

Cement Ticket

API Well Number:

34-099-2-3157-00-00

Record of Casing, Cementing and Mudding

Well Owner: **NORTHSTAR #3 LLC** Permit Issued: _____
Lease Name: _____ Well No. _____ Date Commenced: **08/18/2011**
County: **MAHONING** Township: **COITSVILLE** Date Completed: _____
Driller: **UNION DRLG** Tool **RTAF** LTD **0** DTD _____
TD Formation **MAHONING** Class _____
Comments: **HL #2 13.5 inch TD at 1025' Surface casing was R-3 40.5 lb J55 New 10.75 inch pipe, set with guide shoe, float collar and 15 centralizers. Centralizers set every other joint. Operator ran 26 joints of 10.75 inch pipe, pipe set at 1019' KB actual pipe in hole 1003'. Operator Broke circulation, ran 1000 gallons of Sweep, 1000lb of gel and two 50lb bags of unicele. Operator then mixed cement ran 449 sacks of class A 3% CaCl.2% foam Chch and 1/4 sack of unicele. Operator**
L cement to 940' = 92.2 Bbl of fresh water. During displacement 30Bbl return of good cement to surface. 1019' X

Strings

FLD ☐ *Hole 2 Field Entry Bot ☐ 1025 Diam ☐ 13.5 Top ☐ 0 LENGTH ☐

Set Dt ☐ SHOT/RIP: ☐ CSG_REC'D: ☐

CMMT Casing Condition,
Weight and Cement Basket

Cement

CONDITION ☐ WEIGHT ☐

BOC ☐ 0 TOC ☐ 0 DT_CM ☐ Duration ☐ ☐ WITNESSED

CMT_CON ☐ INSPECTOR **HILL TOM**

CLASS_CMT: ☐ SACKS ☐ YIELD ☐

CLASS_CMT2: ☐ SACKS2 ☐ GEL_VISC ☐

Cement Comments

Centralizer Wiper Plug

Shoe Collar Other

Strings

FLD Packer Bot 7986 Diam Top 0 LENGTH

Set Dt 2/17/2011 SHOT/RIP: CSG_REC'D:

CMMT Casing Condition, Weight and Cement Basket BAKER LOK-SET T-440

Cement

CONDITION New WEIGHT

BOC 0 TOC 0 DT_CM Duration ☐ WITNESSED

CMT_CON INSPECTOR

CLASS_CMT: SACKS YIELD

CLASS_CMT2: SACKS2 GEL_VISC 0

Cement Comments

Centralizer Wiper Plug

Shoe Collar Other

Strings

FLD Production Casing Bot 8098 Diam 7.625 Top 0 LENGTH

Set Dt 10/3/2011 SHOT/RIP: CSG_REC'D:

CMMT Casing Condition, Weight and Cement Basket CEMENTED WITH 221 SACKS

Cement

CONDITION New WEIGHT

BOC 0 TOC 0 DT_CM Duration ☒ WITNESSED

CMT_CON UNIVERSAL WELL SERVICES INSPECTOR ROBERTS CARL

CLASS_CMT: Unitropic SACKS 221 YIELD

CLASS_CMT2: SACKS2 GEL_VISC 0

Cement Comments

Centralizer Wiper Plug

Shoe Collar Other

Strings

FLD *Surface Casing Fiel Bot 1019 Diam 10.75 Top 0 LENGTH

Set Dt 9/2/2011 SHOT/RIP: CSG_REC'D:

CMMT Casing Condition,
Weight and Cement Basket

R-3 New 40.5lb pipe, guide shoe, float collar and 15 centralizers

Cement

CONDITION New WEIGHT 15.6

BOC 0 TOC 0 DT_CM Duration ☒ WITNESSED

CMT_CON UNIVERSAL WELL SERVICES INSPECTOR HILL TOM

CLASS_CMT: Class A Cement SACKS 449 YIELD 1.18

CLASS_CMT2: SACKS2 GEL_VISC

Cement Comments

Centralizer Wiper Plug

Shoe Collar Other

1/4 sack of unicele, 3% CaCl, .2% foam chch

Strings

FLD Tubing 1 Bot 7986 Diam 4.5 Top 0 LENGTH

Set Dt 2/17/2011 SHOT/RIP: CSG_REC'D:

CMMT Casing Condition,
Weight and Cement Basket

Cement

CONDITION New WEIGHT

BOC 0 TOC 0 DT_CM Duration ☐ WITNESSED

CMT_CON INSPECTOR

CLASS_CMT: SACKS YIELD

CLASS_CMT2: SACKS2 GEL_VISC 0

Cement Comments

Centralizer Wiper Plug

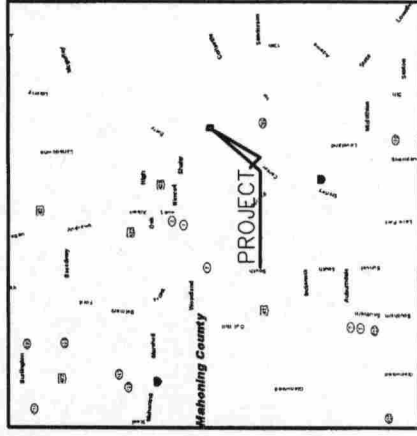
Shoe Collar Other

NORTH STAR NO.3

SALTWATER INJECTION WELL FACILITY PLANS

43-A MCCARTNEY ROAD, CAMPBELL, OH 44405

| INDEX OF SHEETS: | |
|-------------------------------------|---|
| DIMENSIONAL LAYOUT..... | 1 |
| PAVING, GRADING & DRAINAGE PLAN.... | 2 |
| UTILITIES PLAN..... | 3 |
| TANK FARM LAYOUT..... | 4 |
| STORAGE TANK PLANS..... | 5 |
| OIL/WATER SEPARATOR PLANS..... | 6 |
| SETTLING TANK PLANS..... | 7 |
| HYDRAULIC SCHEMATIC PLANS..... | 8 |



VICINITY MAP

PREPARED FOR:

NORTHSTAR #3, LLC
 c/o Rex Energy
 476 Rolling Ridge Drive, Suite 300
 State College, PA 16801
 814-278-7267

PREPARED BY:

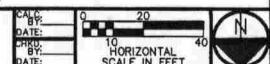
TOTAL DESIGN ENGINEERING, LLC
 Civil Engineering & Surveying
 2761 Salt Springs Road
 Youngstown, Ohio 44509
 330-207-5502
 Gary Toneri, P.E., P.S.

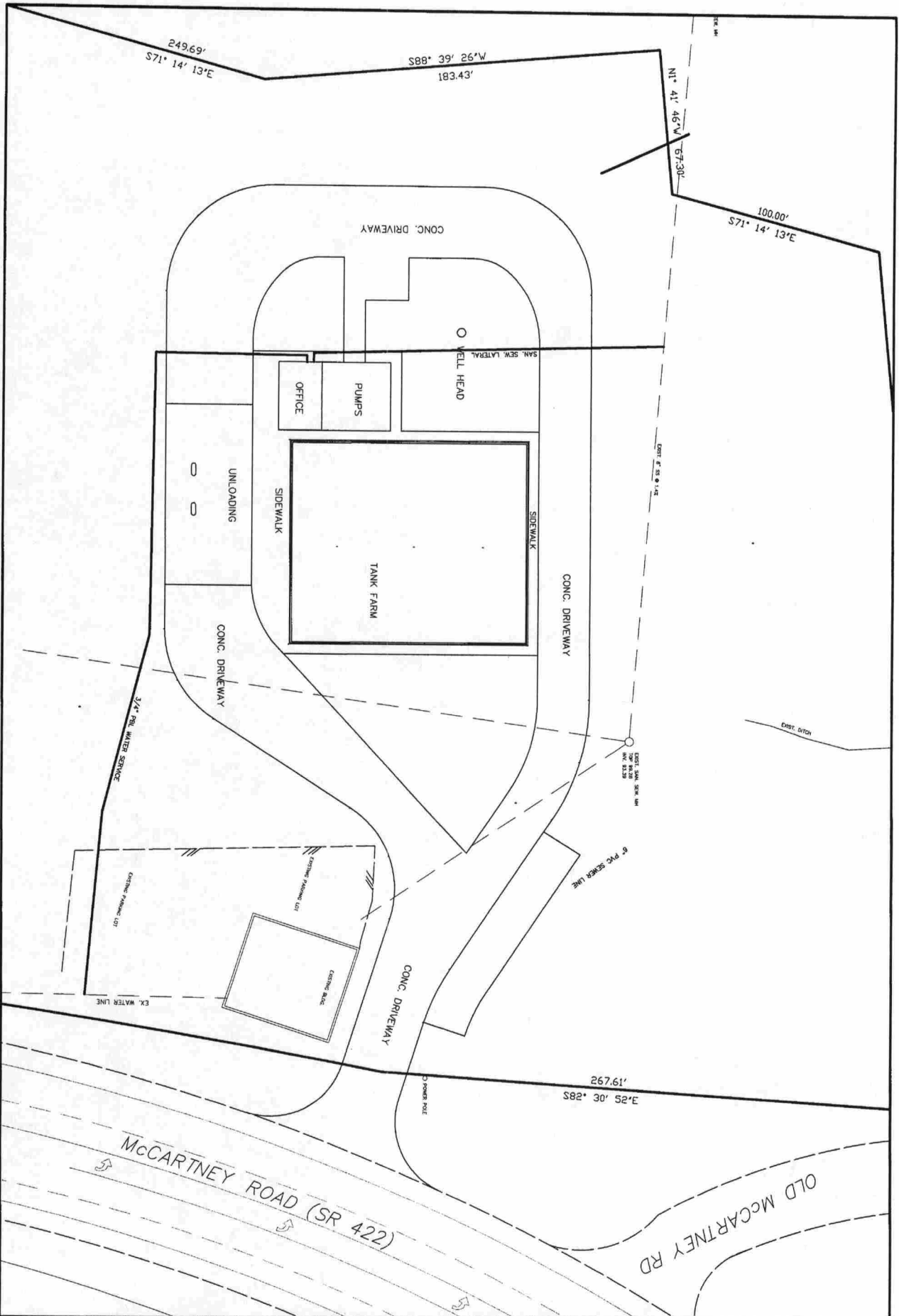


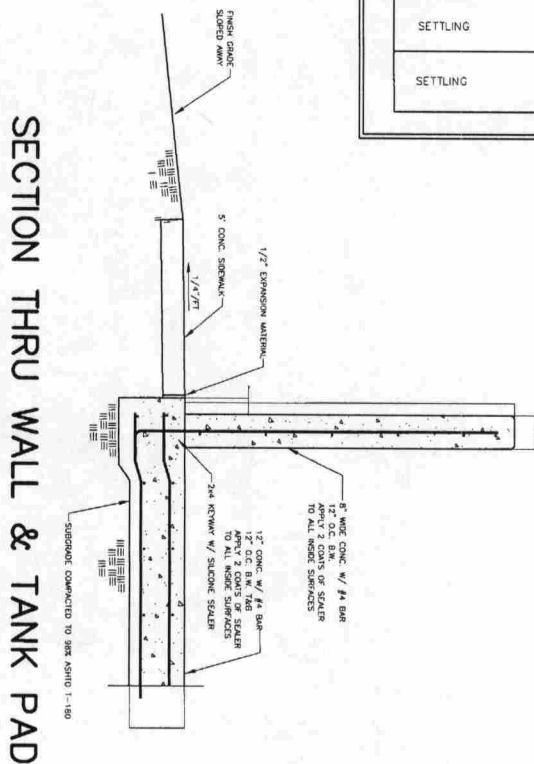
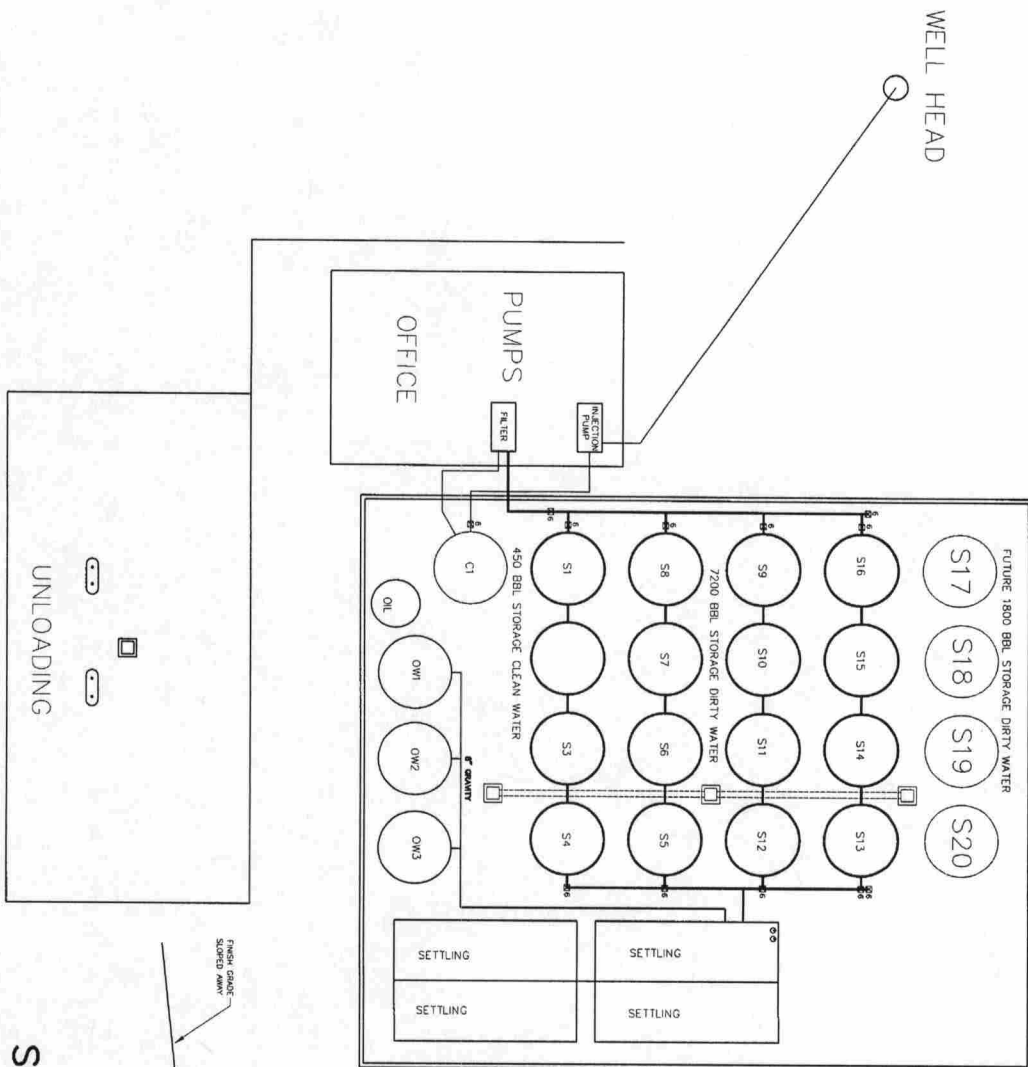
[Signature] 1/4/12
 GARY P. TONERI, P.E. DATE



**NORTHSTAR #3 LLC DISPOSAL WELL PROJECT
PAYING, GRADING AND DRAINAGE PLAN**





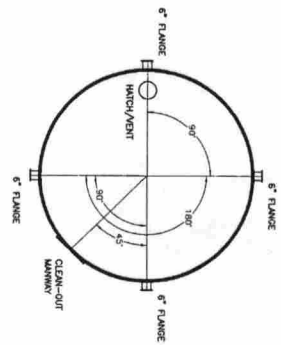


TOTAL DESIGN ENGINEERING, LLC
2781 Salt Springs Road
Springtown, OH 44609
330-207-2502

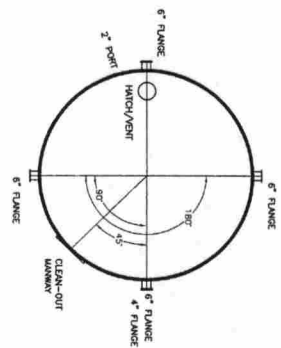
NORTHSTAR #3, LLC DISPOSAL WELL PROJECT
TANK FARM

CALC. BY: []
DATE: []
REV. BY: []
DATE: []

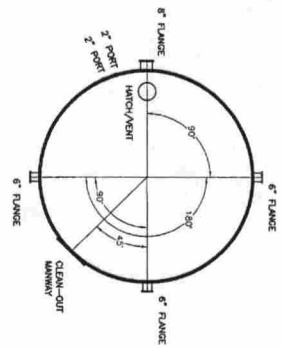
HORIZONTAL
SCALE IN FEET



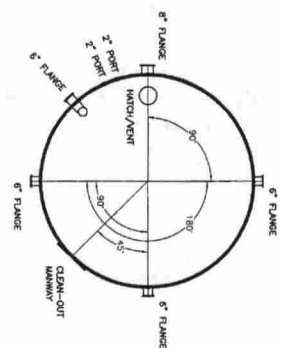
PLAN



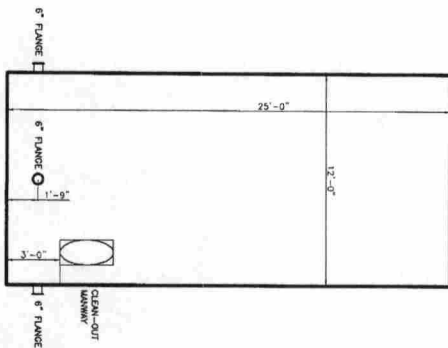
PLAN



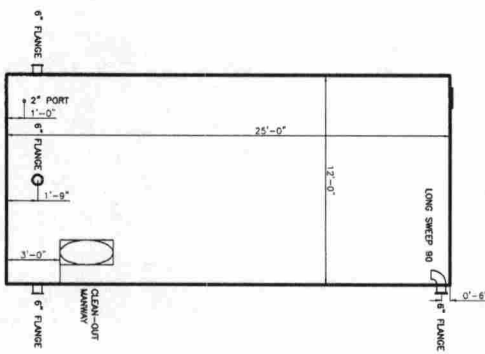
PLAN



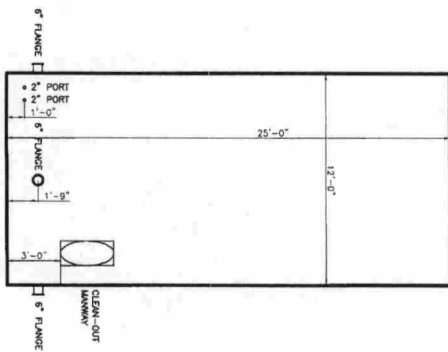
PLAN



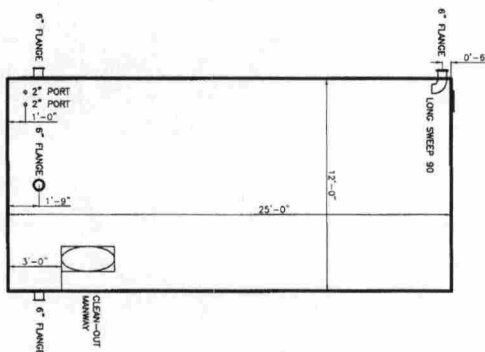
ELEVATION



ELEVATION



ELEVATION



ELEVATION

TANK NO. S2, S3, S6, S7, S8,
S9, S10, S11, S14, S15, S16

TANK NO. S4, S5, S12, S13

TANK NO. S1

TANK NO. C1

22.5 FT EFFECTIVE STORAGE
450 BBLS EFFECTIVE STORAGE

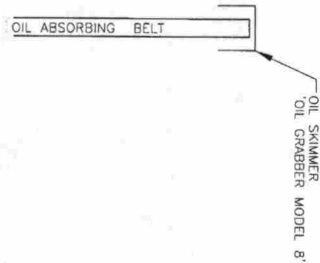


TOTAL DESIGN ENGINEERING, LLC
2761 Salt Springs Road
Youngstown, OH 44509
330-207-8502

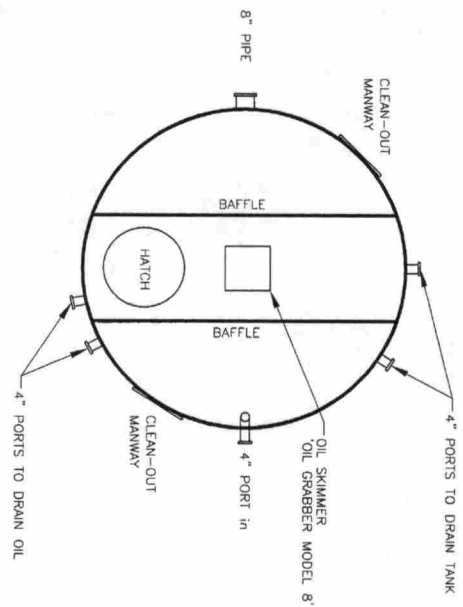
NORTHSTAR #3, LLC DISPOSAL WELL PROJECT
STORAGE TANKS

CALC BY
DATE
PRO BY
DATE

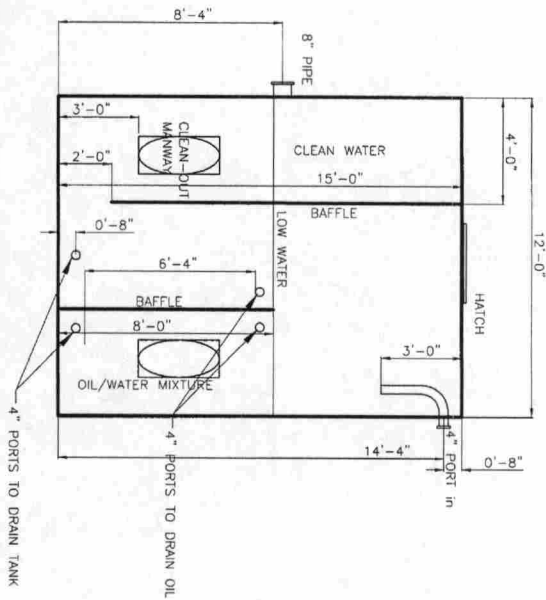




PLAN VIEW



ELEVATION

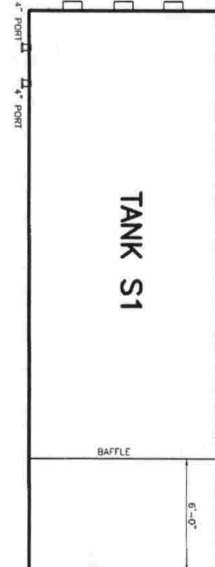
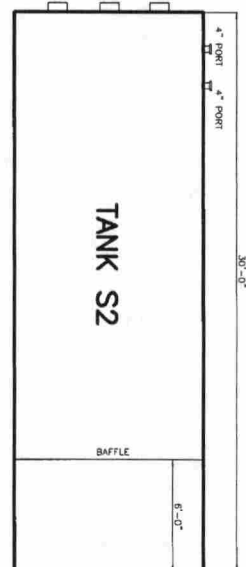


TOTAL DESIGN ENGINEERING, LLC
2761 Salt Springs Road
Youngstown, OH 44509
330-207-8502

NORTHSTAR #3, LLC DISPOSAL WELL PROJECT
OIL/WATER SEPARATOR TANKS

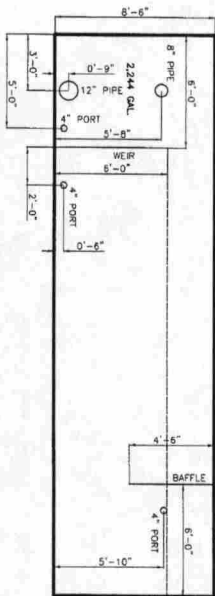
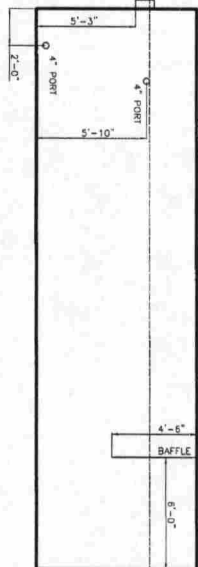
CALC
BY
DATE
CHKD
BY
DATE



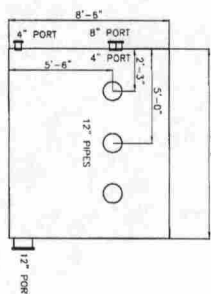


PLAN VIEW

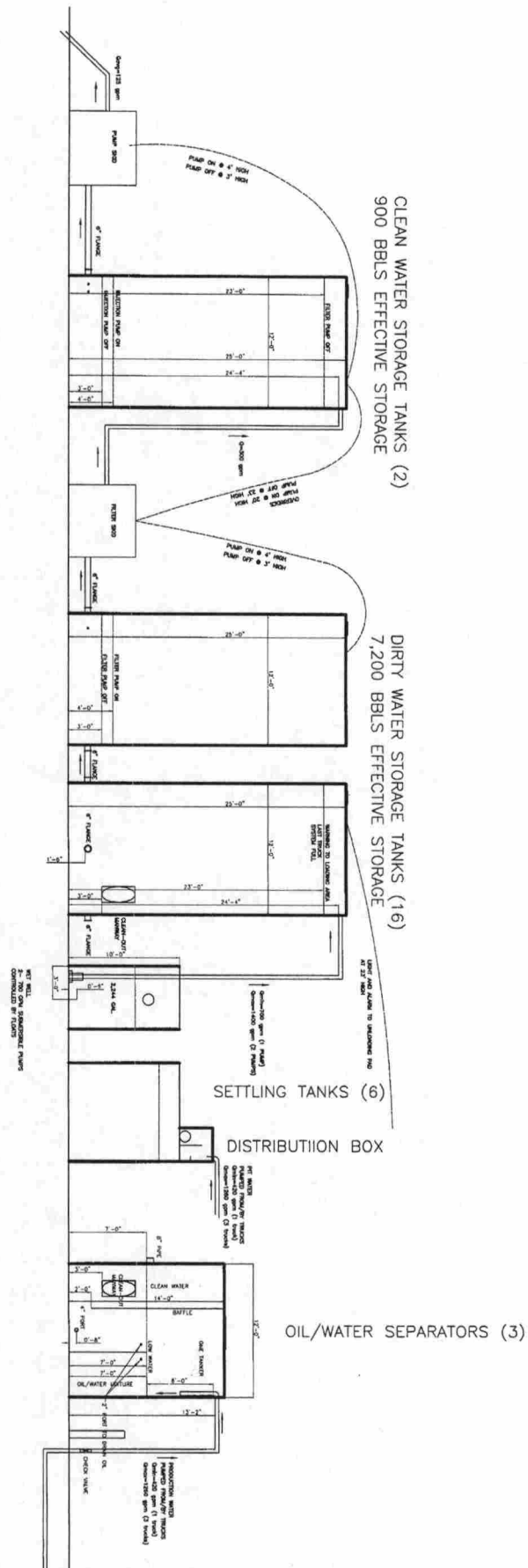
PLAN VIEW

ELEVATION SIDEELEVATION SIDE

SETTLING TANKS



ELEVATION ENDS



TOTAL DESIGN ENGINEERING, LLC
 2761 Salt Springs Road
 Youngstown, OH 44509
 330-207-5502

NORTHSTAR #3 DISPOSAL WELL PROJECT HYDRAULIC SCHEMATIC PLAN

CACC: []
 BY: []
 DATE: []
 SCALE: []
 HORIZONTAL
 SCALE IN FEET



Rexecution = On Time, On Target, On Budget

476 Rolling Ridge Drive
Suite 300
State College, PA 16801
Ph: 814.278.7267
Fax: 814.278.7286
www.rexenergy.com

February 15, 2012

Mr. Tom Tomastik, Geologist
Ohio Department of Natural Resources
2045 Morse Road, Building H-3
Columbus, Ohio 43229-6693

RE: Well Completion Record Report for Northstar Khalil Well #3

Dear Mr. Tomastik,

Please find enclosed the Well Completion Record Report for the Northstar Khalil Well #3. If you have any questions or comments, please do not hesitate to contact me by e-mail at sreynolds@rexenergycorp.com, or by telephone at 814-278-7149.

Thank you and have a wonderful day.

Sincerely,

Suzanne Reynolds
Permit Specialist

Enclosure

RECEIVED

OCT 25 2013

Division of Oil & Gas
Columbus

Pressure Test Report

COMPANY INFORMATION

Company Name Rex Energy
Representative Sean Weissert
Phone
Fax
Address

E-Mail Address
Service Company Parker Energy Services

WELL INFORMATION

Well Name North Star #3
Well Location Mahoning Ohio
Field and Pool
Status (Oil, Gas, Water, Injection)
Perforated Intervals
Mid-point of Perforated Intervals (MPP)
Drilling Rig Number
Elevations
 Kelly Bushing (KB)
 Casing Flange (CF)
 KB-CF
 Ground Level
Plug Back Total Depth
Total Depth
Production Casing
Production Tubing

TEST INFORMATION

Type of Test Build Up
Date(s) of Test 6/9/13 - 6/17/13
Dead-weight Gauge Tubing Pressure 0
Dead-weight Gauge Casing Pressure
Shut-in Date (Duration) 6/9/13
Date / Time on Bottom
Date / Time off Bottom

Probe Serial Number
Probe Offset from End of Tool String
Run Depth at Probe Pressure Port

PRESSURE TEST RESULTS

Maximum Recorded Probe Pressure 5624.3 psig
Maximum Recorded Probe Temperature 149.6 deg F
Final Buildup Pressure
Gradient Survey Information
 Extrapolated Pressure to MPP
 Final Gradient at Depth
Job Number



| | |
|-----------------|------------------|
| Company Name | Rex Energy |
| Well Name | North Star #3 |
| Type of Test | Build Up |
| Date(s) of Test | 6/9/13 - 6/17/13 |

PROBE INFORMATION

Probe Serial Number
Model
Pressure
 Calibrated Pressure Range
 Accuracy
 Resolution
Temperature
 Calibrated Temperature Range
 Accuracy
 Resolution
Calibration File Used for Reports

PROGRAMMING DETAILS

| | | | | |
|-------------|--------------------|---------------|-----------------|----------------|
| <u>Step</u> | <u>Sample Mode</u> | <u>Period</u> | <u>Duration</u> | <u>Comment</u> |
|-------------|--------------------|---------------|-----------------|----------------|

Program Start Time
Program End Time
Total Samples Taken
Usage for this Test
Generic Data File Name



| | |
|-----------------|------------------|
| Company Name | Rex Energy |
| Well Name | North Star #3 |
| Type of Test | Build Up |
| Date(s) of Test | 6/9/13 - 6/17/13 |

COMMENTS

Reported By

Brandon Parker

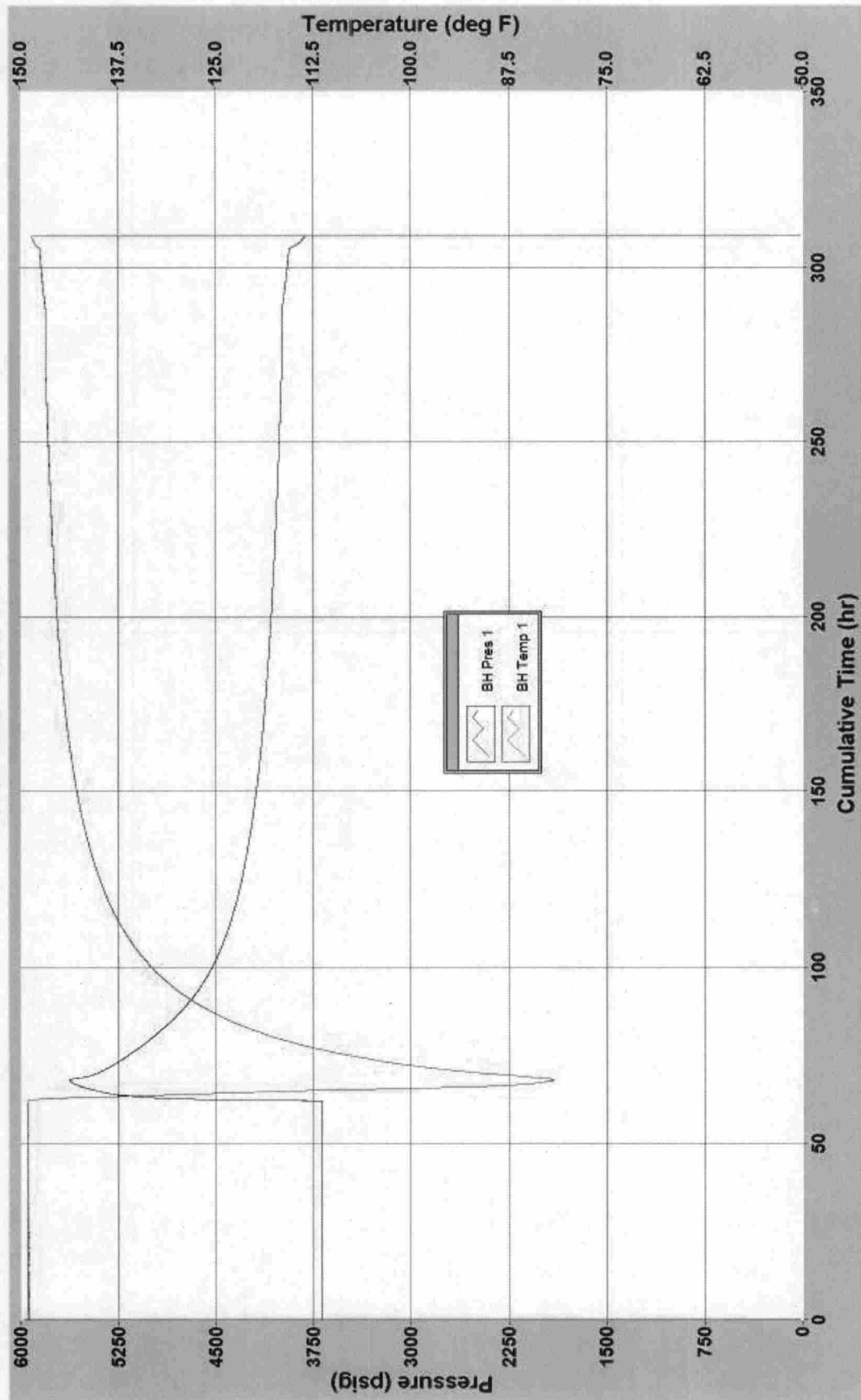
RIH with gauges on 6/9/13. Set @ 7904' in 5.5" casing

POOH on 6/17/13.



Company Name Rex Energy
Well Name North Star #3
Type of Test Build Up
Date(s) of Test 6/9/13 - 6/17/13

North Star 3





Company Name Rex Energy
Well Name North Star #3
Type of Test Build Up
Date(s) of Test 6/9/13 - 6/17/13

| Date | Time | Cum.Time BH1 | BH Pres 1 | BH Temp 1 |
|------------|----------|-----------------|-----------|--------------|
| | | hr | psig | deg F |
| 2013/06/09 | 13:38:05 | 0.0000 | 14.372 | 86.884 |
| 2013/06/09 | 14:38:05 | 1.0000 | 3684.576 | 149.027 |
| 2013/06/09 | 15:38:05 | 2.0000 | 3684.656 | 149.027 |
| 2013/06/09 | 16:38:05 | 3.0000 | 3684.658 | 149.027 |
| 2013/06/09 | 17:38:05 | 4.0000 | 3684.662 | 149.034 |
| 2013/06/09 | 18:38:05 | 5.0000 | 3684.621 | 149.027 |
| 2013/06/09 | 19:38:05 | 6.0000 | 3684.640 | 149.036 |
| 2013/06/09 | 20:38:05 | 7.0000 | 3684.552 | 149.023 |
| 2013/06/09 | 21:38:05 | 8.0000 | 3684.555 | 149.022 |
| 2013/06/09 | 22:38:05 | 9.0000 | 3684.574 | 149.034 |
| 2013/06/09 | 23:38:05 | 10.0000 | 3684.525 | 149.029 |
| 2013/06/10 | 00:38:05 | 11.0000 | 3684.535 | 149.031 |
| 2013/06/10 | 01:38:05 | 12.0000 | 3684.476 | 149.027 |
| 2013/06/10 | 02:38:05 | 13.0000 | 3684.474 | 149.027 |
| 2013/06/10 | 03:38:05 | 14.0000 | 3684.467 | 149.036 |
| 2013/06/10 | 04:38:05 | 15.0000 | 3684.451 | 149.034 |
| 2013/06/10 | 05:38:05 | 16.0000 | 3684.409 | 149.034 |
| 2013/06/10 | 06:38:05 | 17.0000 | 3684.382 | 149.031 |
| 2013/06/10 | 07:38:05 | 18.0000 | 3684.337 | 149.025 |
| 2013/06/10 | 08:38:05 | 19.0000 | 3684.332 | 149.029 |
| 2013/06/10 | 09:38:05 | 20.0000 | 3684.348 | 149.032 |
| 2013/06/10 | 10:38:05 | 21.0000 | 3684.302 | 149.032 |
| 2013/06/10 | 11:38:05 | 22.0000 | 3684.302 | 149.034 |
| 2013/06/10 | 12:38:05 | 23.0000 | 3684.259 | 149.023 |
| 2013/06/10 | 13:38:05 | 24.0000 | 3684.238 | 149.029 |
| 2013/06/10 | 14:38:05 | 25.0000 | 3684.229 | 149.032 |
| 2013/06/10 | 15:38:05 | 26.0000 | 3684.179 | 149.029 |
| 2013/06/10 | 16:38:05 | 27.0000 | 3684.202 | 149.036 |
| 2013/06/10 | 17:38:05 | 28.0000 | 3684.145 | 149.032 |
| 2013/06/10 | 18:38:05 | 29.0000 | 3684.156 | 149.032 |
| 2013/06/10 | 19:38:05 | 30.0000 | 3684.119 | 149.032 |
| 2013/06/10 | 20:38:05 | 31.0000 | 3684.100 | 149.034 |
| 2013/06/10 | 21:38:05 | 32.0000 | 3684.060 | 149.025 |
| 2013/06/10 | 22:38:05 | 33.0000 | 3684.048 | 149.032 |
| 2013/06/10 | 23:38:05 | 34.0000 | 3684.041 | 149.034 |
| 2013/06/11 | 00:38:05 | 35.0000 | 3683.999 | 149.027 |
| 2013/06/11 | 01:38:05 | 36.0000 | 3683.973 | 149.031 |
| 2013/06/11 | 02:38:05 | 37.0000 | 3683.984 | 149.032 |
| 2013/06/11 | 03:38:05 | 38.0000 | 3683.966 | 149.040 |
| 2013/06/11 | 04:38:05 | 39.0000 | 3683.920 | 149.027 |
| 2013/06/11 | 05:38:05 | 40.0000 | 3683.902 | 149.029 |
| 2013/06/11 | 06:38:05 | 41.0000 | 3683.900 | 149.038 |
| 2013/06/11 | 07:38:05 | 42.0000 | 3683.851 | 149.031 |
| 2013/06/11 | 08:38:05 | 43.0000 | 3683.852 | 149.034 |
| 2013/06/11 | 09:38:05 | 44.0000 | 3683.835 | 149.036 |
| 2013/06/11 | 10:38:05 | 45.0000 | 3683.826 | 149.040 |
| 2013/06/11 | 11:38:05 | 46.0000 | 3683.768 | 149.031 |
| 2013/06/11 | 12:38:05 | 47.0000 | 3683.769 | 149.036 |
| 2013/06/11 | 13:38:05 | 48.0000 | 3683.724 | 149.032 |
| 2013/06/11 | 14:38:05 | 49.0000 | 3683.730 | 149.038 |
| 2013/06/11 | 15:38:05 | 50.0000 | 3683.712 | 149.036 |
| 2013/06/11 | 16:38:05 | 51.0000 | 3683.673 | 149.034 |
| 2013/06/11 | 17:38:05 | 52.0000 | 3683.649 | 149.029 |
| 2013/06/11 | 18:38:05 | 53.0000 | 3683.606 | 149.029 |

| Date | Time | Cum.Time BH1 | BH Pres 1 | BH Temp 1 |
|------------|----------|-----------------|-----------|--------------|
| | | hr | psig | deg F |
| 2013/06/11 | 19:38:05 | 54.0000 | 3683.602 | 149.027 |
| 2013/06/11 | 20:38:05 | 55.0000 | 3683.583 | 149.027 |
| 2013/06/11 | 21:38:05 | 56.0000 | 3683.566 | 149.029 |
| 2013/06/11 | 22:38:05 | 57.0000 | 3683.535 | 149.027 |
| 2013/06/11 | 23:38:05 | 58.0000 | 3683.538 | 149.032 |
| 2013/06/12 | 00:38:05 | 59.0000 | 3683.529 | 149.032 |
| 2013/06/12 | 01:38:05 | 60.0000 | 3683.523 | 149.036 |
| 2013/06/12 | 02:38:05 | 61.0000 | 3683.488 | 149.032 |
| 2013/06/12 | 03:38:05 | 62.0000 | 3683.444 | 149.029 |
| 2013/06/12 | 04:38:05 | 63.0000 | 4993.754 | 143.182 |
| 2013/06/12 | 05:38:05 | 64.0000 | 5298.398 | 128.129 |
| 2013/06/12 | 06:38:05 | 65.0000 | 5422.578 | 113.338 |
| 2013/06/12 | 07:38:05 | 66.0000 | 5525.358 | 93.247 |
| 2013/06/12 | 08:38:05 | 67.0000 | 5594.818 | 84.394 |
| 2013/06/12 | 09:38:05 | 68.0000 | 5622.039 | 81.691 |
| 2013/06/12 | 10:38:05 | 69.0000 | 5487.385 | 85.816 |
| 2013/06/12 | 11:38:05 | 70.0000 | 5409.545 | 91.540 |
| 2013/06/12 | 12:38:05 | 71.0000 | 5352.696 | 95.871 |
| 2013/06/12 | 13:38:05 | 72.0000 | 5304.123 | 99.680 |
| 2013/06/12 | 14:38:05 | 73.0000 | 5259.618 | 102.920 |
| 2013/06/12 | 15:38:05 | 74.0000 | 5216.576 | 105.501 |
| 2013/06/12 | 16:38:05 | 75.0000 | 5175.878 | 107.980 |
| 2013/06/12 | 17:38:05 | 76.0000 | 5136.644 | 110.341 |
| 2013/06/12 | 18:38:05 | 77.0000 | 5098.815 | 112.410 |
| 2013/06/12 | 19:38:05 | 78.0000 | 5062.527 | 114.202 |
| 2013/06/12 | 20:38:05 | 79.0000 | 5027.531 | 115.740 |
| 2013/06/12 | 21:38:05 | 80.0000 | 4993.439 | 117.372 |
| 2013/06/12 | 22:38:05 | 81.0000 | 4960.281 | 118.789 |
| 2013/06/12 | 23:38:05 | 82.0000 | 4928.075 | 120.105 |
| 2013/06/13 | 00:38:05 | 83.0000 | 4896.675 | 121.260 |
| 2013/06/13 | 01:38:05 | 84.0000 | 4866.475 | 122.400 |
| 2013/06/13 | 02:38:05 | 85.0000 | 4837.408 | 123.420 |
| 2013/06/13 | 03:38:05 | 86.0000 | 4809.478 | 124.372 |
| 2013/06/13 | 04:38:05 | 87.0000 | 4782.687 | 125.283 |
| 2013/06/13 | 05:38:05 | 88.0000 | 4757.136 | 126.142 |
| 2013/06/13 | 06:38:05 | 89.0000 | 4732.708 | 126.957 |
| 2013/06/13 | 07:38:05 | 90.0000 | 4709.379 | 127.670 |
| 2013/06/13 | 08:38:05 | 91.0000 | 4687.350 | 128.401 |
| 2013/06/13 | 09:38:05 | 92.0000 | 4666.252 | 129.106 |
| 2013/06/13 | 10:38:05 | 93.0000 | 4646.020 | 129.704 |
| 2013/06/13 | 11:38:05 | 94.0000 | 4626.887 | 130.320 |
| 2013/06/13 | 12:38:05 | 95.0000 | 4608.743 | 130.872 |
| 2013/06/13 | 13:38:05 | 96.0000 | 4591.286 | 131.409 |
| 2013/06/13 | 14:38:05 | 97.0000 | 4574.549 | 131.931 |
| 2013/06/13 | 15:38:05 | 98.0000 | 4558.759 | 132.426 |
| 2013/06/13 | 16:38:05 | 99.0000 | 4543.596 | 132.865 |
| 2013/06/13 | 17:38:05 | 100.0000 | 4529.224 | 133.320 |
| 2013/06/13 | 18:38:05 | 101.0000 | 4515.365 | 133.723 |
| 2013/06/13 | 19:38:05 | 102.0000 | 4502.095 | 134.123 |
| 2013/06/13 | 20:38:05 | 103.0000 | 4489.377 | 134.496 |
| 2013/06/13 | 21:38:05 | 104.0000 | 4477.216 | 134.874 |
| 2013/06/13 | 22:38:05 | 105.0000 | 4465.494 | 135.217 |
| 2013/06/13 | 23:38:05 | 106.0000 | 4454.223 | 135.554 |
| 2013/06/14 | 00:38:05 | 107.0000 | 4443.436 | 135.873 |



Company Name Rex Energy
Well Name North Star #3
Type of Test Build Up
Date(s) of Test 6/9/13 - 6/17/13

| Date | Time | Cum.Time BH1 | BH Pres 1 | BH Temp 1 |
|------------|----------|-----------------|-----------|--------------|
| | | hr | psig | deg F |
| 2013/06/14 | 01:38:05 | 108.0000 | 4433.101 | 136.191 |
| 2013/06/14 | 02:38:05 | 109.0000 | 4423.010 | 136.474 |
| 2013/06/14 | 03:38:05 | 110.0000 | 4413.363 | 136.742 |
| 2013/06/14 | 04:38:05 | 111.0000 | 4404.032 | 137.026 |
| 2013/06/14 | 05:38:05 | 112.0000 | 4395.092 | 137.287 |
| 2013/06/14 | 06:38:05 | 113.0000 | 4386.418 | 137.550 |
| 2013/06/14 | 07:38:05 | 114.0000 | 4377.979 | 137.777 |
| 2013/06/14 | 08:38:05 | 115.0000 | 4369.847 | 138.013 |
| 2013/06/14 | 09:38:05 | 116.0000 | 4362.061 | 138.245 |
| 2013/06/14 | 10:38:05 | 117.0000 | 4354.453 | 138.447 |
| 2013/06/14 | 11:38:05 | 118.0000 | 4347.064 | 138.664 |
| 2013/06/14 | 12:38:05 | 119.0000 | 4339.866 | 138.862 |
| 2013/06/14 | 13:38:05 | 120.0000 | 4332.945 | 139.048 |
| 2013/06/14 | 14:38:05 | 121.0000 | 4326.288 | 139.239 |
| 2013/06/14 | 15:38:05 | 122.0000 | 4319.725 | 139.429 |
| 2013/06/14 | 16:38:05 | 123.0000 | 4313.374 | 139.595 |
| 2013/06/14 | 17:38:05 | 124.0000 | 4307.218 | 139.780 |
| 2013/06/14 | 18:38:05 | 125.0000 | 4301.208 | 139.937 |
| 2013/06/14 | 19:38:05 | 126.0000 | 4295.362 | 140.094 |
| 2013/06/14 | 20:38:05 | 127.0000 | 4289.689 | 140.245 |
| 2013/06/14 | 21:38:05 | 128.0000 | 4284.109 | 140.410 |
| 2013/06/14 | 22:38:05 | 129.0000 | 4278.749 | 140.547 |
| 2013/06/14 | 23:38:05 | 130.0000 | 4273.497 | 140.688 |
| 2013/06/15 | 00:38:05 | 131.0000 | 4268.350 | 140.819 |
| 2013/06/15 | 01:38:05 | 132.0000 | 4263.374 | 140.965 |
| 2013/06/15 | 02:38:05 | 133.0000 | 4258.465 | 141.073 |
| 2013/06/15 | 03:38:05 | 134.0000 | 4253.851 | 141.215 |
| 2013/06/15 | 04:38:05 | 135.0000 | 4249.049 | 141.334 |
| 2013/06/15 | 05:38:05 | 136.0000 | 4244.545 | 141.453 |
| 2013/06/15 | 06:38:05 | 137.0000 | 4239.989 | 141.564 |
| 2013/06/15 | 07:38:05 | 138.0000 | 4235.701 | 141.674 |
| 2013/06/15 | 08:38:05 | 139.0000 | 4231.481 | 141.777 |
| 2013/06/15 | 09:38:05 | 140.0000 | 4227.345 | 141.894 |
| 2013/06/15 | 10:38:05 | 141.0000 | 4223.297 | 142.003 |
| 2013/06/15 | 11:38:05 | 142.0000 | 4219.289 | 142.097 |
| 2013/06/15 | 12:38:05 | 143.0000 | 4215.394 | 142.205 |
| 2013/06/15 | 13:38:05 | 144.0000 | 4211.541 | 142.281 |
| 2013/06/15 | 14:38:05 | 145.0000 | 4207.859 | 142.383 |
| 2013/06/15 | 15:38:05 | 146.0000 | 4204.131 | 142.471 |
| 2013/06/15 | 16:38:05 | 147.0000 | 4200.566 | 142.560 |
| 2013/06/15 | 17:38:05 | 148.0000 | 4197.031 | 142.644 |
| 2013/06/15 | 18:38:05 | 149.0000 | 4193.576 | 142.731 |
| 2013/06/15 | 19:38:05 | 150.0000 | 4190.224 | 142.817 |
| 2013/06/15 | 20:38:05 | 151.0000 | 4186.887 | 142.903 |
| 2013/06/15 | 21:38:05 | 152.0000 | 4183.684 | 142.990 |
| 2013/06/15 | 22:38:05 | 153.0000 | 4180.362 | 143.049 |
| 2013/06/15 | 23:38:05 | 154.0000 | 4177.234 | 143.125 |
| 2013/06/16 | 00:38:05 | 155.0000 | 4174.153 | 143.190 |
| 2013/06/16 | 01:38:05 | 156.0000 | 4171.125 | 143.267 |
| 2013/06/16 | 02:38:05 | 157.0000 | 4168.164 | 143.337 |
| 2013/06/16 | 03:38:05 | 158.0000 | 4165.249 | 143.406 |
| 2013/06/16 | 04:38:05 | 159.0000 | 4162.363 | 143.472 |
| 2013/06/16 | 05:38:05 | 160.0000 | 4159.479 | 143.532 |
| 2013/06/16 | 06:38:05 | 161.0000 | 4156.735 | 143.604 |

| Date | Time | Cum.Time BH1 | BH Pres 1 | BH Temp 1 |
|------------|----------|-----------------|-----------|--------------|
| | | hr | psig | deg F |
| 2013/06/16 | 07:38:05 | 162.0000 | 4153.967 | 143.658 |
| 2013/06/16 | 08:38:05 | 163.0000 | 4151.334 | 143.731 |
| 2013/06/16 | 09:38:05 | 164.0000 | 4148.606 | 143.785 |
| 2013/06/16 | 10:38:05 | 165.0000 | 4146.097 | 143.854 |
| 2013/06/16 | 11:38:05 | 166.0000 | 4143.503 | 143.911 |
| 2013/06/16 | 12:38:05 | 167.0000 | 4140.955 | 143.958 |
| 2013/06/16 | 13:38:05 | 168.0000 | 4138.513 | 144.023 |
| 2013/06/16 | 14:38:05 | 169.0000 | 4136.044 | 144.066 |
| 2013/06/16 | 15:38:05 | 170.0000 | 4133.641 | 144.120 |
| 2013/06/16 | 16:38:05 | 171.0000 | 4131.321 | 144.178 |
| 2013/06/16 | 17:38:05 | 172.0000 | 4128.926 | 144.225 |
| 2013/06/16 | 18:38:05 | 173.0000 | 4126.625 | 144.270 |
| 2013/06/16 | 19:38:05 | 174.0000 | 4124.366 | 144.325 |
| 2013/06/16 | 20:38:05 | 175.0000 | 4122.151 | 144.369 |
| 2013/06/16 | 21:38:05 | 176.0000 | 4119.970 | 144.421 |
| 2013/06/16 | 22:38:05 | 177.0000 | 4117.770 | 144.462 |
| 2013/06/16 | 23:38:05 | 178.0000 | 4115.640 | 144.505 |
| 2013/06/17 | 00:38:05 | 179.0000 | 4113.537 | 144.550 |
| 2013/06/17 | 01:38:05 | 180.0000 | 4111.454 | 144.592 |
| 2013/06/17 | 02:38:05 | 181.0000 | 4109.396 | 144.633 |
| 2013/06/17 | 03:38:05 | 182.0000 | 4107.413 | 144.675 |
| 2013/06/17 | 04:38:05 | 183.0000 | 4105.409 | 144.718 |
| 2013/06/17 | 05:38:05 | 184.0000 | 4103.453 | 144.761 |
| 2013/06/17 | 06:38:05 | 185.0000 | 4101.502 | 144.799 |
| 2013/06/17 | 07:38:05 | 186.0000 | 4099.554 | 144.838 |
| 2013/06/17 | 08:38:05 | 187.0000 | 4097.662 | 144.871 |
| 2013/06/17 | 09:38:05 | 188.0000 | 4095.791 | 144.909 |
| 2013/06/17 | 10:38:05 | 189.0000 | 4093.934 | 144.950 |
| 2013/06/17 | 11:38:05 | 190.0000 | 4092.158 | 144.984 |
| 2013/06/17 | 12:38:05 | 191.0000 | 4090.350 | 145.027 |
| 2013/06/17 | 13:38:05 | 192.0000 | 4088.604 | 145.062 |
| 2013/06/17 | 14:38:05 | 193.0000 | 4086.840 | 145.098 |
| 2013/06/17 | 15:38:05 | 194.0000 | 4085.081 | 145.130 |
| 2013/06/17 | 16:38:05 | 195.0000 | 4083.383 | 145.161 |
| 2013/06/17 | 17:38:05 | 196.0000 | 4081.660 | 145.191 |
| 2013/06/17 | 18:38:05 | 197.0000 | 4079.996 | 145.220 |
| 2013/06/17 | 19:38:05 | 198.0000 | 4078.353 | 145.258 |
| 2013/06/17 | 20:38:05 | 199.0000 | 4076.714 | 145.287 |
| 2013/06/17 | 21:38:05 | 200.0000 | 4075.095 | 145.317 |
| 2013/06/17 | 22:38:05 | 201.0000 | 4073.508 | 145.353 |
| 2013/06/17 | 23:38:05 | 202.0000 | 4071.939 | 145.386 |
| 2013/06/18 | 00:38:05 | 203.0000 | 4070.388 | 145.414 |
| 2013/06/18 | 01:38:05 | 204.0000 | 4068.790 | 145.436 |
| 2013/06/18 | 02:38:05 | 205.0000 | 4067.305 | 145.472 |
| 2013/06/18 | 03:38:05 | 206.0000 | 4065.741 | 145.494 |
| 2013/06/18 | 04:38:05 | 207.0000 | 4064.273 | 145.524 |
| 2013/06/18 | 05:38:05 | 208.0000 | 4062.823 | 145.555 |
| 2013/06/18 | 06:38:05 | 209.0000 | 4061.323 | 145.584 |
| 2013/06/18 | 07:38:05 | 210.0000 | 4059.874 | 145.602 |
| 2013/06/18 | 08:38:05 | 211.0000 | 4058.475 | 145.645 |
| 2013/06/18 | 09:38:05 | 212.0000 | 4057.030 | 145.659 |
| 2013/06/18 | 10:38:05 | 213.0000 | 4055.594 | 145.681 |
| 2013/06/18 | 11:38:05 | 214.0000 | 4054.260 | 145.717 |
| 2013/06/18 | 12:38:05 | 215.0000 | 4052.872 | 145.738 |



Company Name Rex Energy
Well Name North Star #3
Type of Test Build Up
Date(s) of Test 6/9/13 - 6/17/13

| Date | Time | Cum.Time BH1 | BH Pres 1 | BH Temp 1 |
|------------|----------|-----------------|-----------|--------------|
| | | hr | psig | deg F |
| 2013/06/18 | 13:38:05 | 216.0000 | 4051.480 | 145.758 |
| 2013/06/18 | 14:38:05 | 217.0000 | 4050.111 | 145.780 |
| 2013/06/18 | 15:38:05 | 218.0000 | 4048.829 | 145.816 |
| 2013/06/18 | 16:38:05 | 219.0000 | 4047.511 | 145.834 |
| 2013/06/18 | 17:38:05 | 220.0000 | 4046.228 | 145.861 |
| 2013/06/18 | 18:38:05 | 221.0000 | 4044.887 | 145.875 |
| 2013/06/18 | 19:38:05 | 222.0000 | 4043.576 | 145.890 |
| 2013/06/18 | 20:38:05 | 223.0000 | 4042.344 | 145.920 |
| 2013/06/18 | 21:38:05 | 224.0000 | 4041.086 | 145.949 |
| 2013/06/18 | 22:38:05 | 225.0000 | 4039.759 | 145.965 |
| 2013/06/18 | 23:38:05 | 226.0000 | 4038.466 | 145.983 |
| 2013/06/19 | 00:38:05 | 227.0000 | 4037.223 | 146.001 |
| 2013/06/19 | 01:38:05 | 228.0000 | 4036.000 | 146.026 |
| 2013/06/19 | 02:38:05 | 229.0000 | 4034.786 | 146.050 |
| 2013/06/19 | 03:38:05 | 230.0000 | 4033.580 | 146.070 |
| 2013/06/19 | 04:38:05 | 231.0000 | 4032.409 | 146.088 |
| 2013/06/19 | 05:38:05 | 232.0000 | 4031.230 | 146.107 |
| 2013/06/19 | 06:38:05 | 233.0000 | 4030.054 | 146.120 |
| 2013/06/19 | 07:38:05 | 234.0000 | 4028.930 | 146.147 |
| 2013/06/19 | 08:38:05 | 235.0000 | 4027.797 | 146.172 |
| 2013/06/19 | 09:38:05 | 236.0000 | 4026.692 | 146.188 |
| 2013/06/19 | 10:38:05 | 237.0000 | 4025.546 | 146.205 |
| 2013/06/19 | 11:38:05 | 238.0000 | 4024.458 | 146.230 |
| 2013/06/19 | 12:38:05 | 239.0000 | 4023.340 | 146.237 |
| 2013/06/19 | 13:38:05 | 240.0000 | 4022.299 | 146.264 |
| 2013/06/19 | 14:38:05 | 241.0000 | 4021.197 | 146.277 |
| 2013/06/19 | 15:38:05 | 242.0000 | 4020.134 | 146.295 |
| 2013/06/19 | 16:38:05 | 243.0000 | 4019.087 | 146.318 |
| 2013/06/19 | 17:38:05 | 244.0000 | 4018.021 | 146.336 |
| 2013/06/19 | 18:38:05 | 245.0000 | 4016.974 | 146.352 |
| 2013/06/19 | 19:38:05 | 246.0000 | 4015.938 | 146.363 |
| 2013/06/19 | 20:38:05 | 247.0000 | 4014.916 | 146.388 |
| 2013/06/19 | 21:38:05 | 248.0000 | 4013.878 | 146.392 |
| 2013/06/19 | 22:38:05 | 249.0000 | 4012.933 | 146.419 |
| 2013/06/19 | 23:38:05 | 250.0000 | 4011.924 | 146.437 |
| 2013/06/20 | 00:38:05 | 251.0000 | 4010.938 | 146.451 |
| 2013/06/20 | 01:38:05 | 252.0000 | 4009.936 | 146.466 |
| 2013/06/20 | 02:38:05 | 253.0000 | 4008.972 | 146.480 |
| 2013/06/20 | 03:38:05 | 254.0000 | 4007.958 | 146.493 |
| 2013/06/20 | 04:38:05 | 255.0000 | 4007.060 | 146.516 |
| 2013/06/20 | 05:38:05 | 256.0000 | 4006.097 | 146.521 |
| 2013/06/20 | 06:38:05 | 257.0000 | 4005.167 | 146.536 |
| 2013/06/20 | 07:38:05 | 258.0000 | 4004.219 | 146.554 |
| 2013/06/20 | 08:38:05 | 259.0000 | 4003.320 | 146.570 |
| 2013/06/20 | 09:38:05 | 260.0000 | 4002.343 | 146.577 |
| 2013/06/20 | 10:38:05 | 261.0000 | 4001.457 | 146.592 |
| 2013/06/20 | 11:38:05 | 262.0000 | 4000.550 | 146.613 |
| 2013/06/20 | 12:38:05 | 263.0000 | 3999.625 | 146.622 |
| 2013/06/20 | 13:38:05 | 264.0000 | 3998.730 | 146.633 |
| 2013/06/20 | 14:38:05 | 265.0000 | 3997.902 | 146.658 |
| 2013/06/20 | 15:38:05 | 266.0000 | 3996.969 | 146.665 |
| 2013/06/20 | 16:38:05 | 267.0000 | 3996.073 | 146.673 |
| 2013/06/20 | 17:38:05 | 268.0000 | 3995.225 | 146.694 |
| 2013/06/20 | 18:38:05 | 269.0000 | 3994.324 | 146.707 |

| Date | Time | Cum.Time BH1 | BH Pres 1 | BH Temp 1 |
|------------|----------|-----------------|-----------|--------------|
| | | hr | psig | deg F |
| 2013/06/20 | 19:38:05 | 270.0000 | 3993.526 | 146.719 |
| 2013/06/20 | 20:38:05 | 271.0000 | 3992.627 | 146.728 |
| 2013/06/20 | 21:38:05 | 272.0000 | 3991.794 | 146.741 |
| 2013/06/20 | 22:38:05 | 273.0000 | 3990.944 | 146.752 |
| 2013/06/20 | 23:38:00 | 273.9986 | 3990.887 | 146.761 |
| 2013/06/21 | 00:38:00 | 274.9986 | 3990.845 | 146.757 |
| 2013/06/21 | 01:43:00 | 276.0819 | 3990.842 | 146.759 |
| 2013/06/21 | 02:43:00 | 277.0819 | 3990.825 | 146.757 |
| 2013/06/21 | 03:43:00 | 278.0819 | 3990.820 | 146.763 |
| 2013/06/21 | 04:38:00 | 278.9986 | 3990.834 | 146.763 |
| 2013/06/21 | 05:38:00 | 279.9986 | 3990.748 | 146.752 |
| 2013/06/21 | 06:43:00 | 281.0819 | 3990.786 | 146.761 |
| 2013/06/21 | 07:43:00 | 282.0819 | 3990.772 | 146.761 |
| 2013/06/21 | 08:43:00 | 283.0819 | 3990.741 | 146.761 |
| 2013/06/21 | 09:38:00 | 283.9986 | 3990.712 | 146.761 |
| 2013/06/21 | 10:38:00 | 284.9986 | 3990.746 | 146.766 |
| 2013/06/21 | 11:38:00 | 285.9986 | 3990.703 | 146.759 |
| 2013/06/21 | 12:43:00 | 287.0819 | 3990.688 | 146.763 |
| 2013/06/21 | 13:38:00 | 287.9986 | 3990.689 | 146.764 |
| 2013/06/21 | 14:38:05 | 289.0000 | 3986.954 | 146.820 |
| 2013/06/21 | 15:38:05 | 290.0000 | 3982.982 | 146.878 |
| 2013/06/21 | 16:38:05 | 291.0000 | 3979.093 | 146.926 |
| 2013/06/21 | 17:38:05 | 292.0000 | 3975.451 | 146.988 |
| 2013/06/21 | 18:38:05 | 293.0000 | 3971.866 | 147.027 |
| 2013/06/21 | 19:38:05 | 294.0000 | 3968.400 | 147.081 |
| 2013/06/21 | 20:38:05 | 295.0000 | 3965.107 | 147.128 |
| 2013/06/21 | 21:38:05 | 296.0000 | 3961.863 | 147.173 |
| 2013/06/21 | 22:38:05 | 297.0000 | 3958.714 | 147.216 |
| 2013/06/21 | 23:38:05 | 298.0000 | 3955.670 | 147.256 |
| 2013/06/22 | 00:38:05 | 299.0000 | 3952.713 | 147.297 |
| 2013/06/22 | 01:38:05 | 300.0000 | 3949.775 | 147.331 |
| 2013/06/22 | 02:38:05 | 301.0000 | 3946.928 | 147.360 |
| 2013/06/22 | 03:38:05 | 302.0000 | 3944.199 | 147.402 |
| 2013/06/22 | 04:38:05 | 303.0000 | 3941.508 | 147.432 |
| 2013/06/22 | 05:38:05 | 304.0000 | 3938.906 | 147.465 |
| 2013/06/22 | 06:38:05 | 305.0000 | 3936.384 | 147.495 |
| 2013/06/22 | 07:38:05 | 306.0000 | 3902.823 | 147.834 |
| 2013/06/22 | 08:38:05 | 307.0000 | 3861.414 | 148.203 |
| 2013/06/22 | 09:38:05 | 308.0000 | 3834.122 | 148.402 |

Pressure Test Report

COMPANY INFORMATION

| | |
|----------------|---------------|
| Company Name | Rex Energy |
| Representative | Sean Weissert |
| Phone | |
| Fax | |
| Address | |

| | |
|-----------------|------------------------|
| E-Mail Address | |
| Service Company | Parker Energy Services |

WELL INFORMATION

| | |
|---|---------------|
| Well Name | North Star #3 |
| Well Location | Mahoning Ohio |
| Field and Pool | |
| Status (Oil, Gas, Water, Injection) | |
| Perforated Intervals | |
| Mid-point of Perforated Intervals (MPP) | |
| Drilling Rig Number | |
| Elevations | |
| Kelly Bushing (KB) | |
| Casing Flange (CF) | |
| KB-CF | |
| Ground Level | |
| Plug Back Total Depth | |
| Total Depth | |
| Production Casing | |
| Production Tubing | |

TEST INFORMATION

| | |
|-----------------------------------|------------------|
| Type of Test | Build Up |
| Date(s) of Test | 6/9/13 - 6/17/13 |
| Dead-weight Gauge Tubing Pressure | 0 |
| Dead-weight Gauge Casing Pressure | |
| Shut-in Date (Duration) | 6/9/13 |
| Date / Time on Bottom | |
| Date / Time off Bottom | |

| | |
|--------------------------------------|--|
| Probe Serial Number | |
| Probe Offset from End of Tool String | |
| Run Depth at Probe Pressure Port | |

PRESSURE TEST RESULTS

| | |
|------------------------------------|-------------|
| Maximum Recorded Probe Pressure | 5624.3 psig |
| Maximum Recorded Probe Temperature | 149.6 deg F |
| Final Buildup Pressure | |
| Gradient Survey Information | |
| Extrapolated Pressure to MPP | |
| Final Gradient at Depth | |
| Job Number | |



| | |
|-----------------|------------------|
| Company Name | Rex Energy |
| Well Name | North Star #3 |
| Type of Test | Build Up |
| Date(s) of Test | 6/9/13 - 6/17/13 |

PROBE INFORMATION

Probe Serial Number

Model

Pressure

Calibrated Pressure Range

Accuracy

Resolution

Temperature

Calibrated Temperature Range

Accuracy

Resolution

Calibration File Used for Reports

PROGRAMMING DETAILS

| <u>Step</u> | <u>Sample Mode</u> | <u>Period</u> | <u>Duration</u> | <u>Comment</u> |
|-------------|--------------------|---------------|-----------------|----------------|
|-------------|--------------------|---------------|-----------------|----------------|

Program Start Time

Program End Time

Total Samples Taken

Usage for this Test

Generic Data File Name



| | |
|-----------------|------------------|
| Company Name | Rex Energy |
| Well Name | North Star #3 |
| Type of Test | Build Up |
| Date(s) of Test | 6/9/13 - 6/17/13 |

COMMENTS

Reported By Brandon Parker

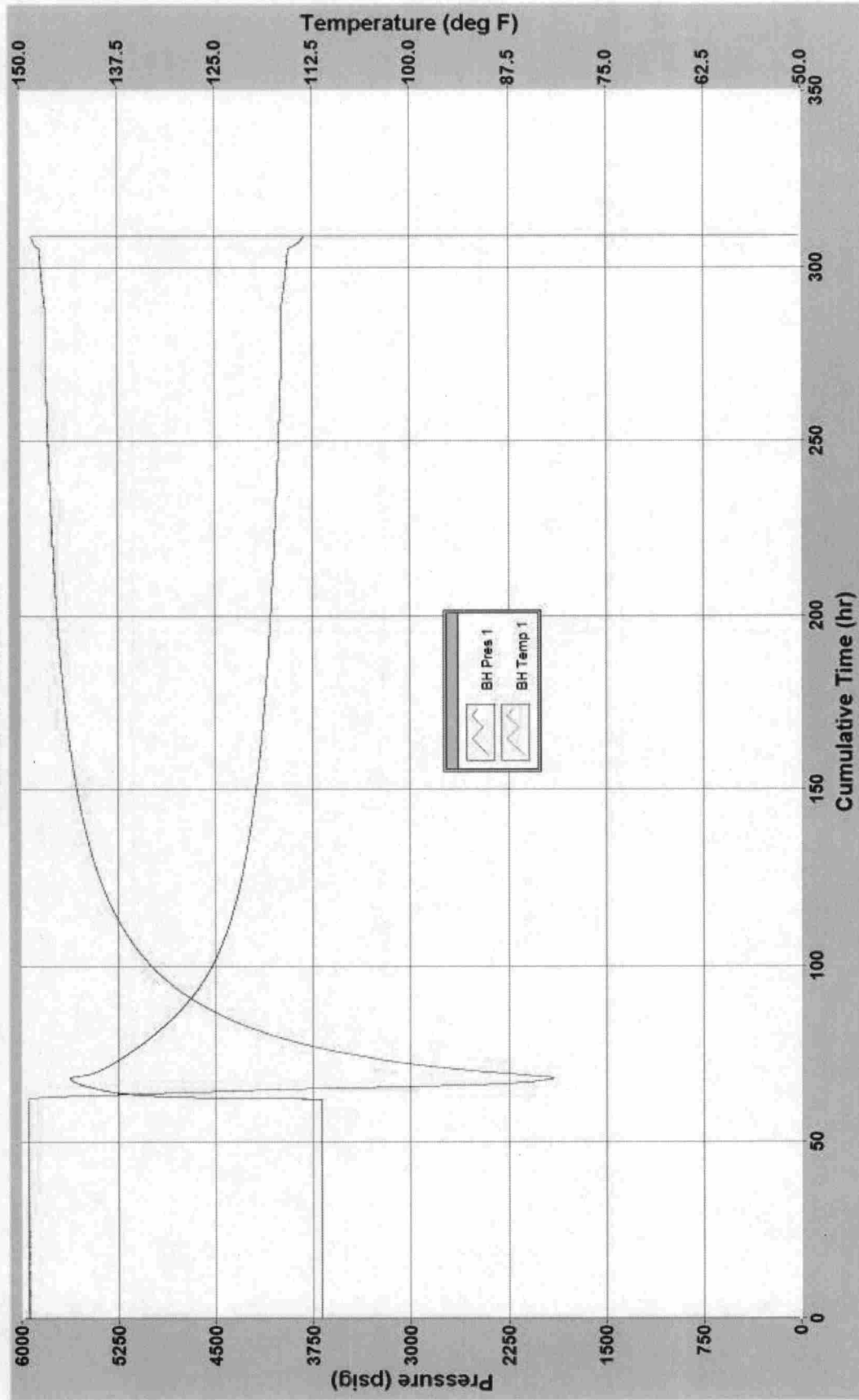
RIH with gauges on 6/9/13. Set @ 7904' in 5.5" casing

POOH on 6/17/13.



Company Name Rex Energy
Well Name North Star #3
Type of Test Build Up
Date(s) of Test 6/9/13 - 6/17/13

North Star 3





Company Name Rex Energy
Well Name North Star #3
Type of Test Build Up
Date(s) of Test 6/9/13 - 6/17/13

| Date | Time | Cum.Time BH1 | BH Pres 1 | BH Temp 1 |
|------------|----------|-----------------|-----------|--------------|
| | | hr | psig | deg F |
| 2013/06/09 | 13:38:05 | 0.0000 | 14.372 | 86.884 |
| 2013/06/09 | 14:38:05 | 1.0000 | 3684.576 | 149.027 |
| 2013/06/09 | 15:38:05 | 2.0000 | 3684.656 | 149.027 |
| 2013/06/09 | 16:38:05 | 3.0000 | 3684.658 | 149.027 |
| 2013/06/09 | 17:38:05 | 4.0000 | 3684.662 | 149.034 |
| 2013/06/09 | 18:38:05 | 5.0000 | 3684.621 | 149.027 |
| 2013/06/09 | 19:38:05 | 6.0000 | 3684.640 | 149.036 |
| 2013/06/09 | 20:38:05 | 7.0000 | 3684.552 | 149.023 |
| 2013/06/09 | 21:38:05 | 8.0000 | 3684.555 | 149.022 |
| 2013/06/09 | 22:38:05 | 9.0000 | 3684.574 | 149.034 |
| 2013/06/09 | 23:38:05 | 10.0000 | 3684.525 | 149.029 |
| 2013/06/10 | 00:38:05 | 11.0000 | 3684.535 | 149.031 |
| 2013/06/10 | 01:38:05 | 12.0000 | 3684.476 | 149.027 |
| 2013/06/10 | 02:38:05 | 13.0000 | 3684.474 | 149.027 |
| 2013/06/10 | 03:38:05 | 14.0000 | 3684.467 | 149.036 |
| 2013/06/10 | 04:38:05 | 15.0000 | 3684.451 | 149.034 |
| 2013/06/10 | 05:38:05 | 16.0000 | 3684.409 | 149.034 |
| 2013/06/10 | 06:38:05 | 17.0000 | 3684.382 | 149.031 |
| 2013/06/10 | 07:38:05 | 18.0000 | 3684.337 | 149.025 |
| 2013/06/10 | 08:38:05 | 19.0000 | 3684.332 | 149.029 |
| 2013/06/10 | 09:38:05 | 20.0000 | 3684.348 | 149.032 |
| 2013/06/10 | 10:38:05 | 21.0000 | 3684.302 | 149.032 |
| 2013/06/10 | 11:38:05 | 22.0000 | 3684.302 | 149.034 |
| 2013/06/10 | 12:38:05 | 23.0000 | 3684.259 | 149.023 |
| 2013/06/10 | 13:38:05 | 24.0000 | 3684.238 | 149.029 |
| 2013/06/10 | 14:38:05 | 25.0000 | 3684.229 | 149.032 |
| 2013/06/10 | 15:38:05 | 26.0000 | 3684.179 | 149.029 |
| 2013/06/10 | 16:38:05 | 27.0000 | 3684.202 | 149.036 |
| 2013/06/10 | 17:38:05 | 28.0000 | 3684.145 | 149.032 |
| 2013/06/10 | 18:38:05 | 29.0000 | 3684.156 | 149.032 |
| 2013/06/10 | 19:38:05 | 30.0000 | 3684.119 | 149.032 |
| 2013/06/10 | 20:38:05 | 31.0000 | 3684.100 | 149.034 |
| 2013/06/10 | 21:38:05 | 32.0000 | 3684.060 | 149.025 |
| 2013/06/10 | 22:38:05 | 33.0000 | 3684.048 | 149.032 |
| 2013/06/10 | 23:38:05 | 34.0000 | 3684.041 | 149.034 |
| 2013/06/11 | 00:38:05 | 35.0000 | 3683.999 | 149.027 |
| 2013/06/11 | 01:38:05 | 36.0000 | 3683.973 | 149.031 |
| 2013/06/11 | 02:38:05 | 37.0000 | 3683.984 | 149.032 |
| 2013/06/11 | 03:38:05 | 38.0000 | 3683.966 | 149.040 |
| 2013/06/11 | 04:38:05 | 39.0000 | 3683.920 | 149.027 |
| 2013/06/11 | 05:38:05 | 40.0000 | 3683.902 | 149.029 |
| 2013/06/11 | 06:38:05 | 41.0000 | 3683.900 | 149.038 |
| 2013/06/11 | 07:38:05 | 42.0000 | 3683.851 | 149.031 |
| 2013/06/11 | 08:38:05 | 43.0000 | 3683.852 | 149.034 |
| 2013/06/11 | 09:38:05 | 44.0000 | 3683.835 | 149.036 |
| 2013/06/11 | 10:38:05 | 45.0000 | 3683.826 | 149.040 |
| 2013/06/11 | 11:38:05 | 46.0000 | 3683.768 | 149.031 |
| 2013/06/11 | 12:38:05 | 47.0000 | 3683.769 | 149.036 |
| 2013/06/11 | 13:38:05 | 48.0000 | 3683.724 | 149.032 |
| 2013/06/11 | 14:38:05 | 49.0000 | 3683.730 | 149.038 |
| 2013/06/11 | 15:38:05 | 50.0000 | 3683.712 | 149.036 |
| 2013/06/11 | 16:38:05 | 51.0000 | 3683.673 | 149.034 |
| 2013/06/11 | 17:38:05 | 52.0000 | 3683.649 | 149.029 |
| 2013/06/11 | 18:38:05 | 53.0000 | 3683.606 | 149.029 |

| Date | Time | Cum.Time BH1 | BH Pres 1 | BH Temp 1 |
|------------|----------|-----------------|-----------|--------------|
| | | hr | psig | deg F |
| 2013/06/11 | 19:38:05 | 54.0000 | 3683.602 | 149.027 |
| 2013/06/11 | 20:38:05 | 55.0000 | 3683.583 | 149.027 |
| 2013/06/11 | 21:38:05 | 56.0000 | 3683.566 | 149.029 |
| 2013/06/11 | 22:38:05 | 57.0000 | 3683.535 | 149.027 |
| 2013/06/11 | 23:38:05 | 58.0000 | 3683.538 | 149.032 |
| 2013/06/12 | 00:38:05 | 59.0000 | 3683.529 | 149.032 |
| 2013/06/12 | 01:38:05 | 60.0000 | 3683.523 | 149.036 |
| 2013/06/12 | 02:38:05 | 61.0000 | 3683.488 | 149.032 |
| 2013/06/12 | 03:38:05 | 62.0000 | 3683.444 | 149.029 |
| 2013/06/12 | 04:38:05 | 63.0000 | 4993.754 | 143.182 |
| 2013/06/12 | 05:38:05 | 64.0000 | 5298.398 | 128.129 |
| 2013/06/12 | 06:38:05 | 65.0000 | 5422.578 | 113.338 |
| 2013/06/12 | 07:38:05 | 66.0000 | 5525.358 | 93.247 |
| 2013/06/12 | 08:38:05 | 67.0000 | 5594.818 | 84.394 |
| 2013/06/12 | 09:38:05 | 68.0000 | 5622.039 | 81.691 |
| 2013/06/12 | 10:38:05 | 69.0000 | 5487.385 | 85.816 |
| 2013/06/12 | 11:38:05 | 70.0000 | 5409.545 | 91.540 |
| 2013/06/12 | 12:38:05 | 71.0000 | 5352.696 | 95.871 |
| 2013/06/12 | 13:38:05 | 72.0000 | 5304.123 | 99.680 |
| 2013/06/12 | 14:38:05 | 73.0000 | 5259.618 | 102.920 |
| 2013/06/12 | 15:38:05 | 74.0000 | 5216.576 | 105.501 |
| 2013/06/12 | 16:38:05 | 75.0000 | 5175.878 | 107.980 |
| 2013/06/12 | 17:38:05 | 76.0000 | 5136.644 | 110.341 |
| 2013/06/12 | 18:38:05 | 77.0000 | 5098.815 | 112.410 |
| 2013/06/12 | 19:38:05 | 78.0000 | 5062.527 | 114.202 |
| 2013/06/12 | 20:38:05 | 79.0000 | 5027.531 | 115.740 |
| 2013/06/12 | 21:38:05 | 80.0000 | 4993.439 | 117.372 |
| 2013/06/12 | 22:38:05 | 81.0000 | 4960.281 | 118.789 |
| 2013/06/12 | 23:38:05 | 82.0000 | 4928.075 | 120.105 |
| 2013/06/13 | 00:38:05 | 83.0000 | 4896.675 | 121.260 |
| 2013/06/13 | 01:38:05 | 84.0000 | 4866.475 | 122.400 |
| 2013/06/13 | 02:38:05 | 85.0000 | 4837.408 | 123.420 |
| 2013/06/13 | 03:38:05 | 86.0000 | 4809.478 | 124.372 |
| 2013/06/13 | 04:38:05 | 87.0000 | 4782.687 | 125.283 |
| 2013/06/13 | 05:38:05 | 88.0000 | 4757.136 | 126.142 |
| 2013/06/13 | 06:38:05 | 89.0000 | 4732.708 | 126.957 |
| 2013/06/13 | 07:38:05 | 90.0000 | 4709.379 | 127.670 |
| 2013/06/13 | 08:38:05 | 91.0000 | 4687.350 | 128.401 |
| 2013/06/13 | 09:38:05 | 92.0000 | 4666.252 | 129.106 |
| 2013/06/13 | 10:38:05 | 93.0000 | 4646.020 | 129.704 |
| 2013/06/13 | 11:38:05 | 94.0000 | 4626.887 | 130.320 |
| 2013/06/13 | 12:38:05 | 95.0000 | 4608.743 | 130.872 |
| 2013/06/13 | 13:38:05 | 96.0000 | 4591.286 | 131.409 |
| 2013/06/13 | 14:38:05 | 97.0000 | 4574.549 | 131.931 |
| 2013/06/13 | 15:38:05 | 98.0000 | 4558.759 | 132.426 |
| 2013/06/13 | 16:38:05 | 99.0000 | 4543.596 | 132.865 |
| 2013/06/13 | 17:38:05 | 100.0000 | 4529.224 | 133.320 |
| 2013/06/13 | 18:38:05 | 101.0000 | 4515.365 | 133.723 |
| 2013/06/13 | 19:38:05 | 102.0000 | 4502.095 | 134.123 |
| 2013/06/13 | 20:38:05 | 103.0000 | 4489.377 | 134.496 |
| 2013/06/13 | 21:38:05 | 104.0000 | 4477.216 | 134.874 |
| 2013/06/13 | 22:38:05 | 105.0000 | 4465.494 | 135.217 |
| 2013/06/13 | 23:38:05 | 106.0000 | 4454.223 | 135.554 |
| 2013/06/14 | 00:38:05 | 107.0000 | 4443.436 | 135.873 |



Company Name Rex Energy
Well Name North Star #3
Type of Test Build Up
Date(s) of Test 6/9/13 - 6/17/13

| Date | Time | Cum.Time BH1 | BH Pres 1 | BH Temp 1 |
|------------|----------|-----------------|-----------|--------------|
| | | hr | psig | deg F |
| 2013/06/14 | 01:38:05 | 108.0000 | 4433.101 | 136.191 |
| 2013/06/14 | 02:38:05 | 109.0000 | 4423.010 | 136.474 |
| 2013/06/14 | 03:38:05 | 110.0000 | 4413.363 | 136.742 |
| 2013/06/14 | 04:38:05 | 111.0000 | 4404.032 | 137.026 |
| 2013/06/14 | 05:38:05 | 112.0000 | 4395.092 | 137.287 |
| 2013/06/14 | 06:38:05 | 113.0000 | 4386.418 | 137.550 |
| 2013/06/14 | 07:38:05 | 114.0000 | 4377.979 | 137.777 |
| 2013/06/14 | 08:38:05 | 115.0000 | 4369.847 | 138.013 |
| 2013/06/14 | 09:38:05 | 116.0000 | 4362.061 | 138.245 |
| 2013/06/14 | 10:38:05 | 117.0000 | 4354.453 | 138.447 |
| 2013/06/14 | 11:38:05 | 118.0000 | 4347.064 | 138.664 |
| 2013/06/14 | 12:38:05 | 119.0000 | 4339.866 | 138.862 |
| 2013/06/14 | 13:38:05 | 120.0000 | 4332.945 | 139.048 |
| 2013/06/14 | 14:38:05 | 121.0000 | 4326.288 | 139.239 |
| 2013/06/14 | 15:38:05 | 122.0000 | 4319.725 | 139.429 |
| 2013/06/14 | 16:38:05 | 123.0000 | 4313.374 | 139.595 |
| 2013/06/14 | 17:38:05 | 124.0000 | 4307.218 | 139.780 |
| 2013/06/14 | 18:38:05 | 125.0000 | 4301.208 | 139.937 |
| 2013/06/14 | 19:38:05 | 126.0000 | 4295.362 | 140.094 |
| 2013/06/14 | 20:38:05 | 127.0000 | 4289.689 | 140.245 |
| 2013/06/14 | 21:38:05 | 128.0000 | 4284.109 | 140.410 |
| 2013/06/14 | 22:38:05 | 129.0000 | 4278.749 | 140.547 |
| 2013/06/14 | 23:38:05 | 130.0000 | 4273.497 | 140.688 |
| 2013/06/15 | 00:38:05 | 131.0000 | 4268.350 | 140.819 |
| 2013/06/15 | 01:38:05 | 132.0000 | 4263.374 | 140.965 |
| 2013/06/15 | 02:38:05 | 133.0000 | 4258.465 | 141.073 |
| 2013/06/15 | 03:38:05 | 134.0000 | 4253.851 | 141.215 |
| 2013/06/15 | 04:38:05 | 135.0000 | 4249.049 | 141.334 |
| 2013/06/15 | 05:38:05 | 136.0000 | 4244.545 | 141.453 |
| 2013/06/15 | 06:38:05 | 137.0000 | 4239.989 | 141.564 |
| 2013/06/15 | 07:38:05 | 138.0000 | 4235.701 | 141.674 |
| 2013/06/15 | 08:38:05 | 139.0000 | 4231.481 | 141.777 |
| 2013/06/15 | 09:38:05 | 140.0000 | 4227.345 | 141.894 |
| 2013/06/15 | 10:38:05 | 141.0000 | 4223.297 | 142.003 |
| 2013/06/15 | 11:38:05 | 142.0000 | 4219.289 | 142.097 |
| 2013/06/15 | 12:38:05 | 143.0000 | 4215.394 | 142.205 |
| 2013/06/15 | 13:38:05 | 144.0000 | 4211.541 | 142.281 |
| 2013/06/15 | 14:38:05 | 145.0000 | 4207.859 | 142.383 |
| 2013/06/15 | 15:38:05 | 146.0000 | 4204.131 | 142.471 |
| 2013/06/15 | 16:38:05 | 147.0000 | 4200.566 | 142.560 |
| 2013/06/15 | 17:38:05 | 148.0000 | 4197.031 | 142.644 |
| 2013/06/15 | 18:38:05 | 149.0000 | 4193.576 | 142.731 |
| 2013/06/15 | 19:38:05 | 150.0000 | 4190.224 | 142.817 |
| 2013/06/15 | 20:38:05 | 151.0000 | 4186.887 | 142.903 |
| 2013/06/15 | 21:38:05 | 152.0000 | 4183.684 | 142.990 |
| 2013/06/15 | 22:38:05 | 153.0000 | 4180.362 | 143.049 |
| 2013/06/15 | 23:38:05 | 154.0000 | 4177.234 | 143.125 |
| 2013/06/16 | 00:38:05 | 155.0000 | 4174.153 | 143.190 |
| 2013/06/16 | 01:38:05 | 156.0000 | 4171.125 | 143.267 |
| 2013/06/16 | 02:38:05 | 157.0000 | 4168.164 | 143.337 |
| 2013/06/16 | 03:38:05 | 158.0000 | 4165.249 | 143.406 |
| 2013/06/16 | 04:38:05 | 159.0000 | 4162.363 | 143.472 |
| 2013/06/16 | 05:38:05 | 160.0000 | 4159.479 | 143.532 |
| 2013/06/16 | 06:38:05 | 161.0000 | 4156.735 | 143.604 |

| Date | Time | Cum.Time BH1 | BH Pres 1 | BH Temp 1 |
|------------|----------|-----------------|-----------|--------------|
| | | hr | psig | deg F |
| 2013/06/16 | 07:38:05 | 162.0000 | 4153.967 | 143.658 |
| 2013/06/16 | 08:38:05 | 163.0000 | 4151.334 | 143.731 |
| 2013/06/16 | 09:38:05 | 164.0000 | 4148.606 | 143.785 |
| 2013/06/16 | 10:38:05 | 165.0000 | 4146.097 | 143.854 |
| 2013/06/16 | 11:38:05 | 166.0000 | 4143.503 | 143.911 |
| 2013/06/16 | 12:38:05 | 167.0000 | 4140.955 | 143.958 |
| 2013/06/16 | 13:38:05 | 168.0000 | 4138.513 | 144.023 |
| 2013/06/16 | 14:38:05 | 169.0000 | 4136.044 | 144.066 |
| 2013/06/16 | 15:38:05 | 170.0000 | 4133.641 | 144.120 |
| 2013/06/16 | 16:38:05 | 171.0000 | 4131.321 | 144.178 |
| 2013/06/16 | 17:38:05 | 172.0000 | 4128.926 | 144.225 |
| 2013/06/16 | 18:38:05 | 173.0000 | 4126.625 | 144.270 |
| 2013/06/16 | 19:38:05 | 174.0000 | 4124.366 | 144.325 |
| 2013/06/16 | 20:38:05 | 175.0000 | 4122.151 | 144.369 |
| 2013/06/16 | 21:38:05 | 176.0000 | 4119.970 | 144.421 |
| 2013/06/16 | 22:38:05 | 177.0000 | 4117.770 | 144.462 |
| 2013/06/16 | 23:38:05 | 178.0000 | 4115.640 | 144.505 |
| 2013/06/17 | 00:38:05 | 179.0000 | 4113.537 | 144.550 |
| 2013/06/17 | 01:38:05 | 180.0000 | 4111.454 | 144.592 |
| 2013/06/17 | 02:38:05 | 181.0000 | 4109.396 | 144.633 |
| 2013/06/17 | 03:38:05 | 182.0000 | 4107.413 | 144.675 |
| 2013/06/17 | 04:38:05 | 183.0000 | 4105.409 | 144.718 |
| 2013/06/17 | 05:38:05 | 184.0000 | 4103.453 | 144.761 |
| 2013/06/17 | 06:38:05 | 185.0000 | 4101.502 | 144.799 |
| 2013/06/17 | 07:38:05 | 186.0000 | 4099.554 | 144.838 |
| 2013/06/17 | 08:38:05 | 187.0000 | 4097.662 | 144.871 |
| 2013/06/17 | 09:38:05 | 188.0000 | 4095.791 | 144.909 |
| 2013/06/17 | 10:38:05 | 189.0000 | 4093.934 | 144.950 |
| 2013/06/17 | 11:38:05 | 190.0000 | 4092.158 | 144.984 |
| 2013/06/17 | 12:38:05 | 191.0000 | 4090.350 | 145.027 |
| 2013/06/17 | 13:38:05 | 192.0000 | 4088.604 | 145.062 |
| 2013/06/17 | 14:38:05 | 193.0000 | 4086.840 | 145.098 |
| 2013/06/17 | 15:38:05 | 194.0000 | 4085.081 | 145.130 |
| 2013/06/17 | 16:38:05 | 195.0000 | 4083.383 | 145.161 |
| 2013/06/17 | 17:38:05 | 196.0000 | 4081.660 | 145.191 |
| 2013/06/17 | 18:38:05 | 197.0000 | 4079.996 | 145.220 |
| 2013/06/17 | 19:38:05 | 198.0000 | 4078.353 | 145.258 |
| 2013/06/17 | 20:38:05 | 199.0000 | 4076.714 | 145.287 |
| 2013/06/17 | 21:38:05 | 200.0000 | 4075.095 | 145.317 |
| 2013/06/17 | 22:38:05 | 201.0000 | 4073.508 | 145.353 |
| 2013/06/17 | 23:38:05 | 202.0000 | 4071.939 | 145.386 |
| 2013/06/18 | 00:38:05 | 203.0000 | 4070.388 | 145.414 |
| 2013/06/18 | 01:38:05 | 204.0000 | 4068.790 | 145.436 |
| 2013/06/18 | 02:38:05 | 205.0000 | 4067.305 | 145.472 |
| 2013/06/18 | 03:38:05 | 206.0000 | 4065.741 | 145.494 |
| 2013/06/18 | 04:38:05 | 207.0000 | 4064.273 | 145.524 |
| 2013/06/18 | 05:38:05 | 208.0000 | 4062.823 | 145.555 |
| 2013/06/18 | 06:38:05 | 209.0000 | 4061.323 | 145.584 |
| 2013/06/18 | 07:38:05 | 210.0000 | 4059.874 | 145.602 |
| 2013/06/18 | 08:38:05 | 211.0000 | 4058.475 | 145.645 |
| 2013/06/18 | 09:38:05 | 212.0000 | 4057.030 | 145.659 |
| 2013/06/18 | 10:38:05 | 213.0000 | 4055.594 | 145.681 |
| 2013/06/18 | 11:38:05 | 214.0000 | 4054.260 | 145.717 |
| 2013/06/18 | 12:38:05 | 215.0000 | 4052.872 | 145.738 |



Company Name Rex Energy
Well Name North Star #3
Type of Test Build Up
Date(s) of Test 6/9/13 - 6/17/13

| Date | Time | Cum.Time BH1 | BH Pres 1 | BH Temp 1 |
|------------|----------|-----------------|-----------|--------------|
| | | hr | psig | deg F |
| 2013/06/18 | 13:38:05 | 216.0000 | 4051.480 | 145.758 |
| 2013/06/18 | 14:38:05 | 217.0000 | 4050.111 | 145.780 |
| 2013/06/18 | 15:38:05 | 218.0000 | 4048.829 | 145.816 |
| 2013/06/18 | 16:38:05 | 219.0000 | 4047.511 | 145.834 |
| 2013/06/18 | 17:38:05 | 220.0000 | 4046.228 | 145.861 |
| 2013/06/18 | 18:38:05 | 221.0000 | 4044.887 | 145.875 |
| 2013/06/18 | 19:38:05 | 222.0000 | 4043.576 | 145.890 |
| 2013/06/18 | 20:38:05 | 223.0000 | 4042.344 | 145.920 |
| 2013/06/18 | 21:38:05 | 224.0000 | 4041.086 | 145.949 |
| 2013/06/18 | 22:38:05 | 225.0000 | 4039.759 | 145.965 |
| 2013/06/18 | 23:38:05 | 226.0000 | 4038.466 | 145.983 |
| 2013/06/19 | 00:38:05 | 227.0000 | 4037.223 | 146.001 |
| 2013/06/19 | 01:38:05 | 228.0000 | 4036.000 | 146.026 |
| 2013/06/19 | 02:38:05 | 229.0000 | 4034.786 | 146.050 |
| 2013/06/19 | 03:38:05 | 230.0000 | 4033.580 | 146.070 |
| 2013/06/19 | 04:38:05 | 231.0000 | 4032.409 | 146.088 |
| 2013/06/19 | 05:38:05 | 232.0000 | 4031.230 | 146.107 |
| 2013/06/19 | 06:38:05 | 233.0000 | 4030.054 | 146.120 |
| 2013/06/19 | 07:38:05 | 234.0000 | 4028.930 | 146.147 |
| 2013/06/19 | 08:38:05 | 235.0000 | 4027.797 | 146.172 |
| 2013/06/19 | 09:38:05 | 236.0000 | 4026.692 | 146.188 |
| 2013/06/19 | 10:38:05 | 237.0000 | 4025.546 | 146.205 |
| 2013/06/19 | 11:38:05 | 238.0000 | 4024.458 | 146.230 |
| 2013/06/19 | 12:38:05 | 239.0000 | 4023.340 | 146.237 |
| 2013/06/19 | 13:38:05 | 240.0000 | 4022.299 | 146.264 |
| 2013/06/19 | 14:38:05 | 241.0000 | 4021.197 | 146.277 |
| 2013/06/19 | 15:38:05 | 242.0000 | 4020.134 | 146.295 |
| 2013/06/19 | 16:38:05 | 243.0000 | 4019.087 | 146.318 |
| 2013/06/19 | 17:38:05 | 244.0000 | 4018.021 | 146.336 |
| 2013/06/19 | 18:38:05 | 245.0000 | 4016.974 | 146.352 |
| 2013/06/19 | 19:38:05 | 246.0000 | 4015.938 | 146.363 |
| 2013/06/19 | 20:38:05 | 247.0000 | 4014.916 | 146.388 |
| 2013/06/19 | 21:38:05 | 248.0000 | 4013.878 | 146.392 |
| 2013/06/19 | 22:38:05 | 249.0000 | 4012.933 | 146.419 |
| 2013/06/19 | 23:38:05 | 250.0000 | 4011.924 | 146.437 |
| 2013/06/20 | 00:38:05 | 251.0000 | 4010.938 | 146.451 |
| 2013/06/20 | 01:38:05 | 252.0000 | 4009.936 | 146.466 |
| 2013/06/20 | 02:38:05 | 253.0000 | 4008.972 | 146.480 |
| 2013/06/20 | 03:38:05 | 254.0000 | 4007.958 | 146.493 |
| 2013/06/20 | 04:38:05 | 255.0000 | 4007.060 | 146.516 |
| 2013/06/20 | 05:38:05 | 256.0000 | 4006.097 | 146.521 |
| 2013/06/20 | 06:38:05 | 257.0000 | 4005.167 | 146.536 |
| 2013/06/20 | 07:38:05 | 258.0000 | 4004.219 | 146.554 |
| 2013/06/20 | 08:38:05 | 259.0000 | 4003.320 | 146.570 |
| 2013/06/20 | 09:38:05 | 260.0000 | 4002.343 | 146.577 |
| 2013/06/20 | 10:38:05 | 261.0000 | 4001.457 | 146.592 |
| 2013/06/20 | 11:38:05 | 262.0000 | 4000.550 | 146.613 |
| 2013/06/20 | 12:38:05 | 263.0000 | 3999.625 | 146.622 |
| 2013/06/20 | 13:38:05 | 264.0000 | 3998.730 | 146.633 |
| 2013/06/20 | 14:38:05 | 265.0000 | 3997.902 | 146.658 |
| 2013/06/20 | 15:38:05 | 266.0000 | 3996.969 | 146.665 |
| 2013/06/20 | 16:38:05 | 267.0000 | 3996.073 | 146.673 |
| 2013/06/20 | 17:38:05 | 268.0000 | 3995.225 | 146.694 |
| 2013/06/20 | 18:38:05 | 269.0000 | 3994.324 | 146.707 |

| Date | Time | Cum.Time BH1 | BH Pres 1 | BH Temp 1 |
|------------|----------|-----------------|-----------|--------------|
| | | hr | psig | deg F |
| 2013/06/20 | 19:38:05 | 270.0000 | 3993.526 | 146.719 |
| 2013/06/20 | 20:38:05 | 271.0000 | 3992.627 | 146.728 |
| 2013/06/20 | 21:38:05 | 272.0000 | 3991.794 | 146.741 |
| 2013/06/20 | 22:38:05 | 273.0000 | 3990.944 | 146.752 |
| 2013/06/20 | 23:38:00 | 273.9986 | 3990.887 | 146.761 |
| 2013/06/21 | 00:38:00 | 274.9986 | 3990.845 | 146.757 |
| 2013/06/21 | 01:43:00 | 276.0819 | 3990.842 | 146.759 |
| 2013/06/21 | 02:43:00 | 277.0819 | 3990.825 | 146.757 |
| 2013/06/21 | 03:43:00 | 278.0819 | 3990.820 | 146.763 |
| 2013/06/21 | 04:38:00 | 278.9986 | 3990.834 | 146.763 |
| 2013/06/21 | 05:38:00 | 279.9986 | 3990.748 | 146.752 |
| 2013/06/21 | 06:43:00 | 281.0819 | 3990.786 | 146.761 |
| 2013/06/21 | 07:43:00 | 282.0819 | 3990.772 | 146.761 |
| 2013/06/21 | 08:43:00 | 283.0819 | 3990.741 | 146.761 |
| 2013/06/21 | 09:38:00 | 283.9986 | 3990.712 | 146.761 |
| 2013/06/21 | 10:38:00 | 284.9986 | 3990.746 | 146.766 |
| 2013/06/21 | 11:38:00 | 285.9986 | 3990.703 | 146.759 |
| 2013/06/21 | 12:43:00 | 287.0819 | 3990.688 | 146.763 |
| 2013/06/21 | 13:38:00 | 287.9986 | 3990.689 | 146.764 |
| 2013/06/21 | 14:38:05 | 289.0000 | 3986.954 | 146.820 |
| 2013/06/21 | 15:38:05 | 290.0000 | 3982.982 | 146.878 |
| 2013/06/21 | 16:38:05 | 291.0000 | 3979.093 | 146.926 |
| 2013/06/21 | 17:38:05 | 292.0000 | 3975.451 | 146.988 |
| 2013/06/21 | 18:38:05 | 293.0000 | 3971.866 | 147.027 |
| 2013/06/21 | 19:38:05 | 294.0000 | 3968.400 | 147.081 |
| 2013/06/21 | 20:38:05 | 295.0000 | 3965.107 | 147.128 |
| 2013/06/21 | 21:38:05 | 296.0000 | 3961.863 | 147.173 |
| 2013/06/21 | 22:38:05 | 297.0000 | 3958.714 | 147.216 |
| 2013/06/21 | 23:38:05 | 298.0000 | 3955.670 | 147.256 |
| 2013/06/22 | 00:38:05 | 299.0000 | 3952.713 | 147.297 |
| 2013/06/22 | 01:38:05 | 300.0000 | 3949.775 | 147.331 |
| 2013/06/22 | 02:38:05 | 301.0000 | 3946.928 | 147.360 |
| 2013/06/22 | 03:38:05 | 302.0000 | 3944.199 | 147.402 |
| 2013/06/22 | 04:38:05 | 303.0000 | 3941.508 | 147.432 |
| 2013/06/22 | 05:38:05 | 304.0000 | 3938.906 | 147.465 |
| 2013/06/22 | 06:38:05 | 305.0000 | 3936.384 | 147.495 |
| 2013/06/22 | 07:38:05 | 306.0000 | 3902.823 | 147.834 |
| 2013/06/22 | 08:38:05 | 307.0000 | 3861.414 | 148.203 |
| 2013/06/22 | 09:38:05 | 308.0000 | 3834.122 | 148.402 |

Density

☒ Well Head PSA

Differential Pressure

☒ Analog #7 Value

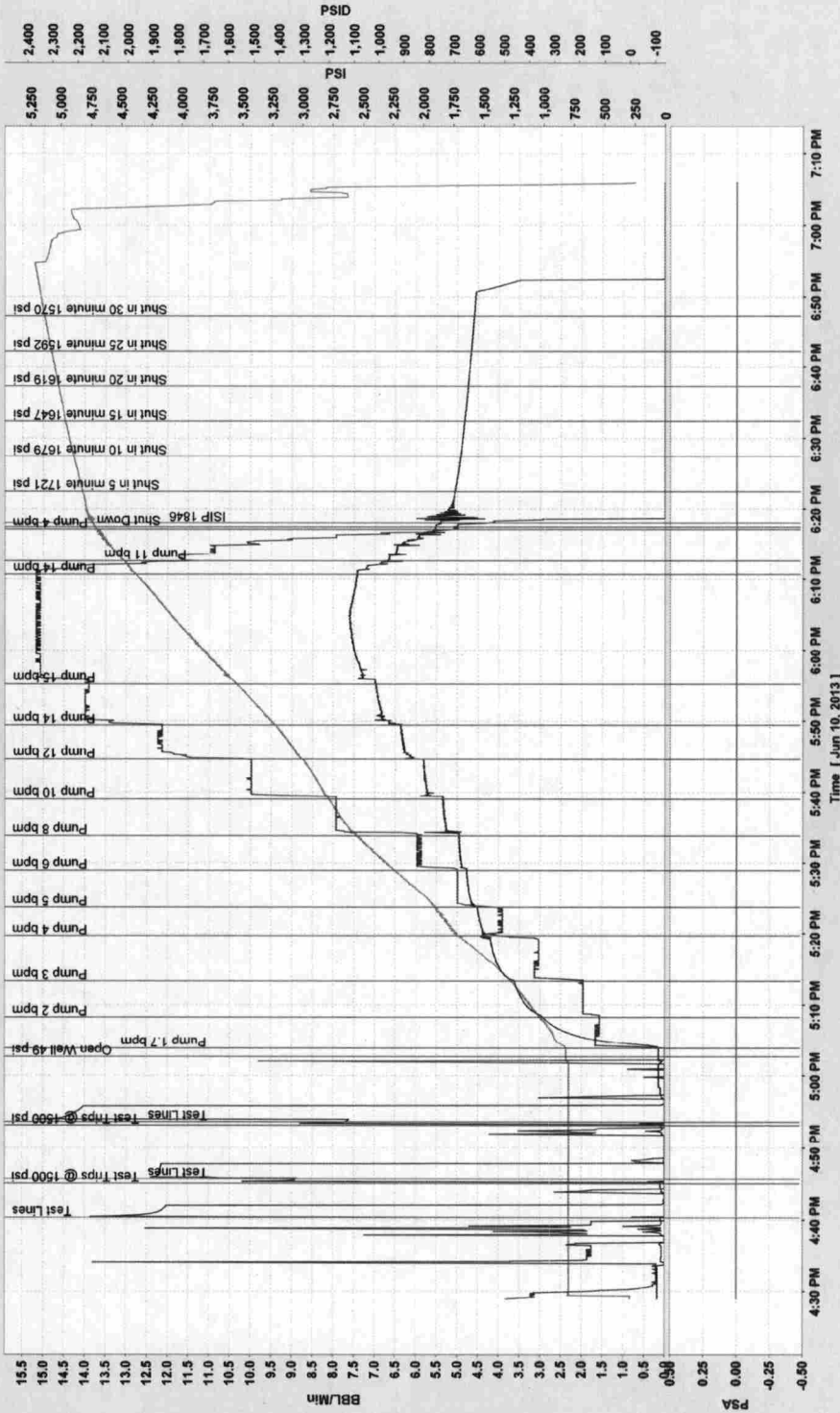
Flow

☒ Well Head Slurry Flow

Pressure

☒ Well Head Pressure

Northstar Khalil #3 SWD



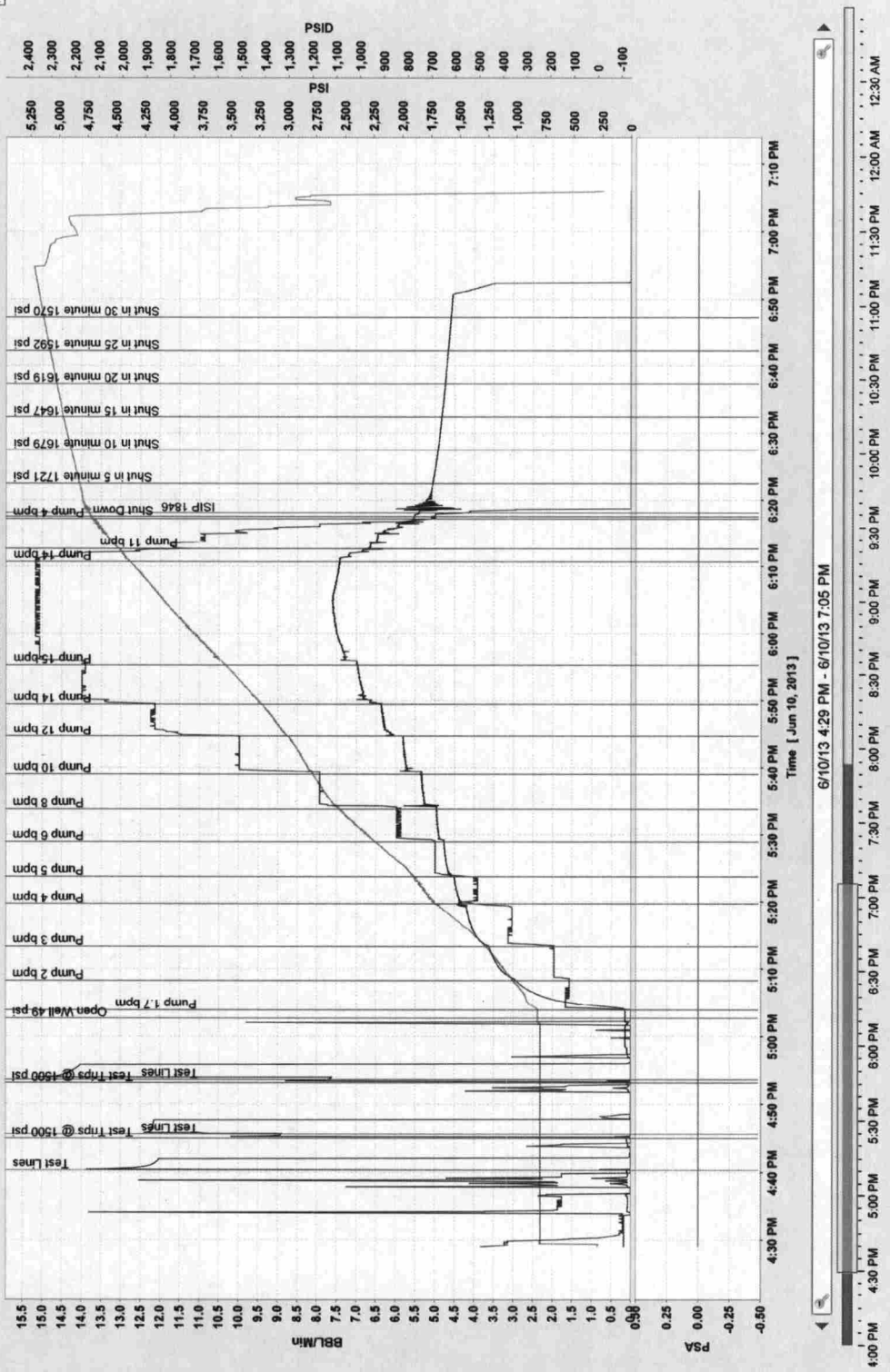
6/10/13 4:29 PM - 6/10/13 7:05 PM

4:00 PM 4:30 PM 5:00 PM 5:30 PM 6:00 PM 6:30 PM 7:00 PM 7:30 PM 8:00 PM 8:30 PM 9:00 PM 9:30 PM 10:00 PM 10:30 PM 11:00 PM 11:30 PM 12:00 AM 12:30 AM

Density

- ☒ Well Head PSA
- ☐ Differential Pressure
- ☒ Analog #7 Value
- ☐ Flow
- ☒ Well Head Slurry Flow
- ☐ Pressure
- ☒ Well Head Pressure

Northstar Khali #3 SWD



[1] New Stage First - Total(s)

| Time | Comment | SLURRYjob (2) | |
|----------|---------|------------------|---|
| 19:00:00 | | | |
| 09:24:31 | | 142 | 0 |

[1] New Stage First - Job Log

| Time | Comment | CASING-psi | SLURRY | SLURRYstg | SLURRYjob (2) | |
|----------|---------|------------|--------|-----------|------------------|--|
| 09:24:30 | End Job | -2500 | 0.1 | 143 | 142 | |

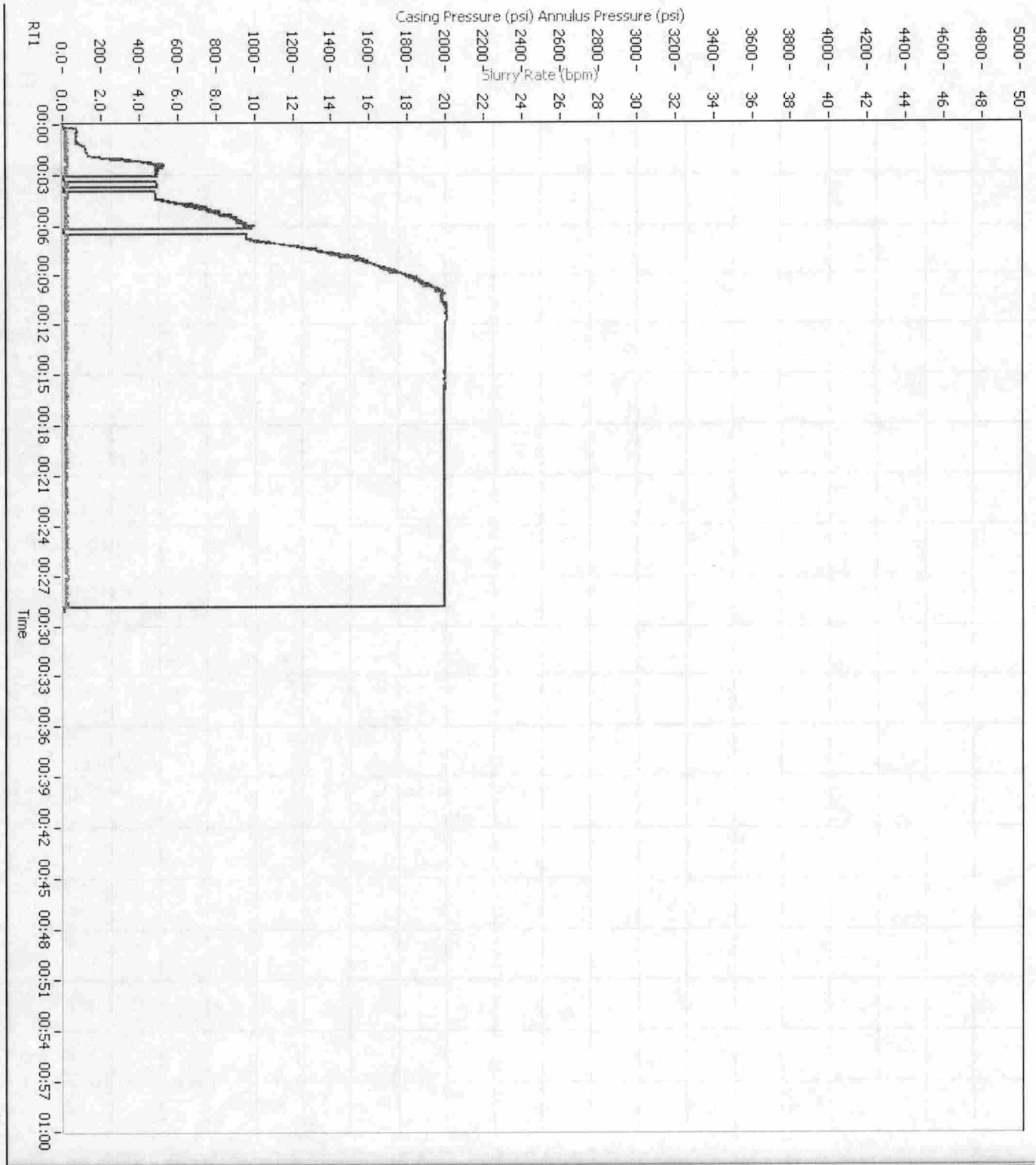
[1] New Stage First - Job Log - continued

| Time | Comment | | | | | |
|----------|---------|--|---|--|--|--|
| 09:24:30 | End Job | | 0 | | | |

[1] New Stage First - Key & Unit(s)

| Name | Abbreviation | Units |
|---------------------------|---------------|-------|
| Casing Pressure Sine | CASING-psi | psi |
| Slurry Rate | SLURRY | bpm |
| Slurry Fluid Volume Stage | SLURRYstg | gal |
| Slurry Fluid Volume Job | SLURRYjob (2) | gal |
| Clean Fluid Rate | CLEANf (2) | bpm |
| Horsepower - Total | HHPTot (2) | hhp |
| Annulus Pressure Sine | ANNp (2) | psi |

[1] New Stage First - Recorded Time Plot 1 - 1 of 1



[1] New Stage First - Recorded Time Plot 1 - 1 of 1

[2] New Stage - Average(s)

| Time | | Comment | CASING-psi | SLURRY |
|----------|-----------|----------------|------------|--------|
| 10:17:25 | Start Avg | | | |
| 11:22:22 | Stop Avg | Establish Rate | 1702 | 6.4 |

[2] New Stage - ISIP(s)

| Time | | Comment | CASING-psi |
|----------|------------|---------------|------------|
| 11:22:06 | Start ISIP | | |
| 11:24:42 | Stop ISIP | Check Rs & Ps | 0 |

| Time | | Comment | CASING-psi |
|----------|------------|---------------|------------|
| 11:24:45 | Start ISIP | | |
| 11:24:50 | Stop ISIP | Check Rs & Ps | 0 |

| Time | | Comment | CASING-psi |
|----------|------------|------------|------------|
| 11:25:12 | Start ISIP | | |
| 11:34:46 | Stop ISIP | ISIP 3 min | 0 |

[2] New Stage - Total(s)

| Time | Comment | SLURRYjob (2) | |
|----------|---------|------------------|---|
| 19:00:00 | | | |
| 11:34:46 | | 17982 | 0 |

[2] New Stage - Job Log

| Time | Comment | CASING-psi | SLURRY | SLURRYstg | SLURRYjob (2) | CASING-psi |
|----------|----------------|------------|--------|-----------|------------------|------------|
| 10:14:54 | Test Lines | 2314 | 0.1 | 79 | 79 | 2314 |
| 10:17:22 | Establish Rate | 215 | 2.6 | 469 | 470 | 215 |
| 10:19:25 | Check Rs & Ps | 986 | 2.8 | 718 | 717 | 986 |
| 10:20:23 | Establish Rate | 1177 | 4.9 | 875 | 874 | 1177 |
| 10:21:25 | Check Rs & Ps | 1289 | 5.0 | 1092 | 1091 | 1289 |
| 10:23:25 | Check Rs & Ps | 1401 | 4.9 | 1506 | 1506 | 1401 |
| 10:25:25 | Check Rs & Ps | 1494 | 4.9 | 1920 | 1920 | 1494 |
| 10:27:25 | Check Rs & Ps | 1567 | 4.9 | 2336 | 2337 | 1567 |
| 10:29:25 | Check Rs & Ps | 1626 | 4.8 | 2751 | 2751 | 1626 |
| 10:31:25 | Check Rs & Ps | 1699 | 4.9 | 3168 | 3168 | 1699 |
| 10:32:32 | Establish Rate | 1753 | 5.4 | 3408 | 3408 | 1753 |
| 10:33:25 | Check Rs & Ps | 1782 | 5.6 | 3610 | 3610 | 1782 |
| 10:35:25 | Check Rs & Ps | 1846 | 5.4 | 4068 | 4067 | 1846 |
| 10:37:25 | Check Rs & Ps | 1895 | 5.5 | 4524 | 4523 | 1895 |
| 10:38:30 | Establish Rate | 1938 | 5.4 | 4772 | 4771 | 1938 |
| 10:39:25 | Check Rs & Ps | 1943 | 5.5 | 4981 | 4981 | 1943 |
| 10:41:25 | Check Rs & Ps | 1943 | 5.0 | 5414 | 5414 | 1943 |
| 10:43:25 | Check Rs & Ps | 1938 | 5.0 | 5833 | 5830 | 1938 |
| 10:45:25 | Check Rs & Ps | 1904 | 4.8 | 6250 | 6246 | 1904 |
| 10:47:25 | Check Rs & Ps | 1870 | 4.9 | 6667 | 6663 | 1870 |
| 10:49:25 | Check Rs & Ps | 1836 | 4.9 | 7082 | 7077 | 1836 |
| 10:51:25 | Check Rs & Ps | 1772 | 5.0 | 7496 | 7493 | 1772 |
| 10:52:46 | Establish Rate | 1782 | 5.5 | 7784 | 7781 | 1782 |
| 10:53:25 | Check Rs & Ps | 1763 | 5.5 | 7933 | 7930 | 1763 |
| 10:55:15 | Establish Rate | 1714 | 6.0 | 8358 | 8355 | 1714 |
| 10:55:25 | Check Rs & Ps | 1763 | 6.0 | 8406 | 8403 | 1763 |
| 10:57:26 | Check Rs & Ps | 1714 | 6.5 | 8917 | 8916 | 1714 |
| 10:59:00 | Establish Rate | 1738 | 6.9 | 9356 | 9356 | 1738 |
| 10:59:26 | Check Rs & Ps | 1680 | 7.1 | 9482 | 9481 | 1680 |
| 11:01:22 | Establish Rate | 1680 | 7.6 | 10062 | 10061 | 1680 |
| 11:01:26 | Check Rs & Ps | 1660 | 7.5 | 10081 | 10080 | 1660 |
| 11:02:36 | Establish Rate | 1670 | 8.0 | 10460 | 10457 | 1670 |
| 11:03:26 | Check Rs & Ps | 1699 | 8.0 | 10738 | 10734 | 1699 |
| 11:05:26 | Check Rs & Ps | 1709 | 8.0 | 11415 | 11412 | 1709 |
| 11:06:50 | Establish Rate | 1719 | 8.6 | 11897 | 11893 | 1719 |
| 11:07:26 | Check Rs & Ps | 1709 | 8.7 | 12113 | 12110 | 1709 |
| 11:09:26 | Check Rs & Ps | 1709 | 8.6 | 12844 | 12841 | 1709 |
| 11:11:26 | Establish Rate | 1807 | 9.4 | 13605 | 13598 | 1807 |
| 11:11:26 | Check Rs & Ps | 1807 | 9.4 | 13608 | 13598 | 1807 |
| 11:13:26 | Check Rs & Ps | 1772 | 9.4 | 14390 | 14389 | 1772 |
| 11:15:26 | Check Rs & Ps | 1826 | 9.8 | 15203 | 15201 | 1826 |
| 11:17:26 | Check Rs & Ps | 1826 | 9.9 | 16035 | 16034 | 1826 |
| 11:19:26 | Check Rs & Ps | 1802 | 9.9 | 16859 | 16862 | 1802 |
| 11:21:27 | Check Rs & Ps | 1816 | 10.0 | 17692 | 17696 | 1816 |
| 11:22:18 | Shut Down | 1553 | 0.1 | 17966 | 17969 | 1553 |
| 11:23:27 | Check Rs & Ps | 1445 | 0.1 | 17971 | 17974 | 1445 |
| 11:24:54 | ISIP 3 min | 1377 | 0.1 | 17977 | 17980 | 1377 |
| 11:27:44 | ISIP 5 min | 1357 | -47.6 | 17979 | 17982 | 1357 |
| 11:34:44 | End Job | -15 | -47.6 | 17979 | 17982 | -15 |

[2] New Stage - Job Log - continued

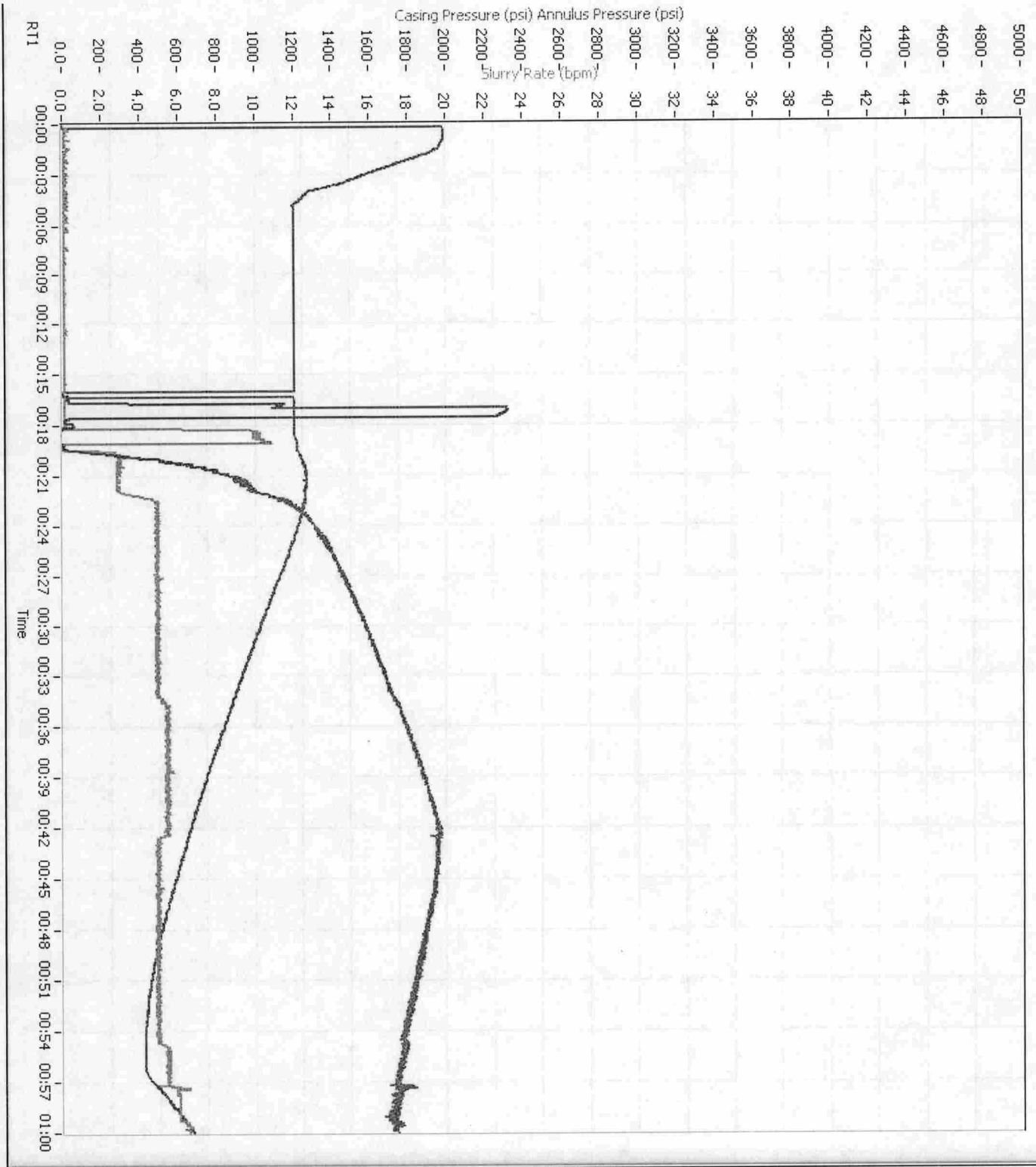


| Time | Comment | CASING-psi | CASING-psi | ANNp (2) | HHPtot (2) | |
|----------|----------------|------------|------------|----------|------------|--|
| 10:14:54 | Test Lines | 2314 | 2314 | 1206 | 5 | |
| 10:17:22 | Establish Rate | 215 | 215 | 1235 | 12 | |
| 10:19:25 | Check Rs & Ps | 986 | 986 | 1260 | 67 | |
| 10:20:23 | Establish Rate | 1177 | 1177 | 1255 | 139 | |
| 10:21:25 | Check Rs & Ps | 1289 | 1289 | 1230 | 160 | |
| 10:23:25 | Check Rs & Ps | 1401 | 1401 | 1167 | 173 | |
| 10:25:25 | Check Rs & Ps | 1494 | 1494 | 1104 | 181 | |
| 10:27:25 | Check Rs & Ps | 1567 | 1567 | 1035 | 186 | |
| 10:29:25 | Check Rs & Ps | 1626 | 1626 | 967 | 194 | |
| 10:31:25 | Check Rs & Ps | 1699 | 1699 | 903 | 210 | |
| 10:32:32 | Establish Rate | 1753 | 1753 | 874 | 232 | |
| 10:33:25 | Check Rs & Ps | 1782 | 1782 | 845 | 244 | |
| 10:35:25 | Check Rs & Ps | 1846 | 1846 | 781 | 249 | |
| 10:37:25 | Check Rs & Ps | 1895 | 1895 | 723 | 252 | |
| 10:38:30 | Establish Rate | 1938 | 1938 | 693 | 255 | |
| 10:39:25 | Check Rs & Ps | 1943 | 1943 | 669 | 263 | |
| 10:41:25 | Check Rs & Ps | 1943 | 1943 | 620 | 237 | |
| 10:43:25 | Check Rs & Ps | 1938 | 1938 | 566 | 239 | |
| 10:45:25 | Check Rs & Ps | 1904 | 1904 | 518 | 226 | |
| 10:47:25 | Check Rs & Ps | 1870 | 1870 | 479 | 226 | |
| 10:49:25 | Check Rs & Ps | 1836 | 1836 | 444 | 220 | |
| 10:51:25 | Check Rs & Ps | 1772 | 1772 | 425 | 218 | |
| 10:52:46 | Establish Rate | 1782 | 1782 | 420 | 241 | |
| 10:53:25 | Check Rs & Ps | 1763 | 1763 | 420 | 237 | |
| 10:55:15 | Establish Rate | 1714 | 1714 | 508 | 257 | |
| 10:55:25 | Check Rs & Ps | 1763 | 1763 | 522 | 263 | |
| 10:57:26 | Check Rs & Ps | 1714 | 1714 | 664 | 273 | |
| 10:59:00 | Establish Rate | 1738 | 1738 | 767 | 293 | |
| 10:59:26 | Check Rs & Ps | 1680 | 1680 | 791 | 294 | |
| 11:01:22 | Establish Rate | 1680 | 1680 | 898 | 305 | |
| 11:01:26 | Check Rs & Ps | 1660 | 1660 | 903 | 315 | |
| 11:02:36 | Establish Rate | 1670 | 1670 | 962 | 319 | |
| 11:03:26 | Check Rs & Ps | 1699 | 1699 | 996 | 333 | |
| 11:05:26 | Check Rs & Ps | 1709 | 1709 | 1074 | 335 | |
| 11:06:50 | Establish Rate | 1719 | 1719 | 1118 | 364 | |
| 11:07:26 | Check Rs & Ps | 1709 | 1709 | 1133 | 367 | |
| 11:09:26 | Check Rs & Ps | 1709 | 1709 | 1191 | 367 | |
| 11:11:26 | Establish Rate | 1807 | 1807 | 1250 | 416 | |
| 11:11:26 | Check Rs & Ps | 1807 | 1807 | 1250 | 416 | |
| 11:13:26 | Check Rs & Ps | 1772 | 1772 | 1274 | 408 | |
| 11:15:26 | Check Rs & Ps | 1826 | 1826 | 1294 | 437 | |
| 11:17:26 | Check Rs & Ps | 1826 | 1826 | 1323 | 441 | |
| 11:19:26 | Check Rs & Ps | 1802 | 1802 | 1353 | 431 | |
| 11:21:27 | Check Rs & Ps | 1816 | 1816 | 1377 | 443 | |
| 11:22:18 | Shut Down | 1553 | 1553 | 1382 | 4 | |
| 11:23:27 | Check Rs & Ps | 1445 | 1445 | 1426 | 3 | |
| 11:24:54 | ISIP 3 min | 1377 | 1377 | 1489 | 3 | |
| 11:27:44 | ISIP 5 min | 1357 | 1357 | 1582 | 0 | |
| 11:34:44 | End Job | -15 | -15 | 557 | 17 | |

[2] New Stage - Key & Unit(s)

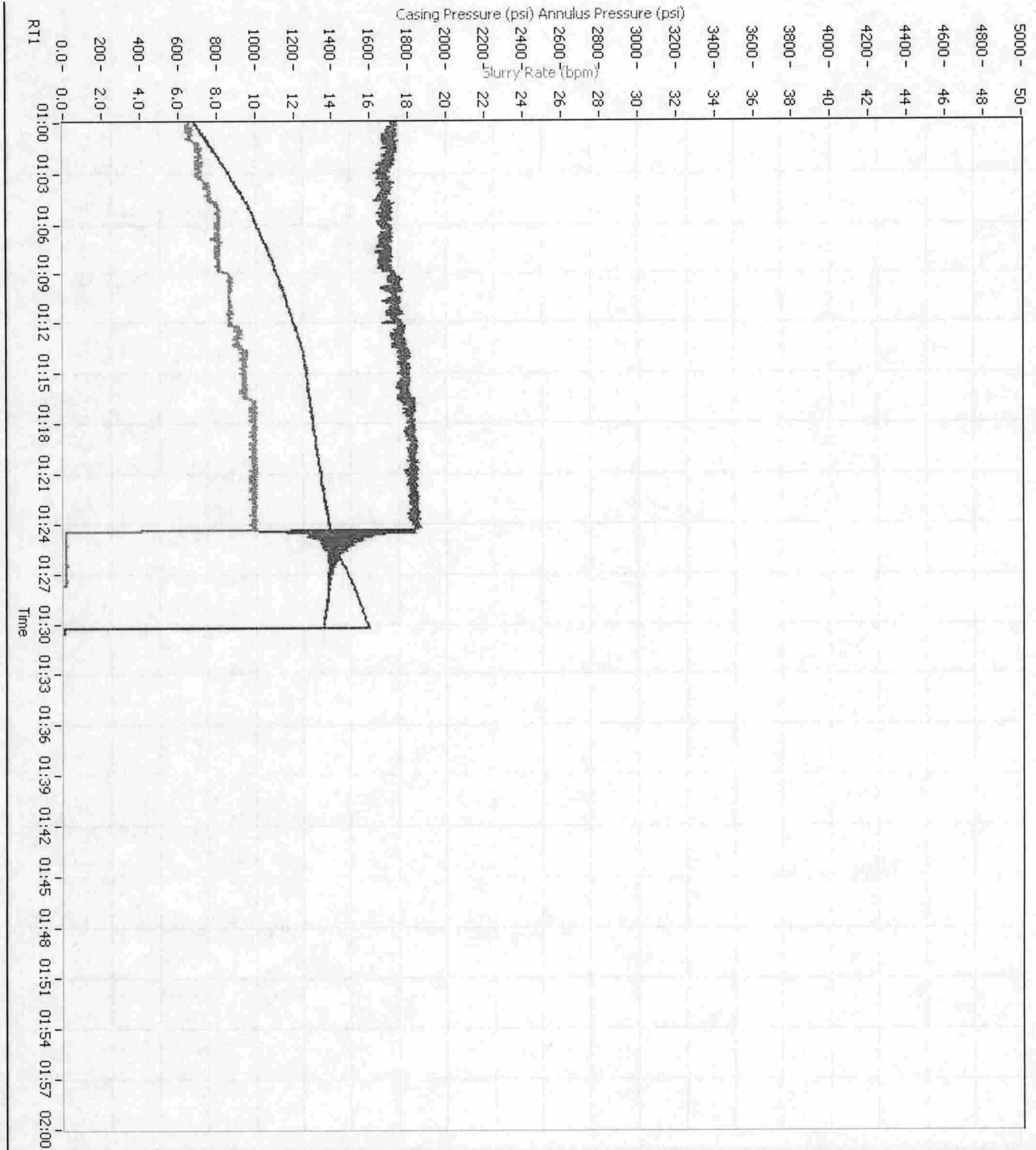
| Name | Abbreviation | Units |
|---------------------------|---------------|-------|
| Casing Pressure | CASING-psi | psi |
| Sine | | |
| Slurry Rate | SLURRY | bpm |
| Slurry Fluid Volume Stage | SLURRYstg | gal |
| Slurry Fluid Volume Job | SLURRYjob (2) | gal |
| Clean Fluid Rate | CLEANf (2) | bpm |
| Horsepower - Total | HHPtot (2) | hhp |
| Annulus Pressure | ANNp (2) | psi |
| Sine | | |

[2] New Stage - Recorded Time Plot 1 - 1 of 2



[2] New Stage - Recorded Time Plot 1 - 1 of 2

[2] New Stage - Recorded Time Plot 1 - 2 of 2



[2] New Stage - Recorded Time Plot 1 - 2 of 2

Radiation Action, Monitoring, and Disposal Plan

R.E. Gas Development, LLC
R.E. Disposal # 1
1933 Old McCartney Road
Campbell, Ohio 44405

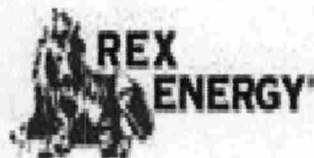


Table of Contents

| | |
|--|---------|
| Introduction | Intro-1 |
| 1. Radiation Monitoring | 1-1 |
| 1.1 Introduction | 1-1 |
| 1.2 Scoping Analysis | 1-1 |
| 1.3 Portable Radiation Monitoring Equipment | 1-1 |
| 1.4 Evaluation Equipment | 1-3 |
| 2. Action Levels and Response | 2-1 |
| 2.1 Detection and Initial Response | 2-1 |
| 2.2 Action Level One Procedures | 2-3 |
| 2.3 Action Level Two Procedures | 2-3 |
| 3. Plan Implementation | 3-1 |
| 3.1 Persons Responsible For Implementation of the Plan | 3-1 |
| 3.2 Persons Radiation Monitoring | 3-1 |
| 3.3 Certified Health Physicist Consultant | 3-2 |
| 3.4 Facility Personnel | 3-2 |
| 3.5 Persons Daily and Annual Equipment Checks | 3-2 |
| 3.6 Revision of the Plan | 3-2 |
| 4. Designated Isolation Area | 4-1 |
| 5. Characterization Procedures | 5-1 |
| 5.1 Characterization Procedures | 5-1 |
| 6. Disposition/Storage of Waste | 7-1 |
| 7. Personnel Training | 8-1 |
| 7.1 Training | 8-1 |
| 8. Recordkeeping | 9-1 |

Introduction

The following describes the Radiation Monitoring, Action Plan, and Disposal (Plan) for the R. E. Gas Development, LLC (Rex) Injection well in the City of Campbell, Mahoning County, Ohio. This Plan contains procedures for monitoring for and responding to radioactive materials detected entering the facility and describes related procedures for personnel training, Ohio Department of Health notification and ODNR, recordkeeping, and reporting. The facility will receive oil and gas liquid waste known as Brine for deep well injection into a Class II well. The purpose of this Policy is to establish work practices that will ensure proper handling and disposal of Naturally Occurring Radioactive Material (NORM) and Technologically Enhanced Radioactive Material (TENORM).

This Plan includes the following sections:

- Section 1 - Radiation Monitoring
- Section 2 - Action Levels and Response
- Section 3 - Plan Implementation
- Section 4 - Designated Isolation Area
- Section 5 - Characterization Procedures
- Section 6 - Disposal Plan
- Section 7 - Personnel Training
- Section 8 - Recordkeeping

Each section of the Plan includes specific requirements and/or procedures to be followed to meet the requirements of the regulations.

Section 1

Radiation Monitoring

1.1 Introduction

The treatment facility is designed to accept produced waters from natural gas and oil wells. Representative samples of water will be collected and analyzed for radionuclide composition and characterization at the well field prior to the initial shipment to the facility, annually, and after a significant operation change in production. The water samples will be analyzed for radionuclide composition by isotopic analysis, specifically Ra-226 and Ra-228, naturally occurring isotopes of uranium and thorium, and the presence of any gamma emitting radionuclides other than those naturally occurring radionuclides. In addition, slurries and solids produced during, and as a result of, the processing of residual wastes at the facility will be surveyed for ionizing radiation in the vicinity of the process equipment and the solids storage locations. The results of all radiological analyses and surveys will be recorded and available for inspection by ODNR and OEPA. and, as discussed below, performed and documented in accordance with state approved protocols and equipment and by properly trained and supervised personnel.

1.2 Scoping Analysis

a scoping analysis of a range of radionuclide compositions of residual waste that may be delivered to the facility and the exposure rates in the vicinity of the solids production and storage locations. the concentrations of Ra-226 and Ra-228 observed in residual waste samples from different well fields varied by over two orders of magnitude. It is anticipated that, when brine waters at this facility are processed and/or store; solids in the form of sludge will be produced that may contain varying concentrations of naturally occurring radionuclides. This in turn will result in external radiation exposure rates that may also be highly variable.

These exposure rates drop off quickly with distance from the side of a roll-off container; i.e., the dose rate drops down by about a factor of 10 at 10 feet from the roll-off and by about a factor of 1000 at 100 feet from the roll-off. The implications of these calculations are that (1) radiation surveys performed in the vicinity of the tanks containing produced water shipped to the facility are unlikely to detect any elevation in the natural background radiation exposure rate, (2) it is highly unlikely that anyone at the site will experience an annual dose approaching 100 mrem, and (3) some of the solids shipped for disposal will need to be defined as TENORM and managed in accordance with state regulations and guidelines applicable to TENORM. These matters are addressed in subsequent sections

1.3 Portable Radiation Monitoring Equipment

Properly trained personnel, who meet the requirements of the Plan, will utilize a hand-held survey meter that meets the requirements of the Bureau of Radiation Protection. This instrument will be used to measure and record exposure rates (radiation levels) in the vicinity of process equipment and waste staging areas where the highest levels of radiation exposure are anticipated and where workers are anticipated to be located for extended periods of time. The surveys will be used to ensure and document that exposures to workers are as far below the radiation protection standards for members of the general public as is reasonable achievable. The survey meter will be recalibrated on an annual basis to a Cesium (Cs)-137 U.S. National Institute of Standards and Technology (NIST)-traceable source.

Our plan is to perform a walkover survey of the site in order to establish a baseline that defines the natural background radiation contours at the site. We anticipate some variability in the natural background due to variations in the soil composition across the site and also due to the presence of surface features at different locations across the site. For example, a preliminary walkover survey using a hand-held 1 inch sodium iodide (NaI) survey meter at another similar site revealed external exposure rates that varied from about 7 to 10 $\mu\text{R/hr}$. We expect a similar range of background radiation exposures at the subject facility; however, we expect small differences between the sites due to differences in soil composition. We also expect that the radiation field at a given location at the site will vary from time to time due to changes in the moisture content of the soil and certainly due to snow cover. Our plan is to perform an annual walkover survey of un-impacted areas for use as a baseline against which to assess and document the radiation fields in the vicinity of impacted and potentially impacted areas at the site.

We plan to perform and document monthly radiation surveys in the vicinity of equipment and sludge storage locations (i.e., areas where we can expect some increase in the background radiation levels due to the presence of TENORM).

Full time workers, who have the greatest potential to experience elevated exposures associated with TENORM on site, will be issued either thermoluminescent dosimeters (TLDs) or optically stimulated luminescent (OSL) dosimeters, which will be changed out quarterly. The initial baseline walkover survey, the routine surveys of the water treatment and solids storage areas, and the personal dosimetry monitoring program will be used in combination to monitor and record the radiation exposures experienced by personnel at the site, with the objective of ensuring that no worker experiences exposures that approach 100 mrem/yr and to provide the information needed to ensure that exposures are maintained as low as is reasonably achievable.

Properly trained personnel will also have access to a hand-held multi-channel analyzer (MCA) that can be used to identify the isotopes that are responsible for any observed elevated levels of external exposure. However, it should be recognized that, since the radionuclide composition of water delivered to the site will be fully characterized; the sources of elevated exposure rates can be readily surmised and anticipated to be due to elevated levels of Ra-226 in the incoming brine. Nevertheless, the use of the MCA will provide further assurance that the site will be able to detect and identify any unknown source of gamma emitters. The MCA will have the ability to download any gamma spectrum found during surveying to a computer. This instrument will have a built-in low-level radioactive source that will allow self-calibration whenever the MCA is turned on. The MCA will be pre-calibrated for the dose rate function on an annual basis to a Cs-137 NIST-traceable source.

The portable radiation monitoring equipment will contain detectors and readout displays meeting the following criteria:

1. The portable monitoring equipment will have a range of gamma dose rate measurements (i.e. 10 $\mu\text{R hr}$ to over 50 mrem hr).
2. The monitoring equipment will be capable of detecting and displaying ambient background radiation levels. The monitoring system will be equipped with a visual readout of the radiation level in $\mu\text{Sv hr}$, $\mu\text{rem hr}$, $\mu\text{R hr}$, or counts per minute (cpm).
3. The readout on the instrumentation will provide scale multiplying factors or logarithmic scales to display higher radiation levels.
4. Portable instrumentation will be powered either by replaceable batteries or power cells with charging units and provide indication if battery/power cell capacity is not at levels for proper unit function.
5. The range of readout for portable (hand-held) monitoring equipment will be 0.01 to approximately 100 mrem hr and have a known gamma energy response.
6. Portable instruments shall be calibrated to a Cs-137 NIST-traceable source as required by the instrument manufacturer, but at least once a year. Hand-held equipment will be sent to a facility identified by either the instrument manufacturer or consulting Health Physicist. Rex will make arrangements with this calibration facility for back-up instruments to be provided so that normal operations can continue.
7. Radiation monitors may be response checked daily on a relative basis.

1.4 Evaluation Equipment

If a radiation alarm is determined to be valid, additional supplies may be required to determine the specific radioisotope. The following equipment and supplies will be available on-site as necessary for handling of such radioactive material samples:

1. Portable MCA coupled to a NaI detector or solid state detector. Appropriate calibration source(s) will also be needed to check the library of spectra.
2. Probes for survey meter capable of detecting beta and gamma radiation. Depending on the survey meter and probe(s) used for beta/gamma monitoring, a different probe could be obtained for alpha monitoring, if desired.
3. Supplies for taking samples for laboratory analysis, such as containers for water samples.
4. Disposable protective clothing and gloves for personnel handling potentially contaminated waste.
5. A supply of radiation warning signs, rope, tape, etc.
6. Supplies and information for data analysis, e.g., scientific calculator, survey forms, tables of radioisotopes with half-life, etc.

Section 2

Action Levels and Response

The procedures described in Section 3 of this Plan must be implemented if the presence of radioactive material is indicated by the radiation monitoring device. The following describes the action levels requiring a response.

ActionLevelOne: Action Level One occurs when the radiation monitoring instrument registers a reading of 10 $\mu\text{R/hr}$ above background.

(Note: The regulations require a gamma exposure rate from a cesium 137 source, at a level no higher than 10 $\mu\text{R/hr}$ above the average local background, at any detector element, shall cause an alarm at the facility. Instrument background shall be kept below 10 $\mu\text{R/hr}$ using shielding if needed, and the system shall be set to detect gamma ray energies of 50 kilo electron volts and higher.)

ActionLevelTwo: Radiation dose rates of 20 $\mu\text{Sv/hr}$ (2 mrem/hr) or greater in the cab of the waste transport vehicle, 500 $\mu\text{Sv/hr}$ (50 mrem/hr) or greater from any other surface, or the detection of contamination on the outside of the vehicle. The contamination limits for removable beta/gamma radiation are set by 10 CFR 49, Section 173.443 at 6,600 dpm/300 cm^2 (2,200 dpm/100 cm^2). Action Level Two requires immediate notification of the Department and isolation of the vehicle.

2.1 Detection and Initial Response

The standard format and content guidance for the Plan is especially concerned with material delivered to a landfill or transfer facility that contains unexpected elevated levels of radioactive material. As described above, such circumstances cannot occur at the subject facility. Nevertheless, this Plan includes provisions for dealing with unexpected circumstances.

Through the use of shielding calculations using MicroShield, we have determined that the radiation field in the immediate vicinity of a cylindrical tank, 12 feet high and 6 foot radius, containing about 15,000 pCi/L of Ra-226, in full equilibrium with its progeny, will result in a radiation field of approximately 10 $\mu\text{R/hr}$ above natural background. Hence, before the first shipment of water from a well field is transported to the facility, it will be characterized in a manner that there will be no surprises with respect to the radiation fields that will be associated with the treatment of the water. Appendix A provides important baseline information characterizing the relationship between the concentration of Ra-226 in the water and the radiation field in the vicinity of the solids resulting from water treatment assuming all progeny in equilibrium. These calculated values are likely overestimated by at least 12% to 15% because the derived concentrations do not take into consideration the concrete that will be added to the sludge as a stabilizing agent, nor do the values account for shielding afforded by the container walls, which would result in a modest reduction in the derived radiation fields. The variability in the relationships in Appendix A is primarily due to the variability in the dissolved solids in the water in different wells for wells with relatively high Ra-226 concentrations (i.e. thousands of pCi/L). However, for water samples with relatively low Ra-226 concentrations (i.e., hundreds of pCi/L), the concentrations of Ra-228 are in many cases comparable to that of Ra-226, and the ratio is substantially higher. As a rule of thumb, for the water with the higher Ra-226 concentrations, the relationship appears to be less than 0.01 $\mu\text{R/hr}$ at contact with a roll-off containing solids per pCi/L of Ra-226 in the water that was treated and that

produced the solids. As stated previously, it is assumed that all progeny of Ra-226 and Ra-228 are in full equilibrium for all cases.

Care will be taken in making use of these relationships because we recognize that radon and its progeny in produced water recently extracted from the ground may not be present in equilibrium with Ra-226, and certainly solids freshly produced from the water treatment process will not contain radon and its progeny in equilibrium. Hence, relatively high concentrations of Ra-226 might be present in freshly produced water, but gamma surveys may read at background levels (i.e., 7 to 10 $\mu\text{R/hr}$). It is for this reason that it is essential that isotopic analysis of the produced water from each well field be performed and recorded, using radon emanation analytical techniques, at the time that water from each well field is first sent to the facility for treatment. The water treated at the facility on any given day is expected to be closer to the average concentrations provided in Table A-1 because the facility is expected to receive water from several well pads concurrently.

As a rule of thumb, the relationship between Ra-226 in water (in full equilibrium with its progeny) and the radiation field at contact with a 20 cubic yard roll-off containing the solids associated with the treatment of this water is expected to be no more than about 0.01 $\mu\text{R/hr}$ per pCi/L of Ra-226. Hence, at 150,000 pCi/L, the radiation field at contact of a 20 cubic yard roll off containing the solids associated with processing that water is expected to be about 1.5 mrem/hr (note, for the purpose of this Plan, we are treating a Roentgen as equivalent to a rem). We believe that, through proper design of the facility, training, and operational procedures, if water containing as much as 150,000 pCi/L were to be shipped to the facility, a circumstance that we do not anticipate given the data we have compiled to date, the solids associated with processing that water could be managed without resulting in exposures to workers in excess of 100 mrem/yr effective dose equivalent (EDE).

If the surveys in the vicinity of any systems and equipment indicate radiation fields that could result in radiation exposures to workers in excess the radiation exposure limits for members of the public (e.g., 50 $\mu\text{R/hr}$ above background in heavily occupied locations) or can be reduced to lower levels in accordance with as-low-as-reasonably-achievable (ALARA) principles, action will be taken to reduce the exposure. These actions could include limiting access to the area (including posting signs) and relocating the equipment to an access controlled area.

Staged slurries and solids that exceed Action Level One will be recorded and labeled in order to ensure that their shipment offsite and disposal are performed in accordance with DOT and Ohio requirements. Section 7 of this Plan presents additional discussion and analysis of the disposition of the solids associated with the operations and decommissioning of this facility. Consideration has also been given to the potential for inhalation exposure to radium and radon progeny. The sludge produced from processing produced water will remain as a moist sludge at all times. As a result, there is no potential for fugitive dust.

2.2 Action Level One Procedures

1. If the radiation level on a second measurement registers radiation greater than the specified rates in Action Level One, move the vehicle to the Designated Isolation Area and notify the local Health & Safety/Environmental Manager.
2. Personnel shall verify that the dose rates are less than 0.05 mR hr outside the site boundary.
3. If treatment or processing is considered, keep the load onsite until the nature of the RAM and proper actions are determined.
4. If the driver leaves with the vehicle without a DOT Exemption Form and before the RAM can be evaluated, contact the Ohio State Highway Patrol and provide them with any information you may have on the vehicle such as make, model, color, company name, license plate number, time left and the direction in which the vehicle was traveling and, if possible, the intended destination. This is to ensure that the driver does not dispose of the contaminated water improperly.
5. Complete a RAM alarm incident report and record the occurrence in the daily operational log.

2.3 Action Level Two Procedures

If the radiation level on a second measurement registers radiation greater than the specified rates in Action Level Two, the following procedures are required:

1. Direct the vehicle to the Designated Isolation Area, remove the driver and keep the driver and all other personnel at least 50 feet from the vehicle.
2. Physically secure the contaminated load against removal or inadvertent disposal (i.e. leaks).
3. All incidents of detection of prohibited Action Level Two radioactive material shall be immediately reported to the Department of Health. Proceed as directed by the AHP.
4. Notify the local Health & Safety/Environmental Manager.
5. Verify that the dose rates are less than 0.05 mR hr outside the boundary of the site.
6. Do not allow the vehicle or container to leave the facility without the permission of the State, and the driver being issued a DOT Exemption Form signed by the Department's AHP or their authorized representative.
7. Complete a RAM alarm incident report and record the occurrence in the daily operational log.

Section 3

Plan Implementation

This Section of the Plan describes the individuals responsible for implementation of the Plan, the daily routine procedures to be followed, and the actions to be taken if the portable radiation monitoring equipment is engaged.

3.1 Persons Responsible For Implementation of the Plan

The primary individual responsible for implementation of the Plan at the facility is the Site Superintendent (SS). The SS is the individual that is responsible for the daily operation of the facility. One of the other on site facility employees will be designated as the Alternate SS. The Alternate SS will assume the position of the SS in the event that the primary SS is unavailable. These individuals each have the authority to implement the Plan. The SS and Alternate SS will be trained in the fundamentals of radiation safety and detection.

The primary responsibilities of the SS are:

- Sampling of incoming produced water loads for radioactive material (RAM);
- Isolation of potentially affected vehicles;
- Response to radiation readings above action limits;
- Survey and characterization of the water load radioactive sources;
- Monitoring operation of radiation detection equipment; and
- Training and supervision of site personnel in the fundamentals of radiation safety and detection;

3.2 Persons Radiation Monitoring

The SS at the facility will be responsible for conducting the daily operation of the portable (hand-held) radiation monitors.

This responsibility includes:

1. Inspection of each tank bottom, sludge present, or filter bag, and their containers;
2. Monitoring of the readout of the detection monitoring equipment;
3. Initial response to readings above the action limit;
4. Notification of the SS and/or AHP in the event of a confirmed reading above the action limit; and
5. Operational checks of the monitoring equipment.

The SS and other facility personnel will be trained in the operation of the device and the fundamentals of radiation safety and detection.

3.3 Certified Health Physicist Consultant

A Certified Health Physicist (CHP) consultant may be utilized by the facility to provide support in the event that further RAM characterization is required.

If necessary, the CHP will perform the characterization and determination of the radiation source and assist in determining the appropriate disposition of the radioactive materials.

3.4 Facility Personnel

Written procedures will be provided to on site personnel and posted on site where they can be seen by the personnel performing the waste monitoring. The procedures will be coordinated in advance with facility personnel, including appropriate notification of other applicable state or local agencies and authorities.

All facility personnel will be trained in the basics of radiation safety. Exposure of the facility staff to radiation is highly unlikely as the incoming water will be contained inside tanker trucks. Under routine circumstances, facility personnel are considered members of the general public (less than 100 mrem per year dose limit) and, as such, will not require individual dose monitoring. On an as-needed basis, radiation dose assessments may be performed on specific individuals associated with a potential exposure resulting from a specific event or source. The dose assessments will be performed by a CHP Consultant retained by Rex.

3.5 Persons Daily and Annual Equipment Checks

Portable radiation monitoring detectors shall be response checked routinely.

Portable radiation monitoring devices shall be calibrated annually to a traceable Cs-137 source. This radiation standard shall be traceable to the U.S. National Institute of Standards and Technology.

3.6 Revision of the Plan

This Plan will be reviewed and updated periodically by the Health & Safety/ Environmental Manager. At a minimum, this will occur when any of the following occurs:

1. Applicable Department regulations or policies are revised;
2. The Action Plan fails during an incident;
3. The facility operation changes in a manner that would interfere with implementation of the Plan;
4. The individual responsible for implementing the plan changes;
5. The monitoring equipment used is changed;
6. The designated area for vehicles in which RAM has been detected changes



Section 4

Designated Isolation Area

The location of the Designated Isolation area is to be used for radiation and waste characterization surveys, and if needed, to isolate a vehicle or container and prevent personnel radiation exposure levels as low as reasonably achievable (ALARA). This area is reasonably isolated from personnel work areas and can be roped off and monitored to prevent trespass into the area.

If surveys show that either exterior dose rate limit in Action Level Two is exceeded, but there is no removable contamination on the exterior of the vehicle and the dose rate in the cab is below 50 mrem/hr, the vehicle should be promptly moved to the Designated Isolation Area for additional characterization or evaluation by the SS, CHP, or regulatory staff.

Section 5

Characterization Procedures

Depending on the composition, water volumes carrying RAM may be rejected from the facility. The following describes the produced water characterization procedures to be followed once a production water sample has been confirmed to contain radioactive material as indicated by the radiation monitoring instrumentation of the facility.

1. Characterization of any samples will be performed under the direct supervision of the SS or the contracted CHP
2. Characterization of any potential sample will be performed by gamma spectroscopy, analytical, or other equivalent methods, to identify the radioisotope present.

5.1 Characterization Procedures

Gamma spectroscopy will be used to identify the radioisotope present in any waste samples exceeding the Action Levels. The specific procedure in the characterization phase will be determined by the SS or CHP, depending on the situation and radiation levels. Procedures will also be determined based on situational factors. The factors to be considered include the nature of the material, radiation levels indicated by the initial survey, highest dose rate, instrumentation, personnel available, weather, and other factors.

In general, for collected material samples exceeding the Action Levels, appropriate characterization procedures should include the following:

1. Measure the radiation levels in the sample once collected. Using appropriate instrumentation and measurement set-up, identify the radioisotope (i.e., via gamma spectroscopy). If the gamma spectroscopy indicates the radiation is from RAM with a half-life of 65 days or less, the Area Health Physicist may authorize the contents to be processed or disposed of immediately in the facility, provided there is minimal risk to workers. Alternately,
2. The area(s) where radioactive material is identified should be roped off or otherwise secured to prevent persons from entering areas where radiation levels exceed 0.02 mSv hr (2 mrem hr), and labeled with appropriate signs. Radiation levels in areas occupied by operational staff should be kept ALARA. The contaminated waste should be physically secured against removal or inadvertent disposal or else be under observation by facility staff at all times.
3. If radioactive material is not detected in the sample, resurvey the exterior of the vessel. Mark any areas where radiation levels exceed background levels. The source of the radiation may be the transport vehicle itself, storage tank bottoms, pipe scale, and filter socks or other filtering media.



Section 6

Disposal Plan

6.1 Disposal of NORM and TENORM

Once the source is identified and properly analyzed through a certified laboratory it will be sent for proper disposal. Tank bottoms and filter socks will be the main source of disposal. If radium levels are above a combined 7 $\mu\text{Ci/g}$ (radium 226 & radium 228) they will not be suitable for Ohio landfills. Based off of lab readings, the material will then attempted to be shipped into an approved Pennsylvania landfill through a full Form-U process and state approval. If levels are too high for acceptance into Pennsylvania, the material of concern; whether bulk or drum form, will be shipped into a NORM/TENORM permitted landfill.

All shipments of those materials containing NORM must be coordinated by the RSO and managed accordingly. Disposal options may vary depending upon the media, radionuclide, activity and concentration. Appropriate support from a third-party service provider may be considered for these activities.

Section 7

Personnel Training

7.1 Training

Rex Energy will arrange to have several levels of training (typically 1-2 hours) for designated staff within the company to ensure all workers who may work on or around sites where NORM/TENORM is possible are qualified and can work safely and know what to do should NORM or TENORM are present at their work site.

Training of the individuals responsible for implementing the Plan, including the SS and facility personnel, will be conducted prior to implementation of the Plan, with annual refresher training in the areas of:

1. Fundamentals of radiation safety;
2. Operation of the monitoring instrumentation used by the facility, including daily operation and other response checks;
3. Radiation Work Procedures; and
4. All aspects of the Plan.

Basic Radiation Awareness

Designated staff will receive a training session on:

- Sources of radiation;
- Safe work through Time-Distance-Shielding;
- Personal protective equipment use and limitations;
- Awareness that NORM may be present, in low concentrations, during work activities;
- Exposure levels as established by state and/or federal regulators; and
- Emergency procedures.

Training intended for drillers, field staff and people in work yards around drill pipes and other materials, or who service this material will include

- Sources of radiation;
- Radiological fundamentals;
- Biological effects;
- ALARA ("as low as (is) reasonably achievable") philosophy;
- Radiological posting and controls;
- Contamination and exposure controls;
- Personal protective equipment use and limitations;
- Personal hygiene considerations & proper PPE
- Roles and responsibilities; and
- Emergency procedures.

3.1.2 Assessor Training

Staff who will need to work with radiation survey meters or collect samples will receive additional training (typically 8 hour) on:

- Use of survey meters;
- Problem solving;

- Sample collection;
- Radiation (action) levels that merit further assessment; and
- Interpretation of state and federal criteria.

Particular attention to the safe operation of the meters, daily calibration, annual manufacturer calibration and limitations and precautions in the use and information gathered when using the meters.

3.1.3 Radiation Safety Officer (RSO)

Should Rex not have a qualified RSO upon implementation of this policy, Rex may consider retaining the services of a third party (consultant) to act as RSO or as an interim RSO during a transition period until an internal person can be so appointed/trained.

Duties of the RSO will include:

- Training of all designated workers
- Periodically compile and retain data (per NRC);
- Dosimeter screening on designated staff annually;
- Ensure appropriate assessment (refer to section 3.3) of equipment and materials prior to shipment to a scrap metal or disposal facility;
- Incident response and coordination.
- Proper PPE at all times

Section 8

Recordkeeping

8.1 Processing of NORM and TENORM

All detections of radioactive material by the radiation monitoring system in excess of Action Levels will be recorded in the daily operational log. The daily operational log will document each alarm of the radiation monitoring system and record the information set listed below for each incident.

All wastes arriving at the facility will be accompanied by documentation that the wastes originated from a well pad where representative samples of water were collected and analyzed for Ra- 226, Ra- 228, isotopes of naturally occurring uranium and thorium and a broad spectrum of gamma emitting radionuclides (i.e., gamma spectrometry)..

The daily operational record will include the following information:

- Date, time, and location of the occurrence;
- A brief narrative description of the occurrence;
- Specific information on the origin of the material, if known;
- A description of the RAM involved, if known;
- The name, address, and telephone number(s) of the supplier, handler, or transporter of the RAM contaminated water, the name of the driver; and
- The final disposition of the material (processed, disposed, or rejected).

WELL COMPLETION RECORD (Form 8)

Ohio Department of Natural Resources
Division of Oil and Gas Resources Management
2045 Morse Road, Bldg. H-3, Columbus, OH 43229-6693
Telephone: 614-265-6633 Fax: 614-265-7998

This report is due in duplicate 60 days after completion of the well. If the permit has expired and the well was not drilled, check the box below, sign on reverse side (Back), and return to our office within 30 days after expiration.

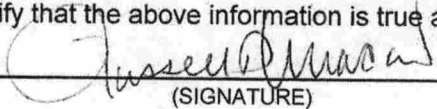
☐

| 1. Owner #: 2651 | | 3. API #: 34-099-23157-0000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|--|-------------------------|----------------------|----------------------|-----------------------|-------------------------|--|-----------------------|------------------|---------------------------------|---------|--------------|----------------------------------|------------|----------------|--------------------|---|---------------|---------------|---------------|-------------|---------|-------------|-----|--------------|--|---------------|---------|--|--|--|--------------|-----------|--|--|--|--|
| 2. Owner name, address and telephone numbers: B&L Energy 2761 Salt Springs Rd. Youngstown, OH 44509 | | 4. Type of Permit: NEW WELL, SALT WATER INJECTION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 5. County: MAHONING | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 6. Civil Township: COITSVILLE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 7. Footage: 10769 FL 1012 WL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8. Type of Well: Salt Water Disposal | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9. X: 41.08983308 Y: -80.6126089 | | 21. Date drilling commenced: 8/28/2011 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10. Quad: CAMPBELL | | 22. Date drilling completed: 10/20/2011 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11. Section: 12. Lot: | | 23. Date put into production: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13. Fraction: 14. Qtr.Twp: | | 24. Date plugged if dry: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15. Tract: | | 25. Producing formation: NA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16. Allot: | | 26. Deepest formation: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17. Well #: 3 | | 27. Driller's total depth: 9581 ft | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18. Lease Name: NORTHSTAR KHALIL | | 28. Logger's total depth: 9580 ft | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 19. PTD: 9300 20. Drilling Unit: 6.7 | | 29. Lost hole at _____ feet. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30. Type of tools: <input type="checkbox"/> Cable <input type="checkbox"/> Air Rotary <input type="checkbox"/> Fluid Rotary <input checked="" type="checkbox"/> Air/Fluid Rotary <input type="checkbox"/> Cable/Air Rotary <input type="checkbox"/> Service Rig <input type="checkbox"/> Cable/Fluid Rotary <input type="checkbox"/> Cable/Air Rotary/Fluid Rotary | | 31. Type of completion: <input checked="" type="checkbox"/> Open Hole <input checked="" type="checkbox"/> Through Casing <input type="checkbox"/> Slotted Liner | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 32. Elevation: Ground Level 1036 ft Derrick Floor 1052 ft Kelly Bushing 1052 ft | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 33. Perforated intervals and number of shots: 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 34. Name of Frac Company: NA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 35. Method of shot, acid, or fracture treatments, production tests, pressures, etc.: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table style="width:100%; border: none;"> <tr> <td style="width:25%;">SHOT:</td> <td style="width:25%;">ACID:</td> <td style="width:25%;">FRAC FLUIDS:</td> <td style="width:25%;">SAND:</td> <td style="width:20%;">PRESSURES (psi):</td> </tr> <tr> <td>Lbs. _____</td> <td>Gals. _____</td> <td>Water (gals) NA</td> <td>Lbs. NA</td> <td>Breakdown NA</td> </tr> <tr> <td>Qts. _____</td> <td>Type _____</td> <td>Water (bbl) NA</td> <td>Sks. NA</td> <td>ATP NA</td> </tr> <tr> <td>Type _____</td> <td>Percent _____</td> <td>CO2 (tons) NA</td> <td></td> <td>ISIP NA</td> </tr> <tr> <td></td> <td></td> <td>N2 (mscf) NA</td> <td></td> <td>5 min. SIP NA</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>Avg. Rate NA</td> </tr> </table> | | | | SHOT: | ACID: | FRAC FLUIDS: | SAND: | PRESSURES (psi): | Lbs. _____ | Gals. _____ | Water (gals) NA | Lbs. NA | Breakdown NA | Qts. _____ | Type _____ | Water (bbl) NA | Sks. NA | ATP NA | Type _____ | Percent _____ | CO2 (tons) NA | | ISIP NA | | | N2 (mscf) NA | | 5 min. SIP NA | | | | | Avg. Rate NA | | | | | |
| SHOT: | ACID: | FRAC FLUIDS: | SAND: | PRESSURES (psi): | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lbs. _____ | Gals. _____ | Water (gals) NA | Lbs. NA | Breakdown NA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Qts. _____ | Type _____ | Water (bbl) NA | Sks. NA | ATP NA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Type _____ | Percent _____ | CO2 (tons) NA | | ISIP NA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | N2 (mscf) NA | | 5 min. SIP NA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Avg. Rate NA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <div style="display: flex; justify-content: space-between; align-items: center;"> <div> METHOD OF FLUID CONTAINMENT FLUIDS: Swab <input type="checkbox"/> Flowback <input type="checkbox"/> PIT: <input type="checkbox"/> FRAC TANK: <input type="checkbox"/> </div> <div style="border: 2px solid black; padding: 5px; text-align: center;"> RECEIVED FEB 16 2012 Division of Oil and Gas Resources Management </div> <div> DATE TREATED: NA </div> </div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 36. Amount of initial production per day: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table style="width:100%; border: none;"> <tr> <td style="width:33%;">Natural:</td> <td style="width:16%;">Gas</td> <td style="width:16%;">Oil</td> <td style="width:16%;">Brine</td> <td style="width:16%;">(MCF.)</td> <td style="width:16%;">(Bbls.)</td> </tr> <tr> <td>After Treatment:</td> <td>Gas 0</td> <td>Oil 0</td> <td>Brine 0</td> <td></td> <td></td> </tr> <tr> <td>SERC Data:</td> <td>Number of Tanks: 0</td> <td colspan="4">Maximum Storage Capacity of all Tanks (bbls.) 0</td> </tr> </table> | | | | Natural: | Gas | Oil | Brine | (MCF.) | (Bbls.) | After Treatment: | Gas 0 | Oil 0 | Brine 0 | | | SERC Data: | Number of Tanks: 0 | Maximum Storage Capacity of all Tanks (bbls.) 0 | | | | | | | | | | | | | | | | | | | | |
| Natural: | Gas | Oil | Brine | (MCF.) | (Bbls.) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| After Treatment: | Gas 0 | Oil 0 | Brine 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SERC Data: | Number of Tanks: 0 | Maximum Storage Capacity of all Tanks (bbls.) 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 37. Casing and tubing record: Please indicate which is used (cement or mudding) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table style="width:100%; border: none;"> <tr> <th>Type</th> <th>Size</th> <th>Feet Used in Drilling</th> <th>Amount of Cement or Mud</th> <th>Feet Left in Well</th> </tr> <tr> <td>Conductor/Drive Pipe:</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Surface:</td> <td>10.75</td> <td>1019</td> <td>CMT 449 sks</td> <td>1017</td> </tr> <tr> <td>Intermediate:</td> <td>7.625</td> <td>8096</td> <td>CMT 221 sks</td> <td>8080</td> </tr> <tr> <td>Production:</td> <td>4.5</td> <td>7972</td> <td></td> <td>7972</td> </tr> <tr> <td>Tubing:</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="5">Comments:</td> </tr> </table> | | | | Type | Size | Feet Used in Drilling | Amount of Cement or Mud | Feet Left in Well | Conductor/Drive Pipe: | | | | | Surface: | 10.75 | 1019 | CMT 449 sks | 1017 | Intermediate: | 7.625 | 8096 | CMT 221 sks | 8080 | Production: | 4.5 | 7972 | | 7972 | Tubing: | | | | | Comments: | | | | |
| Type | Size | Feet Used in Drilling | Amount of Cement or Mud | Feet Left in Well | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Conductor/Drive Pipe: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Surface: | 10.75 | 1019 | CMT 449 sks | 1017 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Intermediate: | 7.625 | 8096 | CMT 221 sks | 8080 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Production: | 4.5 | 7972 | | 7972 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tubing: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Comments: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 38. Name of drilling contractor: UNION DRILLING | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 39. Type of electrical and/or radioactivity logs run: LITHO-DENSITY, COMP. NEUTRON, GAMMA RAY, (all logs must be submitted) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 40. Name of logging company: SCHLUMBERGER | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <div style="border: 1px solid black; padding: 5px;"> DIVISION USE ONLY <table style="width:100%; border: none;"> <tr> <td style="width:33%;">Log Submitted: Y / N</td> <td style="width:33%;">FRAC DATA SUBMITTED:</td> <td style="width:33%;">Well Class:</td> </tr> <tr> <td>Confidential: Y / N</td> <td>Pressure/Rate Graph <input type="checkbox"/></td> <td></td> </tr> <tr> <td></td> <td>Record <input type="checkbox"/></td> <td></td> </tr> <tr> <td></td> <td>Invoice <input type="checkbox"/></td> <td></td> </tr> </table> </div> | | | | Log Submitted: Y / N | FRAC DATA SUBMITTED: | Well Class: | Confidential: Y / N | Pressure/Rate Graph <input type="checkbox"/> | | | Record <input type="checkbox"/> | | | Invoice <input type="checkbox"/> | | | | | | | | | | | | | | | | | | | | | | | | |
| Log Submitted: Y / N | FRAC DATA SUBMITTED: | Well Class: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Confidential: Y / N | Pressure/Rate Graph <input type="checkbox"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Record <input type="checkbox"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Invoice <input type="checkbox"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| FORMATION | TOP | BASE | Shows of oil, gas, fresh water, or brine; indicate depth or interval | REMARKS |
|--------------------------|------|------|---|-----------|
| Freshwater Strata | | | | |
| Glacial Deposits | | | | |
| Coal Seams | | | | |
| 1st Cow Run | | | | |
| Buell Run | | | | |
| 2nd Cow Run | | | | |
| Salt Sand | | | | |
| Maxton Sand | | | | |
| Keener Sand | | | | |
| Big Injun Sand | | | | |
| Squaw Sand | | | | |
| Mississippian Shale | | | | |
| Weir Sand | | | | |
| Berea Sand | | | | |
| Bedford Shale | | | | |
| 2nd Berea | | | | |
| Ohio Shale | | | | |
| Gantz | | | | |
| Thirty Foot | | | | |
| Gordon | | | | |
| Cinnamon | | | | |
| Marcellus | | | | |
| Big Lime | | | | |
| Sylvania | | | | |
| Oriskany | | | | |
| Bass Island | | | | |
| Salina | 4040 | | | |
| Salt Section | | | | |
| Newburg | | | | |
| Lockport | 4713 | | | |
| Little Lime | | | | |
| Packer Shell | | | | |
| Stray Clinton | 5210 | | | |
| Red Clinton | | | | |
| White Clinton | | | | |
| Medina | 5290 | | | |
| Queenston | 5462 | 7055 | | |
| Utica | 7055 | 7348 | | gas shows |
| Trenton | 7348 | | | |
| Black River | | | | |
| Gull River | | | | |
| Glenwood Shale | | | | |
| Knox Unconformity | 8096 | | | |
| Beekmantown | | | | |
| Rose Run | 8310 | | | |
| Trempealeau/Copper Ridge | | | | |
| "B" Zone | | | | |
| Krysik | | | | |
| Kerbel | | | | |
| Conasauga | | | | |
| Rome | | | | |
| Mt. Simon | 9280 | | | |
| Granite Wash | | | | |
| Middle Run | | | | |
| Granite | | | | |

RECEIVED
FEB 16 2012
 Division of Oil and Gas
 Resources Management

I certify that the above information is true and correct, to the best of my knowledge:


 (SIGNATURE)
 Russell Macaw
 (NAME typed or printed)

2/15/2012
 (DATE)
 Vice President - Appalachian Regional Manager
 (TITLE)

(REPRESENTING)