

State of West Virginia  
Department of Environmental Protection - Office of Oil and Gas  
Well Operator's Report of Well Work

API 47-051-01763 County MARSHALL District FRANKLIN  
Quad POWHATAN POINT Pad Name MND 06 Field/Pool Name N/A  
Farm name CONSOLIDATED COAL COMPANY Well Number MND 06 DHS

Operator (as registered with the OOG) Noble Energy, Inc.  
Address 1000 Noble Energy Drive City Canonsburg State PA Zip 15317

As Drilled location NAD 83/UTM Attach an as-drilled plat, profile view, and deviation survey  
Top hole Northing 39.817699 Easting 80.791676  
Landing Point of Curve Northing 39.818272 Easting 80.794456  
Bottom Hole Northing 39.841442 Easting 80.816118

Elevation (ft) 722' GL Type of Well  New  Existing Type of Report  Interim  Final  
Permit Type  Deviated  Horizontal  Horizontal 6A  Vertical Depth Type  Deep  Shallow  
Type of Operation  Convert  Deepen  Drill  Plug Back  Redrilling  Rework  Stimulate  
Well Type  Brine Disposal  CBM  Gas  Oil  Secondary Recovery  Solution Mining  Storage  Other \_\_\_\_\_  
Type of Completion  Single  Multiple Fluids Produced  Brine  Gas  NGL  Oil  Other \_\_\_\_\_  
Drilled with  Cable  Rotary

Drilling Media Surface hole  Air  Mud  Fresh Water Intermediate hole  Air  Mud  Fresh Water  Brine  
Production hole  Air  Mud  Fresh Water  Brine  
Mud Type(s) and Additive(s)  
SYNTHETIC OIL BASED

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Date permit issued 06/10/2014 Date drilling commenced 09/04/2014 Date drilling ceased 11/14/2014  
Date completion activities began 04/28/2017 Date completion activities ceased 05/15/2017  
Verbal plugging (Y/N) \_\_\_\_\_ Date permission granted \_\_\_\_\_ Granted by \_\_\_\_\_

Please note: Operator is required to submit a plugging application within 5 days of verbal permission to plug

Freshwater depth(s) ft 128' & 265' Open mine(s) (Y/N) depths N  
Salt water depth(s) ft NONE NOTED FOR OFFSETS Void(s) encountered (Y/N) depths N - DRILLED IN PILLAR  
Coal depth(s) ft 284'-294' Cavern(s) encountered (Y/N) depths N  
Is coal being mined in area (Y/N) N

Reviewed

2/2/18

Reviewed by:  
  
03/02/2018

API 47- 051 - 01763 Farm name CONSOLIDATED COAL COMPANY Well number MND 06 DHS

CASING STRINGS	Hole Size	Casing Size	Depth	New or Used	Grade wt/ft	Basket Depth(s)	Did cement circulate (Y/ N) * Provide details below*
Conductor	26"	20"	40'	NEW	DH-36		Y
Surface	18"	16"	110'	NEW	H-40		Y
Coal	17 1/2"	13 3/8"	718'	NEW	J-55		Y
Intermediate 1	12.38"	9 5/8"	2032'	NEW	HCK-55		Y
Intermediate 2							
Intermediate 3							
Production	8 3/4" & 8 1/2"	5 1/2"	16,756'	NEW	P-110		Y
Tubing							
Packer type and depth set							

Comment Details \_\_\_\_\_

CEMENT DATA	Class/Type of Cement	Number of Sacks	Slurry wt (ppg)	Yield (ft <sup>3</sup> /sks)	Volume (ft <sup>3</sup> )	Cement Top (MD)	WOC (hrs)
Conductor	CaCl 1.15					0	8
Surface	CaCl 1.15					0	8
Coal	Type 1 / Class A	490	15.6	1.39	681.1	0	8
Intermediate 1	Type 1 / Class A	745	15.6	1.18	879.1	0	8
Intermediate 2							
Intermediate 3							
Production	Type 1 / Class A	Lead 721 Tail 2536	14.8	Lead 1.54 Tail 1.37	total 4495.61	2070	8
Tubing							

Drillers TD (ft) 16,756 Loggers TD (ft) 16,755'  
 Deepest formation penetrated Marcellus Plug back to (ft) \_\_\_\_\_  
 Plug back procedure \_\_\_\_\_

Kick off depth (ft) 2,143'

Check all wireline logs run  caliper  density  deviated/directional  induction  
 neutron  resistivity  gamma ray  temperature  sonic

Well cored  Yes  No Conventional Sidewall Were cuttings collected  Yes  No

DESCRIBE THE CENTRALIZER PLACEMENT USED FOR EACH CASING STRING No centralizers used on conductor.  
18 Centralizers on Intermediate String (Bow string centralizers on first two joints then every third joint to 100' from surface).  
 294 Bow Tech Centralizers on Production String (rigid bow string every joint to KOP, rigid bow spring every third joint from KOP to top of cement).

WAS WELL COMPLETED AS SHOT HOLE  Yes  No DETAILS \_\_\_\_\_

WAS WELL COMPLETED OPEN HOLE?  Yes  No DETAILS \_\_\_\_\_

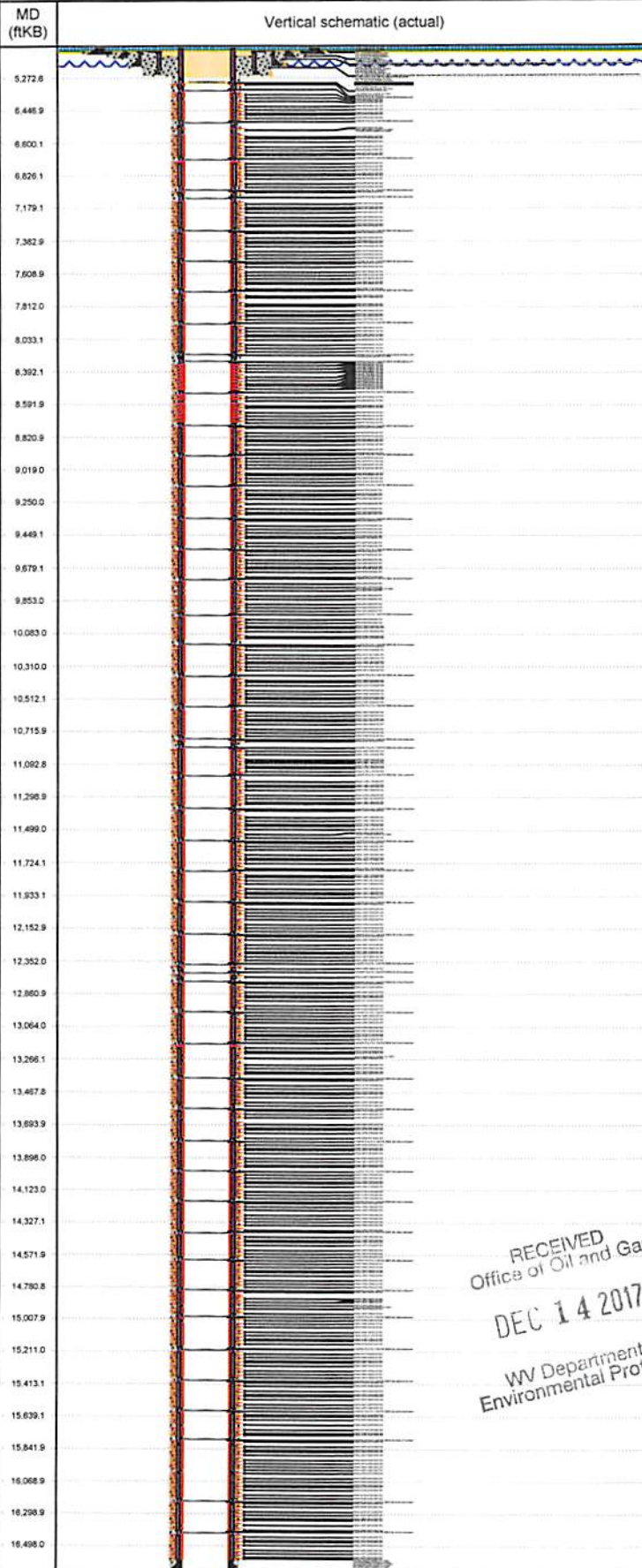
WERE TRACERS USED  Yes  No TYPE OF TRACER(S) USED \_\_\_\_\_





**Well Name: MND-6D-HS**

HORIZONTAL - Original Hole, 12/11/2017 3:06:57 PM



**Well Header**

API 47-051-01763	Business Unit MARCELLUS	District 30	Well Config HORIZONTAL
Original KB Elevation (ft) 748	KB - GL / MSL (ftKB) 25.90	Spud Date 9/4/2014	P & A Date

Comment

Directions To Well

Current PBTD (mKB)

**Bottom Hole Location**

North-South Distance (ft)	From N or S Line	East-West Distance (ft)	From E or W Line
---------------------------	------------------	-------------------------	------------------

**Plug Back Total Depths**

Date	Depth (ftKB)	Method	Com

**Wellbore Sections**

Section Des	Size (in)	Act Top, MD (ftKB)	Act Btm, MD (ftKB)
CONDUCTOR 1	24	26	40
CONDUCTOR 2	18	40	135
SURFACE	14 3/4	135	760
INTERMEDIATE 1	12 1/4	760	2,070

**Zone Statuses**

Zone Name	Status Date	Status	Fluid Type	Job	Prod Method

**Casing Strings**

Csg Des	Run Date	OD (in)	Wt/Len (lb/ft)	Grade	Top, MD (ftKB)	MD (ftKB)
Conductor	8/10/2014	20	165.60	X-56	25.9	40.0
Conductor	8/24/2014	16	65.00	H-40	25.9	110.0
Surface	9/8/2014	13 3/8	54.50	J-55	25.9	745.0
Intermediate	11/5/2014	9 5/8	36.00	J-55	25.9	2,058.7
Production	11/13/2014	5 1/2	23.00	P-110	-2.3	16,756.0

**Cement**

Des	Top (ftKB)	Btm (ftKB)
Conductor Cement	25.9	40.0
Conductor Cement	25.9	110.0
Surface Casing Cement	26.0	745.0
Intermediate 1 Casing Cement	25.9	2,058.7
Production Casing Cement	41.0	165,756.0

**Tubing Components**

Item Des	OD (in)	Wt (lb/ft)	Grade	Jts	Len (ft)

**Perforation Data**

Linked Zone	Brnch/Stg	Sum of Entered Shot Total	Top (ftKB)	Btm (ftKB)	Date
	52	58	6,120.00	6,292.00	5/14/2017
	51	58	6,322.00	6,499.00	5/13/2017
	50	58	6,526.00	6,701.00	5/13/2017
	49	58	6,729.00	6,903.00	5/13/2017
	48	58	6,930.00	7,105.00	5/13/2017
	47	58	7,130.00	7,307.00	5/12/2017
	46	58	7,332.00	7,509.00	5/12/2017
	45	58	7,536.00	7,711.00	5/12/2017
	44	58	7,736.00	7,909.00	5/12/2017
	43	58	7,938.00	8,115.00	5/11/2017
	42	58	8,140.00	8,317.00	5/11/2017
	41	58	8,345.00	8,519.00	5/11/2017
	40	58	8,544.00	8,719.00	5/11/2017
	39	58	8,746.00	8,918.00	5/10/2017
	38	58	8,948.00	9,122.00	5/10/2017
	37	58	9,147.00	9,330.00	5/9/2017
	36	58	9,352.00	9,529.00	5/9/2017
	35	58	9,554.00	9,731.00	5/9/2017
	34	58	9,758.00	9,933.00	5/9/2017

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 Office of Oil and Gas  
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 WV Department of  
 Environmental Protection

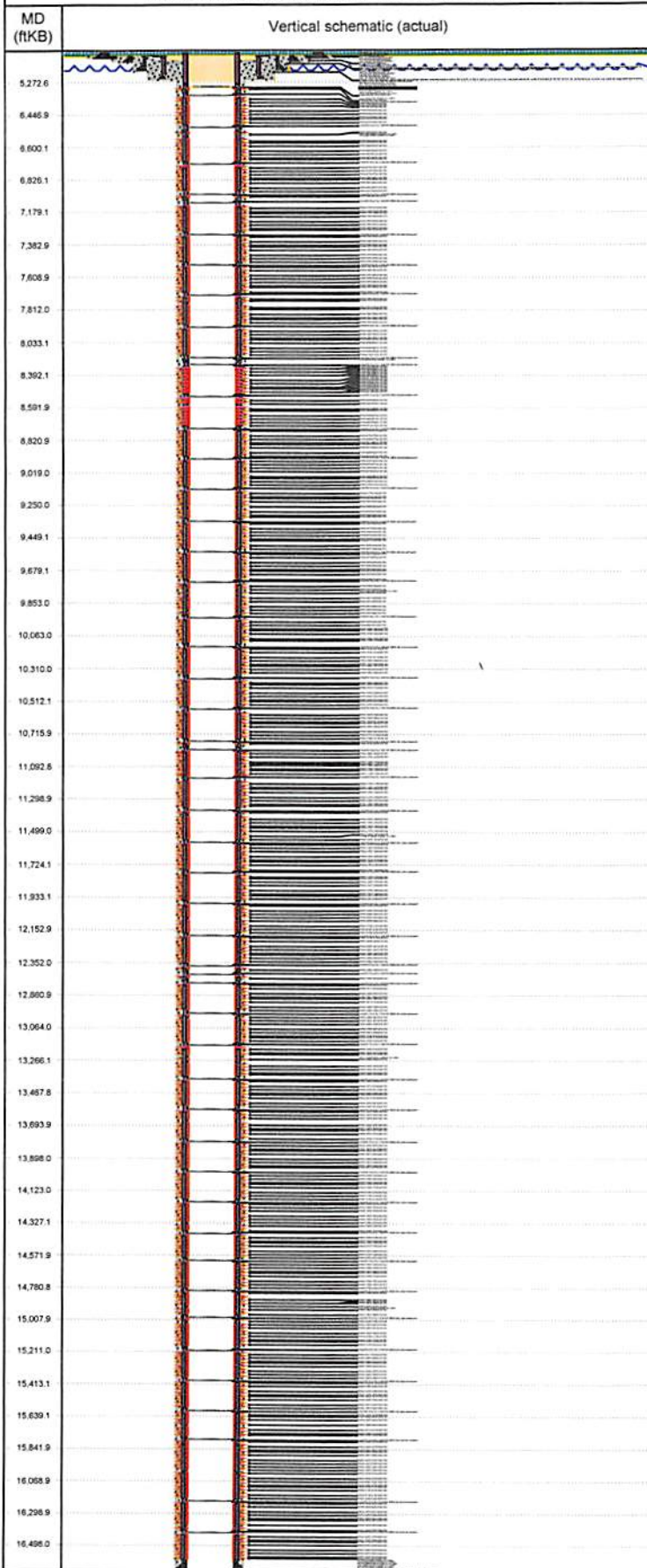




# Frac Wellbore Schematic Report

Well Name: MND-6D-HS

HORIZONTAL - Original Hole, 12/11/2017 3:06:58 PM



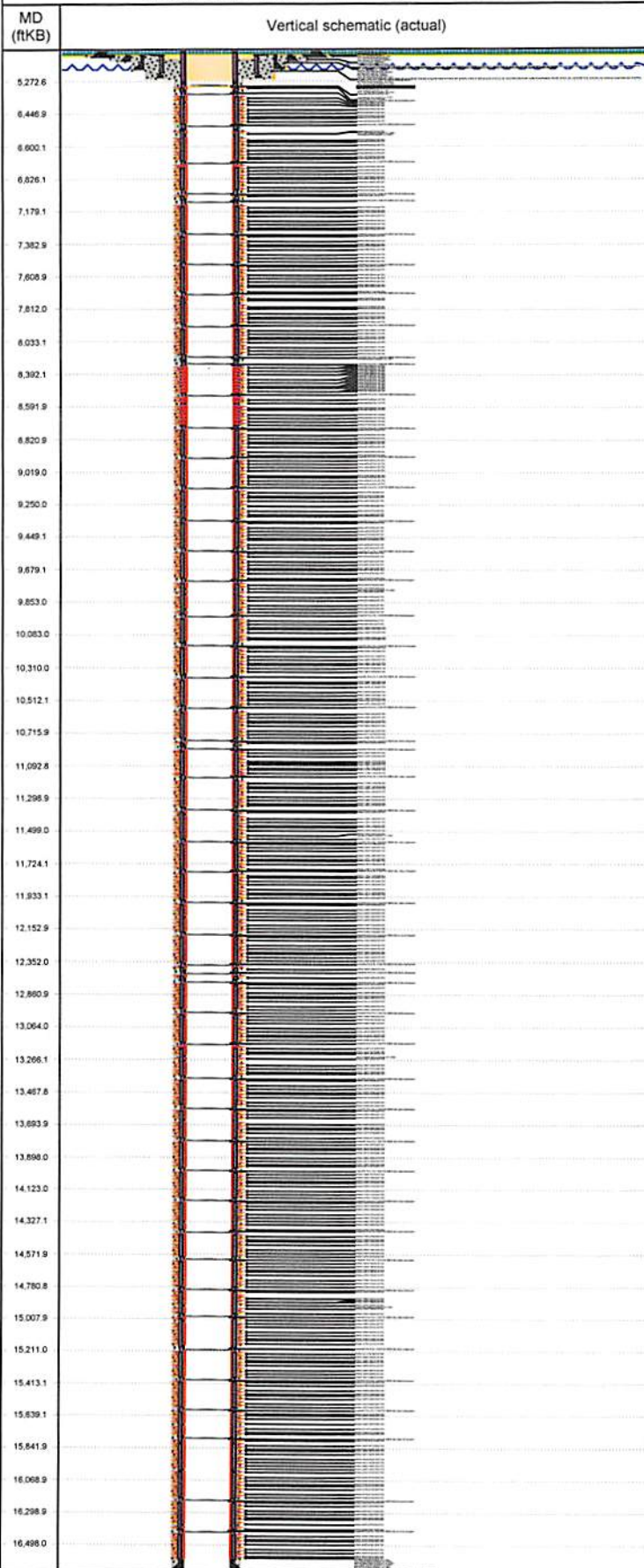
Perforation Data					
Linked Zone	Bnch/Stg	Sum of Entered Shot Total	Top (ftKB)	Btm (ftKB)	Date
	33	58	9,958.00	10,132.00	5/8/2017
	32	58	10,160.00	10,333.00	5/8/2017
	31	58	10,358.00	10,539.00	5/8/2017
	30	58	10,564.00	10,741.00	5/7/2017
	29	58	10,766.00	10,943.00	5/7/2017
	28	58	10,968.00	11,145.00	5/7/2017
	27	58	11,173.00	11,347.00	5/7/2017
	26	58	11,372.00	11,550.00	5/7/2017
	25	58	11,574.00	11,751.00	5/5/2017
	24	58	11,776.00	11,953.00	5/5/2017
	23	58	11,978.00	12,155.00	5/5/2017
	22	58	12,178.00	12,352.00	5/4/2017
	21	58	12,382.00	12,559.00	5/4/2017
	20	58	12,584.00	12,761.00	5/4/2017
	19	58	12,790.00	12,965.00	5/4/2017
	18	58	12,988.00	13,165.00	5/4/2017
	17	58	13,190.00	13,367.00	5/3/2017
	16	58	13,392.00	13,571.00	5/3/2017
	15	58	13,594.00	13,771.00	5/3/2017
	14	58	13,796.00	13,973.00	5/3/2017
	13	58	14,003.00	14,175.00	5/2/2017
	12	58	14,200.00	14,377.00	5/2/2017
	11	58	14,402.00	14,574.00	5/2/2017
	10	58	14,604.00	14,781.00	5/1/2017
	09	58	14,806.00	14,983.00	5/1/2017
	08	58	15,008.00	15,181.00	5/1/2017
	07	58	15,211.00	15,383.00	5/1/2017
	06	58	15,412.00	15,589.00	4/30/2017
	05	58	15,614.00	15,791.00	4/30/2017
	04	58	15,816.00	15,989.00	4/30/2017
	03	58	16,018.00	16,195.00	4/30/2017
	02	58	16,220.00	16,397.00	4/29/2017
	01	58	16,422.00	16,599.00	4/29/2017
<b>Total (Sum)</b>		<b>3,016</b>			
Other In Hole					
Run Date	Des	OD (in)	Top (ftKB)	Btm (ftKB)	
4/29/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	16,412.0	16,414.0	
4/30/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	16,210.0	16,212.0	
4/30/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	16,008.0	16,006.0	
4/30/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	15,769.0	15,771.0	
4/30/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	15,604.0	15,606.0	
5/1/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	15,399.0	15,401.0	
5/1/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	15,200.0	15,202.0	
5/1/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	14,998.0	15,000.0	
5/1/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	14,796.0	14,798.0	
5/2/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	14,589.0	14,591.0	
5/2/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	14,392.0	14,394.0	
5/2/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	14,190.0	14,192.0	
5/3/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	13,988.0	13,990.0	
5/3/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	13,790.0	13,792.0	
5/3/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	13,584.0	13,586.0	
5/3/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	13,382.0	13,384.0	
5/4/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	13,180.0	13,182.0	
5/4/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	12,978.0	12,980.0	
5/4/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	12,776.0	12,778.0	
5/4/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	12,574.0	12,576.0	
5/4/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	12,372.0	12,374.0	
5/5/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	12,170.0	12,172.0	
5/5/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	11,968.0	11,970.0	

03/02/2018



**Well Name: MND-6D-HS**

HORIZONTAL - Original Hole, 12/11/2017 3:06:59 PM



Other In Hole					
Run Date	Des	OD (in)	Top (ftKB)	Btm (ftKB)	
5/5/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	11,766.0	11,768.0	
5/7/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	11,564.0	11,566.0	
5/7/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	11,362.0	11,364.0	
5/7/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	11,160.0	11,162.0	
5/7/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	10,958.0	10,960.0	
5/7/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	10,756.0	10,758.0	
5/8/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	10,554.0	10,556.0	
5/8/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	10,348.0	10,350.0	
5/8/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	10,147.0	10,149.0	
5/9/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	9,948.0	9,950.0	
5/9/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	9,746.0	9,748.0	
5/9/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	9,545.0	9,547.0	
5/9/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	9,342.0	9,344.0	
5/10/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	9,137.0	9,139.0	
5/10/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	8,933.0	8,935.0	
5/11/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	8,736.0	8,738.0	
5/11/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	8,534.0	8,536.0	
5/11/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	8,332.0	8,334.0	
5/11/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	8,131.0	8,133.0	
5/12/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	7,928.0	7,930.0	
5/12/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	7,726.0	7,728.0	
5/12/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	7,524.0	7,526.0	
5/12/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	7,322.0	7,324.0	
5/13/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	7,120.0	7,122.0	
5/13/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	6,918.0	6,920.0	
5/13/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	6,719.0	6,721.0	
5/13/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	6,514.0	6,516.0	
5/14/2017	Composite Flow Through Plug (HALLIBURTON OBSIDIA...	4.37	6,307.0	6,309.0	
5/14/2017	Composite Bridge Plug	4.37	5,440.0	5,442.0	

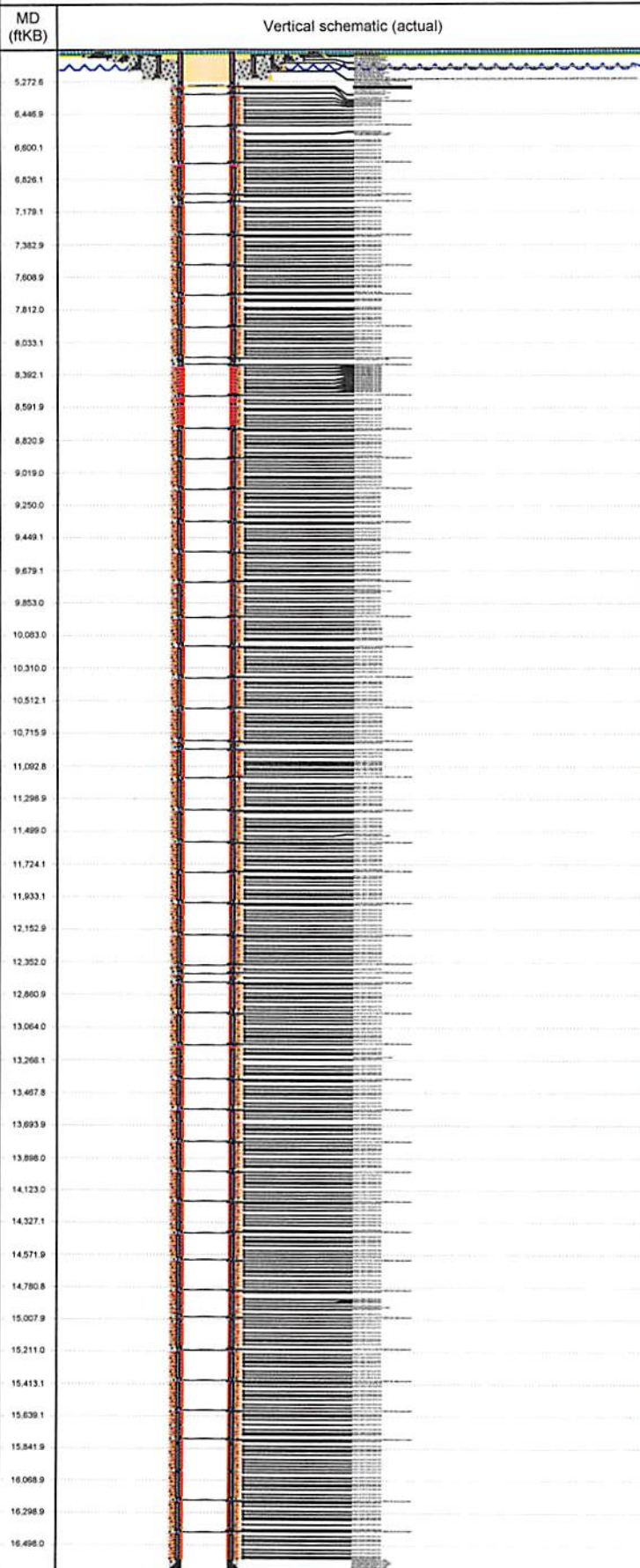
Logs			
Date	Type	Top, MD (ftKB)	Btm, MD (ftKB)

Stimulation Intervals			
Bnch/Stg	Start Date	Primary Job Type	
	4/29/2017		
Comment # of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal) 31,634.40			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
6,733.0	7,615.0	11.0	29.8
Bnch/Stg	Start Date	Primary Job Type	
	4/29/2017		
Comment # of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal) 607,756.80			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
8,471.0	10,332.0	85.9	91.3
Bnch/Stg	Start Date	Primary Job Type	
	4/29/2017		
Comment # of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal) 640,491.60			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
8,154.0	10,817.0	83.8	88.0
Bnch/Stg	Start Date	Primary Job Type	
	4/30/2017		
Comment # of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal) 631,276.80			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
9,082.0	11,906.0	86.3	89.5



**Well Name: MND-6D-HS**

HORIZONTAL - Original Hole, 12/11/2017 3:07:00 PM

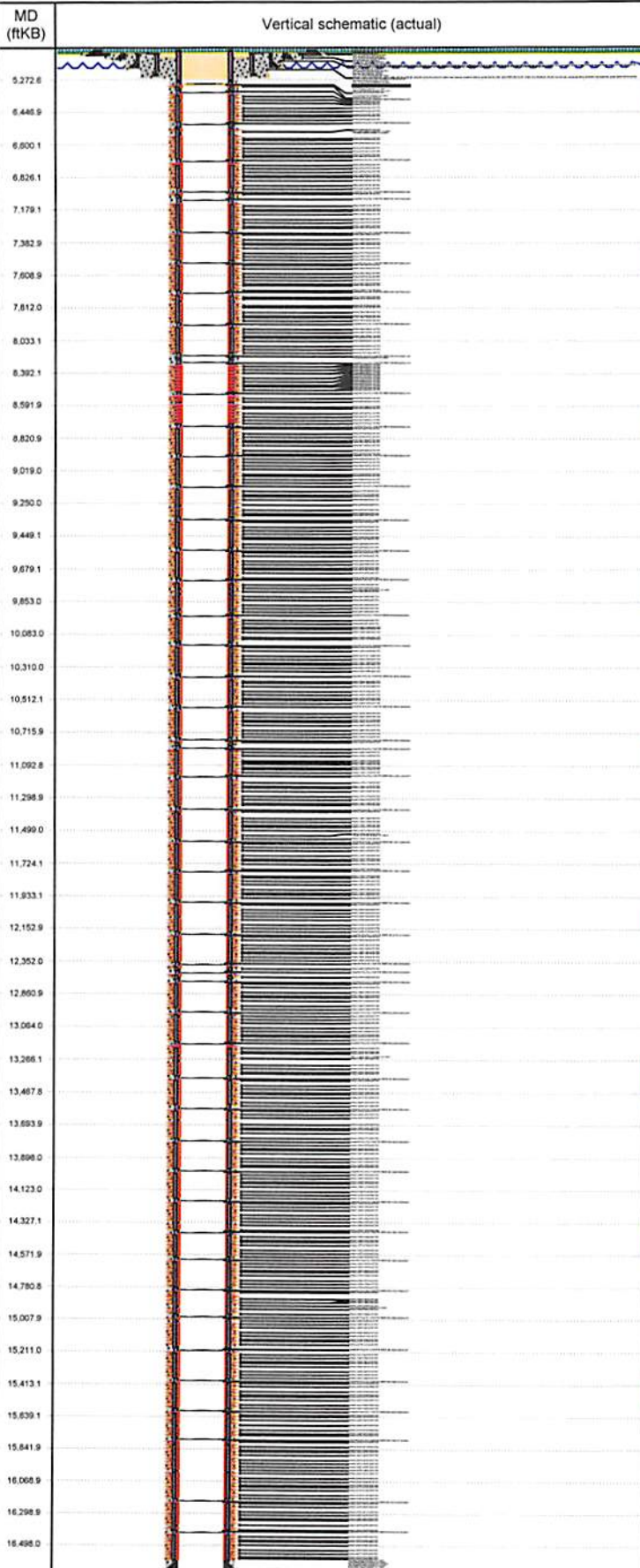


Stimulation Intervals			
Bnch/Stg	Start Date	Primary Job Type	
	4/30/2017		
Comment			
# of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal)			
656,161.80			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
8,279.0	9,506.0	87.7	93.0
Bnch/Stg	Start Date	Primary Job Type	
	4/30/2017		
Comment			
# of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal)			
581,658.00			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
8,368.0	10,420.0	88.2	92.4
Bnch/Stg	Start Date	Primary Job Type	
	5/1/2017		
Comment			
# of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal)			
581,830.20			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
8,130.0	10,494.0	88.2	91.9
Bnch/Stg	Start Date	Primary Job Type	
	5/1/2017		
Comment			
# of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal)			
564,958.80			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
8,195.0	9,117.0	93.4	95.3
Bnch/Stg	Start Date	Primary Job Type	
	5/1/2017		
Comment			
# of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal)			
602,632.80			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
8,339.0	9,268.0	94.7	97.2
Bnch/Stg	Start Date	Primary Job Type	
	5/1/2017		
Comment			
# of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal)			
573,963.60			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
8,185.0	10,338.0	86.9	91.0
Bnch/Stg	Start Date	Primary Job Type	
	5/2/2017		
Comment			
# of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal)			
570,133.20			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
8,557.0	10,263.0	88.8	92.6
Bnch/Stg	Start Date	Primary Job Type	
	5/2/2017		
Comment			
# of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal)			
616,207.20			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
8,459.0	9,924.0	93.3	94.4
Bnch/Stg	Start Date	Primary Job Type	
	5/2/2017		
Comment			
# of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal)			
579,293.40			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
8,210.0	9,682.0	90.1	93.2



**Well Name: MND-6D-HS**

HORIZONTAL - Original Hole, 12/11/2017 3:07:02 PM

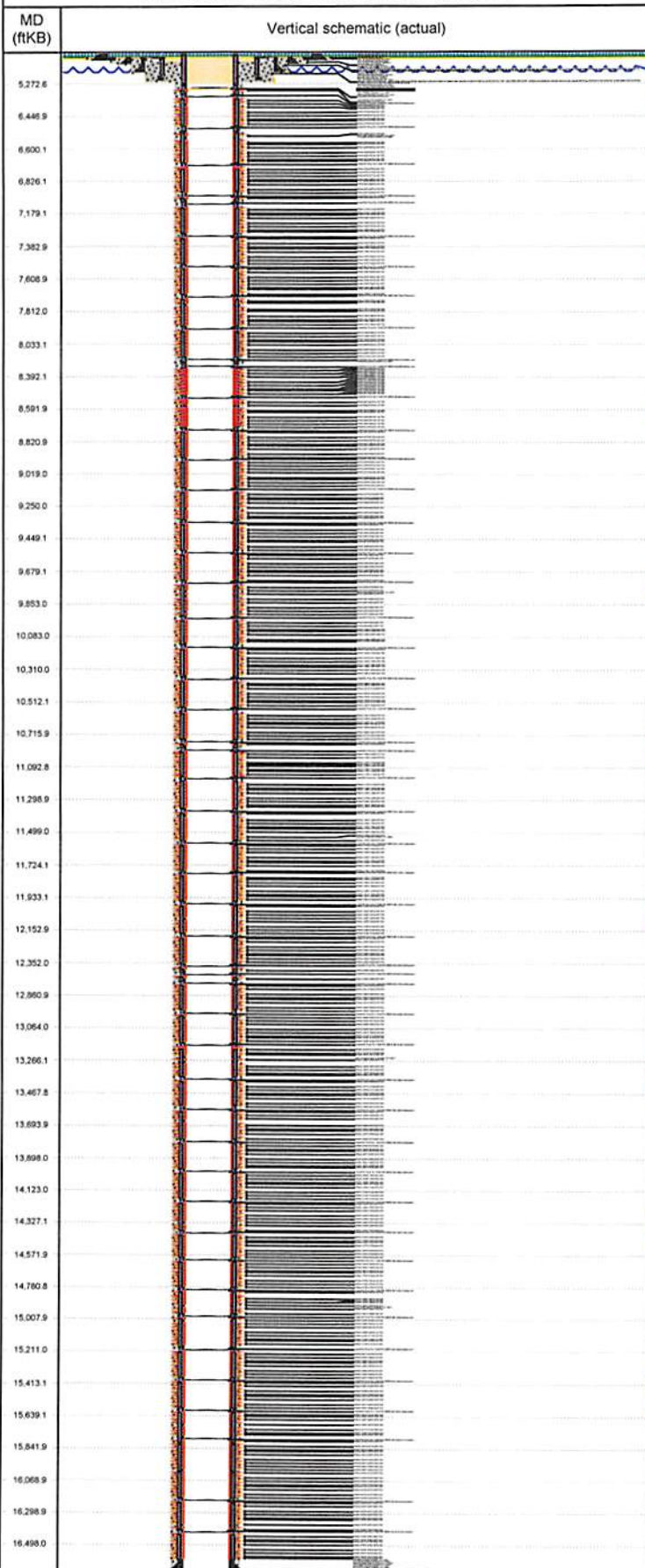


Stimulation Intervals			
Bnch/Stg	Start Date	Primary Job Type	
	5/2/2017		
Comment			
# of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal)			
576,063.60			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
8,401.0	10,749.0	89.1	93.2
Bnch/Stg	Start Date	Primary Job Type	
	5/3/2017		
Comment			
# of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal)			
596,282.40			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
8,173.0	9,142.0	88.5	91.6
Bnch/Stg	Start Date	Primary Job Type	
	5/3/2017		
Comment			
# of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal)			
565,202.40			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
8,416.0	9,288.0	92.9	100.1
Bnch/Stg	Start Date	Primary Job Type	
	5/3/2017		
Comment			
# of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal)			
516,579.00			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
8,472.0	9,371.0	93.4	98.6
Bnch/Stg	Start Date	Primary Job Type	
	5/3/2017		
Comment			
# of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal)			
564,614.40			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
8,256.0	9,597.0	90.5	95.4
Bnch/Stg	Start Date	Primary Job Type	
	5/4/2017		
Comment			
# of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal)			
554,547.00			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
8,531.0	10,315.0	91.9	95.3
Bnch/Stg	Start Date	Primary Job Type	
	5/4/2017		
Comment			
# of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal)			
508,284.00			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
8,452.0	9,122.0	93.1	97.1
Bnch/Stg	Start Date	Primary Job Type	
	5/4/2017		
Comment			
# of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal)			
510,174.00			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
8,575.0	9,486.0	95.4	100.8
Bnch/Stg	Start Date	Primary Job Type	
	5/4/2017		
Comment			
# of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal)			
499,493.40			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
8,539.0	9,637.0	96.2	100.5



**Well Name: MND-6D-HS**

HORIZONTAL - Original Hole, 12/11/2017 3:07:03 PM

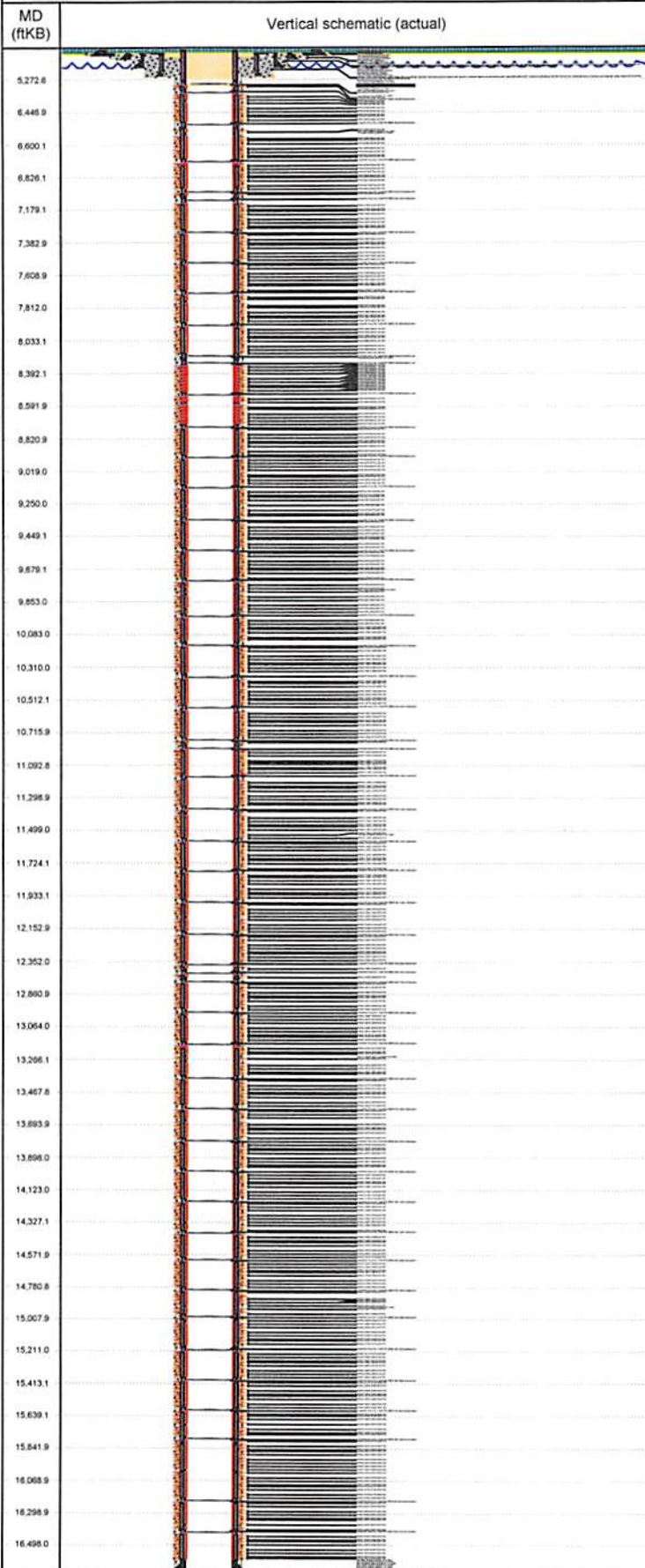


Stimulation Intervals			
Bnch/Stg	Start Date	Primary Job Type	
	5/4/2017		
Comment # of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal) 510,405.00			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
7,845.0	9,686.0	89.9	92.6
Bnch/Stg	Start Date	Primary Job Type	
	5/5/2017		
Comment # of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal) 518,889.00			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
8,253.0	9,639.0	95.2	100.6
Bnch/Stg	Start Date	Primary Job Type	
	5/5/2017		
Comment # of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal) 540,687.00			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
7,952.0	10,239.0	91.4	93.9
Bnch/Stg	Start Date	Primary Job Type	
	5/5/2017		
Comment # of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal) 644,985.60			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
7,580.0	9,785.0	89.1	94.3
Bnch/Stg	Start Date	Primary Job Type	
	5/7/2017		
Comment # of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal) 577,752.00			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
8,390.0	10,172.0	93.1	96.4
Bnch/Stg	Start Date	Primary Job Type	
	5/7/2017		
Comment # of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal) 509,531.40			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
8,218.0	9,877.0	90.4	97.0
Bnch/Stg	Start Date	Primary Job Type	
	5/7/2017		
Comment # of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal) 525,462.00			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
8,306.0	9,695.0	93.4	101.3
Bnch/Stg	Start Date	Primary Job Type	
	5/7/2017		
Comment # of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal) 494,529.00			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
7,725.0	9,911.0	88.6	94.7
Bnch/Stg	Start Date	Primary Job Type	
	5/8/2017		
Comment # of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal) 500,047.80			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
7,592.0	9,194.0	89.5	95.5



**Well Name: MND-6D-HS**

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Stimulation Intervals			
Bnch/Stg	Start Date	Primary Job Type	
Comment # of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal) 565,790.40			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
7,977.0	9,201.0	96.1	101.5
Bnch/Stg	Start Date	Primary Job Type	
	5/8/2017		
Comment # of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal) 579,188.82			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
7,930.0	9,051.0	98.1	101.4
Bnch/Stg	Start Date	Primary Job Type	
	5/8/2017		
Comment # of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal) 544,790.40			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
8,012.0	9,035.0	97.8	101.2
Bnch/Stg	Start Date	Primary Job Type	
	5/9/2017		
Comment # of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal) 586,920.60			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
8,014.0	9,290.0	98.2	101.4
Bnch/Stg	Start Date	Primary Job Type	
	5/9/2017		
Comment # of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal) 549,389.40			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
7,672.0	9,390.0	94.8	100.9
Bnch/Stg	Start Date	Primary Job Type	
	5/9/2017		
Comment # of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal) 515,684.40			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
7,868.0	8,880.0	97.8	101.1
Bnch/Stg	Start Date	Primary Job Type	
	5/9/2017		
Comment # of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal) 484,306.20			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
7,923.0	9,111.0	98.0	101.5
Bnch/Stg	Start Date	Primary Job Type	
	5/10/2017		
Comment # of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal) 621,616.80			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
7,659.0	8,893.0	95.8	100.6
Bnch/Stg	Start Date	Primary Job Type	
	5/11/2017		
Comment # of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal) 505,764.00			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
7,590.0	8,791.0	94.4	101.2



**Well Name: MND-6D-HS**

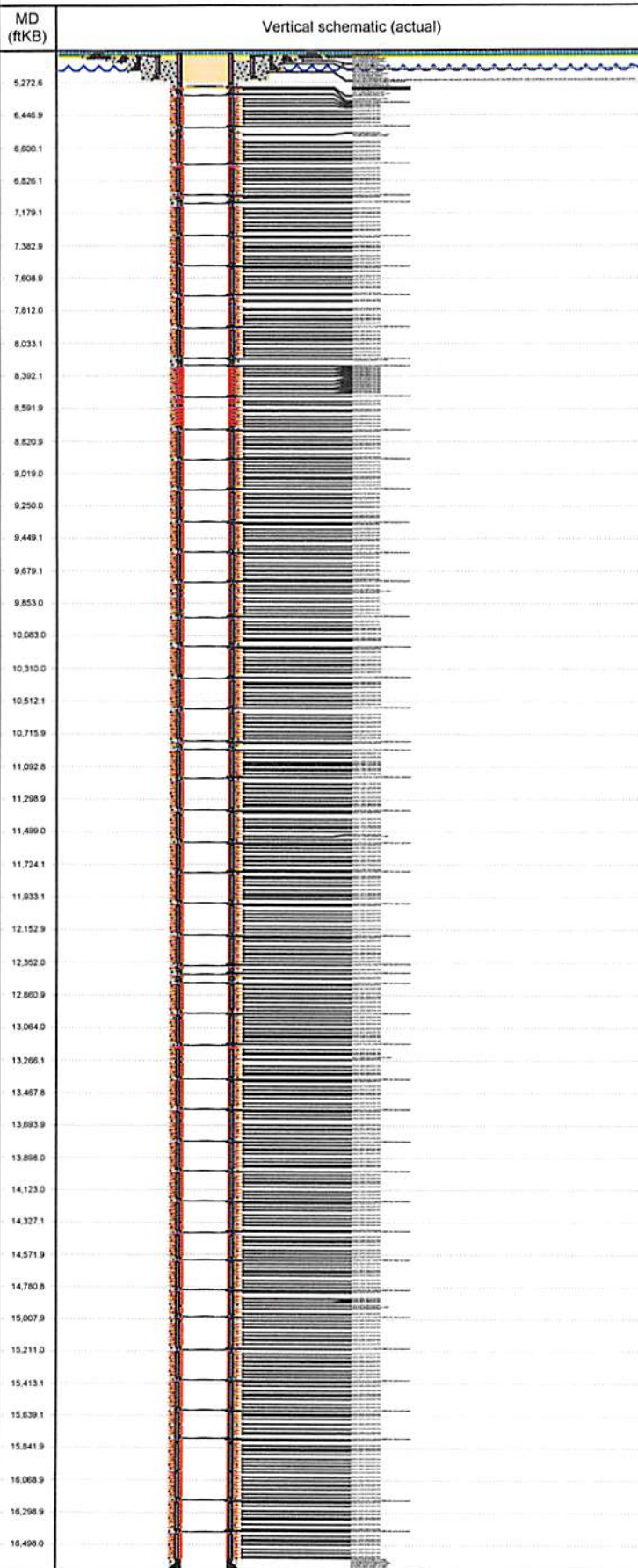
HORIZONTAL - Original Hole, 12/11/2017 3:07:05 PM



Stimulation Intervals				
Bnch/Stg	Start Date	Primary Job Type		
	5/11/2017			
Comment				
# of Clusters = 8, # of Shots = 58				
Volume Slurry Total (gal)				
544,756.80				
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)	
7,416.0	8,320.0	98.2	101.0	
Bnch/Stg	Start Date	Primary Job Type		
	5/11/2017			
Comment				
# of Clusters = 8, # of Shots = 58				
Volume Slurry Total (gal)				
573,589.80				
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)	
7,393.0	8,775.0	97.6	100.9	
Bnch/Stg	Start Date	Primary Job Type		
	5/11/2017			
Comment				
# of Clusters = 8, # of Shots = 58				
Volume Slurry Total (gal)				
480,526.20				
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)	
7,332.0	8,917.0	94.7	99.3	
Bnch/Stg	Start Date	Primary Job Type		
	5/11/2017			
Comment				
# of Clusters = 8, # of Shots = 58				
Volume Slurry Total (gal)				
460,080.60				
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)	
7,469.0	9,121.0	98.1	102.6	
Bnch/Stg	Start Date	Primary Job Type		
	5/12/2017			
Comment				
# of Clusters = 8, # of Shots = 58				
Volume Slurry Total (gal)				
482,584.20				
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)	
7,268.0	8,339.0	97.3	101.3	
Bnch/Stg	Start Date	Primary Job Type		
	5/12/2017			
Comment				
# of Clusters = 8, # of Shots = 58				
Volume Slurry Total (gal)				
521,194.80				
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)	
7,195.0	8,257.0	98.6	102.7	
Bnch/Stg	Start Date	Primary Job Type		
	5/12/2017			
Comment				
# of Clusters = 8, # of Shots = 58				
Volume Slurry Total (gal)				
520,909.20				
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)	
7,035.0	7,815.0	96.6	100.5	
Bnch/Stg	Start Date	Primary Job Type		
	5/12/2017			
Comment				
# of Clusters = 8, # of Shots = 58				
Volume Slurry Total (gal)				
436,695.00				
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)	
6,969.0	8,442.0	93.2	95.9	
Bnch/Stg	Start Date	Primary Job Type		
	5/13/2017			
Comment				
# of Clusters = 8, # of Shots = 58				
Volume Slurry Total (gal)				
412,872.60				
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)	
6,964.0	7,784.0	95.3	100.2	

**Well Name: MND-6D-HS**

HORIZONTAL - Original Hole, 12/11/2017 3:07:06 PM



Stimulation Intervals			
Bnch/Stg	Start Date	Primary Job Type	
	5/13/2017		
Comment # of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal) 514,495.80			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
6,923.0	7,958.0	98.5	100.8
Bnch/Stg	Start Date	Primary Job Type	
	5/13/2017		
Comment # of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal) 412,889.40			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
6,901.0	8,205.0	96.9	100.8
Bnch/Stg	Start Date	Primary Job Type	
	5/13/2017		
Comment # of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal) 393,405.60			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
6,922.0	8,108.0	96.2	100.3
Bnch/Stg	Start Date	Primary Job Type	
	5/14/2017		
Comment # of Clusters = 8, # of Shots = 58			
Volume Slurry Total (gal) 376,353.60			
Treat Pressure Avg (psi)	Treat Pressure Max (psi)	Slurry Rate Avg (bbl/min)	Slurry Rate Max (bbl/min)
6,922.0	8,761.0	95.9	100.5





## MND 6

Formations	Top TVD	Base TVD	Top MD	Base MD	Fluid
Shale and Sandstone	0	284	0	284	
Pittsburgh Coal	284	294	284	294	
Shale and Sandstone	294	706	294	706	
Dunkard Sand	706	727	706	727	
Shale	727	876	727	876	
Gas Sand	876	947	876	5972	
Shale	947	1016	947	6191	
1st Salt Sand	1016	1032	1016	6313	
Shale	1032	1139	1032	6719	
2nd Salt Sand	1139	1168	1139	7118	
Shale and Sandstone	1168	1298	1168	7333	
Maxton Sand	1298	1345	1298	8194	
Shale	1345	1363	1345	8194	
Big Lime	1363	1435	1363	8541	
Big Injun	1435	1705	1435	8869	
Price	1705	1803	1705	8890	
Murrysville	1803	1910	1803	8983	
Shale and Sandstone	1910	2448	1910	8998	
Gordon	2448	2478	2448	9073	
Shale and Sandstone	2478	2999	2478	9179	
Fifth Sand	2999	3052	2999	9995	
Shale and Sandstone	3052	3854	3052	9179	
Warren Sand	3854	3863	3860	9995	
Shale	3863	4580	3869	10660	
Java Shale	4580	4664	4593	not encountered	
Pipe Creek Shale	4664	4739	4678	not encountered	
Angola Shale	4739	5323	4754	not encountered	
Rhinestreet	5323	5642	5344	not encountered	
Cashaqua	5642	5714	5666	not encountered	
Middlesex	5714	5737	5739	not encountered	
West River	5737	5798	5762	not encountered	
Burkett	5798	5822	5824	not encountered	
Tully Limestone	5822	5848	5848	not encountered	
Hamilton	5848	5883	5875	not encountered	
Marcellus	5883	5936	5910	not encountered	
Onondaga	5936	5944	5964	not encountered	
Huntersville	5944	6158	5972	6191	
Oriskany	6158	6270	6191	6313	
Helderburg	6270	6530	6313	6719	
Bass Island Dolomite	6530	6609	6719	7118	
Salina G Big Lime	6609	6809	7118	7333	
Salina F	6809	7608	7333	8194	
Lockport Dolomite	7608	7930	8194	8541	
Rochester Shale	7930	8235	8541	8869	
Dayton Fm/Packer Shell	8235	8254	8869	8890	

03/02/2018



Shale	8254	8341	8890	8983	
Clinton Sand	8341	8355	8983	8998	
Shale	8355	8424	8998	9073	
Medina Sand	8424	8523	9073	9179	
Queenston Shale	8523	9280	9179	9995	
Reedsville Shale	9280	9898	9995	10660	Gas
Utica Shale	9898	10511	10660	not encountered	
Point Pleasant	10511	10631	not encountered	not encountered	
Trenton Limestone	10631		not encountered	not encountered	

# Hydraulic Fracturing Fluid Product Component Information Disclosure

RECEIVED  
Office of Oil and Gas

DEC 14 2017

WV Department of  
Environmental Protection

Job Start Date:	5/14/2017
Job End Date:	5/14/2017
State:	West Virginia
County:	Marshall
API Number:	47-051-01763-00-00
Operator Name:	Noble Energy, Inc.
Well Name and Number:	MND 6 D
Latitude:	39.81754700
Longitude:	-80.79195000
Datum:	NAD27
Federal Well:	NO
Indian Well:	NO
True Vertical Depth:	5,898
Total Base Water Volume (gal):	27,178,419
Total Base Non Water Volume:	0



## Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Fresh Water	Operator	Base Fluid					
			Water	7732-18-5	100.00000	87.29241	Density = 8.340
Ingredients	Listed Above	Listed Above					
			Water	7732-18-5	100.00000	0.62838	



FE-1A ACIDIZING COMPOSITION	Halliburton	Additive					
				Listed Below			
OILPERM A	Halliburton	Non-ionic Surfactant					
				Listed Below			
HYDROCHLORI C ACID	Halliburton	Solvent					
				Listed Below			
FR-76	Halliburton	Friction Reducer					
				Listed Below			
SAND-COMMON WHITE-100 MESH, SSA-2, 100 LB SACK (100002158)	Halliburton	Proppant					
				Listed Below			
HAI-OS ACID INHIBITOR	Halliburton	Corrosion Inhibitor					
				Listed Below			
SAND- PREMIUM WHITE-40/70, BULK	Halliburton	Proppant					
				Listed Below			
SC-30	X-Chem	Scale Inhibitor					

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Office of Oil and Gas  
DEC 14 2017  
WV Department of  
Environmental Protection

				Listed Below			
B-84	X-Chem	Biocide					
				Listed Below			
Items above are Trade Names with the exception of Base Water . Items below are the individual ingredients.							
			Crystalline silica, quartz	14808-60-7	100.00000	12.05123	
			Hydrochloric acid	7647-01-0	7.50000	0.04446	
			Acrylamide acrylate copolymer	Proprietary	30.00000	0.01779	Denise Tuck, Halliburton, 3000 N. Sam Houston Pkwy E., Houston, TX 77032, 281-871-6226
			Inorganic salt	Proprietary	30.00000	0.01779	
			Hydrotreated light petroleum distillate	64742-47-8	30.00000	0.01779	
			Acetic anhydride	108-24-7	100.00000	0.00284	
			Acetic acid	64-19-7	60.00000	0.00171	
			Ethanol	64-17-5	60.00000	0.00057	
			Oxyalkylated phenolic resin	Proprietary	30.00000	0.00038	
			Heavy aromatic petroleum naphtha	64742-94-5	30.00000	0.00029	
			Methanol	67-56-1	60.00000	0.00028	
			Fatty acids, tall oil	Proprietary	30.00000	0.00014	
			Reaction product of acetophenone, formaldehyde, thiourea and oleic acid in dimethyl formamide	68527-49-1	30.00000	0.00014	
			Ethoxylated alcohols	Proprietary	30.00000	0.00014	
			Olefins	Proprietary	5.00000	0.00006	
			Poly(oxy-1,2-ethanediyl), alpha-(4-nonylphenyl)-omega-hydroxy-, branched	127087-87-0	5.00000	0.00005	
			Naphthalene	91-20-3	5.00000	0.00005	



			Propargyl alcohol	107-19-7	10.00000	0.00005	
			1,2,4 Trimethylbenzene	95-63-6	1.00000	0.00001	
			Sodium Hydroxide	1310-73-2	1.50000		
			Glutaraldehyde	111-30-8	30.00000		
			Ethanol	64-17-5	5.00000		
			Didecyl dimethyl ammonium chloride	7173-51-5	10.00000		
			n-Alkyl dimethyl benzyl ammonium chloride	68424-85-1	10.00000		
			Water	7732-18-5	100.00000		

\* Total Water Volume sources may include various types of water including fresh water, produced water, and recycled water

\*\* Information is based on the maximum potential for concentration and thus the total may be over 100%

\*\*\* If you are calculating a percentage of total ingredients do not add the water volume below the green line to the water volume above the green line

Note: For Field Development Products (products that begin with FDP), MSDS level only information has been provided.

Ingredient information for chemicals subject to 29 CFR 1910.1200(i) and Appendix D are obtained from suppliers Material Safety Data Sheets (MSDS)