 | 65/15 | 2 | 18.8 | 1.7 | - | 2.2 | 20k | 8.5/10.3 | 180,149 | 694 | -/- |
| 7 | 10/12 | 6,180' | invert | 10.75 | 50 | 17 | 12 | 7/11/- | 46/29 | 81.2/18.8 | 65/15 | 2 | 18.8 | 1.7 | - | 2.2 | 20k | 8.5/10.3 | 180,149 | 694 | -/183 |
| 8 | 10/13 | 6,456' | invert | 10.25 | 55 | 19 | 8 | 8/9/- | 46/27 | 79.8/20.2 | 67/17 | 2 | 14.8 | 2.1 | - | 2.7 | 20k | 8.5/6.3 | 162,398 | 508 | -/-65 |
| 9 | 10/14 | 7,707' | invert | 10.3 | 50 | 16 | 8 | 5/9/- | 40/24 | 81.0/19.0 | 68/16 | 2 | 14.7 | 2.1 | - | 2.7 | 21k | 8.6/6.1 | 177,834 | 508 | -/-70 |
| 10 | 10/15 | 9,064' | invert | 9.75 | 47 | 13 | 7 | 5/8/- | 33/20 | 81.6/18.4 | 71/169 | 3 | 11.3 | 2.3 | - | 3 | 28k | 6.5/4.8 | 247,894 | 739 | -/-39 |
| 11 | 10/16 | 10,246' | invert | 10.3 | 48 | 17 | 9 | 7/9/- | 43/26 | 80.7/19.3 | 67/16 | 2 | 14.9 | 2.6 | - | 3.4 | 34k | 9.1/5.9 | 364,320 | 704 | -/244 |
| 12 | 10/17 | 10,671' | invert | 10.25 | 48 | 17 | 10 | 8/12/- | 44/27 | 82.6/17.4 | 69/14.5 | 2 | 14.6 | 2.6 | - | 3.4 | 33K | 8.2/6.4 | 364,320 | 742 | -/50 |
| 13 | 10/18 | 11,185' | invert | 10.25 | 48 | 17 | 10 | 8/12/- | 44/27 | 82.6/17.4 | 69/14.5 | 2 | 14.6 | 2.6 | - | 3.4 | 33K | 8.2/6.4 | 364,320 | 742 | -/- |
| 14 | 10/19 | 11,185' | invert | 10.25 | 48 | 17 | 10 | 8/12/- | 44/27 | 82.6/17.4 | 69/14.5 | 2 | 14.6 | 2.6 | - | 3.4 | 33K | 8.2/6.4 | 364,320 | 742 | -/- |
| 15 | 12/23 | 11,185' | invert | 10.25 | 48 | 17 | 10 | 8/12/- | 44/27 | 82.6/17.4 | 69/14.5 | 2 | 14.6 | 2.6 | - | 3.4 | 33K | 8.2/6.4 | 364,320 | 742 | -/- |
| 16 | 12/24 | 11,195' | saltwater | 9.5 | 27 | 2 | 1 | - | 5/3 | - | 1/93.5 | - | 8.5 | - | 9.5 | - | 139k | 0.0/0.3 | - | - | -/- |
| 17 | 12/25 | 11,427' | saltwater | 9.5 | 27 | 2 | 1 | - | 5/3 | - | 1/93.5 | - | 8.5 | - | 9.5 | - | 139k | 0.0/0.3 | - | - | -/- |
| 18 | 12/26 | 15,915' | saltwater | 9.5 | 27 | 2 | 1 | - | 5/3 | - | 0/91.8 | - | 8.2 | - | 9 | - | 131k | 0.0/0.4 | - | - | -/- |
| 19 | 12/27 | 16,175' | saltwater | 9.5 | 27 | 2 | 1 | - | 5/3 | - | 0/91.8 | - | 8.2 | - | 9 | - | 131k | 0.0/0.4 | - | - | -/- |
| 20 | 12/28 | 20,519' | saltwater | 9.5 | 27 | 2 | 1 | - | 5/3 | - | 0/91.8 | - | 8.2 | - | 9 | - | 131k | 0.0/0.4 | - | - | -/- |

# 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' | 2,175' | 2,175' | 18 | 24.00 | Surface | 1 | 17 1/2 | PDC | NOV | BBK | E163630 | 9x16 | 18 | - | - | - | - | - | - |
| 2 | 2,175' | 6,180' | 4,005' | 32 | 50.00 | Vertical | 2 | 12 1/4 | PDC | NOV | A204276 | A198097 | 6x18 | 32 | 2 | NOV | 6/5 5.0 | 2.12° | 32 | 0.13 |
| 3 | 6,180' | 10,310' | 4,130' | 65 | 115.00 | Vertical | 3 | 8 3/4 | PDC | NOV | DS616M | A202739 | 6x22 | 65 | 3 | NOV | 7/8 5.7 | 1.50° | 65 | 0.24 |
| 4 | 10,310' | 11,185' | 875' | 23.5 | 138.50 | Curve | 4 | 8 3/4 | PDC | Smith | MDI516 | JJ2135 | 5x18 | 23.5 | 4 | NOV | 7/8 5.0 | 2.38° | 23.5 | 0.52 |
| 5 | 11,185' | 20,519' | 9,334' | 94 | 232.50 | Lateral | 5 | 6 | PDC | Smith | Z613 | JK1605 | 2x22; 3x16 | 94 | 5 | Ryan | 6/7 ML 8.0 | 1.50° | 94 | 0.80 |

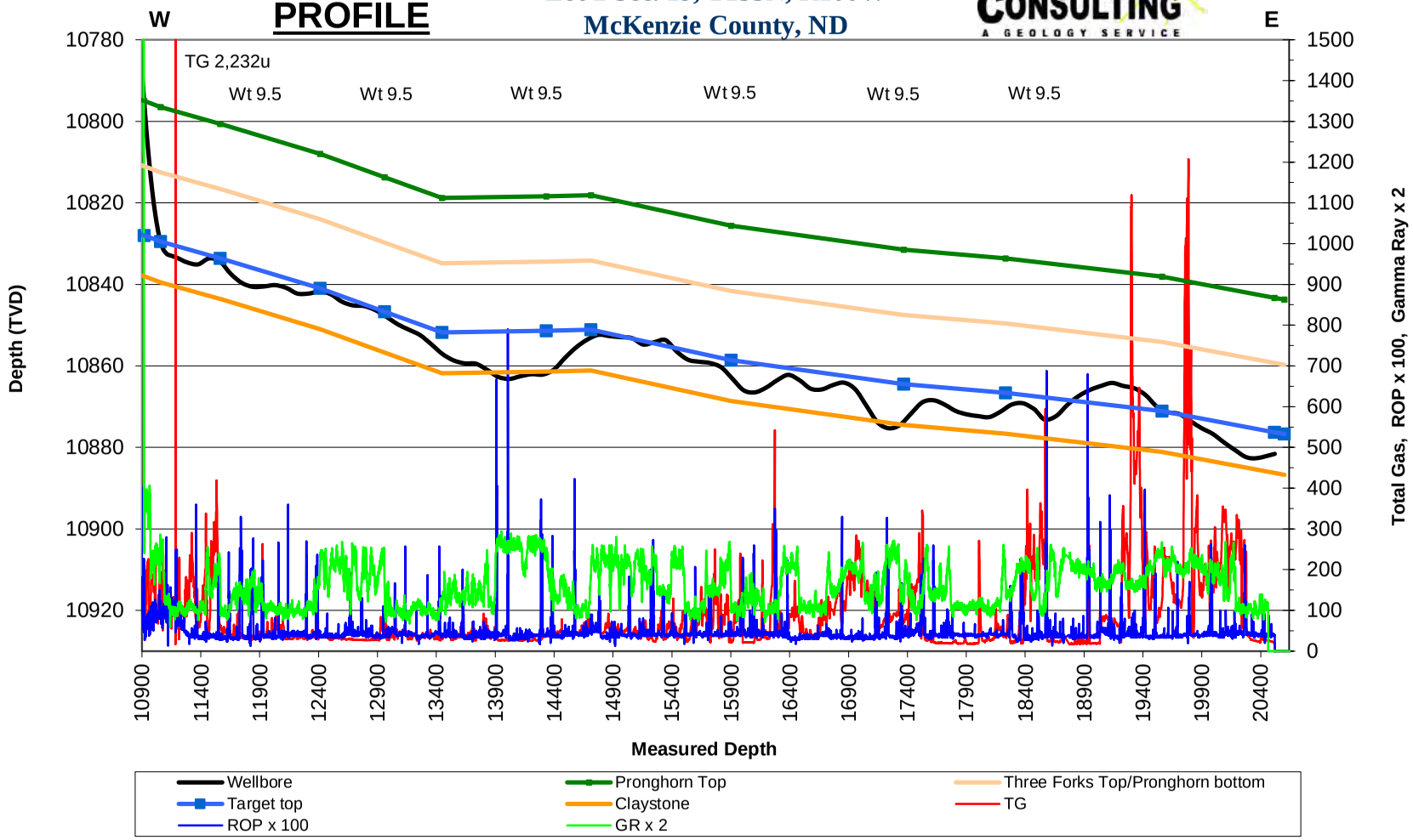
# PLAN VIEW

## Oasis Petroleum North America, LLC
## Chalmers 5300 21-19 8T



**Oasis Petroleum North America, LLC**
**Chalmers 5300 21-19 8T**
**Lot 2 Sec. 19, T153N, R100W**
**McKenzie County, ND**

SUNBURST CONSULTING
A GEOLOGY SERVICE



# FORMATION MARKERS & DIP ESTIMATES

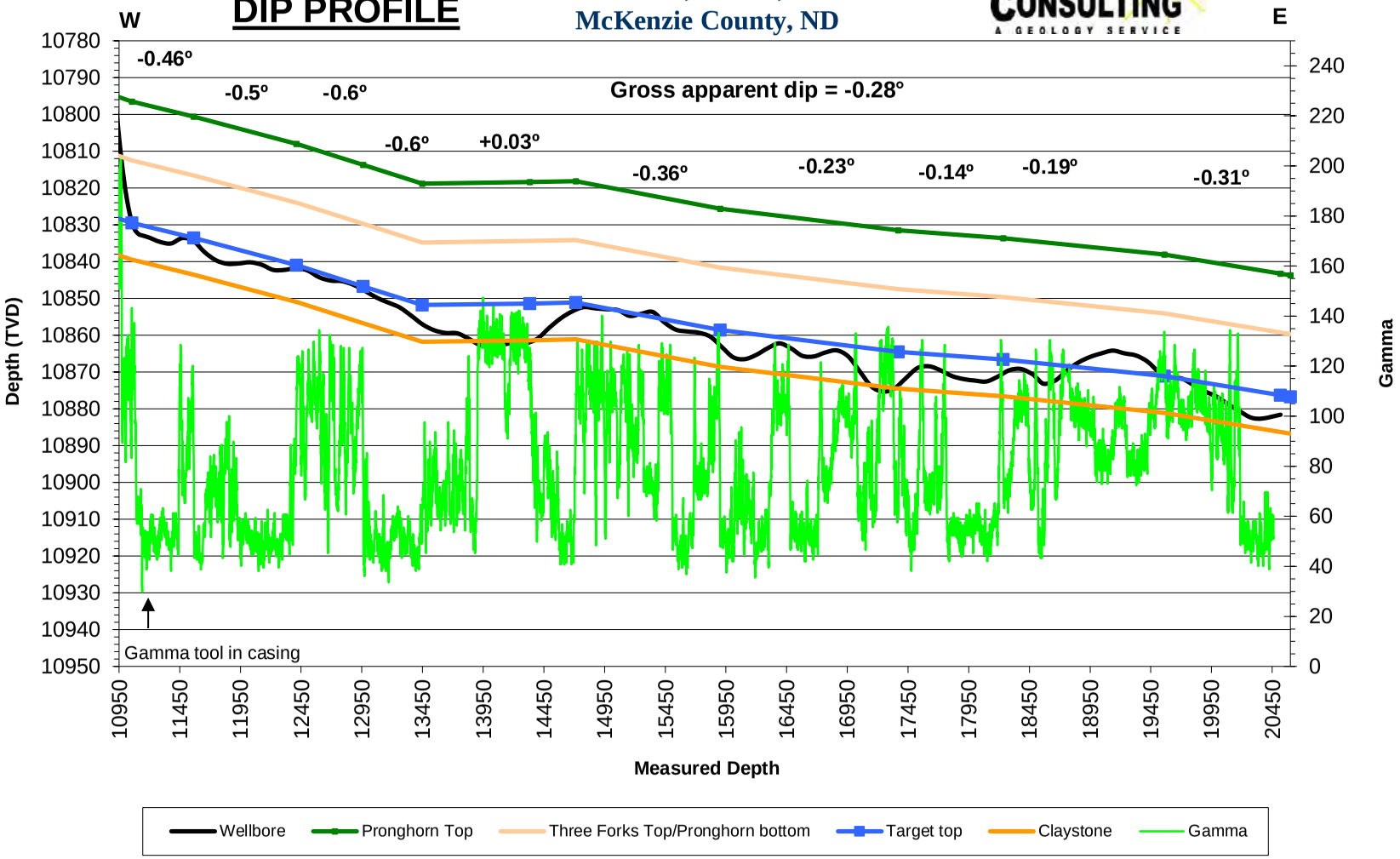
***Oasis Petroleum North America, LLC - Chalmers 5300 21-19 8T***

| Dip Change Points | MD | TVD | TVD diff. | MD diff. | Dip | Dipping up/down | Type of Marker |
|---|---|---|---|---|---|---|---|
| **Marker** | | | | | | | |
| Target entry | 11,057' | 10,829.50 | | | | | Gamma |
| Upper high gamma | 11,565' | 10,833.58 | 4.08 | 508.00 | ***-0.46*** | Down | Gamma |
| Upper high gamma | 12,412' | 10,840.97 | 7.39 | 847.00 | ***-0.50*** | Down | Gamma |
| Upper high gamma | 12,960' | 10,846.71 | 5.74 | 548.00 | ***-0.60*** | Down | Gamma |
| Lower high gamma | 13,447' | 10,851.80 | 5.09 | 487.00 | ***-0.60*** | Down | Gamma |
| Claystone | 14,448' | 10,851.28 | -0.52 | 1001.00 | ***0.03*** | Up | Gamma |
| Upper high gamma | 14,713' | 10,851.14 | -0.14 | 265.00 | ***0.03*** | Up | Gamma |
| Upper high gamma | 15,903' | 10,858.61 | 7.47 | 1190.00 | ***-0.36*** | Down | Gamma |
| Claystone | 17,369' | 10,864.50 | 5.89 | 1466.00 | ***-0.23*** | Down | Gamma |
| Cool gamma | 18,232' | 10,866.61 | 2.11 | 863.00 | ***-0.14*** | Down | Gamma |
| Upper high gamma | 19,561' | 10,871.10 | 4.49 | 1329.00 | ***-0.19*** | Down | Gamma |
| Projected Final Target Contact | 20,516' | 10,876.27 | 5.17 | 955.00 | ***-0.31*** | Down | Gamma |
| | | | | | | | |
| **Gross Dip** | | | | | | | |
| Initial Target Contact | 11,057' | 10,829.50 | | | | | |
| Projected Final Target Contact | 20,516' | 10,876.27 | 46.77 | 9459.00 | ***-0.28*** | Down | Projection |
| | | | | | | | |

**Oasis Petroleum North America, LLC**
**Chalmers 5300 21-19 8T**
**Lot 2 Sec. 19, T153N, R100W**
**McKenzie County, ND**

SUNBURST CONSULTING
A GEOLOGY SERVICE

# DIP PROFILE



# SUNBURST CONSULTING, INC.

| | | | | | |
|---|---|---|---|---|---|
| Operator: | Oasis Petroleum North America, LLC | | | Kick-off: | 10/15/2014 |
| Well : | Chalmers 5300 21-19 8T | | | Finish: | 12/28/2014 |
| County: | McKenzie | State: | ND | Directional Supervision: | |
| QQ: | Lot 2 | Section: | 19 | RPM | |
| Township: | 153 | N/S: | N | | |
| Range: | 100 | E/W: | W | Date: | 1/9/2015 |
| Footages: | 2226 | FN/SL: | N | Time: | 11:28 |
| | 327 | FE/WL: | W | **F9 to re-calculate** | |
| Minimum Curvature Method (SPE-3362) | | | | Proposed dir: | 88.96 |

[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 | 147 | 0.30 | 295.90 | 147.00 | 0.17 | -0.35 | -0.34 | |
| 1 | 240.00 | 0.30 | 298.40 | 240.00 | 0.39 | -0.78 | -0.78 | 0.01 |
| 2 | 333.00 | 0.40 | 273.50 | 333.00 | 0.53 | -1.32 | -1.31 | 0.19 |
| 3 | 427.00 | 0.10 | 334.70 | 427.00 | 0.62 | -1.68 | -1.67 | 0.39 |
| 4 | 520.00 | 0.30 | 337.70 | 520.00 | 0.92 | -1.81 | -1.79 | 0.22 |
| 5 | 613.00 | 0.30 | 347.50 | 612.99 | 1.38 | -1.96 | -1.93 | 0.06 |
| 6 | 702.00 | 0.60 | 288.80 | 701.99 | 1.76 | -2.45 | -2.42 | 0.58 |
| 7 | 790.00 | 0.50 | 326.20 | 789.99 | 2.23 | -3.10 | -3.06 | 0.41 |
| 8 | 880.00 | 0.50 | 276.40 | 879.98 | 2.60 | -3.71 | -3.66 | 0.47 |
| 9 | 970.00 | 0.20 | 304.50 | 969.98 | 2.73 | -4.23 | -4.18 | 0.37 |
| 10 | 1063.00 | 0.70 | 292.90 | 1062.98 | 3.04 | -4.88 | -4.83 | 0.54 |
| 11 | 1156.00 | 0.70 | 290.30 | 1155.97 | 3.46 | -5.94 | -5.88 | 0.03 |
| 12 | 1250.00 | 0.50 | 326.00 | 1249.97 | 4.00 | -6.71 | -6.63 | 0.44 |
| 13 | 1343.00 | 0.80 | 327.20 | 1342.96 | 4.88 | -7.29 | -7.20 | 0.32 |
| 14 | 1436.00 | 1.10 | 347.00 | 1435.95 | 6.30 | -7.84 | -7.72 | 0.47 |
| 15 | 1530.00 | 0.70 | 171.00 | 1529.95 | 6.61 | -7.95 | -7.83 | 1.91 |
| 16 | 1623.00 | 1.70 | 181.60 | 1622.92 | 4.67 | -7.90 | -7.81 | 1.10 |
| 17 | 1717.00 | 1.60 | 197.20 | 1716.89 | 2.02 | -8.33 | -8.29 | 0.49 |
| 18 | 1810.00 | 1.60 | 154.70 | 1809.85 | -0.39 | -8.16 | -8.16 | 1.25 |
| 19 | 1903.00 | 1.80 | 109.10 | 1902.82 | -2.04 | -6.22 | -6.26 | 1.43 |
| 20 | 1997.00 | 1.00 | 91.90 | 1996.79 | -2.55 | -4.01 | -4.05 | 0.95 |
| 21 | 2198.00 | 0.90 | 23.60 | 2197.76 | -1.16 | -1.62 | -1.64 | 0.53 |
| 22 | 2261.00 | 1.20 | 29.80 | 2260.75 | -0.14 | -1.10 | -1.10 | 0.51 |
| 23 | 2354.00 | 0.40 | 209.50 | 2353.75 | 0.42 | -0.77 | -0.76 | 1.72 |
| 24 | 2446.00 | 0.60 | 204.50 | 2445.75 | -0.29 | -1.13 | -1.13 | 0.22 |
| 25 | 2540.00 | 0.50 | 187.80 | 2539.74 | -1.15 | -1.39 | -1.41 | 0.20 |
| 26 | 2633.00 | 0.70 | 205.40 | 2632.74 | -2.06 | -1.69 | -1.73 | 0.29 |
| 27 | 2726.00 | 0.60 | 192.00 | 2725.73 | -3.05 | -2.03 | -2.09 | 0.19 |
| 28 | 2820.00 | 0.90 | 113.60 | 2819.72 | -3.83 | -1.46 | -1.53 | 1.04 |
| 29 | 2913.00 | 1.10 | 110.40 | 2912.71 | -4.43 | 0.05 | -0.03 | 0.22 |
| 30 | 3007.00 | 1.00 | 106.60 | 3006.69 | -4.98 | 1.68 | 1.59 | 0.13 |
| 31 | 3100.00 | 0.70 | 100.30 | 3099.68 | -5.31 | 3.02 | 2.92 | 0.34 |
| 32 | 3193.00 | 0.90 | 104.20 | 3192.67 | -5.60 | 4.28 | 4.18 | 0.22 |
| 33 | 3287.00 | 0.90 | 104.20 | 3286.66 | -5.96 | 5.71 | 5.60 | 0.00 |
| 34 | 3380.00 | 1.00 | 99.00 | 3379.65 | -6.26 | 7.22 | 7.11 | 0.14 |

# SUNBURST CONSULTING, INC.

| | | | | | |
|---|---|---|---|---|---|
| Operator: | Oasis Petroleum North America, LLC | | | Kick-off: | 10/15/2014 |
| Well : | Chalmers 5300 21-19 8T | | | Finish: | 12/28/2014 |
| County: | McKenzie | State: | ND | Directional Supervision: | |
| QQ: | Lot 2 | Section: | 19 | RPM | |
| Township: | 153 | N/S: | N | | |
| Range: | 100 | E/W: | W | Date: | 1/9/2015 |
| Footages: | 2226 | FN/SL: | N | Time: | 11:28 |
| | 327 | FE/WL: | W | **F9 to re-calculate** | |
| Minimum Curvature Method (SPE-3362) | | | | Proposed dir: | 88.96 |

[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 | 3474.00 | 1.10 | 110.20 | 3473.63 | -6.70 | 8.88 | 8.76 | 0.24 |
| 36 | 3567.00 | 0.80 | 108.50 | 3566.62 | -7.22 | 10.33 | 10.20 | 0.32 |
| 37 | 3660.00 | 0.90 | 111.10 | 3659.61 | -7.69 | 11.63 | 11.49 | 0.12 |
| 38 | 3754.00 | 0.80 | 111.10 | 3753.60 | -8.19 | 12.93 | 12.78 | 0.11 |
| 39 | 3847.00 | 1.30 | 67.60 | 3846.59 | -8.02 | 14.51 | 14.37 | 0.97 |
| 40 | 3940.00 | 1.20 | 58.90 | 3939.56 | -7.12 | 16.32 | 16.19 | 0.23 |
| 41 | 4034.00 | 1.30 | 55.20 | 4033.54 | -6.00 | 18.04 | 17.93 | 0.14 |
| 42 | 4127.00 | 1.50 | 61.40 | 4126.51 | -4.81 | 19.98 | 19.89 | 0.27 |
| 43 | 4221.00 | 1.10 | 59.80 | 4220.49 | -3.77 | 21.84 | 21.76 | 0.43 |
| 44 | 4314.00 | 1.20 | 55.00 | 4313.47 | -2.76 | 23.40 | 23.35 | 0.15 |
| 45 | 4407.00 | 1.00 | 61.30 | 4406.45 | -1.82 | 24.91 | 24.88 | 0.25 |
| 46 | 4500.00 | 0.90 | 62.30 | 4499.44 | -1.09 | 26.27 | 26.25 | 0.11 |
| 47 | 4593.00 | 0.90 | 52.60 | 4592.43 | -0.30 | 27.50 | 27.49 | 0.16 |
| 48 | 4687.00 | 0.40 | 33.70 | 4686.42 | 0.42 | 28.27 | 28.27 | 0.57 |
| 49 | 4780.00 | 0.30 | 340.90 | 4779.42 | 0.92 | 28.37 | 28.38 | 0.35 |
| 50 | 4873.00 | 0.40 | 17.80 | 4872.42 | 1.46 | 28.39 | 28.41 | 0.26 |
| 51 | 4967.00 | 0.10 | 35.10 | 4966.42 | 1.84 | 28.54 | 28.56 | 0.33 |
| 52 | 5060.00 | 0.20 | 335.60 | 5059.42 | 2.05 | 28.52 | 28.55 | 0.19 |
| 53 | 5153.00 | 0.10 | 358.20 | 5152.42 | 2.28 | 28.45 | 28.48 | 0.12 |
| 54 | 5247.00 | 0.20 | 317.70 | 5246.42 | 2.48 | 28.33 | 28.37 | 0.15 |
| 55 | 5340.00 | 0.30 | 216.70 | 5339.42 | 2.41 | 28.08 | 28.12 | 0.42 |
| 56 | 5433.00 | 0.20 | 241.80 | 5432.42 | 2.14 | 27.79 | 27.82 | 0.16 |
| 57 | 5527.00 | 0.20 | 160.00 | 5526.42 | 1.91 | 27.70 | 27.73 | 0.28 |
| 58 | 5620.00 | 0.20 | 302.40 | 5619.42 | 1.84 | 27.62 | 27.65 | 0.41 |
| 59 | 5714.00 | 0.40 | 276.30 | 5713.42 | 1.96 | 27.16 | 27.19 | 0.25 |
| 60 | 5807.00 | 0.40 | 266.30 | 5806.41 | 1.98 | 26.51 | 26.54 | 0.07 |
| 61 | 5900.00 | 0.30 | 253.30 | 5899.41 | 1.89 | 25.95 | 25.98 | 0.14 |
| 62 | 5994.00 | 0.30 | 241.60 | 5993.41 | 1.70 | 25.50 | 25.53 | 0.07 |
| 63 | 6087.00 | 0.60 | 212.10 | 6086.41 | 1.17 | 25.03 | 25.04 | 0.40 |
| 64 | 6126.00 | 0.60 | 226.10 | 6125.40 | 0.86 | 24.77 | 24.78 | 0.37 |
| 65 | 6173.00 | 0.60 | 213.70 | 6172.40 | 0.48 | 24.46 | 24.46 | 0.28 |
| 66 | 6267.00 | 0.60 | 116.70 | 6266.40 | -0.15 | 24.62 | 24.62 | 0.96 |
| 67 | 6360.00 | 1.00 | 101.70 | 6359.39 | -0.53 | 25.85 | 25.84 | 0.48 |
| 68 | 6453.00 | 0.50 | 127.90 | 6452.38 | -0.95 | 26.97 | 26.95 | 0.64 |
| 69 | 6547.00 | 0.30 | 153.80 | 6546.38 | -1.42 | 27.40 | 27.37 | 0.28 |

# SUNBURST CONSULTING, INC.

| | | | | | |
|---|---|---|---|---|---|
| Operator: | Oasis Petroleum North America, LLC | | | Kick-off: | 10/15/2014 |
| Well : | Chalmers 5300 21-19 8T | | | Finish: | 12/28/2014 |
| County: | McKenzie | State: | ND | Directional Supervision: | |
| QQ: | Lot 2 | Section: | 19 | RPM | |
| Township: | 153 | N/S: | N | | |
| Range: | 100 | E/W: | W | Date: | 1/9/2015 |
| Footages: | 2226 | FN/SL: | N | Time: | 11:28 |
| | 327 | FE/WL: | W | **F9 to re-calculate** | |
| Minimum Curvature Method (SPE-3362) | | | | Proposed dir: | 88.96 |

[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 | 6640.00 | 0.90 | 175.10 | 6639.37 | -2.37 | 27.57 | 27.52 | 0.68 |
| 71 | 6734.00 | 1.00 | 187.10 | 6733.36 | -3.92 | 27.53 | 27.46 | 0.24 |
| 72 | 6827.00 | 0.20 | 53.30 | 6826.36 | -4.62 | 27.56 | 27.47 | 1.23 |
| 73 | 6920.00 | 0.10 | 338.20 | 6919.36 | -4.45 | 27.66 | 27.58 | 0.21 |
| 74 | 7014.00 | 0.40 | 317.50 | 7013.36 | -4.13 | 27.41 | 27.33 | 0.33 |
| 75 | 7107.00 | 0.70 | 18.60 | 7106.35 | -3.36 | 27.37 | 27.31 | 0.66 |
| 76 | 7200.00 | 0.80 | 20.40 | 7199.34 | -2.21 | 27.78 | 27.73 | 0.11 |
| 77 | 7294.00 | 0.50 | 30.60 | 7293.34 | -1.24 | 28.22 | 28.19 | 0.34 |
| 78 | 7387.00 | 0.50 | 357.70 | 7386.33 | -0.49 | 28.41 | 28.39 | 0.30 |
| 79 | 7480.00 | 0.70 | 311.00 | 7479.33 | 0.29 | 27.96 | 27.96 | 0.55 |
| 80 | 7574.00 | 1.60 | 30.30 | 7573.31 | 1.80 | 28.19 | 28.22 | 1.73 |
| 81 | 7667.00 | 1.70 | 30.00 | 7666.28 | 4.12 | 29.54 | 29.60 | 0.11 |
| 82 | 7760.00 | 0.80 | 14.40 | 7759.25 | 5.94 | 30.39 | 30.49 | 1.03 |
| 83 | 7854.00 | 0.70 | 17.80 | 7853.25 | 7.12 | 30.73 | 30.85 | 0.12 |
| 84 | 7947.00 | 0.50 | 332.90 | 7946.24 | 8.03 | 30.71 | 30.85 | 0.53 |
| 85 | 8040.00 | 0.00 | 359.10 | 8039.24 | 8.39 | 30.53 | 30.68 | 0.54 |
| 86 | 8134.00 | 0.30 | 216.70 | 8133.24 | 8.19 | 30.38 | 30.53 | 0.32 |
| 87 | 8227.00 | 0.40 | 91.70 | 8226.24 | 7.99 | 30.56 | 30.70 | 0.67 |
| 88 | 8320.00 | 0.50 | 92.30 | 8319.23 | 7.96 | 31.29 | 31.43 | 0.11 |
| 89 | 8414.00 | 0.50 | 86.20 | 8413.23 | 7.97 | 32.11 | 32.25 | 0.06 |
| 90 | 8507.00 | 0.60 | 101.10 | 8506.23 | 7.90 | 32.99 | 33.13 | 0.19 |
| 91 | 8600.00 | 0.60 | 116.10 | 8599.22 | 7.60 | 33.91 | 34.04 | 0.17 |
| 92 | 8694.00 | 0.60 | 94.90 | 8693.22 | 7.34 | 34.84 | 34.97 | 0.23 |
| 93 | 8787.00 | 0.70 | 108.80 | 8786.21 | 7.11 | 35.86 | 35.99 | 0.20 |
| 94 | 8881.00 | 0.30 | 155.00 | 8880.21 | 6.70 | 36.51 | 36.63 | 0.57 |
| 95 | 8974.00 | 0.60 | 132.40 | 8973.20 | 6.16 | 36.97 | 37.08 | 0.37 |
| 96 | 9067.00 | 0.40 | 191.70 | 9066.20 | 5.51 | 37.27 | 37.36 | 0.56 |
| 97 | 9161.00 | 0.40 | 160.60 | 9160.20 | 4.88 | 37.31 | 37.39 | 0.23 |
| 98 | 9254.00 | 0.40 | 160.70 | 9253.20 | 4.27 | 37.52 | 37.60 | 0.00 |
| 99 | 9347.00 | 0.40 | 222.20 | 9346.20 | 3.72 | 37.41 | 37.48 | 0.44 |
| 100 | 9441.00 | 0.70 | 201.40 | 9440.19 | 2.94 | 36.98 | 37.03 | 0.38 |
| 101 | 9534.00 | 0.60 | 186.10 | 9533.19 | 1.93 | 36.72 | 36.75 | 0.21 |
| 102 | 9627.00 | 0.60 | 99.90 | 9626.18 | 1.36 | 37.15 | 37.17 | 0.88 |
| 103 | 9720.00 | 0.90 | 95.20 | 9719.17 | 1.21 | 38.36 | 38.38 | 0.33 |
| 104 | 9814.00 | 0.80 | 119.80 | 9813.16 | 0.82 | 39.66 | 39.67 | 0.40 |

# SUNBURST CONSULTING, INC.

| | | | | | |
|---|---|---|---|---|---|
| Operator: | Oasis Petroleum North America, LLC | | | Kick-off: | 10/15/2014 |
| Well : | Chalmers 5300 21-19 8T | | | Finish: | 12/28/2014 |
| County: | McKenzie | State: | ND | Directional Supervision: | |
| QQ: | Lot 2 | Section: | 19 | RPM | |
| Township: | 153 | N/S: | N | | |
| Range: | 100 | E/W: | W | Date: | 1/9/2015 |
| Footages: | 2226 | FN/SL: | N | Time: | 11:28 |
| | 327 | FE/WL: | W | **F9 to re-calculate** | |
| Minimum Curvature Method (SPE-3362) | | | | Proposed dir: | 88.96 |

[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 | 9907.00 | 0.70 | 118.70 | 9906.16 | 0.22 | 40.73 | 40.72 | 0.11 |
| 106 | 10000.00 | 0.70 | 95.40 | 9999.15 | -0.10 | 41.79 | 41.78 | 0.30 |
| 107 | 10094.00 | 0.50 | 115.30 | 10093.14 | -0.33 | 42.73 | 42.72 | 0.30 |
| 108 | 10187.00 | 0.20 | 181.60 | 10186.14 | -0.67 | 43.09 | 43.08 | 0.49 |
| 109 | 10253.00 | 0.40 | 111.00 | 10252.14 | -0.87 | 43.31 | 43.28 | 0.58 |
| 110 | 10300.00 | 0.20 | 180.20 | 10299.14 | -1.01 | 43.46 | 43.43 | 0.81 |
| 111 | 10331.00 | 0.50 | 115.00 | 10330.14 | -1.12 | 43.58 | 43.55 | 1.46 |
| 112 | 10362.00 | 3.40 | 80.80 | 10361.12 | -1.03 | 44.61 | 44.59 | 9.68 |
| 113 | 10393.00 | 7.50 | 78.20 | 10391.97 | -0.47 | 47.50 | 47.48 | 13.25 |
| 114 | 10424.00 | 12.70 | 76.10 | 10422.48 | 0.76 | 52.79 | 52.80 | 16.81 |
| 115 | 10456.00 | 17.10 | 75.80 | 10453.40 | 2.76 | 60.77 | 60.81 | 13.75 |
| 116 | 10487.00 | 21.10 | 75.80 | 10482.69 | 5.25 | 70.60 | 70.69 | 12.90 |
| 117 | 10518.00 | 23.60 | 75.30 | 10511.35 | 8.20 | 82.02 | 82.15 | 8.09 |
| 118 | 10549.00 | 25.50 | 77.10 | 10539.55 | 11.26 | 94.53 | 94.71 | 6.59 |
| 119 | 10580.00 | 28.00 | 78.90 | 10567.23 | 14.15 | 108.17 | 108.41 | 8.48 |
| 120 | 10611.00 | 31.30 | 78.20 | 10594.17 | 17.20 | 123.20 | 123.49 | 10.70 |
| 121 | 10642.00 | 34.30 | 75.90 | 10620.23 | 20.98 | 139.56 | 139.92 | 10.48 |
| 122 | 10673.00 | 37.20 | 74.70 | 10645.38 | 25.58 | 157.07 | 157.51 | 9.62 |
| 123 | 10704.00 | 40.60 | 73.20 | 10669.50 | 30.97 | 175.78 | 176.31 | 11.38 |
| 124 | 10736.00 | 44.50 | 72.90 | 10693.07 | 37.28 | 196.47 | 197.11 | 12.20 |
| 125 | 10767.00 | 48.20 | 73.80 | 10714.47 | 43.70 | 217.96 | 218.71 | 12.12 |
| 126 | 10798.00 | 52.10 | 74.00 | 10734.33 | 50.30 | 240.82 | 241.69 | 12.59 |
| 127 | 10829.00 | 56.00 | 73.70 | 10752.52 | 57.28 | 264.92 | 265.92 | 12.60 |
| 128 | 10860.00 | 59.80 | 73.30 | 10768.99 | 64.73 | 290.09 | 291.22 | 12.31 |
| 129 | 10891.00 | 64.30 | 73.60 | 10783.52 | 72.53 | 316.34 | 317.60 | 14.54 |
| 130 | 10922.00 | 67.60 | 75.00 | 10796.15 | 80.19 | 343.59 | 344.98 | 11.42 |
| 131 | 10953.00 | 71.20 | 76.10 | 10807.06 | 87.42 | 371.68 | 373.21 | 12.08 |
| 132 | 10985.00 | 75.20 | 77.90 | 10816.31 | 94.31 | 401.52 | 403.17 | 13.61 |
| 133 | 11016.00 | 79.00 | 79.20 | 10823.23 | 100.30 | 431.13 | 432.88 | 12.92 |
| 134 | 11047.00 | 82.50 | 80.20 | 10828.21 | 105.77 | 461.23 | 463.08 | 11.73 |
| 135 | 11078.00 | 86.50 | 81.20 | 10831.18 | 110.76 | 491.68 | 493.61 | 13.30 |
| 136 | 11109.00 | 88.80 | 81.80 | 10832.45 | 115.33 | 522.31 | 524.32 | 7.67 |
| 137 | 11125.00 | 89.10 | 82.00 | 10832.74 | 117.59 | 538.15 | 540.19 | 2.25 |
| 138 | 11191.00 | 89.80 | 84.00 | 10833.38 | 125.63 | 603.65 | 605.83 | 3.21 |
| 139 | 11284.00 | 88.70 | 83.80 | 10834.59 | 135.51 | 696.11 | 698.46 | 1.20 |

# SUNBURST CONSULTING, INC.

| | | | | | |
|---|---|---|---|---|---|
| Operator: | Oasis Petroleum North America, LLC | | | Kick-off: | 10/15/2014 |
| Well : | Chalmers 5300 21-19 8T | | | Finish: | 12/28/2014 |
| County: | McKenzie | State: | ND | Directional Supervision: | |
| QQ: | Lot 2 | Section: | 19 | RPM | |
| Township: | 153 | N/S: | N | | |
| Range: | 100 | E/W: | W | Date: | 1/9/2015 |
| Footages: | 2226 | FN/SL: | N | Time: | 11:28 |
| | 327 | FE/WL: | W | **F9 to re-calculate** | |

Minimum Curvature Method (SPE-3362) Proposed dir: 88.96

[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 | 11377.00 | 90.70 | 83.30 | 10835.08 | 145.96 | 788.52 | 791.04 | 2.22 |
| 141 | 11470.00 | 91.10 | 83.60 | 10833.62 | 156.57 | 880.90 | 883.60 | 0.54 |
| 142 | 11562.00 | 88.00 | 83.10 | 10834.34 | 167.22 | 972.27 | 975.14 | 3.41 |
| 143 | 11655.00 | 88.20 | 84.00 | 10837.43 | 177.66 | 1064.63 | 1067.68 | 0.99 |
| 144 | 11748.00 | 89.10 | 86.30 | 10839.62 | 185.52 | 1157.26 | 1160.44 | 2.66 |
| 145 | 11841.00 | 89.70 | 89.00 | 10840.59 | 189.33 | 1250.17 | 1253.40 | 2.97 |
| 146 | 11936.00 | 90.40 | 91.80 | 10840.51 | 188.67 | 1345.16 | 1348.36 | 3.04 |
| 147 | 12030.00 | 90.00 | 91.50 | 10840.18 | 185.96 | 1439.12 | 1442.25 | 0.53 |
| 148 | 12125.00 | 89.20 | 91.50 | 10840.84 | 183.47 | 1534.08 | 1537.16 | 0.84 |
| 149 | 12220.00 | 89.10 | 90.60 | 10842.25 | 181.73 | 1629.05 | 1632.08 | 0.95 |
| 150 | 12315.00 | 90.90 | 90.60 | 10842.25 | 180.74 | 1724.04 | 1727.04 | 1.89 |
| 151 | 12409.00 | 89.70 | 90.50 | 10841.76 | 179.84 | 1818.04 | 1821.00 | 1.28 |
| 152 | 12504.00 | 89.50 | 90.50 | 10842.42 | 179.01 | 1913.03 | 1915.96 | 0.21 |
| 153 | 12599.00 | 88.30 | 90.60 | 10844.25 | 178.10 | 2008.01 | 2010.91 | 1.27 |
| 154 | 12694.00 | 90.60 | 90.20 | 10845.16 | 177.43 | 2102.99 | 2105.87 | 2.46 |
| 155 | 12788.00 | 89.20 | 91.10 | 10845.32 | 176.37 | 2196.98 | 2199.82 | 1.77 |
| 156 | 12883.00 | 89.60 | 90.70 | 10846.32 | 174.87 | 2291.97 | 2294.76 | 0.60 |
| 157 | 12978.00 | 88.40 | 90.60 | 10847.98 | 173.80 | 2386.94 | 2389.71 | 1.27 |
| 158 | 13073.00 | 89.40 | 90.60 | 10849.80 | 172.80 | 2481.92 | 2484.65 | 1.05 |
| 159 | 13167.00 | 89.00 | 90.30 | 10851.11 | 172.06 | 2575.91 | 2578.61 | 0.53 |
| 160 | 13262.00 | 89.40 | 90.80 | 10852.44 | 171.15 | 2670.89 | 2673.56 | 0.67 |
| 161 | 13357.00 | 87.90 | 91.10 | 10854.68 | 169.58 | 2765.85 | 2768.47 | 1.61 |
| 162 | 13452.00 | 89.20 | 90.50 | 10857.08 | 168.25 | 2860.81 | 2863.39 | 1.51 |
| 163 | 13546.00 | 88.90 | 90.40 | 10858.64 | 167.51 | 2954.79 | 2957.35 | 0.34 |
| 164 | 13641.00 | 90.20 | 89.60 | 10859.39 | 167.51 | 3049.79 | 3052.33 | 1.61 |
| 165 | 13736.00 | 89.70 | 89.40 | 10859.47 | 168.34 | 3144.78 | 3147.32 | 0.57 |
| 166 | 13831.00 | 88.50 | 88.90 | 10860.96 | 169.75 | 3239.76 | 3242.31 | 1.37 |
| 167 | 13926.00 | 89.40 | 89.20 | 10862.70 | 171.33 | 3334.73 | 3337.29 | 1.00 |
| 168 | 14020.00 | 90.00 | 88.80 | 10863.19 | 172.97 | 3428.71 | 3431.29 | 0.77 |
| 169 | 14115.00 | 90.80 | 89.20 | 10862.53 | 174.63 | 3523.70 | 3526.28 | 0.94 |
| 170 | 14210.00 | 89.80 | 90.00 | 10862.03 | 175.29 | 3618.69 | 3621.28 | 1.35 |
| 171 | 14305.00 | 90.10 | 88.20 | 10862.12 | 176.78 | 3713.67 | 3716.27 | 1.92 |
| 172 | 14399.00 | 91.40 | 87.70 | 10860.89 | 180.14 | 3807.60 | 3810.25 | 1.48 |
| 173 | 14494.00 | 92.10 | 87.20 | 10857.98 | 184.37 | 3902.46 | 3905.17 | 0.91 |
| 174 | 14589.00 | 91.00 | 88.20 | 10855.42 | 188.18 | 3997.35 | 4000.11 | 1.56 |

# SUNBURST CONSULTING, INC.

| | | | | | |
|---|---|---|---|---|---|
| Operator: | Oasis Petroleum North America, LLC | | | Kick-off: | 10/15/2014 |
| Well : | Chalmers 5300 21-19 8T | | | Finish: | 12/28/2014 |
| County: | McKenzie | State: | ND | Directional Supervision: | |
| QQ: | Lot 2 | Section: | 19 | RPM | |
| Township: | 153 | N/S: | N | | |
| Range: | 100 | E/W: | W | Date: | 1/9/2015 |
| Footages: | 2226 | FN/SL: | N | Time: | 11:28 |
| | 327 | FE/WL: | W | **F9 to re-calculate** | |

Minimum Curvature Method (SPE-3362) Proposed dir: 88.96

[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 | 14683.00 | 91.30 | 88.20 | 10853.53 | 191.13 | 4091.29 | 4094.08 | 0.32 |
| 176 | 14778.00 | 90.10 | 90.50 | 10852.37 | 192.21 | 4186.26 | 4189.06 | 2.73 |
| 177 | 14873.00 | 89.50 | 91.40 | 10852.70 | 190.63 | 4281.25 | 4284.00 | 1.14 |
| 178 | 14968.00 | 90.20 | 91.90 | 10852.95 | 187.90 | 4376.21 | 4378.90 | 0.91 |
| 179 | 15063.00 | 89.50 | 91.00 | 10853.20 | 185.49 | 4471.18 | 4473.81 | 1.20 |
| 180 | 15157.00 | 88.60 | 91.00 | 10854.76 | 183.85 | 4565.15 | 4567.73 | 0.96 |
| 181 | 15252.00 | 92.10 | 89.70 | 10854.18 | 183.27 | 4660.13 | 4662.69 | 3.93 |
| 182 | 15347.00 | 88.50 | 91.10 | 10853.68 | 182.61 | 4755.11 | 4757.64 | 4.07 |
| 183 | 15442.00 | 88.10 | 91.60 | 10856.50 | 180.37 | 4850.04 | 4852.51 | 0.67 |
| 184 | 15537.00 | 89.50 | 91.70 | 10858.49 | 177.64 | 4944.97 | 4947.38 | 1.48 |
| 185 | 15631.00 | 89.90 | 91.80 | 10858.98 | 174.77 | 5038.93 | 5041.27 | 0.44 |
| 186 | 15726.00 | 89.70 | 89.60 | 10859.31 | 173.61 | 5133.92 | 5136.22 | 2.33 |
| 187 | 15821.00 | 89.00 | 89.60 | 10860.39 | 174.27 | 5228.91 | 5231.21 | 0.74 |
| 188 | 15916.00 | 87.60 | 90.10 | 10863.21 | 174.52 | 5323.86 | 5326.15 | 1.56 |
| 189 | 16010.00 | 89.00 | 89.30 | 10865.99 | 175.01 | 5417.82 | 5420.10 | 1.72 |
| 190 | 16105.00 | 90.40 | 86.70 | 10866.49 | 178.33 | 5512.75 | 5515.07 | 3.11 |
| 191 | 16200.00 | 91.00 | 86.50 | 10865.33 | 183.96 | 5607.57 | 5609.99 | 0.67 |
| 192 | 16294.00 | 91.20 | 88.90 | 10863.53 | 187.73 | 5701.47 | 5703.94 | 2.56 |
| 193 | 16389.00 | 90.40 | 88.40 | 10862.20 | 189.97 | 5796.43 | 5798.93 | 0.99 |
| 194 | 16484.00 | 88.00 | 88.90 | 10863.53 | 192.21 | 5891.39 | 5893.91 | 2.58 |
| 195 | 16579.00 | 89.50 | 89.40 | 10865.60 | 193.62 | 5986.36 | 5988.88 | 1.66 |
| 196 | 16674.00 | 90.30 | 89.60 | 10865.76 | 194.44 | 6081.35 | 6083.88 | 0.87 |
| 197 | 16768.00 | 91.00 | 89.70 | 10864.70 | 195.02 | 6175.34 | 6177.87 | 0.75 |
| 198 | 16863.00 | 89.70 | 90.00 | 10864.12 | 195.27 | 6270.34 | 6272.85 | 1.40 |
| 199 | 16958.00 | 88.30 | 90.40 | 10865.78 | 194.94 | 6365.32 | 6367.81 | 1.53 |
| 200 | 17053.00 | 86.80 | 90.20 | 10869.84 | 194.44 | 6460.23 | 6462.70 | 1.59 |
| 201 | 17148.00 | 88.30 | 90.30 | 10873.90 | 194.02 | 6555.14 | 6557.58 | 1.58 |
| 202 | 17243.00 | 90.00 | 90.50 | 10875.31 | 193.36 | 6650.12 | 6652.54 | 1.80 |
| 203 | 17337.00 | 91.00 | 92.20 | 10874.49 | 191.15 | 6744.09 | 6746.45 | 2.10 |
| 204 | 17432.00 | 92.40 | 92.10 | 10871.67 | 187.58 | 6838.98 | 6841.26 | 1.48 |
| 205 | 17527.00 | 90.90 | 89.90 | 10868.93 | 185.93 | 6933.92 | 6936.15 | 2.80 |
| 206 | 17622.00 | 89.70 | 89.90 | 10868.43 | 186.09 | 7028.91 | 7031.13 | 1.26 |
| 207 | 17716.00 | 89.00 | 89.80 | 10869.50 | 186.34 | 7122.91 | 7125.11 | 0.75 |
| 208 | 17811.00 | 89.10 | 90.40 | 10871.08 | 186.17 | 7217.89 | 7220.08 | 0.64 |
| 209 | 17906.00 | 89.90 | 91.80 | 10871.91 | 184.35 | 7312.87 | 7315.01 | 1.70 |

# SUNBURST CONSULTING, INC.

| | | | | | |
|---|---|---|---|---|---|
| Operator: | Oasis Petroleum North America, LLC | | | Kick-off: | 10/15/2014 |
| Well : | Chalmers 5300 21-19 8T | | | Finish: | 12/28/2014 |
| County: | McKenzie | State: | ND | Directional Supervision: | |
| QQ: | Lot 2 | Section: | 19 | RPM | |
| Township: | 153 | N/S: | N | | |
| Range: | 100 | E/W: | W | Date: | 1/9/2015 |
| Footages: | 2226 | FN/SL: | N | Time: | 11:28 |
| | 327 | FE/WL: | W | **F9 to re-calculate** | |
| Minimum Curvature Method (SPE-3362) | | | | Proposed dir: | 88.96 |

[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 | 18001.00 | 89.60 | 92.10 | 10872.32 | 181.12 | 7407.81 | 7409.88 | 0.45 |
| 211 | 18095.00 | 90.10 | 92.30 | 10872.57 | 177.51 | 7501.74 | 7503.73 | 0.57 |
| 212 | 18190.00 | 91.50 | 92.30 | 10871.24 | 173.70 | 7596.65 | 7598.55 | 1.47 |
| 213 | 18285.00 | 90.60 | 90.90 | 10869.50 | 171.05 | 7691.60 | 7693.43 | 1.75 |
| 214 | 18380.00 | 89.80 | 88.50 | 10869.17 | 171.54 | 7786.59 | 7788.42 | 2.66 |
| 215 | 18475.00 | 88.50 | 88.10 | 10870.58 | 174.36 | 7881.53 | 7883.40 | 1.43 |
| 216 | 18506.00 | 88.10 | 88.10 | 10871.50 | 175.39 | 7912.50 | 7914.38 | 1.29 |
| 217 | 18569.00 | 88.80 | 87.80 | 10873.20 | 177.64 | 7975.44 | 7977.35 | 1.21 |
| 218 | 18664.00 | 92.30 | 87.40 | 10872.29 | 181.62 | 8070.34 | 8072.30 | 3.71 |
| 219 | 18759.00 | 91.00 | 88.60 | 10869.55 | 184.93 | 8165.23 | 8167.25 | 1.86 |
| 220 | 18854.00 | 91.60 | 88.40 | 10867.40 | 187.42 | 8260.18 | 8262.22 | 0.67 |
| 221 | 18948.00 | 90.20 | 90.40 | 10865.92 | 188.40 | 8354.15 | 8356.20 | 2.60 |
| 222 | 19043.00 | 91.00 | 90.00 | 10864.93 | 188.07 | 8449.15 | 8451.17 | 0.94 |
| 223 | 19138.00 | 89.90 | 90.30 | 10864.18 | 187.82 | 8544.14 | 8546.14 | 1.20 |
| 224 | 19233.00 | 89.20 | 90.10 | 10864.93 | 187.49 | 8639.14 | 8641.12 | 0.77 |
| 225 | 19328.00 | 90.10 | 90.00 | 10865.51 | 187.41 | 8734.13 | 8736.10 | 0.95 |
| 226 | 19422.00 | 87.90 | 90.30 | 10867.15 | 187.16 | 8828.11 | 8830.06 | 2.36 |
| 227 | 19517.00 | 88.70 | 91.50 | 10869.97 | 185.67 | 8923.06 | 8924.96 | 1.52 |
| 228 | 19612.00 | 89.60 | 91.60 | 10871.37 | 183.10 | 9018.01 | 9019.85 | 0.95 |
| 229 | 19707.00 | 89.90 | 90.90 | 10871.79 | 181.03 | 9112.99 | 9114.77 | 0.80 |
| 230 | 19802.00 | 88.00 | 90.50 | 10873.53 | 179.87 | 9207.96 | 9209.71 | 2.04 |
| 231 | 19896.00 | 89.90 | 90.30 | 10875.25 | 179.21 | 9301.94 | 9303.66 | 2.03 |
| 232 | 19991.00 | 88.40 | 91.10 | 10876.66 | 178.05 | 9396.92 | 9398.60 | 1.79 |
| 233 | 20086.00 | 89.10 | 90.10 | 10878.73 | 177.06 | 9491.89 | 9493.54 | 1.28 |
| 234 | 20181.00 | 88.60 | 90.90 | 10880.64 | 176.23 | 9586.86 | 9588.48 | 0.99 |
| 235 | 20276.00 | 89.30 | 90.40 | 10882.38 | 175.15 | 9681.84 | 9683.42 | 0.91 |
| 236 | 20370.00 | 90.40 | 90.30 | 10882.63 | 174.58 | 9775.84 | 9777.40 | 1.18 |
| 237 | 20519.00 | 90.40 | 90.30 | 10881.59 | 173.80 | 9924.83 | 9926.35 | 0.00 |

# DEVIATION SURVEYS

| Depth | Inclination | Azimuth |
|---|---|---|
| 147 | 0.30 | 295.90 |
| 240 | 0.30 | 298.40 |
| 333 | 0.40 | 273.50 |
| 427 | 0.10 | 334.70 |
| 520 | 0.30 | 337.70 |
| 613 | 0.30 | 347.50 |
| 702 | 0.60 | 288.80 |
| 790 | 0.50 | 326.20 |
| 880 | 0.50 | 276.40 |
| 970 | 0.20 | 304.50 |
| 1063 | 0.70 | 292.90 |
| 1156 | 0.70 | 290.30 |
| 1250 | 0.50 | 326.00 |
| 1343 | 0.80 | 327.20 |
| 1436 | 1.10 | 347.00 |
| 1530 | 0.70 | 171.00 |
| 1623 | 1.70 | 181.60 |
| 1717 | 1.60 | 197.20 |
| 1810 | 1.60 | 154.70 |
| 1903 | 1.80 | 109.10 |
| 1997 | 1.00 | 91.90 |

# FORMATION TOPS & STRUCTURAL RELATIONSHIPS

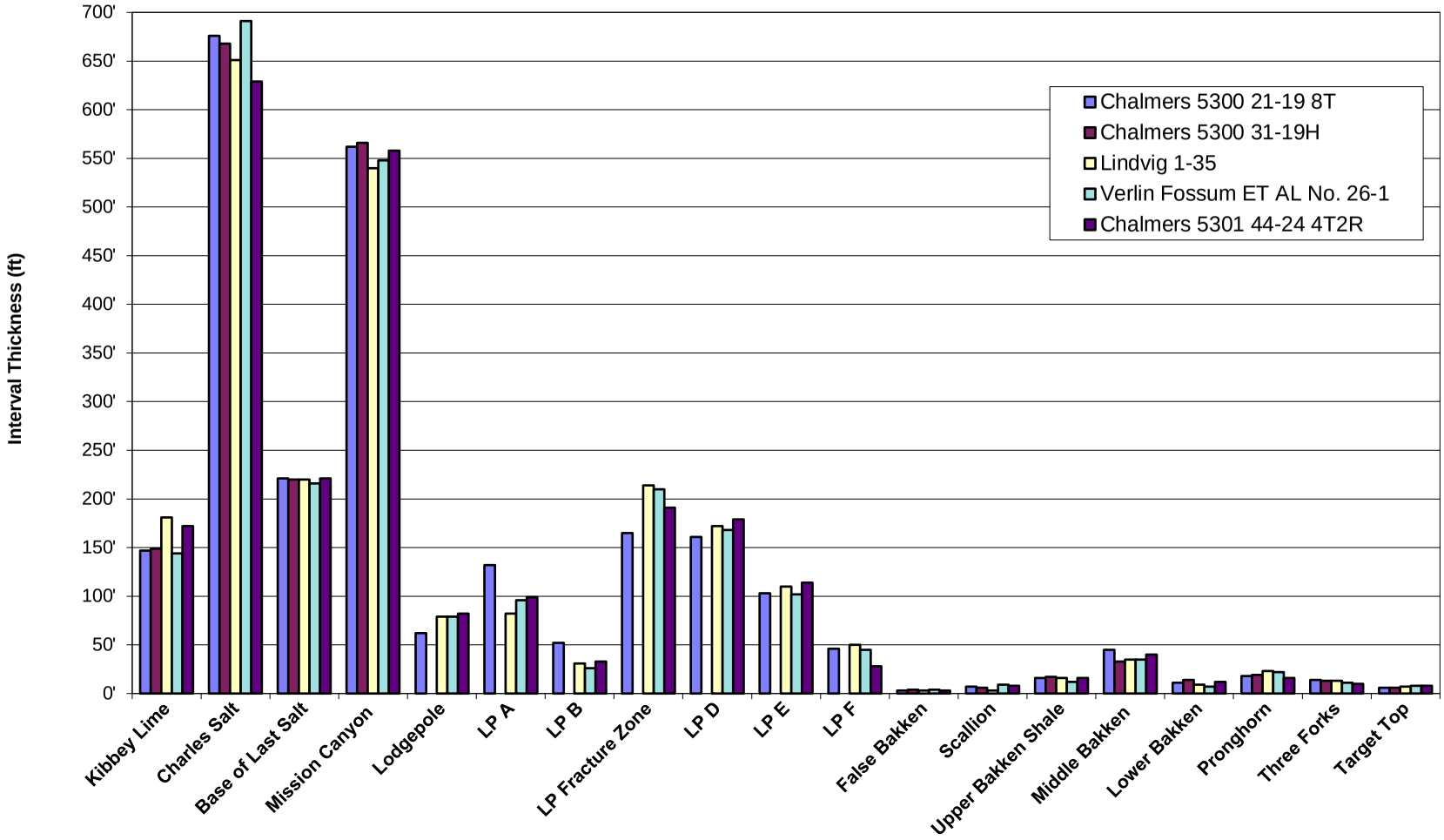
| | Subject Well: | | | | | | | | Offset Wells: | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Operator:** | **Oasis Petroleum North America, LLC** | | | | | | | | | | | |
| **Well Name:** | **Chalmers 5300 21-19 8T** | | | | | | | | | | | |
| **Location:** | 2,226' FNL & 327' FWL | | | | | | | | | | | |
| | Lot 2 Sec. 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 Lindvig 1-35** | **Dip To Verlin Fossum ET AL No. 26-1** | **Dip To Chalmers 5301 44-24 4T2R** |
| Mowry | 5,029' | -2,953' | 5,045' | 5,045' | -2,969' | 439' | 5,788' | -16' | -13' | - | - | - |
| Dakota | 5,417' | -3,341' | 5,484' | 5,484' | -3,408' | 498' | 5,349' | -67' | -9' | - | - | - |
| Swift | - | - | 5,982' | 5,982' | -3,906' | 502' | 4,851' | - | -13' | | | |
| Rierdon | 6,463' | -4,387' | 6,485' | 6,484' | -4,408' | 416' | 4,349' | -21' | -13' | - | - | - |
| Dunham Salt | 6,891' | -4,815' | 6,901' | 6,900' | -4,824' | 15' | 3,933' | -9' | -8' | - | - | - |
| Dunham Salt Base | 6,960' | -4,884' | 6,916' | 6,915' | -4,839' | 350' | 3,918' | 45' | -8' | - | - | - |
| Pine Salt | 7,257' | -5,181' | 7,266' | 7,265' | -5,189' | 30' | 3,568' | -8' | -9' | - | - | - |
| Pine Salt Base | 7,290' | -5,214' | 7,296' | 7,295' | -5,219' | 75' | 3,538' | -5' | -9' | - | - | - |
| Opeche Salt | 7,351' | -5,275' | 7,371' | 7,370' | -5,294' | 56' | 3,463' | -19' | -18' | - | - | - |
| Opeche Salt Base | 7,426' | -5,350' | 7,427' | 7,426' | -5,350' | 243' | 3,407' | 0' | 1' | - | - | - |
| Amsden | 7,662' | -5,586' | 7,670' | 7,669' | -5,593' | 168' | 3,164' | -7' | 0' | - | - | - |
| Tyler | 7,828' | -5,752' | 7,838' | 7,837' | -5,761' | 203' | 2,996' | -9' | -3' | - | - | - |
| Otter/Base Minnelusa | 8,032' | -5,956' | 8,041' | 8,040' | -5,964' | 346' | 2,793' | -8' | 0' | - | - | - |
| Kibbey Lime | 8,384' | -6,308' | 8,387' | 8,386' | -6,310' | 147' | 2,447' | -2' | 4' | -87' | -113' | -219' |
| Charles Salt | 8,534' | -6,458' | 8,534' | 8,533' | -6,457' | 676' | 2,300' | 1' | 6' | -53' | -116' | -194' |
| Base of Last Salt | 9,209' | -7,133' | 9,210' | 9,209' | -7,133' | 221' | 1,624' | 0' | -2' | -78' | -101' | -241' |
| Mission Canyon | 9,427' | -7,351' | 9,431' | 9,430' | -7,354' | 562' | 1,403' | -3' | -3' | -79' | -106' | -241' |
| Lodgepole | 9,993' | -7,917' | 9,993' | 9,992' | -7,916' | 62' | 841' | 1' | 1' | -101' | -120' | -245' |
| LP A | - | - | 10,055' | 10,054' | -7,978' | 132' | 779' | - | - | -84' | -103' | -225' |
| LP B | - | - | 10,187' | 10,186' | -8,110' | 52' | 647' | - | - | -134' | -139' | -258' |
| LP Fracture Zone | - | - | 10,239' | 10,238' | -8,162' | 165' | 595' | - | - | -155' | -165' | -277' |
| LP D | - | - | 10,404' | 10,403' | -8,327' | 161' | 430' | - | - | -106' | -120' | -251' |
| LP E | - | - | 10,576' | 10,564' | -8,488' | 103' | 269' | - | - | -95' | -113' | -233' |
| LP F | - | - | 10,702' | 10,667' | -8,591' | 46' | 166' | - | - | -88' | -114' | -222' |
| False Bakken | 10,706' | -8,630' | 10,766' | 10,713' | -8,637' | 3' | 120' | -7' | -10' | -84' | -115' | -240' |
| Scallion | | 2,076' | 10,770' | 10,716' | -8,640' | 7' | 117' | - | -9' | -84' | -114' | -240' |
| Upper Bakken Shale | 10,716' | -8,640' | 10,782' | 10,723' | -8,647' | 16' | 110' | -7' | -10' | -88' | -112' | -239' |
| Middle Bakken | 10,732' | -8,656' | 10,808' | 10,739' | -8,663' | 45' | 94' | -7' | -9' | -88' | -116' | -239' |
| Lower Bakken | 10,766' | -8,690' | 10,892' | 10,784' | -8,708' | 11' | 49' | -18' | -21' | -98' | -126' | -244' |
| Pronghorn | 10,780' | -8,704' | 10,918' | 10,795' | -8,719' | 18' | 38' | -15' | -18' | -100' | -130' | -243' |
| Three Forks | 10,799' | -8,723' | 10,973' | 10,813' | -8,737' | 14' | 20' | -14' | -17' | -95' | -126' | -245' |
| Target Top | 10,811' | -8,735' | 11,050' | 10,827' | -8,751' | 6' | 6' | -16' | -18' | -96' | -129' | -249' |
| Target Landing | 10,818' | -8,742' | 11,185' | 10,833' | -8,757' | - | 0' | -15' | -18' | -95' | -127' | -247' |
| Target Base/Claystone | 10,822' | -8,746' | - | - | - | - | - | - | - | - | - | - |
| Claystone | 10,823' | -8,747' | - | - | - | - | - | - | - | - | - | - |

# CONTROL DATA

| Operator: | Oasis Petroleum North America, LLC | | | | Texas Gas Exploration Company | | | | Mosbacher Production Company | | | | Oasis Petroleum North America, LLC | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Well Name: | Chalmers 5300 31-19H | | | | Lindvig 1-35 | | | | Verlin Fossum ET AL No. 26-1 | | | | Chalmers 5301 44-24 4T2R | | | |
| Location: | NW SW Sec. 19 T153N R100W<br>McKenzie County, ND<br>~1/4 mile S of Chalmers 5300 21-19 8T | | | | SE SE Sec. 35 T153N R101W<br>McKenzie County, ND<br>~2 1/4 miles SSW of Chalmers 5300 21-19 8T | | | | NW SE Sec. 26, T153N R101W<br>McKenzie County, ND<br>~1 3/4 miles SSW of Chalmers 5300 21-19 8T | | | | SE SE Sec. 24 T153N R101W<br>McKenzie County, ND<br>~1/2 mile SSW of Chalmers 5300 21-19 8T | | | |
| Elevation: | KB: 1,929' | | | | KB: 2,226' | | | | KB: 2,175' | | | | 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' | 8,449' | -6,223' | 181' | 2,439' | 8,372' | -6,197' | 144' | 2,433' | 8,266' | -6,091' | 172' | 2,419' |
| Charles Salt | 8,392' | -6,463' | 668' | 2,276' | 8,630 | -6,404' | 651' | 2,258' | 8,516' | -6,341' | 691' | 2,289' | 8,438 | -6,263' | 629' | 2,247' |
| Base of Last Salt | 9,060' | -7,131' | 220' | 1,608' | 9,281 | -7,055' | 220' | 1,607' | 9,207' | -7,032' | 216' | 1,598' | 9,067 | -6,892' | 221' | 1,618' |
| Mission Canyon | 9,280' | -7,351' | 566' | 1,388' | 9,501 | -7,275' | 540' | 1,387' | 9,423' | -7,248' | 548' | 1,382' | 9,288 | -7,113' | 558' | 1,397' |
| Lodgepole | 9,846' | -7,917' | - | 822' | 10,041 | -7,815' | 79' | 847' | 9,971' | -7,796' | 79' | 834' | 9,846 | -7,671' | 82' | 839' |
| LP A | - | - | - | - | 10,120' | -7,894' | 82' | 768' | 10,050' | -7,875' | 96' | 755' | 9,928 | -7,753' | 99' | 757' |
| LP B | - | - | - | - | 10,202' | -7,976' | 31' | 686' | 10,146' | -7,971' | 26' | 659' | 10,027 | -7,852' | 33' | 658' |
| LP Fracture Zone | - | - | - | - | 10,233' | -8,007' | 214' | 655' | 10,172' | -7,997' | 210' | 633' | 10,060' | -7,885' | 191' | 625' |
| LP D | - | - | - | - | 10,447' | -8,221' | 172' | 441' | 10,382' | -8,207' | 168' | 423' | 10,251' | -8,076' | 179' | 434' |
| LP E | - | - | - | - | 10,619 | -8,393' | 110' | 269' | 10,550' | -8,375' | 102' | 255' | 10,430' | -8,255' | 114' | 255' |
| LP F | - | - | - | - | 10,729' | -8,503' | 50' | 159' | 10,652' | -8,477' | 45' | 153' | 10,544' | -8,369' | 28' | 141' |
| False Bakken | 10,556' | -8,627' | 4' | 112' | 10,779' | -8,553' | 3' | 109' | 10,697' | -8,522' | 4' | 108' | 10,572' | -8,397' | 3' | 113' |
| Scallion | 10,560' | -8,631' | 6' | 108' | 10,782' | -8,556' | 3' | 106' | 10,701' | -8,526' | 9' | 104' | 10,575' | -8,400' | 8' | 110' |
| Upper Bakken Shale | 10,566' | -8,637' | 17' | 102' | 10,785' | -8,559' | 16' | 103' | 10,710' | -8,535' | 12' | 95' | 10,583 | -8,408' | 16' | 102' |
| Middle Bakken | 10,583' | -8,654' | 33' | 85' | 10,801' | -8,575' | 35' | 87' | 10,722' | -8,547' | 35' | 83' | 10,599' | -8,424' | 40' | 86' |
| Lower Bakken | 10,616' | -8,687' | 14' | 52' | 10,836 | -8,610' | 9' | 52' | 10,757' | -8,582' | 7' | 48' | 10,639' | -8,464' | 12' | 46' |
| Pronghorn | 10,630' | -8,701' | 19' | 38' | 10,845' | -8,619' | 23' | 43' | 10,764' | -8,589' | 22' | 41' | 10,651' | -8,476' | 16' | 34' |
| Three Forks | 10,649' | -8,720' | 13' | 19' | 10,868' | -8,642' | 13' | 20' | 10,786' | -8,611' | 11' | 19' | 10,667' | -8,492' | 10' | 18' |
| Target Top | 10,662' | -8,733' | 6' | 6' | 10,881' | -8,655' | 7' | 7' | 10,797' | -8,622' | 8' | 8' | 10,677' | -8,502' | 8' | 8' |
| Target Landing | 10,668' | -8,739' | 4' | 0' | 10,888' | -8,662' | 4' | 0' | 10,805' | -8,630' | 4' | 0' | 10,685 | -8,510' | 4' | 0' |
| Target Base/Claystone | 10,672' | -8,743' | 1' | - | 10,892' | -8,666' | 1' | - | 10,809' | -8,634' | 1' | - | 10,689' | -8,514' | - | - |
| Claystone | 10,673' | -8,744' | - | - | 10,893' | -8,667' | - | - | 10,810' | -8,635' | - | - | - | - | - | - |

# INTERVAL THICKNESS

Oasis Petroleum North America, LLC - Chalmers 5300 21-19 8T



# LANDING PROJECTION

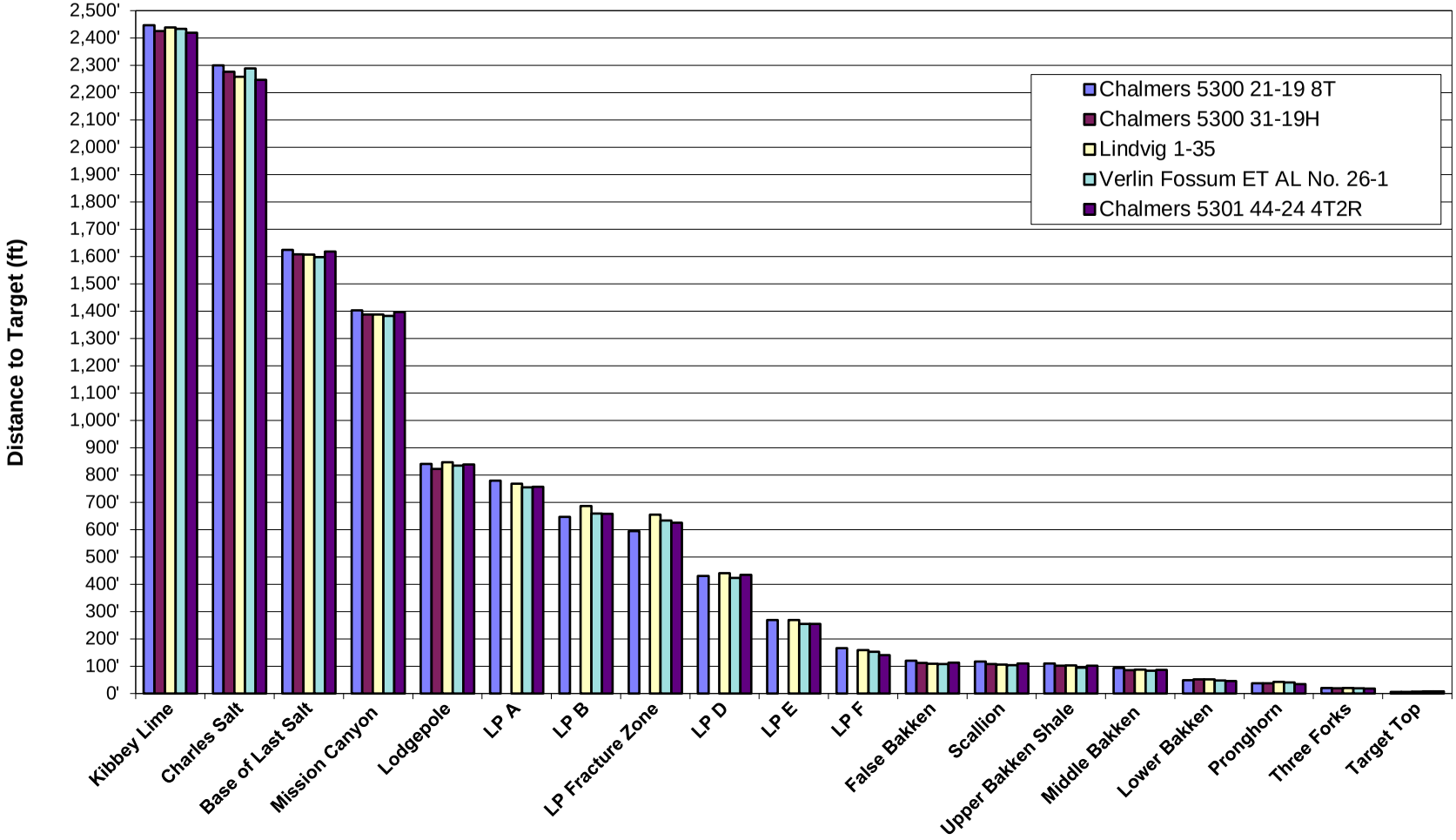
| Formation/ Zone: | Proposed Target Landing From: | | | | |
|---|---|---|---|---|---|
| | Chalmers 5300 31-19H | Lindvig 1-35 | Verlin Fossum ET AL No. 26-1 | Chalmers 5301 44-24 4T2R | Average of Offset Wells |
| Kibbey Lime | 10,811' | 10,825' | 10,819' | 10,805' | 10,815' |
| Charles Salt | 10,809' | 10,791' | 10,822' | 10,780' | 10,801' |
| Base of Last Salt | 10,817' | 10,816' | 10,807' | 10,827' | 10,817' |
| Mission Canyon | 10,818' | 10,817' | 10,812' | 10,827' | 10,819' |
| Lodgepole | 10,814' | 10,839' | 10,826' | 10,831' | 10,828' |
| LP A | - | 10,822' | 10,809' | 10,811' | 10,814' |
| LP B | - | 10,872' | 10,845' | 10,844' | 10,854' |
| LP Fracture Zone | - | 10,893' | 10,871' | 10,863' | 10,876' |
| LP D | - | 10,844' | 10,826' | 10,837' | 10,836' |
| LP E | - | 10,833' | 10,819' | 10,819' | 10,824' |
| LP F | - | 10,826' | 10,820' | 10,808' | 10,818' |
| False Bakken | 10,825' | 10,822' | 10,821' | 10,826' | 10,824' |
| Scallion | 10,824' | 10,822' | 10,820' | 10,826' | 10,823' |
| Upper Bakken Shale | 10,825' | 10,826' | 10,818' | 10,825' | 10,824' |
| Middle Bakken | 10,824' | 10,826' | 10,822' | 10,825' | 10,824' |
| Lower Bakken | 10,836' | 10,836' | 10,832' | 10,830' | 10,834' |
| Pronghorn | 10,833' | 10,838' | 10,836' | 10,829' | 10,834' |
| Three Forks | 10,832' | 10,833' | 10,832' | 10,831' | 10,832' |
| Target Landing | 10,833' | 10,834' | 10,835' | 10,835' | 10,834' |

**Current Landing Target (20' below top of Three Forks):** **10,833'**

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

# ISOPACH TO TARGET

Oasis Petroleum North America, LLC - Chalmers 5300 21-19 8T



# ***LITHOLOGY***

## Oasis Petroleum North America, LLC
## Chalmers 5300 21-19 7T2

*Rig crews caught 100' sample intervals, under the supervision of Sunburst geologists, from 4,700' to 8,200', 30' intervals from 8,200', to the TD of the lateral at 20,519'. Formation tops and lithologic markers have been inserted into the sample descriptions below for reference. Sample descriptions begin in the Belle Fourche Formation 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 Belle Fourche Formation [Cretaceous Colorado Group]***

4,700-4,800 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

4,800-4,900 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

4,900-5,000 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

***Mowry Formation [Cretaceous Dakota Group] 5,045'MD (-2,969')***

5,000-5,100 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

5,100-5,200 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain; rare SILTSTONE: light gray, friable, sub blocky, calcite cement moderately cemented

5,200-5,300 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

5,300-5,400 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

***Dakota Formation [Dakota Group] 5,484' MD (-3,408')***

5,400-5,500 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain; rare SILTY SANDSTONE: light gray, very fine grained, friable-loose, sub rounded, vitreous, moderately sorted, calcite cement moderately cemented

5,500-5,600 SILTSTONE: light gray, light brown, friable, sub blocky, calcite cement moderately cemented; rare SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

5,600-5,700 SILTSTONE: light gray, light brown, friable, sub blocky, calcite cement moderately cemented; rare SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

5,700-5,800 SILTSTONE: light gray, light brown, friable, sub blocky, calcite cement moderately cemented; rare SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

5,800-5,900 SILTY SANDSTONE: light gray, very fine grained, friable-loose, sub rounded, vitreous, moderately sorted, calcite cement moderately cemented; rare SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

***Swift Formation [Jurassic] 5,982' (-3,906')***

5,900-6,000 SHALE: light blue-green, common medium gray-brown, firm, earthy, calcareous, common disseminated pyrite, no visible porosity, no visible oil stain

6,000-6,100 SHALE: light blue-green, common medium gray-brown, firm, earthy, calcareous, common disseminated pyrite, no visible porosity, no visible oil stain

6,100-6,150 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

6,150-6,200 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

6,200-6,300 SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain; trace SILTY SANDSTONE: light gray, very fine grained, friable-loose, sub rounded, vitreous, moderately sorted, calcite cement moderately cemented

6,300-6,400 LIMESTONE: mudstone, off white, light gray, very fine crystalline, friable, dense, earthy, possible intercrystalline porosity, no visible oil stain; trace SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

***Rierdon Formation [Jurassic] 6,485' MD / 6,484' TVD (-4,408')***

6,400-6,500 LIMESTONE: mudstone, dark-medium gray-brown, very fine crystalline, friable, dense, earthy, possible intercrystalline porosity, no visible oil stain; trace SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

6,500-6,600 LIMESTONE: mudstone, off white, light gray, very fine crystalline, friable, dense, earthy, possible intercrystalline porosity, no visible oil stain; trace SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

6,600-6,700 LIMESTONE: mudstone, off white, light gray, very fine crystalline, friable, dense, earthy, possible intercrystalline porosity, no visible oil stain; trace SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

6,700-6,800 LIMESTONE: mudstone, off white, light gray, very fine crystalline, friable, dense, earthy, possible intercrystalline porosity, no visible oil stain; trace SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

6,800-6,900 ANHYDRITE: milky white, microcrystalline, soft-friable, massive, amorphous, no visible porosity, no visible oil stain; occasional LIMESTONE: mudstone, light gray-cream, microcrystalline, friable-firm, dense, earthy-chalky, no visible porosity, no visible oil stain

***Dunham Salt Member [Piper Formation] 6,901' MD / 6,900' TVD (-4,824')***

***Dunham Salt Base [Piper Formation] 6,916' MD / 6,915' TVD (-4,839')***

6,900-7,000 LIMESTONE: mudstone, off white, light gray, very fine crystalline, friable, dense, earthy, possible intercrystalline porosity, no visible oil stain; rare SHALE: dark-medium gray, firm, sub blocky, earthy, calcareous, trace disseminated pyrite, no visible porosity, no visible oil stain

7,000-7,100 SILTSTONE: orange-red brown, friable, sub blocky, calcareous cement moderately cemented, possible intergranular porosity, no visible oil stain; ANHYDRITE: milky white, microcrystalline, soft-friable, massive, amorphous, no visible porosity, no visible oil stain

7,100-7,200 SILTSTONE: orange-red brown, friable, sub blocky, calcareous cement moderately cemented, possible intergranular porosity, no visible oil stain; ANHYDRITE: milky white, microcrystalline, soft-friable, massive, amorphous, no visible porosity, no visible oil stain

***Pine Salt Member [Spearfish Formation] 7,266' MD / 7,265' TVD (-5,189')***

***Pine Salt Base [Spearfish Formation] 7,296' MD / 7,295' TVD (-5,219')***

7,200-7,300 SALT: translucent, milky, microcrystalline, hard, massive, crystalline texture; SILTSTONE: orange-red brown, friable-firm, sub blocky, calcareous cement moderately cemented, possible intergranular porosity, no visible oil stain; ANHYDRITE: milky white, microcrystalline, soft-friable, massive, amorphous, no visible porosity, no visible oil stain

7,300-7,400 SALT: translucent, milky, microcrystalline, hard, massive, crystalline texture; SILTSTONE: orange-red brown, friable, sub blocky, calcareous cement moderately cemented, possible intergranular porosity, no visible oil stain

***Opeche Salt Member [Opeche Formation] 7,371' MD / 7,370' TVD (-5,294')***

7,300-7,400 SALT: translucent, milky, microcrystalline, hard, massive, crystalline texture; SILTSTONE: orange-red brown, friable, sub blocky, calcareous cement moderately cemented, possible intergranular porosity, no visible oil stain

***Opeche Salt Base [Opeche Formation] 7,427' MD / 7,426' TVD (-5,350')***

7,400-7,500 SILTSTONE: orange-red brown, friable-firm, sub blocky, calcareous cement moderately cemented, trace clear quartz grains, possible intergranular porosity, no visible oil stain; trace SALT: translucent, milky, microcrystalline, hard, massive, crystalline texture

7,500-7,600 SILTSTONE: orange-red brown, friable-firm, sub blocky, calcareous cement moderately cemented, trace clear quartz grains, possible intergranular porosity, no visible oil stain; ANHYDRITE: milky white, microcrystalline, soft-friable, massive, amorphous, no visible porosity, no visible oil stain

***Amsden Formation [Pennsylvanian Minnelusa Group] 7,670' MD / 7,669' TVD (-5,593')***

7,600-7,700 DOLOMITE: mudstone, light pink-off white, trace red, microcrystalline, soft-friable, laminated, crystalline-micro sucrosic, calcareous, no visible porosity, no visible oil stain

7,700-7,800 DOLOMITE: mudstone, light pink-off white, trace red, microcrystalline, soft-friable, laminated, crystalline-micro sucrosic, calcareous, no visible porosity, no visible oil stain: occasional SILTSTONE: orange-red brown, friable-firm, sub blocky, calcareous cement moderately cemented, trace clear quartz grains, possible intergranular porosity, no visible oil stain; rare SHALE: dark gray, friable, sub blocky, earthy no visible porosity, no visible oil stain

***Tyler Formation [Pennsylvanian Minnelusa Group] 7,838' MD / 7,837' TVD (-5,761')***

7,800-7,900 SHALE: dark gray, friable, sub blocky, earthy, no visible porosity, no visible oil stain; rare SILTSTONE: orange-red brown, friable-firm, sub blocky, calcareous cement moderately cemented, trace clear quartz grains, possible intergranular porosity, no visible oil stain

7,900-8,000 SHALE: dark gray, friable, sub blocky, earthy, no visible porosity, no visible oil stain; rare SILTSTONE: orange-red brown, friable-firm, sub blocky, calcareous cement moderately cemented, trace clear quartz grains, possible intergranular porosity, no visible oil stain

***Otter [Mississippian Big Snowy Group] 8,041' MD / 8,040' TVD (-5,964')***

8,000-8,100 SHALE: dark gray, firm, sub blocky, earthy no visible porosity, no visible oil stain; rare SILTSTONE: orange-red brown, friable-firm, sub blocky, calcareous cement moderately cemented, trace clear quartz grains, possible intergranular porosity, no visible oil stain

8,100-8,200 SHALE: light gray-gray, red gray, friable, sub blocky, earthy, no visible porosity, no visible oil stain; LIMESTONE: mudstone-wackestone, light gray, microcrystalline, friable, dense, earthy, no visible porosity, no visible oil stain

8,200-8,240 LIMESTONE: mudstone-wackestone, light gray, microcrystalline, friable, dense, earthy, no visible porosity, no visible oil stain; common SILTSTONE: orange-red brown, friable-firm, sub blocky, calcareous cement moderately cemented, trace clear quartz grains, possible intergranular porosity, no visible oil stain

8,240-8,270 LIMESTONE: mudstone-wackestone, light gray, microcrystalline, friable, dense, earthy, no visible porosity, no visible oil stain; common SILTSTONE: orange-red brown, friable-firm, sub blocky, calcareous cement moderately cemented, trace clear quartz grains, possible intergranular porosity, no visible oil stain

8,270-8,300 SILTSTONE: orange-red brown, friable-firm, sub blocky, calcareous cement moderately cemented, trace clear quartz grains, possible intergranular porosity, no visible oil stain; rare SHALE: dark gray, firm, sub blocky, earthy no visible porosity, no visible oil stain

8,300-8,330 SILTSTONE: orange-red brown, friable-firm, sub blocky, calcareous cement moderately cemented, trace clear quartz grains, possible intergranular porosity, no visible oil stain; rare SHALE: dark gray, firm, sub blocky, earthy no visible porosity, no visible oil stain

8,330-8,360 SILTSTONE: dark orange-light brown, tan, soft, sub blocky, calcite cement, poorly cemented; rare ANHYDRITE: off white, soft, amorphous texture; trace SILTY SANDSTONE: tan-off white, very fine grained, sub rounded, moderately sorted, calcite cement, poorly cemented

***Kibbey Lime [Kibbey Formation Mississippian Big Snowy Group] 8,387' MD / 8,386' TVD (-6,310')***

8,360-8,390 ANHYDRITE: off white, soft, amorphous texture; rare SILTSTONE: dark orange-light brown, tan, pink, soft, sub blocky, calcite cement, poorly cemented, no visible porosity

8,390-8,420 LIMESTONE: mudstone, light-medium gray-gray brown, micro crystalline, firm-hard, argillaceous in part, dense, chalky texture, no visible porosity; rare ANHYDRITE: off white, 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] 8,534' MD / 8,533' TVD (-6,457')***

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 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 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

8,780-8,810 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 even 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 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; trace SALT: as above

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] 9,210' MD / 9,209' TVD (-7,133')***

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; DOLOMITE: mudstone, light brown, light gray brown, rare light gray, microcrystalline, friable-firm, laminated, earthy trace intercrystalline porosity, occasional spotty light brown oil stain

9,260-9,290 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

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

***Mission Canyon Formation [Mississippian Madison Group] 9,431' MD / 9,430' TVD (-7,354')***

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 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

9,560-9,590 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 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

9,950-9,980 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

***Lodgepole Formation [Mississippian Madison Group] 9,993' MD / 9,992' TVD (-7,916')***

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: mudstones, 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

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-crystalline texture, trace disseminated pyrite

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

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

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

***False Bakken Member [Lodgepole Formation] 10,766' MD / 10,713' TVD (-8,637')***

10,760-10,790 SHALE: black, black gray, hard, splintery, smooth, pyritic, carbonaceous, fracture porosity; trace LIMESTONE: as above

***Scallion [Lodgepole Formation] 10,770' MD / 10,716' TVD (-8,640')***

10,760-10,790 SHALE: black, black gray, hard, splintery, smooth, pyritic, carbonaceous, fracture porosity; trace LIMESTONE: as above

***Upper Bakken Shale [Bakken Formation] 10,782' MD / 10,723' TVD (-8,647')***

10,760-10,790 SHALE: black, black gray, hard, splintery, smooth, pyritic, carbonaceous, fracture porosity; trace LIMESTONE: as above

***Middle Bakken Member [Bakken Formation] 10,808' MD / 10,739' TVD (-8,663')***

10,790-10,820 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

10,820-10,850 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] 10,892' MD / 10,784' TVD (-8,708')***

10,880-10,910 SHALE: black, black gray, hard, splintery, smooth, pyritic, carbonaceous, fracture porosity; trace 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

***Pronghorn [Bakken Formation] 10,918' MD / 10,795' TVD (-8,719')***

10,910-10,940 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; 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

***Three Forks [Devonian] 10,973' MD / 10,813' TVD (-8,737')***

10,970-11,000 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

11,000-11,030 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

11,150-11,185 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

11,185-11,210 DOLOMITE: mudstone, light brown-tan, occasional cream, trace light gray brown, microcrystalline, 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-tan, occasional cream, trace light gray brown, very fine crystalline, 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; moderately yellow streaming cut fluorescence

11,240-11,270 DOLOMITE: mudstone, light brown-tan, occasional cream, trace light gray brown, very fine crystalline, 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; moderately yellow streaming cut fluorescence

11,270-11,300 DOLOMITE: mudstone, light brown-tan, occasional cream, trace light gray brown, very fine crystalline, 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; moderately yellow streaming cut fluorescence

11,300-11,330 DOLOMITE: mudstone, light brown-tan, occasional cream, trace light gray brown, very fine crystalline, 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; moderately yellow streaming cut fluorescence

11,330-11,360 DOLOMITE: mudstone, light brown-tan, occasional cream, trace light gray brown, very fine crystalline, 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; moderately yellow streaming cut fluorescence

11,360-11,390 DOLOMITE: mudstone, light brown-tan, occasional cream, trace light gray brown, very fine crystalline, 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; moderately yellow streaming cut fluorescence

11,390-11,420 DOLOMITE: mudstone, light brown-tan, occasional cream, trace light gray brown, very fine crystalline, 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; moderately yellow streaming cut fluorescence

11,420-11,450 DOLOMITE: mudstone, light brown-tan, occasional cream, trace light gray brown, very fine crystalline, 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; moderately yellow streaming cut fluorescence

11,450-11,480 DOLOMITE: mudstone, light brown-tan, occasional cream, trace light gray brown, very fine crystalline, 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; moderately yellow streaming cut fluorescence

11,480-11,510 DOLOMITE: mudstone, light brown-tan, occasional cream, trace light gray brown, very fine crystalline, 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; moderately yellow streaming cut fluorescence

11,510-11,540 DOLOMITE: mudstone, light brown-tan, occasional cream, trace light gray brown, very fine crystalline, 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; moderately yellow streaming cut fluorescence

11,540-11,570 DOLOMITE: mudstone, light brown-tan, occasional cream, trace light gray brown, very fine crystalline, 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; moderately yellow streaming cut fluorescence

11,570-11,600 DOLOMITE: mudstone, light brown-tan, occasional cream, trace light gray brown, very fine crystalline, 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; moderately yellow streaming cut fluorescence

11,600-11,630 DOLOMITE: mudstone, light brown-tan, occasional cream, trace light gray brown, very fine crystalline, 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; moderately yellow streaming cut fluorescence

11,630-11,660 DOLOMITE: mudstone, light brown-tan, occasional cream, trace light gray brown, very fine crystalline, 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; moderately yellow streaming cut fluorescence

11,660-11,690 DOLOMITE: mudstone, light brown-tan, occasional cream, trace light gray brown, very fine crystalline, 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; moderately yellow streaming cut fluorescence

11,690-11,720 DOLOMITE: mudstone, light brown-tan, occasional cream, trace light gray brown, very fine crystalline, 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; moderately yellow streaming cut fluorescence

11,720-11,750 DOLOMITE: mudstone, light brown-tan, occasional cream, trace light gray brown, very fine crystalline, 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; moderately yellow streaming cut fluorescence

11,750-11,780 DOLOMITE: mudstone, light brown-tan, occasional cream, trace light gray brown, very fine crystalline, 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; moderately yellow streaming cut fluorescence

11,780-11,810 DOLOMITE: mudstone, light brown-tan, occasional cream, trace light gray brown, very fine crystalline, 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; moderately yellow streaming cut fluorescence

11,810-11,840 DOLOMITE: mudstone, light brown-tan, occasional cream, trace light gray brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace 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; moderately yellow streaming cut fluorescence

11,840-11,870 DOLOMITE: mudstone, light brown-tan, occasional cream, trace light gray brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace 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; moderately yellow streaming cut fluorescence

11,870-11,900 DOLOMITE: mudstone, light brown-tan, occasional cream, trace light gray brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace 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; moderately yellow streaming cut fluorescence

11,900-11,930 DOLOMITE: mudstone, light brown-tan, occasional cream, trace light gray brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace 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; moderately yellow streaming cut fluorescence

11,930-11,960 DOLOMITE: mudstone, light brown-tan, occasional cream, trace light gray brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace 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; moderately yellow streaming cut fluorescence

11,960-11,990 DOLOMITE: mudstone, light brown-tan, occasional cream, trace light gray brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace 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; moderately yellow streaming cut fluorescence

11,990-12,020 DOLOMITE: mudstone, light brown-tan, occasional cream, trace light gray brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace 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; moderately yellow streaming cut fluorescence

12,020-12,050 DOLOMITE: mudstone, light brown-tan, occasional cream, trace light gray brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace 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; moderately yellow streaming cut fluorescence

12,050-12,080 DOLOMITE: mudstone, light brown-tan, occasional cream, trace light gray brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace 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; moderately yellow streaming cut fluorescence

12,080-12,110 DOLOMITE: mudstone, light brown-tan, occasional cream, trace light gray brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace 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; moderately yellow streaming cut fluorescence

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

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

12,230-12,260 DOLOMITE: mudstone, light-medium tan, common cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace 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; pale yellow streaming cut fluorescence

12,260-12,290 DOLOMITE: mudstone, light-medium tan, common cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace 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; pale yellow streaming cut fluorescence

12,290-12,320 DOLOMITE: mudstone, light tan, common cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace 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; pale yellow streaming cut fluorescence

12,320-12,350 DOLOMITE: mudstone, light tan, common cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace 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; pale yellow streaming cut fluorescence

12,350-12,380 DOLOMITE: mudstone, light tan, common cream, off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace 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; pale yellow streaming cut fluorescence

12,380-12,410 DOLOMITE: mudstone, light tan, common cream, off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace 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; pale yellow streaming cut fluorescence

12,410-12,440 DOLOMITE: mudstone, light-medium tan, common light brown, occasional cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, occasional spotty trace 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; pale yellow diffuse-streaming cut fluorescence

12,440-12,470 DOLOMITE: mudstone, light-medium tan, common light brown, occasional cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, common spotty trace 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; pale yellow diffuse-streaming cut fluorescence

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

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

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

12,560-12,590 DOLOMITE: mudstone, light-medium tan, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, occasional spotty trace even light brown oil stain; abundant SHALE: light green-light gray, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow diffuse-streaming cut fluorescence

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

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

12,650-12,680 DOLOMITE: mudstone, light-medium tan, common light brown, fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, occasional spotty trace even light brown oil stain; abundant SHALE: light green-light gray, 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, medium tan, common light brown, off white, fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, occasional spotty trace even light brown oil stain; common SHALE: light green-light gray, 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, medium tan, common light brown, off white, fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, occasional spotty trace even light brown oil stain; common SHALE: light green-light gray, 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, tan, common light brown, off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, occasional spotty trace even light brown oil stain; common SHALE: light green-light gray, 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, tan, common light brown, off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, occasional spotty trace even light brown oil stain; common SHALE: light green-light gray, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow diffuse cut fluorescence

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

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

12,860-12,890 DOLOMITE: mudstone, light tan, common light brown, off white, very fine crystalline, firm, laminated, micro sucrosic, trace disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; occasional SHALE: light green-light gray, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

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

12,920-12,950 DOLOMITE: mudstone, light tan, off white, very fine crystalline, firm, laminated, micro sucrosic, trace disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; occasional SHALE: light green-light gray, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

12,950-12,980 DOLOMITE: mudstone, light tan, off white, very fine crystalline, firm, laminated, micro sucrosic, trace disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light green-light gray, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

12,980-13,010 DOLOMITE: mudstone, light tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, trace disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace

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

13,010-13,040 DOLOMITE: mudstone, light tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, trace disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light green-light gray, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

13,040-13,070 DOLOMITE: mudstone, light tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, trace disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light green-light gray, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

13,070-13,100 DOLOMITE: mudstone, light tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, trace disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light green-light gray, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

13,100-13,130 DOLOMITE: mudstone, light tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, trace disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light green-light gray, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

13,130-13,160 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light green-light gray, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

13,160-13,190 DOLOMITE: mudstone, tan, off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light green-light gray, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

13,190-13,220 DOLOMITE: mudstone, tan, off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light green-light gray, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

13,220-13,250 DOLOMITE: mudstone, tan, off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light green-light gray, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

13,250-13,280 DOLOMITE: mudstone, tan, off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light green-light gray, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

13,280-13,310 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

13,310-13,340 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

133,140-13,370 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

13,370-13,400 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

13,400-13,430 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

13,430-13,460 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

13,460-13,490 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

13,490-13,520 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

13,520-13,550 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

13,550-13,580 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain;

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

13,580-13,610 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

13,610-13,640 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

13,640-13,670 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

13,670-13,700 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

13,700-13,730 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

13,730-13,760 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

13,760-13,790 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

13,790-13,820 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

13,820-13,850 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

13,850-13,880 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

13,880-13,910 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

13,910-13,940 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

13,940-13,970 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; rare DOLOMITE: as above

13,970-14,000 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; trace DOLOMITE: 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

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

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

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

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

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

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

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

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

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

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

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

14,360-14,390 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

14,390-14,420 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

14,420-14,450 DOLOMITE: mudstone, tan, off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; occasional SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

14,450-14,480 DOLOMITE: mudstone, tan-light brown, off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; occasional SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

14,480-14,510 DOLOMITE: mudstone, tan-light brown, off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; occasional SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow diffuse-streaming cut fluorescence

14,510-14,540 DOLOMITE: mudstone, tan-light brown, off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; occasional SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow diffuse cut fluorescence

14,540-14,570 DOLOMITE: mudstone, off white, tan, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; occasional SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow diffuse cut fluorescence

14,570-14,600 DOLOMITE: mudstone, off white, tan, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; occasional SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow diffuse cut fluorescence

14,600-14,630 DOLOMITE: mudstone, off white, tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, even trace light brown oil stain; occasional

SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow diffuse cut fluorescence

14,630-14,660 DOLOMITE: mudstone, off white, tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, even trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow diffuse cut fluorescence

14,660-14,690 DOLOMITE: mudstone, tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, even trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow diffuse cut fluorescence

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

14,750-14,780 DOLOMITE: mudstone, tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace light brown oil stain; abundant SHALE: light gray blue, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,780-14,810 DOLOMITE: mudstone, tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace light brown oil stain; abundant SHALE: light gray blue, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

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

14,840-14,870 DOLOMITE: mudstone, tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace light brown oil stain; abundant SHALE: light gray blue, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

14,870-14,900 DOLOMITE: mudstone, tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace spotty light brown oil stain; abundant SHALE: as above; moderately yellow streaming cut fluorescence

14,900-14,930 DOLOMITE: mudstone, tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace spotty light brown oil stain; abundant SHALE: as above; moderately yellow streaming cut fluorescence

14,930-14,960 DOLOMITE: mudstone, light tan-light brown, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace spotty light brown oil stain; abundant SHALE: as above; pale yellow streaming cut fluorescence

14,960-14,990 DOLOMITE: mudstone, light tan-light brown, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace spotty light brown oil stain; abundant SHALE: as above; pale yellow streaming cut fluorescence

14,990-15,020 DOLOMITE: mudstone, light tan-light brown, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace spotty light brown oil stain; abundant SHALE: as above, occasional disseminated pyrite; pale yellow streaming cut fluorescence

15,020-15,050 DOLOMITE: mudstone, light tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace spotty light brown oil stain; abundant SHALE: as above, occasional disseminated pyrite; pale yellow streaming cut fluorescence

15,050-15,080 DOLOMITE: mudstone, light tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace spotty light brown oil stain; abundant SHALE: as above, occasional disseminated pyrite; pale yellow streaming cut fluorescence

15,080-15,110 DOLOMITE: mudstone, light tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace spotty light brown oil stain; common SHALE: as above; pale yellow streaming cut fluorescence

15,110-15,140 DOLOMITE: mudstone, light tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace spotty light brown oil stain; common SHALE: as above; pale yellow streaming cut fluorescence

15,140-15,170 DOLOMITE: mudstone, light tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace spotty light brown oil stain; common SHALE: as above, trace disseminated pyrite; pale yellow diffuse-streaming cut fluorescence

15,170-15,200 DOLOMITE: mudstone, light tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace spotty light brown oil stain; common SHALE: as above, trace disseminated pyrite; pale yellow diffuse-streaming cut fluorescence

15,200-15,230 DOLOMITE: mudstone, light tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace spotty light brown oil stain; common SHALE: as above, trace disseminated pyrite; pale yellow streaming cut fluorescence

15,230-15,260 DOLOMITE: mudstone, light tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace spotty light brown oil stain; abundant SHALE: as above, trace disseminated pyrite; pale yellow diffuse-streaming cut fluorescence

15,260-15,290 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace spotty light brown oil stain; abundant SHALE: as above, trace disseminated pyrite; pale yellow diffuse-streaming cut fluorescence

15,290-15,320 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace spotty light brown oil stain; abundant SHALE: as above, trace disseminated pyrite; pale yellow diffuse-streaming cut fluorescence

15,320-15,350 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace spotty light brown oil stain; abundant SHALE: as above; pale yellow diffuse-streaming cut fluorescence

15,350-15,380 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace spotty light brown oil stain; abundant SHALE: as above; pale yellow streaming cut fluorescence

15,380-15,410 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace spotty light brown oil stain; abundant SHALE: as above; pale yellow streaming cut fluorescence

15,410-15,440 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace spotty light brown oil stain; occasional SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

15,440-15,470 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace spotty light brown oil stain; occasional SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

15,470-15,500 DOLOMITE: mudstone, tan, off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace spotty light brown oil stain; occasional SHALE: light gray blue, firm, sub blocky, earthy, rare disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

15,500-15,530 DOLOMITE: mudstone, tan, off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace spotty light brown oil stain; common SHALE: light gray blue, firm, sub blocky, earthy, rare disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

15,530-15,560 DOLOMITE: mudstone, light tan, cream, off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace spotty light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, rare disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

15,560-15,590 DOLOMITE: mudstone, light tan, cream, off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, trace spotty light brown oil stain; rare

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

15,590-15,620 DOLOMITE: mudstone, light tan, cream, off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

15,620-15,650 DOLOMITE: mudstone, light tan, cream, off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

15,650-15,680 DOLOMITE: mudstone, light tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

15,680-15,710 DOLOMITE: mudstone, light tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

15,710-15,740 DOLOMITE: mudstone, light tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

15,740-15,770 DOLOMITE: mudstone, light tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

15,770-15,800 DOLOMITE: mudstone, light tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

15,800-15,830 DOLOMITE: mudstone, light tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

15,830-15,860 DOLOMITE: mudstone, light tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

15,860-15,890 DOLOMITE: mudstone, light tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

15,890-15,920 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

15,920-15,950 DOLOMITE: mudstone, light brown-tan, occasional cream, rare off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

15,950-15,980 DOLOMITE: mudstone, light brown-tan, occasional cream, rare off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

15,980-16,010 DOLOMITE: mudstone, light brown-tan, occasional cream, rare off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,010-16,040 DOLOMITE: mudstone, light brown-tan, occasional cream, rare off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,040-16,070 DOLOMITE: mudstone, light brown-tan, occasional cream, rare off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,070-16,100 DOLOMITE: mudstone, light brown-tan, occasional cream, rare off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,100-16,130 DOLOMITE: mudstone, light brown-tan, occasional cream, rare off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,130-16,160 DOLOMITE: mudstone, light brown-tan, occasional cream, rare off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace

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

16,160-16,190 DOLOMITE: mudstone, light brown-tan, occasional cream, rare off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,190-16,220 DOLOMITE: mudstone, light brown-tan, occasional cream, rare off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,220-16,250 DOLOMITE: mudstone, light brown-tan, occasional cream, rare off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,250-16,280 DOLOMITE: mudstone, light brown-tan, occasional cream, rare off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,280-16,310 DOLOMITE: mudstone, light brown-tan, occasional cream, rare off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,310-16,340 DOLOMITE: mudstone, light brown-tan, occasional light gray, rare off white-cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,340-16,370 DOLOMITE: mudstone, light brown-tan, occasional light gray, rare off white-cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,370-16,400 DOLOMITE: mudstone, light brown-tan, occasional light gray, rare off white-cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,400-16,430 DOLOMITE: mudstone, light brown-tan, occasional light gray, rare off white-cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,430-16,460 DOLOMITE: mudstone, light brown-tan, occasional light gray, rare off white-cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,460-16,490 DOLOMITE: mudstone, light brown-tan, occasional light gray, rare off white-cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,490-16,520 DOLOMITE: mudstone, light brown-tan, occasional cream, rare off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,520-16,550 DOLOMITE: mudstone, light brown-tan, occasional cream, rare off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,550-16,580 DOLOMITE: mudstone, light brown-tan, occasional cream, rare off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,580-16,610 DOLOMITE: mudstone, light brown-tan, occasional cream, rare off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,610-16,640 DOLOMITE: mudstone, light brown-tan, occasional cream, rare off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,640-16,670 DOLOMITE: mudstone, light brown-tan, occasional cream, rare off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,670-16,700 DOLOMITE: mudstone, light brown-tan, occasional cream, rare off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,700-16,730 DOLOMITE: mudstone, light brown-tan, occasional cream, rare off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace

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

16,730-16,760 DOLOMITE: mudstone, light brown-tan, occasional light gray, rare off white-cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,760-16,790 DOLOMITE: mudstone, light brown-tan, occasional light gray, rare off white-cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,790-16,820 DOLOMITE: mudstone, light brown-tan, occasional light gray, rare off white-cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,820-16,850 DOLOMITE: mudstone, light tan, occasional light gray, rare off white-cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,850-16,880 DOLOMITE: mudstone, light tan, occasional light gray, cream, rare off white-cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, medium gray, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,880-16,910 DOLOMITE: mudstone, light tan, occasional light gray, cream, rare off white-cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, medium gray, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,910-16,940 DOLOMITE: mudstone, light tan, occasional light gray, cream, rare off white-cream, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, medium gray, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,940-16,970 DOLOMITE: mudstone, light tan, cream, rare off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, medium gray, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

16,970-17,000 DOLOMITE: mudstone, light tan, cream, rare off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, medium gray, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

17,000-17,030 DOLOMITE: mudstone, light tan, cream, rare off white, very fine crystalline, firm, laminated, micro sucrosic, occasional disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, medium gray, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

17,030-17,060 DOLOMITE: mudstone, light tan, cream, off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, rare medium gray, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

17,060-17,090 DOLOMITE: mudstone, light tan, cream, off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, rare medium gray, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

17,090-17,120 DOLOMITE: mudstone, light tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty light brown oil stain; trace SHALE: light gray blue, rare medium gray, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

17,120-17,150 DOLOMITE: mudstone, light tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty light brown oil stain; trace SHALE: light gray blue, rare medium gray, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

17,150-17,180 DOLOMITE: mudstone, light tan, cream, trace light brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty light brown oil stain; trace SHALE: light gray blue, rare medium gray, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

17,180-17,210 DOLOMITE: mudstone, light tan, cream, trace light brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty light brown oil stain; trace SHALE: light gray blue, rare medium gray, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

17,210-17,240 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; trace DOLOMITE: as above; pale yellow streaming cut fluorescence

17,240-17,270 CLAYSTONE: light gray, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; pale yellow streaming cut fluorescence

17,270-17,300 CLAYSTONE: light gray blue, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; pale yellow streaming cut fluorescence

17,300-17,330 CLAYSTONE: light gray blue, common gray brown, trace off white-white, firm, sub blocky, earthy, common disseminated pyrite, no visible porosity, no visible oil stain; trace DOLOMITE: as above; pale yellow streaming cut fluorescence

17,330-17,360 DOLOMITE: mudstone, light tan, cream, trace light brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty light brown oil stain; trace CLAYSTONE: light gray blue, rare medium gray, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

17,360-17,390 DOLOMITE: mudstone, light tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty light brown oil stain; trace CLAYSTONE: light gray blue, rare medium gray, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

17,390-17,420 DOLOMITE: mudstone, light tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty light brown oil stain; trace SHALE: light gray blue, rare medium gray, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

17,420-17,450 DOLOMITE: mudstone, light tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty light brown oil stain; trace SHALE: light gray blue, rare medium gray, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow diffuse-streaming cut fluorescence

17,450-17,480 DOLOMITE: mudstone, light tan, cream, off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty light brown oil stain; trace SHALE: light gray blue, rare medium gray, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow diffuse-streaming cut fluorescence

17,480-17,510 DOLOMITE: mudstone, light tan, cream, off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty light brown oil stain; trace SHALE: light gray blue, rare medium gray, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow diffuse-streaming cut fluorescence

17,510-17,540 DOLOMITE: mudstone, light tan, cream, off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty light brown oil stain; common SHALE: light gray blue, rare medium gray, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow diffuse-streaming cut fluorescence

17,540-17,570 DOLOMITE: mudstone, light tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty light brown oil stain; common SHALE: light gray blue, rare medium gray, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow diffuse-streaming cut fluorescence

17,570-17,600 DOLOMITE: mudstone, light tan, cream, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty light brown oil stain; common SHALE: light gray blue, rare medium gray, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow diffuse-streaming cut fluorescence

17,600-17,630 DOLOMITE: mudstone, light tan, cream, off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty light brown oil stain; rare SHALE:

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

17,630-17,660 DOLOMITE: mudstone, light tan, cream, off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, rare medium gray, firm, sub blocky, earthy, occasional disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

17,660-17,690 DOLOMITE: mudstone, light tan, cream, off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, rare medium gray, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

17,690-17,720 DOLOMITE: mudstone, light tan, cream, off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, rare medium gray, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

17,720-17,750 DOLOMITE: mudstone, light tan, off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, rare medium gray, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

17,750-17,780 DOLOMITE: mudstone, light tan, off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, rare medium gray, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

17,780-17,810 DOLOMITE: mudstone, light brown-tan, off white, trace light gray, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, rare medium gray, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

17,810-17,840 DOLOMITE: mudstone, light brown-tan, off white, trace light gray, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, rare medium gray, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

17,840-17,870 DOLOMITE: mudstone, light brown-tan, trace light gray, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, rare medium gray, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

17,870-17,900 DOLOMITE: mudstone, light brown, trace light gray, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, rare medium gray, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

17,900-17,930 DOLOMITE: mudstone, light tan, trace light gray, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, rare medium grained, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

17,930-17,960 DOLOMITE: mudstone, light tan, trace light gray, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, rare medium grained, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

17,960-17,990 DOLOMITE: mudstone, light tan-brown, cream, trace light gray, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, rare medium grained, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

17,990-18,020 DOLOMITE: mudstone, light tan-brown, cream, trace light gray, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, rare medium grained, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

18,020-18,050 DOLOMITE: mudstone, light tan, cream, trace light gray, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

18,050-18,080 DOLOMITE: mudstone, light tan, cream, trace light gray, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

18,080-18,110 DOLOMITE: mudstone, light tan, off white, trace light gray, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

18,110-18,140 DOLOMITE: mudstone, light tan, off white, trace light gray, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

18,140-18,170 DOLOMITE: mudstone, light tan, trace light gray, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

18,170-18,200 DOLOMITE: mudstone, light tan, trace light gray, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare

SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

18,200-18,230 DOLOMITE: mudstone, light tan, trace light gray, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

18,230-18,260 DOLOMITE: mudstone, light tan, trace light gray, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

18,260-18,290 DOLOMITE: mudstone, light tan, trace light gray, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

18,290-18,320 DOLOMITE: mudstone, light brown-tan, rare light gray, trace off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

18,320-18,350 DOLOMITE: mudstone, light brown-tan, rare light gray, trace off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

18,350-18,380 DOLOMITE: mudstone, light brown-tan, rare light gray, trace off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

18,380-18,410 DOLOMITE: mudstone, light brown-tan, rare light gray, trace off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

18,410-18,440 DOLOMITE: mudstone, light brown-tan, rare light gray, trace off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

18,440-18,470 DOLOMITE: mudstone, light brown-tan, rare light gray, trace off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

18,470-18,500 DOLOMITE: mudstone, light brown-tan, rare light gray, trace off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

18,500-18,530 DOLOMITE: mudstone, light brown-tan, rare light gray, trace off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

18,530-18,560 DOLOMITE: mudstone, light brown-tan, rare light gray, trace off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

18,560-18,590 DOLOMITE: mudstone, light brown-tan, rare light gray, trace off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

18,590-18,620 DOLOMITE: mudstone, light gray, light brown-tan, occasional off white, trace light gray brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; slightly yellow streaming cut fluorescence

18,620-18,650 DOLOMITE: mudstone, light brown-tan, rare light gray, trace off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately yellow streaming cut fluorescence

18,650-18,680 DOLOMITE: mudstone, light gray, light brown-tan, occasional off white, trace light gray brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; slightly yellow streaming cut fluorescence

18,680-18,710 DOLOMITE: mudstone, light gray, light brown-tan, occasional off white, trace light gray brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; slow yellow streaming cut fluorescence

18,710-18,740 DOLOMITE: mudstone, light gray, light brown-tan, occasional off white, trace light gray brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; slow yellow streaming cut fluorescence

18,740-18,770 DOLOMITE: mudstone, light gray, light brown-tan, occasional off white, trace light gray brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity,

rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; slow yellow streaming cut fluorescence

18,770-18,800 DOLOMITE: mudstone, light gray, light brown-tan, occasional off white, trace light gray brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; slow yellow streaming cut fluorescence

18,800-18,830 DOLOMITE: mudstone, light gray, light brown-tan, occasional off white, trace light gray brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; slow yellow streaming cut fluorescence

18,830-18,860 DOLOMITE: mudstone, light gray, light brown-tan, occasional off white, trace light gray brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; slow yellow streaming cut fluorescence

18,860-18,890 DOLOMITE: mudstone, light gray, light brown-tan, occasional off white, trace light gray brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; slow yellow streaming cut fluorescence

18,890-18,920 DOLOMITE: mudstone, light gray, light brown-tan, occasional off white, trace light gray brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; slow yellow streaming cut fluorescence

18,920-18,950 DOLOMITE: mudstone, light gray, light brown-tan, occasional off white, trace light gray brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; slow yellow streaming cut fluorescence

18,950-18,980 DOLOMITE: mudstone, light gray, light brown-tan, occasional off white, trace light gray brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; slow yellow streaming cut fluorescence

18,980-19,010 DOLOMITE: mudstone, light gray, light brown-tan, occasional off white, trace light gray brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; slow yellow streaming cut fluorescence

19,010-19,040 DOLOMITE: mudstone, light gray, light brown-tan, occasional off white, trace light gray brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; slow yellow streaming cut fluorescence

19,040-19,070 DOLOMITE: mudstone, light gray, light brown-tan, occasional off white, trace light gray brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; slow yellow streaming cut fluorescence

19,070-19,100 DOLOMITE: mudstone, light gray, light brown-tan, occasional off white, trace light gray brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; slow yellow streaming cut fluorescence

19,100-19,130 DOLOMITE: mudstone, light gray, light brown-tan, occasional off white, trace light gray brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; slow yellow streaming cut fluorescence

19,130-19,160 DOLOMITE: mudstone, light gray, light brown-tan, occasional off white, trace light gray brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; slow yellow streaming cut fluorescence

19,160-19,190 DOLOMITE: mudstone, light gray, light brown-tan, occasional off white, trace light gray brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; slow yellow streaming cut fluorescence

19,190-19,220 DOLOMITE: mudstone, light gray, tan, occasional off white, trace light gray brown, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; slow yellow streaming cut fluorescence

19,220-19,250 DOLOMITE: mudstone, light gray, tan, occasional off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; slow yellow streaming cut fluorescence

19,250-19,280 DOLOMITE: mudstone, light gray, tan, occasional off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; slow yellow streaming cut fluorescence

19,280-19,310 DOLOMITE: mudstone, light gray-brown, tan, occasional off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; slow yellow streaming cut fluorescence

19,310-19,340 DOLOMITE: mudstone, light gray-brown, tan, occasional off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown

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

19,340-19,370 DOLOMITE: mudstone, light gray-brown, tan, occasional off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

19,370-19,400 DOLOMITE: mudstone, light gray-brown, tan, occasional off white, very fine crystalline, firm, laminated, micro sucrosic, rare disseminated pyrite, occasional intercrystalline porosity, rare spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow streaming cut fluorescence

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

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

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

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

19,520-19,550 DOLOMITE: mudstone, light gray-brown, tan, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, spotty trace light brown oil stain; occasional SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

19,550-19,580 DOLOMITE: mudstone, light gray-brown, tan, trace cream, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, spotty trace light brown oil stain; occasional SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

19,580-19,610 DOLOMITE: mudstone, light gray-brown, tan, trace cream, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, spotty trace light brown oil stain; occasional SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

19,610-19,640 DOLOMITE: mudstone, light gray-brown, tan, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, spotty trace light brown oil stain; occasional SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

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

19,670-19,700 DOLOMITE: mudstone, light gray, tan, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, spotty trace light brown oil stain; common SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

19,700-19,730 DOLOMITE: mudstone, light gray-brown, tan, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, trace spotty trace light brown oil stain; common SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately pale yellow streaming cut fluorescence

19,730-19,760 DOLOMITE: mudstone, light gray-brown, tan, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, rare disseminated pyrite, trace spotty trace light brown oil stain; common SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately pale yellow streaming cut fluorescence

19,760-19,790 DOLOMITE: mudstone, light gray-brown, tan, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, rare disseminated pyrite, trace spotty trace light brown oil stain; common SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately pale yellow streaming cut fluorescence

19,790-19,820 DOLOMITE: mudstone, light gray-brown, tan, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, rare disseminated pyrite, trace spotty trace light brown oil stain; common SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; moderately pale yellow streaming cut fluorescence

19,820-19,850 DOLOMITE: mudstone, light gray-brown, tan, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, rare disseminated pyrite, trace spotty trace light brown oil stain; common SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

19,850-19,880 DOLOMITE: mudstone, light gray-brown, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, rare disseminated pyrite, trace spotty trace light brown oil stain; common SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

19,880-19,910 DOLOMITE: mudstone, light gray-brown, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, rare disseminated pyrite, trace spotty trace light brown oil stain;

common SHALE: light gray blue, firm, sub blocky, earthy, trace disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

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

19,940-19,970 DOLOMITE: mudstone, light gray-brown, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, rare disseminated pyrite, trace spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

19,970-20,000 DOLOMITE: mudstone, light gray-brown, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, rare disseminated pyrite, trace spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

20,000-20,030 DOLOMITE: mudstone, light gray-brown, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, rare disseminated pyrite, trace spotty trace light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

20,030-20,060 DOLOMITE: mudstone, light tan-brown, off white, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, rare disseminated pyrite, trace spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, rare disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

20,060-20,090 DOLOMITE: mudstone, light tan-brown, off white, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, rare disseminated pyrite, trace spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, rare disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

20,090-20,120 DOLOMITE: mudstone, light tan, off white, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, rare disseminated pyrite, trace spotty trace light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

20,120-20,150 DOLOMITE: mudstone, light tan, off white, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, rare disseminated pyrite, trace spotty light brown oil stain; trace SHALE: light gray blue, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow streaming cut fluorescence

20,150-20,180 DOLOMITE: mudstone, light tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, occasional disseminated pyrite, trace spotty light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; pale yellow diffuse-streaming cut fluorescence

20,180-20,210 DOLOMITE: mudstone, light tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, occasional disseminated pyrite, trace spotty light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, possible intergranular porosity, no visible oil stain; slow pale yellow diffuse-streaming cut fluorescence

20,210-20,240 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, occasional disseminated pyrite, trace spotty light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, rare disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow diffuse-streaming cut fluorescence

20,240-20,270 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, occasional disseminated pyrite, trace spotty light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, rare disseminated pyrite, possible intergranular porosity, no visible oil stain; slow pale yellow diffuse cut fluorescence

20,270-20,300 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, occasional disseminated pyrite, trace spotty light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, rare disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow diffuse cut fluorescence

20,300-20,330 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, occasional disseminated pyrite, trace spotty light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, rare disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow diffuse cut fluorescence

20,330-20,360 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, occasional disseminated pyrite, trace spotty light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, rare disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow diffuse cut fluorescence

20,360-20,390 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, occasional disseminated pyrite, trace spotty light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, rare disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow diffuse cut fluorescence

20,390-20,420 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, occasional disseminated pyrite, trace spotty light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, rare disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow diffuse cut fluorescence

20,420-20,450 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, occasional disseminated pyrite, trace spotty light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, rare disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow diffuse cut fluorescence

20,450-20,480 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, occasional disseminated pyrite, trace spotty light brown oil stain; rare

SHALE: light gray blue, firm, sub blocky, earthy, rare disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow diffuse cut fluorescence

20,480-20,519 DOLOMITE: mudstone, tan, off white, cream, very fine crystalline, firm, laminated, micro sucrosic, occasional intercrystalline porosity, occasional disseminated pyrite, trace spotty light brown oil stain; rare SHALE: light gray blue, firm, sub blocky, earthy, rare disseminated pyrite, possible intergranular porosity, no visible oil stain; pale yellow diffuse cut fluorescence

RYAN DIRECTIONAL SERVICES, INC.
A NABORS COMPANY

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

Wednesday, December 31, 2014

State of North Dakota

Subject: **Surveys**

Re: **Oasis**
**Chalmers 5300 21-19 8T**
**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* |
|---|---|---|---|---|---|---|---|---|
| Mike McCammond | MWD Operator | O.H. | 0' | 11125' | 10/05/14 | 10/17/14 | MWD | 11125' |
| Mike McCammond | MWD Operator | O.H. | 11125' | 20456' | 12/23/14 | 12/26/14 | MWD | 20519' |

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

Douglas Hudson

**Douglas Hudson**
Well Planner

**RYAN DIRECTIONAL SERVICES, INC.**
A NABORS COMPANY

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

Friday, October 17, 2014

State of North Dakota
County of McKenzie

Subject: **Survey Certification Letter**

Survey Company: **Ryan Directional Services, Inc.**
Job Number: **8158**
Survey Job Type: **Ryan MWD**
Customer: **Oasis Petroleum**
Well Name: **Chalmers 5300 21-19 8T**
Rig Name: **Nabors B-22**

Surface: **48 3' 41.300 N / 103 36' 10.110 W**
A.P.I. No: **33-053-06021**
Location: **McKenzie, ND**
RKB Height: **2076'**
Distance to Bit: **60'**

| *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' | 11185' | 10/05/14 | 10/17/14 | MWD | 11185' |

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

Sunday, December 28, 2014

State of North Dakota
County of McKenzie

Subject: **Survey Certification Letter**

Survey Company: **Ryan Directional Services, Inc.**
Job Number: **8417**
Survey Job Type: **Ryan MWD**
Customer: **Oasis Petroleum**
Well Name: **Chalmers 5300 21-19 8T**
Rig Name: **Nabors B-22**

Surface: **48 3' 41.300 N / 103 36' 10.110 W**
A.P.I. No: **33-053-06021**
Location: **McKenzie, ND**
RKB Height: **2076'**
Distance to Bit: **63'**

| *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 | 11191' | 20456' | 12/23/14 | 12/28/14 | MWD | 20519' |

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.

Report #: 1

Date:

**RYAN DIRECTIONAL SERVICES, INC.**

A NABORS COMPANY

Ryan Job # 8158

# SURVEY REPORT

Customer: Oasis Petroleum

Well Name: Chalmers 5300 21-19 8T

Rig #: Nabors B-22

API #: 33-053-06021

Calculation Method: Minimum Curvature Calculation

MWD Operator: M. McCammond / R. Maddalena

Directional Drillers: RPM

Survey Corrected To: True North

Vertical Section Direction: 88.95

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 | 147 | 0.30 | 295.90 | 64.00 | 147.00 | -0.34 | 0.17 | -0.35 | 0.20 |
| 2 | 240 | 0.30 | 298.40 | 66.00 | 240.00 | -0.77 | 0.39 | -0.78 | 0.01 |
| 3 | 333 | 0.40 | 273.50 | 66.00 | 333.00 | -1.31 | 0.53 | -1.32 | 0.19 |
| 4 | 427 | 0.10 | 334.70 | 68.00 | 427.00 | -1.67 | 0.62 | -1.68 | 0.39 |
| 5 | 520 | 0.30 | 337.70 | 68.00 | 519.99 | -1.79 | 0.92 | -1.81 | 0.22 |
| 6 | 613 | 0.30 | 347.50 | 69.00 | 612.99 | -1.93 | 1.38 | -1.95 | 0.06 |
| 7 | 702 | 0.60 | 288.80 | 66.00 | 701.99 | -2.41 | 1.76 | -2.44 | 0.58 |
| 8 | 790 | 0.50 | 326.20 | 69.00 | 789.99 | -3.05 | 2.23 | -3.09 | 0.41 |
| 9 | 880 | 0.50 | 276.40 | 71.00 | 879.98 | -3.65 | 2.60 | -3.70 | 0.47 |
| 10 | 970 | 0.20 | 304.50 | 75.00 | 969.98 | -4.17 | 2.73 | -4.22 | 0.37 |
| 11 | 1063 | 0.70 | 292.90 | 75.00 | 1062.98 | -4.82 | 3.04 | -4.88 | 0.54 |
| 12 | 1156 | 0.70 | 290.30 | 78.00 | 1155.97 | -5.87 | 3.46 | -5.94 | 0.03 |
| 13 | 1250 | 0.50 | 326.00 | 78.00 | 1249.97 | -6.63 | 4.00 | -6.70 | 0.44 |
| 14 | 1343 | 0.80 | 327.20 | 82.00 | 1342.96 | -7.19 | 4.88 | -7.28 | 0.32 |
| 15 | 1436 | 1.10 | 347.00 | 78.00 | 1435.95 | -7.72 | 6.30 | -7.83 | 0.47 |
| 16 | 1530 | 0.70 | 171.00 | 77.00 | 1529.94 | -7.82 | 6.61 | -7.95 | 1.91 |
| 17 | 1623 | 1.70 | 181.60 | 80.00 | 1622.92 | -7.81 | 4.67 | -7.90 | 1.10 |
| 18 | 1717 | 1.60 | 197.20 | 82.00 | 1716.88 | -8.29 | 2.02 | -8.32 | 0.49 |
| 19 | 1810 | 1.60 | 154.70 | 82.00 | 1809.85 | -8.16 | -0.39 | -8.15 | 1.25 |
| 20 | 1903 | 1.80 | 109.10 | 82.00 | 1902.81 | -6.25 | -2.04 | -6.22 | 1.43 |
| 21 | 1997 | 1.00 | 91.90 | 86.00 | 1996.79 | -4.05 | -2.55 | -4.00 | 0.95 |
| 22 | 2198 | 0.90 | 23.60 | 80.00 | 2197.76 | -1.64 | -1.17 | -1.62 | 0.53 |
| 23 | 2261 | 1.20 | 29.80 | 87.00 | 2260.75 | -1.09 | -0.14 | -1.09 | 0.51 |
| 24 | 2354 | 0.40 | 209.50 | 93.00 | 2353.75 | -0.76 | 0.42 | -0.77 | 1.72 |
| 25 | 2446 | 0.60 | 204.50 | 98.00 | 2445.74 | -1.13 | -0.29 | -1.13 | 0.22 |
| 26 | 2540 | 0.50 | 187.80 | 100.00 | 2539.74 | -1.41 | -1.15 | -1.39 | 0.20 |
| 27 | 2633 | 0.70 | 205.40 | 104.00 | 2632.74 | -1.72 | -2.06 | -1.68 | 0.29 |
| 28 | 2726 | 0.60 | 192.00 | 107.00 | 2725.73 | -2.08 | -3.05 | -2.03 | 0.19 |
| 29 | 2820 | 0.90 | 113.60 | 111.00 | 2819.72 | -1.53 | -3.83 | -1.46 | 1.04 |
| 30 | 2913 | 1.10 | 110.40 | 113.00 | 2912.71 | -0.03 | -4.43 | 0.05 | 0.22 |
| 31 | 3007 | 1.00 | 106.60 | 116.00 | 3006.69 | 1.59 | -4.98 | 1.68 | 0.13 |
| 32 | 3100 | 0.70 | 100.30 | 118.00 | 3099.68 | 2.92 | -5.32 | 3.02 | 0.34 |
| 33 | 3193 | 0.90 | 104.20 | 120.00 | 3192.67 | 4.18 | -5.60 | 4.29 | 0.22 |
| 34 | 3287 | 0.90 | 104.20 | 122.00 | 3286.66 | 5.61 | -5.96 | 5.72 | 0.00 |
| 35 | 3380 | 1.00 | 99.00 | 123.00 | 3379.65 | 7.11 | -6.27 | 7.23 | 0.14 |
| 36 | 3474 | 1.10 | 110.20 | 125.00 | 3473.63 | 8.76 | -6.71 | 8.88 | 0.24 |
| 37 | 3567 | 0.80 | 108.50 | 127.00 | 3566.62 | 10.20 | -7.22 | 10.34 | 0.32 |
| 38 | 3660 | 0.90 | 111.10 | 127.00 | 3659.61 | 11.49 | -7.69 | 11.63 | 0.12 |
| 39 | 3754 | 0.80 | 111.10 | 129.00 | 3753.60 | 12.78 | -8.19 | 12.94 | 0.11 |
| 40 | 3847 | 1.30 | 67.60 | 132.00 | 3846.59 | 14.37 | -8.02 | 14.52 | 0.97 |
| 41 | 3940 | 1.20 | 58.90 | 132.00 | 3939.56 | 16.19 | -7.12 | 16.33 | 0.23 |
| 42 | 4034 | 1.30 | 55.20 | 134.00 | 4033.54 | 17.93 | -6.00 | 18.04 | 0.14 |
| 43 | 4127 | 1.50 | 61.40 | 136.00 | 4126.51 | 19.89 | -4.82 | 19.98 | 0.27 |
| 44 | 4221 | 1.10 | 59.80 | 138.00 | 4220.49 | 21.77 | -3.77 | 21.84 | 0.43 |
| 45 | 4314 | 1.20 | 55.00 | 138.00 | 4313.47 | 23.35 | -2.77 | 23.41 | 0.15 |
| 46 | 4407 | 1.00 | 61.30 | 140.00 | 4406.45 | 24.88 | -1.82 | 24.92 | 0.25 |
| 47 | 4500 | 0.90 | 62.30 | 141.00 | 4499.44 | 26.25 | -1.09 | 26.28 | 0.11 |
| 48 | 4593 | 0.90 | 52.60 | 143.00 | 4592.43 | 27.49 | -0.30 | 27.50 | 0.16 |
| 49 | 4687 | 0.40 | 33.70 | 145.00 | 4686.42 | 28.28 | 0.42 | 28.27 | 0.57 |
| 50 | 4780 | 0.30 | 340.90 | 145.00 | 4779.42 | 28.38 | 0.92 | 28.37 | 0.35 |
| 51 | 4873 | 0.40 | 17.80 | 147.00 | 4872.42 | 28.41 | 1.46 | 28.39 | 0.26 |
| 52 | 4967 | 0.10 | 35.10 | 147.00 | 4966.42 | 28.57 | 1.84 | 28.54 | 0.33 |
| 53 | 5060 | 0.20 | 335.60 | 149.00 | 5059.42 | 28.55 | 2.05 | 28.52 | 0.19 |
| 54 | 5153 | 0.10 | 358.20 | 150.00 | 5152.42 | 28.49 | 2.28 | 28.45 | 0.12 |
| 55 | 5247 | 0.20 | 317.70 | 152.00 | 5246.42 | 28.38 | 2.48 | 28.34 | 0.15 |
| 56 | 5340 | 0.30 | 216.70 | 154.00 | 5339.42 | 28.12 | 2.41 | 28.08 | 0.42 |
| 57 | 5433 | 0.20 | 241.80 | 156.00 | 5432.42 | 27.83 | 2.13 | 27.79 | 0.16 |
| 58 | 5527 | 0.20 | 160.00 | 156.00 | 5526.42 | 27.74 | 1.90 | 27.71 | 0.28 |
| 59 | 5620 | 0.20 | 302.40 | 158.00 | 5619.42 | 27.65 | 1.84 | 27.62 | 0.41 |
| 60 | 5714 | 0.40 | 276.30 | 158.00 | 5713.41 | 27.19 | 1.96 | 27.16 | 0.25 |

Report #: 1

Date:

**RYAN DIRECTIONAL SERVICES, INC.**

A NABORS COMPANY

Ryan Job # 8158

## SURVEY REPORT

Customer: Oasis Petroleum

Well Name: Chalmers 5300 21-19 8T

Rig #: Nabors B-22

API #: 33-053-06021

Calculation Method: Minimum Curvature Calculation

MWD Operator: M. McCammond / R. Maddalena

Directional Drillers: RPM

Survey Corrected To: True North

Vertical Section Direction: 88.95

Total Correction: 8.17

Temperature Forecasting Model (Chart Only): Logarithmic

| Survey # | MD | Inc | Azm | Temp | TVD | VS | N/S | E/W | DLS |
|---|---|---|---|---|---|---|---|---|---|
| 61 | 5807 | 0.40 | 266.30 | 159.00 | 5806.41 | 26.54 | 1.98 | 26.51 | 0.07 |
| 62 | 5900 | 0.30 | 253.30 | 161.00 | 5899.41 | 25.99 | 1.89 | 25.96 | 0.14 |
| 63 | 5994 | 0.30 | 241.60 | 163.00 | 5993.41 | 25.53 | 1.70 | 25.50 | 0.07 |
| 64 | 6087 | 0.60 | 212.10 | 161.00 | 6086.41 | 25.05 | 1.17 | 25.03 | 0.40 |
| 65 | 6126 | 0.60 | 226.10 | 152.00 | 6125.40 | 24.79 | 0.85 | 24.77 | 0.37 |
| 66 | 6173 | 0.60 | 213.70 | 129.00 | 6172.40 | 24.47 | 0.48 | 24.46 | 0.28 |
| 67 | 6267 | 0.60 | 116.70 | 134.00 | 6266.40 | 24.62 | -0.15 | 24.63 | 0.96 |
| 68 | 6360 | 1.00 | 101.70 | 140.00 | 6359.39 | 25.84 | -0.53 | 25.86 | 0.48 |
| 69 | 6453 | 0.50 | 127.90 | 143.00 | 6452.38 | 26.95 | -0.95 | 26.97 | 0.64 |
| 70 | 6547 | 0.30 | 153.80 | 147.00 | 6546.38 | 27.37 | -1.42 | 27.40 | 0.28 |
| 71 | 6640 | 0.90 | 175.10 | 149.00 | 6639.37 | 27.53 | -2.37 | 27.57 | 0.68 |
| 72 | 6734 | 1.00 | 187.10 | 152.00 | 6733.36 | 27.46 | -3.92 | 27.54 | 0.24 |
| 73 | 6827 | 0.20 | 53.30 | 156.00 | 6826.36 | 27.48 | -4.63 | 27.57 | 1.23 |
| 74 | 6920 | 0.10 | 338.20 | 159.00 | 6919.36 | 27.58 | -4.45 | 27.67 | 0.21 |
| 75 | 7014 | 0.40 | 317.50 | 163.00 | 7013.36 | 27.33 | -4.13 | 27.41 | 0.33 |
| 76 | 7107 | 0.70 | 18.60 | 165.00 | 7106.35 | 27.31 | -3.36 | 27.38 | 0.66 |
| 77 | 7200 | 0.80 | 20.40 | 168.00 | 7199.34 | 27.74 | -2.21 | 27.78 | 0.11 |
| 78 | 7294 | 0.50 | 30.60 | 170.00 | 7293.34 | 28.19 | -1.24 | 28.22 | 0.34 |
| 79 | 7387 | 0.50 | 357.70 | 174.00 | 7386.33 | 28.40 | -0.49 | 28.41 | 0.30 |
| 80 | 7480 | 0.70 | 311.00 | 176.00 | 7479.33 | 27.97 | 0.29 | 27.97 | 0.55 |
| 81 | 7574 | 1.60 | 30.30 | 177.00 | 7573.31 | 28.22 | 1.80 | 28.19 | 1.73 |
| 82 | 7667 | 1.70 | 30.00 | 179.00 | 7666.28 | 29.61 | 4.12 | 29.54 | 0.11 |
| 83 | 7760 | 0.80 | 14.40 | 179.00 | 7759.25 | 30.49 | 5.94 | 30.39 | 1.03 |
| 84 | 7854 | 0.70 | 17.80 | 181.00 | 7853.24 | 30.85 | 7.12 | 30.73 | 0.12 |
| 85 | 7947 | 0.50 | 332.90 | 183.00 | 7946.24 | 30.86 | 8.02 | 30.72 | 0.53 |
| 86 | 8040 | 0.00 | 359.10 | 185.00 | 8039.24 | 30.68 | 8.39 | 30.53 | 0.54 |
| 87 | 8134 | 0.30 | 216.70 | 186.00 | 8133.24 | 30.53 | 8.19 | 30.39 | 0.32 |
| 88 | 8227 | 0.40 | 91.70 | 188.00 | 8226.24 | 30.71 | 7.98 | 30.56 | 0.67 |
| 89 | 8320 | 0.50 | 92.30 | 190.00 | 8319.23 | 31.44 | 7.96 | 31.29 | 0.11 |
| 90 | 8414 | 0.50 | 86.20 | 192.00 | 8413.23 | 32.25 | 7.97 | 32.11 | 0.06 |
| 91 | 8507 | 0.60 | 101.10 | 188.00 | 8506.23 | 33.14 | 7.90 | 33.00 | 0.19 |
| 92 | 8600 | 0.60 | 116.10 | 186.00 | 8599.22 | 34.05 | 7.59 | 33.91 | 0.17 |
| 93 | 8694 | 0.60 | 94.90 | 188.00 | 8693.22 | 34.97 | 7.33 | 34.84 | 0.23 |
| 94 | 8787 | 0.70 | 108.80 | 192.00 | 8786.21 | 35.99 | 7.11 | 35.87 | 0.20 |
| 95 | 8881 | 0.30 | 155.00 | 194.00 | 8880.21 | 36.63 | 6.70 | 36.51 | 0.57 |
| 96 | 8974 | 0.60 | 132.40 | 195.00 | 8973.20 | 37.08 | 6.15 | 36.98 | 0.37 |
| 97 | 9067 | 0.40 | 191.70 | 197.00 | 9066.20 | 37.37 | 5.51 | 37.27 | 0.56 |
| 98 | 9161 | 0.40 | 160.60 | 199.00 | 9160.20 | 37.40 | 4.88 | 37.31 | 0.23 |
| 99 | 9254 | 0.40 | 160.70 | 201.00 | 9253.20 | 37.60 | 4.26 | 37.53 | 0.00 |
| 100 | 9347 | 0.40 | 222.20 | 203.00 | 9346.19 | 37.48 | 3.72 | 37.42 | 0.44 |
| 101 | 9441 | 0.70 | 201.40 | 201.00 | 9440.19 | 37.04 | 2.94 | 36.99 | 0.38 |
| 102 | 9534 | 0.60 | 186.10 | 204.00 | 9533.18 | 36.76 | 1.93 | 36.73 | 0.21 |
| 103 | 9627 | 0.60 | 99.90 | 206.00 | 9626.18 | 37.18 | 1.36 | 37.16 | 0.88 |
| 104 | 9720 | 0.90 | 95.20 | 208.00 | 9719.17 | 38.38 | 1.21 | 38.36 | 0.33 |
| 105 | 9814 | 0.80 | 119.80 | 212.00 | 9813.16 | 39.68 | 0.81 | 39.67 | 0.40 |
| 106 | 9907 | 0.70 | 118.70 | 213.00 | 9906.15 | 40.73 | 0.22 | 40.73 | 0.11 |
| 107 | 10000 | 0.70 | 95.40 | 215.00 | 9999.15 | 41.78 | -0.11 | 41.79 | 0.30 |
| 108 | 10094 | 0.50 | 115.30 | 217.00 | 10093.14 | 42.72 | -0.34 | 42.74 | 0.30 |
| 109 | 10187 | 0.20 | 181.60 | 217.00 | 10186.14 | 43.08 | -0.67 | 43.10 | 0.49 |
| 110 | 10253 | 0.40 | 111.00 | 219.00 | 10252.14 | 43.29 | -0.87 | 43.31 | 0.58 |
| 111 | 10300 | 0.20 | 180.20 | 186.00 | 10299.14 | 43.44 | -1.01 | 43.46 | 0.81 |
| 112 | 10331 | 0.50 | 115.00 | 188.00 | 10330.14 | 43.56 | -1.12 | 43.59 | 1.46 |
| 113 | 10362 | 3.40 | 80.80 | 186.00 | 10361.12 | 44.59 | -1.03 | 44.62 | 9.68 |
| 114 | 10393 | 7.50 | 78.20 | 186.00 | 10391.97 | 47.49 | -0.47 | 47.51 | 13.25 |
| 115 | 10424 | 12.70 | 76.10 | 190.00 | 10422.48 | 52.80 | 0.76 | 52.80 | 16.81 |
| 116 | 10456 | 17.10 | 75.80 | 190.00 | 10453.40 | 60.82 | 2.76 | 60.78 | 13.75 |
| 117 | 10487 | 21.10 | 75.80 | 190.00 | 10482.69 | 70.69 | 5.25 | 70.61 | 12.90 |
| 118 | 10518 | 23.60 | 75.30 | 190.00 | 10511.35 | 82.16 | 8.19 | 82.02 | 8.09 |
| 119 | 10549 | 25.50 | 77.10 | 192.00 | 10539.55 | 94.72 | 11.26 | 94.53 | 6.59 |
| 120 | 10580 | 28.00 | 78.90 | 192.00 | 10567.23 | 108.42 | 14.15 | 108.18 | 8.48 |

Report #: 1

Date:

**RYAN DIRECTIONAL SERVICES, INC.**

A NABORS COMPANY

Ryan Job # 8158

## SURVEY REPORT

Customer: Oasis Petroleum
Well Name: Chalmers 5300 21-19 8T
Rig #: Nabors B-22
API #: 33-053-06021
Calculation Method: Minimum Curvature Calculation

MWD Operator: M. McCammond / R. Maddalena
Directional Drillers: RPM
Survey Corrected To: True North
Vertical Section Direction: 88.95
Total Correction: 8.17
Temperature Forecasting Model (Chart Only): Logarithmic

| Survey # | MD | Inc | Azm | Temp | TVD | VS | N/S | E/W | DLS |
|---|---|---|---|---|---|---|---|---|---|
| 121 | 10611 | 31.30 | 78.20 | 194.00 | 10594.17 | 123.50 | 17.20 | 123.20 | 10.70 |
| 122 | 10642 | 34.30 | 75.90 | 194.00 | 10620.22 | 139.92 | 20.97 | 139.56 | 10.48 |
| 123 | 10673 | 37.20 | 74.70 | 194.00 | 10645.38 | 157.52 | 25.58 | 157.08 | 9.62 |
| 124 | 10704 | 40.60 | 73.20 | 195.00 | 10669.50 | 176.32 | 30.97 | 175.78 | 11.38 |
| 125 | 10736 | 44.50 | 72.90 | 194.00 | 10693.07 | 197.12 | 37.28 | 196.47 | 12.20 |
| 126 | 10767 | 48.20 | 73.80 | 192.00 | 10714.47 | 218.73 | 43.70 | 217.96 | 12.12 |
| 127 | 10798 | 52.10 | 74.00 | 192.00 | 10734.33 | 241.70 | 50.29 | 240.82 | 12.59 |
| 128 | 10829 | 56.00 | 73.70 | 192.00 | 10752.52 | 265.93 | 57.27 | 264.92 | 12.60 |
| 129 | 10860 | 59.80 | 73.30 | 192.00 | 10768.99 | 291.23 | 64.73 | 290.10 | 12.31 |
| 130 | 10891 | 64.30 | 73.60 | 194.00 | 10783.52 | 317.62 | 72.53 | 316.34 | 14.54 |
| 131 | 10922 | 67.60 | 75.00 | 195.00 | 10796.15 | 345.00 | 80.18 | 343.59 | 11.42 |
| 132 | 10953 | 71.20 | 76.10 | 194.00 | 10807.06 | 373.22 | 87.42 | 371.69 | 12.08 |
| 133 | 10985 | 75.20 | 77.90 | 195.00 | 10816.31 | 403.19 | 94.31 | 401.53 | 13.61 |
| 134 | 11016 | 79.00 | 79.20 | 195.00 | 10823.23 | 432.90 | 100.30 | 431.14 | 12.92 |
| 135 | 11047 | 82.50 | 80.20 | 197.00 | 10828.21 | 463.10 | 105.77 | 461.24 | 11.73 |
| 136 | 11078 | 86.50 | 81.20 | 199.00 | 10831.18 | 493.63 | 110.75 | 491.68 | 13.30 |
| 137 | 11109 | 88.80 | 81.80 | 199.00 | 10832.45 | 524.34 | 115.33 | 522.31 | 7.67 |
| 138 | 11125 | 89.10 | 82.00 | 199.00 | 10832.74 | 540.22 | 117.59 | 538.15 | 2.25 |
| 139 | 11191 | 89.80 | 84.00 | 222.00 | 10833.38 | 605.85 | 125.63 | 603.65 | 3.21 |
| 140 | 11284 | 88.70 | 83.80 | 222.00 | 10834.59 | 698.48 | 135.51 | 696.12 | 1.20 |
| 141 | 11377 | 90.70 | 83.30 | 221.00 | 10835.08 | 791.06 | 145.96 | 788.52 | 2.22 |
| 142 | 11470 | 91.10 | 83.60 | 222.00 | 10833.62 | 883.62 | 156.56 | 880.90 | 0.54 |
| 143 | 11562 | 88.00 | 83.10 | 222.00 | 10834.34 | 975.17 | 167.22 | 972.27 | 3.41 |
| 144 | 11655 | 88.20 | 84.00 | 222.00 | 10837.43 | 1067.71 | 177.66 | 1064.63 | 0.99 |
| 145 | 11748 | 89.10 | 86.30 | 222.00 | 10839.62 | 1160.47 | 185.52 | 1157.26 | 2.66 |
| 146 | 11841 | 89.70 | 89.00 | 224.00 | 10840.59 | 1253.43 | 189.33 | 1250.17 | 2.97 |
| 147 | 11936 | 90.40 | 91.80 | 226.00 | 10840.51 | 1348.39 | 188.67 | 1345.16 | 3.04 |
| 148 | 12030 | 90.00 | 91.50 | 228.00 | 10840.18 | 1442.29 | 185.96 | 1439.12 | 0.53 |
| 149 | 12125 | 89.20 | 91.50 | 230.00 | 10840.84 | 1537.19 | 183.47 | 1534.08 | 0.84 |
| 150 | 12220 | 89.10 | 90.60 | 233.00 | 10842.25 | 1632.11 | 181.73 | 1629.06 | 0.95 |
| 151 | 12315 | 90.90 | 90.60 | 233.00 | 10842.25 | 1727.07 | 180.74 | 1724.05 | 1.89 |
| 152 | 12409 | 89.70 | 90.50 | 235.00 | 10841.76 | 1821.03 | 179.84 | 1818.04 | 1.28 |
| 153 | 12504 | 89.50 | 90.50 | 237.00 | 10842.42 | 1915.99 | 179.01 | 1913.03 | 0.21 |
| 154 | 12599 | 88.30 | 90.60 | 239.00 | 10844.25 | 2010.94 | 178.09 | 2008.01 | 1.27 |
| 155 | 12694 | 90.60 | 90.20 | 239.00 | 10845.16 | 2105.90 | 177.43 | 2103.00 | 2.46 |
| 156 | 12788 | 89.20 | 91.10 | 240.00 | 10845.32 | 2199.85 | 176.37 | 2196.99 | 1.77 |
| 157 | 12883 | 89.60 | 90.70 | 242.00 | 10846.32 | 2294.79 | 174.87 | 2291.97 | 0.60 |
| 158 | 12978 | 88.40 | 90.60 | 242.00 | 10847.98 | 2389.73 | 173.80 | 2386.95 | 1.27 |
| 159 | 13073 | 89.40 | 90.60 | 242.00 | 10849.80 | 2484.67 | 172.80 | 2481.92 | 1.05 |
| 160 | 13167 | 89.00 | 90.30 | 244.00 | 10851.11 | 2578.63 | 172.06 | 2575.91 | 0.53 |
| 161 | 13262 | 89.40 | 90.80 | 244.00 | 10852.44 | 2673.59 | 171.15 | 2670.90 | 0.67 |
| 162 | 13357 | 87.90 | 91.10 | 246.00 | 10854.68 | 2768.50 | 169.58 | 2765.86 | 1.61 |
| 163 | 13452 | 89.20 | 90.50 | 246.00 | 10857.08 | 2863.42 | 168.25 | 2860.81 | 1.51 |
| 164 | 13546 | 88.90 | 90.40 | 248.00 | 10858.64 | 2957.37 | 167.51 | 2954.80 | 0.34 |
| 165 | 13641 | 90.20 | 89.60 | 248.00 | 10859.39 | 3052.35 | 167.51 | 3049.79 | 1.61 |
| 166 | 13736 | 89.70 | 89.40 | 249.00 | 10859.47 | 3147.34 | 168.34 | 3144.79 | 0.57 |
| 167 | 13831 | 88.50 | 88.90 | 249.00 | 10860.96 | 3242.33 | 169.75 | 3239.76 | 1.37 |
| 168 | 13926 | 89.40 | 89.20 | 249.00 | 10862.70 | 3337.31 | 171.33 | 3334.73 | 1.00 |
| 169 | 14020 | 90.00 | 88.80 | 249.00 | 10863.19 | 3431.31 | 172.97 | 3428.72 | 0.77 |
| 170 | 14115 | 90.80 | 89.20 | 251.00 | 10862.53 | 3526.31 | 174.62 | 3523.70 | 0.94 |
| 171 | 14210 | 89.80 | 90.00 | 253.00 | 10862.03 | 3621.30 | 175.29 | 3618.69 | 1.35 |
| 172 | 14305 | 90.10 | 88.20 | 251.00 | 10862.12 | 3716.29 | 176.78 | 3713.68 | 1.92 |
| 173 | 14399 | 91.40 | 87.70 | 251.00 | 10860.89 | 3810.27 | 180.14 | 3807.61 | 1.48 |
| 174 | 14494 | 92.10 | 87.20 | 253.00 | 10857.98 | 3905.19 | 184.37 | 3902.47 | 0.91 |
| 175 | 14589 | 91.00 | 88.20 | 251.00 | 10855.41 | 4000.13 | 188.18 | 3997.35 | 1.56 |
| 176 | 14683 | 91.30 | 88.20 | 253.00 | 10853.53 | 4094.10 | 191.13 | 4091.29 | 0.32 |
| 177 | 14778 | 90.10 | 90.50 | 255.00 | 10852.37 | 4189.09 | 192.21 | 4186.27 | 2.73 |
| 178 | 14873 | 89.50 | 91.40 | 255.00 | 10852.70 | 4284.03 | 190.63 | 4281.25 | 1.14 |
| 179 | 14968 | 90.20 | 91.90 | 257.00 | 10852.95 | 4378.92 | 187.90 | 4376.21 | 0.91 |
| 180 | 15063 | 89.50 | 91.00 | 257.00 | 10853.20 | 4473.83 | 185.49 | 4471.18 | 1.20 |

Report #: 1

Date:

**RYAN DIRECTIONAL SERVICES, INC.**

A NABORS COMPANY

Ryan Job # 8158

## SURVEY REPORT

Customer: Oasis Petroleum
Well Name: Chalmers 5300 21-19 8T
Rig #: Nabors B-22
API #: 33-053-06021
Calculation Method: Minimum Curvature Calculation

MWD Operator: M. McCammond / R. Maddalena
Directional Drillers: RPM
Survey Corrected To: True North
Vertical Section Direction: 88.95
Total Correction: 8.17
Temperature Forecasting Model (Chart Only): Logarithmic

| Survey # | MD | Inc | Azm | Temp | TVD | VS | N/S | E/W | DLS |
|---|---|---|---|---|---|---|---|---|---|
| 181 | 15157 | 88.60 | 91.00 | 257.00 | 10854.75 | 4567.75 | 183.85 | 4565.15 | 0.96 |
| 182 | 15252 | 92.10 | 89.70 | 257.00 | 10854.17 | 4662.71 | 183.27 | 4660.13 | 3.93 |
| 183 | 15347 | 88.50 | 91.10 | 247.00 | 10853.68 | 4757.66 | 182.61 | 4755.11 | 4.07 |
| 184 | 15442 | 88.10 | 91.60 | 257.00 | 10856.50 | 4852.53 | 180.37 | 4850.04 | 0.67 |
| 185 | 15537 | 89.50 | 91.70 | 257.00 | 10858.48 | 4947.40 | 177.64 | 4944.98 | 1.48 |
| 186 | 15631 | 89.90 | 91.80 | 257.00 | 10858.98 | 5041.29 | 174.76 | 5038.93 | 0.44 |
| 187 | 15726 | 89.70 | 89.60 | 257.00 | 10859.31 | 5136.24 | 173.60 | 5133.92 | 2.33 |
| 188 | 15821 | 89.00 | 89.60 | 258.00 | 10860.39 | 5231.23 | 174.27 | 5228.91 | 0.74 |
| 189 | 15916 | 87.60 | 90.10 | 260.00 | 10863.20 | 5326.17 | 174.52 | 5323.87 | 1.56 |
| 190 | 16010 | 89.00 | 89.30 | 258.00 | 10865.99 | 5420.12 | 175.01 | 5417.82 | 1.72 |
| 191 | 16105 | 90.40 | 86.70 | 258.00 | 10866.49 | 5515.09 | 178.32 | 5512.75 | 3.11 |
| 192 | 16200 | 91.00 | 86.50 | 258.00 | 10865.33 | 5610.00 | 183.96 | 5607.58 | 0.67 |
| 193 | 16294 | 91.20 | 88.90 | 258.00 | 10863.53 | 5703.96 | 187.73 | 5701.48 | 2.56 |
| 194 | 16389 | 90.40 | 88.40 | 258.00 | 10862.20 | 5798.95 | 189.97 | 5796.44 | 0.99 |
| 195 | 16484 | 88.00 | 88.90 | 260.00 | 10863.53 | 5893.93 | 192.20 | 5891.40 | 2.58 |
| 196 | 16579 | 89.50 | 89.40 | 260.00 | 10865.60 | 5988.90 | 193.61 | 5986.36 | 1.66 |
| 197 | 16674 | 90.30 | 89.60 | 260.00 | 10865.76 | 6083.90 | 194.44 | 6081.36 | 0.87 |
| 198 | 16768 | 91.00 | 89.70 | 262.00 | 10864.70 | 6177.88 | 195.02 | 6175.35 | 0.75 |
| 199 | 16863 | 89.70 | 90.00 | 260.00 | 10864.12 | 6272.87 | 195.27 | 6270.34 | 1.40 |
| 200 | 16958 | 88.30 | 90.40 | 262.00 | 10865.77 | 6367.83 | 194.93 | 6365.32 | 1.53 |
| 201 | 17053 | 86.80 | 90.20 | 262.00 | 10869.84 | 6462.71 | 194.44 | 6460.23 | 1.59 |
| 202 | 17148 | 88.30 | 90.30 | 262.00 | 10873.90 | 6557.60 | 194.02 | 6555.14 | 1.58 |
| 203 | 17243 | 90.00 | 90.50 | 262.00 | 10875.31 | 6652.55 | 193.36 | 6650.13 | 1.80 |
| 204 | 17337 | 91.00 | 92.20 | 262.00 | 10874.49 | 6746.46 | 191.15 | 6744.09 | 2.10 |
| 205 | 17432 | 92.40 | 92.10 | 262.00 | 10871.67 | 6841.27 | 187.58 | 6838.98 | 1.48 |
| 206 | 17527 | 90.90 | 89.90 | 262.00 | 10868.93 | 6936.16 | 185.93 | 6933.92 | 2.80 |
| 207 | 17622 | 89.70 | 89.90 | 260.00 | 10868.43 | 7031.15 | 186.09 | 7028.92 | 1.26 |
| 208 | 17716 | 89.00 | 89.80 | 262.00 | 10869.50 | 7125.13 | 186.34 | 7122.91 | 0.75 |
| 209 | 17811 | 89.10 | 90.40 | 262.00 | 10871.08 | 7220.10 | 186.17 | 7217.90 | 0.64 |
| 210 | 17906 | 89.90 | 91.80 | 262.00 | 10871.90 | 7315.02 | 184.35 | 7312.87 | 1.70 |
| 211 | 18001 | 89.60 | 92.10 | 264.00 | 10872.32 | 7409.89 | 181.12 | 7407.82 | 0.45 |
| 212 | 18095 | 90.10 | 92.30 | 264.00 | 10872.57 | 7503.74 | 177.51 | 7501.75 | 0.57 |
| 213 | 18190 | 91.50 | 92.30 | 264.00 | 10871.24 | 7598.56 | 173.70 | 7596.66 | 1.47 |
| 214 | 18285 | 90.60 | 90.90 | 264.00 | 10869.50 | 7693.44 | 171.04 | 7691.60 | 1.75 |
| 215 | 18380 | 89.80 | 88.50 | 262.00 | 10869.17 | 7788.43 | 171.54 | 7786.59 | 2.66 |
| 216 | 18475 | 88.50 | 88.10 | 266.00 | 10870.58 | 7883.41 | 174.36 | 7881.54 | 1.43 |
| 217 | 18506 | 88.10 | 88.10 | 264.00 | 10871.50 | 7914.39 | 175.39 | 7912.51 | 1.29 |
| 218 | 18569 | 88.80 | 87.80 | 262.00 | 10873.20 | 7977.36 | 177.64 | 7975.44 | 1.21 |
| 219 | 18664 | 92.30 | 87.40 | 264.00 | 10872.29 | 8072.31 | 181.62 | 8070.34 | 3.71 |
| 220 | 18759 | 91.00 | 88.60 | 264.00 | 10869.55 | 8167.26 | 184.93 | 8165.24 | 1.86 |
| 221 | 18854 | 91.60 | 88.40 | 266.00 | 10867.40 | 8262.23 | 187.42 | 8260.18 | 0.67 |
| 222 | 18948 | 90.20 | 90.40 | 264.00 | 10865.92 | 8356.21 | 188.40 | 8354.16 | 2.60 |
| 223 | 19043 | 91.00 | 90.00 | 262.00 | 10864.93 | 8451.18 | 188.07 | 8449.15 | 0.94 |
| 224 | 19138 | 89.90 | 90.30 | 264.00 | 10864.18 | 8546.15 | 187.82 | 8544.15 | 1.20 |
| 225 | 19233 | 89.20 | 90.10 | 267.00 | 10864.93 | 8641.13 | 187.49 | 8639.14 | 0.77 |
| 226 | 19328 | 90.10 | 90.00 | 267.00 | 10865.51 | 8736.11 | 187.41 | 8734.14 | 0.95 |
| 227 | 19422 | 87.90 | 90.30 | 267.00 | 10867.15 | 8830.07 | 187.16 | 8828.12 | 2.36 |
| 228 | 19517 | 88.70 | 91.50 | 267.00 | 10869.96 | 8924.97 | 185.67 | 8923.06 | 1.52 |
| 229 | 19612 | 89.60 | 91.60 | 269.00 | 10871.37 | 9019.86 | 183.10 | 9018.02 | 0.95 |
| 230 | 19707 | 89.90 | 90.90 | 269.00 | 10871.79 | 9114.78 | 181.03 | 9112.99 | 0.80 |
| 231 | 19802 | 88.00 | 90.50 | 269.00 | 10873.53 | 9209.71 | 179.87 | 9207.96 | 2.04 |
| 232 | 19896 | 89.90 | 90.30 | 269.00 | 10875.25 | 9303.66 | 179.21 | 9301.94 | 2.03 |
| 233 | 19991 | 88.40 | 91.10 | 269.00 | 10876.66 | 9398.61 | 178.05 | 9396.92 | 1.79 |
| 234 | 20086 | 89.10 | 90.10 | 269.00 | 10878.73 | 9493.54 | 177.05 | 9491.89 | 1.28 |
| 235 | 20181 | 88.60 | 90.90 | 269.00 | 10880.64 | 9588.49 | 176.23 | 9586.87 | 0.99 |
| 236 | 20276 | 89.30 | 90.40 | 267.00 | 10882.38 | 9683.43 | 175.15 | 9681.84 | 0.91 |
| 237 | 20370 | 90.40 | 90.30 | 269.00 | 10882.63 | 9777.40 | 174.57 | 9775.84 | 1.18 |
| 238 | 20456 | 90.40 | 90.80 | 269.00 | 10882.03 | 9863.36 | 173.75 | 9861.83 | 0.58 |
| Projection | 20519 | 90.40 | 90.80 | PTB | 10881.59 | 9926.33 | 172.87 | 9924.83 | 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. **28636**

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

| | | | |
|---|---|---|---|
| ☑ Notice of Intent | Approximate Start Date **July 29, 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 **Change casing** | |

| Well Name and Number | | | | | |
|---|---|---|---|---|---|
| **Chalmers 5300 21-19 8T** | | | | | |
| Footages | Qtr-Qtr | Section | Township | Range | |
| 2226 F N L 326 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 permission to make the following changes to the above referenced well:**

- **Surface casing changed to 13 3/8" and depth changed to 2,126'**
- **Contingency 9 5/8" casing added**
- **7' casing changed to all 32#**

**Attached are revised drill plan, well summary, directional plan and plot**

| | | |
|---|---|---|
| Company **Oasis Petroleum North America LLC** | | Telephone Number **281-404-9563** |
| Address **1001 Fannin, Suite 1500** | | |
| City **Houston** | State **TX** | Zip Code **77002** |
| Signature Heather McCowan | Printed Name **Heather McCowan** | |
| Title **Regulatory Assistant** | Date **July 29, 2014** | |
| Email Address **hmccowan@oasispetroleum.com** | | |

**FOR STATE USE ONLY**

| | |
|---|---|
| ☐ Received | ☒ Approved |
| Date 8-15-14 | |
| By Heather Erbele | |
| Title Petroleum Resource Specialist | |

# Oasis Petroleum
# Well Summary
# Chalmers 5300 21-19 8T
# 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 8T
# 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 8T
# 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' - 11106' | 32 | HCP-110 | LTC | 6.094" | 6.000"** | 6730 | 8970 | 9870 |

**Special Drift

| Interval | Description | Collapse | Burst | Tension |
|---|---|---|---|---|
| | | (psi) a | (psi) b | (1000 lbs) c |
| 0' - 11106' | 7", 32#, P-110, LTC, 8rd | 11820 / 2.10* | 12460 / 1.28 | 897 / 2.23 |
| 6741' - 9209' | 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, 301k 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:** **614 sks** (168 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

# Oasis Petroleum
# Well Summary
# Chalmers 5300 21-19 8T
# Sec. 19 T153N R100W
# McKenzie County, North Dakota

PRODUCTION LINER

| Size | Interval | Weight | Grade | Coupling | I.D. | Drift | Torque |
|---|---|---|---|---|---|---|---|
| 4-1/2" | 10291' - 20582' | 13.5 | P-110 | BTC | 3.920" | 3.795" | 2270 |

| Interval | Description | Collapse | Burst | Tension |
|---|---|---|---|---|
| | | (psi) a | (psi) b | (1000 lbs) c |
| 10291' - 20582' | 4-1/2", 13.5 lb, P-110, BTC | 10670 / 1.98 | 12410 / 1.28 | 443 / 2.02 |

**API Rating & Safety Factor**

a) Based on full casing evacuation with 9.5 ppg fluid on backside @ 10876' TVD.

b) Burst pressure based on 9000 psi treating pressure with 10.2 ppg internal fluid gradient and 9 ppg external fluid gradient @ 10876' TVD.

c) Based on string weight in 9.5 ppg fluid (Buoyed weight: 119k 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)**

# 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. **28636**

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

| | | | |
|---|---|---|---|
| ☑ Notice of Intent | Approximate Start Date **July 7, 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 **location revision** | |

| Well Name and Number | | | | | |
|---|---|---|---|---|---|
| **Chalmers 5300 21-19 8T** | | | | | |
| Footages | Qtr-Qtr | Section | Township | Range | |
| **2226 F N L 326 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

**We respectfully request permission to revise the APD issued for this well to include the following change:**
**The surface location will change to 2226' FNL & 327' FWL, Lot 19-153N-100W. (This modification was made to accomodate the drilling rigs)**

**Valid plats are attached to replace those within the approved permit.**

**The following statements remain true:**
**Notice has been provided to the owner of any permanently occupied dwelling within 1320 feet.**
**This well is not located within 500 feet of an occupied dwelling.**

**Attached is the new well plat, drill plan, directional plan, and directional plot.**

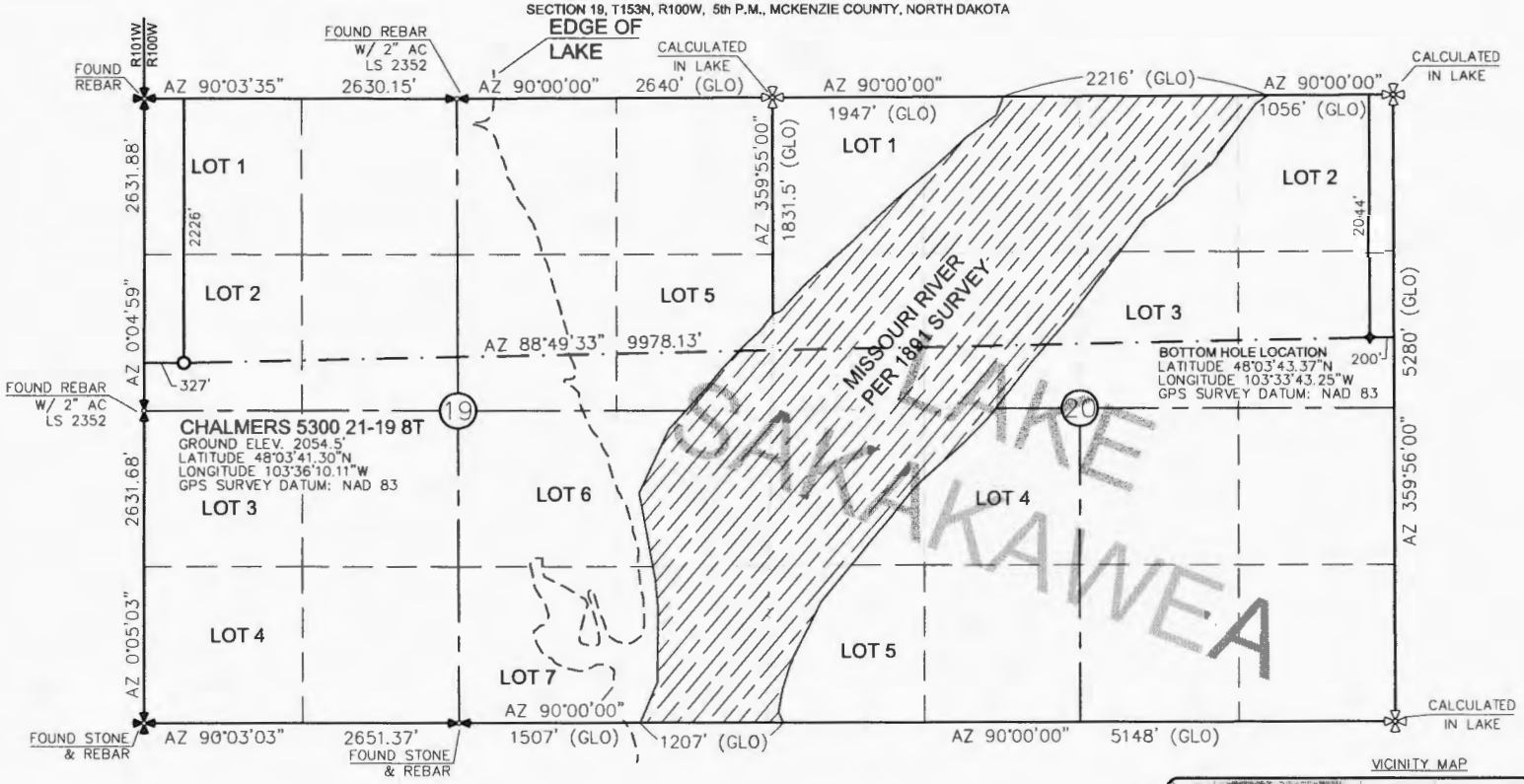
| | | |
|---|---|---|
| Company **Oasis Petroleum Inc.** | | Telephone Number **(281) 404-9563** |
| Address **1001 Fannin, Suite 1500** | | |
| City **Houston** | State **TX** | Zip Code **77002** |
| Signature Heather McCowan | Printed Name **Heather McCowan** | |
| Title **Regulatory Assistant** | Date **July 7, 2014** | |
| Email Address **hmccowan@oasispetroleum.com** | | |

**FOR STATE USE ONLY**

| | |
|---|---|
| ☐ Received | ☒ Approved |
| Date 7/8/14 | |
| By Nathaniel Erbele | |
| Title Petroleum Resource Specialist | |

# WELL LOCATION PLAT

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"CHALMERS 5300 21-19 8T"
2226 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

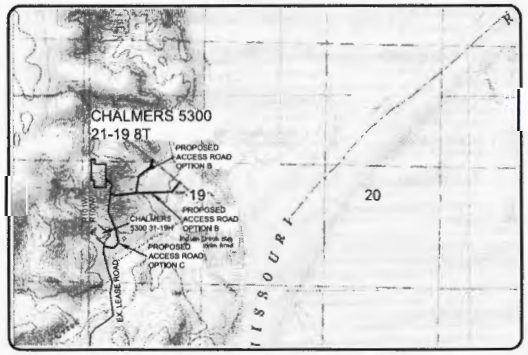
STAKED ON 1/29/14
VERTICAL CONTROL DATUM WAS BASED UPON CONTROL POINT 16 WITH AN ELEVATION OF 2014.2'

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

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| Revision No. | Date | By | Description |
|---|---|---|---|
| REV 1 | 3/12/14 | JJS | ADDED WELLS ON PAD |
| REV 2 | 4/22/14 | BKH | MOVED WELLS ON PAD/REVISED PAD |
| REV 3 | 5/7/14 | BKH | 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.K.H. Project No.: S13-09-282.03
Checked By: D.D.K. Date: JAN. 2014

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

INTERSTATE ENGINEERING
Professionally yours, friendly people, your trust

Azimuths to True North
Magnetic North: 8.17°

Magnetic Field
Strength: 56490.5snT
Dip Angle: 72.96°
Date: 2/17/2014
Model: IGRF200510

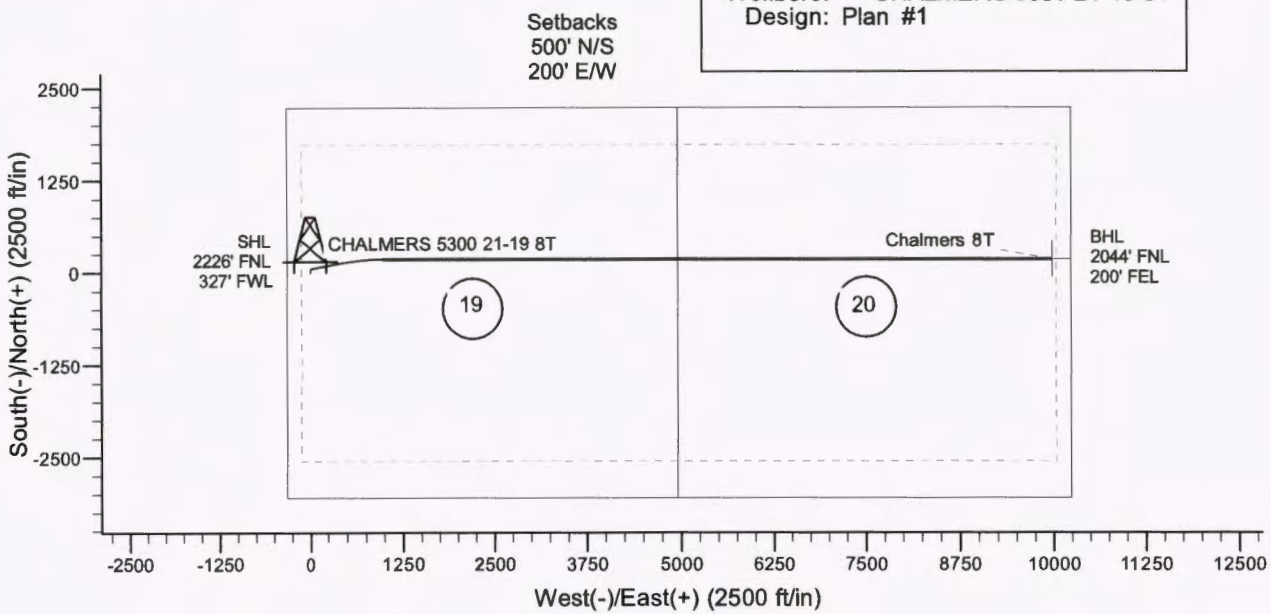
OASIS PETROLEUM

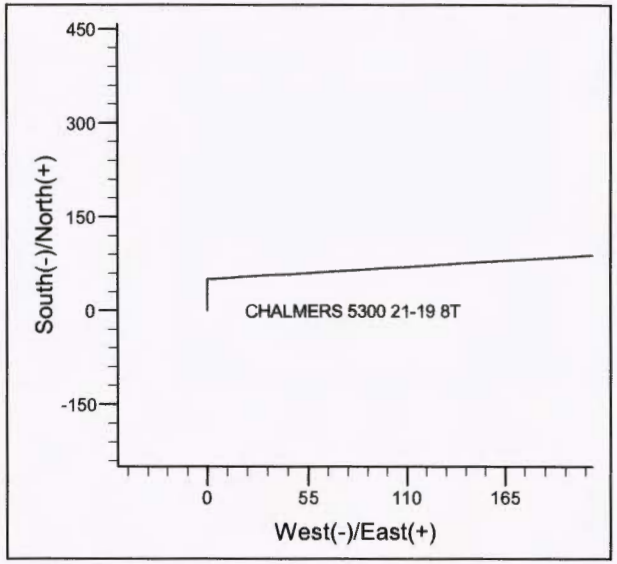
Project: Indian Hills
Site: 153N-100W-19/20
Well: CHALMERS 5300 21-19 8T
Wellbore: CHALMERS 5300 21-19 8T
Design: Plan #1

SITE DETAILS: 153N-100W-19/20

Well Centre Latitude: 48° 3' 41.300 N
Longitude: 103° 36' 10.110 W

Positional Uncertainity: 0.0
Convergence: -2.31
Local North: True



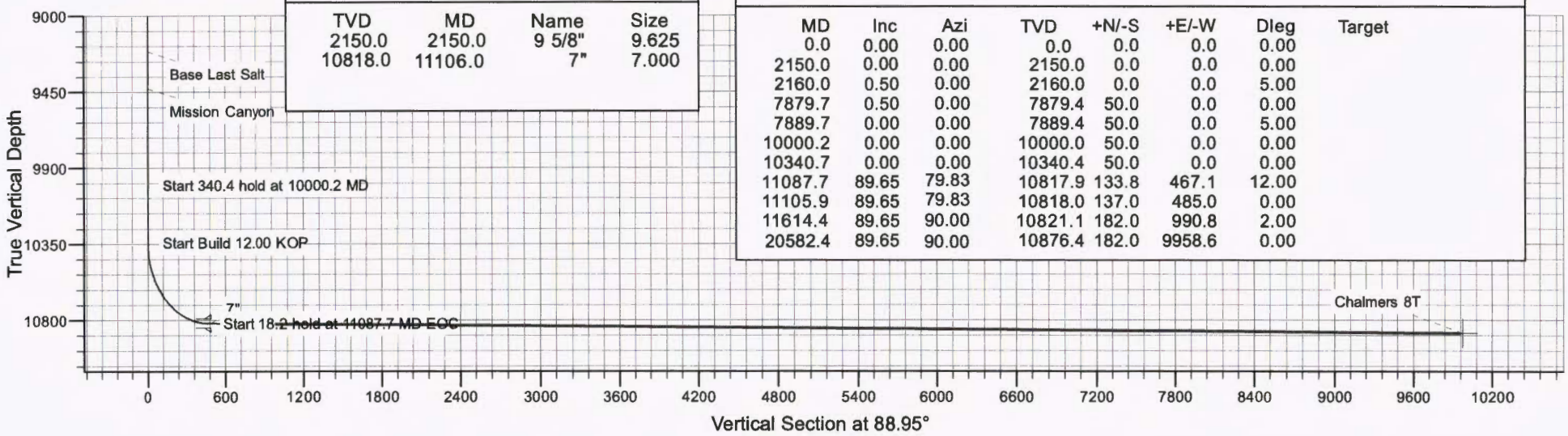




CASING DETAILS

| TVD | MD | Name | Size |
|---|---|---|---|
| 2150.0 | 2150.0 | 9 5/8" | 9.625 |
| 10818.0 | 11106.0 | 7" | 7.000 |

SECTION DETAILS

| MD | Inc | Azi | TVD | +N/-S | +E/-W | Dleg | Target |
|---|---|---|---|---|---|---|---|
| 0.0 | 0.00 | 0.00 | 0.0 | 0.0 | 0.0 | 0.00 | |
| 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 | |
| 10340.7 | 0.00 | 0.00 | 10340.4 | 50.0 | 0.0 | 0.00 | |
| 11087.7 | 89.65 | 79.83 | 10817.9 | 133.8 | 467.1 | 12.00 | |
| 11105.9 | 89.65 | 79.83 | 10818.0 | 137.0 | 485.0 | 0.00 | |
| 11614.4 | 89.65 | 90.00 | 10821.1 | 182.0 | 990.8 | 2.00 | |
| 20582.4 | 89.65 | 90.00 | 10876.4 | 182.0 | 9958.6 | 0.00 | |



## DRILLING PLAN

| | | | |
|---|---|---|---|
| **OPERATOR** | Oasis Petroleum | **COUNTY/STATE** | McKenzie Co., ND |
| **WELL NAME** | Chalmers 5300 21-19 8T | **RIG** | B 25 |
| **WELL TYPE** | Horizontal Three Forks | | |
| **LOCATION** | SW NW 19-153N-100W | Surface Location (survey plat): 2226' FNL | 327' FWL |
| **EST. T.D.** | 20,582' | **GROUND ELEV:** 2,046' | **Sub Height:** 25' |
| | TOTAL LATERAL: 9,476' | **KB ELEV:** 2,071' | |

| MARKER | | TVD | Subsea TVD |
|---|---|---|---|
| Pierre | NDIC MAP | 2,021 | 50 |
| Greenhorn | | 4,624 | -2,553 |
| Mowry | | 5,029 | -2,958 |
| Dakota | | 5,417 | -3,346 |
| Rierdon | | 6,463 | -4,392 |
| Dunham Salt | | 6,891 | -4,820 |
| Dunham Salt Base | | 6,960 | -4,889 |
| Pine Salt | | 7,257 | -5,186 |
| Pine Salt Base | | 7,290 | -5,219 |
| Opeche Salt | | 7,351 | -5,280 |
| Opeche Salt Base | | 7,426 | -5,355 |
| Amsden | | 7,662 | -5,591 |
| Tyler | | 7,828 | -5,757 |
| Otter/Base Minnelusa | | 8,032 | -5,961 |
| Kibbey Lime | | 8,384 | -6,313 |
| Charles Salt | | 8,534 | -6,463 |
| Base Last Salt | | 9,209 | -7,138 |
| Mission Canyon | | 9,429 | -7,358 |
| Lodgepole | | 9,993 | -7,922 |
| False Bakken | | 10,706 | -8,635 |
| Upper Bakken Shale | | 10,716 | -8,645 |
| Middle Bakken | | 10,732 | -8,661 |
| Lower Bakken Shale | | 10,766 | -8,695 |
| Pronghorn | | 10,780 | -8,709 |
| Threeforks | | 10,799 | -8,728 |
| Threeforks(Top of Target) | | 10,811 | -8,740 |
| Threeforks(Base of Target) | | 10,822 | -8,751 |
| Claystone | | 10,822 | -8,751 |

**Est. Dip Rate:** [illegible]

**Max. Anticipated BHP:** 4889

| 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<br>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' - | 2,150' | FW | 8.4-9.0 | 28-32 | NC | Circ Mud Tanks |
| **Intermediate:** | 2,150' - | 11,106' | Invert | 9.5-10.4 | 40-50 | 30+HtHp | Circ Mud Tanks |
| Lateral: | 11,106' - | 20,582' | 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" | 2,150' | | To Surface | 12 | 100' into Pierre |
| Intermediate: | 7" | 32# | 8-3/4" | 11,106' | | 3917 | 24 | 1500' above Dakota |
| Production Liner: | 4.5" | 13.5# | 6" | 20,582' | TOL @ 10,291' | | | 50' above KOP |

**PROBABLE PLUGS, IF REQ'D:**

**OTHER:**

| | MD | TVD | FNL/FSL | FEL/FWL | S-T-R | AZI |
|---|---|---|---|---|---|---|
| Surface: | 2,150 | 2,150 | 2226 FNL | 327 FWL | SEC. 19 T153N R100W | Survey Company: |
| KOP: | 10,341' | 10,341' | 2176 FNL | 327 FWL | SEC. 19 T153N R100W | Build Rate: 12 deg /100' |
| EOC: | 11,088' | 10,818' | 2092 FNL | 793 FWL | SEC. 19 T153N R100W | 79.8 |
| Casing Point: | 11,106' | 10,818' | 2089 FNL | 811 FWL | SEC. 19 T153N R100W | 79.8 |
| Three Forks Lateral TD: | 20,582' | 10,876' | 2044 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:** dsd 6/11/14

# Oasis

**Indian Hills**
**153N-100W-19/20**
**CHALMERS 5300 21-19 8T**

**CHALMERS 5300 21-19 8T**

**Plan: Plan #1**

# Standard Planning Report

**11 June, 2014**

# Oasis Petroleum

## Planning Report

| | | | |
|---|---|---|---|
| **Database:** | OpenWellsCompass - EDM Prod | **Local Co-ordinate Reference:** | Well CHALMERS 5300 21-19 8T |
| **Company:** | Oasis | **TVD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Project:** | Indian Hills | **MD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Site:** | 153N-100W-19/20 | **North Reference:** | True |
| **Well:** | CHALMERS 5300 21-19 8T | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | CHALMERS 5300 21-19 8T | | |
| **Design:** | Plan #1 | | |

| **Project** | Indian Hills | | |
|---|---|---|---|
| **Map System:** | US State Plane 1983 | **System Datum:** | Mean Sea Level |
| **Geo Datum:** | North American Datum 1983 | | |
| **Map Zone:** | North Dakota Northern Zone | | |

| **Site** | 153N-100W-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 8T | | | | | |
|---|---|---|---|---|---|---|
| **Well Position** | **+N/-S** | -300.9 ft | **Northing:** | 402,475.42 ft | **Latitude:** | 48° 3' 41.300 N |
| | **+E/-W** | 40.1 ft | **Easting:** | 1,209,990.43 ft | **Longitude:** | 103° 36' 10.110 W |
| **Position Uncertainty** | | 0.0 ft | **Wellhead Elevation:** | | **Ground Level:** | 2,046.0 ft |

| **Wellbore** | CHALMERS 5300 21-19 8T | | | | |
|---|---|---|---|---|---|
| **Magnetics** | **Model Name** | **Sample Date** | **Declination (°)** | **Dip Angle (°)** | **Field Strength (nT)** |
| | IGRF200510 | 2/17/2014 | 8.17 | 72.96 | 56,491 |

| **Design** | Plan #1 | | | | |
|---|---|---|---|---|---|
| **Audit Notes:** | | | | | |
| **Version:** | | **Phase:** | PROTOTYPE | **Tie On Depth:** | 0.0 |
| **Vertical Section:** | **Depth From (TVD) (ft)** | **+N/-S (ft)** | **+E/-W (ft)** | **Direction (°)** | |
| | 0.0 | 0.0 | 0.0 | 88.95 | |

**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 | |
| 10,340.7 | 0.00 | 0.00 | 10,340.4 | 50.0 | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 11,087.7 | 89.65 | 79.83 | 10,817.9 | 133.8 | 467.1 | 12.00 | 12.00 | 0.00 | 79.83 | |
| 11,105.9 | 89.65 | 79.83 | 10,818.0 | 137.0 | 485.0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 11,614.4 | 89.65 | 90.00 | 10,821.1 | 182.0 | 990.8 | 2.00 | 0.00 | 2.00 | 90.05 | |
| 20,582.4 | 89.65 | 90.00 | 10,876.4 | 182.0 | 9,958.6 | 0.00 | 0.00 | 0.00 | 0.00 | |

# Oasis Petroleum

## Planning Report

| | | | |
|---|---|---|---|
| **Database:** | OpenWellsCompass - EDM Prod | **Local Co-ordinate Reference:** | Well CHALMERS 5300 21-19 8T |
| **Company:** | Oasis | **TVD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Project:** | Indian Hills | **MD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Site:** | 153N-100W-19/20 | **North Reference:** | True |
| **Well:** | CHALMERS 5300 21-19 8T | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | CHALMERS 5300 21-19 8T | | |
| **Design:** | Plan #1 | | |

**Planned Survey**

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00 | 0.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 100.0 | 0.00 | 0.00 | 100.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 200.0 | 0.00 | 0.00 | 200.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 300.0 | 0.00 | 0.00 | 300.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 400.0 | 0.00 | 0.00 | 400.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 500.0 | 0.00 | 0.00 | 500.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 600.0 | 0.00 | 0.00 | 600.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 700.0 | 0.00 | 0.00 | 700.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 800.0 | 0.00 | 0.00 | 800.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 900.0 | 0.00 | 0.00 | 900.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 1,000.0 | 0.00 | 0.00 | 1,000.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 1,100.0 | 0.00 | 0.00 | 1,100.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 1,200.0 | 0.00 | 0.00 | 1,200.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 1,300.0 | 0.00 | 0.00 | 1,300.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 1,400.0 | 0.00 | 0.00 | 1,400.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 1,500.0 | 0.00 | 0.00 | 1,500.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 1,600.0 | 0.00 | 0.00 | 1,600.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 1,700.0 | 0.00 | 0.00 | 1,700.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 1,800.0 | 0.00 | 0.00 | 1,800.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 1,900.0 | 0.00 | 0.00 | 1,900.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 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 | 0.0 | 0.00 | 0.00 | 0.00 |
| 2,300.0 | 0.50 | 0.00 | 2,300.0 | 1.3 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 2,400.0 | 0.50 | 0.00 | 2,400.0 | 2.1 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 2,500.0 | 0.50 | 0.00 | 2,500.0 | 3.0 | 0.0 | 0.1 | 0.00 | 0.00 | 0.00 |
| 2,600.0 | 0.50 | 0.00 | 2,600.0 | 3.9 | 0.0 | 0.1 | 0.00 | 0.00 | 0.00 |
| 2,700.0 | 0.50 | 0.00 | 2,700.0 | 4.8 | 0.0 | 0.1 | 0.00 | 0.00 | 0.00 |
| 2,800.0 | 0.50 | 0.00 | 2,800.0 | 5.6 | 0.0 | 0.1 | 0.00 | 0.00 | 0.00 |
| 2,900.0 | 0.50 | 0.00 | 2,900.0 | 6.5 | 0.0 | 0.1 | 0.00 | 0.00 | 0.00 |
| 3,000.0 | 0.50 | 0.00 | 3,000.0 | 7.4 | 0.0 | 0.1 | 0.00 | 0.00 | 0.00 |
| 3,100.0 | 0.50 | 0.00 | 3,100.0 | 8.2 | 0.0 | 0.2 | 0.00 | 0.00 | 0.00 |
| 3,200.0 | 0.50 | 0.00 | 3,200.0 | 9.1 | 0.0 | 0.2 | 0.00 | 0.00 | 0.00 |
| 3,300.0 | 0.50 | 0.00 | 3,300.0 | 10.0 | 0.0 | 0.2 | 0.00 | 0.00 | 0.00 |
| 3,400.0 | 0.50 | 0.00 | 3,400.0 | 10.9 | 0.0 | 0.2 | 0.00 | 0.00 | 0.00 |
| 3,500.0 | 0.50 | 0.00 | 3,499.9 | 11.7 | 0.0 | 0.2 | 0.00 | 0.00 | 0.00 |
| 3,600.0 | 0.50 | 0.00 | 3,599.9 | 12.6 | 0.0 | 0.2 | 0.00 | 0.00 | 0.00 |
| 3,700.0 | 0.50 | 0.00 | 3,699.9 | 13.5 | 0.0 | 0.2 | 0.00 | 0.00 | 0.00 |
| 3,800.0 | 0.50 | 0.00 | 3,799.9 | 14.4 | 0.0 | 0.3 | 0.00 | 0.00 | 0.00 |
| 3,900.0 | 0.50 | 0.00 | 3,899.9 | 15.2 | 0.0 | 0.3 | 0.00 | 0.00 | 0.00 |
| 4,000.0 | 0.50 | 0.00 | 3,999.9 | 16.1 | 0.0 | 0.3 | 0.00 | 0.00 | 0.00 |
| 4,100.0 | 0.50 | 0.00 | 4,099.9 | 17.0 | 0.0 | 0.3 | 0.00 | 0.00 | 0.00 |
| 4,200.0 | 0.50 | 0.00 | 4,199.9 | 17.8 | 0.0 | 0.3 | 0.00 | 0.00 | 0.00 |
| 4,300.0 | 0.50 | 0.00 | 4,299.9 | 18.7 | 0.0 | 0.3 | 0.00 | 0.00 | 0.00 |
| 4,400.0 | 0.50 | 0.00 | 4,399.9 | 19.6 | 0.0 | 0.4 | 0.00 | 0.00 | 0.00 |
| 4,500.0 | 0.50 | 0.00 | 4,499.9 | 20.5 | 0.0 | 0.4 | 0.00 | 0.00 | 0.00 |
| 4,600.0 | 0.50 | 0.00 | 4,599.9 | 21.3 | 0.0 | 0.4 | 0.00 | 0.00 | 0.00 |
| 4,624.1 | 0.50 | 0.00 | 4,624.0 | 21.5 | 0.0 | 0.4 | 0.00 | 0.00 | 0.00 |
| **Greenhorn** | | | | | | | | | |

# Oasis Petroleum

## Planning Report

| | | | |
|---|---|---|---|
| **Database:** | OpenWellsCompass - EDM Prod | **Local Co-ordinate Reference:** | Well CHALMERS 5300 21-19 8T |
| **Company:** | Oasis | **TVD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Project:** | Indian Hills | **MD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Site:** | 153N-100W-19/20 | **North Reference:** | True |
| **Well:** | CHALMERS 5300 21-19 8T | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | CHALMERS 5300 21-19 8T | | |
| **Design:** | Plan #1 | | |

**Planned Survey**

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |
|---|---|---|---|---|---|---|---|---|---|
| 4,700.0 | 0.50 | 0.00 | 4,699.9 | 22.2 | 0.0 | 0.4 | 0.00 | 0.00 | 0.00 |
| 4,800.0 | 0.50 | 0.00 | 4,799.9 | 23.1 | 0.0 | 0.4 | 0.00 | 0.00 | 0.00 |
| 4,900.0 | 0.50 | 0.00 | 4,899.9 | 24.0 | 0.0 | 0.4 | 0.00 | 0.00 | 0.00 |
| 5,000.0 | 0.50 | 0.00 | 4,999.9 | 24.8 | 0.0 | 0.5 | 0.00 | 0.00 | 0.00 |
| 5,029.1 | 0.50 | 0.00 | 5,029.0 | 25.1 | 0.0 | 0.5 | 0.00 | 0.00 | 0.00 |
| **Mowry** | | | | | | | | | |
| 5,100.0 | 0.50 | 0.00 | 5,099.9 | 25.7 | 0.0 | 0.5 | 0.00 | 0.00 | 0.00 |
| 5,200.0 | 0.50 | 0.00 | 5,199.9 | 26.6 | 0.0 | 0.5 | 0.00 | 0.00 | 0.00 |
| 5,300.0 | 0.50 | 0.00 | 5,299.9 | 27.4 | 0.0 | 0.5 | 0.00 | 0.00 | 0.00 |
| 5,400.0 | 0.50 | 0.00 | 5,399.9 | 28.3 | 0.0 | 0.5 | 0.00 | 0.00 | 0.00 |
| 5,417.1 | 0.50 | 0.00 | 5,417.0 | 28.5 | 0.0 | 0.5 | 0.00 | 0.00 | 0.00 |
| **Dakota** | | | | | | | | | |
| 5,500.0 | 0.50 | 0.00 | 5,499.9 | 29.2 | 0.0 | 0.5 | 0.00 | 0.00 | 0.00 |
| 5,600.0 | 0.50 | 0.00 | 5,599.9 | 30.1 | 0.0 | 0.5 | 0.00 | 0.00 | 0.00 |
| 5,700.0 | 0.50 | 0.00 | 5,699.9 | 30.9 | 0.0 | 0.6 | 0.00 | 0.00 | 0.00 |
| 5,800.0 | 0.50 | 0.00 | 5,799.9 | 31.8 | 0.0 | 0.6 | 0.00 | 0.00 | 0.00 |
| 5,900.0 | 0.50 | 0.00 | 5,899.9 | 32.7 | 0.0 | 0.6 | 0.00 | 0.00 | 0.00 |
| 6,000.0 | 0.50 | 0.00 | 5,999.9 | 33.6 | 0.0 | 0.6 | 0.00 | 0.00 | 0.00 |
| 6,100.0 | 0.50 | 0.00 | 6,099.8 | 34.4 | 0.0 | 0.6 | 0.00 | 0.00 | 0.00 |
| 6,200.0 | 0.50 | 0.00 | 6,199.8 | 35.3 | 0.0 | 0.6 | 0.00 | 0.00 | 0.00 |
| 6,300.0 | 0.50 | 0.00 | 6,299.8 | 36.2 | 0.0 | 0.7 | 0.00 | 0.00 | 0.00 |
| 6,400.0 | 0.50 | 0.00 | 6,399.8 | 37.0 | 0.0 | 0.7 | 0.00 | 0.00 | 0.00 |
| 6,463.2 | 0.50 | 0.00 | 6,463.0 | 37.6 | 0.0 | 0.7 | 0.00 | 0.00 | 0.00 |
| **Rierdon** | | | | | | | | | |
| 6,500.0 | 0.50 | 0.00 | 6,499.8 | 37.9 | 0.0 | 0.7 | 0.00 | 0.00 | 0.00 |
| 6,600.0 | 0.50 | 0.00 | 6,599.8 | 38.8 | 0.0 | 0.7 | 0.00 | 0.00 | 0.00 |
| 6,700.0 | 0.50 | 0.00 | 6,699.8 | 39.7 | 0.0 | 0.7 | 0.00 | 0.00 | 0.00 |
| 6,800.0 | 0.50 | 0.00 | 6,799.8 | 40.5 | 0.0 | 0.7 | 0.00 | 0.00 | 0.00 |
| 6,891.2 | 0.50 | 0.00 | 6,891.0 | 41.3 | 0.0 | 0.8 | 0.00 | 0.00 | 0.00 |
| **Dunham Salt** | | | | | | | | | |
| 6,900.0 | 0.50 | 0.00 | 6,899.8 | 41.4 | 0.0 | 0.8 | 0.00 | 0.00 | 0.00 |
| 6,960.2 | 0.50 | 0.00 | 6,960.0 | 41.9 | 0.0 | 0.8 | 0.00 | 0.00 | 0.00 |
| **Dunham Salt Base** | | | | | | | | | |
| 7,000.0 | 0.50 | 0.00 | 6,999.8 | 42.3 | 0.0 | 0.8 | 0.00 | 0.00 | 0.00 |
| 7,100.0 | 0.50 | 0.00 | 7,099.8 | 43.2 | 0.0 | 0.8 | 0.00 | 0.00 | 0.00 |
| 7,200.0 | 0.50 | 0.00 | 7,199.8 | 44.0 | 0.0 | 0.8 | 0.00 | 0.00 | 0.00 |
| 7,257.2 | 0.50 | 0.00 | 7,257.0 | 44.5 | 0.0 | 0.8 | 0.00 | 0.00 | 0.00 |
| **Pine Salt** | | | | | | | | | |
| 7,290.2 | 0.50 | 0.00 | 7,290.0 | 44.8 | 0.0 | 0.8 | 0.00 | 0.00 | 0.00 |
| **Pine Salt Base** | | | | | | | | | |
| 7,300.0 | 0.50 | 0.00 | 7,299.8 | 44.9 | 0.0 | 0.8 | 0.00 | 0.00 | 0.00 |
| 7,351.2 | 0.50 | 0.00 | 7,351.0 | 45.3 | 0.0 | 0.8 | 0.00 | 0.00 | 0.00 |
| **Opeche Salt** | | | | | | | | | |
| 7,400.0 | 0.50 | 0.00 | 7,399.8 | 45.8 | 0.0 | 0.8 | 0.00 | 0.00 | 0.00 |
| 7,426.2 | 0.50 | 0.00 | 7,426.0 | 46.0 | 0.0 | 0.8 | 0.00 | 0.00 | 0.00 |
| **Opeche Salt Base** | | | | | | | | | |
| 7,500.0 | 0.50 | 0.00 | 7,499.8 | 46.6 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 7,600.0 | 0.50 | 0.00 | 7,599.8 | 47.5 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 7,662.2 | 0.50 | 0.00 | 7,662.0 | 48.1 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| **Amsden** | | | | | | | | | |
| 7,700.0 | 0.50 | 0.00 | 7,699.8 | 48.4 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 7,800.0 | 0.50 | 0.00 | 7,799.8 | 49.3 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 7,828.2 | 0.50 | 0.00 | 7,828.0 | 49.5 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| **Tyler** | | | | | | | | | |

# Oasis Petroleum

## Planning Report

| | | | |
|---|---|---|---|
| **Database:** | OpenWellsCompass - EDM Prod | **Local Co-ordinate Reference:** | Well CHALMERS 5300 21-19 8T |
| **Company:** | Oasis | **TVD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Project:** | Indian Hills | **MD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Site:** | 153N-100W-19/20 | **North Reference:** | True |
| **Well:** | CHALMERS 5300 21-19 8T | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | CHALMERS 5300 21-19 8T | | |
| **Design:** | Plan #1 | | |

**Planned Survey**

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |
|---|---|---|---|---|---|---|---|---|---|
| 7,879.7 | 0.50 | 0.00 | 7,879.4 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| **Start Drop -5.00** | | | | | | | | | |
| 7,889.7 | 0.00 | 0.00 | 7,889.4 | 50.0 | 0.0 | 0.9 | 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 | 0.9 | 0.00 | 0.00 | 0.00 |
| 8,000.0 | 0.00 | 0.00 | 7,999.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 8,032.2 | 0.00 | 0.00 | 8,032.0 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| **Otter/Base Minnelusa** | | | | | | | | | |
| 8,100.0 | 0.00 | 0.00 | 8,099.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 8,200.0 | 0.00 | 0.00 | 8,199.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 8,300.0 | 0.00 | 0.00 | 8,299.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 8,384.2 | 0.00 | 0.00 | 8,384.0 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| **Kibbey Lime** | | | | | | | | | |
| 8,400.0 | 0.00 | 0.00 | 8,399.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 8,500.0 | 0.00 | 0.00 | 8,499.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 8,534.2 | 0.00 | 0.00 | 8,534.0 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| **Charles Salt** | | | | | | | | | |
| 8,600.0 | 0.00 | 0.00 | 8,599.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 8,700.0 | 0.00 | 0.00 | 8,699.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 8,800.0 | 0.00 | 0.00 | 8,799.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 8,900.0 | 0.00 | 0.00 | 8,899.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 9,000.0 | 0.00 | 0.00 | 8,999.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 9,100.0 | 0.00 | 0.00 | 9,099.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 9,200.0 | 0.00 | 0.00 | 9,199.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 9,209.2 | 0.00 | 0.00 | 9,209.0 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| **Base Last Salt** | | | | | | | | | |
| 9,300.0 | 0.00 | 0.00 | 9,299.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 9,400.0 | 0.00 | 0.00 | 9,399.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 9,429.2 | 0.00 | 0.00 | 9,429.0 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| **Mission Canyon** | | | | | | | | | |
| 9,500.0 | 0.00 | 0.00 | 9,499.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 9,600.0 | 0.00 | 0.00 | 9,599.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 9,700.0 | 0.00 | 0.00 | 9,699.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 9,800.0 | 0.00 | 0.00 | 9,799.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 9,900.0 | 0.00 | 0.00 | 9,899.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 9,993.2 | 0.00 | 0.00 | 9,993.0 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| **Lodgepole** | | | | | | | | | |
| 10,000.2 | 0.00 | 0.00 | 10,000.0 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| **Start 340.4 hold at 10000.2 MD** | | | | | | | | | |
| 10,100.0 | 0.00 | 0.00 | 10,099.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 10,200.0 | 0.00 | 0.00 | 10,199.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 10,300.0 | 0.00 | 0.00 | 10,299.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 10,340.7 | 0.00 | 0.00 | 10,340.4 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| **Start Build 12.00 KOP** | | | | | | | | | |
| 10,350.0 | 1.12 | 79.83 | 10,349.8 | 50.0 | 0.1 | 1.0 | 12.00 | 12.00 | 0.00 |
| 10,375.0 | 4.12 | 79.83 | 10,374.8 | 50.2 | 1.2 | 2.1 | 12.00 | 12.00 | 0.00 |
| 10,400.0 | 7.12 | 79.83 | 10,399.6 | 50.7 | 3.6 | 4.6 | 12.00 | 12.00 | 0.00 |
| 10,425.0 | 10.12 | 79.83 | 10,424.3 | 51.3 | 7.3 | 8.3 | 12.00 | 12.00 | 0.00 |
| 10,450.0 | 13.12 | 79.83 | 10,448.8 | 52.2 | 12.3 | 13.2 | 12.00 | 12.00 | 0.00 |
| 10,475.0 | 16.12 | 79.83 | 10,473.0 | 53.3 | 18.5 | 19.5 | 12.00 | 12.00 | 0.00 |
| 10,500.0 | 19.12 | 79.83 | 10,496.8 | 54.7 | 25.9 | 26.9 | 12.00 | 12.00 | 0.00 |
| 10,525.0 | 22.12 | 79.83 | 10,520.2 | 56.2 | 34.6 | 35.6 | 12.00 | 12.00 | 0.00 |
| 10,550.0 | 25.12 | 79.83 | 10,543.1 | 58.0 | 44.5 | 45.5 | 12.00 | 12.00 | 0.00 |
| 10,575.0 | 28.12 | 79.83 | 10,565.5 | 60.0 | 55.5 | 56.6 | 12.00 | 12.00 | 0.00 |

# Oasis Petroleum

## Planning Report

| | | | |
|---|---|---|---|
| **Database:** | OpenWellsCompass - EDM Prod | **Local Co-ordinate Reference:** | Well CHALMERS 5300 21-19 8T |
| **Company:** | Oasis | **TVD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Project:** | Indian Hills | **MD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Site:** | 153N-100W-19/20 | **North Reference:** | True |
| **Well:** | CHALMERS 5300 21-19 8T | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | CHALMERS 5300 21-19 8T | | |
| **Design:** | Plan #1 | | |

**Planned Survey**

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |
|---|---|---|---|---|---|---|---|---|---|
| 10,600.0 | 31.12 | 79.83 | 10,587.2 | 62.1 | 67.6 | 68.8 | 12.00 | 12.00 | 0.00 |
| 10,625.0 | 34.12 | 79.83 | 10,608.3 | 64.5 | 80.9 | 82.1 | 12.00 | 12.00 | 0.00 |
| 10,650.0 | 37.12 | 79.83 | 10,628.6 | 67.1 | 95.2 | 96.4 | 12.00 | 12.00 | 0.00 |
| 10,675.0 | 40.12 | 79.83 | 10,648.1 | 69.8 | 110.6 | 111.9 | 12.00 | 12.00 | 0.00 |
| 10,700.0 | 43.12 | 79.83 | 10,666.8 | 72.8 | 126.9 | 128.2 | 12.00 | 12.00 | 0.00 |
| 10,725.0 | 46.12 | 79.83 | 10,684.6 | 75.9 | 144.2 | 145.6 | 12.00 | 12.00 | 0.00 |
| 10,750.0 | 49.12 | 79.83 | 10,701.4 | 79.1 | 162.4 | 163.8 | 12.00 | 12.00 | 0.00 |
| 10,757.0 | 49.96 | 79.83 | 10,706.0 | 80.1 | 167.7 | 169.1 | 12.00 | 12.00 | 0.00 |
| **False Bakken** | | | | | | | | | |
| 10,772.9 | 51.87 | 79.83 | 10,716.0 | 82.2 | 179.8 | 181.2 | 12.00 | 12.00 | 0.00 |
| **Upper Bakken Shale** | | | | | | | | | |
| 10,775.0 | 52.12 | 79.83 | 10,717.3 | 82.5 | 181.4 | 182.9 | 12.00 | 12.00 | 0.00 |
| 10,799.8 | 55.09 | 79.83 | 10,732.0 | 86.1 | 201.0 | 202.6 | 12.00 | 12.00 | 0.00 |
| **Middle Bakken** | | | | | | | | | |
| 10,800.0 | 55.12 | 79.83 | 10,732.1 | 86.1 | 201.2 | 202.8 | 12.00 | 12.00 | 0.00 |
| 10,825.0 | 58.12 | 79.83 | 10,745.9 | 89.8 | 221.8 | 223.4 | 12.00 | 12.00 | 0.00 |
| 10,850.0 | 61.12 | 79.83 | 10,758.5 | 93.6 | 243.0 | 244.7 | 12.00 | 12.00 | 0.00 |
| 10,866.0 | 63.04 | 79.83 | 10,766.0 | 96.1 | 256.9 | 258.6 | 12.00 | 12.00 | 0.00 |
| **Lower Bakken Shale** | | | | | | | | | |
| 10,875.0 | 64.12 | 79.83 | 10,770.0 | 97.5 | 264.8 | 266.6 | 12.00 | 12.00 | 0.00 |
| 10,899.1 | 67.02 | 79.83 | 10,780.0 | 101.4 | 286.5 | 288.3 | 12.00 | 12.00 | 0.00 |
| **Pronghorn** | | | | | | | | | |
| 10,900.0 | 67.12 | 79.83 | 10,780.3 | 101.5 | 287.3 | 289.1 | 12.00 | 12.00 | 0.00 |
| 10,925.0 | 70.12 | 79.83 | 10,789.4 | 105.6 | 310.2 | 312.0 | 12.00 | 12.00 | 0.00 |
| 10,950.0 | 73.12 | 79.83 | 10,797.3 | 109.8 | 333.5 | 335.5 | 12.00 | 12.00 | 0.00 |
| 10,955.9 | 73.83 | 79.83 | 10,799.0 | 110.8 | 339.1 | 341.0 | 12.00 | 12.00 | 0.00 |
| **Threeforks** | | | | | | | | | |
| 10,975.0 | 76.12 | 79.83 | 10,804.0 | 114.1 | 357.2 | 359.3 | 12.00 | 12.00 | 0.00 |
| 11,000.0 | 79.12 | 79.83 | 10,809.3 | 118.4 | 381.3 | 383.4 | 12.00 | 12.00 | 0.00 |
| 11,009.4 | 80.25 | 79.83 | 10,811.0 | 120.0 | 390.4 | 392.5 | 12.00 | 12.00 | 0.00 |
| **Threeforks(Top of Target)** | | | | | | | | | |
| 11,025.0 | 82.12 | 79.83 | 10,813.4 | 122.7 | 405.5 | 407.7 | 12.00 | 12.00 | 0.00 |
| 11,050.0 | 85.12 | 79.83 | 10,816.2 | 127.1 | 430.0 | 432.3 | 12.00 | 12.00 | 0.00 |
| 11,075.0 | 88.12 | 79.83 | 10,817.6 | 131.5 | 454.6 | 456.9 | 12.00 | 12.00 | 0.00 |
| 11,087.7 | 89.65 | 79.83 | 10,817.9 | 133.8 | 467.1 | 469.5 | 12.00 | 12.00 | 0.00 |
| **Start 18.2 hold at 11087.7 MD EOC** | | | | | | | | | |
| 11,105.9 | 89.65 | 79.83 | 10,818.0 | 137.0 | 485.0 | 487.4 | 0.00 | 0.00 | 0.00 |
| **Start DLS 2.00 TFO 90.05 Csg Pt** | | | | | | | | | |
| 11,106.0 | 89.65 | 79.83 | 10,818.0 | 137.0 | 485.1 | 487.5 | 0.00 | 0.00 | 0.00 |
| **7"** | | | | | | | | | |
| 11,200.0 | 89.65 | 81.71 | 10,818.6 | 152.1 | 577.8 | 580.5 | 2.00 | 0.00 | 2.00 |
| 11,300.0 | 89.65 | 83.71 | 10,819.2 | 164.8 | 677.0 | 679.9 | 2.00 | 0.00 | 2.00 |
| 11,400.0 | 89.65 | 85.71 | 10,819.8 | 174.0 | 776.6 | 779.7 | 2.00 | 0.00 | 2.00 |
| 11,500.0 | 89.65 | 87.71 | 10,820.4 | 179.7 | 876.4 | 879.6 | 2.00 | 0.00 | 2.00 |
| 11,600.0 | 89.65 | 89.71 | 10,821.0 | 182.0 | 976.4 | 979.6 | 2.00 | 0.00 | 2.00 |
| 11,614.4 | 89.65 | 90.00 | 10,821.1 | 182.0 | 990.8 | 994.0 | 2.00 | 0.00 | 2.00 |
| **Start 8984.3 hold at 11614.4 MD** | | | | | | | | | |
| 11,700.0 | 89.65 | 90.00 | 10,821.7 | 182.0 | 1,076.4 | 1,079.5 | 0.00 | 0.00 | 0.00 |
| 11,800.0 | 89.65 | 90.00 | 10,822.3 | 182.0 | 1,176.4 | 1,179.5 | 0.00 | 0.00 | 0.00 |
| 11,900.0 | 89.65 | 90.00 | 10,822.9 | 182.0 | 1,276.4 | 1,279.5 | 0.00 | 0.00 | 0.00 |
| 12,000.0 | 89.65 | 90.00 | 10,823.5 | 182.0 | 1,376.4 | 1,379.5 | 0.00 | 0.00 | 0.00 |
| 12,100.0 | 89.65 | 90.00 | 10,824.1 | 182.0 | 1,476.4 | 1,479.5 | 0.00 | 0.00 | 0.00 |
| 12,200.0 | 89.65 | 90.00 | 10,824.7 | 182.0 | 1,576.4 | 1,579.4 | 0.00 | 0.00 | 0.00 |
| 12,300.0 | 89.65 | 90.00 | 10,825.4 | 182.0 | 1,676.4 | 1,679.4 | 0.00 | 0.00 | 0.00 |

# Oasis Petroleum

Planning Report

| | | | |
|---|---|---|---|
| **Database:** | OpenWellsCompass - EDM Prod | **Local Co-ordinate Reference:** | Well CHALMERS 5300 21-19 8T |
| **Company:** | Oasis | **TVD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Project:** | Indian Hills | **MD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Site:** | 153N-100W-19/20 | **North Reference:** | True |
| **Well:** | CHALMERS 5300 21-19 8T | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | CHALMERS 5300 21-19 8T | | |
| **Design:** | Plan #1 | | |

**Planned Survey**

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |
|---|---|---|---|---|---|---|---|---|---|
| 12,400.0 | 89.65 | 90.00 | 10,826.0 | 182.0 | 1,776.4 | 1,779.4 | 0.00 | 0.00 | 0.00 |
| 12,500.0 | 89.65 | 90.00 | 10,826.6 | 182.0 | 1,876.4 | 1,879.4 | 0.00 | 0.00 | 0.00 |
| 12,600.0 | 89.65 | 90.00 | 10,827.2 | 182.0 | 1,976.4 | 1,979.4 | 0.00 | 0.00 | 0.00 |
| 12,700.0 | 89.65 | 90.00 | 10,827.8 | 182.0 | 2,076.4 | 2,079.4 | 0.00 | 0.00 | 0.00 |
| 12,800.0 | 89.65 | 90.00 | 10,828.4 | 182.0 | 2,176.4 | 2,179.3 | 0.00 | 0.00 | 0.00 |
| 12,900.0 | 89.65 | 90.00 | 10,829.1 | 182.0 | 2,276.4 | 2,279.3 | 0.00 | 0.00 | 0.00 |
| 13,000.0 | 89.65 | 90.00 | 10,829.7 | 182.0 | 2,376.4 | 2,379.3 | 0.00 | 0.00 | 0.00 |
| 13,100.0 | 89.65 | 90.00 | 10,830.3 | 182.0 | 2,476.4 | 2,479.3 | 0.00 | 0.00 | 0.00 |
| 13,200.0 | 89.65 | 90.00 | 10,830.9 | 182.0 | 2,576.4 | 2,579.3 | 0.00 | 0.00 | 0.00 |
| 13,300.0 | 89.65 | 90.00 | 10,831.5 | 182.0 | 2,676.4 | 2,679.2 | 0.00 | 0.00 | 0.00 |
| 13,400.0 | 89.65 | 90.00 | 10,832.1 | 182.0 | 2,776.4 | 2,779.2 | 0.00 | 0.00 | 0.00 |
| 13,500.0 | 89.65 | 90.00 | 10,832.8 | 182.0 | 2,876.4 | 2,879.2 | 0.00 | 0.00 | 0.00 |
| 13,600.0 | 89.65 | 90.00 | 10,833.4 | 182.0 | 2,976.4 | 2,979.2 | 0.00 | 0.00 | 0.00 |
| 13,700.0 | 89.65 | 90.00 | 10,834.0 | 182.0 | 3,076.4 | 3,079.2 | 0.00 | 0.00 | 0.00 |
| 13,800.0 | 89.65 | 90.00 | 10,834.6 | 182.0 | 3,176.4 | 3,179.2 | 0.00 | 0.00 | 0.00 |
| 13,900.0 | 89.65 | 90.00 | 10,835.2 | 182.0 | 3,276.4 | 3,279.1 | 0.00 | 0.00 | 0.00 |
| 14,000.0 | 89.65 | 90.00 | 10,835.8 | 182.0 | 3,376.4 | 3,379.1 | 0.00 | 0.00 | 0.00 |
| 14,100.0 | 89.65 | 90.00 | 10,836.5 | 182.0 | 3,476.3 | 3,479.1 | 0.00 | 0.00 | 0.00 |
| 14,200.0 | 89.65 | 90.00 | 10,837.1 | 182.0 | 3,576.3 | 3,579.1 | 0.00 | 0.00 | 0.00 |
| 14,300.0 | 89.65 | 90.00 | 10,837.7 | 182.0 | 3,676.3 | 3,679.1 | 0.00 | 0.00 | 0.00 |
| 14,400.0 | 89.65 | 90.00 | 10,838.3 | 182.0 | 3,776.3 | 3,779.0 | 0.00 | 0.00 | 0.00 |
| 14,500.0 | 89.65 | 90.00 | 10,838.9 | 182.0 | 3,876.3 | 3,879.0 | 0.00 | 0.00 | 0.00 |
| 14,600.0 | 89.65 | 90.00 | 10,839.5 | 182.0 | 3,976.3 | 3,979.0 | 0.00 | 0.00 | 0.00 |
| 14,700.0 | 89.65 | 90.00 | 10,840.2 | 182.0 | 4,076.3 | 4,079.0 | 0.00 | 0.00 | 0.00 |
| 14,800.0 | 89.65 | 90.00 | 10,840.8 | 182.0 | 4,176.3 | 4,179.0 | 0.00 | 0.00 | 0.00 |
| 14,900.0 | 89.65 | 90.00 | 10,841.4 | 182.0 | 4,276.3 | 4,278.9 | 0.00 | 0.00 | 0.00 |
| 15,000.0 | 89.65 | 90.00 | 10,842.0 | 182.0 | 4,376.3 | 4,378.9 | 0.00 | 0.00 | 0.00 |
| 15,100.0 | 89.65 | 90.00 | 10,842.6 | 182.0 | 4,476.3 | 4,478.9 | 0.00 | 0.00 | 0.00 |
| 15,200.0 | 89.65 | 90.00 | 10,843.2 | 182.0 | 4,576.3 | 4,578.9 | 0.00 | 0.00 | 0.00 |
| 15,300.0 | 89.65 | 90.00 | 10,843.9 | 182.0 | 4,676.3 | 4,678.9 | 0.00 | 0.00 | 0.00 |
| 15,400.0 | 89.65 | 90.00 | 10,844.5 | 182.0 | 4,776.3 | 4,778.9 | 0.00 | 0.00 | 0.00 |
| 15,500.0 | 89.65 | 90.00 | 10,845.1 | 182.0 | 4,876.3 | 4,878.8 | 0.00 | 0.00 | 0.00 |
| 15,600.0 | 89.65 | 90.00 | 10,845.7 | 182.0 | 4,976.3 | 4,978.8 | 0.00 | 0.00 | 0.00 |
| 15,700.0 | 89.65 | 90.00 | 10,846.3 | 182.0 | 5,076.3 | 5,078.8 | 0.00 | 0.00 | 0.00 |
| 15,800.0 | 89.65 | 90.00 | 10,846.9 | 182.0 | 5,176.3 | 5,178.8 | 0.00 | 0.00 | 0.00 |
| 15,900.0 | 89.65 | 90.00 | 10,847.6 | 182.0 | 5,276.3 | 5,278.8 | 0.00 | 0.00 | 0.00 |
| 16,000.0 | 89.65 | 90.00 | 10,848.2 | 182.0 | 5,376.3 | 5,378.7 | 0.00 | 0.00 | 0.00 |
| 16,100.0 | 89.65 | 90.00 | 10,848.8 | 182.0 | 5,476.3 | 5,478.7 | 0.00 | 0.00 | 0.00 |
| 16,200.0 | 89.65 | 90.00 | 10,849.4 | 182.0 | 5,576.3 | 5,578.7 | 0.00 | 0.00 | 0.00 |
| 16,300.0 | 89.65 | 90.00 | 10,850.0 | 182.0 | 5,676.3 | 5,678.7 | 0.00 | 0.00 | 0.00 |
| 16,400.0 | 89.65 | 90.00 | 10,850.6 | 182.0 | 5,776.3 | 5,778.7 | 0.00 | 0.00 | 0.00 |
| 16,500.0 | 89.65 | 90.00 | 10,851.3 | 182.0 | 5,876.3 | 5,878.6 | 0.00 | 0.00 | 0.00 |
| 16,600.0 | 89.65 | 90.00 | 10,851.9 | 182.0 | 5,976.3 | 5,978.6 | 0.00 | 0.00 | 0.00 |
| 16,700.0 | 89.65 | 90.00 | 10,852.5 | 182.0 | 6,076.3 | 6,078.6 | 0.00 | 0.00 | 0.00 |
| 16,800.0 | 89.65 | 90.00 | 10,853.1 | 182.0 | 6,176.3 | 6,178.6 | 0.00 | 0.00 | 0.00 |
| 16,900.0 | 89.65 | 90.00 | 10,853.7 | 182.0 | 6,276.3 | 6,278.6 | 0.00 | 0.00 | 0.00 |
| 17,000.0 | 89.65 | 90.00 | 10,854.3 | 182.0 | 6,376.3 | 6,378.6 | 0.00 | 0.00 | 0.00 |
| 17,100.0 | 89.65 | 90.00 | 10,855.0 | 182.0 | 6,476.3 | 6,478.5 | 0.00 | 0.00 | 0.00 |
| 17,200.0 | 89.65 | 90.00 | 10,855.6 | 182.0 | 6,576.3 | 6,578.5 | 0.00 | 0.00 | 0.00 |
| 17,300.0 | 89.65 | 90.00 | 10,856.2 | 182.0 | 6,676.3 | 6,678.5 | 0.00 | 0.00 | 0.00 |
| 17,400.0 | 89.65 | 90.00 | 10,856.8 | 182.0 | 6,776.3 | 6,778.5 | 0.00 | 0.00 | 0.00 |
| 17,500.0 | 89.65 | 90.00 | 10,857.4 | 182.0 | 6,876.3 | 6,878.5 | 0.00 | 0.00 | 0.00 |
| 17,600.0 | 89.65 | 90.00 | 10,858.0 | 182.0 | 6,976.3 | 6,978.4 | 0.00 | 0.00 | 0.00 |
| 17,700.0 | 89.65 | 90.00 | 10,858.7 | 182.0 | 7,076.3 | 7,078.4 | 0.00 | 0.00 | 0.00 |
| 17,800.0 | 89.65 | 90.00 | 10,859.3 | 182.0 | 7,176.3 | 7,178.4 | 0.00 | 0.00 | 0.00 |

# Oasis Petroleum

## Planning Report

| | | | |
|---|---|---|---|
| **Database:** | OpenWellsCompass - EDM Prod | **Local Co-ordinate Reference:** | Well CHALMERS 5300 21-19 8T |
| **Company:** | Oasis | **TVD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Project:** | Indian Hills | **MD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Site:** | 153N-100W-19/20 | **North Reference:** | True |
| **Well:** | CHALMERS 5300 21-19 8T | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | CHALMERS 5300 21-19 8T | | |
| **Design:** | Plan #1 | | |

**Planned Survey**

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |
|---|---|---|---|---|---|---|---|---|---|
| 17,900.0 | 89.65 | 90.00 | 10,859.9 | 182.0 | 7,276.3 | 7,278.4 | 0.00 | 0.00 | 0.00 |
| 18,000.0 | 89.65 | 90.00 | 10,860.5 | 182.0 | 7,376.3 | 7,378.4 | 0.00 | 0.00 | 0.00 |
| 18,100.0 | 89.65 | 90.00 | 10,861.1 | 182.0 | 7,476.3 | 7,478.4 | 0.00 | 0.00 | 0.00 |
| 18,200.0 | 89.65 | 90.00 | 10,861.7 | 182.0 | 7,576.3 | 7,578.3 | 0.00 | 0.00 | 0.00 |
| 18,300.0 | 89.65 | 90.00 | 10,862.4 | 182.0 | 7,676.3 | 7,678.3 | 0.00 | 0.00 | 0.00 |
| 18,400.0 | 89.65 | 90.00 | 10,863.0 | 182.0 | 7,776.3 | 7,778.3 | 0.00 | 0.00 | 0.00 |
| 18,500.0 | 89.65 | 90.00 | 10,863.6 | 182.0 | 7,876.3 | 7,878.3 | 0.00 | 0.00 | 0.00 |
| 18,600.0 | 89.65 | 90.00 | 10,864.2 | 182.0 | 7,976.3 | 7,978.3 | 0.00 | 0.00 | 0.00 |
| 18,700.0 | 89.65 | 90.00 | 10,864.8 | 182.0 | 8,076.3 | 8,078.2 | 0.00 | 0.00 | 0.00 |
| 18,800.0 | 89.65 | 90.00 | 10,865.4 | 182.0 | 8,176.3 | 8,178.2 | 0.00 | 0.00 | 0.00 |
| 18,900.0 | 89.65 | 90.00 | 10,866.1 | 182.0 | 8,276.3 | 8,278.2 | 0.00 | 0.00 | 0.00 |
| 19,000.0 | 89.65 | 90.00 | 10,866.7 | 182.0 | 8,376.3 | 8,378.2 | 0.00 | 0.00 | 0.00 |
| 19,100.0 | 89.65 | 90.00 | 10,867.3 | 182.0 | 8,476.3 | 8,478.2 | 0.00 | 0.00 | 0.00 |
| 19,200.0 | 89.65 | 90.00 | 10,867.9 | 182.0 | 8,576.3 | 8,578.1 | 0.00 | 0.00 | 0.00 |
| 19,300.0 | 89.65 | 90.00 | 10,868.5 | 182.0 | 8,676.3 | 8,678.1 | 0.00 | 0.00 | 0.00 |
| 19,400.0 | 89.65 | 90.00 | 10,869.1 | 182.0 | 8,776.2 | 8,778.1 | 0.00 | 0.00 | 0.00 |
| 19,500.0 | 89.65 | 90.00 | 10,869.8 | 182.0 | 8,876.2 | 8,878.1 | 0.00 | 0.00 | 0.00 |
| 19,600.0 | 89.65 | 90.00 | 10,870.4 | 182.0 | 8,976.2 | 8,978.1 | 0.00 | 0.00 | 0.00 |
| 19,700.0 | 89.65 | 90.00 | 10,871.0 | 182.0 | 9,076.2 | 9,078.1 | 0.00 | 0.00 | 0.00 |
| 19,800.0 | 89.65 | 90.00 | 10,871.6 | 182.0 | 9,176.2 | 9,178.0 | 0.00 | 0.00 | 0.00 |
| 19,900.0 | 89.65 | 90.00 | 10,872.2 | 182.0 | 9,276.2 | 9,278.0 | 0.00 | 0.00 | 0.00 |
| 20,000.0 | 89.65 | 90.00 | 10,872.8 | 182.0 | 9,376.2 | 9,378.0 | 0.00 | 0.00 | 0.00 |
| 20,100.0 | 89.65 | 90.00 | 10,873.5 | 182.0 | 9,476.2 | 9,478.0 | 0.00 | 0.00 | 0.00 |
| 20,200.0 | 89.65 | 90.00 | 10,874.1 | 182.0 | 9,576.2 | 9,578.0 | 0.00 | 0.00 | 0.00 |
| 20,300.0 | 89.65 | 90.00 | 10,874.7 | 182.0 | 9,676.2 | 9,677.9 | 0.00 | 0.00 | 0.00 |
| 20,400.0 | 89.65 | 90.00 | 10,875.3 | 182.0 | 9,776.2 | 9,777.9 | 0.00 | 0.00 | 0.00 |
| 20,500.0 | 89.65 | 90.00 | 10,875.9 | 182.0 | 9,876.2 | 9,877.9 | 0.00 | 0.00 | 0.00 |
| 20,582.4 | 89.65 | 90.00 | 10,876.4 | 182.0 | 9,958.6 | 9,960.3 | 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 |
|---|---|---|---|---|---|---|---|---|---|
| Chalmers 8T | 0.00 | 0.00 | 10,876.8 | 181.7 | 9,974.9 | 402,255.11 | 1,219,964.60 | 48° 3' 43.067 N | 103° 33' 43.255 W |
| - plan misses target center by 16.3ft at 20582.4ft MD (10876.4 TVD, 182.0 N, 9958.6 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 |
| 11,106.0 | 10,818.0 | 7" | 7.000 | 8.750 |

| | | | |
|---|---|---|---|
| **Database:** | OpenWellsCompass - EDM Prod | **Local Co-ordinate Reference:** | Well CHALMERS 5300 21-19 8T |
| **Company:** | Oasis | **TVD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Project:** | Indian Hills | **MD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Site:** | 153N-100W-19/20 | **North Reference:** | True |
| **Well:** | CHALMERS 5300 21-19 8T | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | CHALMERS 5300 21-19 8T | | |
| **Design:** | Plan #1 | | |

**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 | | | |
| 10,757.0 | 10,706.0 | False Bakken | | | |
| 10,772.9 | 10,716.0 | Upper Bakken Shale | | | |
| 10,799.8 | 10,732.0 | Middle Bakken | | | |
| 10,866.0 | 10,766.0 | Lower Bakken Shale | | | |
| 10,899.1 | 10,780.0 | Pronghorn | | | |
| 10,955.9 | 10,799.0 | Threeforks | | | |
| 11,009.4 | 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 340.4 hold at 10000.2 MD |
| 10,340.7 | 10,340.4 | 50.0 | 0.0 | Start Build 12.00 KOP |
| 11,087.7 | 10,817.9 | 133.8 | 467.1 | Start 18.2 hold at 11087.7 MD EOC |
| 11,105.9 | 10,818.0 | 137.0 | 485.0 | Start DLS 2.00 TFO 90.05 Csg Pt |
| 11,614.4 | 10,821.1 | 182.0 | 990.8 | Start 8984.3 hold at 11614.4 MD |
| 20,598.7 | 10,876.5 | 182.0 | 9,974.9 | TD at 20598.7 |

# SECTION BREAKDOWN

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"CHALMERS 5300 21-19 8T"
2226 FEET FROM NORTH LINE AND 327 FEET FROM WEST LINE
SECTIONS 19 & 20, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA

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 | BRH | MOVED WELLS ON PAD/REVISED PAD |
| REV 3 | 5/2/14 | BRH | MOVED WELLS ON PAD/REVISED PAD |

OASIS PETROLEUM NORTH AMERICA, LLC
SECTION BREAKDOWN
SECTIONS 19 & 20, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. Project No.: 813-09-282.03
Checked By: D.D.K. Date: JAN. 2014

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P.O. Box 648
425 East Main Street
Sidney, Montana 59270
Ph: (406) 433-5617
Fax: (406) 433-5618
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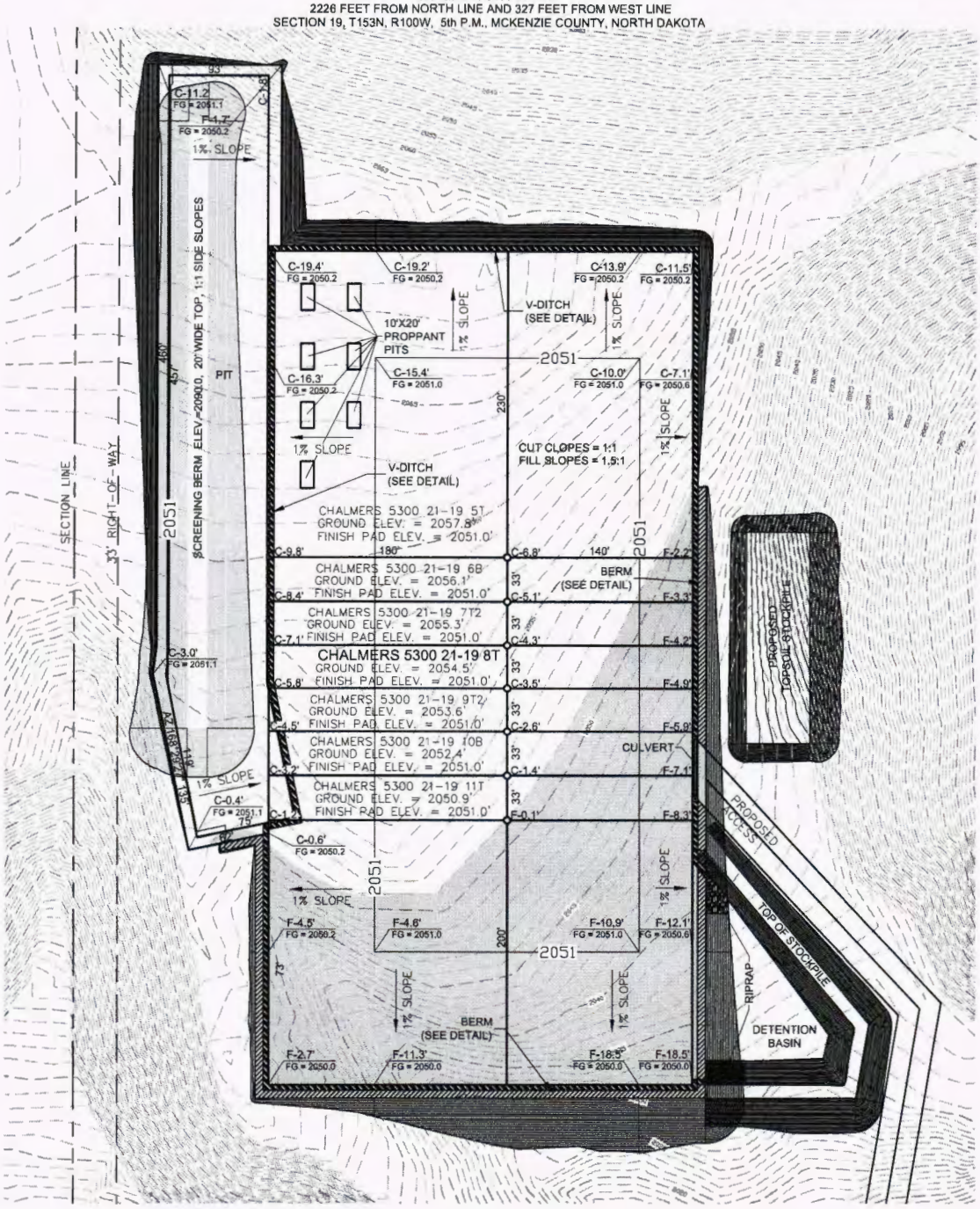
# PAD LAYOUT

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"CHALMERS 5300 21-19 8T"
2226 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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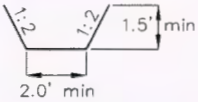
REGISTERED LAND SURVEYOR
DARYL D. KASEMAN
LS-3880
DATE: 5/07/14
NORTH DAKOTA

0 80
1" = 80'

V-DITCH DETAIL




Proposed Contours
Original Contours
BERM
DITCH

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

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Ph (406) 433-5617
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Other offices in Minnesota, North Dakota and South Dakota

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

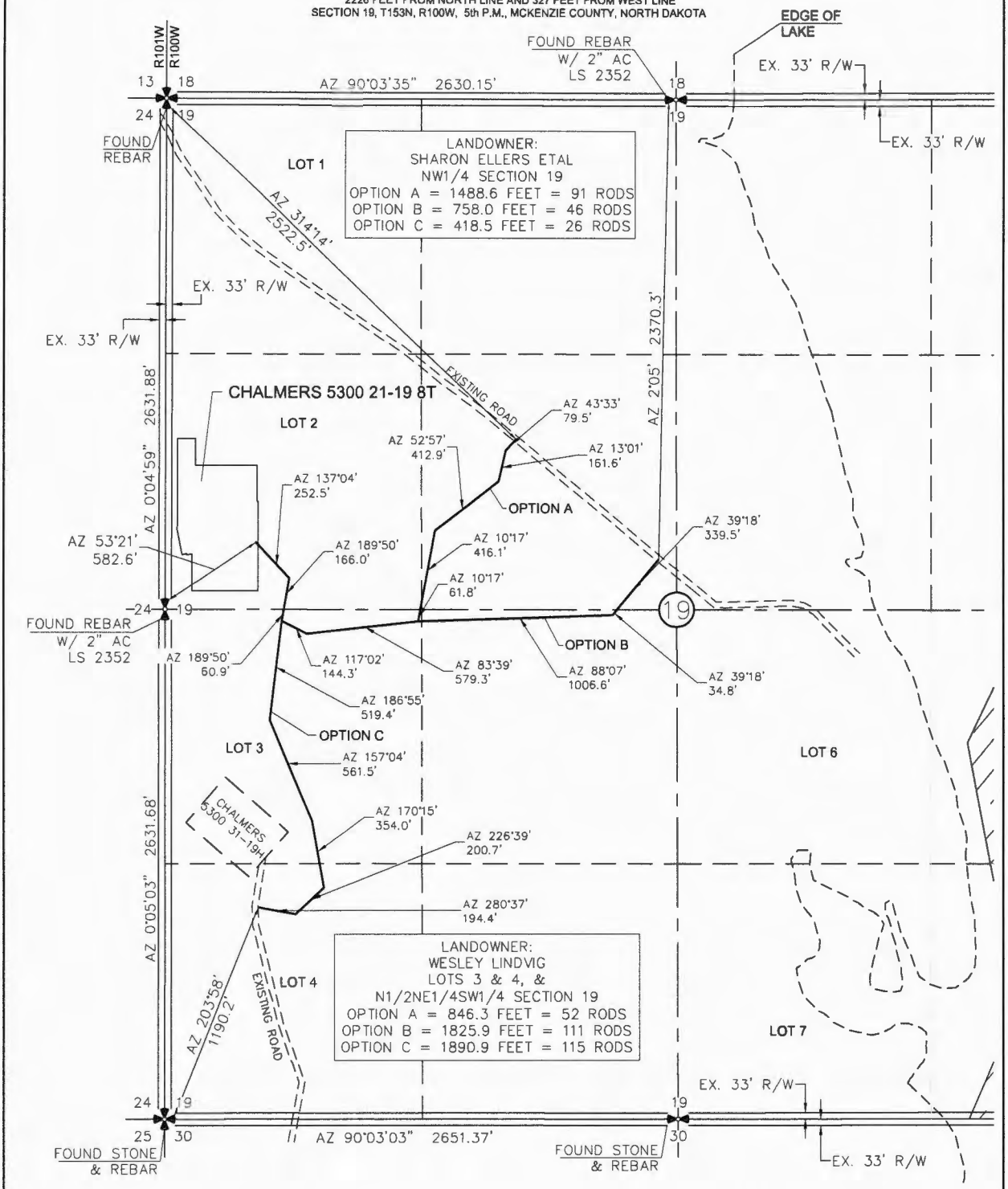
Drawn By: B.H.H. | Project No.: 313-09-282.03
Checked By: D.D.K. | Date: JAN. 2014

| 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 |

Chalmers\CADD\Chalmers 5300 21-19 8T Revised 5-2-14.dwg - 5/7/2014 11:48 AM

# ACCESS APPROACH

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"CHALMERS 5300 21-19 8T"
2226 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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REGISTERED LAND SURVEYOR
DARYL D. KASEMAN
LS-3880
DATE: 5/07/14
NORTH DAKOTA

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

0 500
1" = 500'

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OASIS PETROLEUM NORTH AMERICA, LLC
ACCESS APPROACH
SECTION 19, T153N, R100W

MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. | Project No.: S13-09-282.03
Checked By: D.D.K. | Date: JAN. 2014

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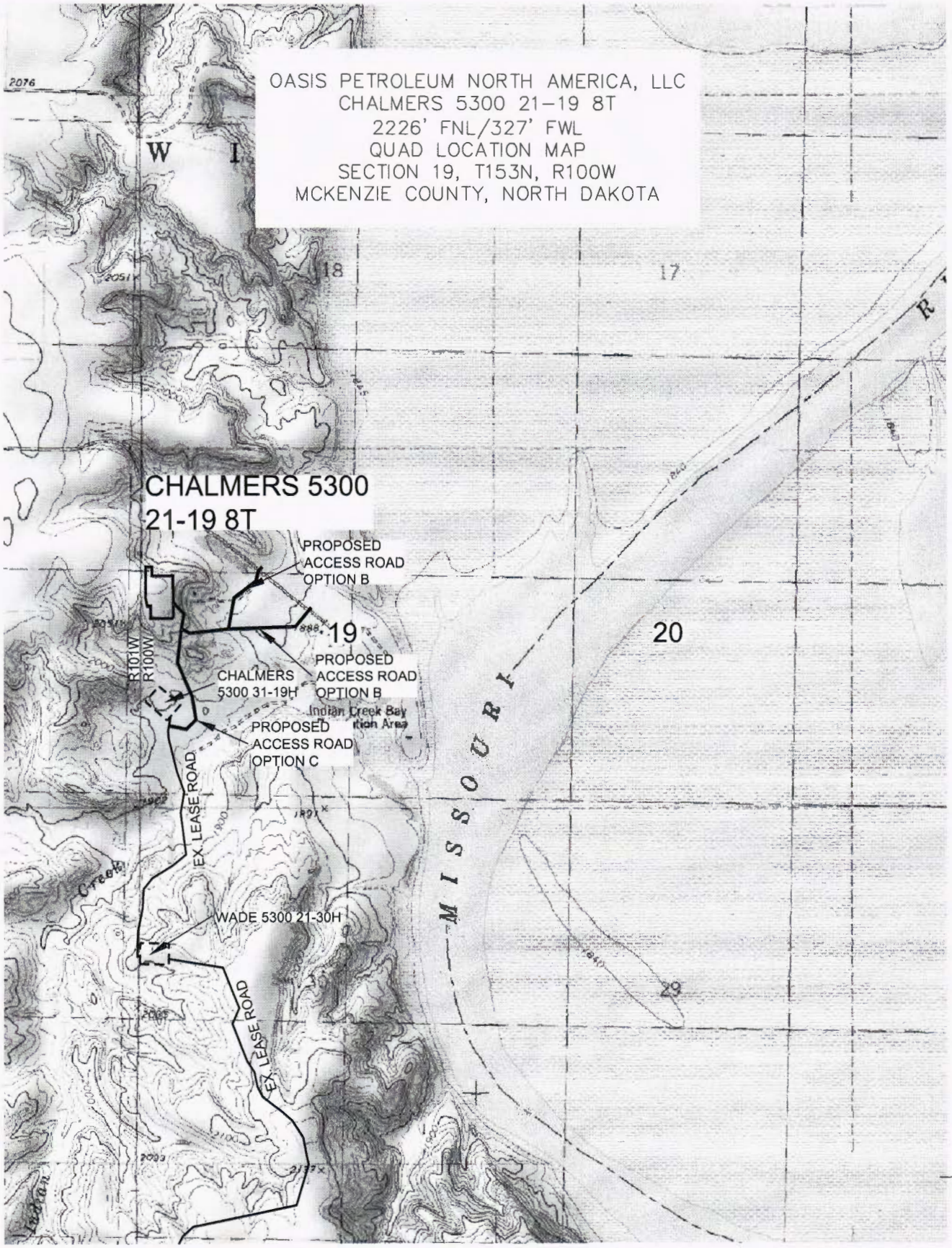
| REV 3 | 5/2/14 | BHH | MOVED WELLS ON PAD/REVISED PAD |

Chalmers 5300 21-19 8T Revised 5-2-14.dwg – 5/7/2014 10:46 AM

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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.: S13-09-282.03
Checked By: D.D.K. | Date: JAN. 2014

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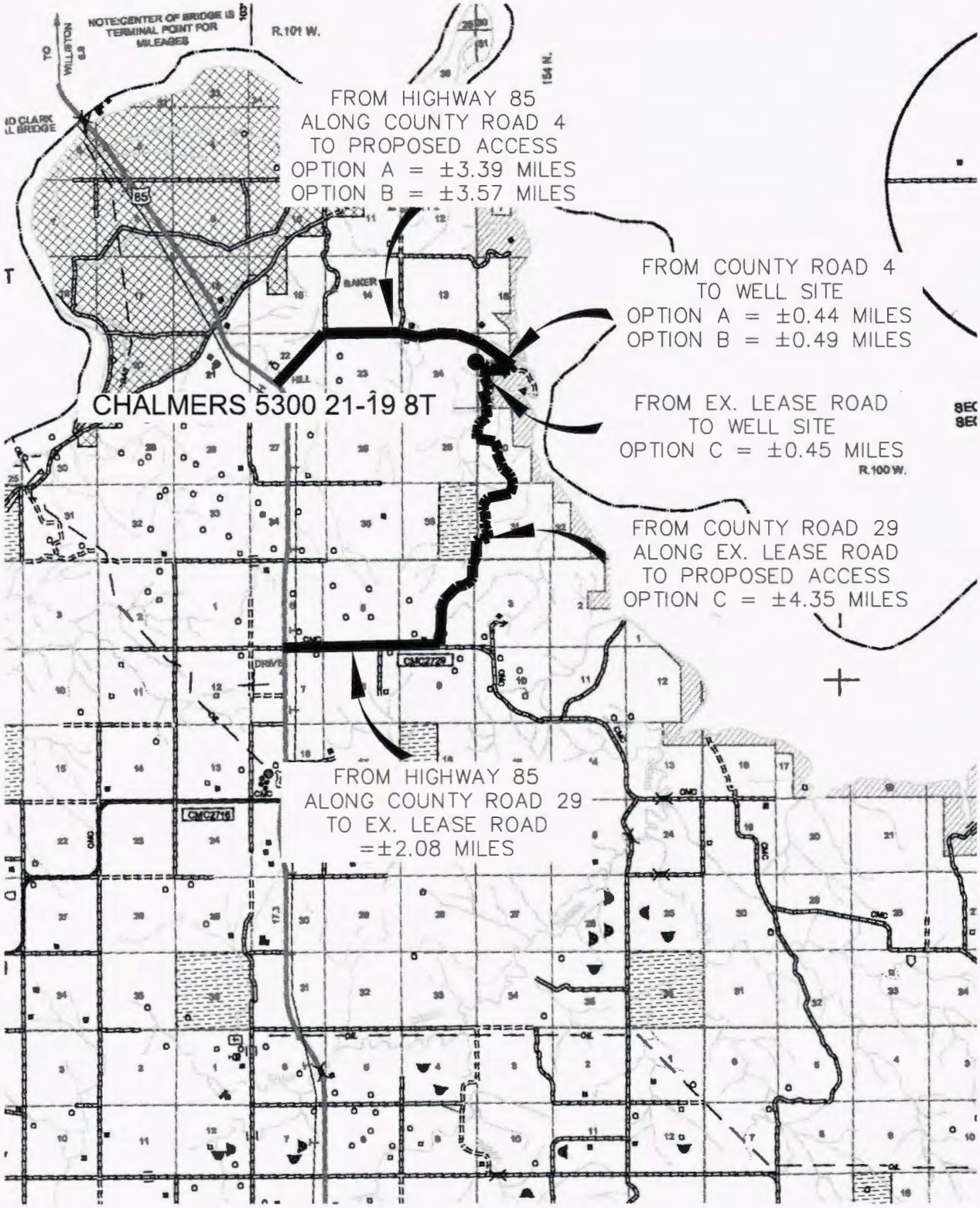
| REV 3 | 5/2/14 | BHH | MOVED WELLS ON PAD/REVISED PAD |

# COUNTY ROAD MAP

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"CHALMERS 5300 21-19 8T"
2226 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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SCALE: 1" = 2 MILE



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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.: S13-09-282.03
Checked By: D.D.K. Date: JAN. 2014

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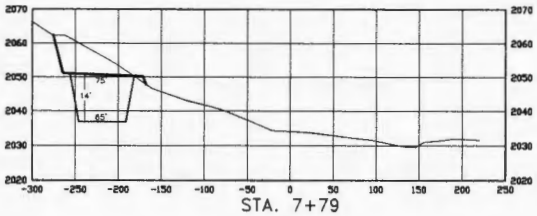
| REV 3 | 5/2/14 | BHH | MOVED WELLS ON PAD/REVISED PAD |

# CROSS SECTIONS

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"CHALMERS 5300 21-19 8T"
2226 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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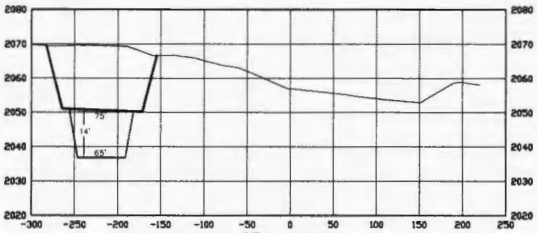


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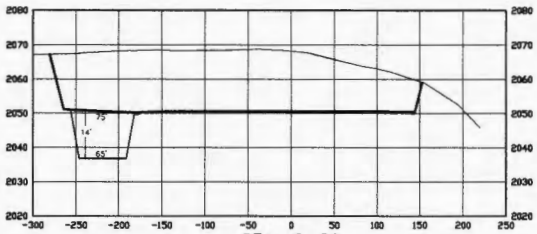


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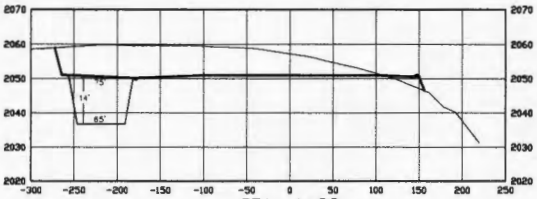


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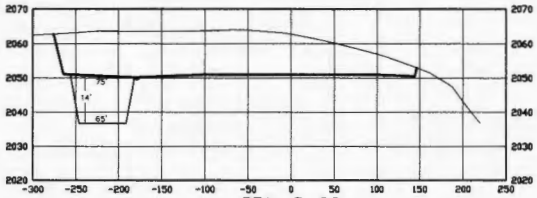


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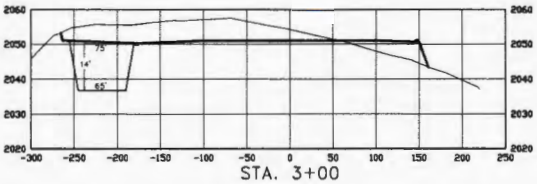


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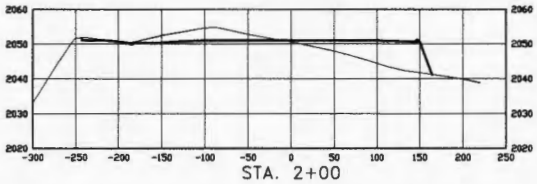

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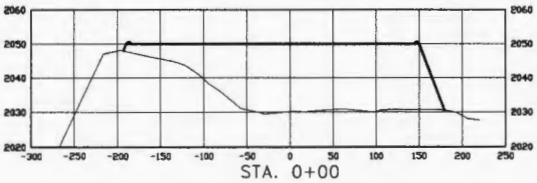

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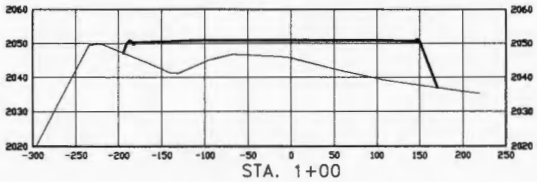

STA. 1+00

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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OASIS PETROLEUM NORTH AMERICA, LLC
CROSS SECTIONS
SECTION 19, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. | Project No.: S13-09-282.03
Checked By: D.D.K. | Date: JAN. 2014

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| REV 1 | 3/12/14 | JJS | MOVED WELLS ON PAD |
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| REV 3 | 5/2/14 | BHH | MOVED WELLS ON PAD/REVISED PAD |

# WELL LOCATION SITE QUANTITIES

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"CHALMERS 5300 21-19 8T"
2226 FEET FROM NORTH LINE AND 327 FEET FROM WEST LINE
SECTION 19, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA

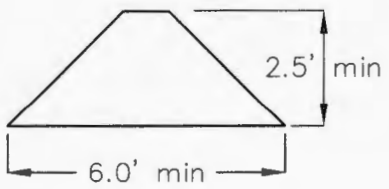
| | |
|---|---|
| WELL SITE ELEVATION | 2054.5 |
| WELL PAD ELEVATION | 2051.0 |

| | |
|---|---|
| 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 |

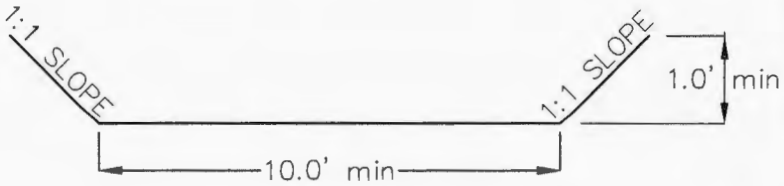
NOTE: ALL QUANTITIES ARE IN CUBIC YARDS (UNLESS NOTED)
CUT END SLOPES AT 1:1
FILL END SLOPES AT 1.5:1

WELL SITE LOCATION
2226' FNL
327' FWL

BERM DETAIL




DITCH DETAIL

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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
QUANTITIES
SECTION 19, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. Project No.: S13-09-282.03
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 |

# 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  28636

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 8T** Well File No.: **28636**
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)

APR 2014 RECEIVED ND OIL & GAS DIVISION

Well File No. 28636

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

| | | | |
|---|---|---|---|
| ☑ Notice of Intent | Approximate Start Date **October 1, 2014** | ☐ Drilling Prognosis | ☐ Spill Report |
| ☐ Report of Work Done | Date Work Completed | ☐ Redrilling or Repair | ☐ Shooting |
| ☐ Notice of Intent to Begin a Workover Project that may Qualify for a Tax Exemption Pursuant to NDCC Section 57-51.1-03. | Approximate Start Date | ☐ Casing or Liner | ☐ Acidizing |
| | | ☐ Plug Well | ☐ Fracture Treatment |
| | | ☐ Supplemental History | ☐ Change Production Method |
| | | ☐ Temporarily Abandon | ☐ Reclamation |
| | | ☑ Other | **Waiver to rule Rule 43-02-03-31** |

| Well Name and Number | | | | |
|---|---|---|---|---|
| **Chalmers 5300 21-19 8T** | | | | |
| Footages | Qtr-Qtr | Section | Township | Range |
| **2226 F N L 326 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:**

**The Oasis Petroleum/ ~~Chalmers 5300 31-19H (NDIC 20407)~~ located within a mile of the subject wel**

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

| | | |
|---|---|---|
| Company **Oasis Petroleum North America LLC** | | Telephone Number **281-404-9491** |
| Address **1001 Fannin, Suite 1500** | | |
| City **Houston** | State **TX** | Zip Code **77002** |
| Signature | Printed Name **Brandi Terry** | |
| Title **Regulatory Specialist** | Date **April 1, 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. 28636

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

☑ Notice of Intent — Approximate Start Date: **October 1, 2014**

☐ Report of Work Done — Date Work Completed:

☐ Notice of Intent to Begin a Workover Project that may Qualify for a Tax Exemption Pursuant to NDCC Section 57-51.1-03. — Approximate Start Date:

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

| Well Name and Number | | | | | |
|---|---|---|---|---|---|
| **Chalmers 5300 21-19 8T** | | | | | |
| Footages | Qtr-Qtr | Section | Township | Range | |
| **2226 F N L 326 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** | **April 1, 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 8T**
**LOT2 Section 19-153N-100W**
**McKenzie County**
**Well File # 28636**

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 Section 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: 9972' 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 / 1 / 2014 | No |

| Operator | Telephone Number |
|---|---|
| OASIS PETROLEUM NORTH AMERICA LLC | 281-404-9491 |

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

☑ Notice has been provided to the owner of any permanently occupied dwelling within 1,320 feet.

☑ This well is not located within five hundred feet of an occupied dwelling.

## WELL INFORMATION (If more than one lateral proposed, enter data for additional laterals on page 2)

| Well Name | Well Number |
|---|---|
| CHALMERS | 5300 21-19 8T |

| Surface Footages | Qtr-Qtr | Section | Township | Range | County |
|---|---|---|---|---|---|
| 2226 F N L 326 F W L | LOT2 | 19 | 153 N | 100 W | McKenzie |

| Longstring Casing Point Footages | Qtr-Qtr | Section | Township | Range | County |
|---|---|---|---|---|---|
| 2089 F N L 811 F W L | LOT2 | 19 | 153 N | 100 W | McKenzie |

| Longstring Casing Point Coordinates From Well Head | Azimuth | Longstring Total Depth |
|---|---|---|
| 137 N From WH 485 E From WH | 79.8 º | 11106 Feet MD 10818 Feet TVD |

| Bottom Hole Footages From Nearest Section Line | Qtr-Qtr | Section | Township | Range | County |
|---|---|---|---|---|---|
| 2044 F N L 213 F E L | SENE | 20 | 153 N | 100 W | McKenzie |

| Bottom Hole Coordinates From Well Head | KOP Lateral 1 | Azimuth Lateral 1 | Estimated Total Depth Lateral 1 |
|---|---|---|---|
| 182 N From WH 9959 E From WH | 10341 Feet MD | 90.0 º | 20582 Feet MD 10876 Feet TVD |

| Latitude of Well Head | Longitude of Well Head | NAD Reference | Description of (Subject to NDIC Approval) |
|---|---|---|---|
| 48 ° 03 ' 41.30 " | -103 ° 36 ' 10.11 " | NAD83 | Spacing Unit: Section 19 &20 T153N R100W |

| Ground Elevation | Acres in Spacing/Drilling Unit | Spacing/Drilling Unit Setback Requirement | Industrial Commission Order |
|---|---|---|---|
| 2054 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 |
|---|---|---|---|
| 10498 Feet | 10513 Feet | 5280 Feet | 5263 Feet |

| Objective Horizons | Pierre Shale Top |
|---|---|
| Three Forks B1 | 2021 |

| Proposed | Size | Weight | Depth | Cement Volume | |
|---|---|---|---|---|---|
| Surface Casing | 9 - 5/8 " | 36 Lb./Ft. | 2150 Feet | 632 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. | 11106 Feet MD 10818 Feet TVD | 765 Sacks | 3917 Feet | 5417 Feet |

| Base Last Charles Salt (If Applicable) | |
|---|---|
| 9209 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 **03 / 31 / 2014**

| ePermit | Printed Name **Brandi Terry** | Title **Regulatory Specialist** |
|---|---|---|

**FOR STATE USE ONLY**

| Permit and File Number **28636** | API Number **33 - 053 - 06021** |
|---|---|
| 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,

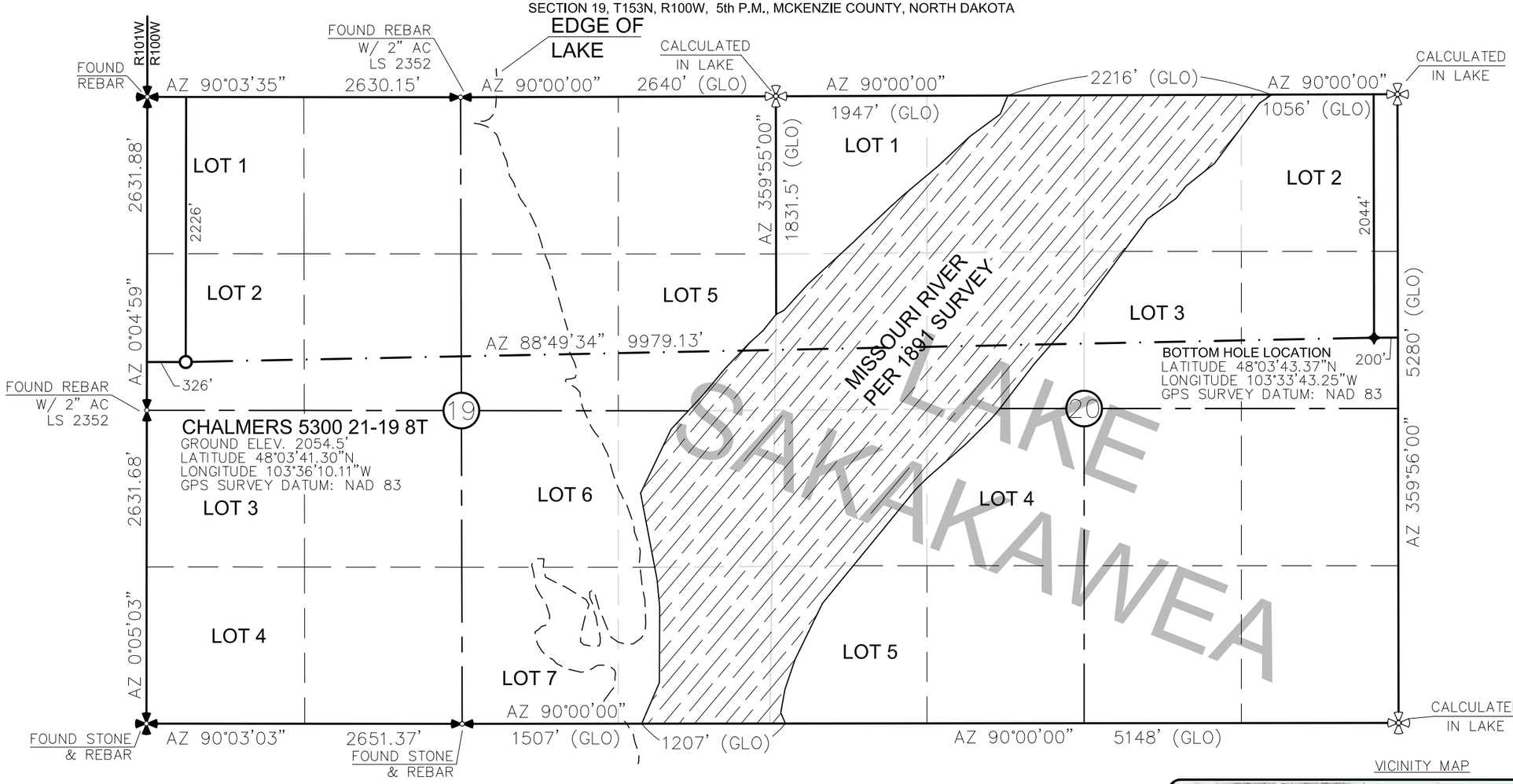
*Bruce E. Hicks*

Assistant Director


600 E Boulevard Ave - Dept 405, Bismarck, North Dakota 58505-0840 Phone (701)328-8020 Fax (701)328-8022

# WELL LOCATION PLAT

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"CHALMERS 5300 21-19 8T"
2226 FEET FROM NORTH LINE AND 326 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

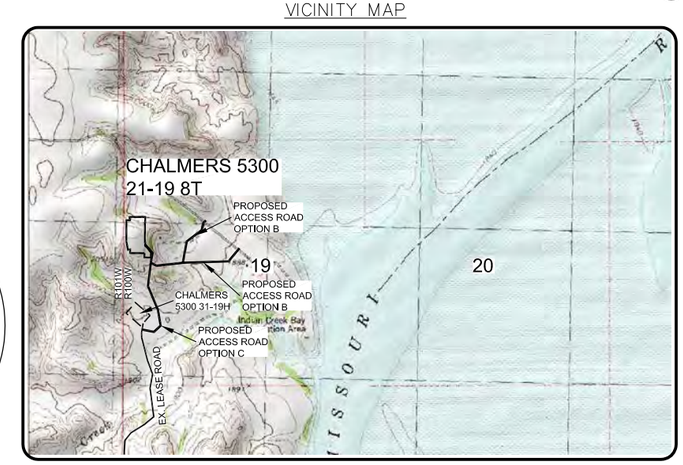
STAKED ON 1/29/14
VERTICAL CONTROL DATUM WAS BASED UPON CONTROL POINT 16 WITH AN ELEVATION OF 2014.2'

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: 3/13/14
NORTH DAKOTA

VICINITY MAP

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| Revision No. | Date | By | Description |
|---|---|---|---|
| REV 1 | 3/12/14 | JJS | MOVED WELLS ON PAD |

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

Drawn By: B.H.H. Project No.: S13-09-282.03
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
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# DRILLING PLAN

| | | | |
|---|---|---|---|
| **OPERATOR** | Oasis Petroleum | **COUNTY/STATE** | McKenzie Co. , ND |
| **WELL NAME** | Chalmers 5300 21-19 8T | **RIG** | B 25 |
| **WELL TYPE** | Horizontal Three Forks | | |
| **LOCATION** | SW NW 19-153N-100W Surface Location (survey plat): 2226' FNL | 326' FWL | |
| **EST. T.D.** | 20,582' | **GROUND ELEV:** 2,046' | **Sub Height:** 25' |
| | TOTAL LATERAL: 9,476' | **KB ELEV:** 2,071' | |

| **MARKER** | | **TVD** | **Subsea TVD** |
|---|---|---|---|
| Pierre | NDIC MAP | 2,021 | 50 |
| Greenhorn | | 4,624 | -2,553 |
| Mowry | | 5,029 | -2,958 |
| Dakota | | 5,417 | -3,346 |
| Rierdon | | 6,463 | -4,392 |
| Dunham Salt | | 6,891 | -4,820 |
| Dunham Salt Base | | 6,960 | -4,889 |
| Pine Salt | | 7,257 | -5,186 |
| Pine Salt Base | | 7,290 | -5,219 |
| Opeche Salt | | 7,351 | -5,280 |
| Opeche Salt Base | | 7,426 | -5,355 |
| Amsden | | 7,662 | -5,591 |
| Tyler | | 7,828 | -5,757 |
| Otter/Base Minnelusa | | 8,032 | -5,961 |
| Kibbey Lime | | 8,384 | -6,313 |
| Charles Salt | | 8,534 | -6,463 |
| Base Last Salt | | 9,209 | -7,138 |
| Mission Canyon | | 9,429 | -7,358 |
| Lodgepole | | 9,993 | -7,922 |
| False Bakken | | 10,706 | -8,635 |
| Upper Bakken Shale | | 10,716 | -8,645 |
| Middle Bakken | | 10,732 | -8,661 |
| Lower Bakken Shale | | 10,766 | -8,695 |
| Pronghorn | | 10,780 | -8,709 |
| Threeforks | | 10,799 | -8,728 |
| Threeforks(Top of Target) | | 10,811 | -8,740 |
| Threeforks(Base of Target) | | 10,822 | -8,751 |
| Claystone | | 10,822 | -8,751 |

**Est. Dip Rate:** -0.35

**Max. Anticipated BHP:** 4689

| **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<br>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' - | 2,150' | FW | 8.4-9.0 | 28-32 | NC | Circ Mud Tanks |
| **Intermediate:** | 2,150' - | 11,106' | Invert | 9.5-10.4 | 40-50 | 30+HtHp | Circ Mud Tanks |
| Lateral: | 11,106' - | 20,582' | 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" | 2,150' | | To Surface | 12 | 100' into Pierre |
| Intermediate: | 7" | 32# | 8-3/4" | 11,106' | | 3917 | 24 | 1500' above Dakota |
| Production Liner: | 4.5" | 13.5# | 6" | 20,582' | **TOL @ 10,291'** | | | 50' above KOP |

**PROBABLE PLUGS, IF REQ'D:**

**OTHER:**

| | **MD** | **TVD** | **FNL/FSL** | **FEL/FWL** | **S-T-R** | **AZI** |
|---|---|---|---|---|---|---|
| Surface: | 2,150 | 2,150 | 2226 FNL | 326 FWL | **SEC. 19 T153N R100W** | Survey Company: |
| KOP: | 10,341' | 10,341' | 2176 FNL | 326 FWL | **SEC. 19 T153N R100W** | Build Rate: 12 deg /100' |
| EOC: | 11,088' | 10,818' | 2092 FNL | 793 FWL | **SEC. 19 T153N R100W** | 79.8 |
| Casing Point: | 11,106' | 10,818' | 2089 FNL | 811 FWL | **SEC. 19 T153N R100W** | 79.8 |
| Three Forks Lateral TD: | 20,582' | 10,876' | 2044 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)**

**Geology:** N. Gabelman 2/4/2014 **Engineering:** dad6/11/14

# Oasis Petroleum
# Well Summary
# Chalmers 5300 21-19 8T
# Section 19 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' - 2150' | 36 | J-55 | LTC | 8.921" | 8.765" | 3400 | 4530 | 5660 |

| Interval | Description | Collapse | Burst | Tension |
|---|---|---|---|---|
| | | (psi) / a | (psi) / b | (1000 lbs) / c |
| 0' - 2150' | 9-5/8", 36#, J-55, LTC, 8rd | 2020 / 2.00 | 3520 / 3.49 | 453 / 2.71 |

**API Rating & Safety Factor**

a) Based on full casing evacuation with 9 ppg fluid on backside (2150' setting depth).

b) Burst pressure based on 9 ppg fluid with no fluid on backside (2150' setting depth).

c) Based on string weight in 9 ppg fluid at 2150' TVD plus 100k# overpull. (Buoyed weight equals 67k 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:** **459 sks** (243 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

# Oasis Petroleum
# Well Summary
# Chalmers 5300 21-19 8T
# Section 19 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' - 11106' | 32 | HCP-110 | LTC | 6.094" | 6.000"** | 6730 | 8970 | 9870 |

****Special Drift 7" 32# to 6.0"**

| Interval | Length | Description | Collapse | Burst | Tension |
|---|---|---|---|---|---|
| | | | (psi) a | (psi) b | (1000 lbs) c |
| 0' - 11106' | 11106' | 7", 32#, P-110, LTC, 8rd | 11820 / 2.10* | 12460 / 1.28 | 897 / 2.23 |
| 6695' - 9433' | 2738' | 7", 32#, HCP-110, LTC, 8rd | 11820 / 1.04** | 12460 / 1.29 | |

**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, (301k 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:** **183 sks** (84 bbls), 11.8 ppg, 2.55 cu. ft./sk Econocem Cement with .3% Fe-2 and .25 lb/sk Lost Circulation Additive

**Tail Slurry:** **582 sks** (170 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 21-19 8T
# Section 19 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' - 20582 | 13.5 | P-110 | BTC | 3.920" | 3.795" | 2270 | 3020 | 3780 |

| Interval | Length | Desctiption | Collapse | Burst | Tension |
|---|---|---|---|---|---|
| | | | (psi) a | (psi) b | (1000 lbs) c |
| 10291' - 20582 | 10308 | 4-1/2", 13.5 lb, P-110, BTC | 10670 / 1.98 | 12410 / 1.28 | 443 / 2.01 |

**API Rating & Safety Factor**

a) Based on full casing evacuation with 9.5 ppg fluid on backside @ 10877' TVD.

b) Burst pressure based on 9000 psi treating pressure with 10.2 ppg internal fluid gradient and 9 ppg external fluid gradient @ 10877' TVD.

c) Based on string weight in 9.5 ppg fluid (Buoyed weight: 119k lbs.) plus 100k lbs overpull.

Azimuths to True North
Magnetic North: 8.17°

Magnetic Field
Strength: 56490.5snT
Dip Angle: 72.96°
Date: 2/17/2014
Model: IGRF200510

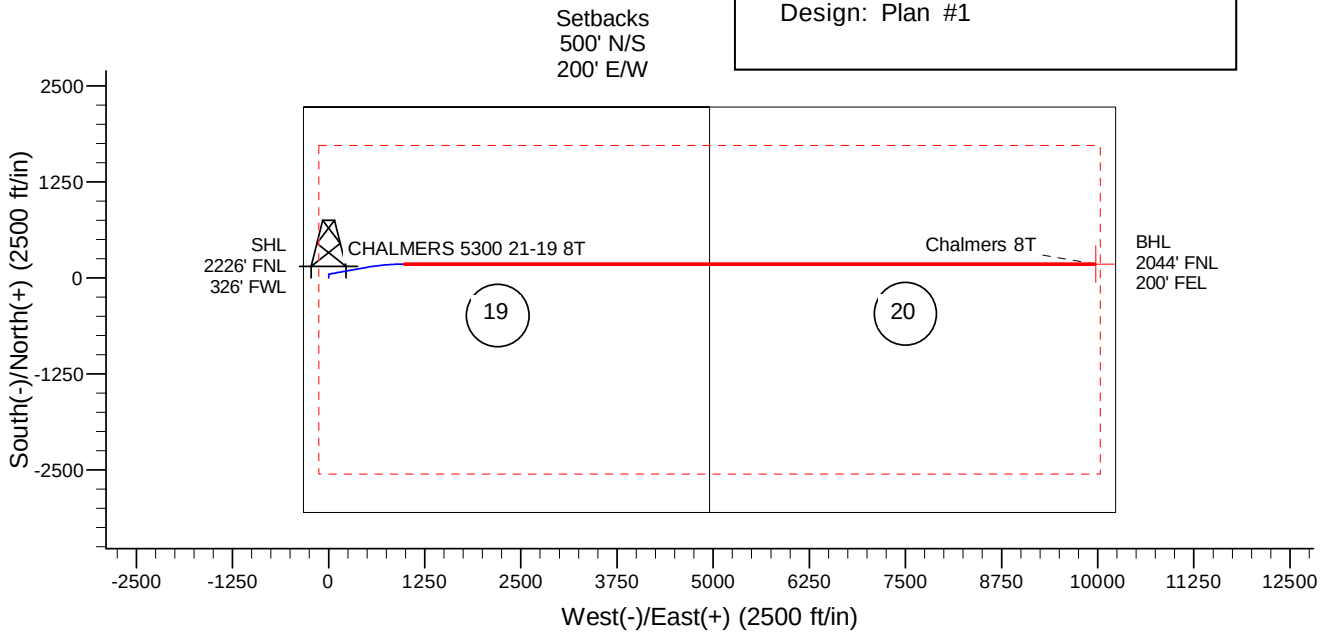
OASIS PETROLEUM

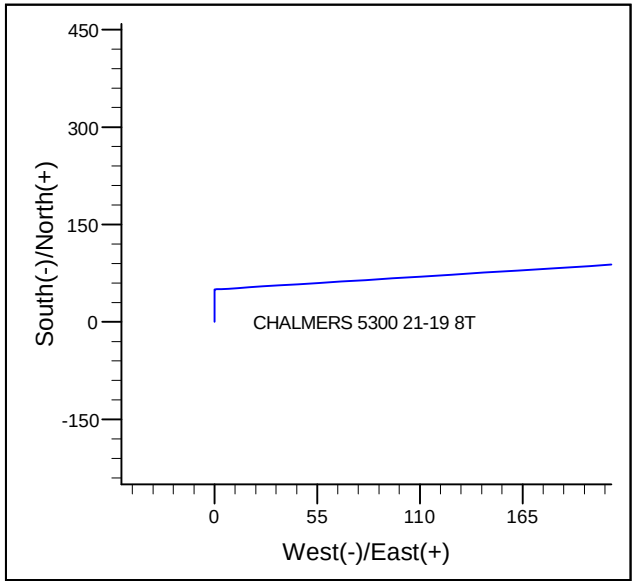
Project: Indian Hills
Site: 153N-100W-19/20
Well: CHALMERS 5300 21-19 8T
Wellbore: CHALMERS 5300 21-19 8T
Design: Plan #1

## SITE DETAILS: 153N-100W-19/20

Well Centre Latitude: 48° 3' 41.300 N
Longitude: 103° 36' 10.110 W

Positional Uncertainity: 0.0
Convergence: -2.31
Local North: True



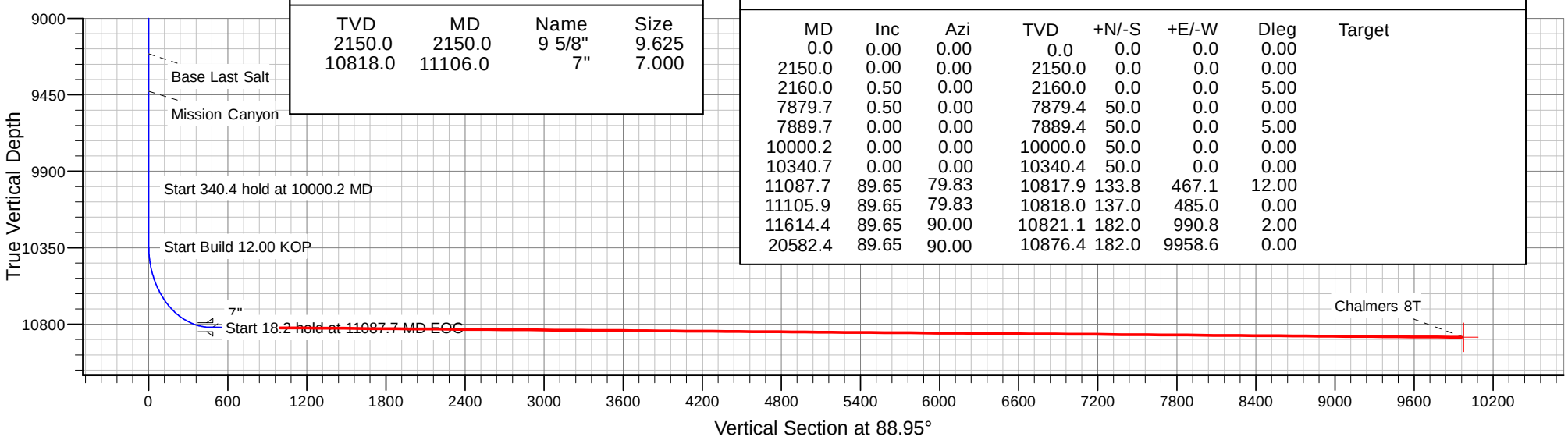




## CASING DETAILS

| TVD | MD | Name | Size |
|---|---|---|---|
| 2150.0 | 2150.0 | 9 5/8" | 9.625 |
| 10818.0 | 11106.0 | 7" | 7.000 |

## SECTION DETAILS

| MD | Inc | Azi | TVD | +N/-S | +E/-W | Dleg | Target |
|---|---|---|---|---|---|---|---|
| 0.0 | 0.00 | 0.00 | 0.0 | 0.0 | 0.0 | 0.00 | |
| 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 | |
| 10340.7 | 0.00 | 0.00 | 10340.4 | 50.0 | 0.0 | 0.00 | |
| 11087.7 | 89.65 | 79.83 | 10817.9 | 133.8 | 467.1 | 12.00 | |
| 11105.9 | 89.65 | 79.83 | 10818.0 | 137.0 | 485.0 | 0.00 | |
| 11614.4 | 89.65 | 90.00 | 10821.1 | 182.0 | 990.8 | 2.00 | |
| 20582.4 | 89.65 | 90.00 | 10876.4 | 182.0 | 9958.6 | 0.00 | |



# Oasis

**Indian Hills**
**153N-100W-19/20**
**CHALMERS 5300 21-19 8T**

**CHALMERS 5300 21-19 8T**

**Plan: Plan #1**

# Standard Planning Report

**11 June, 2014**

# Oasis Petroleum

## Planning Report

| | | | |
|---|---|---|---|
| **Database:** | OpenWellsCompass - EDM Prod | **Local Co-ordinate Reference:** | Well CHALMERS 5300 21-19 8T |
| **Company:** | Oasis | **TVD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Project:** | Indian Hills | **MD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Site:** | 153N-100W-19/20 | **North Reference:** | True |
| **Well:** | CHALMERS 5300 21-19 8T | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | CHALMERS 5300 21-19 8T | | |
| **Design:** | Plan #1 | | |

**Project** Indian Hills

| | | | |
|---|---|---|---|
| **Map System:** | US State Plane 1983 | **System Datum:** | Mean Sea Level |
| **Geo Datum:** | North American Datum 1983 | | |
| **Map Zone:** | North Dakota Northern Zone | | |

**Site** 153N-100W-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 8T

| | | | | | | |
|---|---|---|---|---|---|---|
| **Well Position** | **+N/-S** | -300.9 ft | **Northing:** | 402,475.42 ft | **Latitude:** | 48° 3' 41.300 N |
| | **+E/-W** | 40.1 ft | **Easting:** | 1,209,990.43 ft | **Longitude:** | 103° 36' 10.110 W |
| **Position Uncertainty** | | 0.0 ft | **Wellhead Elevation:** | | **Ground Level:** | 2,046.0 ft |

**Wellbore** CHALMERS 5300 21-19 8T

| Magnetics | Model Name | Sample Date | Declination (°) | Dip Angle (°) | Field Strength (nT) |
|---|---|---|---|---|---|
| | IGRF200510 | 2/17/2014 | 8.17 | 72.96 | 56,491 |

**Design** Plan #1

**Audit Notes:**

| | | | | |
|---|---|---|---|---|
| **Version:** | **Phase:** | PROTOTYPE | **Tie On Depth:** | 0.0 |

| Vertical Section: | Depth From (TVD) (ft) | +N/-S (ft) | +E/-W (ft) | Direction (°) |
|---|---|---|---|---|
| | 0.0 | 0.0 | 0.0 | 88.95 |

**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 | |
| 10,340.7 | 0.00 | 0.00 | 10,340.4 | 50.0 | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 11,087.7 | 89.65 | 79.83 | 10,817.9 | 133.8 | 467.1 | 12.00 | 12.00 | 0.00 | 79.83 | |
| 11,105.9 | 89.65 | 79.83 | 10,818.0 | 137.0 | 485.0 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 11,614.4 | 89.65 | 90.00 | 10,821.1 | 182.0 | 990.8 | 2.00 | 0.00 | 2.00 | 90.05 | |
| 20,582.4 | 89.65 | 90.00 | 10,876.4 | 182.0 | 9,958.6 | 0.00 | 0.00 | 0.00 | 0.00 | |

| | | | |
|---|---|---|---|
| **Database:** | OpenWellsCompass - EDM Prod | **Local Co-ordinate Reference:** | Well CHALMERS 5300 21-19 8T |
| **Company:** | Oasis | **TVD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Project:** | Indian Hills | **MD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Site:** | 153N-100W-19/20 | **North Reference:** | True |
| **Well:** | CHALMERS 5300 21-19 8T | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | CHALMERS 5300 21-19 8T | | |
| **Design:** | Plan #1 | | |

**Planned Survey**

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |
|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 0.00 | 0.00 | 0.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 100.0 | 0.00 | 0.00 | 100.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 200.0 | 0.00 | 0.00 | 200.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 300.0 | 0.00 | 0.00 | 300.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 400.0 | 0.00 | 0.00 | 400.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 500.0 | 0.00 | 0.00 | 500.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 600.0 | 0.00 | 0.00 | 600.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 700.0 | 0.00 | 0.00 | 700.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 800.0 | 0.00 | 0.00 | 800.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 900.0 | 0.00 | 0.00 | 900.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 1,000.0 | 0.00 | 0.00 | 1,000.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 1,100.0 | 0.00 | 0.00 | 1,100.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 1,200.0 | 0.00 | 0.00 | 1,200.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 1,300.0 | 0.00 | 0.00 | 1,300.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 1,400.0 | 0.00 | 0.00 | 1,400.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 1,500.0 | 0.00 | 0.00 | 1,500.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 1,600.0 | 0.00 | 0.00 | 1,600.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 1,700.0 | 0.00 | 0.00 | 1,700.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 1,800.0 | 0.00 | 0.00 | 1,800.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 1,900.0 | 0.00 | 0.00 | 1,900.0 | 0.0 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 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 | 0.0 | 0.00 | 0.00 | 0.00 |
| 2,300.0 | 0.50 | 0.00 | 2,300.0 | 1.3 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 2,400.0 | 0.50 | 0.00 | 2,400.0 | 2.1 | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 |
| 2,500.0 | 0.50 | 0.00 | 2,500.0 | 3.0 | 0.0 | 0.1 | 0.00 | 0.00 | 0.00 |
| 2,600.0 | 0.50 | 0.00 | 2,600.0 | 3.9 | 0.0 | 0.1 | 0.00 | 0.00 | 0.00 |
| 2,700.0 | 0.50 | 0.00 | 2,700.0 | 4.8 | 0.0 | 0.1 | 0.00 | 0.00 | 0.00 |
| 2,800.0 | 0.50 | 0.00 | 2,800.0 | 5.6 | 0.0 | 0.1 | 0.00 | 0.00 | 0.00 |
| 2,900.0 | 0.50 | 0.00 | 2,900.0 | 6.5 | 0.0 | 0.1 | 0.00 | 0.00 | 0.00 |
| 3,000.0 | 0.50 | 0.00 | 3,000.0 | 7.4 | 0.0 | 0.1 | 0.00 | 0.00 | 0.00 |
| 3,100.0 | 0.50 | 0.00 | 3,100.0 | 8.2 | 0.0 | 0.2 | 0.00 | 0.00 | 0.00 |
| 3,200.0 | 0.50 | 0.00 | 3,200.0 | 9.1 | 0.0 | 0.2 | 0.00 | 0.00 | 0.00 |
| 3,300.0 | 0.50 | 0.00 | 3,300.0 | 10.0 | 0.0 | 0.2 | 0.00 | 0.00 | 0.00 |
| 3,400.0 | 0.50 | 0.00 | 3,400.0 | 10.9 | 0.0 | 0.2 | 0.00 | 0.00 | 0.00 |
| 3,500.0 | 0.50 | 0.00 | 3,499.9 | 11.7 | 0.0 | 0.2 | 0.00 | 0.00 | 0.00 |
| 3,600.0 | 0.50 | 0.00 | 3,599.9 | 12.6 | 0.0 | 0.2 | 0.00 | 0.00 | 0.00 |
| 3,700.0 | 0.50 | 0.00 | 3,699.9 | 13.5 | 0.0 | 0.2 | 0.00 | 0.00 | 0.00 |
| 3,800.0 | 0.50 | 0.00 | 3,799.9 | 14.4 | 0.0 | 0.3 | 0.00 | 0.00 | 0.00 |
| 3,900.0 | 0.50 | 0.00 | 3,899.9 | 15.2 | 0.0 | 0.3 | 0.00 | 0.00 | 0.00 |
| 4,000.0 | 0.50 | 0.00 | 3,999.9 | 16.1 | 0.0 | 0.3 | 0.00 | 0.00 | 0.00 |
| 4,100.0 | 0.50 | 0.00 | 4,099.9 | 17.0 | 0.0 | 0.3 | 0.00 | 0.00 | 0.00 |
| 4,200.0 | 0.50 | 0.00 | 4,199.9 | 17.8 | 0.0 | 0.3 | 0.00 | 0.00 | 0.00 |
| 4,300.0 | 0.50 | 0.00 | 4,299.9 | 18.7 | 0.0 | 0.3 | 0.00 | 0.00 | 0.00 |
| 4,400.0 | 0.50 | 0.00 | 4,399.9 | 19.6 | 0.0 | 0.4 | 0.00 | 0.00 | 0.00 |
| 4,500.0 | 0.50 | 0.00 | 4,499.9 | 20.5 | 0.0 | 0.4 | 0.00 | 0.00 | 0.00 |
| 4,600.0 | 0.50 | 0.00 | 4,599.9 | 21.3 | 0.0 | 0.4 | 0.00 | 0.00 | 0.00 |
| 4,624.1 | 0.50 | 0.00 | 4,624.0 | 21.5 | 0.0 | 0.4 | 0.00 | 0.00 | 0.00 |
| **Greenhorn** | | | | | | | | | |

| | | | |
|---|---|---|---|
| **Database:** | OpenWellsCompass - EDM Prod | **Local Co-ordinate Reference:** | Well CHALMERS 5300 21-19 8T |
| **Company:** | Oasis | **TVD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Project:** | Indian Hills | **MD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Site:** | 153N-100W-19/20 | **North Reference:** | True |
| **Well:** | CHALMERS 5300 21-19 8T | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | CHALMERS 5300 21-19 8T | | |
| **Design:** | Plan #1 | | |

**Planned Survey**

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |
|---|---|---|---|---|---|---|---|---|---|
| 4,700.0 | 0.50 | 0.00 | 4,699.9 | 22.2 | 0.0 | 0.4 | 0.00 | 0.00 | 0.00 |
| 4,800.0 | 0.50 | 0.00 | 4,799.9 | 23.1 | 0.0 | 0.4 | 0.00 | 0.00 | 0.00 |
| 4,900.0 | 0.50 | 0.00 | 4,899.9 | 24.0 | 0.0 | 0.4 | 0.00 | 0.00 | 0.00 |
| 5,000.0 | 0.50 | 0.00 | 4,999.9 | 24.8 | 0.0 | 0.5 | 0.00 | 0.00 | 0.00 |
| 5,029.1 | 0.50 | 0.00 | 5,029.0 | 25.1 | 0.0 | 0.5 | 0.00 | 0.00 | 0.00 |
| **Mowry** | | | | | | | | | |
| 5,100.0 | 0.50 | 0.00 | 5,099.9 | 25.7 | 0.0 | 0.5 | 0.00 | 0.00 | 0.00 |
| 5,200.0 | 0.50 | 0.00 | 5,199.9 | 26.6 | 0.0 | 0.5 | 0.00 | 0.00 | 0.00 |
| 5,300.0 | 0.50 | 0.00 | 5,299.9 | 27.4 | 0.0 | 0.5 | 0.00 | 0.00 | 0.00 |
| 5,400.0 | 0.50 | 0.00 | 5,399.9 | 28.3 | 0.0 | 0.5 | 0.00 | 0.00 | 0.00 |
| 5,417.1 | 0.50 | 0.00 | 5,417.0 | 28.5 | 0.0 | 0.5 | 0.00 | 0.00 | 0.00 |
| **Dakota** | | | | | | | | | |
| 5,500.0 | 0.50 | 0.00 | 5,499.9 | 29.2 | 0.0 | 0.5 | 0.00 | 0.00 | 0.00 |
| 5,600.0 | 0.50 | 0.00 | 5,599.9 | 30.1 | 0.0 | 0.5 | 0.00 | 0.00 | 0.00 |
| 5,700.0 | 0.50 | 0.00 | 5,699.9 | 30.9 | 0.0 | 0.6 | 0.00 | 0.00 | 0.00 |
| 5,800.0 | 0.50 | 0.00 | 5,799.9 | 31.8 | 0.0 | 0.6 | 0.00 | 0.00 | 0.00 |
| 5,900.0 | 0.50 | 0.00 | 5,899.9 | 32.7 | 0.0 | 0.6 | 0.00 | 0.00 | 0.00 |
| 6,000.0 | 0.50 | 0.00 | 5,999.9 | 33.6 | 0.0 | 0.6 | 0.00 | 0.00 | 0.00 |
| 6,100.0 | 0.50 | 0.00 | 6,099.8 | 34.4 | 0.0 | 0.6 | 0.00 | 0.00 | 0.00 |
| 6,200.0 | 0.50 | 0.00 | 6,199.8 | 35.3 | 0.0 | 0.6 | 0.00 | 0.00 | 0.00 |
| 6,300.0 | 0.50 | 0.00 | 6,299.8 | 36.2 | 0.0 | 0.7 | 0.00 | 0.00 | 0.00 |
| 6,400.0 | 0.50 | 0.00 | 6,399.8 | 37.0 | 0.0 | 0.7 | 0.00 | 0.00 | 0.00 |
| 6,463.2 | 0.50 | 0.00 | 6,463.0 | 37.6 | 0.0 | 0.7 | 0.00 | 0.00 | 0.00 |
| **Rierdon** | | | | | | | | | |
| 6,500.0 | 0.50 | 0.00 | 6,499.8 | 37.9 | 0.0 | 0.7 | 0.00 | 0.00 | 0.00 |
| 6,600.0 | 0.50 | 0.00 | 6,599.8 | 38.8 | 0.0 | 0.7 | 0.00 | 0.00 | 0.00 |
| 6,700.0 | 0.50 | 0.00 | 6,699.8 | 39.7 | 0.0 | 0.7 | 0.00 | 0.00 | 0.00 |
| 6,800.0 | 0.50 | 0.00 | 6,799.8 | 40.5 | 0.0 | 0.7 | 0.00 | 0.00 | 0.00 |
| 6,891.2 | 0.50 | 0.00 | 6,891.0 | 41.3 | 0.0 | 0.8 | 0.00 | 0.00 | 0.00 |
| **Dunham Salt** | | | | | | | | | |
| 6,900.0 | 0.50 | 0.00 | 6,899.8 | 41.4 | 0.0 | 0.8 | 0.00 | 0.00 | 0.00 |
| 6,960.2 | 0.50 | 0.00 | 6,960.0 | 41.9 | 0.0 | 0.8 | 0.00 | 0.00 | 0.00 |
| **Dunham Salt Base** | | | | | | | | | |
| 7,000.0 | 0.50 | 0.00 | 6,999.8 | 42.3 | 0.0 | 0.8 | 0.00 | 0.00 | 0.00 |
| 7,100.0 | 0.50 | 0.00 | 7,099.8 | 43.2 | 0.0 | 0.8 | 0.00 | 0.00 | 0.00 |
| 7,200.0 | 0.50 | 0.00 | 7,199.8 | 44.0 | 0.0 | 0.8 | 0.00 | 0.00 | 0.00 |
| 7,257.2 | 0.50 | 0.00 | 7,257.0 | 44.5 | 0.0 | 0.8 | 0.00 | 0.00 | 0.00 |
| **Pine Salt** | | | | | | | | | |
| 7,290.2 | 0.50 | 0.00 | 7,290.0 | 44.8 | 0.0 | 0.8 | 0.00 | 0.00 | 0.00 |
| **Pine Salt Base** | | | | | | | | | |
| 7,300.0 | 0.50 | 0.00 | 7,299.8 | 44.9 | 0.0 | 0.8 | 0.00 | 0.00 | 0.00 |
| 7,351.2 | 0.50 | 0.00 | 7,351.0 | 45.3 | 0.0 | 0.8 | 0.00 | 0.00 | 0.00 |
| **Opeche Salt** | | | | | | | | | |
| 7,400.0 | 0.50 | 0.00 | 7,399.8 | 45.8 | 0.0 | 0.8 | 0.00 | 0.00 | 0.00 |
| 7,426.2 | 0.50 | 0.00 | 7,426.0 | 46.0 | 0.0 | 0.8 | 0.00 | 0.00 | 0.00 |
| **Opeche Salt Base** | | | | | | | | | |
| 7,500.0 | 0.50 | 0.00 | 7,499.8 | 46.6 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 7,600.0 | 0.50 | 0.00 | 7,599.8 | 47.5 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 7,662.2 | 0.50 | 0.00 | 7,662.0 | 48.1 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| **Amsden** | | | | | | | | | |
| 7,700.0 | 0.50 | 0.00 | 7,699.8 | 48.4 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 7,800.0 | 0.50 | 0.00 | 7,799.8 | 49.3 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 7,828.2 | 0.50 | 0.00 | 7,828.0 | 49.5 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| **Tyler** | | | | | | | | | |

| | | | |
|---|---|---|---|
| **Database:** | OpenWellsCompass - EDM Prod | **Local Co-ordinate Reference:** | Well CHALMERS 5300 21-19 8T |
| **Company:** | Oasis | **TVD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Project:** | Indian Hills | **MD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Site:** | 153N-100W-19/20 | **North Reference:** | True |
| **Well:** | CHALMERS 5300 21-19 8T | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | CHALMERS 5300 21-19 8T | | |
| **Design:** | Plan #1 | | |

**Planned Survey**

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |
|---|---|---|---|---|---|---|---|---|---|
| 7,879.7 | 0.50 | 0.00 | 7,879.4 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| **Start Drop -5.00** | | | | | | | | | |
| 7,889.7 | 0.00 | 0.00 | 7,889.4 | 50.0 | 0.0 | 0.9 | 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 | 0.9 | 0.00 | 0.00 | 0.00 |
| 8,000.0 | 0.00 | 0.00 | 7,999.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 8,032.2 | 0.00 | 0.00 | 8,032.0 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| **Otter/Base Minnelusa** | | | | | | | | | |
| 8,100.0 | 0.00 | 0.00 | 8,099.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 8,200.0 | 0.00 | 0.00 | 8,199.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 8,300.0 | 0.00 | 0.00 | 8,299.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 8,384.2 | 0.00 | 0.00 | 8,384.0 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| **Kibbey Lime** | | | | | | | | | |
| 8,400.0 | 0.00 | 0.00 | 8,399.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 8,500.0 | 0.00 | 0.00 | 8,499.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 8,534.2 | 0.00 | 0.00 | 8,534.0 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| **Charles Salt** | | | | | | | | | |
| 8,600.0 | 0.00 | 0.00 | 8,599.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 8,700.0 | 0.00 | 0.00 | 8,699.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 8,800.0 | 0.00 | 0.00 | 8,799.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 8,900.0 | 0.00 | 0.00 | 8,899.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 9,000.0 | 0.00 | 0.00 | 8,999.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 9,100.0 | 0.00 | 0.00 | 9,099.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 9,200.0 | 0.00 | 0.00 | 9,199.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 9,209.2 | 0.00 | 0.00 | 9,209.0 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| **Base Last Salt** | | | | | | | | | |
| 9,300.0 | 0.00 | 0.00 | 9,299.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 9,400.0 | 0.00 | 0.00 | 9,399.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 9,429.2 | 0.00 | 0.00 | 9,429.0 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| **Mission Canyon** | | | | | | | | | |
| 9,500.0 | 0.00 | 0.00 | 9,499.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 9,600.0 | 0.00 | 0.00 | 9,599.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 9,700.0 | 0.00 | 0.00 | 9,699.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 9,800.0 | 0.00 | 0.00 | 9,799.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 9,900.0 | 0.00 | 0.00 | 9,899.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 9,993.2 | 0.00 | 0.00 | 9,993.0 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| **Lodgepole** | | | | | | | | | |
| 10,000.2 | 0.00 | 0.00 | 10,000.0 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| **Start 340.4 hold at 10000.2 MD** | | | | | | | | | |
| 10,100.0 | 0.00 | 0.00 | 10,099.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 10,200.0 | 0.00 | 0.00 | 10,199.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 10,300.0 | 0.00 | 0.00 | 10,299.8 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| 10,340.7 | 0.00 | 0.00 | 10,340.4 | 50.0 | 0.0 | 0.9 | 0.00 | 0.00 | 0.00 |
| **Start Build 12.00 KOP** | | | | | | | | | |
| 10,350.0 | 1.12 | 79.83 | 10,349.8 | 50.0 | 0.1 | 1.0 | 12.00 | 12.00 | 0.00 |
| 10,375.0 | 4.12 | 79.83 | 10,374.8 | 50.2 | 1.2 | 2.1 | 12.00 | 12.00 | 0.00 |
| 10,400.0 | 7.12 | 79.83 | 10,399.6 | 50.7 | 3.6 | 4.6 | 12.00 | 12.00 | 0.00 |
| 10,425.0 | 10.12 | 79.83 | 10,424.3 | 51.3 | 7.3 | 8.3 | 12.00 | 12.00 | 0.00 |
| 10,450.0 | 13.12 | 79.83 | 10,448.8 | 52.2 | 12.3 | 13.2 | 12.00 | 12.00 | 0.00 |
| 10,475.0 | 16.12 | 79.83 | 10,473.0 | 53.3 | 18.5 | 19.5 | 12.00 | 12.00 | 0.00 |
| 10,500.0 | 19.12 | 79.83 | 10,496.8 | 54.7 | 25.9 | 26.9 | 12.00 | 12.00 | 0.00 |
| 10,525.0 | 22.12 | 79.83 | 10,520.2 | 56.2 | 34.6 | 35.6 | 12.00 | 12.00 | 0.00 |
| 10,550.0 | 25.12 | 79.83 | 10,543.1 | 58.0 | 44.5 | 45.5 | 12.00 | 12.00 | 0.00 |
| 10,575.0 | 28.12 | 79.83 | 10,565.5 | 60.0 | 55.5 | 56.6 | 12.00 | 12.00 | 0.00 |

| | | | |
|---|---|---|---|
| **Database:** | OpenWellsCompass - EDM Prod | **Local Co-ordinate Reference:** | Well CHALMERS 5300 21-19 8T |
| **Company:** | Oasis | **TVD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Project:** | Indian Hills | **MD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Site:** | 153N-100W-19/20 | **North Reference:** | True |
| **Well:** | CHALMERS 5300 21-19 8T | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | CHALMERS 5300 21-19 8T | | |
| **Design:** | Plan #1 | | |

**Planned Survey**

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |
|---|---|---|---|---|---|---|---|---|---|
| 10,600.0 | 31.12 | 79.83 | 10,587.2 | 62.1 | 67.6 | 68.8 | 12.00 | 12.00 | 0.00 |
| 10,625.0 | 34.12 | 79.83 | 10,608.3 | 64.5 | 80.9 | 82.1 | 12.00 | 12.00 | 0.00 |
| 10,650.0 | 37.12 | 79.83 | 10,628.6 | 67.1 | 95.2 | 96.4 | 12.00 | 12.00 | 0.00 |
| 10,675.0 | 40.12 | 79.83 | 10,648.1 | 69.8 | 110.6 | 111.9 | 12.00 | 12.00 | 0.00 |
| 10,700.0 | 43.12 | 79.83 | 10,666.8 | 72.8 | 126.9 | 128.2 | 12.00 | 12.00 | 0.00 |
| 10,725.0 | 46.12 | 79.83 | 10,684.6 | 75.9 | 144.2 | 145.6 | 12.00 | 12.00 | 0.00 |
| 10,750.0 | 49.12 | 79.83 | 10,701.4 | 79.1 | 162.4 | 163.8 | 12.00 | 12.00 | 0.00 |
| 10,757.0 | 49.96 | 79.83 | 10,706.0 | 80.1 | 167.7 | 169.1 | 12.00 | 12.00 | 0.00 |
| **False Bakken** | | | | | | | | | |
| 10,772.9 | 51.87 | 79.83 | 10,716.0 | 82.2 | 179.8 | 181.2 | 12.00 | 12.00 | 0.00 |
| **Upper Bakken Shale** | | | | | | | | | |
| 10,775.0 | 52.12 | 79.83 | 10,717.3 | 82.5 | 181.4 | 182.9 | 12.00 | 12.00 | 0.00 |
| 10,799.8 | 55.09 | 79.83 | 10,732.0 | 86.1 | 201.0 | 202.6 | 12.00 | 12.00 | 0.00 |
| **Middle Bakken** | | | | | | | | | |
| 10,800.0 | 55.12 | 79.83 | 10,732.1 | 86.1 | 201.2 | 202.8 | 12.00 | 12.00 | 0.00 |
| 10,825.0 | 58.12 | 79.83 | 10,745.9 | 89.8 | 221.8 | 223.4 | 12.00 | 12.00 | 0.00 |
| 10,850.0 | 61.12 | 79.83 | 10,758.5 | 93.6 | 243.0 | 244.7 | 12.00 | 12.00 | 0.00 |
| 10,866.0 | 63.04 | 79.83 | 10,766.0 | 96.1 | 256.9 | 258.6 | 12.00 | 12.00 | 0.00 |
| **Lower Bakken Shale** | | | | | | | | | |
| 10,875.0 | 64.12 | 79.83 | 10,770.0 | 97.5 | 264.8 | 266.6 | 12.00 | 12.00 | 0.00 |
| 10,899.1 | 67.02 | 79.83 | 10,780.0 | 101.4 | 286.5 | 288.3 | 12.00 | 12.00 | 0.00 |
| **Pronghorn** | | | | | | | | | |
| 10,900.0 | 67.12 | 79.83 | 10,780.3 | 101.5 | 287.3 | 289.1 | 12.00 | 12.00 | 0.00 |
| 10,925.0 | 70.12 | 79.83 | 10,789.4 | 105.6 | 310.2 | 312.0 | 12.00 | 12.00 | 0.00 |
| 10,950.0 | 73.12 | 79.83 | 10,797.3 | 109.8 | 333.5 | 335.5 | 12.00 | 12.00 | 0.00 |
| 10,955.9 | 73.83 | 79.83 | 10,799.0 | 110.8 | 339.1 | 341.0 | 12.00 | 12.00 | 0.00 |
| **Threeforks** | | | | | | | | | |
| 10,975.0 | 76.12 | 79.83 | 10,804.0 | 114.1 | 357.2 | 359.3 | 12.00 | 12.00 | 0.00 |
| 11,000.0 | 79.12 | 79.83 | 10,809.3 | 118.4 | 381.3 | 383.4 | 12.00 | 12.00 | 0.00 |
| 11,009.4 | 80.25 | 79.83 | 10,811.0 | 120.0 | 390.4 | 392.5 | 12.00 | 12.00 | 0.00 |
| **Threeforks(Top of Target)** | | | | | | | | | |
| 11,025.0 | 82.12 | 79.83 | 10,813.4 | 122.7 | 405.5 | 407.7 | 12.00 | 12.00 | 0.00 |
| 11,050.0 | 85.12 | 79.83 | 10,816.2 | 127.1 | 430.0 | 432.3 | 12.00 | 12.00 | 0.00 |
| 11,075.0 | 88.12 | 79.83 | 10,817.6 | 131.5 | 454.6 | 456.9 | 12.00 | 12.00 | 0.00 |
| 11,087.7 | 89.65 | 79.83 | 10,817.9 | 133.8 | 467.1 | 469.5 | 12.00 | 12.00 | 0.00 |
| **Start 18.2 hold at 11087.7 MD EOC** | | | | | | | | | |
| 11,105.9 | 89.65 | 79.83 | 10,818.0 | 137.0 | 485.0 | 487.4 | 0.00 | 0.00 | 0.00 |
| **Start DLS 2.00 TFO 90.05 Csg Pt** | | | | | | | | | |
| 11,106.0 | 89.65 | 79.83 | 10,818.0 | 137.0 | 485.1 | 487.5 | 0.00 | 0.00 | 0.00 |
| **7"** | | | | | | | | | |
| 11,200.0 | 89.65 | 81.71 | 10,818.6 | 152.1 | 577.8 | 580.5 | 2.00 | 0.00 | 2.00 |
| 11,300.0 | 89.65 | 83.71 | 10,819.2 | 164.8 | 677.0 | 679.9 | 2.00 | 0.00 | 2.00 |
| 11,400.0 | 89.65 | 85.71 | 10,819.8 | 174.0 | 776.6 | 779.7 | 2.00 | 0.00 | 2.00 |
| 11,500.0 | 89.65 | 87.71 | 10,820.4 | 179.7 | 876.4 | 879.6 | 2.00 | 0.00 | 2.00 |
| 11,600.0 | 89.65 | 89.71 | 10,821.0 | 182.0 | 976.4 | 979.6 | 2.00 | 0.00 | 2.00 |
| 11,614.4 | 89.65 | 90.00 | 10,821.1 | 182.0 | 990.8 | 994.0 | 2.00 | 0.00 | 2.00 |
| **Start 8984.3 hold at 11614.4 MD** | | | | | | | | | |
| 11,700.0 | 89.65 | 90.00 | 10,821.7 | 182.0 | 1,076.4 | 1,079.5 | 0.00 | 0.00 | 0.00 |
| 11,800.0 | 89.65 | 90.00 | 10,822.3 | 182.0 | 1,176.4 | 1,179.5 | 0.00 | 0.00 | 0.00 |
| 11,900.0 | 89.65 | 90.00 | 10,822.9 | 182.0 | 1,276.4 | 1,279.5 | 0.00 | 0.00 | 0.00 |
| 12,000.0 | 89.65 | 90.00 | 10,823.5 | 182.0 | 1,376.4 | 1,379.5 | 0.00 | 0.00 | 0.00 |
| 12,100.0 | 89.65 | 90.00 | 10,824.1 | 182.0 | 1,476.4 | 1,479.5 | 0.00 | 0.00 | 0.00 |
| 12,200.0 | 89.65 | 90.00 | 10,824.7 | 182.0 | 1,576.4 | 1,579.4 | 0.00 | 0.00 | 0.00 |
| 12,300.0 | 89.65 | 90.00 | 10,825.4 | 182.0 | 1,676.4 | 1,679.4 | 0.00 | 0.00 | 0.00 |

| | | | |
|---|---|---|---|
| **Database:** | OpenWellsCompass - EDM Prod | **Local Co-ordinate Reference:** | Well CHALMERS 5300 21-19 8T |
| **Company:** | Oasis | **TVD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Project:** | Indian Hills | **MD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Site:** | 153N-100W-19/20 | **North Reference:** | True |
| **Well:** | CHALMERS 5300 21-19 8T | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | CHALMERS 5300 21-19 8T | | |
| **Design:** | Plan #1 | | |

**Planned Survey**

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |
|---|---|---|---|---|---|---|---|---|---|
| 12,400.0 | 89.65 | 90.00 | 10,826.0 | 182.0 | 1,776.4 | 1,779.4 | 0.00 | 0.00 | 0.00 |
| 12,500.0 | 89.65 | 90.00 | 10,826.6 | 182.0 | 1,876.4 | 1,879.4 | 0.00 | 0.00 | 0.00 |
| 12,600.0 | 89.65 | 90.00 | 10,827.2 | 182.0 | 1,976.4 | 1,979.4 | 0.00 | 0.00 | 0.00 |
| 12,700.0 | 89.65 | 90.00 | 10,827.8 | 182.0 | 2,076.4 | 2,079.4 | 0.00 | 0.00 | 0.00 |
| 12,800.0 | 89.65 | 90.00 | 10,828.4 | 182.0 | 2,176.4 | 2,179.3 | 0.00 | 0.00 | 0.00 |
| 12,900.0 | 89.65 | 90.00 | 10,829.1 | 182.0 | 2,276.4 | 2,279.3 | 0.00 | 0.00 | 0.00 |
| 13,000.0 | 89.65 | 90.00 | 10,829.7 | 182.0 | 2,376.4 | 2,379.3 | 0.00 | 0.00 | 0.00 |
| 13,100.0 | 89.65 | 90.00 | 10,830.3 | 182.0 | 2,476.4 | 2,479.3 | 0.00 | 0.00 | 0.00 |
| 13,200.0 | 89.65 | 90.00 | 10,830.9 | 182.0 | 2,576.4 | 2,579.3 | 0.00 | 0.00 | 0.00 |
| 13,300.0 | 89.65 | 90.00 | 10,831.5 | 182.0 | 2,676.4 | 2,679.2 | 0.00 | 0.00 | 0.00 |
| 13,400.0 | 89.65 | 90.00 | 10,832.1 | 182.0 | 2,776.4 | 2,779.2 | 0.00 | 0.00 | 0.00 |
| 13,500.0 | 89.65 | 90.00 | 10,832.8 | 182.0 | 2,876.4 | 2,879.2 | 0.00 | 0.00 | 0.00 |
| 13,600.0 | 89.65 | 90.00 | 10,833.4 | 182.0 | 2,976.4 | 2,979.2 | 0.00 | 0.00 | 0.00 |
| 13,700.0 | 89.65 | 90.00 | 10,834.0 | 182.0 | 3,076.4 | 3,079.2 | 0.00 | 0.00 | 0.00 |
| 13,800.0 | 89.65 | 90.00 | 10,834.6 | 182.0 | 3,176.4 | 3,179.2 | 0.00 | 0.00 | 0.00 |
| 13,900.0 | 89.65 | 90.00 | 10,835.2 | 182.0 | 3,276.4 | 3,279.1 | 0.00 | 0.00 | 0.00 |
| 14,000.0 | 89.65 | 90.00 | 10,835.8 | 182.0 | 3,376.4 | 3,379.1 | 0.00 | 0.00 | 0.00 |
| 14,100.0 | 89.65 | 90.00 | 10,836.5 | 182.0 | 3,476.3 | 3,479.1 | 0.00 | 0.00 | 0.00 |
| 14,200.0 | 89.65 | 90.00 | 10,837.1 | 182.0 | 3,576.3 | 3,579.1 | 0.00 | 0.00 | 0.00 |
| 14,300.0 | 89.65 | 90.00 | 10,837.7 | 182.0 | 3,676.3 | 3,679.1 | 0.00 | 0.00 | 0.00 |
| 14,400.0 | 89.65 | 90.00 | 10,838.3 | 182.0 | 3,776.3 | 3,779.0 | 0.00 | 0.00 | 0.00 |
| 14,500.0 | 89.65 | 90.00 | 10,838.9 | 182.0 | 3,876.3 | 3,879.0 | 0.00 | 0.00 | 0.00 |
| 14,600.0 | 89.65 | 90.00 | 10,839.5 | 182.0 | 3,976.3 | 3,979.0 | 0.00 | 0.00 | 0.00 |
| 14,700.0 | 89.65 | 90.00 | 10,840.2 | 182.0 | 4,076.3 | 4,079.0 | 0.00 | 0.00 | 0.00 |
| 14,800.0 | 89.65 | 90.00 | 10,840.8 | 182.0 | 4,176.3 | 4,179.0 | 0.00 | 0.00 | 0.00 |
| 14,900.0 | 89.65 | 90.00 | 10,841.4 | 182.0 | 4,276.3 | 4,278.9 | 0.00 | 0.00 | 0.00 |
| 15,000.0 | 89.65 | 90.00 | 10,842.0 | 182.0 | 4,376.3 | 4,378.9 | 0.00 | 0.00 | 0.00 |
| 15,100.0 | 89.65 | 90.00 | 10,842.6 | 182.0 | 4,476.3 | 4,478.9 | 0.00 | 0.00 | 0.00 |
| 15,200.0 | 89.65 | 90.00 | 10,843.2 | 182.0 | 4,576.3 | 4,578.9 | 0.00 | 0.00 | 0.00 |
| 15,300.0 | 89.65 | 90.00 | 10,843.9 | 182.0 | 4,676.3 | 4,678.9 | 0.00 | 0.00 | 0.00 |
| 15,400.0 | 89.65 | 90.00 | 10,844.5 | 182.0 | 4,776.3 | 4,778.9 | 0.00 | 0.00 | 0.00 |
| 15,500.0 | 89.65 | 90.00 | 10,845.1 | 182.0 | 4,876.3 | 4,878.8 | 0.00 | 0.00 | 0.00 |
| 15,600.0 | 89.65 | 90.00 | 10,845.7 | 182.0 | 4,976.3 | 4,978.8 | 0.00 | 0.00 | 0.00 |
| 15,700.0 | 89.65 | 90.00 | 10,846.3 | 182.0 | 5,076.3 | 5,078.8 | 0.00 | 0.00 | 0.00 |
| 15,800.0 | 89.65 | 90.00 | 10,846.9 | 182.0 | 5,176.3 | 5,178.8 | 0.00 | 0.00 | 0.00 |
| 15,900.0 | 89.65 | 90.00 | 10,847.6 | 182.0 | 5,276.3 | 5,278.8 | 0.00 | 0.00 | 0.00 |
| 16,000.0 | 89.65 | 90.00 | 10,848.2 | 182.0 | 5,376.3 | 5,378.7 | 0.00 | 0.00 | 0.00 |
| 16,100.0 | 89.65 | 90.00 | 10,848.8 | 182.0 | 5,476.3 | 5,478.7 | 0.00 | 0.00 | 0.00 |
| 16,200.0 | 89.65 | 90.00 | 10,849.4 | 182.0 | 5,576.3 | 5,578.7 | 0.00 | 0.00 | 0.00 |
| 16,300.0 | 89.65 | 90.00 | 10,850.0 | 182.0 | 5,676.3 | 5,678.7 | 0.00 | 0.00 | 0.00 |
| 16,400.0 | 89.65 | 90.00 | 10,850.6 | 182.0 | 5,776.3 | 5,778.7 | 0.00 | 0.00 | 0.00 |
| 16,500.0 | 89.65 | 90.00 | 10,851.3 | 182.0 | 5,876.3 | 5,878.6 | 0.00 | 0.00 | 0.00 |
| 16,600.0 | 89.65 | 90.00 | 10,851.9 | 182.0 | 5,976.3 | 5,978.6 | 0.00 | 0.00 | 0.00 |
| 16,700.0 | 89.65 | 90.00 | 10,852.5 | 182.0 | 6,076.3 | 6,078.6 | 0.00 | 0.00 | 0.00 |
| 16,800.0 | 89.65 | 90.00 | 10,853.1 | 182.0 | 6,176.3 | 6,178.6 | 0.00 | 0.00 | 0.00 |
| 16,900.0 | 89.65 | 90.00 | 10,853.7 | 182.0 | 6,276.3 | 6,278.6 | 0.00 | 0.00 | 0.00 |
| 17,000.0 | 89.65 | 90.00 | 10,854.3 | 182.0 | 6,376.3 | 6,378.6 | 0.00 | 0.00 | 0.00 |
| 17,100.0 | 89.65 | 90.00 | 10,855.0 | 182.0 | 6,476.3 | 6,478.5 | 0.00 | 0.00 | 0.00 |
| 17,200.0 | 89.65 | 90.00 | 10,855.6 | 182.0 | 6,576.3 | 6,578.5 | 0.00 | 0.00 | 0.00 |
| 17,300.0 | 89.65 | 90.00 | 10,856.2 | 182.0 | 6,676.3 | 6,678.5 | 0.00 | 0.00 | 0.00 |
| 17,400.0 | 89.65 | 90.00 | 10,856.8 | 182.0 | 6,776.3 | 6,778.5 | 0.00 | 0.00 | 0.00 |
| 17,500.0 | 89.65 | 90.00 | 10,857.4 | 182.0 | 6,876.3 | 6,878.5 | 0.00 | 0.00 | 0.00 |
| 17,600.0 | 89.65 | 90.00 | 10,858.0 | 182.0 | 6,976.3 | 6,978.4 | 0.00 | 0.00 | 0.00 |
| 17,700.0 | 89.65 | 90.00 | 10,858.7 | 182.0 | 7,076.3 | 7,078.4 | 0.00 | 0.00 | 0.00 |
| 17,800.0 | 89.65 | 90.00 | 10,859.3 | 182.0 | 7,176.3 | 7,178.4 | 0.00 | 0.00 | 0.00 |

| | | | |
|---|---|---|---|
| **Database:** | OpenWellsCompass - EDM Prod | **Local Co-ordinate Reference:** | Well CHALMERS 5300 21-19 8T |
| **Company:** | Oasis | **TVD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Project:** | Indian Hills | **MD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Site:** | 153N-100W-19/20 | **North Reference:** | True |
| **Well:** | CHALMERS 5300 21-19 8T | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | CHALMERS 5300 21-19 8T | | |
| **Design:** | Plan #1 | | |

**Planned Survey**

| Measured Depth (ft) | Inclination (°) | Azimuth (°) | Vertical Depth (ft) | +N/-S (ft) | +E/-W (ft) | Vertical Section (ft) | Dogleg Rate (°/100ft) | Build Rate (°/100ft) | Turn Rate (°/100ft) |
|---|---|---|---|---|---|---|---|---|---|
| 17,900.0 | 89.65 | 90.00 | 10,859.9 | 182.0 | 7,276.3 | 7,278.4 | 0.00 | 0.00 | 0.00 |
| 18,000.0 | 89.65 | 90.00 | 10,860.5 | 182.0 | 7,376.3 | 7,378.4 | 0.00 | 0.00 | 0.00 |
| 18,100.0 | 89.65 | 90.00 | 10,861.1 | 182.0 | 7,476.3 | 7,478.4 | 0.00 | 0.00 | 0.00 |
| 18,200.0 | 89.65 | 90.00 | 10,861.7 | 182.0 | 7,576.3 | 7,578.3 | 0.00 | 0.00 | 0.00 |
| 18,300.0 | 89.65 | 90.00 | 10,862.4 | 182.0 | 7,676.3 | 7,678.3 | 0.00 | 0.00 | 0.00 |
| 18,400.0 | 89.65 | 90.00 | 10,863.0 | 182.0 | 7,776.3 | 7,778.3 | 0.00 | 0.00 | 0.00 |
| 18,500.0 | 89.65 | 90.00 | 10,863.6 | 182.0 | 7,876.3 | 7,878.3 | 0.00 | 0.00 | 0.00 |
| 18,600.0 | 89.65 | 90.00 | 10,864.2 | 182.0 | 7,976.3 | 7,978.3 | 0.00 | 0.00 | 0.00 |
| 18,700.0 | 89.65 | 90.00 | 10,864.8 | 182.0 | 8,076.3 | 8,078.2 | 0.00 | 0.00 | 0.00 |
| 18,800.0 | 89.65 | 90.00 | 10,865.4 | 182.0 | 8,176.3 | 8,178.2 | 0.00 | 0.00 | 0.00 |
| 18,900.0 | 89.65 | 90.00 | 10,866.1 | 182.0 | 8,276.3 | 8,278.2 | 0.00 | 0.00 | 0.00 |
| 19,000.0 | 89.65 | 90.00 | 10,866.7 | 182.0 | 8,376.3 | 8,378.2 | 0.00 | 0.00 | 0.00 |
| 19,100.0 | 89.65 | 90.00 | 10,867.3 | 182.0 | 8,476.3 | 8,478.2 | 0.00 | 0.00 | 0.00 |
| 19,200.0 | 89.65 | 90.00 | 10,867.9 | 182.0 | 8,576.3 | 8,578.1 | 0.00 | 0.00 | 0.00 |
| 19,300.0 | 89.65 | 90.00 | 10,868.5 | 182.0 | 8,676.3 | 8,678.1 | 0.00 | 0.00 | 0.00 |
| 19,400.0 | 89.65 | 90.00 | 10,869.1 | 182.0 | 8,776.2 | 8,778.1 | 0.00 | 0.00 | 0.00 |
| 19,500.0 | 89.65 | 90.00 | 10,869.8 | 182.0 | 8,876.2 | 8,878.1 | 0.00 | 0.00 | 0.00 |
| 19,600.0 | 89.65 | 90.00 | 10,870.4 | 182.0 | 8,976.2 | 8,978.1 | 0.00 | 0.00 | 0.00 |
| 19,700.0 | 89.65 | 90.00 | 10,871.0 | 182.0 | 9,076.2 | 9,078.1 | 0.00 | 0.00 | 0.00 |
| 19,800.0 | 89.65 | 90.00 | 10,871.6 | 182.0 | 9,176.2 | 9,178.0 | 0.00 | 0.00 | 0.00 |
| 19,900.0 | 89.65 | 90.00 | 10,872.2 | 182.0 | 9,276.2 | 9,278.0 | 0.00 | 0.00 | 0.00 |
| 20,000.0 | 89.65 | 90.00 | 10,872.8 | 182.0 | 9,376.2 | 9,378.0 | 0.00 | 0.00 | 0.00 |
| 20,100.0 | 89.65 | 90.00 | 10,873.5 | 182.0 | 9,476.2 | 9,478.0 | 0.00 | 0.00 | 0.00 |
| 20,200.0 | 89.65 | 90.00 | 10,874.1 | 182.0 | 9,576.2 | 9,578.0 | 0.00 | 0.00 | 0.00 |
| 20,300.0 | 89.65 | 90.00 | 10,874.7 | 182.0 | 9,676.2 | 9,677.9 | 0.00 | 0.00 | 0.00 |
| 20,400.0 | 89.65 | 90.00 | 10,875.3 | 182.0 | 9,776.2 | 9,777.9 | 0.00 | 0.00 | 0.00 |
| 20,500.0 | 89.65 | 90.00 | 10,875.9 | 182.0 | 9,876.2 | 9,877.9 | 0.00 | 0.00 | 0.00 |
| 20,582.4 | 89.65 | 90.00 | 10,876.4 | 182.0 | 9,958.6 | 9,960.3 | 0.00 | 0.00 | 0.00 |

**Design Targets**

| Target Name<br>- hit/miss target<br>- Shape | Dip Angle (°) | Dip Dir. (°) | TVD (ft) | +N/-S (ft) | +E/-W (ft) | Northing (ft) | Easting (ft) | Latitude | Longitude |
|---|---|---|---|---|---|---|---|---|---|
| Chalmers 8T | 0.00 | 0.00 | 10,876.8 | 181.7 | 9,974.9 | 402,255.11 | 1,219,964.60 | 48° 3' 43.067 N | 103° 33' 43.255 W |
| - plan misses target center by 16.3ft at 20582.4ft MD (10876.4 TVD, 182.0 N, 9958.6 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 |
| 11,106.0 | 10,818.0 | 7" | 7.000 | 8.750 |

| | | | |
|---|---|---|---|
| **Database:** | OpenWellsCompass - EDM Prod | **Local Co-ordinate Reference:** | Well CHALMERS 5300 21-19 8T |
| **Company:** | Oasis | **TVD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Project:** | Indian Hills | **MD Reference:** | WELL @ 2071.0ft (Original Well Elev) |
| **Site:** | 153N-100W-19/20 | **North Reference:** | True |
| **Well:** | CHALMERS 5300 21-19 8T | **Survey Calculation Method:** | Minimum Curvature |
| **Wellbore:** | CHALMERS 5300 21-19 8T | | |
| **Design:** | Plan #1 | | |

**Formations**

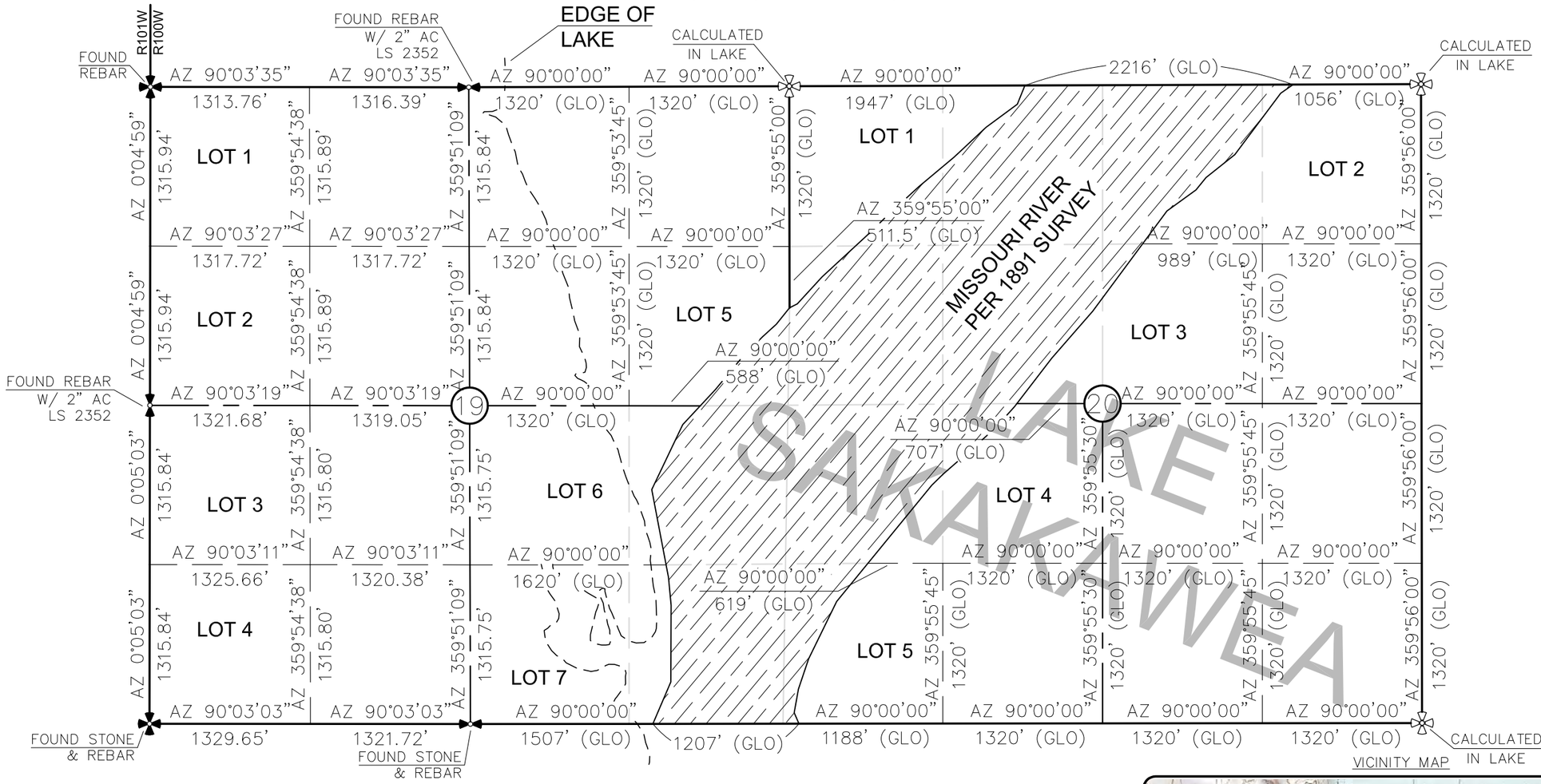
| Measured Depth (ft) | Vertical Depth (ft) | Name | Lithology | Dip (°) | Dip Direction (°) |
|---|---|---|---|---|---|
| 2,021.0 | 2,021.0 | Pierre | | | |
| 4,624.1 | 4,624.0 | Greenhorn | | | |
| 5,029.1 | 5,029.0 | Mowry | | | |
| 5,417.1 | 5,417.0 | Dakota | | | |
| 6,463.2 | 6,463.0 | Rierdon | | | |
| 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 | | | |
| 10,757.0 | 10,706.0 | False Bakken | | | |
| 10,772.9 | 10,716.0 | Upper Bakken Shale | | | |
| 10,799.8 | 10,732.0 | Middle Bakken | | | |
| 10,866.0 | 10,766.0 | Lower Bakken Shale | | | |
| 10,899.1 | 10,780.0 | Pronghorn | | | |
| 10,955.9 | 10,799.0 | Threeforks | | | |
| 11,009.4 | 10,811.0 | Threeforks(Top of Target) | | | |

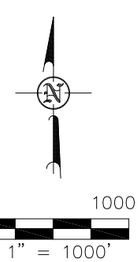
**Plan Annotations**

| 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 340.4 hold at 10000.2 MD |
| 10,340.7 | 10,340.4 | 50.0 | 0.0 | Start Build 12.00 KOP |
| 11,087.7 | 10,817.9 | 133.8 | 467.1 | Start 18.2 hold at 11087.7 MD EOC |
| 11,105.9 | 10,818.0 | 137.0 | 485.0 | Start DLS 2.00 TFO 90.05 Csg Pt |
| 11,614.4 | 10,821.1 | 182.0 | 990.8 | Start 8984.3 hold at 11614.4 MD |
| 20,598.7 | 10,876.5 | 182.0 | 9,974.9 | TD at 20598.7 |

# SECTION BREAKDOWN

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"CHALMERS 5300 21-19 8T"
2226 FEET FROM NORTH LINE AND 326 FEET FROM WEST LINE
SECTIONS 19 & 20, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA




– MONUMENT – RECOVERED

– MONUMENT – NOT RECOVERED

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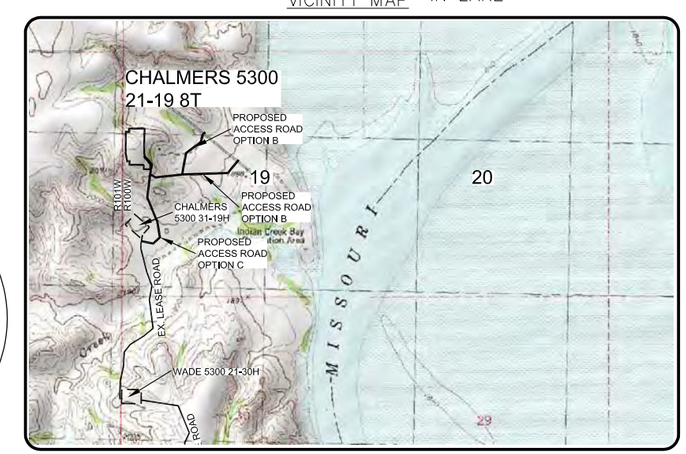
ALL AZIMUTHS ARE BASED ON G.P.S. OBSERVATIONS. THE ORIGINAL SURVEY OF THIS AREA FOR THE GENERAL LAND OFFICE (G.L.O.) WAS 1891. THE CORNERS FOUND ARE AS INDICATED AND ALL OTHERS ARE COMPUTED FROM THOSE CORNERS FOUND AND BASED ON G.L.O. DATA. THE MAPPING ANGLE FOR THIS AREA IS APPROXIMATELY –0°03'.

REGISTERED LAND SURVEYOR
DARYL D. KASEMAN
LS-3880
DATE: 3/13/14
NORTH DAKOTA

VICINITY MAP

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| Revision No. | Date | By | Description |
|---|---|---|---|
| REV 1 | 3/12/14 | JJS | MOVED WELLS ON PAD |

OASIS PETROLEUM NORTH AMERICA, LLC
SECTION BREAKDOWN
SECTIONS 19 & 20, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. Project No.: S13-09-282.03
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 8T"
2226 FEET FROM NORTH LINE AND 326 FEET FROM WEST LINE
SECTION 19, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA

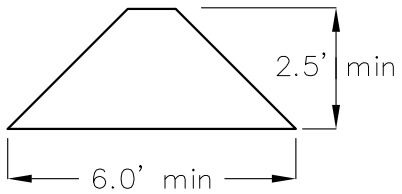
| | |
|---|---|
| WELL SITE ELEVATION | 2054.5 |
| WELL PAD ELEVATION | 2046.0 |

| | |
|---|---|
| EXCAVATION | 119,687 |
| PLUS PIT | 22,050 |
| | 141,737 |
| EMBANKMENT | 53,703 |
| PLUS SHRINKAGE (30%) | 16,111 |
| | 69,814 |
| STOCKPILE PIT | 22,050 |
| STOCKPILE TOP SOIL (6") | 7,335 |
| BERMS | 1,373 LF = 445 CY |
| DITCHES | 2,044 LF = 313 CY |
| DETENTION AREA | 4,751 CY |
| SCREENING BERM | 27,464 CY |
| STOCKPILE MATERIAL | 19,693 |
| DISTURBED AREA FROM PAD | 9.09 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
2226' FNL
326' FWL

BERM DETAIL




DITCH DETAIL

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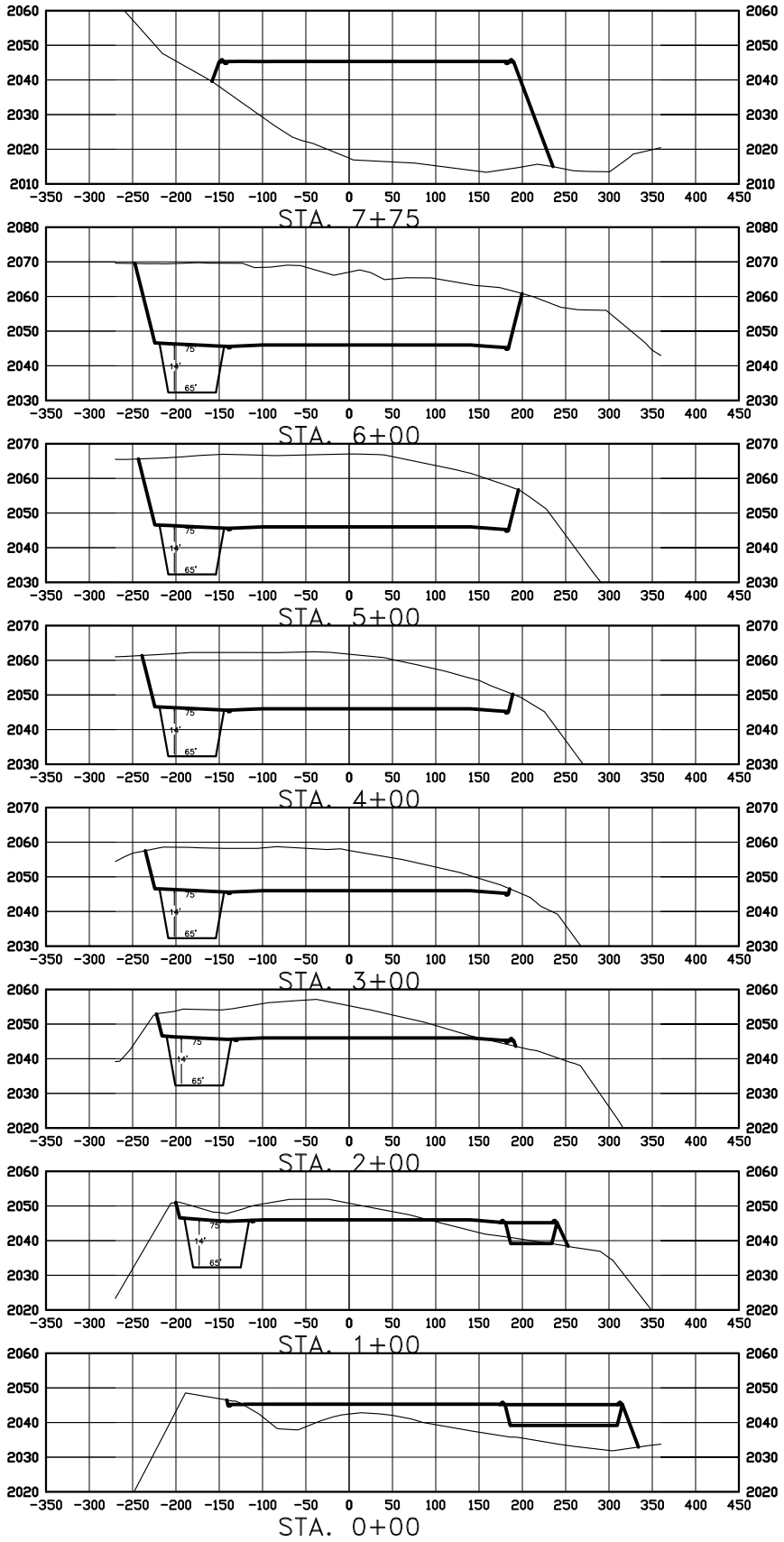
OASIS PETROLEUM NORTH AMERICA, LLC
QUANTITIES
SECTION 19, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. | Project No.: S13-09-282.03
Checked By: D.D.K. | Date: JAN. 2014

| Revision No. | Date | By | Description |
|---|---|---|---|
| REV 1 | 3/12/14 | JJS | MOVED WELLS ON PAD |

# CROSS SECTIONS

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"CHALMERS 5300 21-19 8T"
2226 FEET FROM NORTH LINE AND 326 FEET FROM WEST LINE
SECTION 19, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA

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REGISTERED LAND SURVEYOR
DARYL D. KASEMAN
LS-3880
DATE: 3/13/14
NORTH DAKOTA

SCALE
HORIZ 1"=200'
VERT 1"=50'

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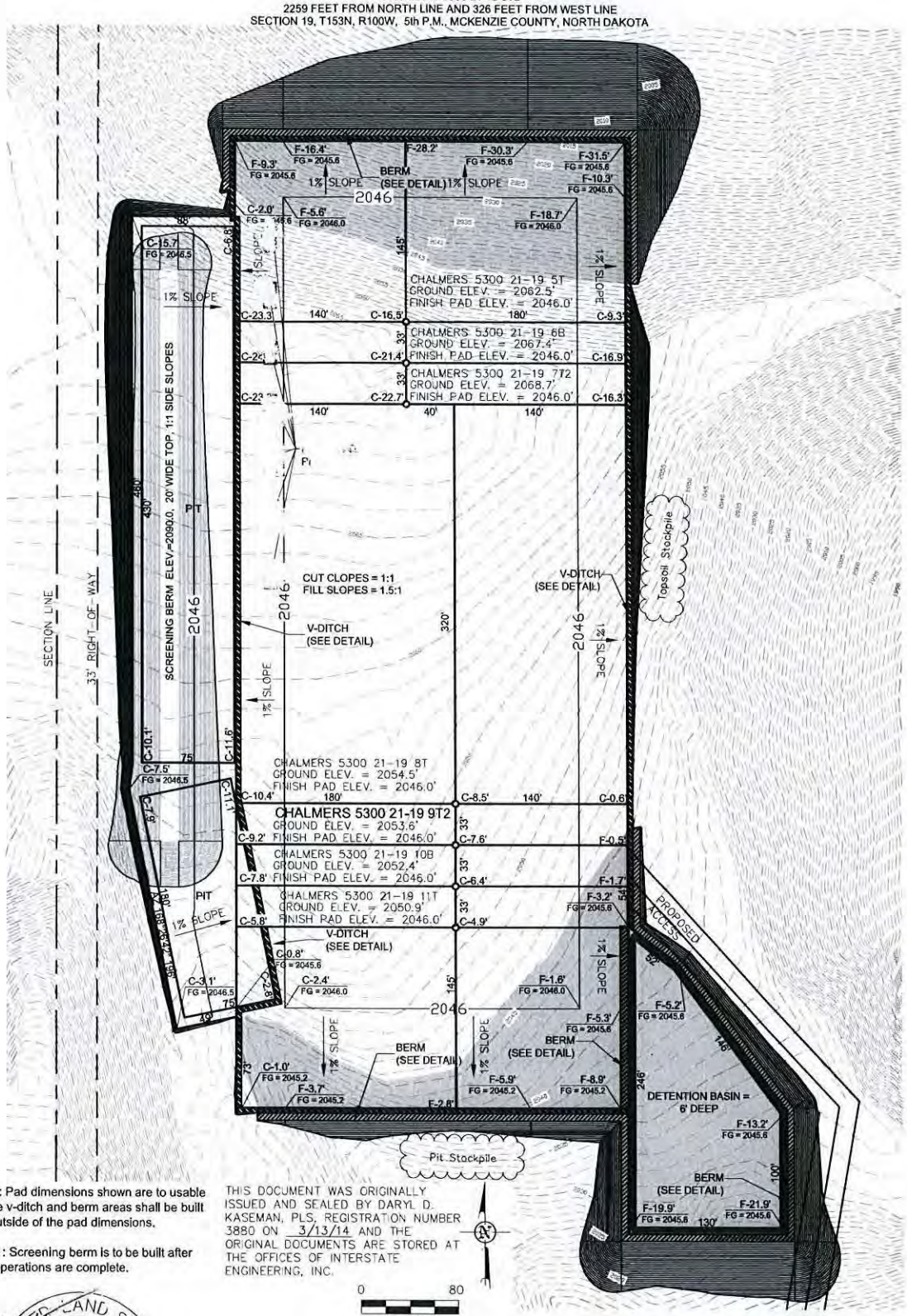
OASIS PETROLEUM NORTH AMERICA, LLC
PAD CROSS SECTIONS
SECTION 19, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. | Project No.: S13-09-282.03
Checked By: D.D.K. | Date: JAN. 2014

| Revision No. | Date | By | Description |
|---|---|---|---|
| REV 1 | 3/12/14 | JJS | MOVED WELLS ON PAD |

# PAD LAYOUT

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
*CHALMERS 5300 21-19 9T2*
2259 FEET FROM NORTH LINE AND 326 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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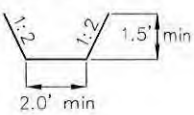
0 80
1" = 80'

REGISTERED LAND SURVEYOR
DARYL D. KASEMAN
LS-3880
DATE: 3/13/14
NORTH DAKOTA

Proposed Contours
Original Contours
BERM
DITCH

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

## V-DITCH DETAIL

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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.: S13-09-282.04
Checked By: D.D.K. | Date: JAN. 2014

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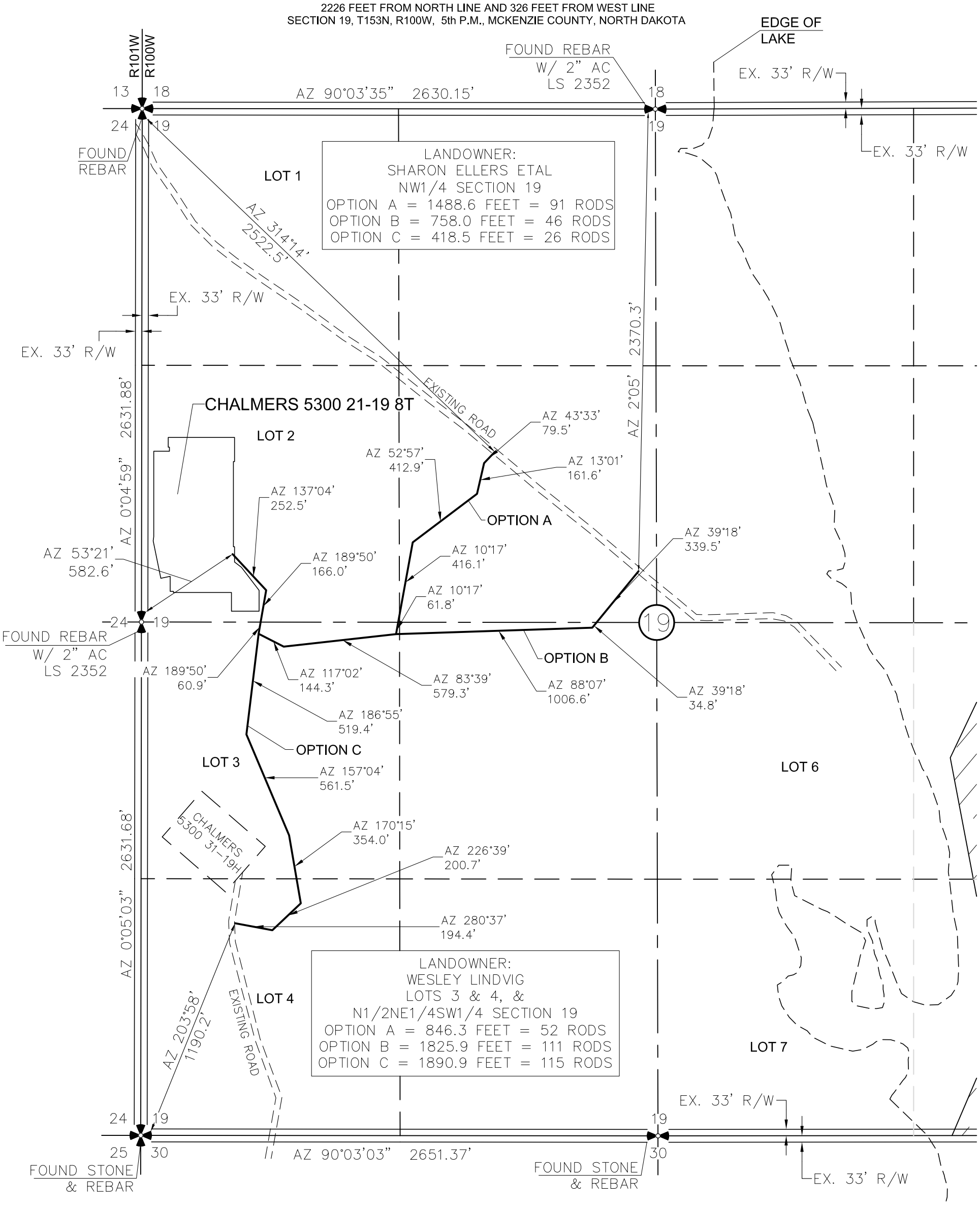
| REV 1 | 3/12/14 | JJS | MOVED WELLS ON PAD |

# ACCESS APPROACH

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"CHALMERS 5300 21-19 8T"
2226 FEET FROM NORTH LINE AND 326 FEET FROM WEST LINE
SECTION 19, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA




RECEIVED LAND SURVEYOR
DARYL D. KASEMAN
LS-3880
DATE: 3/13/14
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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OASIS PETROLEUM NORTH AMERICA, LLC
ACCESS APPROACH
SECTION 19, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. | Project No.: S13-09-282.03
Checked By: D.D.K. | Date: JAN. 2014

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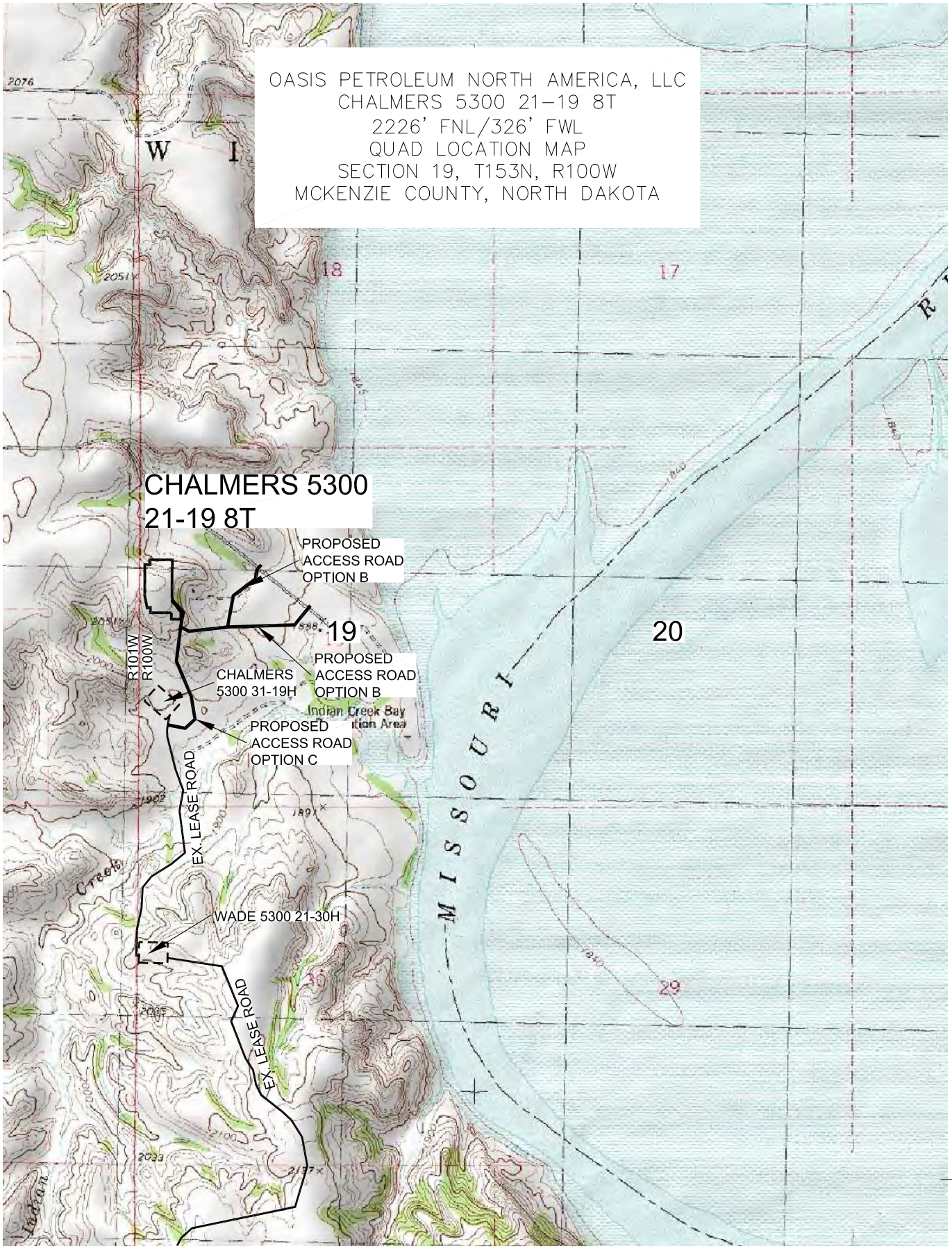
| REV 1 | 3/12/14 | JJS | MOVED WELLS ON PAD |

G:\2013\S13-09-\282.03 Oasis Petroleum - 4 of 7 Infill Wells for Chalmers\CADD\REVISED CHALMERS 8T.dwg - 3/13/2014 2:05 PM josh schmierer

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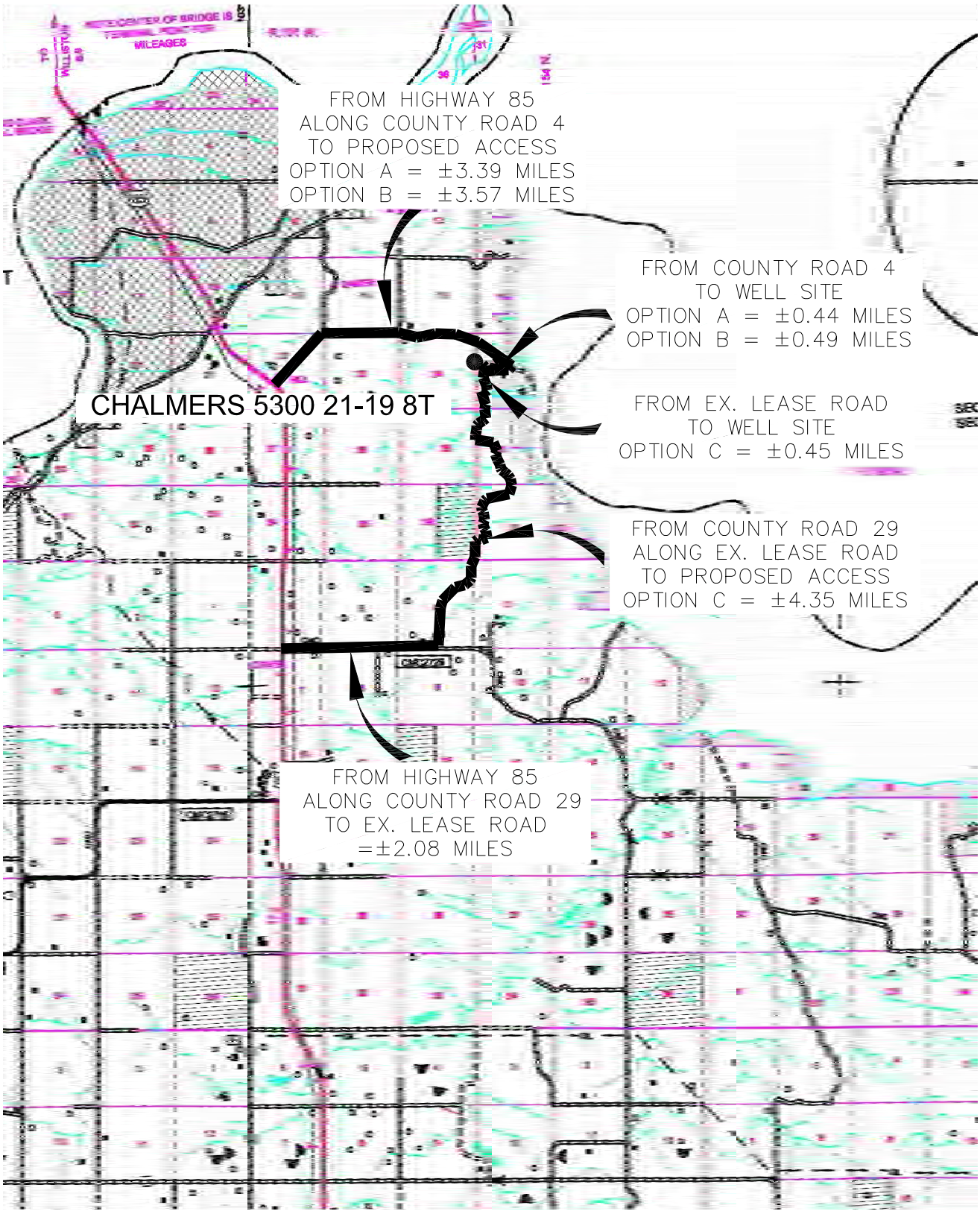
OASIS PETROLEUM NORTH AMERICA, LLC
QUAD LOCATION MAP
SECTION 19, T153N, R100W
MCKENZIE COUNTY, NORTH DAKOTA

Drawn By: B.H.H. | Project No.: S13-09-282.03
Checked By: D.D.K. | Date: JAN. 2014

| Revision No. | Date | By | Description |
|---|---|---|---|
| REV 1 | 3/12/14 | JJS | MOVED WELLS ON PAD |

# COUNTY ROAD MAP

OASIS PETROLEUM NORTH AMERICA, LLC
1001 FANNIN, SUITE 1500, HOUSTON, TX 77002
"CHALMERS 5300 21-19 8T"
2226 FEET FROM NORTH LINE AND 326 FEET FROM WEST LINE
SECTION 19, T153N, R100W, 5th P.M., MCKENZIE COUNTY, NORTH DAKOTA

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SCALE: 1" = 2 MILE

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

Drawn By: B.H.H. | Project No.: S13-09-282.03
Checked By: D.D.K. | Date: JAN. 2014

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| REV 1 | 3/12/14 | JJS | MOVED WELLS ON 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

Pad 1
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

**Chelsea Covington**
Regulatory Assistant
Oasis Petroleum North America, LLC

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