



west virginia department of environmental protection

Office of Oil and Gas
601 57th Street, S.E.
Charleston, WV 25304
(304) 926-0450
fax: (304) 926-0452

Austin Caperton, Cabinet Secretary
www.dep.wv.gov

Tuesday, May 14, 2019
PERMIT MODIFICATION APPROVAL
Horizontal 6A / New Drill

ARSENAL RESOURCES LLC
6031 WALLACE ROAD EXTENSION
SUITE 603
WEXFORD, PA 15090

Re: Permit Modification Approval for J OSBORN HSOP 16 204
47-033-05931-00-00


Conductor casing depths and weight, intermediate casing depth, and production casing weight have changed.

ARSENAL RESOURCES LLC

The Office of Oil and Gas has reviewed the attached permit modification for the above referenced permit. The attached modification has been approved and well work may begin. Please be reminded that the oil and gas inspector is to be notified twenty-four (24) hours before permitted well work is commenced.

If there are any questions, please feel free to contact me at (304) 926- 0450.

James A. Martin
Chief

Operator's Well Number: J OSBORN HSOP 16 204
Farm Name: JUDY M OSBORN (LE) (JUDY M OSBORN IRREC) 
U.S. WELL NUMBER: 47-033-05931-00-00
Horizontal 6A New Drill
Date Modification Issued: May 14, 2019

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
WELL WORK PERMIT APPLICATION

1) Well Operator: Arsenal Resources 494519412 Harrison Simpson Rosemont
Operator ID County District Quadrangle

2) Operator's Well Number: J Osborn HSOP16 204 Well Pad Name: J Osborn HSOP16

3) Farm Name/Surface Owner: Judy M. Osborn (LE) Public Road Access: 77/4 Moss Run (Coplin Run)

4) Elevation, current ground: 1163.14' Elevation, proposed post-construction: 1163.30'

5) Well Type (a) Gas Oil _____ Underground Storage _____

Other _____

(b) If Gas Shallow Deep _____

Horizontal _____

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6) Existing Pad: Yes or No No

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Target Formation- Marcellus Shale, Top- 7020.3 ft, Bottom- 7120.3 ft, Anticipated Thickness- 100 ft, Associated Pressure- 0.5 psi/ft

8) Proposed Total Vertical Depth: 7219.3 ft (Pilot); 7108.3 ft (Lateral)

9) Formation at Total Vertical Depth: Huntersville Chert (Pilot); Marcellus Shale (Lateral)

10) Proposed Total Measured Depth: 24,574.02 ft

11) Proposed Horizontal Leg Length: 17,098.5 ft

12) Approximate Fresh Water Strata Depths: 43 ft, 258 ft, 356 ft, 539 ft, 725 ft

13) Method to Determine Fresh Water Depths: offsetting wells reported water depths (033-02179, 033-02507, 033-02975)

14) Approximate Saltwater Depths: None Expected

15) Approximate Coal Seam Depths: Horlem - 146, Bakerstown - 227, Brush Creek - 325, Upper Freeport - 399, Lower Freeport - 437, Upper Kittanning - 527, Middle Kittanning - 590, Lower Kittanning - 611

16) Approximate Depth to Possible Void (coal mine, karst, other): None known

17) Does Proposed well location contain coal seams directly overlying or adjacent to an active mine? Yes _____ No

(a) If Yes, provide Mine Info: Name: _____
Depth: _____
Seam: _____
Owner: _____

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18)

CASING AND TUBING PROGRAM

TYPE	Size (in)	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling (ft)	INTERVALS: Left in Well (ft)	CEMENT: Fill-up (Cu. Ft.)/CTS
Conductor	24	Used		94	100	100	CTS
Fresh Water	13.375	New	J-55	54.5	800	800	CTS
Coal							
Intermediate	9.625	New	J-55	40	2,500	2,500	CTS
Production	5.5	New	P-110	20	24,574	24,574	TOC @ 2,350
Tubing							
Liners							

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TYPE	Size (in)	Wellbore Diameter (in)	Wall Thickness (in)	Burst Pressure (psi)	Anticipated Max. Internal Pressure (psi)	Cement Type	Cement Yield (cu. ft./k)
Conductor	24	36			0	Class A, 3% CaCl2	1.2
Fresh Water	13.375	17.5	0.38	2,730	900	Class A, 3% CaCl2	1.2
Coal							
Intermediate	9.625	12.25	0.395	3,950	1,500	Class A, 3% CaCl2	1.29
Production	5.5	8.5-8.75	0.361	15,920	9,500	Class A/50:50 Poz	1.29/1.34
Tubing					5,000		
Liners					N/A		

PACKERS

Kind:				
Sizes:				
Depths Set:				

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19) Describe proposed well work, including the drilling and plugging back of any pilot hole:

The well will be started with a conductor rig drilling a 36" hole to Conductor programmed depth then running 24" casing and circulate cement back to surface. The conductor rig will move out and the drilling rig will move in and rig up. The drilling rig will then spud a 17 1/2" hole and drill to fresh water casing (Surface) to the programmed depth, Run 13- 3/8" casing and cement to surface. The rig will continue drilling a 12- 1/4" intermediate hole to the programmed depth, run 9- 5/8" casing and cement to surface. The rig will then continue to drill an 8- 3/4" hole to a designed pilot hole depth, then trip out of hole to run wireline logs. A cement kick-off plug will then be set from bottom of the pilot hole to the designed KOP. We will then drill off the cement plug and start drilling the curve and lateral section to the programmed total measured depth, run 5 1/2" casing and cement according to the program

20) Describe fracturing/stimulating methods in detail, including anticipated max pressure and max rate:

The well will be completed using a plug and perforation method and stimulated with a slickwater and sand slurry. The anticipated maximum rate will be 90 bpm and the maximum pressure will be 9,500 psi.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 17.26

22) Area to be disturbed for well pad only, less access road (acres): 6.63

23) Describe centralizer placement for each casing string:

24"- No centralizers 13 3/8" – one bow spring centralizer on every other joint 9 5/8" – one bow spring centralizer every third joint from TD to surface 5 1/2" – one semi rigid centralizer on every joint from TD of casing to end of curve. Then every other joint to KOP. Every third joint from KOP to 2,600'; there will be no centralizers from 2,600 to surface.

24) Describe all cement additives associated with each cement type:

24" will be circulated to surface. The 13 3/8" casing will be cemented to surface with Class A cement and no greater than 3% CaCl (calcium chloride). The 9 5/8" casing will be cemented to surface with Class A cement, & no greater than 3% calcium chloride. The 5 1/2" production string will be cemented back to 2,350' (+/- 150' above the casing shoe for the 9 5/8") with Class A and 50/50 Poz cement retarded (to extend pumpability) cellophane flaked for fluid loss, Bentonite gel as an extender (increased pumpability and fluid loss), a defoaming agent to decrease cement foaming during mixing to insure the cement is of proper weight for placement and possibly gypsum gas blocking additive to aid in blocking/gas migration (in combination with other additive mentioned here, helps cement achieve a "right angle" set) during the plastic phase of the cement set-up.

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25) Proposed borehole conditioning procedures:

Top holes will be drilled with fresh water KOP. At KOP, the wellbore will be loaded with synthetic oil based mud, barite-weighted mud system with such properties as to build a filter-cake on the face of the bore-hole. This will provide lubricity as well as stabilizing the well bore. We will begin rotating the drill string and mud will be circulated upon reaching TD until no further cuttings are observed coming across the shaker screens. Once clean mud is circulated back to surface, we will pull three stands of drill pipe, load the hole, pull three stands and load the hole. The weight indicator on the rig will be monitored for any occurrences of drag and if any are noticed, we will re-run the previous stand of pipe pulled across and circulate 2x bottoms up while watching shakers for signs of cuttings. Once at the base curve, the string will be continuously rotated while pumping 2x bottoms up. We will pull three stands and fill the hole until we reach the vertical section of the well.

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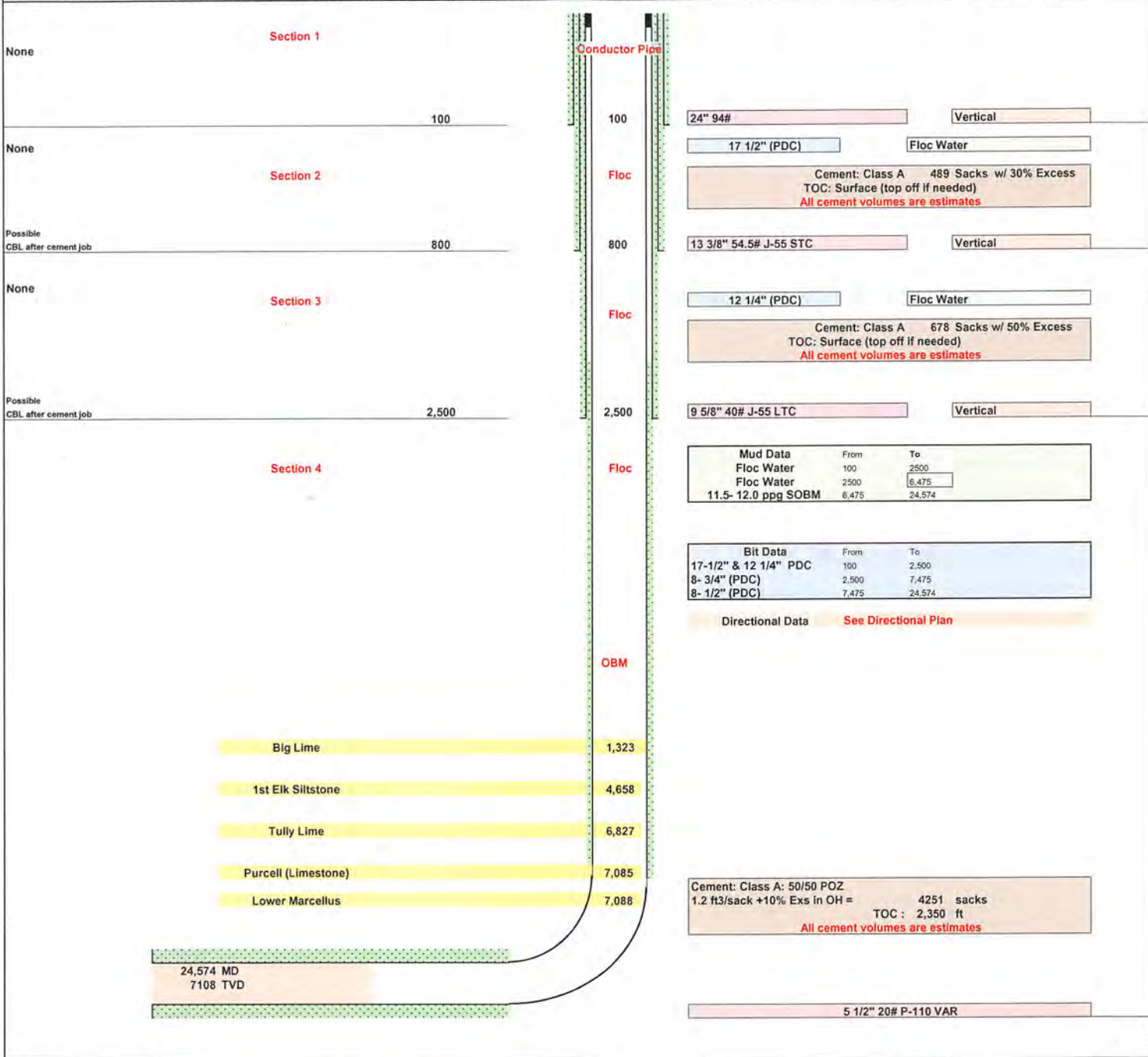
*Note: Attach additional sheets as needed.



Other Names:	N/A
Surface Location:	TBD
Bottom Hole Location:	TBD
Total Depth:	24,574 MD (ft) 7,108 TVD (ft)

County:	Harrison
State:	West Virginia
AFE #:	XX
RKB:	27
API #:	XX
Ground Level:	1,163

Logs	Significant Formations (TVD)	Depth (ft) MD	Depth (ft) TVD	Hole Size	Casing and Cement	Mud	Directional & Surveys
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Revision 1
 Note: Not drawn to scale
 Date Last Revised: 7-May-19
 Jarrett Toms
 Cement Outside Casing Seal Assembly in Annulus

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TECHNICAL DATA SHEETConnection: **VAroughneck**

Size: 5 1/2 in X 23.00 lb/ft

Drift: **standard**Bevel: **standard**

Grade: VA-HC-P110

Material:

	US Customary	Metric
Yield Strength Min.	110,000 psi	758 Mpa
Yield Strength Max.	140,000 psi	965 Mpa
Tensile Strength Min.	125,000 psi	862 Mpa

Pipe:

	US Customary	Metric		US Customary	Metric
Nominal OD:	5.500 in	139.70 mm	Wall Thickness:	0.415 in	10.54 mm
Nominal ID:	4.670 in	118.62 mm	Standard Drift:	4.545 in	115.44 mm
Nominal Weight:	23.00 lb/ft	34.23 kg/m	Pipe Body Yield Strength:	729 klb	3.242 kN
Pipe Cross Section:	6.630 in ²	4,276.80 mm ²			

Connection:

	US Customary	Metric		
OD:	6.260 in	159.00 mm	Threads per inch:	5 Threads
ID:	4.669 in	118.60 mm		
Length:	8.976 in	228.00 mm		

Connection Performance (Uniaxial Load):

	US Customary	Metric		US Customary	Metric
Joint Strength:	729 klb	3,242 kN	Tension Efficiency:	> 100.0 %	
Collapse Resistance:	16,350 psi	112.73 Mpa	Displacement:	1.242 gal/ft	15.43 l/m
Internal Yield Pressure:	14,518 psi	100.10 Mpa	Production:	0.890 gal/ft	11.05 l/m
Load on Coupling Face:	582 klb	2,590 kN			

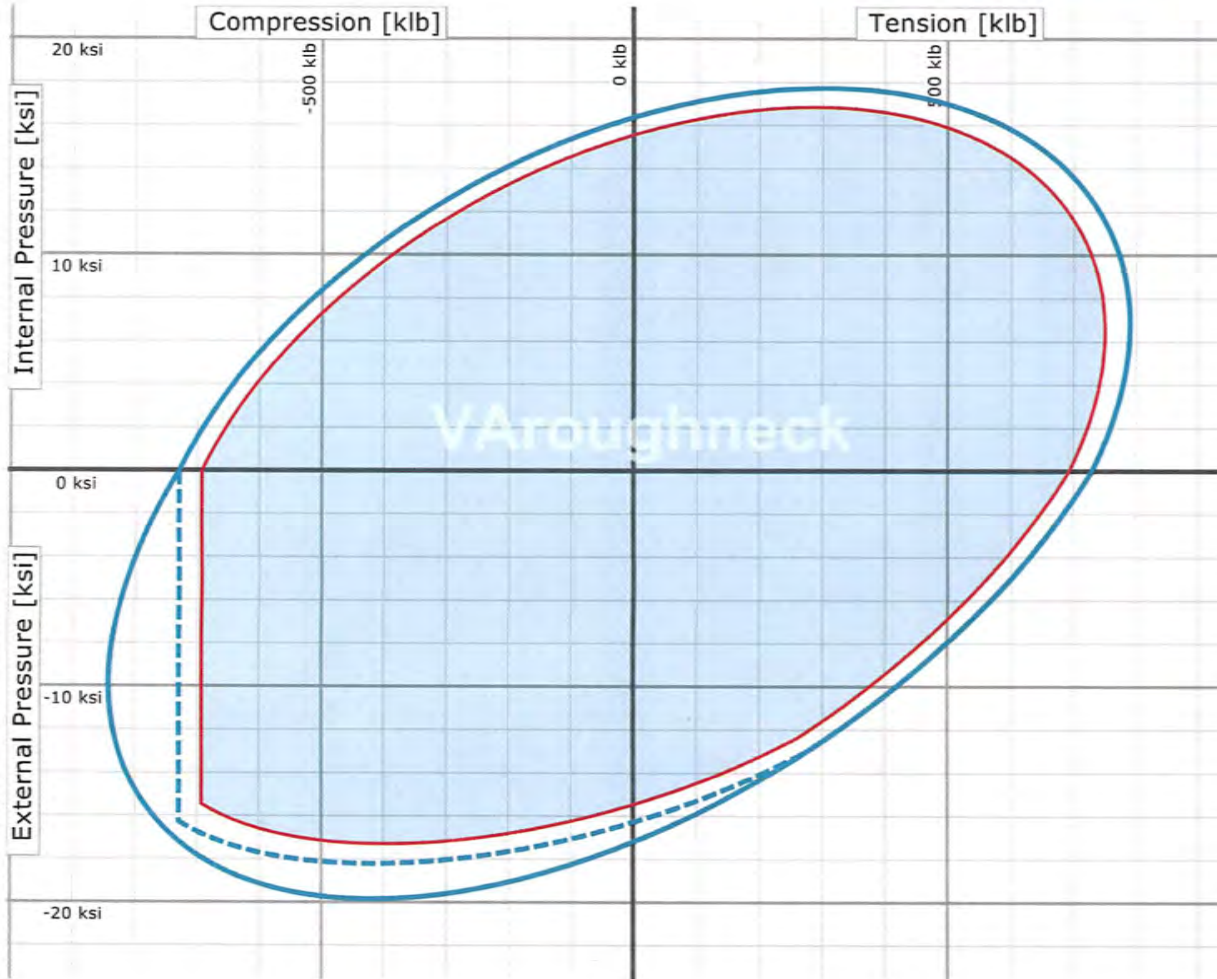
Field Make Up (Friction Factor = 1.0):

	US Customary	Metric		US Customary	Metric
Minimum Torque:	17,847 ft.lb	24,197 Nm	Make-Up Loss:	4.370 in	111.00 mm
Optimum Torque:	19,830 ft.lb	26,886 Nm	Yield Torque:	24,800 ft.lb	33,600 Nm
Maximum Torque:	21,813 ft.lb	29,574 Nm			
Min. Torque on Shoulder:	%				

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LOAD ENVELOPE



Recommended Field of Application

- Pipe Body Envelope
- - - Pipe Body Collapse

Efficiency (% Pipe Body) under Uniaxial Loads

Tension:	100.0 %
Compression:	100.0 %
Internal Pressure:	100.0 %
External Pressure:	100.0 %

Sealability Rating (% Efficiency) under Combined Loads

Tension:	100.0 %
Compression:	100.0 %
Internal Pressure:	100.0 %
External Pressure:	100.0 %

Test Conditions

Test Medium:	Fluid
Von Mises Envelope:	95.0 %
Bending:	81.00 °/100ft

The graph is calculated under consideration of the requirements of EN ISO 13679 and API 5C3. The combined loads are calculated without the consideration of wall thickness tolerances and differ from the values in the data sheet, which are calculated with tolerances determined by API. Any printout is NOT SUBJECT TO REGULAR REVISION. The generated performance envelope shall solely be used as a tool to facilitate the comparison of performance properties under combined loads, of different grades, sizes and connections of voestalpine Tubulars products. Field-specific safety/design factors as well as other loads are not considered. Thus the results shall by no means be used to replace the own string design engineering or to justify any warranty/guaranty cases.

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TECHNICAL DATA SHEET

Connection: **VArOUGHneckAC**

Size: 5 1/2 in X 20.00 lb/ft

Drift: **standard**

Bevel: **standard**

Grade: VA-XP-P110

Material:

	US Customary	Metric
Yield Strength Min.	110,000 psi	758 Mpa
Yield Strength Max.	140,000 psi	965 Mpa
Tensile Strength Min.	125,000 psi	862 Mpa

Pipe:

	US Customary	Metric		US Customary	Metric
Nominal OD:	5.500 in	139.70 mm	Wall Thickness:	0.361 in	9.17 mm
Nominal ID:	4.778 in	121.36 mm	Standard Drift:	4.653 in	118.19 mm
Nominal Weight:	20.00 lb/ft	29.76 kg/m	Pipe Body Yield Strength:	729 klb	3,241 kN
Pipe Cross Section:	5.828 in ²	3,760.13 mm ²			

Connection:

	US Customary	Metric		
OD:	6.300 in	160.02 mm	Threads per inch:	5 Threads
ID:	4.764 in	121.00 mm		
Length:	8.976 in	228.00 mm		

Connection Performance (Uniaxial Load):

	US Customary	Metric		US Customary	Metric
Joint Strength:	729 klb	3,241 kN	Tension Efficiency:	> 100.0 %	
Collapse Resistance:	13,970 psi	96.30 Mpa	Displacement:	1.240 gal/ft	15.40 l/m
Internal Yield Pressure:	15,920 psi	107.50 Mpa	Production:	0.932 gal/ft	11.57 l/m
Load on Coupling Face:	709 klb	3,160 kN			

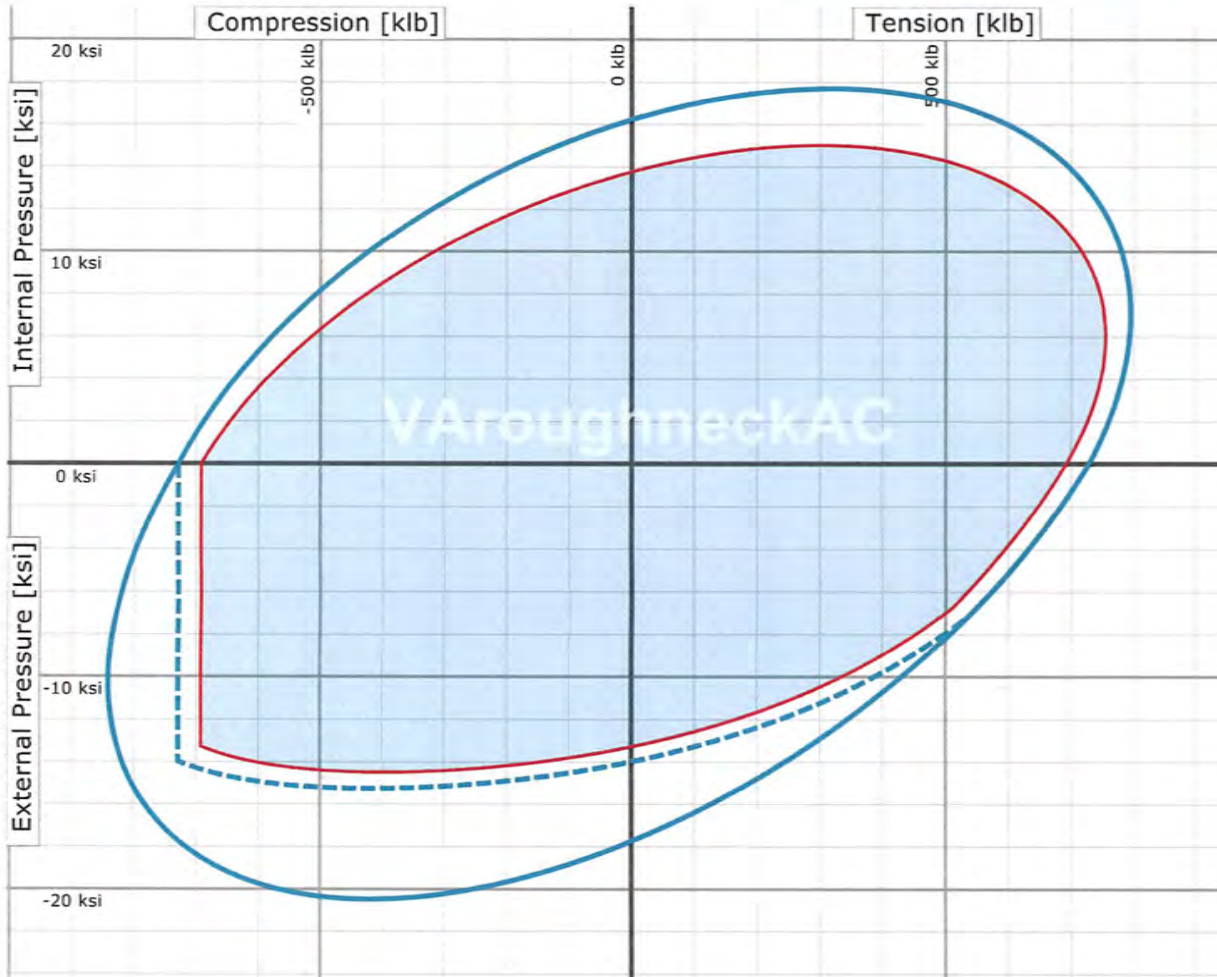
Field Make Up (Friction Factor = 1.0):

	US Customary	Metric		US Customary	Metric
Minimum Torque:	15,822 ft.lb	21,451 Nm	Make-Up Loss:	4.370 in	111.00 mm
Optimum Torque:	17,580 ft.lb	23,835 Nm	Yield Torque:	22,000 ft.lb	29,800 Nm
Maximum Torque:	19,338 ft.lb	26,218 Nm			
Min. Torque on Shoulder:	%				

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LOAD ENVELOPE



Recommended Field of Application

- Pipe Body Envelope
- - - Pipe Body Collapse

Efficiency (% Pipe Body) under Uniaxial Loads

Tension:	100.0 %
Compression:	100.0 %
Internal Pressure:	89.3 %
External Pressure:	100.0 %

Sealability Rating (% Efficiency) under Combined Loads

Tension:	100.0 %
Compression:	100.0 %
Internal Pressure:	100.0 %
External Pressure:	100.0 %

Test Conditions

Test Medium:	Fluid
Von Mises Envelope:	95.0 %
Bending:	20.00 °/100ft

The graph is calculated under consideration of the requirements of EN ISO 13679 and API 5C3. The combined loads are calculated without the consideration of wall thickness tolerances and differ from the values in the data sheet, which are calculated with tolerances determined by API. Any printout is NOT SUBJECT TO REGULAR REVISION. The generated performance envelope shall solely be used as a tool to facilitate the comparison of performance properties under combined loads, of different grades, sizes and connections of voestalpine Tubulars products. Field-specific safety/design factors as well as other loads are not considered. Thus the results shall by no means be used to replace the own string design engineering or to justify any warranty/guaranty cases.

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Mods

05/17/2019



May 9, 2019

WVDEP
Office of Oil and Gas
ATTN: Laura Adkins
601 57th Street SE
Charleston, WV 25304

RE: J Osborn HSOP16 201, J Osborn HSOP16 202, J Osborn HSOP16 203, and
J Osborn HSOP 16 204

Dear Ms. Adkins:

Enclosed, please find the revised WW6B for the J Osborn HSOP16 201 (API 47-033-05949), J Osborn HSOP16 202 (API 47-033-05950), J Osborn HSOP16 203 (API 47-033-05941), and J Osborn HSOP16 204 (API 47-033-05931).

The following changes occurred within the WW6B:

- Conductor casing depths were changed to 100'
- Conductor casing and weight has changed from 26" to 24" and 94#
- Changed intermediate casing depth from 1,500' to 2,500'
- Changed production casing weight from 23# to 20#

I have also enclosed the spec sheets. Sam Ward has reviewed and signed these too.

If you need any additional information, please let me know. Thank you!

Sincerely,

Kelly Davis
Permitting Specialist
1-304-517-8743 mobile
1-724-940-1218 office
kdavis@arsenalresources.com

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