# Appendix VII: Reservoir Fluids

## Water Analyses Testing Results

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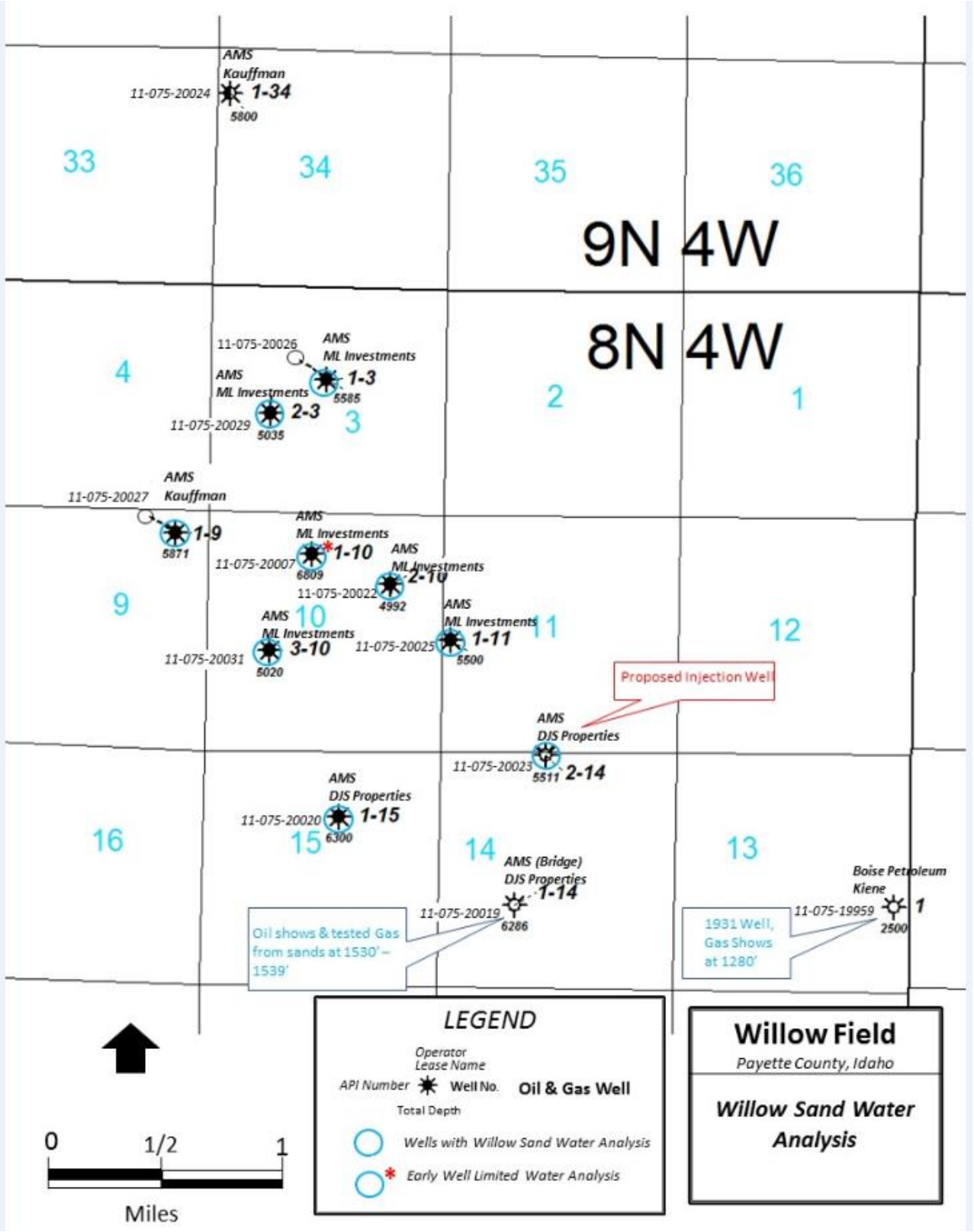
Base Map for Location of Sampled Wells



# Water Test Analyses Table

| Well Name | Date Sampled | Formation Sampled | Depth (MD ft) | Total Dissolved Solids (TDS) (mg/L) | Benzene (ug/L) | Toluene (ug/L) | Ethylbenzene (ug/L) | Xylene (ug/L) | Appendix |
|---|---|---|---|---|---|---|---|---|---|
| AMS DJS 2-14 | 10/22/2014 | Willow Sand | 5380 | 3150 | 1510 | 830 | 55 | 390 | App. VII |
| AMS DJS 1-15 | 5/28/2019 | U. Willow Sandy Silts | 3756 | 1540 | 3030 | 1930 | 178 | 89 | App. VII |
| AMS Kauffman 1-9 | 3/19/2015 | Willow Sand | 4560 | 2600 | 2142 | 2335 | 548 | 661 | App. VII |
| AMS ML Investments 1-3 | 5/30/2019 | Willow Sand | 4379 | 1300 | 775 | 1690 | 349 | 1800 | App. VII |
| AMS ML Investments 1-11 | 10/9/2014 | Willow Sand | 4262 | 5950 | 8900 | 7800 | 600 | 3490 | App. VII |
| AMS ML Investments 2-3 | 5/30/2019 | Willow Sand | 4462 | 1010 | 1650 | 2710 | 772 | 4290 | App. VII |
| AMS ML Investments 2-10 | 3/20/2014 | Willow Sand | 4288 | 1650 | 4280 | 4150 | 425 | 2480 | App. VII |
| AMS ML Investments 3-10 | 5/26/2019 | Willow Sand | 4246 | 510 | 2210 | 3730 | 1010 | 4460 | App. VII |
| AMS ML Investments 1-10* | 4/26/2010 | Willow Sand | 4225 | 1210 | *See note below | | | | App. VII |
| Sample #1 | 1/5/2013 | Willow Sand | 4096 | 2034 | *See note below | | | | App. VII |
| Sample #2 | 1/5/2013 | Willow Sand | 4096 | 2137 | *See note below | | | | App. VII |
| Sample #3 | 1/5/2013 | Willow Sand | 4096 | 15982 | *See note below | | | | App. VII |
| | 2/16/2016 | Willow Sand | 4096 | 1349 | *See note below | | | | App. VII |

*NOTE: ML 1-10 - A water analysis was performed for this well, but the sample was not run for BTEX. However, gas and condensate samples were pulled in which both samples showed to have concentrations of BTEX as well as other hydrocarbon components.
See ML 1-10 Gas and Condensate analysis in Appendix App. S-10 and S-11

All water samples were pulled from a separator, a vessel that collects the full well stream from each well when it is on production. This vessel is the first line of separation from the producing well bore. Additionally, there are no injection wells within the hydrocarbon producing area/formations, proving that the produced water is native to the formation. Furthermore, the water samples taken from the 8 wells referenced in the injection permit application all share similar characteristics across the hydrocarbon producing field.

Analytical Laboratories, Inc.
1804 N. 33rd Street
Boise, Idaho 83703
Phone (208) 342-5515

**Attn:** JEFF JANIK
ALTA MESA SERVICES, LP
15021 KATY FREEWAY STE 400
HOUSTON, TX 77094

**Collected By:** J JANIK
**Submitted By:** J JANIK

Perfs 5380 - 5390'

**Source of Sample:**
DJS PROP 2-14 PRODUCOD WATER

**Time of Collection:** 16:00
**Date of Collection:** 10/22/2014
**Date Received:** 10/23/2014
**Report Date:** 11/7/2014

**Field Temp:**
**PWS:**
**Temp Rcvd in Lab:** 20.4 °C
**PWS Name**

## Laboratory Analysis Report

**Sample Number:** 1442245

NO FIELD TEMP GIVEN; NO TRAVEL BLANKS RCVD; Methane, Ethane, and Ethene testing were performed by Accutest Mountain States (AMS).

| Test Requested | MCL | Analysis Result | Units | MDL | Method | Date Completed | Analyst |
|---|---|---|---|---|---|---|---|
| Aluminum, Al | UR | 1.12 | mg/L | 0.10 | EPA 200.7 | 10/24/2014 | KC |
| Arsenic Low | 0.01 | < 0.005 | mg/L | 0.005 | EPA 200.8 | 11/3/2014 | JH |
| Barium, Ba | 2 | 0.12 | mg/L | 0.05 | EPA 200.7 | 10/24/2014 | KC |
| Boron, B | | 7.40 | mg/L | 0.10 | EPA 200.7 | 11/4/2014 | KC |
| Calcium, Ca | UR | 51.1 | mg/L | 0.50 | EPA 200.7 | 10/28/2014 | KC |
| Iron, Fe | UR | 11.9 | mg/L | 0 | EPA 200.7 | 10/29/2014 | KC |
| Magnesium, Mg | UR | 0.50 | mg/L | 0.50 | EPA 200.7 | 10/28/2014 | KC |
| Manganese Low | | 0.128 | mg/L | 0.005 | EPA 200.7 | 10/24/2014 | KC |
| Potassium, K | UR | 56.7 | mg/L | 0.5 | EPA 200.7 | 10/28/2014 | KC |
| Selenium Low | 0.05 | < 0.005 | mg/L | 0.005 | EPA 200.8 | 11/3/2014 | JH |
| Silica | UR | 106 | mg/L | 0.25 | EPA 200.7 | 11/4/2014 | KC |
| Sodium, Na | UR | 392 | mg/L | 0.50 | EPA 200.7 | 10/28/2014 | KC |
| Uranium, U | 30 | < 5 | ug/L | 5 | EPA 200.8 | 11/3/2014 | JH |
| Metals Digestion | | * | | | EPA 200.9-11 | 10/23/2014 | JMS |
| Density | | 0.998 | g/mL | | Gravimetric | 11/4/2014 | JH |
| Nitrate (as N) | | < 0.2 | mg/L | 0.2 | EPA 300.0 | 10/23/2014 | NC |

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated



Date Report Printed: 11/7/2014 11:59:12

## Laboratory Analysis Report

**Sample Number:** 1442245

NO FIELD TEMP GIVEN; NO TRAVEL BLANKS RCVD; Methane, Ethane, and Ethene testing were performed by Accutest Mountain States (AMS).

| Test Requested | MCL | Analysis Result | Units | MDL | Method | Date Completed | Analyst |
|---|---|---|---|---|---|---|---|
| Benzene | | 1510 | ug/L | 0.5 | EPA 8260B | 10/28/2014 | CY |
| Toluene | | 830 | ug/L | 0.5 | EPA 8260B | 10/28/2014 | CY |
| Ethylbenzene | | 55.0 | ug/L | 0.5 | EPA 8260B | 10/28/2014 | CY |
| Xylene, Total | | 390 | ug/L | 0.5 | EPA 8260B | 10/28/2014 | CY |
| Methane | | 2.49 | mg/L | 0.0008 | RSKSOP 175 | 10/27/2014 | AMS |
| Ethane | | 0.399 | mg/L | 0.0016 | RSKSOP 175 | 10/27/2014 | AMS |
| Ethene | | <0.0024 | mg/L | 0.0024 | RSKSOP 175 | 10/27/2014 | AMS |
| Alkalinity | UR | 332 | mg/L CaCO3 | | EPA 310.1 | 10/30/2014 | CJS |
| Chloride, Cl | UR | 305 | mg/L | 1 | EPA 300.0 | 10/23/2014 | NC |
| Fluoride, F | 4.0 | 6.88 | mg/L | 0.10 | EPA 300.0 | 10/23/2014 | NC |
| Sulfate, SO4 | UR | 34 | mg/L | 1 | EPA 300.0 | 10/23/2014 | NC |
| pH | UR | 8.8 | S.U. | | SM 4500-H B | 10/23/2014 | RME |
| Conductivity | UR | 1,880 | umhos | 2 | SM 2510B | 10/23/2014 | RME |
| Bicarbonate | | 302 | mg/L | | SM 2320 | 10/30/2014 | CJS |
| Carbonate | | 29.8 | mg/L | | SM 2320 | 10/30/2014 | CJS |
| Hydroxide | | 0.0 | mg/L | | SM 2320 | 10/30/2014 | CJS |
| Resistivity | | 5.32 | ohm*cm | | | 10/23/2014 | DS |
| Total Dissolved Solids | UR | 1,540 | mg/L | 25 | SM 2540C | 10/28/2014 | GM |

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

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If you have any questions concerning this report,
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Boise, Idaho 83703
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Date Report Printed: 11/21/2014 3:49:55 PM
http://www.analyticallaboratories.com
These test results relate only to the items tested.

## Laboratory Analysis Report

**Sample Number:** 1442246

**Attn:** JEFF JANIK
ALTA MESA SERVICES, LP
15021 KATY FREEWAY STE 400
HOUSTON, TX 77094

**Collected By:** J JANIK
**Submitted By:** J JANIK

**Source of Sample:**
DJS PROP 2-14 PRODUCOD WATER

**Time of Collection:** 16:00
**Date of Collection:** 10/22/2014
**Date Received:** 10/23/2014
**Report Date:** 11/21/2014

**PWS#:**

Field Temp: Temp Rcvd in Lab: 20.4 °C **PWS Name:**

NO FIELD TEMP GIVEN; Radiological testing was performed by Summit Environmental (SUM).

| Test Requested | MCL | Analysis Result | Units | MDL | Method | Date Completed | Analyst |
|---|---|---|---|---|---|---|---|
| Gross Alpha | 15 pCi | <3 | pCi/L | 3 | EPA 900.0 | 11/11/2014 | SUM |
| Gross Beta | | 57+/-5.8 | pCi/L | 4 | EPA 900.0 | 11/11/2014 | SUM |

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

Page 1 of 1

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James Hibbs

CLIENT CODE=

# CHAIN OF CUSTODY RECORD

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1804 N. 33rd Street • Boise, ID 83703
(208) 342-5515 • Fax: (208) 342-5591 • 1-800-574-5773
Website: www.analyticallaboratories.com
E-mail: ali@analyticallaboratories.com

| CLIENT INFORMATION: | PROJECT INFORMATION: |
|---|---|
| Project Manager: JEFF JANIK | Project Name: DJS PROP. 2-14 |
| Company: ALTA MESA SERVICES | PWS Number: |
| Address: 15021 KATY FRWY, SUITE 400 HOUSTON, TX 77094 | Purchase Order Number: |
| | Required Due Date: |
| Phone: 713.824.9427 Fax: | E-mail Address: JJANIK@ALTAMESA.NET |
| Sampled by: (Please print) JEFF JANIK | Transported by: (Please print) JEFF JANIK |

TESTS REQUESTED: FOLLOW BOTTLES

| Lab ID | Date Sampled | Time Sampled | Sample Description (Source) | Sample Matrix | Remarks: |
|---|---|---|---|---|---|
| 42245 | 8/22 | 4:00 | PRODUCED WATER | | |
| | 8/22 | 4:00 | " | | |
| | 8/22 | 4:00 | " | | |
| | 8/22 | 4:00 | " | | |
| | 8/22 | 4:00 | " | | |
| | 8/22 | 4:00 | " | | |
| 42246 | 8/22 | 4:00 | " | | RADS/Alpha/Beta |
| | 10/22 | | " | | |
| | RB | | " | | |
| | | | " | | |

Invoice to: (If different than above address)

Special Instructions: *No field Temp rad / no Travel Blanks rad

ALLOCATIONS OF RISK: Analytical Laboratories, Inc. will perform preparation and testing services, obtain findings and prepare reports in accordance with Good Laboratory Practices (GLP). If, for any reason, Analytical Laboratories, Inc. errors in the conduct of a test or procedure, their liability shall be limited to the cost of the test or procedure completed in error. Under no circumstances will Analytical Laboratories, Inc. be liable for any other cost associated with obtaining a sample or use of data.

**Note: Samples are discarded 21 days after results are reported. Hazardous samples will be returned to client or disposed of at client expense.**

| | Print Name: | Company: | Date: | Time: |
|---|---|---|---|---|
| Relinquished By: (Signature) [signature] | JEFF JANIK | ALTA MESA SERVICES | 8/23/14 | 9:35 AM |
| Received By: (Signature) | | | | |
| Relinquished By: (Signature) | | | 10/23/14 | |
| Received By: (Signature) Jordyn Salyers | Jordyn Salyers | ALI | ~~8/23/14~~ | 9:35 a.m |

SAMPLE RECEIPT Total # of Containers: 10 Chains of Custody Seals Y / (N) / NA Intact: Y / (N) / NA Temperature Received: 20.4°C Condition: *

REV. 2/19/12 WHITE: STAYS WITH SAMPLE (S) YELLOW: LAB PINK: SAMPLER

# Analytical Laboratories, Inc.

1804 N. 33rd Street
Boise, Idaho 83703
Phone (208) 342-5515

Attn:
HIGH MESA SERVICES
4669 LITTLE WILLOW RD.
FAYETTE, ID 83661

Collected By: J. NATH/DUDLEY
Submitted By:

Source of Sample:
DJS 1-15 WELL SEPARATOR

Time of Collection: 21:30
Date of Collection: 5/28/2019
Date Received: 5/29/2019
Report Date: 6/5/2019

Field Temp:
PWS:

Temp Rcvd in Lab: 7.8 °C
PWS Name

## Laboratory Analysis Report

Sample Number: 1925145

Methane, Ethane, and Ethene testing were performed by SGS North America (SGS).

| Test Requested | MCL | Analysis Result | Units | MDL | Method | Date Completed | Analyst |
|---|---|---|---|---|---|---|---|
| Density | | 0.9437 | g/mL | | Gravimetric | 6/4/2019 | JH |
| Metals Digestion | | * | | | EPA 200.2 | 5/29/2019 | JD |
| Aluminum, Al | UR | 0.58 | mg/L | 0.10 | EPA 200.7 | 5/31/2019 | JMS |
| Barium, Ba | 2 | 0.38 | mg/L | 0.05 | EPA 200.7 | 5/31/2019 | JMS |
| Arsenic Low | 0.01 | 0.0085 | mg/L | 0.0020 | EPA 200.8 | 5/31/2019 | JH |
| Boron, B | | 7.23 | mg/L | 0.10 | EPA 200.7 | 5/31/2019 | JMS |
| Calcium, Ca | UR | 85.1 | mg/L | 0.50 | EPA 200.7 | 6/3/2019 | JMS |
| Iron, Fe | UR | 82.9 | mg/L | 0.05 | EPA 200.7 | 5/31/2019 | JMS |
| Magnesium, Mg | UR | < 0.50 | mg/L | 0.50 | EPA 200.7 | 6/3/2019 | JMS |
| Manganese Low | | 2.34 | mg/L | 0.005 | EPA 200.7 | 5/31/2019 | JMS |
| Potassium, K | UR | 22.6 | mg/L | 0.5 | EPA 200.7 | 6/3/2019 | JMS |
| Selenium Low | 0.05 | < 0.005 | mg/L | 0.005 | EPA 200.8 | 5/31/2019 | JH |
| Silica | UR | 23.0 | mg/L | 0.25 | EPA 200.7 | 5/31/2019 | JMS |
| Sodium, Na | UR | 737 | mg/L | 0.50 | EPA 200.7 | 6/3/2019 | JMS |
| Uranium, U | 30 | < 1 | ug/L | 1 | EPA 200.8 | 5/31/2019 | JH |
| Nitrate (as N) | | < 0.2 | mg/L | 0.2 | EPA 300.0 | 5/29/2019 | TG |

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

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APPENDIX VII-2: Water Analysis: AMS DJS 1-15 (Page 2 of 2)

## Laboratory Analysis Report

**Sample Number:** 1925145

Methane, Ethane, and Ethene testing were performed by SGS North America (SGS).

| Test Requested | MCL | Analysis Result | Units | MDL | Method | Date Completed | Analyst |
|---|---|---|---|---|---|---|---|
| Methane | | 8.52 | mg/L | 0.04 | RSKSOP 175 | 6/1/2019 | SGS |
| Ethane | | 2.48 | mg/L | 0.08 | RSKSOP 175 | 6/1/2019 | SGS |
| Ethene | | <0.0024 | mg/L | 0.0024 | RSKSOP 175 | 6/1/2019 | SGS |
| Benzene | | 3030 | ug/L | 50 | EPA 8260B | 6/3/2019 | CY |
| Toluene | | 1930 | ug/L | 50 | EPA 8260B | 6/3/2019 | CY |
| Ethylbenzene | | 178 | ug/L | 50 | EPA 8260B | 6/3/2019 | CY |
| Xylene, Total | | 89.4 | ug/L | 50 | EPA 8260B | 6/3/2019 | CY |
| Alkalinity | UR | 487 | mg/L CaCO3 | | EPA 310.1 | 5/31/2019 | TG |
| Bicarbonate | | 487 | mg/L CaCO3 | | EPA 310.1 | 5/31/2019 | TG |
| Carbonate | | 0.0 | mg/L CaCO3 | | EPA 310.1 | 5/31/2019 | TG |
| Chloride, Cl | UR | 532 | mg/L | 1 | EPA 300.0 | 5/29/2019 | TG |
| Fluoride, F | 4.0 | 1.65 | mg/L | 0.10 | EPA 300.0 | 5/29/2019 | TG |
| Sulfate, SO4 | UR | 55 | mg/L | 1 | EPA 300.0 | 5/29/2019 | TG |
| pH | UR | 7.0 | S.U. | | SM 4500-H B | 5/29/2019 | JD |
| Hydroxide | | 0.0 | mg/L | | SM 2320 | 5/31/2019 | TG |
| Total Dissolved Solids | UR | 3,150 | mg/L | 25 | SM 2540 C | 5/30/2019 | BDM |

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

6/5/19

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Laboratory • Sample Collection
Phone: (307)-856-0866 • Toll Free: (866)-985-0866

# *LABORATORY ANALYTICAL REPORT*

| | | | |
|---|---|---|---|
| Customer Name: | Alta Mesa | Order ID: | 15032703 |
| Project ID: | Alta Mesa WY Oil and Gas Project | Report Date: | 3/31/2015 |

| | | | Date | Time |
|---|---|---|---|---|
| Lab ID: | 15032703-01 | | | |
| Customer Sample ID: | KAUFFMAN 1-9B | Collection | 3/19/2015 | |
| Matrix: | Aqueous | Received: | 3/27/2015 | 9:20 AM |
| Notes: | | | | |

| Analyses | Result | Units | RL | Qual. | Method | Analysis Date/Time | | Analyst |
|---|---|---|---|---|---|---|---|---|
| **Organic Compounds** | | | | | | | | |
| Benzene | 2142 | ug/L | 100 | | EPA 8021 B | 3/30/2015 | 13:24 | TMC |
| Surr: 4-Bromofluorobenzene | 91.5 | % | 70-130 | | EPA 8021 B | | | |
| Toluene | 2335 | ug/L | 100 | | EPA 8021 B | 3/30/2015 | 13:24 | TMC |
| Surr: 4-Bromofluorobenzene | 91.5 | % | 70-130 | | EPA 8021 B | | | |
| Ethyl Benzene | 547.6 | ug/L | 100 | | EPA 8021 B | 3/30/2015 | 13:24 | TMC |
| Surr: 4-Bromofluorobenzene | 91.5 | % | 70-130 | | EPA 8021 B | | | |
| m,p-Xylene | 1806 | ug/L | 200 | | EPA 8021 B | 3/30/2015 | 13:24 | TMC |
| Surr: 4-Bromofluorobenzene | 91.5 | % | 70-130 | | EPA 8021 B | | | |
| o Xylene | 660.5 | ug/L | 100 | | EPA 8021 B | 3/30/2015 | 13:24 | TMC |
| Surr: 4-Bromofluorobenzene | 91.5 | % | 70-130 | | EPA 8021 B | | | |
| Gasoline Range Organics (GRO) | 156300 | ug/L | 11000 | | EPA 8015 D | 3/30/2015 | 13:24 | TMC |
| Surr: 4-Bromofluorobenzene (FID) | 98.8 | % | 70-130 | | EPA 8015 D | | | |
| Diesel Range Organics (DRO) | 9765 | mg/L | 1470 | | EPA 8015 D | 3/31/2015 | 11:24 | TMC |
| Surr: o-Terphenyl | 1,184.6 | % | 70-130 | | EPA 8015 D | | | |
| TPH as DRO + GRO | 9921 | mg/L | 0.1 | | Calculation | 3/31/2015 | 14:42 | RG |

Definitions:

ND-Not Detected at the reporting limit
RL-Analyte Reporting Limit
H-Holding times for preparation or analysis exceeded
S-Spike Recovery outside accepted recovery limits
J-Analyte detected below quantitation limits
M-Matrix Effect
D-Diluted out of recovery limits
L-Analyzed by a contract laboratory

Documentation will be kept for five (5) years.

Page 1 of 5

PRECISION ANALYSIS

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# *Laboratory Analytical Report*

| | | | |
|---|---|---|---|
| Customer Name: | Alta Mesa | Order ID: | 15032703 |
| Project ID: | Alta Mesa WY Oil and Gas Project | Report Date: | 3/31/2015 |

| | | | Date | Time |
|---|---|---|---|---|
| Lab Sample ID: | 15032703-01 | | | |
| Customer Sample ID: | KAUFFMAN 1-9B | Collection: | 3/19/2015 | |
| Matrix: | Aqueous | Received: | 3/27/2015 | 9:20 AM |

Notes:

| Analyses | Result | Units | RL | Qual. | Method | Analysis Date/Time | Analyst |
|---|---|---|---|---|---|---|---|
| Alkalinity, Bicarbonate (HCO3) | 564.0 | mg/L | 2 | | SM 2320 B | 3/27/2015 11:40:00 AM | JS |
| Alkalinity, Carbonate (CO3) | ND | mg/L | 2 | | SM 2320 B | 3/27/2015 11:40:00 AM | JS |
| Alkalinity, Hydroxide (OH) | ND | mg/L | 2 | | SM 2320 B | 3/27/2015 11:40:00 AM | JS |
| Total Alkalinity | 564.0 | mg/L | 2 | | SM 2320 B | 3/27/2015 11:40:00 AM | JS |
| Barium | ND | mg/L | 0.5 | | EPA 200.7 | 3/30/2015 9:49:11 AM | RG |
| Calcium | 50 | mg/L | 0.5 | | EPA 200.7 | 3/30/2015 9:49:11 AM | RG |
| Calcium (meq/L) | 2.5 | meq/L | 0 | | EPA 200.7 | 3/30/2015 9:49:11 AM | RG |
| Calcium as CaCO3 | 130 | mg/L | 2.5 | | EPA 200.7 | 3/30/2015 9:49:11 AM | RG |
| Anions | 27.2 | meq/L | -50 | | Calculation | 3/31/2015 2:42:00 PM | RG |
| Cation/Anion Balance | 8.1 | % | -50 | | Calculation | 3/31/2015 2:42:00 PM | RG |
| Cations | 32.0 | meq/L | -50 | | Calculation | 3/31/2015 2:42:00 PM | RG |
| Chloride | 612.4 | mg/L | 10 | | EPA 300.0 | 3/30/2015 12:10:00 PM | TMC |
| Chloride as NaCl | 1010 | mg/L | 1.6 | | EPA 300.0 | 3/30/2015 12:10:00 PM | TMC |
| Ionic Strength | 0.0 | mol/L | 0 | | Calculation | 3/31/2015 2:42:00 PM | RG |
| Iron | ND | mg/L | 0.5 | | EPA 200.7 | 3/30/2015 9:49:11 AM | RG |
| Magnesium | ND | mg/L | 0.5 | | EPA 200.7 | 3/30/2015 9:49:11 AM | RG |
| Magnesium (meq/L) | 0.0 | meq/L | 0 | | EPA 200.7 | 3/30/2015 9:49:11 AM | RG |
| pH | 7.43 | s.u. | 0.01 | | EPA 150.1 | 3/27/2015 10:19:00 AM | JS |
| Potassium | 460 | mg/L | 50 | | EPA 200.7 | 3/30/2015 9:43:42 AM | RG |
| Potassium (meq/L) | 11.7 | meq/L | 0 | | EPA 200.7 | 3/30/2015 9:43:42 AM | RG |
| Resistivity, 25C | 2.69 | ohms m | 0.01 | | SM 2510 B | 3/27/2015 10:00:00 AM | JS |
| Sodium | 410 | mg/L | 50 | | EPA 200.7 | 3/30/2015 9:43:42 AM | RG |
| Sodium (meq/L) | 17.8 | meq/L | 0 | | EPA 200.7 | 3/30/2015 9:43:42 AM | RG |
| Specific Gravity | 1.002 | g/cc | 0.001 | | ASTM D 1429-03 | 3/27/2015 10:00:00 AM | JS |

29 Country Acres Rd., Riverton, WY 82501 • E-mail: Admin@Precision-Labs.com • www.Precision-Labs.com

Definitions:
ND-Not Detected at the reporting limit
RL-Analyte Reporting Limit
H-Holding times for preparation or analysis exceeded
S-Spike Recovery outside accepted recovery limits
J-Analyte detected below quantitation limits
M-Matrix Effect
D-Diluted out of recovery limits
L-Analyzed by a contract laboratory

Documentation will be kept for five (5) years.

Page 2 of 5

APPENDIX VII-3: Water Analysis: AMS Kauffman 1-9 (Page 3 of 5)

PRECISION ANALYSIS

Gas Measurement • Emissions Testing
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## *Laboratory Analytical Report*

Customer Name: Alta Mesa
Order ID: 15032703
Project ID: Alta Mesa WY Oil and Gas Project
Report Date: 3/31/2015

| | | | | | | |
|---|---|---|---|---|---|---|
| Strontium | 1.79 | mg/L | 0.5 | EPA 200.7 | 3/30/2015 9:49:11 AM | RG |
| Sulfate | 33.7 | mg/L | 1 | EPA 300.0 | 3/30/2015 12:22:00 PM | TMC |
| Temperature (Thermometric) | 19.8 | °C | 0.1 | N/A | 3/31/2015 2:44:00 PM | AC |
| Total Dissolved Solids (TDS) | 2129 | mg/L | 5 | Calculation | 3/31/2015 2:42:00 PM | RG |
| Total Hardness as CaCO3 | 126 | mg/L | 6.6 | EPA 200.7 | 3/30/2015 9:49:11 AM | RG |
| Total Solids (TS) | 2600 | mg/L | 1 | SM 2540 B | 3/27/2015 11:15:00 AM | KF |

29 Country Acres Rd., Riverton, WY 82501 • E-mail: Admin@Precision-Labs.com • www.Precision-Labs.com

Definitions:
ND-Not Detected at the reporting limit
RL-Analyte Reporting Limit
H-Holding times for preparation or analysis exceeded
S-Spike Recovery outside accepted recovery limits
J-Analyte detected below quantitation limits
M-Matrix Effect
D-Diluted out of recovery limits
L-Analyzed by a contract laboratory

Documentation will be kept for five (5) years.

Page 3 of 5

PRECISION ANALYSIS

5989 N. FM 51
Weatherford, TX 76085
admin@precision-labs.com

## Login Report

**Customer Name:** Alta Mesa
**Project ID:** Alta Mesa WY Oil and Gas Project
**Comment:**

**Order ID:** 15032703
**Order Date:** 3/27/2015

### SAMPLE CONDITION RECORD

| | |
|---|---|
| Number of cooler/packages received: | 1 |
| Number of bottles received: | 2 |
| Were the samples received intact? (no broken bottles, leaks, etc.) | Yes |
| Were the samples received with custody seals? | N/A |
| Were custody seals intact? | N/A |
| Did signature match? | N/A |
| Is the COC properly completed, legible, and signed? | Yes |
| Were all samples received accounted for on the COC? | Yes |
| Were all requested analyses understood and appropriate? | Yes |
| Did the bottle labels correspond with the COC information? | Yes |
| Were Samples collected in proper containers? | Yes |
| Were all containers properly preserved, and pH checked - should be <=2? | N/A |
| Do VOA vials have <6mm headspace? | N/A |
| Was a trip blank present? | N/A |
| Were all analyses within holding time at time of receipt? | Yes |
| Have rush or project due dates been checked and accepted? | Yes |
| Login verification: Client Name: | Yes |
| Login verification: Project Name: | Yes |
| Login Verification: Matrix: | Yes |
| Sample/Cooler Temperature(s): | 19.8 RWOI |

Page 4 of 5

APPENDIX VII-3: Water Analysis: AMS Kauffman 1-9 (Page 5 of 5)

PRECISION ANALYSIS

Toll Free: (866) 985-0866
Email: admin@precision-labs.com
www.precision-labs.com

## Chain of Custody & Analytical Request Record

UPS Tracking # _____ Shipping Cost _____

Lab Use Only | Cooler # : | Custody Seal: Y N NA | Intact: Y N NA | Signature Match: Y N NA | On Ice: Y N NA | Receipt Temperature (°C): 19.8 RwoI

Company Name: Alta Mesa Services, LP

Contact Information: Name: Dale Hayes | Phone: 281-943-1347 direct | Email: dhayes@altamesa.net | Address: 15021 Katy Fwy, Suite 400 Houston, TX 77094

Billing Type: NET 30 ✓ | CREDIT CARD ☐ | CHECK ☐

Sample Origin (state): ID

Report Email Address(es): wmoore@altamesa.net ; jjanik@altamesa.net ; mjaggers@altamesa.net

Project Name: Alta Mesa WY Oil and Gas Project | Station #: | Location:

Purchase Order:

Reporting Preference: E-MAIL ✓ | MAIL ☐

Invoice To: Name: Dale Hayes | Phone: see above | Email: see above

Sampled by Print: x Brett Baker

Sampled by Signature: x

Quote #:

Lab Order # 15032703

Compliance: EPA ✓ | NELAP ☐ | NPDES ☐ | OTHER ☐ _____

Analysis Requested:

| Lab ID | Sample Identification (Name, Location, Interval, Etc.) | Collection Date: | Collection Time: | # Containers: | Sample Type: Water (W), Gas (G), Oil (O) Soil (SL), Solid (SD) | C10+ ExtBTEX | C31+ ExtBTEX | CWA | BTEX, GRO, DRO | Calcium Carbonate | | | | | Normal Turnaround: | Rush 3-5 Days: | Urgent < 3 Days: | 24 Hours: | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2 | G | ✓ | | | | | | | | | ✓ | | ✓ | | |
| | | | | 2 | O | | ✓ | | | | | | | | ✓ | | ✓ | | |
| 01 | Kauffman 1-9B | 3-19-15 | | 2 | W | | | ✓ | ✓ | ✓ | | | | | ✓ | | ✓ | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |

| | | Date: | Time: | Shipped By: | | | Date: | Time: |
|---|---|---|---|---|---|---|---|---|
| Relinquished by Print Name | x Brett Baker | | | HAND ☐ | Received by Print Name | x Mary Hines | 3-27-15 | 9:20 |
| Relinquished by Signature | x | | | UPS ✓ | Received by Signature | x | | |
| Relinquished by Print Name | x | | | FED-EX ☐ | Received by Print Name | x | | |
| Relinquished by Signature | x | | | OTHER ☐ | Received by Signature | x | | |

Page 5 of 5

APPENDIX VII-4: Water Analysis: AMS ML Investments 1-3 (Page 1 of 2)

# Analytical Laboratories, Inc.

1804 N. 33rd Street
Boise, Idaho 83703
Phone (208) 342-5515

**Attn:**
HIGH MESA SERVICES
4669 LITTLE WILLOW RD.
PAYETTE, ID 83661

**Collected By:**
**Submitted By:**

**Source of Sample:**
ML INV 1-3 WELL SEPARATOR

**Time of Collection:** 12:00
**Date of Collection:** 5/30/2019
**Date Received:** 5/30/2019
**Report Date:** 6/4/2019

**Field Temp:**
**PWS:**

**Temp Rcvd in Lab:**
**PWS Name**

## Laboratory Analysis Report

**Sample Number:** 1925328

| Test Requested | MCL | Analysis Result | Units | MDL | Method | Date Completed | Analyst |
|---|---|---|---|---|---|---|---|
| Aluminum, Al | UR | 1.28 | mg/L | 0.10 | EPA 200.7 | 5/31/2019 | JMS |
| Arsenic Low | 0.01 | 0.0031 | mg/L | 0.0020 | EPA 200.8 | 5/31/2019 | JH |
| Barium, Ba | 2 | 1.21 | mg/L | 0.05 | EPA 200.7 | 5/31/2019 | JMS |
| Boron, B | | 8.92 | mg/L | 0.10 | EPA 200.7 | 5/31/2019 | JMS |
| Calcium, Ca | UR | 4.81 | mg/L | 0.50 | EPA 200.7 | 6/3/2019 | JMS |
| Iron, Fe | UR | 38.9 | mg/L | 0.05 | EPA 200.7 | 5/31/2019 | JMS |
| Magnesium, Mg | UR | < 0.50 | mg/L | 0.50 | EPA 200.7 | 6/3/2019 | JMS |
| Manganese Low | | 0.404 | mg/L | 0.005 | EPA 200.7 | 5/31/2019 | JMS |
| Potassium, K | UR | 18.0 | mg/L | 0.5 | EPA 200.7 | 6/3/2019 | JMS |
| Selenium Low | 0.05 | < 0.005 | mg/L | 0.005 | EPA 200.8 | 5/31/2019 | JH |
| Silica | UR | 49.4 | mg/L | 0.25 | EPA 200.7 | 5/31/2019 | JMS |
| Sodium, Na | UR | 380 | mg/L | 0.50 | EPA 200.7 | 6/3/2019 | JMS |
| Uranium, U | 30 | < 1 | ug/L | 1 | EPA 200.8 | 5/31/2019 | JH |
| Metals Digestion | | * | | | EPA 200.2 | 5/30/2019 | JD |
| Density | | 0.9966 | g/mL | | Gravimetric | 6/4/2019 | JH |
| Nitrate (as N) | | < 0.2 | mg/L | 0.2 | EPA 300.0 | 5/30/2019 | NC |

MCL = Maximum Contamination Level
MDL = Method Minimum Detection Limit
UR = Unregulated

Page 1 of 2

Date Report Printed: 6/4/2019 1:41:40 PM

## Laboratory Analysis Report

**Sample Number:** 1925328

| Test Requested | MCL | Analysis Result | Units | MDL | Method | Date Completed | Analyst |
|---|---|---|---|---|---|---|---|
| Benzene | | 775 | ug/L | 50 | EPA 8260B | 6/3/2019 | CY |
| Toluene | | 1690 | ug/L | 50 | EPA 8260B | 6/3/2019 | CY |
| Ethylbenzene | | 349 | ug/L | 50 | EPA 8260B | 6/3/2019 | CY |
| Xylene, Total | | 1800 | ug/L | 50 | EPA 8260B | 6/3/2019 | CY |
| Alkalinity | UR | 570 | mg/L CaCO3 | | EPA 310.1 | 5/31/2019 | TG |
| Bicarbonate | | 570 | mg/L CaCO3 | | EPA 310.1 | 5/31/2019 | TG |
| Carbonate | | 0.0 | mg/L CaCO3 | | EPA 310.1 | 5/31/2019 | TG |
| Chloride, Cl | UR | 90 | mg/L | 1 | EPA 300.0 | 5/30/2019 | NC |
| Fluoride, F | 4.0 | 13.9 | mg/L | 0.10 | EPA 300.0 | 5/30/2019 | NC |
| The fluoride value exceeds the EPA maximum contamination level of 4.0 mg/L. | | | | | | | |
| Sulfate, SO4 | UR | 20 | mg/L | 1 | EPA 300.0 | 5/30/2019 | NC |
| pH | UR | 7.7 | S.U. | | SM 4500-H B | 5/30/2019 | RME |
| Hydroxide | | 0.0 | mg/L | | SM 2320 | 5/31/2019 | TG |
| Total Dissolved Solids | UR | 1,300 | mg/L | 25 | SM 2540 C | 5/31/2019 | GM |

6/4/19 c/o: Brian

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

Thank you for choosing Analytical Laboratories for your testing needs.
If you have any questions concerning this report,
please contact your client manager: Brian M. McGovern

Page 2 of 2

Date Report Printed: 6/4/2019 1:41:40 PM

# Analytical Laboratories, Inc.

1804 N. 33rd Street
Boise, Idaho 83703
Phone (208) 342-5515

**Attn:** JEFF JANIK
ALTA MESA SERVICES, LP
15021 KATY FREEWAY STE 400
HOUSTON, TX 77094

**Collected By:** WARRIOR
**Submitted By:** B ASKEW

**Source of Sample:**
ML INVESTMENTS 1-11

**Time of Collection:** 6:00
**Date of Collection:** 10/9/2014
**Date Received:** 10/9/2014
**Report Date:** 10/23/2014

**Field Temp:**
**PWS:**

**Temp Rcvd in Lab:** 11.5 °C
**PWS Name**

## Laboratory Analysis Report

**Sample Number:** 1440128

NO FIELD TEMP RCVD; NO TRAVEL BLANKS RCVD; Methane, Ethane, and Ethene testing was performed by Accutest Mountain States (AMS). EPA Method 8260: Due to the nature of the sample, dilutions were employed, increasing detection levels.

| Test Requested | MCL | Analysis Result | Units | MDL | Method | Date Completed | Analyst |
|---|---|---|---|---|---|---|---|
| Aluminum, Al | UR | 0.13 | mg/L | 0.10 | EPA 200.7 | 10/10/2014 | KC |
| Arsenic Low | 0.01 | < 0.003 | mg/L | 0.003 | EPA 200.8 | 10/14/2014 | JH |
| Barium, Ba | 2 | 0.67 | mg/L | 0.05 | EPA 200.7 | 10/10/2014 | KC |
| Boron, B | | 9.80 | mg/L | 0.10 | EPA 200.7 | 10/14/2014 | KC |
| Calcium, Ca | UR | 79.1 | mg/L | 0.50 | EPA 200.7 | 10/13/2014 | KC |
| Iron, Fe | UR | 6.33 | mg/L | 0.05 | EPA 200.7 | 10/10/2014 | KC |
| Magnesium, Mg | UR | 0.72 | mg/L | 0.50 | EPA 200.7 | 10/13/2014 | KC |
| Manganese Low | | 0.500 | mg/L | 0.005 | EPA 200.7 | 10/10/2014 | KC |
| Potassium, K | UR | 1,690 | mg/L | 0.5 | EPA 200.7 | 10/14/2014 | KC |
| Selenium Low | 0.05 | < 0.005 | mg/L | 0.005 | EPA 200.8 | 10/14/2014 | JH |
| Silica | UR | 65.4 | mg/L | 0.25 | EPA 200.7 | 10/14/2014 | KC |
| Sodium, Na | UR | 712 | mg/L | 0.5 | EPA 200.7 | 10/14/2014 | KC |
| Uranium, U | 30 | 2 | ug/L | 1 | EPA 200.8 | 10/14/2014 | JH |
| Metals Digestion | | * | | | EPA 200.9-11 | 10/10/2014 | JMS |
| Density | | 0.999 | g/mL | | Gravimetric | 10/21/2014 | JH |
| Nitrate (as N) | | 0.2 | mg/L | 0.2 | EPA 300.0 | 10/9/2014 | NC |

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

Page 1 of 2

Date Report Printed: 10/24/2014 12:23:07

## Laboratory Analysis Report

**Sample Number:** 1440128

NO FIELD TEMP RCVD; NO TRAVEL BLANKS RCVD; Methane, Ethane, and Ethene testing was performed by Accutest Mountain States (AMS). EPA Method 8260: Due to the nature of the sample, dilutions were employed, increasing detection levels.

| Test Requested | MCL | Analysis Result | Units | MDL | Method | Date Completed | Analyst |
|---|---|---|---|---|---|---|---|
| Benzene | | 8900 | ug/L | 500 | EPA 8260B | 10/20/2014 | CY |
| Toluene | | 7800 | ug/L | 500 | EPA 8260B | 10/20/2014 | CY |
| Ethylbenzene | | 600 | ug/L | 50 | EPA 8260B | 10/20/2014 | CY |
| Xylene, Total | | 3490 | ug/L | 100 | EPA 8260B | 10/20/2014 | CY |
| Methane | | 5.70 | mg/L | 0.0004 | RSKSOP 175 | 10/13/2014 | AMS |
| Ethane | | 3.59 | mg/L | 0.0008 | RSKSOP 175 | 10/13/2014 | AMS |
| Ethene | | <0.0012 | mg/L | 0.0012 | RSKSOP 175 | 10/13/2014 | AMS |
| Alkalinity | UR | 806 | mg/L CaCO3 | | EPA 310.1 | 10/17/2014 | CJS |
| Chloride, Cl | UR | 1,990 | mg/L | 1 | EPA 300.0 | 10/13/2014 | NC |
| Fluoride, F | 4.0 | 7.14 | mg/L | 0.10 | EPA 300.0 | 10/13/2014 | NC |
| Sulfate, SO4 | UR | 65 | mg/L | 1 | EPA 300.0 | 10/9/2014 | NC |
| pH | UR | 7.2 | S.U. | | SM 4500-H B | 10/9/2014 | RME |
| Conductivity | UR | 8,500 | umhos | 2 | SM 2510B | 10/9/2014 | RME |
| Bicarbonate | | 806 | mg/L | | SM 2320 | 10/17/2014 | CJS |
| Carbonate | | 0.0 | mg/L | | SM 2320 | 10/17/2014 | CJS |
| Hydroxide | | 0.0 | mg/L | | SM 2320 | 10/17/2014 | CJS |
| Total Dissolved Solids | UR | 5,950 | mg/L | 25 | SM 2540C | 10/14/2014 | GM |

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

Thank you for choosing Analytical Laboratories for your testing needs.
If you have any questions concerning this report,
please contact your client manager: **James Hibbs**

Page 2 of 2

Date Report Printed: 10/24/2014 12:23:07

Analytical Laboratories, Inc.
1804 N. 33rd Street
Boise, Idaho 83703
Phone (208) 342-5515
http://www.analyticallaboratories.com

Date Report Printed: 10/31/2014 8:40:2

## Laboratory Analysis Report

Sample Number: 1440129

Attn: JEFF JANIK
ALTA MESA SERVICES, LP
15021 KATY FREEWAY STE 400
HOUSTON, TX 77094

Collected By: WARRIOR
Submitted By: B ASKEW

Source of Sample
ML INVESTMENTS 1-11

Time of Collection: 6:00
Date of Collection: 10/9/2014
Date Received: 10/9/2014
Report Date: 10/31/2014

Field Temp: Temp Rcvd in Lab: 11.5 °

PWS:

NO FIELD TEMP RCVD; Radiological testing was performed by Summit Environmental (SUM).

| Test Requested | MCL | Analysis Result | Units | MDL | Method | Date Completed | Analyst |
|---|---|---|---|---|---|---|---|
| Gross Alpha | 15 pCi | <3 | pCi/L | 3 | EPA 900.0 | 10/29/2014 | SUM |
| Gross Beta | | 1700+/-250 | pCi/L | 4 | EPA 900.0 | 10/29/2014 | SUM |

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

Thank you for choosing Analytical Laboratories for your testing needs.

If you have any questions about this report, or any future analytical needs, please contact your client manager:

James Hibbs

APPENDIX VII-5: Water Analysis: AMS ML Investments 1-11 (Page 4 of 4)

CLIENT CODE= ALTMES

# CHAIN OF CUSTODY RECORD

**ANALYTICAL LABS, INC.**
1804 N. 33rd Street • Boise, ID 83703
(208) 342-5515 • Fax: (208) 342-5591 • 1-800-574-5773
Website: www.analyticallaboratories.com
E-mail: ali@analyticallaboratories.com

| CLIENT INFORMATION: | | PROJECT INFORMATION: |
|---|---|---|
| Project Manager: | | Project Name: ML Investments 1-11 |
| Company: ALTAMESA | | PWS Number: |
| Address: | | Purchase Order Number: |
| | | Required Due Date: |
| Phone: | Fax: | E-mail Address: |
| Sampled by: (Please print) WARRIOR | | Transported by: (Please print) |

TESTS REQUESTED: See attached

| Lab ID | Date Sampled | Time Sampled | Sample Description (Source) | Sample Matrix | Remarks: |
|---|---|---|---|---|---|
| 40128 | 10-9 | 0600 | ML INVESTMENTS 1-11 | 9 | |
| 40129 | 10-9 | 0600 | ML INVESTMENTS 1-11 | | |

Invoice to: (If different than above address) Followed Bottles/Previous Testing - BB

Special Instructions: No Field Temp rcd No Travel Blanks rcd

ALLOCATIONS OF RISK: Analytical Laboratories, Inc. will perform preparation and testing services, obtain findings and prepare reports in accordance with Good Laboratory Practices (GLP). If, for any reason, Analytical Laboratories, Inc. errors in the conduct of a test or procedure, their liability shall be limited to the cost of the test or procedure completed in error. Under no circumstances will Analytical Laboratories, Inc. be liable for any other cost associated with obtaining a sample or use of data.

**Note: Samples are discarded 21 days after results are reported. Hazardous samples will be returned to client or disposed of at client expense.**

| | Print Name: | Company: | Date: | Time: |
|---|---|---|---|---|
| Relinquished By: (Signature) Brad Askew | Brad Askew | Alta Mesa | 10 15 | 10-9-14 |
| Received By: (Signature) | | | | |
| Relinquished By: (Signature) | | | | |
| Received By: (Signature) Brenda Wright | Brenda Wright | ALI | 10:15 | 10-9-14 |

SAMPLE RECEIPT Total # of Containers: Chains of Custody Seals Y / N / NA Intact: Y / N / NA Temperature Received: Condition: good

11.5°C

REV. 2/19/12 WHITE: STAYS WITH SAMPLE (S) YELLOW: LAB PINK: SAMPLER

APPENDIX VII-6: Water Analysis: AMS ML Investments 2-3 (Page 1 of 2)

Analytical Laboratories, Inc.
1804 N. 33rd Street
Boise, Idaho 83703
Phone (208) 342-5515

Attn:
HIGH MESA SERVICES
4669 LITTLE WILLOW RD.
PAYETTE, ID 83661

Collected By:
Submitted By:

Source of Sample:
ML INV 2-3 WELL SEPARATOR

Time of Collection: 8:07
Date of Collection: 5/30/2019
Date Received: 5/30/2019
Report Date: 6/4/2019

Field Temp:
PWS:

Temp Rcvd in Lab:
PWS Name

## Laboratory Analysis Report

Sample Number: 1925329

| Test Requested | MCL | Analysis Result | Units | MDL | Method | Date Completed | Analyst |
|---|---|---|---|---|---|---|---|
| Aluminum, Al | UR | 1.59 | mg/L | 0.10 | EPA 200.7 | 5/31/2019 | JMS |
| Arsenic Low | 0.01 | 0.013 | mg/L | 0.002 | EPA 200.8 | 5/31/2019 | JH |
| Barium, Ba | 2 | 0.95 | mg/L | 0.05 | EPA 200.7 | 5/31/2019 | JMS |
| Boron, B | | 6.48 | mg/L | 0.10 | EPA 200.7 | 5/31/2019 | JMS |
| Calcium, Ca | UR | 6.78 | mg/L | 0.50 | EPA 200.7 | 6/3/2019 | JMS |
| Iron, Fe | UR | 196 | mg/L | 0.05 | EPA 200.7 | 5/31/2019 | JMS |
| Magnesium, Mg | UR | 1.16 | mg/L | 0.50 | EPA 200.7 | 6/3/2019 | JMS |
| Manganese Low | | 1.42 | mg/L | 0.005 | EPA 200.7 | 5/31/2019 | JMS |
| Potassium, K | UR | 16.9 | mg/L | 0.5 | EPA 200.7 | 6/3/2019 | JMS |
| Selenium Low | 0.05 | < 0.005 | mg/L | 0.005 | EPA 200.8 | 5/31/2019 | JH |
| Silica | UR | 60.6 | mg/L | 0.25 | EPA 200.7 | 5/31/2019 | JMS |
| Sodium, Na | UR | 274 | mg/L | 0.50 | EPA 200.7 | 6/3/2019 | JMS |
| Uranium, U | 30 | < 1 | ug/L | 1 | EPA 200.8 | 5/31/2019 | JH |
| Metals Digestion | | * | | | EPA 200.2 | 5/30/2019 | JD |
| Density | | 0.9963 | g/mL | | Gravimetric | 6/4/2019 | JH |
| Nitrate (as N) | | 0.2 | mg/L | 0.2 | EPA 300.0 | 5/30/2019 | NC |

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

Page 1 of 2

Date Report Printed: 6/4/2019 1:42:03 PM

APPENDIX VII-6: Water Analysis: AMS ML Investments 2-3 (Page 2 of 2)

## Laboratory Analysis Report

**Sample Number:** 1925329

| Test Requested | MCL | Analysis Result | Units | MDL | Method | Date Completed | Analyst |
|---|---|---|---|---|---|---|---|
| Benzene | | 1650 | ug/L | 50 | EPA 8260B | 6/3/2019 | CY |
| Toluene | | 2710 | ug/L | 50 | EPA 8260B | 6/3/2019 | CY |
| Ethylbenzene | | 772 | ug/L | 50 | EPA 8260B | 6/3/2019 | CY |
| Xylene, Total | | 4290 | ug/L | 50 | EPA 8260B | 6/3/2019 | CY |
| Alkalinity | UR | 427 | mg/L CaCO3 | | EPA 310.1 | 5/31/2019 | TG |
| Bicarbonate | | 427 | mg/L CaCO3 | | EPA 310.1 | 5/31/2019 | TG |
| Carbonate | | 0.0 | mg/L CaCO3 | | EPA 310.1 | 5/31/2019 | TG |
| Chloride, Cl | UR | 83 | mg/L | 1 | EPA 300.0 | 5/30/2019 | NC |
| Fluoride., F | 4.0 | 10.2 | mg/L | 0.10 | EPA 300.0 | 5/30/2019 | NC |
| The fluoride value exceeds the EPA maximum contamination level of 4.0 mg/L. | | | | | | | |
| Sulfate, SO4 | UR | 16 | mg/L | 1 | EPA 300.0 | 5/30/2019 | NC |
| pH | UR | 6.9 | S.U. | | SM 4500-H B | 5/30/2019 | RME |
| Hydroxide | | 0.0 | mg/L | | SM 2320 | 5/31/2019 | TG |
| Total Dissolved Solids | UR | 1,010 | mg/L | 25 | SM 2540 C | 5/31/2019 | GM |

6/4/19 c/o : Brian

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

Thank you for choosing Analytical Laboratories for your testing needs.
If you have any questions concerning this report,
please contact your client manager: Brian M. McGovern

Page 2 of 2

Date Report Printed: 6/4/2019 1:42:03 PM

| SAMPLE TYPE CODE |
|---|
| S - Routine Sample |
| P - Repeat sample (at original tap) |
| E - Enforcement (chain of custody) |
| U - Upstream repeat |
| D - Downstream repeat |
| X -Other Repeat |
| W - Untreated |
| V - Invalidated by Lab |
| C - Construction / Special |

**ANALYTICAL LABORATORIES, INC.**
ID00020
1804 N. 33rd Street
Boise, Idaho 83703
1-800-574-5773
1-208-342-5515
www.analyticallaboratories.com

Public Water Supply X Private Water Supply Other_____

| NAME OF WATER SYSTEM | COUNTY | PWS |
|---|---|---|
| | | |

REPORT RESULTS TO:

JEFF JANIK
ALTA MESA SERVICES, LP
15021 KATY FREEWAY
SUITE 400
HOUSTON, TX 77094

| | |
|---|---|
| DATE RECEIVED | 3/21/2014 |
| TIME RECEIVED | 9:20 |
| DATE ANALYZED | 3/21/2014 |
| TIME ANALYZED | 13:45 |
| IF RETEST, ORIGINAL SAMPLE DATE | |
| CHILLED 10 C | X YES NO |

SEND ADDITIONAL COPIES TO:

e-mail: JJANIK@ALTAMESA.NET

Phone (713) 824-9427 Ext Fax

COLLECTED BY:

TRANSPORTED BY: JJ

| SAMPLE TYPE | COLLECTION DATE/TIME | Sampling Location | Cl res | TOTAL COLIFORMS SM 9223 | *E. COLI* SM 9223 | HPC SM 9215 |
|---|---|---|---|---|---|---|
| C | 3/20/2014 16:00 | LAB# 1410058 PROJECT: ML INV 2-10 ZONE 5 4288-4300 | | ABSENCE | ABSENCE | |

REMARKS:

ANALYST: LM
DATE PRINTED: 3/25/2014

ANALYTICAL METHODS

**Total Coliforms**

SM 9222 Membrane Filter Technique, Parts 909 and 909A, Standard Methods... 16th ed.,1985

SM 9221 Mutiple Tube Fermentation , Parts 908 and 908A, and 908B, Standard Methods... 16th

SM 9223 MMO-MUG Test Per 40 CFR141 21(f)(3)(IV)

**E. coli**

MUG Test Per 141.214(x)(7) and 40 CFR 141.21(f)(6)(III)

**HPC**

Pour Plate, Part 907, Standard Methods..., 16th ed., 1

Records shall be retained and destroyed in accordance with IDAPA 58.01.08 and 40 CFR 141.33.
In general, records shall not be retained beyond prescribed retention times.

Analytical Laboratories, Inc.

Brian McGovern 3/25/2014
Laboratory Supervisor Date

APPENDIX VII-7: Water Analysis: AMS ML Investments 2-10 (Page 2 of 4)

Analytical Laboratories, Inc.
1804 N. 33rd Street
Boise, Idaho 83703
Phone (208) 342-5515

**Attn:** JEFF JANIK
ALTA MESA SERVICES, LP
15021 KATY FREEWAY
SUITE 400
HOUSTON, TX 77094

**Collected By:**
**Submitted By:** JJ

**Source of Sample:**
PROJECT: ML INV 2-10 ZONE 5 4288-4300

**Time of Collection:** 16:00
**Date of Collection:** 3/20/2014
**Date Received:** 3/21/2014
**Report Date:** 4/2/2014

**Field Temp:**
**Temp Rcvd in Lab:** 7.1 °C
**PWS:**
**PWS Name:**

## Laboratory Analysis Report

**Sample Number:** 1410059

Methane, Ethane, and Ethene testing were performed by Accutest Mountain States (AMS).

| Test Requested | MCL | Analysis Result | Units | MDL | Method | Date Completed | Analyst |
|---|---|---|---|---|---|---|---|
| Silica | UR | 103 | mg/L | 0.25 | EPA 200.7 | 3/24/2014 | KC |
| Calcium, Ca | UR | 31.3 | mg/L | 0.50 | EPA 200.7 | 3/25/2014 | KC |
| Sodium, Na | UR | 449 | mg/L | 0.50 | EPA 200.7 | 3/25/2014 | KC |
| Potassium, K | UR | 12.4 | mg/L | 0.5 | EPA 200.7 | 3/25/2014 | KC |
| Magnesium, Mg | UR | 0.67 | mg/L | 0.50 | EPA 200.7 | 3/25/2014 | KC |
| Aluminum, Al | UR | 4.03 | mg/L | 0.10 | EPA 200.7 | 3/24/2014 | KC |
| Arsenic Low | 0.01 | < 0.005 | mg/L | 0.005 | EPA 200.8 | 4/1/2014 | JH |
| Barium, Ba | 2 | 5.33 | mg/L | 0.05 | EPA 200.7 | 3/24/2014 | KC |
| Boron, B | | 9.63 | mg/L | 0.10 | EPA 200.7 | 3/24/2014 | KC |
| Iron, Fe | UR | 3.37 | mg/L | 0.05 | EPA 200.7 | 3/24/2014 | KC |
| Manganese, Mn | UR | 0.08 | mg/L | 0.05 | EPA 200.7 | 3/24/2014 | KC |
| Uranium, U | 30 | < 5 | ug/L | 5 | EPA 200.8 | 4/1/2014 | JH |
| Chromium Low | 0.1 | 0.019 | mg/L | 0.010 | EPA 200.8 | 4/1/2014 | JH |
| Lead Low | 0.015 | 0.148 | mg/L | 0.010 | EPA 200.8 | 4/1/2014 | JH |
| Strontium, Sr | | 1.21 | mg/L | 0.01 | EPA 200.7 | 3/24/2014 | KC |
| Selenium Low | 0.05 | < 0.010 | mg/L | 0.010 | EPA 200.8 | 4/1/2014 | JH |

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

Page 1 of 2

Date Report Printed: 4/2/2014 2:41:05 PM

## Laboratory Analysis Report

**Sample Number:** 1410059

Methane, Ethane, and Ethene testing were performed by Accutest Mountain States (AMS).

| Test Requested | MCL | Analysis Result | Units | MDL | Method | Date Completed | Analyst |
|---|---|---|---|---|---|---|---|
| Nitrate (as N) | 10 | < 0.2 | mg/L | 0.2 | EPA 300.0 | 3/21/2014 | NC |
| Benzene | | 4280 | ug/L | 0.5 | EPA 8260B | 3/25/2014 | CY |
| Toluene | | 4150 | ug/L | 0.5 | EPA 8260B | 3/25/2014 | CY |
| Ethylbenzene | | 425 | ug/L | 0.5 | EPA 8260B | 3/25/2014 | CY |
| Xylene, Total | | 2480 | ug/L | 0.5 | EPA 8260B | 3/25/2014 | CY |
| Methane | | 2.29 | mg/L | 0.002 | RSKSOP 175 | 3/31/2014 | AMS |
| Ethane | | 0.521 | mg/L | 0.0008 | RSKSOP 175 | 3/31/2014 | AMS |
| Ethene | | <0.0012 | mg/L | 0.0012 | RSKSOP 175 | 3/31/2014 | AMS |
| pH | UR | 8.8 | S.U. | | SM 4500-H B | 3/21/2014 | JH |
| Conductivity | UR | 1,960 | umhos | 2 | SM 2510B | 3/21/2014 | JH |
| Turbidity | | 91.2 | NTU | 0.5 | EPA 180.1 | 3/21/2014 | JH |
| Chloride, Cl | UR | 214 | mg/L | 1 | EPA 300.0 | 3/23/2014 | NC |
| Fluoride, F | 4.0 | 10.2 | mg/L | 0.10 | EPA 300.0 | 3/23/2014 | NC |
| The fluoride value exceeds the EPA maximum contamination level of 4.0 mg/L. | | | | | | | |
| Sulfate, SO4 | UR | 38 | mg/L | 1 | EPA 300.0 | 3/23/2014 | NC |
| Alkalinity | UR | 424 | mg/L CaCO3 | | EPA 310.1 | 3/28/2014 | CJS |
| Hardness | UR | 85.6 | mg/L | 5.0 | SM 2340 | 3/28/2014 | CJS |
| Oil and Grease | | 105 | mg/L | 5 | EPA 1664 | 4/1/2014 | RME |
| Total Dissolved Solids | UR | 1,650 | mg/L | 25 | SM 2540C | 3/25/2014 | DLR |
| Total Suspended Solids | | 57 | mg/L | 3 | SM 2540 D | 3/22/2014 | DP |
| Surfactants | UR | <0.01 | mg/L | .01 | SM 5540 | 3/26/2014 | MDM |

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

Thank you for choosing Analytical Laboratories for your testing needs.
If you have any questions concerning this report,
please contact your client manager: **James Hibbs**

Page 2 of 2

Date Report Printed: 4/2/2014 2:41:05 PM

Analytical Laboratories, Inc.
1804 N. 33rd Street
Boise, Idaho 83703
Phone (208) 342-5515

Date Report Printed: 4/8/2014 10:20:10
http://www.analyticallaboratories.com

## Laboratory Analysis Report

**Sample Number:** 1410060

**Attn:** JEFF JANIK
ALTA MESA SERVICES, LP
15021 KATY FREEWAY
SUITE 400
HOUSTON, TX 77094

**Collected By:**
**Submitted By:** JJ

**Source of Sample:**
PROJECT: ML INV 2-10 ZONE 5 4288-4300

**Time of Collection:** 16:00
**Date of Collection:** 3/20/2014
**Date Received:** 3/21/2014
**Report Date:** 4/8/2014

**PWS#:**
**PWS Name:**

Field Temp: Temp Rcvd in Lab: 7.1 °C

| Test Requested | MCL | Analysis Result | Units | MDL | Method | Date Completed | Analyst |
|---|---|---|---|---|---|---|---|
| Gross Alpha | 15 pCi | <3 | pCi/L | 3 | EPA 900.0 | 3/31/2014 | SUM |
| Gross Beta | | <4 | pCi/L | 4 | EPA 900.0 | 3/31/2014 | SUM |

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

Thank you for choosing Analytical Laboratories for your testing needs.

If you have any questions about this report, or any future analytical needs, please contact your client manager:

James Hibbs

# Analytical Laboratories, Inc.

1804 N. 33rd Street
Boise, Idaho 83703
Phone (208) 342-5515

**Attn:**
HIGH MESA SERVICES
4669 LITTLE WILLOW RD.
PAYETTE, ID 83661

**Collected By:** J. NATH/DUDLEY
**Submitted By:**

**Source of Sample:**
ML INV 3-10 WELL SEPARATOR

**Time of Collection:** 20:35
**Date of Collection:** 5/26/2019
**Date Received:** 5/29/2019
**Report Date:** 6/5/2019

**Field Temp:**
**PWS:**

**Temp Rcvd in Lab:** 7.8 °C
**PWS Name**

## Laboratory Analysis Report

**Sample Number:** 1925144

Methane, Ethane, and Ethene testing were performed by SGS North America (SGS).

| Test Requested | MCL | Analysis Result | Units | MDL | Method | Date Completed | Analyst |
|---|---|---|---|---|---|---|---|
| Density | | 0.9962 | g/mL | | Gravimetric | 6/4/2019 | JH |
| Metals Digestion | | * | | | EPA 200.2 | 5/29/2019 | JD |
| Aluminum, Al | UR | < 0.10 | mg/L | 0.10 | EPA 200.7 | 5/31/2019 | JMS |
| Barium, Ba | 2 | 1.04 | mg/L | 0.05 | EPA 200.7 | 5/31/2019 | JMS |
| Arsenic Low | 0.01 | < 0.0020 | mg/L | 0.0020 | EPA 200.8 | 5/31/2019 | JH |
| Boron, B | | 0.15 | mg/L | 0.10 | EPA 200.7 | 5/31/2019 | JMS |
| Calcium, Ca | UR | 20.3 | mg/L | 0.50 | EPA 200.7 | 6/3/2019 | JMS |
| Iron, Fe | UR | 1.68 | mg/L | 0.05 | EPA 200.7 | 5/31/2019 | JMS |
| Magnesium, Mg | UR | 1.06 | mg/L | 0.50 | EPA 200.7 | 6/3/2019 | JMS |
| Manganese Low | | 0.247 | mg/L | 0.005 | EPA 200.7 | 5/31/2019 | JMS |
| Potassium, K | UR | 140 | mg/L | 0.5 | EPA 200.7 | 6/3/2019 | JMS |
| Selenium Low | 0.05 | < 0.005 | mg/L | 0.005 | EPA 200.8 | 5/31/2019 | JH |
| Silica | UR | 6.01 | mg/L | 0.25 | EPA 200.7 | 5/31/2019 | JMS |
| Sodium, Na | UR | 38.9 | mg/L | 0.50 | EPA 200.7 | 6/3/2019 | JMS |
| Uranium, U | 30 | < 1 | ug/L | 1 | EPA 200.8 | 5/31/2019 | JH |
| Nitrate (as N) | | < 0.2 | mg/L | 0.2 | EPA 300.0 | 5/29/2019 | TG |

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

Page 1 of 2

Date Report Printed: 6/5/2019 8:10:39 A

## Laboratory Analysis Report

**Sample Number:** 1925144

Methane, Ethane, and Ethene testing were performed by SGS North America (SGS).

| Test Requested | MCL | Analysis Result | Units | MDL | Method | Date Completed | Analyst |
|---|---|---|---|---|---|---|---|
| Methane | | 1.80 | mg/L | 0.04 | RSKSOP 175 | 6/1/2019 | SGS |
| Ethane | | 2.26 | mg/L | 0.08 | RSKSOP 175 | 6/1/2019 | SGS |
| Ethene | | <0.0024 | mg/L | 0.0024 | RSKSOP 175 | 6/1/2019 | SGS |
| Benzene | | 2210 | ug/L | 500 | EPA 8260B | 6/3/2019 | CY |
| Toluene | | 3730 | ug/L | 500 | EPA 8260B | 6/3/2019 | CY |
| Ethylbenzene | | 1010 | ug/L | 500 | EPA 8260B | 6/3/2019 | CY |
| Xylene, Total | | 4460 | ug/L | 500 | EPA 8260B | 6/3/2019 | CY |
| Alkalinity | UR | 367 | mg/L CaCO3 | | EPA 310.1 | 5/31/2019 | TG |
| Bicarbonate | | 367 | mg/L CaCO3 | | EPA 310.1 | 5/31/2019 | TG |
| Carbonate | | 0.0 | mg/L CaCO3 | | EPA 310.1 | 5/31/2019 | TG |
| Chloride, Cl | UR | 222 | mg/L | 1 | EPA 300.0 | 5/30/2019 | NC |
| Fluoride, F | 4.0 | 0.26 | mg/L | 0.10 | EPA 300.0 | 5/29/2019 | TG |
| Sulfate, SO4 | UR | 9 | mg/L | 1 | EPA 300.0 | 5/29/2019 | TG |
| pH | UR | 8.3 | S.U. | | SM 4500-H B | 5/29/2019 | JD |
| Hydroxide | | 0.0 | mg/L | | SM 2320 | 5/31/2019 | TG |
| Total Dissolved Solids | UR | 510 | mg/L | 25 | SM 2540 C | 5/30/2019 | BDM |

MCL = Maximum Contamination Level
MDL = Method/Minimum Detection Limit
UR = Unregulated

6/5/19

# Questar Applied Technology Services

1210 D Street
Rock Springs, Wyoming 82902
Phone: (307) 352-7292
Fax: (307) 352-7326

## WATER ANALYSIS REPORT

| | |
|---|---|
| **COMPANY:** Bridge Energy | **FORMATION:** |
| **FIELD:** Wildcat | **SAMPLE POINT:** Perf 4225' - 4250' |
| **COUNTY:** | **TYPE OF WATER:** |
| **STATE:** Idaho | **DATE SAMPLED:** 4/26/10 |
| **WELL:** ML Investment 1-10 | **DATE ANALYZED:** 4/30/10 |
| **(Willow)** | **ANALYZED BY:** Putnam |
| | **SAMPLED BY:** Nicholas |

| **DISSOLVED SOLIDS** | **mg / L** |
|---|---|
| **CATIONS:** | |
| Sodium, Na: | 299 |
| Calcium, Ca: | 108 |
| Magnesium, Mg: | 2 |
| Barium, Ba: | N/A |
| | |
| | |
| **ANIONS:** | |
| Chloride, Cl: | 405 |
| Sulfate, $SO_4$: | 145 |
| Carbonate, $CO_4$: | 0 |
| Bicarbonate, $HCO_4$: | 250 |
| | |
| Iron, Fe: | 1 |
| Sulfide, $H_2S$: | N/A |
| **TOTAL DISSOLVED:** | 1,210 |
| | |
| **OTHER PROPERTIES:** | |
| pH: | 8.25 |
| Specific Gravity, 60/60F: | 1.0044 |
| Resistivity: (ohms/meter) | 4.42 |
| Sample Temperature: | 67*F |

**REMARKS & RECOMMENDATIONS:**

APPENDIX VII-9: Water Analysis: AMS ML Investments 1-10 Page (2 of 5)

# Questar Applied Technology Services

1210 D Street
Rock Springs, Wyoming 82902
Phone: (307) 352-7292
Fax: (307) 352-7326

## WATER ANALYSIS REPORT

| | | | |
|---|---|---|---|
| COMPANY: | M & L Investments | FORMATION: | |
| FIELD: | | SAMPLE POINT: | water leg in sep. |
| COUNTY: | | TYPE OF WATER: | |
| STATE: | Idaho | DATE SAMPLED: | 1/513 1200 hrs |
| WELL: | Willow 1-10 | DATE ANALYZED: | 1/11/13 |
| MTR.# | | ANALYZED BY | Putnam |
| | | SAMPLED BY | Customer |

| DISSOLVED SOLIDS | mg / L |
|---|---|
| CATIONS: | |
| Sodium, Na: | 644 |
| Calcium, Ca: | 30 |
| Magnesium, Mg: | 12 |
| Barium, Ba: | |
| | |
| | |
| ANIONS: | |
| Chloride, Cl: | 650 |
| Sulfate, $SO_4$: | 98 |
| Carbonate, $CO_4$: | 0 |
| Bicarbonate, $HCO_4$: | 600 |
| | |
| Iron, Fe: | 0 |
| Sulfide, $H_2S$: | |
| TOTAL DISSOLVED: | |
| | 2,034 |
| OTHER PROPERTIES: | |
| pH: | 7.68 |
| Specific Gravity, 60/60F: | 0.9612 |
| Resistivity: (ohms/meter) | 4.32 |
| Sample Temperature: | 66 |

REMARKS & RECOMMENDATIONS: SPG is correct .

APPENDIX VII-9: Water Analysis: AMS ML Investments 1-10 Page (3 of 5)

# Questar Applied Technology Services

1210 D Street
Rock Springs, Wyoming 82902
Phone: (307) 352-7292
Fax: (307) 352-7326

## WATER ANALYSIS REPORT

| | |
|---|---|
| COMPANY: M & L Investments | FORMATION: |
| FIELD: | SAMPLE POINT: Water leg in sep. |
| LEGAL DESC.: | TYPE OF WATER: |
| COUNTY: | DATE SAMPLED: 1/5/13 1000 hrs. |
| STATE: Idaho | DATE ANALYZED: 1/11/13 |
| WELL: Willow 1-10 | ANALYZED BY: Putnam |
| DEPTH: | SAMPLED BY: Customer |

| DISSOLVED SOLIDS | mg / L |
|---|---|
| CATIONS: | . |
| Sodium, Na: | 667 |
| Calcium, Ca: | 48 |
| Magnesium, Mg: | 11 |
| Barium, Ba: | N/A |
| | |
| | |
| ANIONS: | |
| Chloride, Cl: | 700 |
| Sulfate, $SO_4$: | 110 |
| Carbonate, $CO_4$: | 1 |
| Bicarbonate, $HCO_4$: | 600 |
| | |
| Iron, Fe: | 0 |
| Sulfide, $H_2S$: | N/A |
| TOTAL DISSOLVED: | 2,137 |
| | |
| OTHER PROPERTIES: | |
| pH: | 7.72 |
| Specific Gravity, 60/60F: | 0.9618 |
| Resistivity: (ohms/meter) | 4.07 |
| Sample Temperature: | 69*F |

REMARKS & RECOMMENDATIONS: SPG is correct .

APPENDIX VII-9: Water Analysis: AMS ML Investments 1-10 Page (4 of 5)

# Questar Applied Technology Services

1210 D Street
Rock Springs, Wyoming 82902
Phone: (307) 352-7292
Fax: (307) 352-7326

## WATER ANALYSIS REPORT

| | |
|---|---|
| COMPANY: M & L Investments | FORMATION: |
| FIELD: | SAMPLE POINT: Water leg in sep. |
| LEGAL DESC.: | TYPE OF WATER: |
| COUNTY: | DATE SAMPLED: 1/5/13 1400 hrs. |
| STATE: Idaho | DATE ANALYZED: 1/11/13 |
| WELL: Willow 1-10 | ANALYZED BY: Putnam |
| DEPTH: | SAMPLED BY: Customer |

| DISSOLVED SOLIDS | mg / L |
|---|---|
| CATIONS: | . |
| Sodium, Na: | 5,566 |
| Calcium, Ca: | 51 |
| Magnesium, Mg: | 5 |
| Barium, Ba: | N/A |
| | |
| | |
| ANIONS: | |
| Chloride, Cl: | 6,250 |
| Sulfate, $SO_4$: | 110 |
| Carbonate, $CO_4$: | 0 |
| Bicarbonate, $HCO_4$: | 4,000 |
| | |
| Iron, Fe: | 0 |
| Sulfide, $H_2S$: | N/A |
| TOTAL DISSOLVED: | 15,982 |
| | |
| OTHER PROPERTIES: | |
| pH: | 7.71 |
| Specific Gravity, 60/60F: | 0.9714 |
| Resistivity: (ohms/meter) | 4.1 |
| Sample Temperature: | 67*F |

REMARKS & RECOMMENDATIONS: SPG is correct .

APPENDIX VII-9: Water Analysis: AMS ML Investments 1-10 Page (5 of 5)

NALCO Champion
An Ecolab Company

# Water Analysis Report

Attention: **jjgardiner@nalco.com**

Customer: **Alta Mesa Holdings LP**

Location Code: **279372**
Sample ID: **AF66694**
Login Batch: **160216091217**
Collection Date: **02/16/2016**
Receive Date: **02/16/2016**
Report Date: **02/18/2016**

Region: **N/A**
Location: **New Plymouth, ID**
System: **Production System**
Equipment: **ML1-10**
Lab ID: **ABU-0021**
Sample Point: **Separator**

| Analyses | Result | Unit |
|---|---|---|
| Dissolved CO2 | 88 | mg/L |
| Dissolved H2S | 28 | mg/L |
| pH | 7.1 | |
| Pressure | 864 | psi |
| Temperature | 122 | °F |

| Analyses | Result | Unit |
|---|---|---|
| Bicarbonate | 586 | mg/L |
| Carbonate | Not Detected | mg/L |
| Conductivity | 2080 | µS - cm3 |
| Ionic Strength | 0.02 | |
| Resistivity | 4.808 | ohms - m |
| Specific Gravity | 1.0024 | |
| Total Dissolved Solids | 1349.575 | mg/L |

| Cations | Result | Unit |
|---|---|---|
| Iron | 18.10 | mg/L |
| Manganese | 0.245 | mg/L |
| Barium | <.25 | mg/L |
| Strontium | 0.43 | mg/L |
| Calcium | 16.34 | mg/L |
| Magnesium | 0.06 | mg/L |
| Sodium | 512.40 | mg/L |
| Potassium | 8.85 | mg/L |
| Boron | 7.82 | mg/L |
| Zinc | 0.22 | mg/L |
| Phosphorus | 0.37 | mg/L |

| Anions | Result | Unit |
|---|---|---|
| Chloride | 197 | mg/L |
| Sulfate | 19 | mg/L |

| Scale Type | Result |
|---|---|
| Anhydrite CaSO4 SI | -3.63 |
| Barite BaSO4 SI | -3.69 |
| Calcite CaCO3 SI | -0.20 |
| Celestite SrSO4 SI | -2.92 |
| Gypsum CaSO4 SI | -3.64 |
| Hemihydrate CaSO4 SI | -3.44 |

Saturation Index Calculation (Tomson-Oddo Model)

**Comments:**

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03/08/2016 Page 1 of 1

PRECISION ANALYSIS GAS MEASUREMENT EMISSIONS TESTING LABORATORY
307.856.0866
www.precision-labs.com

## EXTENDED HYDROCARBON LIQUID STUDY
## CERTIFICATE OF ANALYSIS

| | | | |
|---|---|---|---|
| Company: | **Alta Mesa** | Sample Name: | **ML 1-10 Separator** |
| Pre Sample Pressure: | 622 PSIG | Sample Number: | 15081306-03 |
| Post Sample Pressure: | 623 PSIG | Date Tested: | 08/14/2015 |
| Field Cyliner Pressure: | 623.7 PSIG | Test Method: | GPA 2186M |
| Lab Cylinder Pressure: | NI PSIG | Sample Location: | Idaho |
| Sample Pressure: | 622.5 PSIG | Date Sampled: | 08/10/2015 |
| Sample Temperature: | 91.5 DEG F | Date Reported: | 08/20/2015 |
| County: | NI | Note: Due to the nature of H2S, the values of | |
| Sampling Method: | GPA-2174 | H2S reported may be lower than actual. | |
| Type Sample: | SPOT | | |

| Components | Mole % | Weight % | Liq. Vol. % |
|---|---|---|---|
| Hydrogen Sulfide | 0.0000 | 0.000 | 0.000 |
| Oxygen | 0.0000 | 0.000 | 0.000 |
| Carbon Dioxide | 0.1186 | 0.072 | 0.055 |
| Nitrogen | 0.1010 | 0.039 | 0.030 |
| Methane | 18.8653 | 4.193 | 8.705 |
| Ethane | 5.5323 | 2.305 | 4.027 |
| Propane | 9.0136 | 5.507 | 6.759 |
| iso-Butane | 3.9344 | 3.168 | 3.504 |
| n-Butane | 8.7791 | 7.070 | 7.533 |
| iso-Pentane | 5.2147 | 5.213 | 5.191 |
| n-Pentane | 7.0274 | 7.025 | 6.933 |
| Hexanes | 5.0741 | 6.059 | 5.679 |
| Heptanes | 11.0165 | 15.295 | 13.833 |
| Octanes | 6.5950 | 10.438 | 9.196 |
| Nonanes | 2.8562 | 5.076 | 4.374 |
| Decanes+ | 7.0474 | 17.502 | 14.625 |
| Benzene | 0.2568 | 0.278 | 0.195 |
| Toluene | 1.2478 | 1.593 | 1.137 |
| Ethylbenzene | 0.1799 | 0.265 | 0.189 |
| Xylenes | 0.8809 | 1.296 | 0.931 |
| n-Hexane | 5.9213 | 7.070 | 6.627 |
| 2,2,4-Trimethylpentane | 0.3376 | 0.534 | 0.477 |
| Totals | 100.000 | 100.000 | 100.000 |

Page 1 of 3

APPENDIX VII-10: Water Analysis: AMS ML Investments 1-10 Extended Oil (Page 2 of 3)

## EXTENDED ANALYSIS DATA

| Components | Mole % | Weight % | Liq. Vol. % |
|---|---|---|---|
| Hydrogen Sulfide | 0.0000 | 0.000 | 0.000 |
| Carbon Dioxide | 0.1186 | 0.072 | 0.055 |
| Nitrogen | 0.1010 | 0.039 | 0.030 |
| Methane | 18.8653 | 4.194 | 8.724 |
| Ethane | 5.5323 | 2.305 | 4.036 |
| Propane | 9.0136 | 5.508 | 6.774 |
| iso-Butane | 3.9344 | 3.169 | 3.512 |
| n-Butane | 8.7791 | 7.071 | 7.550 |
| iso-Pentane | 5.2147 | 5.214 | 5.202 |
| n-Pentane | 7.0274 | 7.026 | 6.948 |
| Hexanes | 5.0741 | 6.059 | 5.692 |
| Heptanes | 11.0165 | 15.297 | 13.864 |
| Octanes | 6.5950 | 10.439 | 9.216 |
| Nonanes | 2.8562 | 5.076 | 4.384 |
| Decanes | 2.5939 | 5.114 | 4.343 |
| Benzene | 0.2568 | 0.278 | 0.196 |
| Toluene | 1.2478 | 1.593 | 1.139 |
| Ethylbenzene | 0.1799 | 0.265 | 0.189 |
| Xylenes | 0.8809 | 1.296 | 0.933 |
| n-Hexane | 5.9213 | 7.071 | 6.642 |
| 2,2,4-Trimethylpentane | 0.3376 | 0.534 | 0.478 |
| Undecanes(C11) | 1.5685 | 3.397 | 2.846 |
| Dodecanes(C12) | 0.9474 | 2.236 | 1.851 |
| Tridecanes(C13) | 0.5950 | 1.520 | 1.246 |
| Tetradecanes(C14) | 0.3443 | 0.947 | 0.769 |
| Pentadecanes(C15) | 0.2120 | 0.624 | 0.504 |
| Hexadecanes(C16) | 0.1309 | 0.411 | 0.327 |
| Heptadecanes(C17) | 0.0257 | 0.085 | 0.067 |
| Octadecanes(C18) | 0.0083 | 0.029 | 0.023 |
| Nonadecanes(C19) | 0.0552 | 0.206 | 0.158 |
| Eicosanes (C20) | 0.0524 | 0.205 | 0.162 |
| Heneicosanes (C21) | 0.0425 | 0.175 | 0.138 |
| Docosanes (C22) | 0.0438 | 0.189 | 0.151 |
| Tricosanes (C23) | 0.0326 | 0.147 | 0.115 |
| Tetracosanes (C24) | 0.0156 | 0.073 | 0.057 |
| Pentacosanes (C25) | 0.0192 | 0.094 | 0.073 |
| Hexacosanes (C26) | 0.0359 | 0.183 | 0.146 |
| Heptacosanes (C27) | 0.0568 | 0.299 | 0.240 |
| Octacosanes (C28) | 0.0244 | 0.133 | 0.103 |
| Nonacosanes (C29) | 0.0838 | 0.475 | 0.366 |
| Triacosanes (C30) | 0.0643 | 0.377 | 0.290 |
| Hentriacontane Plus (C31+) | 0.0949 | 0.575 | 0.459 |
| Totals | 100.000 | 100.000 | 100.000 |

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APPENDIX VII-10: Water Analysis: AMS ML Investments 1-10 Extended Oil (Page 3 of 3)

## ADDITIONAL BTEX DATA

| Components | Mole % | Weight % | Liq. Vol. % |
|---|---|---|---|
| 2-Methylpentane | 3.628 | 4.332 | 4.061 |
| 3-Methylpentane | 1.446 | 1.727 | 1.619 |
| n-Hexane | 5.921 | 7.070 | 6.627 |
| 2,2,4-Trimethylpentane | 0.338 | 0.534 | 0.477 |
| Benzene | 0.257 | 0.278 | 0.195 |
| Toluene | 1.248 | 1.593 | 1.137 |
| Ethylbenzene | 0.180 | 0.265 | 0.189 |
| m-Xylene | 0.101 | 0.149 | 0.107 |
| p-Xylene | 0.630 | 0.927 | 0.666 |
| o-Xylene | 0.150 | 0.220 | 0.158 |

| | |
|---|---|
| RELATIVE SPECIFIC GRAVITY OF DECANES+ (C10+) FRACTION, calculated | **0.74488** |
| AVERAGE MOLECULAR WEIGHT | **72.164** |
| AVERAGE MOLECULAR WEIGHT OF DECANES+ (C10+) FRACTION, calculated | **179.234** |
| TRUE VAPOR PRESSURE AT 100 F, PSIA, calculated | **1014.871** |
| AVERAGE BOILING POINT, F, calculated | **58.149** |
| CUBIC FEET OF GAS / GALLON OF LIQUID, as Ideal Gas, calculated | **27.752** |
| BTU / GALLON OF LIQUID AT 14.73 PSIA, calculated | **103,628.77** |
| LBS / GALLON OF LIQUID, calculated | **5.189** |
| BUBBLE POINT PRESSURE IN PSIG, calculated | **680.100** |
| BUBBLE POINT TEMPERATURE IN DEG F, calculated | **68.930** |

NOTATION: ALL CALCULATIONS PERFORMED USING PHYSICAL CONSTANTS FROM GPA 2145-09, THE TABLES OF PHYSICAL CONSTANTS FOR HYDROCARBONS AND OTHER COMPOUNDS OF INTEREST TO THE NATURAL GAS INDUSTRY.

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APPENDIX VII-11: Water Analysis: AMS ML Investments 1-10 Gas Analysis (Page 1 of 2)

PRECISION ANALYSIS GAS MEASUREMENT EMISSIONS TESTING LABORATORY
307.856.0866
www.precision-labs.com

| | | | |
|---|---|---|---|
| **Client:** | Alta Mesa Services | **Analysis Date:** | 8/11/2015 |
| **Sample ID:** | ML 1-10 | **Date Sampled:** | 8/11/2015 |
| **Unique #:** | N/A | **Purpose:** | By Request |
| **Sample Temperature:** | 88 DEG F | **Sample Pressure:** | 598 PSI |
| **Sampled By:** | Allen McKerchie | **Type Sample:** | Spot |
| **County:** | Payettte | | |

| Components | Mole % | Weight % | Liq. Vol. % |
|---|---|---|---|
| Carbon Dioxide | 0.1370 | 0.3069 | 0.1265 |
| Hydrogen Sulfide | 0.0000 | 0.0000 | 0.0000 |
| Nitrogen | 0.4717 | 0.6724 | 0.2807 |
| Methane | 86.1976 | 70.3591 | 79.0463 |
| Ethane | 6.2007 | 9.4867 | 8.9702 |
| Propane | 3.7953 | 8.5153 | 5.6561 |
| iso-Butane | 0.7936 | 2.3469 | 1.4047 |
| n-Butane | 1.2923 | 3.8218 | 2.2039 |
| iso-Pentane | 0.3480 | 1.2774 | 0.6884 |
| n-Pentane | 0.3514 | 1.2899 | 0.6890 |
| Cyclopentane | 0.0215 | 0.0767 | 0.0344 |
| n-Hexane | 0.1195 | 0.5241 | 0.2659 |
| Cyclohexane | 0.0007 | 0.0030 | 0.0013 |
| Other Hexanes | 0.1141 | 0.5005 | 0.2539 |
| Heptanes | 0.0485 | 0.2473 | 0.1211 |
| Methylcyclohexane | 0.0200 | 0.0999 | 0.0435 |
| 2,2,4-Trimethylpentane | 0.0247 | 0.1436 | 0.0694 |
| Benzene | 0.0156 | 0.0620 | 0.0236 |
| Toluene | 0.0068 | 0.0319 | 0.0123 |
| Ethylbenzene | 0.0023 | 0.0124 | 0.0048 |
| Xylenes | 0.0039 | 0.0211 | 0.0082 |
| C8+ Heavies | 0.0346 | 0.2011 | 0.0959 |
| Totals | 100.0000 | 100.0000 | 100.0000 |

APPENDIX VII-11: Water Analysis: AMS ML Investments 1-10 Gas Analysis (Page 2 of 2)

**ADDITIONAL BETX DATA**

| Components | Mole % | Weight % | Liq. Vol. % |
|---|---|---|---|
| Cyclopentane | 0.0215 | 0.0767 | 0.0344 |
| Cyclohexane | 0.0007 | 0.0030 | 0.0013 |
| 2-Methylpentane | 0.0718 | 0.3150 | 0.1598 |
| 3-Methylpentane | 0.0423 | 0.1855 | 0.0941 |
| n-Hexane | 0.1195 | 0.5241 | 0.2659 |
| Methylcyclohexane | 0.0200 | 0.0999 | 0.0435 |
| 2,2,4-Trimethylpentane | 0.0247 | 0.1436 | 0.0694 |
| Benzene | 0.0156 | 0.0620 | 0.0236 |
| Toluene | 0.0068 | 0.0319 | 0.0123 |
| Ethylbenzene | 0.0023 | 0.0124 | 0.0048 |
| m-Xylene | 0.0006 | 0.0033 | 0.0013 |
| p-Xylene | 0.0026 | 0.0143 | 0.0055 |
| o-Xylene | 0.0006 | 0.0035 | 0.0013 |

| | |
|---|---|
| **SPECIFIC GRAVITY @ 60/60 F, calculated** | 0.6786 |
| **TOTAL GPM (Ethane Inclusive)** | 3.788 |
| **CALCULATED BTU / REAL CF @ 14.73 PSIA, dry basis** | 1198.166 |
| **CALCULATED BTU / REAL CF @ 14.73 PSIA, wet basis** | 1178.078 |
| **AVERAGE MOLECULAR WEIGHT** | 19.654 |
| **MOLAR MASS RATIO** | 0.6786 |
| **RELATIVE DENSITY ( G x Z (Air) / Z ), calculated** | 0.6807 |
| **IDEAL GROSS HEATING VALUE, BTU / IDEAL CF @ 14.696 PSIA** | 1191.677 |
| **COMPRESSIBILITY FACTOR (Z)** | 0.99687 |

| | |
|---|---|
| **PROPANE GPM** | 1.0429 |
| **BUTANE GPM** | 0.6654 |
| **GASOLINE GPM (PENTANE AND HEAVIER)** | 0.4259 |
| **TOTAL ACID GAS MOLE %** | 0.1370 |
| **H2S MOLE %** | 0.0000 |
| **H2S PPM** | 0 |
| **VOC WEIGHT FRACTION** | 0.192 |

NOTATION: ALL CALCULATIONS PERFORMED USING PHYSICAL CONSTANTS FROM GPA 2145-09, THE TABLES OF PHYSICAL CONSTANTS FOR HYDROCARBONS AND OTHER COMPOUNDS OF INTEREST TO THE NATURAL GAS INDUSTRY.