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

Harold D. Ward, Cabinet Secretary
www.dep.wv.gov

Tuesday, October 5, 2021
PERMIT MODIFICATION APPROVAL
Horizontal 6A / New Drill

ARSENAL RESOURCES LLC
6031 WALLACE RD. EXTENSION
WEXFORD, PA 15090

Re: Permit Modification Approval for J OSBORN HSOP 16 203
47-033-05941-00-00

Change in Lateral Trajectory / Lease Line

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 16 203
Farm Name: JUDY M OSBORN (LE) (JUDY M OSBORN IRREVS
U.S. WELL NUMBER: 47-033-05941-00-00
Horizontal 6A New Drill
Date Modification Issued: 10/05/2021

10/08/2021

ARSENAL RESOURCES

September 16, 2021

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

RE: J Osborn HSOP 16 203, API# 47-033-~~05951~~ 05981 – Expedited modification due to spacing changes

Dear Laura:

Enclosed please find the modification for the J Osborn HSOP 16 203, (API# 47-033-~~05951~~ 05981). This permit is being modified due to adjusting the well bore spacing and moving it 150' to the west. The well head locations remained the same. This well was originally permitted to 24,486' and is now permitted to 25,113' with the shift in lateral on the same leases.

Included are the following update forms:

- Plat
- WW-6B, Well Work Permit Application/Casing
- Well Bore Schematic
- WW-6A1, Lease Information
- Roadway Letter
- Site Safety Plan
- AOR

CK# 11796
Amt $5150
Date 9/16/21

Should you have any questions or need any additional information, please feel free to contact me by phone or email. Thanks!

Sincerely,

RECEIVED
Office of Oil and Gas
SEP 20 2021
WV Department of
Environmental Protection

Ross Schweitzer
Sr. Director of Drilling, Construction and Permitting
1-724-584-1192 mobile
rschweitzer@arsenalresources.com

10/08/2021

WW-6B
(04/15)

API NO. 47- 033 - 05941
OPERATOR WELL NO. J Osborn HSOP16 203
Well Pad Name: J Osborn HSOP16

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 203 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: 1164 Elevation, proposed post-construction: 1164'

5) Well Type (a) Gas X Oil _____ Underground Storage _____
Other _____
(b)If Gas Shallow X Deep _____
Horizontal X

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- 7422 ft, Bottom- 7522 ft, Anticipated Thickness- 100 ft, Associated Pressure- 0.5 psi/ft

8) Proposed Total Vertical Depth: 7,510 ft

9) Formation at Total Vertical Depth: Marcellus Shale

10) Proposed Total Measured Depth: 25,877 ft

11) Proposed Horizontal Leg Length: 17,670 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: Harlem – 146', Bakerstown – 227', Brush Creek – 326', 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 X

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

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10/08/2021

WW-6B
(04/15)

API NO. 47- 033 - 059-41
OPERATOR WELL NO. J Osborn HSOP16 203
Well Pad Name: J Osborn HSOP16

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	26	Used		102.7	80	80	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	25,113	25,113	TOC @ 2,350
Tubing							
Liners							

SDW.
9/14/2021

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	26	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	0.415	14,360	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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SEP 20 2021

WV Department of
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10/08/2021

WW-6B
(10/14)

API NO. 47- 033 - 05941
OPERATOR WELL NO. J Osborn HSOP16 203
Well Pad Name: J Osborn HSOP16

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 26" 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 ½" 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- ¼" intermediate hole to the programmed depth, run 9- 5/8" casing and cement to surface. The rig with then continue to drill an 8- ¾" hole to a designed KOP. We will then start drilling the curve and lateral section to the programmed total measured depth, run 5 ½" 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:

26"- 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 ½" – 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 1,600'; there will be no centralizers from 1,600 to surface.

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

26" 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 1,350' (+/- 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 to 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.

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 strands 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.

*Note: Attach additional sheets as needed.

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Office of Oil and Gas
SEP 20 2021
WV Department of
Environmental Protection

10/08/2021

4703305944

ARSENAL RESOURCES

Arsenal Resources
J. Osborn HSOP 16 203
Casing Design
Directional Plan # 3 KLX

Other Names:	N/A		County:	Harrison	
Surface Location:	TBD		State:	West Virginia	
Bottom Hole Location:	TBD		AFE #:	XX	API #: XX
Total Depth:	25,113 MD (ft)		RKB:	25	
	7,510 TVD (ft)		Ground Level:	1,164	

Logs	Significant Formations (TVD)	Depth (ft) MD	Depth (ft) TVD	Hole Size	Casing and Cement	Mud	Directional & Surveys Drlg /Csg Point
None	Section 1		Conductor Pipe				
		100	100	26" 102.7#			Vertical
None				17 1/2" (PDC)		Floc Water	
	Section 2		Floc	Cement: Class A 489 Sacks w/ 30% Excess TOC: Surface (top off if needed) All cement volumes are estimates			
Possible CBL after cement job		850	850	13 3/8" 54.5# J-55 STC			Vertical
None	Section 3		Floc	12 1/4" (PDC)		Floc Water	
				Cement: Class A 678 Sacks w/ 50% Excess TOC: Surface (top off if needed) All cement volumes are estimates			
Possible CBL after cement job		2,500	2,500	9 5/8" 40# J-55 LTC			Vertical
	Section 4		Floc	Mud Data	From	To	
				Floc Water	100	2500	
				Floc Water	2500	7,178	
				11.5- 12.0 ppg SOBM	7,178	25,113	
				Bit Data	From	To	
				17-1/2" & 12 1/4" PDC	100	2,500	
				8- 3/4" (PDC)	2,500	7,178	
				8- 1/2" (PDC)	7,178	25,113	
				Directional Data	See Directional Plan		
			OBM				
	Big Lime		1,323				
	1st Elk Siltstone		4,668				
	Tully Lime		7,162				
	Purcell (Limestone)		7,422				
	Lower Marcellus		7,490	Cement: Class A: 50/50 POZ 1.2 ft3/sack +10% Exs in OH = 4354 sacks TOC : 2,350 ft All cement volumes are estimates			
		25,113 MD 7510 TVD					
				5 1/2" 20# P-110 USS Freedom HTQ			

Revision 1

Note: Not drawn to scale

Cement Outside Casing
Seal Assembly in Annulus

Date Last Revised: 16-Sep-21
Ross Schweitzer

10/08/2021

Area of Review Report - __J Osborn HSOP16_____ Pad, ____203___ Lateral, _____Harrison_____County, WV

Well Name	API Number	Operator Name / Address	Well Type	Latitude	Longitude	Total Depth	Perforated Formation(s)	Producing Zones not Perforated
Davis 1	033-02507	Greylock Conventional, LLC	Existing	39.263283	-80.218542	4447	Fifth, Speechley, Balltown, Benson	NA
Webb 1	033-02181	Alliance Petroleum Corporation	Existing	39.258957	-80.216168	4353	Speechley, Balltown, Benson	NA
J & W Webb 1	033-00255	Union Carbide, Olefins Division	Existing	39.253151	-80.215981	4500	Berea, Riley	NA
Lantz 1	033-01220	Diversified	Plugged - 5/4/1978	39.250275	-80.214177	NA	NA	NA
Johnson - Lang 2	033-01139	Alliance Petroleum Corporation	Existing	39.231279	-80.206811	4660	Fifth	NA
ND Parks 2	033-00423	Delta Drilling	Plugged - 7/28/1966	39.225129	-80.203928	NA	NA	NA
JJ Horner 2	033-00747	Diversified	Existing	39.22219	-80.199955	4448	Benson	NA
JJ Horner 1	033-00445	Delta Drilling	Plugged - 5/20/1967	39.221272	-80.201714	2551	Fifth	NA

ARSENAL
RESOURCES

Click or tap to enter a date.

Alliance Petroleum Corporation
Address
State

RE: Click or tap here to enter text.

Dear Sir/Madam,

Arsenal Resources has developed a Marcellus pad, JOsborn HSOP16, well #203, located in Harrison County, WV. As an owner or operator of conventional natural gas wells in this area, we are requesting your assistance in this matter.

Due to the apparent presence of unique geological conditions, the potential for communication between deep geologic zones exists in this area. This potential communication, via natural gas, water, or both, may occur between hydraulically fractured wells in the Marcellus formation (approximately 7,200 TVD) and existing conventional natural gas wells included in the attached well list for which you are believed to be the operator.

Arsenal Resources anticipates conducting hydraulic fracturing at the JOsborn HSOP16 pad, well #203, during the First Quarter of 2022. We have identified conventional natural gas wells operated by your company within 500' (lateral distance) of our newly planned wells. Plats for each well on this pad are attached.

We recommend that conventional well operators conduct the following activities before, during and after fracturing operations:

1. Inspect surface equipment, prior to fracturing, to establish integrity and establish well conditions.
2. Observe wells closely during and after fracturing and monitor for abnormal increases in water, gas, or pressure.
3. Inspect or install master valves rated to 3,000 psi or other necessary equipment for wellhead integrity.
4. Notify the OOG and Arsenal Resources if any changes in water, gas production, pressure or other anomalies are identified.

Please feel free to contact me at 724-940-1137 with any questions or comments. You may also contact the WV Office of Oil and Gas at 304-926-0440.

Sincerely,

Ross Schweitzer
Sr. Director of Drilling, Construction and Permitting

6031 Wallace Road Extension, Suite 300, Wexford, PA 15090 Phone (724) 940-1100 eFax 1-800-428-0981

AOR Attachment B 10/08/2021

4703305941

ARSENAL RESOURCES

SITE SAFETY PLAN

J OSBORN HSOP16 WELL PAD, #203

911 Address:

2687 Coplin Run Rd
Bridgeport, WV 26330

SDW
9/14/2021

BHL is located on topo map 11,168 feet south of Latitude: 39°15'00"
SHL is located on topo map 9,376 feet south of Latitude: 39°17'30"

BHL is located on topo map 9,515 feet west of Longitude: 80°10'00"
SHL is located on topo map 2,709 feet west of Longitude: 80°12'30"

	SURFACE OWNER	DIST-TM/PAR
1	JUDY M. OSBORN (LE) (JUDY M. OSBORN IRREVOCABLE TRUST)	15-330/5
2	CHARLES THOMAS DAVIS II, ET AL	15-330/4
3	CHARLES THOMAS DAVIS II, ET AL	15-330/5.1
4	CHARLES E. REED 1/2 INTEREST GERALD W. BURNER ET AL 1/2 INTEREST	15-330/25
5	PAUL E. BALL	15-330/29
6	MICHAEL A. & ROBERTA OSBORN	15-350/4.2
7	MICHAEL A. & ROBERTA OSBORN	15-330/26.1
8	JASON OSBORN	15-350/4.3
9	RUSSELL E. RUTAN JR. & DOROTHY L. & JOHN TIMOTHY BELOTTE	15-350/5
10	GOBEL G. OSBORN JR. (LE) (MICHAEL BRUCE & JASON OSBORN)	15-350/6
11	R. MARK & DIANA L. HACKETT	15-350/18
12	DONALD N. & CYNTHIA J. MCHENRY	15-350/16.2
13	CALEB L. & JENNIFER L. CUTRIGHT	15-350/17.8
14*	BRIAN J. & ANDREA L. MILLS	15-350/17.7
15*	BRIAN J. & ANDREA L. MILLS	15-350/17.6
16*	GARY & MARGARET WHEELER	15-350/17.2
17*	BRIAN J. & ANDREA L. MILLS	15-350/17.5
18*	JASON MICHAEL SLEETH	15-350/17.1
19*	CALEB L. & JENNIFER L. CUTRIGHT	15-350/17.3
20*	JAY D. & TIFFANY B. WILLAMS	15-350/27.1
21*	JAY D. & TIFFANY BROOKE WILLIAMS	15-350/26.1
22*	LEWIS FRANKLIN & PAMELA MULLEN	15-350/25
23	CALEB L. CUTRIGHT	15-350/16.7
24	CHRISTOPHER F. & PAMELA MULLEN	15-350/25.3
25	LEWIS FRANKLIN & PAMELA MULLEN	15-350/27
26	CHARLES W. CLEVENGER IRR TRUST	15-370/13
27	SHAWN R. NEWBROUGH	15-370/21
28	EIP III WEST VIRGINIA LLC	15-371/7.1
29	EIP III WEST VIRGINIA LLC	15-371/7
30*	EIP III WEST VIRGINIA LLC	15-370/29

	LESSOR	DIST-TM/PAR
A	GOBEL OSBORN, ET AL	15-330/5
B	CHARLES THOMAS DAVIS, ET UX	15-330/4
C	GEORGE T. FARIS, ET AL	15-330/3
D	JOHN B. WEBB ET AL	15-330/25
E	THE BOARD OF EDUCATION OF THE COUNTY OF HARRISON	15-330/29
F	MARY ALICE HAFER REV TRUST MICHAEL A. OSBORN ET UX	15-330/26.1
G	MARY ALICE HAFER	15-330/26
H	NORVIL D. LANTZ	15-350/5
J	ALDERSON BROADDUS COLLEGE & AMP FUND III, LP	15-350/6
K	MARY LANCASTER CASTILOW ET AL	15-350/18
L	REBECCA A. COMPTON; JAMES MICHAEL COMPTON & JENNIFER NORA COMPTON	15-350/16.2 15-350/17.7 15-350/17.6 15-350/17.8 15-350/17.5 15-350/17.2 15-350/17.3 15-350/17.1
M	GRAFTON COAL COMPANY	P/O 15-350/25.3
N	LEWIS FRANKLIN MULLEN	P/O 15-350/26.1 15-350/25 15-350/25
P	W. R. JOHNSON ET AL	15-350/27 15-350/27.1 15-370/13
Q	N. D. PARKS ET AL	15-370/29 15-371/7 15-371/7.1 15-370/21

SHL

BHL

SURFACE HOLE LOCATION (SHL)	APPROX. LANDING POINT	BOTTOM HOLE LOCATION (BHL)
UTM 17-NAD83(M)	UTM 17-NAD83(M)	UTM 17-NAD83(M)
N:4346578.590	N:4348342.210	N:4341430.010
E:567469.580	E:567265.440	E:569053.360
NAD83, WV NORTH (FT)	NAD83, WV NORTH (FT)	NAD83, WV NORTH (FT)
N:279782.669	N:279018.150	N:262801.790
E:1765244.012	E:1764561.260	E:1770160.100

THRASHER

THE THRASHER GROUP, INC.
600 WHITE OAKS BLVD.
BRIDGEPORT, WV 26330
PHONE 304-624-4108

SEE PAGE 2 FOR PLAT DUE TO LENGTH OF LATERAL

FILE #: J OSBORN HSOP 16 203

DRAWING #: J OSBORN HSOP 16 203

SCALE: 1" = 2000'

MINIMUM DEGREE OF ACCURACY: 1/2500

PROVEN SOURCE OF ELEVATION: U.S.G.S. MONUMENT THOMAS 1498.81'

I, THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND THE REGULATIONS ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

Signed: Joseph H. Lowther

R.P.E.: _____ L.L.S.: P.S. No. 2346

JOSEPH H. LOWTHER ★ LICENSED ★ No. 2346 STATE OF WEST VIRGINIA ★ PROFESSIONAL SURVEYOR ★

(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS

WVDEP
OFFICE OF OIL & GAS
601 57TH STREET
CHARLESTON, WV 25304

DATE: SEPTEMBER 24, 2021

OPERATOR'S WELL #: J OSBORN HSOP 16 203

API WELL #: 47 (STATE) 33 (COUNTY) 05941 H6A (PERMIT)

Well Type: ☐ Oil ☐ Waste Disposal ☒ Production ☐ Deep
☒ Gas ☐ Liquid Injection ☐ Storage ☒ Shallow

WATERSHED: SIMPSON CREEK ELEVATION: 1163.30'±

COUNTY/DISTRICT: HARRISON / SIMPSON QUADRANGLE: ROSEMONT, WV 7.5'

SURFACE OWNER: JUDY M OSBORN (LE) (JUDY M OSBORN IRREVOCABLE TRUST) ACREAGE: 70.00±

OIL & GAS ROYALTY OWNER: GOBEL OSBORN, ET AL ACREAGE: 1,607.99±

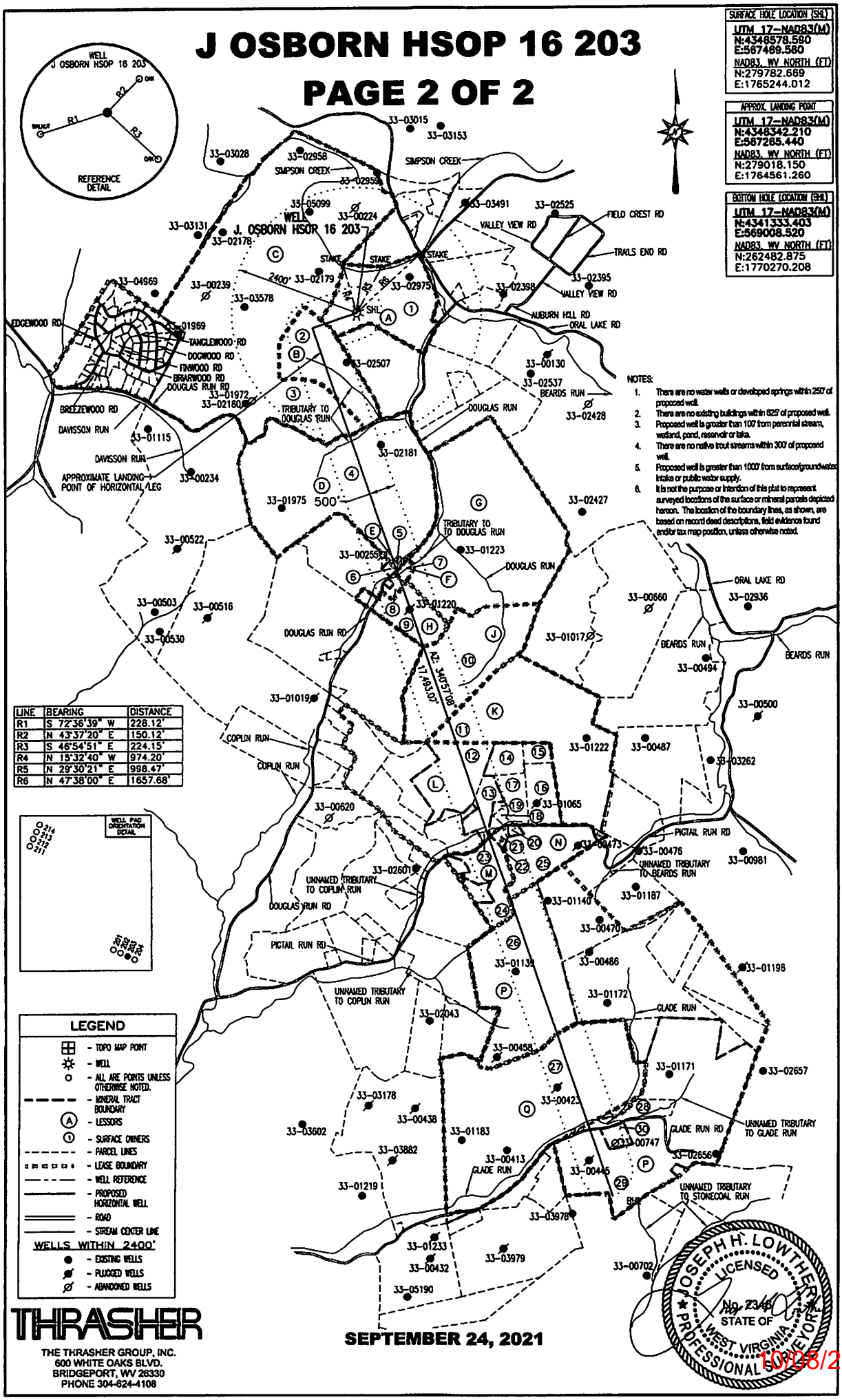
DRILL ☒ CONVERT ☐ DRILL DEEPER ☐ REDRILL ☐ FRACTURE OR STIMULATE ☒
PLUG OFF OLD FORMATION ☐ PERFORATE NEW FORMATION ☐ PLUG & ABANDON ☐
CLEAN OUT & REPLUG ☐ OTHER CHANGE ☐ (SPECIFY): _____

TARGET FORMATION: MARCELLUS ESTIMATED DEPTH: (LATERAL)TVD: 7,510'± TMD: 25,113'±

WELL OPERATOR ARSENAL RESOURCES DESIGNATED AGENT GARY SHORT
Address 6031 WALLACE ROAD EXTENSION, SUITE 300 Address 633 WEST MAIN ST.
City WEXFORD State PA Zip Code 15090 City BRIDGEPORT State WV Zip Code 26330

10/08/2021

J OSBORN HSOP 16 203
PAGE 2 OF 2



BHL is located on topo map 11,168 feet south of Latitude: 39°15'00"
SHL is located on topo map 9,376 feet south of Latitude: 39°17'30"

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G	MARY ALICE HAFER	15-330/26
H	NORVIL D. LANTZ	15-350/5
J	ALDERSON BROADDUS COLLEGE & AMP FUND III, LP	15-350/6
K	MARY LANCASTER CASTILOW ET AL	15-350/18
L	REBECCA A. COMPTON; JAMES MICHAEL COMPTON & JENNIFER NORA COMPTON	15-350/16.2 15-350/17.7 15-350/17.6 15-350/17.8 15-350/17.5 15-350/17.2 15-350/17.3 15-350/17.1
M	GRAFTON COAL COMPANY	P/O 15-350/25.3
N	LEWIS FRANKLIN MULLEN	P/O 15-350/26.1 15-350/25 15-350/25
P	W. R. JOHNSON ET AL	15-350/27 15-350/27.1 15-370/13
Q	N. D. PARKS ET AL	15-370/29 15-371/7 15-371/7.1 15-370/21

SHL

BHL

SURFACE HOLE LOCATION (SHL)	APPROX. LANDING POINT	BOTTOM HOLE LOCATION (BHL)
UTM 17-NAD83(M)	UTM 17-NAD83(M)	UTM 17-NAD83(M)
N:4346578.590	N:4346342.210	N:4341430.010
E:567469.580	E:567265.440	E:569053.360
NAD83, WV NORTH (FT)	NAD83, WV NORTH (FT)	NAD83, WV NORTH (FT)
N:279782.669	N:279018.150	N:262801.790
E:1765244.012	E:1764561.260	E:1770160.100

THRASHER

THE THRASHER GROUP, INC.
600 WHITE OAKS BLVD.
BRIDGEPORT, WV 26330
PHONE 304-624-4108

SEE PAGE 2 FOR PLAT DUE TO LENGTH OF LATERAL

FILE #: J OSBORN HSOP 16 203

DRAWING #: J OSBORN HSOP 16 203

SCALE: 1" = 2000'

MINIMUM DEGREE OF ACCURACY: 1/2500

PROVEN SOURCE OF ELEVATION: U.S.G.S. MONUMENT THOMAS 1498.81'

I, THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND THE REGULATIONS ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

Signed: Joseph H. Lowther

R.P.E.: L.L.S.: P.S. No. 2346

JOSEPH H. LOWTHER ★ LICENSED ★ No. 2346 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS
WVDEP
OFFICE OF OIL & GAS
601 57TH STREET
CHARLESTON, WV 25304

DATE: SEPTEMBER 24, 2021

OPERATOR'S WELL #: J OSBORN HSOP 16 203

API WELL #: 47 (STATE) 33 (COUNTY) 05941 H6A (PERMIT)

Well Type: ☐ Oil ☐ Waste Disposal ☒ Production ☐ Deep
☒ Gas ☐ Liquid Injection ☐ Storage ☒ Shallow

WATERSHED: SIMPSON CREEK ELEVATION: 1163.30'±

COUNTY/DISTRICT: HARRISON / SIMPSON QUADRANGLE: ROSEMONT, WV 7.5'

SURFACE OWNER: JUDY M OSBORN (LE) (JUDY M OSBORN IRREVOCABLE TRUST) ACREAGE: 70.00±

OIL & GAS ROYALTY OWNER: GOBEL OSBORN, ET AL ACREAGE: 1,607.99±

10/08/2021

DRILL ☒ CONVERT ☐ DRILL DEEPER ☐ REDRILL ☐ FRACTURE OR STIMULATE ☒

PLUG OFF OLD FORMATION ☐ PERFORATE NEW FORMATION ☐ PLUG & ABANDON ☐

CLEAN OUT & REPLUG ☐ OTHER CHANGE ☐ (SPECIFY):

TARGET FORMATION: MARCELLUS ESTIMATED DEPTH: (LATERAL)TVD: 7,510'± TMD: 25,113'±

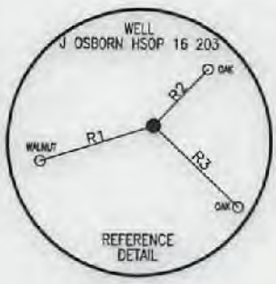
WELL OPERATOR ARSENAL RESOURCES DESIGNATED AGENT GARY SHORT

Address 6031 WALLACE ROAD EXTENSION, SUITE 300 Address 633 WEST MAIN ST.

City WEXFORD State PA Zip Code 15090 City BRIDGEPORT State WV Zip Code 26330

J OSBORN HSOP 16 203

PAGE 2 OF 2



SURFACE HOLE LOCATION (SHL)
UTM 17-NAD83(M)
N:4346578.590
E:567469.580
NAD83, WV NORTH (FT)
N:279782.669
E:1765244.012

APPROX. LANDING POINT
UTM 17-NAD83(M)
N:4346342.210
E:567265.440
NAD83, WV NORTH (FT)
N:279018.150
E:1764561.260

BOTTOM HOLE LOCATION (BHL)
UTM 17-NAD83(M)
N:4341333.403
E:569008.520
NAD83, WV NORTH (FT)
N:262482.875
E:1770270.208

NOTES:

1. There are no water wells or developed springs within 250' of proposed well.
2. There are no existing buildings within 625' of proposed well.
3. Proposed well is greater than 100' from perennial stream, wetland, pond, reservoir or lake.
4. There are no native trout streams within 300' of proposed well.
5. Proposed well is greater than 1000' from surface/groundwater intake or public water supply.
6. It is not the purpose or intention of this plat to represent surveyed locations of the surface or mineral parcels depicted hereon. The location of the boundary lines, as shown, are based on record deed descriptions, field evidence found and/or tax map position, unless otherwise noted.

LINE	BEARING	DISTANCE
R1	S 72°36'39" W	228.12'
R2	N 43°37'20" E	150.12'
R3	S 46°54'51" E	224.15'
R4	N 15°32'40" W	974.20'
R5	N 29°30'21" E	998.47'
R6	N 47°38'00" E	1657.68'

LEGEND

- TOPO MAP POINT
- WELL
- ALL ARE POINTS UNLESS OTHERWISE NOTED.
- MINERAL TRACT BOUNDARY
- (A) LESSORS
- (1) SURFACE OWNERS
- PARCEL LINES
- LEASE BOUNDARY
- WELL REFERENCE
- PROPOSED HORIZONTAL WELL
- ROAD
- STREAM CENTER LINE

WELLS WITHIN 2400'

- EXISTING WELLS
- PLUGGED WELLS
- ABANDONED WELLS

THRASHER

THE THRASHER GROUP, INC.
500 WHITE OAKS BLVD.
BRIDGEPORT, WV 26330
PHONE 304-624-4108

SEPTEMBER 24, 2021

10/08/2021

JOSEPH H. LOWTHER
LICENSED
No. 2345
STATE OF
WEST VIRGINIA
PROFESSIONAL SURVEYOR

ARSENAL RESOURCES

People Powered. Asset Strong.

September 11, 2021

Mr. James Martin, Chief of Oil and Gas
West Virginia Department of Environmental Protection
601 57th Street, SE
Charleston, WV 25304

RE: Ownership of Roadways; J Osborn HSOP 16 201 -204 Wells

Dear Mr. Martin:

In preparation of filing a permit application for the above referenced well, Arsenal Resources has conducted a thorough title examination in order to determine the ownership of the oil and gas underlying roadways crossed by the proposed well(s). If owned in fee by the West Virginia Department of Transportation, Division of Highways, a lease covering its interest in the roadway or roadways has been properly obtained and provided in the application materials. If a right of way only, the oil and gas underlying such roadway or roadways is owned by the adjoining landowners and is also covered by the leaseholds provided in the application materials.

If you have any questions, concerns or need further information, please do not hesitate to contact me at the address listed below.

Sincerely,

Jon Sheldon

Jon Sheldon
Chief Operating Officer

6031 Wallace Road Ext, Suite 300
Wexford, PA 15090
P: 724-940-1100
F: 800-428-0981
www.arsenalresources.com

4703305941

WW-6A1
(5/13)

Operator's Well No. J Osborn HSOP 16 203

INFORMATION SUPPLIED UNDER WEST VIRGINIA CODE
Chapter 22, Article 6A, Section 5(a)(5)
IN LIEU OF FILING LEASE(S) AND OTHER CONTINUING CONTRACT(S)

Under the oath required to make the verification on page 1 of this Notice and Application, I depose and say that I am the person who signed the Notice and Application for the Applicant, and that –

(1) the tract of land is the same tract described in this Application, partly or wholly depicted in the accompanying plat, and described in the Construction and Reclamation Plan;

(2) the parties and recordation data (if recorded) for lease(s) or other continuing contract(s) by which the Applicant claims the right to extract, produce or market the oil or gas are as follows:

Lease Name or Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page

See Attached

Acknowledgement of Possible Permitting/Approval
In Addition to the Office of Oil and Gas

The permit applicant for the proposed well work addressed in this application hereby acknowledges the possibility of the need for permits and/or approvals from local, state, or federal entities in addition to the DEP, Office of Oil and Gas, including but not limited to the following:

- WV Division of Water and Waste Management
- WV Division of Natural Resources WV Division of Highways
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- County Floodplain Coordinator

The applicant further acknowledges that any Office of Oil and Gas permit in no way overrides, replaces, or nullifies the need for other permits/approvals that may be necessary and further affirms that all needed permits/approvals should be acquired from the appropriate authority before the affected activity is initiated.

Well Operator: Arsenal Resources
By: Jon Sheldon
Its: COO

RECEIVED
Office of Oil and Gas
SEP 20 2021
WV Department of
Environmental Protection

10/08/2021

Attachment to WW-6A1, J Osborne 16 203

Letter Designation/Number Designation on Plat	Grantor, Lessor, Assignor, etc.	Grantee, Lessee, Assignee, etc.	Royalty	Book/Page	Acreage
A (00003704)	Gobel Osborn and Audrey Osborn, his wife and Judy Nicholson and Gary Nicholson, her husband	Petroleum Development Corporation	12.50%	1074/420	72
	Petroleum Development Corporation	PDC Mountaineer, LLC		1440/364	
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
A (00003703)	J. Earl Teter, Widower; Irvin D. Teter and Vera Teter, his wife	Petro-Lewis Corp.	12.50%	1062/405	116
	Petro-Lewis Corp.	Partnership Properties Co.		1072/213	
	Partnership Properties Co.	Eastern American Energy Corporation		1124/449	
	Eastern American Energy Corporation	Energy Corporation of America		59/879	
	Energy Corporation of America	Greylock Production, LLC		1603/1121	
	Greylock Production, LLC	Mar Key, LLC		1607/855	
B (00008233)	Charles Thomas Davis and Deborah A. Davis, husband and wife	NRM Petroleum Corporation	14.00%	1097/75	47
	NRM Petroleum Corporation	Natural Resources Management Corporation		Unrecorded (WV Secretary of State)	
	Natural Resources Management Corporation	Edisto Resources Corporation		Unrecorded (WV Secretary of State)	
	NRM Operating Company, LP, Edisto Resources, NRM 1984-B Income, Ltd., and NRM 1984-D Income, Ltd.	Eastern American Energy Corporation		1216/558	
	Eastern American Energy Corporation	Energy Corporation of America		1441/1003 (also 59/879)	
	Energy Corporation of America	Greylock Production, LLC		1603/1121	
	Greylock Production, LLC	Mar Key, LLC		1607/855	
B (00008232)	G. Lester Douglas and Mariellen Douglas, husband and wife	NRM Petroleum Corporation	12.50%	1097/77	47

Attachment to WW-6A1, J Osborne 16 203

Letter Designation/Number Designation on Plat	Grantor, Lessor, Assignor, etc.	Grantee, Lessee, Assignee, etc.	Royalty	Book/Page	Acreage
	NRM Petroleum Corporation	Natural Resources Management Corporation		Unrecorded (WV Secretary of State)	
	Natural Resources Management Corporation	Edisto Resources Corporation		Unrecorded (WV Secretary of State)	
	NRM Operating Company, LP, Edisto Resources, NRM 1984-B Income, Ltd., and NRM 1984-D Income, Ltd.	Eastern American Energy Corporation		1216/558	
	Eastern American Energy Corporation	Energy Corporation of America		1441/1003 (also 59/879)	
	Energy Corporation of America	Greylock Production, LLC		1603/1121	
	Greylock Production, LLC	Mar Key, LLC		1607/855	
C (00008352)	George T. Faris and Nell Steele Faris, his wife, Rachel F. Shuttleworth, widow, Florence Faris, single, and Nell Faris Shinn, widow	Delaware Gas Company	12.50%	820/128	1562
	Delaware Gas Company	Union Carbide Corporation		845/221	
	Union Carbide Corporation	Creslenn Oil Company		897/286 898/258	
	Creslenn Oil Company	Deminex Oil Corporation		Delaware Secretary of State	
	Deminex Oil Corporation	Deminex U.S. Oil Company		Delaware Secretary of State	
	Deminex U.S. Oil Company	Southwest Exploration and Acquisition Company		Delaware Secretary of State	
	Southwest Exploration and Acquisition Company	Southwest Royalties		Delaware Secretary of State	
	Southwest Royalties	HG Energy II Appalachia, LLC		1605/194	
	HG Energy II Appalachia, LLC	Mar Key, LLC		1611/595	
D (00008340)	John B. Webb and Tensie Webb, his wife & William W. Webb and Opal Webb, his wife	Delaware Gas Company	13.00%	820/19	188
	Delaware Gas Company	Union Carbide Corporation		845/221	

Attachment to WW-6A1, J Osborne 16 203

Letter Designation/Number Designation on Plat	Grantor, Lessor, Assignor, etc.	Grantee, Lessee, Assignee, etc.	Royalty	Book/Page	Acreage
	Union Carbide Corporation	Creslenn Oil Company		897/286 898/258	
	Creslenn Oil Company	Deminex Oil Corporation		Delaware Secretary of State	
	Deminex Oil Corporation	Deminex U.S. Oil Company		Delaware Secretary of State	
	Deminex U.S. Oil Company	Southwest Exploration and Acquisition Company		Delaware Secretary of State	
	Southwest Exploration and Acquisition Company	Southwest Royalties		Delaware Secretary of State	
	Southwest Royalties	HG Energy II Appalachia, LLC		1605/194	
	HG Energy II Appalachia, LLC	Mar Key, LLC		1611/595	
E (00008535)	The Board of Education of Harrison County	Mar Key, LLC	15.50%	1626/1254	0.5
F (00007965)	Michael A. Osborn and Roberta Osborn, husband and wife	Mar Key, LLC	14.00%	1579/637	2.406875
F, G (00004022)	Mary Alice Hafer	Petroleum Development Corporation	12.50%	1048/294	250
	Petroleum Development Corporation	PDC Mountaineer, LLC		1440/364	
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
G (00004023)	William D. Courtney, a married man and Margaret D. Courtney, widow	Petroleum Development Corporation	12.50%	1064/1090	167
	Petroleum Development Corporation	PDC Mountaineer, LLC		1440/364	
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
H (00008141)	Norvil D. Lantz, single	Mar Key, LLC	12.50%	1609/139	23.75
H (00008130)	Tammy Carson, married	Mar Key, LLC	12.50%	1609/131	23.75
H (00008131)	Terry J. Kelly, married	Mar Key, LLC	12.50%	1609/133	23.75
H (00008142)	Donna Smith, married	Mar Key, LLC	12.50%	1609/141	23.75

Attachment to WW-6A1, J Osborne 16 203

Letter Designation/Number Designation on Plat	Grantor, Lessor, Assignor, etc.	Grantee, Lessee, Assignee, etc.	Royalty	Book/Page	Acreage
H (00008150)	Michal W. Goforth, widow	Mar Key, LLC	12.50%	1610/713	23.75
H (00008151)	Clifford Aaron Harris, married	Mar Key, LLC	12.50%	1610/715	23.75
H (00008152)	Kelly Klepaldo, married	Mar Key, LLC	12.50%	1610/717	23.75
H (00008153)	June Medina, widow	Mar Key, LLC	12.50%	1610/719	23.75
H (00008154)	Stanley Moore, married	Mar Key, LLC	12.50%	1610/721	23.75
H (00008155)	April L. Strickland, married	Mar Key, LLC	12.50%	1610/723	23.75
H (00008404)	Judy M. Osborn	Mar Key, LLC	12.50%	1621/919	23.75
H (00008416)	Karen Sue Whtye	Mar Key, LLC	12.50%	1624/1091	23.75
H (00008474)	Gordon F. Osborn	Mar Key, LLC	12.50%	1624/1094	23.75
H (00008540)	Ernest Osborn	Mar Key, LLC	12.50%	1626/1150	23.75
J (00008356)	Trustees of Alderson Broaddus University, f/k/a Alderson Broaddus College	Mar Key, LLC	13.00%	1616/1169	86
J (00006680)	DWG Oil and Gas Acquisitions, LLC	Mar Key, LLC	15.00%	1561/493	86
K (00004366)	John Lancaster heirs; widow Mary Lancaster Costilow widow Lena L. Winters	Petroleum Development Corporation	12.50%	1060/292	136
	Petroleum Development Corporation	PDC Mountaineer, LLC		1440/364	
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
L (00008178)	Rebecca A. Compton	Mar Key, LLC	14.00%	1610/832	164.48
L (00008179)	James Michael Compton	Mar Key, LLC	14.00%	1610/834	164.48

Attachment to WW-6A1, J Osborne 16 203

Letter Designation/Number Designation on Plat	Grantor, Lessor, Assignor, etc.	Grantee, Lessee, Assignee, etc.	Royalty	Book/Page	Acreage
L (00008180)	Jennifer Nora Corton, fka Jennifer Nora Compton	Mar Key, LLC	14.00%	1610/836	164.48
M (00008183)	Grafton Coal Company	Mar Key, LLC	14.00%	1610/838	29
N (00007203)	Lewis Franklin Mullen, widower	Mar Key, LLC	15.00%	1576/217	35.5
P (00004238)	W.R. Johnson and Andra Johnson, his wife and Hursey R. Lang and Hazel M. Lang, his wife	Union Carbide Corporation	12.50%	852/587	466
	Union Carbide Corporation	Creslenn Oil Company		897/286	
	Creslenn Oil Company	Delta Producing Corporation		925/522	
	Delta Producing Corporation	Petroleum Corporation of America		967/575 (977/168)	
	Petroleum Corporation of America	Petroleum Development Corporation		977/153	
	Petroleum Development Corporation	PDC Mountaineer, LLC		1440/364	
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
Q (00004299)	ND Parks and Oliva Parks, his wife, James C. Parks and Abbie Y. Parks, his wife	Union Carbide Corporation	12.50%	852/563	250
	Union Carbide Corporation	Creslenn Oil Company		897/286	
	Creslenn Oil Company	Delta Producing Corporation		919/740	
	Delta Producing Corporation	Petroleum Corporation of America		967/575 (977/168)	
	Petroleum Corporation of America	Petroleum Development Corporation		977/153	
	Petroleum Development Corporation	PDC Mountaineer, LLC		1440/364	
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	

West Virginia Secretary of State — Online Data Services

Business and Licensing

Online Data Services Help

Business Organization Detail

NOTICE: The West Virginia Secretary of State's Office makes every reasonable effort to ensure the accuracy of information. However, we make no representation or warranty as to the correctness or completeness of the information. If information is missing from this page, it is not in the The West Virginia Secretary of State's database.

MAR KEY LLC

Organization Information

Org Type	Effective Date	Established Date	Filing Date	Charter	Class	Sec Type	Termination Date	Termination Reason
LLC | Limited Liability Company	7/11/2011		7/11/2011	Domestic	Profit			

Organization Information

Business Purpose	2111 - Mining, Quarrying, Oil & Gas Extraction - Oil and Gas Extraction - Crude Oil and Natural Gas Extraction	**Capital Stock**	
Charter County		**Control Number**	99Q1F
Charter State	WV	**Excess Acres**	
At Will Term	A	**Member Managed**	MBR
At Will Term Years		**Par Value**	
Authorized Shares		**Young Entrepreneur**	Not Specified

Addresses

Type	Address
Designated Office Address	633 W. MAIN STREET BRIDGEPORT, WV, 26330
Mailing Address	6031 WALLACE ROAD EXTENSION SUITE 300 WEXFORD, PA, 15090 USA
Notice of Process Address	CORPORATION SERVICE COMPANY 209 WEST WASHINGTON STREET CHARLESTON, WV, 25302

Principal Office Address	6031 WALLACE ROAD EXTENSION SUITE 300 WEXFORD, PA, 15090 USA
Type	**Address**

Officers

Type	Name/Address
Member	ARSENAL RESOURCES DEVELOPMENT LLC 6031 WALLACE ROAD EXTENSION SUITE 300 WEXFORD, PA, 15090
Organizer	PAUL M HERZING 560 EPSILON DR. PITTSBURGH, PA, 15238 USA
Type	**Name/Address**

Annual Reports

Filed For
2021
2020
2019
2018
2017
2016
2015
2014
2013
2012
Date filed

For more information, please contact the Secretary of State's Office at 304-558-8000.

Saturday, September 11, 2021 — 9:01 PM

West Virginia Secretary of State — Online Data Services

Business and Licensing

Online Data Services Help

Business Organization Detail

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SENECA-UPSHUR PETROLEUM, LLC

Organization Information

Org Type	Effective Date	Established Date	Filing Date	Charter	Class	Sec Type	Termination Date	Termination Reason
LLC | Limited Liability Company	2/12/1973		2/12/1973	Domestic	Profit			

Organization Information

Business Purpose	2111 - Mining, Quarrying, Oil & Gas Extraction - Oil and Gas Extraction - Crude Oil and Natural Gas Extraction	Capital Stock	
Charter County		Control Number	0
Charter State	WV	Excess Acres	0
At Will Term	A	Member Managed	MBR
At Will Term Years		Par Value	
Authorized Shares		Young Entrepreneur	Not Specified

Addresses

Type	Address
Designated Office Address	633 W. MAIN STREET BRIDGEPORT, WV, 26330
Mailing Address	6031 WALLACE ROAD EXTENSION SUITE 300 WEXFORD, PA, 15090 USA
Notice of Process Address	CORPORATION SERVICE COMPANY 209 WEST WASHINGTON STREET CHARLESTON, WV, 25302

Principal Office Address	6031 WALLACE ROAD EXTENSION SUITE 300 WEXFORD, PA, 15090 USA
Type	**Address**

Officers

Type	Name/Address
Member	RIVER RIDGE ENERGY, LLC 6031 WALLACE ROAD EXTENSION, SUITE 300 WEXFORD, PA, 15090
Organizer	TAMMY J OWEN 300 SUMMERS STREET, STE 1500 PO BOX 2107 CHARLESTON, WV, 25328 USA
Type	**Name/Address**

DBA

DBA Name	Description	Effective Date	Termination Date
KEYSPAN PRODUCTION & DEVELOPMENT COMPANY	TRADENAME	6/11/2004	
NATIONAL GRID	TRADENAME	8/17/2007	
NATIONAL GRID PRODUCTION AND DEVELOPMENT	TRADENAME	12/5/2008	5/9/2012
DBA Name	**Description**	**Effective Date**	**Termination Date**

Name Changes

Date	Old Name
3/28/2011	SENECA-UPSHUR PETROLEUM, INC.
Date	**Old Name**

Date	Amendment
6/15/2016	AMENDMENT FILED CHANGING FROM A MANAGER-MANAGED CO. TO A MEMBER-MANAGED CO. >> REMOVED ROBERT KOZEL & STEPHEN A. BISHOP AS MANAGERS & ADDED SOLE MEMBER (C IMAGE).
3/28/2011	CONVERSION: FROM SENECA-UPSHUR PETROLEUM, INC. TO SENECA-UPSHUR PETROLEUM, LLC
7/25/1997	MERGER; MERGING LITTLE SWISS DRILLING COMPANY, A QUAL WV CORP AND PALACE VALLEY PETROLEUM COMPANY, A QUAL WV CORP WITH AND INTO SENECA-UPSHUR PETROLEUM, INC., A QUAL WV CORP, THE SURVIVOR.
Date	**Amendment**

Annual Reports
Filed For
2021
2020
2019
2018
2017
2016
2015
2014
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2012
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2007
2006
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2004
2003
2002
2001
2000
1999
1998
Date filed

For more information, please contact the Secretary of State's Office at 304-558-8000.

Saturday, September 11, 2021 — 9:02 PM

Agreement to Drill, Complete and Operate Oil & Gas Wells

This Agreement to Drill, Complete and Operate Oil & Gas Wells (this "Agreement"), by and among Mountaineer Keystone LLC, a West Virginia limited liability company ("Mountaineer Keystone"), PDC Mountaineer, LLC, a Delaware limited liability company ("PDC"), and PDC Mountaineer Holdings, LLC, a Delaware limited liability company ("PDC Holdings"), is effective as of October 15, 2014. (the "Effective Date") and sets forth the terms pursuant to which Mountaineer Keystone will drill, complete and operate the Wells (as defined below) on behalf of PDC and PDC Holdings. Mountaineer Keystone, PDC, and PDC Holdings are each a "Party" and are collectively the "Parties". In consideration of the foregoing and the respective agreements hereinafter set forth and the mutual benefits to be derived therefrom, the Parties, intending to be legally bound, hereby agree as follows:

1. **Term:** This Agreement is effective from the Effective Date until terminated by Mountaineer Keystone on the one hand or PDC and PDC Holdings on the other hand with 30 days' written notice to the other Party or Parties, as applicable (the "Term").

2. **Authorization to Operate:** PDC and PDC Holdings authorize Mountaineer Keystone to undertake and perform, on PDC and PDC Holdings behalf, all operations, including without limitation permit applications, well pad preparation, drilling and completing wells, and marketing gas, oil and other hydrocarbons therefrom with respect to all oil and gas wells to be drilled on oil and gas leasehold acreage held by PDC or PDC Holdings. PDC, PDC Holdings and Mountaineer Keystone are affiliates with a common parent. Mountaineer Keystone was formed to operate oil and gas leasehold acreage held by PDC, PDC Holdings and certain other affiliates. Mountaineer Keystone agrees that it shall, in a good and workmanlike manner and in accordance with industry standards as they prevail in the area, drill, complete and operate oil and gas wells on leasehold acreage owned by PDC or PDC Holdings from time to time as directed by PDC or PDC Holdings (collectively, the "Wells").

3. **No Third Party Beneficiary:** This Agreement is for the benefit of the Parties and is not for the benefit of any third party.

4. **Counterparts:** This Agreement may be simultaneously executed in several counterparts and via facsimile or similar electronic transmittal, each of which shall be deemed to be an original and taken together shall constitute one and the same instrument.

[Signature Page Follows]

IN WITNESS WHEREOF, Mountaineer Keystone, PDC, and PDC Holdings have caused their duly authorized representatives to execute this Agreement as of the Effective Date.

MOUNTAINEER KEYSTONE LLC

By: _____
Name: Robert Kael
Title: CEO

PDC MOUNTAINEER, LLC

By: _____
Name: Robert Kael
Title: CEO

PDC MOUNTAINEER HOLDINGS, LLC

By: _____
Name: Robert Kael
Title: CEO

Agreement to Drill, Complete and Operate Oil & Gas Wells

This Agreement to Drill, Complete and Operate Oil & Gas Wells (this "Agreement"), by and among Arsenal Resources LLC, a West Virginia limited liability company ("Arsenal"), River Ridge Energy, LLC, a Delaware limited liability company ("River Ridge"), and River Ridge Energy, Holdings, LLC, a Delaware limited liability company ("River Ridge Holdings"), is effective as of March 1, 2017. (the "Effective Date") and sets forth the terms pursuant to which Arsenal will drill, complete and operate the Wells (as defined below) on behalf of River Ridge and River Ridge Holdings. Arsenal, River Ridge, and River Ridge Holdings are each a "Party" and are collectively the "Parties". In consideration of the foregoing and the respective agreements hereinafter set forth and the mutual benefits to be derived therefrom, the Parties, intending to be legally bound, hereby agree as follows:

1. **Term:** This Agreement is effective from the Effective Date until terminated by Arsenal on the one hand or River Ridge and River Ridge Holdings on the other hand with 30 days' written notice to the other Party or Parties, as applicable (the "Term").

2. **Authorization to Operate:** River Ridge and River Holdings authorize Arsenal to undertake and perform, on River Ridge and River Ridge Holdings behalf, all operations, including without limitation permit applications, well pad preparation, drilling and completing wells, and marketing gas, oil and other hydrocarbons therefrom with respect to all oil and gas wells to be drilled on oil and gas leasehold acreage held by River Ridge or River Ridge Holdings. River Ridge, River Ridge Holdings and Arsenal are affiliates with a common parent. Arsenal was formed to operate oil and gas leasehold acreage held by River Ridge, River Ridge Holdings and certain other affiliates. Arsenal agrees that it shall, in a good and workmanlike manner and in accordance with industry standards as they prevail in the area, drill, complete and operate oil and gas wells on leasehold acreage owned by River Ridge or River Ridge Holdings from time to time as directed by River Ridge or River Ridge Holdings (collectively, the "Wells").

3. **No Third Party Beneficiary:** This Agreement is for the benefit of the Parties and is not for the benefit of any third party.

4. **Counterparts:** This Agreement may be simultaneously executed in several counterparts and via facsimile or similar electronic transmittal, each of which shall be deemed to be an original and taken together shall constitute one and the same instrument.

[Signature Page Follows]

IN WITNESS WHEREOF, Arsenal, River Ridge, and River Ridge Holdings have caused their duly authorized representatives to execute this Agreement as of the Effective Date.

ARSENAL RESOURCES LLC

By: _____
Name: Joel E. Symonds
Title: Vice President - Land

RIVER RIDGE ENERGY, LLC

By: _____
Name: Joel E. Symonds
Title: Vice President - Land

RIVER RIDGE HOLDINGS, LLC

By: _____
Name: Joel E. Symonds
Title: Vice President - Land

4703305941

ARSENAL RESOURCES

SITE SAFETY PLAN

J OSBORN HSOP16 WELL PAD, #203

911 Address:

2687 Coplin Run Rd
Bridgeport, WV 26330

SDW
9/14/2021

J OSBORN HSOP16 Well Pad, #203 Site
Safety Plan Table of Contents

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Section 1 – Contacts, Schedules, and Meetings

A. Emergency Contact Information

This section details the method of notification to the public if an H2S Gas, blowout, or flaring emergency would be encountered. This section also lists the H2S Safety Services and Equipment that will be brought on site in case of an H2S Emergency.

Emergency Contact Information

The 24-hour Emergency Contact Information including the name and phone numbers of persons to be notified shall be posted in the production trailer in a common area and in plain sight for reference. The Emergency Contact Information is identified in the following table:

Arsenal Resources – Emergency Contact Information		
Name	**Position**	**24-Hour Phone #**
Jon Sheldon	SVP & Chief Operating Officer	304-376-0719
Ross Schweitzer	Senior Director of Drilling	724-584-1192
Brandon Wedde	Senior Director of Completions	724-719-1240
Greg McCully	Director of Health and Safety	724-991-9172
West Virginia DEP Office of Oil & Gas – Emergency Contact Information		
Name	**Position**	**24-Hour Phone #**
Sam Ward	Local WVDEP Inspector, Harrison County	304-389-7583
	Office of Oil & Gas	304-926-0499
	WVDEP Emergency Spill Hotline	1-800-642-3074
Emergency Response Units		
National Response Center for Reporting Chemical or Oil Spills		800-424-8802
WVDEP Emergency Spill Center		800-642-3074
Ambulance, Fire, and Law Enforcement		911
Harrison County EMS		304-623-4295
Harrison County Emergency Service Center		304-623-4115
Harrison County Sheriff Department		304-624-8550

B. Public Facility Contact Information

According to information provided to Arsenal Resources by BMI, there are three public facilities located within the one-mile radius of the project site. The public facilities are listed below:

Grace Baptist Church	861 Oral Lake Rd	Bridgeport	WV	26330	304-842-4842
Green Valley Church	Oral Lake Rd	Bridgeport	WV	26330	
Briarwood Park	Briarwood Rd	Bridgeport	WV	26330	304-842-8240

* - *ESRI Aerial Imaging was used to determine the location of Schools/Public Facilities/Houses within one mile of the project site.*

C. H2S Gas, Blow Out, and Flaring Emergency Notification and Evacuation Procedures

This section details the method of notification to the public if an H2S Gas, blowout, or flaring emergency would be encountered. This section also lists the H2S Safety Services and Equipment that will be brought on-site in case of an H2S Emergency.

Evacuation Plan

In the event of an emergency that requires evacuation, personnel are to vacate the well pad area in a calm and orderly fashion by exiting the pad via the access road onto Rt. 77/4, Moss Run (Coplin Run).

The procedure to be used in alerting nearby persons in the event of any occurrence that could pose a threat to life or property will be arranged and completed with public officials in detail, prior to drilling into the hydrogen sulfide formations.

In the event of an actual emergency, the following steps will be immediately taken:

1. Arsenal Resources will immediately notify the appropriate parties from the Emergency Contacts Section of this plan and any other appropriate parties to conduct necessary evacuation notifications. The emergency officials will immediately warn each resident and transient's down-wind within the radius of exposure from the well site, and then warn all residents in the radius of exposure. Additional evacuation zones may be necessary as the situation warrants. Arsenal Resources will provide assistance to emergency authorities.

2. Arsenal Resources will dispatch sufficient personnel to assist with traffic control in the vicinity away from the potentially dangerous area as requested and directed by the emergency authorities in charge of the evacuation procedures. A guard will be stationed at the entrance of the well site to monitor essential and non-essential traffic.

3. General:
   A. The area included within the radius of exposure is considered to be the zone of maximum potential hazard from a hydrogen sulfide gas escape. Immediate evacuation of public areas, in accordance with the provisions of this contingency plan, is imperative. When it is determined that conditions exist which create an additional area (beyond the initial zone of maximum potential hazard) vulnerable to possible hazard, public areas in the additional hazardous area will be evacuated in accordance with the contingency plan.

   B. In the event of a disaster, after the public areas have been evacuated and traffic stopped, it is expected that local civil authorities will have arrived and within a few hours will have

assumed direction of and control of the public, including all public areas. Arsenal Resources will cooperate with these authorities to the fullest extent and will exert every effort by careful advice to such authorities to prevent panic or rumors.

C. Arsenal Resources will dispatch appropriate management personnel at the disaster site as soon as possible. The company's personnel will cooperate with and provide such information to civil authorities as they might require.

D. One of the products of the combustion of hydrogen sulfide is sulfur dioxide (SO_2). Under certain conditions this gas may be equally as dangerous as H_2S. A pump type detector device, which determines the percent of SO_2 in air through concentrations in ppm, will be available. Although normal air movement is sufficient to dissipate this material to safe levels, the SO_2 detector should be utilized to check concentrations in the proximity of the well once every hour, or as necessary and the situation warrants. Also, if any low areas are suspected of having high concentrations, personnel should be made aware of these areas, and steps should be taken to determine whether or not these low areas are hazardous.

This evacuation plan will also be posted in the production trailer in a common area and in plain sight for personnel to reference if there is an emergency that requires evacuation. The evacuation plan will be reviewed in the pre-drill or weekly safety meetings with all personnel.

D. Pre-Spud Meeting.

The Pre-Spud Meeting Form included on the next page will be used during the pre-spud meeting to account for all parties that are present. The invited parties shall include Representatives from Arsenal Resources Drilling and HSE Departments, the regional WVDEP Inspector, and representatives from all contractor companies being utilized during the drilling process.

Meeting Date:_____ Pre-Spud Meeting

J OSBORN HSOP16 Well Pad, #203

NAME	TITLE
	Arsenal Resources DRILLING REPRESENTATIVE
	Arsenal Resources SITE SUPERVISOR/REPRESENTATIVE
	STATE INSPECTOR
	DRILLING CONTRACTOR REPRESENTATIVE

E. Daily Visitor Sign-In Sheets

Arsenal Resources utilizes a third-party security contractor to monitor the main entry to our sites from the start of the drilling process through the conclusion of flowback. The contractors will be utilizing their forms to document all individuals that access Arsenal Resources' well pad.

F. Safety Meetings

Safety Meetings: Arsenal Resources and selected contractors shall hold a "pre- drill" safety meeting to discuss Well Site Safety during operations at the project location.

Safety Meetings will be held on a daily basis, prior to starting different phases of the operation (e.g., completion or work over operations), or when safety issues arise or need to be addressed.

Attendance logs will be kept for all site safety meetings and maintained on site.

The local WV DEP inspector, Sam Ward, or another Office of Oil and Gas representative and emergency responders from the area will be notified of and invited to the pre-drill and subsequent meeting.

Section 2 – Maps and Diagrams

A. Plan View Map

The following pages include a Plan view map of the location, access road, pit(s), flare lines, nearby dwellings, notation of the north direction and the prevailing wind direction.

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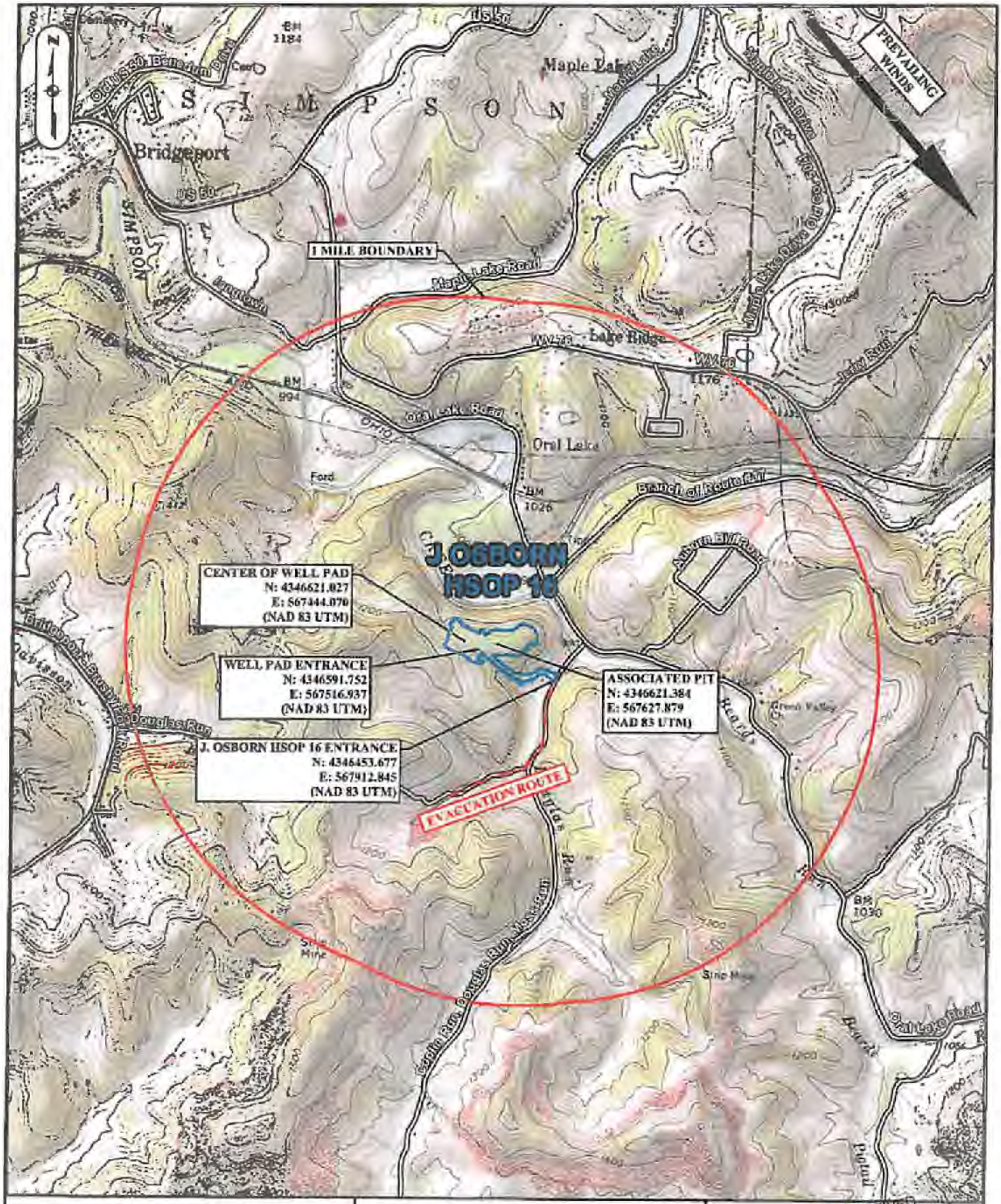
WV Department of
Environmental Protection

B. Topographic Map

This section includes a Topographic map of the well location, including a 1 mile radius of well location, and UTM NAD 83 coordinates of well site entrance, UTM NAD 83 coordinates of the point the access road intersects the public route, and public route numbers and/or route names.



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2021
WV Department of
Environmental Protection

10/08/2021

C. Evacuation Plan Procedures

In the event of an H2S emergency, the following steps will be immediately taken:

1. Arsenal Resources will immediately notify the appropriate parties from the Emergency Contacts Section of this plan and any other appropriate parties to conduct necessary evacuation notifications. The emergency officials will immediately warn each resident and transient's down-wind within the radius of exposure from the well site, and then warn all residents in the radius of exposure. Additional evacuation zones may be necessary as the situation warrants. Arsenal Resources will provide assistance to emergency authorities.
2. Arsenal Resources will dispatch sufficient personnel to assist with traffic control in the vicinity away from the potentially dangerous area as requested and directed by the emergency authorities in charge of the evacuation procedures. A guard will be stationed at the entrance of the well site to monitor essential and non-essential traffic.

General:

A. The area included within the radius of exposure is considered to be the zone of maximum potential hazard from a hydrogen sulfide gas escape. Immediate evacuation of public areas, in accordance with the provisions of this contingency plan, is imperative. When it is determined that conditions exist which create an additional area (beyond the initial zone of maximum potential hazard) vulnerable to possible hazard, public areas in the additional hazardous area will be evacuated in accordance with the contingency plan.

B. In the event of a disaster, after the public areas have been evacuated and traffic stopped, it is expected that local civil authorities will have arrived and within a few hours will have assumed direction of and control of the public, including all public areas. Arsenal Resources will cooperate with these authorities to the fullest extent and will exert every effort by careful advice to such authorities to prevent panic or rumors.

C. Arsenal Resources will dispatch appropriate management personnel at the disaster site as soon as possible. The company's personnel will cooperate with and provide such information to civil authorities as they might require.

D. One of the products of the combustion of hydrogen sulfide is sulfur dioxide (SO_2). Under certain conditions this gas may be equally as dangerous as H_2S. A pump type detector device, which determines the percent of SO_2 in air through concentrations in ppm, will be available. Although normal air movement is sufficient to dissipate this material to safe levels, the SO_2 detector should be utilized to check concentrations in the proximity of the well once every hour, or as necessary and the situation warrants. Also, if any low areas are suspected of having high concentrations, personnel should be made aware of these areas, and steps should be taken to determine whether or not these low areas are hazardous.

Section 3 - Well Work

This section includes written descriptions of well work and procedure to be used during the drilling, completion, and production phases, including schematic plan views of each, as well as casing sheets.

Project Description

The project involves the construction of several temporary and permanent features including a 1,496 foot long, 16 foot wide gravel access road, a 166,298 BBLs associated pit, and a 175,000 square foot gravel well pad along with erosion and sediment BMP's. The well pad is to be built, and the well to be drilled, will be horizontal well for natural gas extraction analysis.

General Drilling Program

1. Move in and rig up rat hole rig and drill 36" conductor hole and run 24" conductor casing to approximately 80' depth. Cement to surface via pump truck thru swedge and up the backside and drill 16" mouse hole per rig specifications. Rig down move off rat hole rig.
2. Move in and rig up a double or triple drilling rig, rig up flow lines and steel pits, and drill 17 ½" hole to a depth of 300' – 1000' depending on local fresh water depth. Drilling medium will be on fresh water. Run new, J-55, 54.5#, 13 3/8" casing and hardware to near bottom and cement to surface with Class A, 3% CaCl2 cement. Wait at least 8 hrs. on cement prior to drilling. If no cement circulation, call the inspector, run a CBL to determine cement top, then grout from the top back to surface. Wait on top grout 8hrs if grout is needed prior to drilling. Nipple up casing with annular BOP and test.
3. *Open Mine Contingency Plan:* when an open mine is encountered, Arsenal Resources will run 20" (H-40, 94#) and hardware as a mine string. The mine string will be set between 30 to 50 feet below the base of the open mine encountered. The mine string will have a cement balance job on the bottom (below the open mine), and the top will be surface-grouted to ground level. Then drill down to the proposed surface depth and set 13 -3/8" casing as originally planned.
4. Rig up directional drillers (if they are scheduled to nudge the surface) and trip in hole with 12 ¼" bit and drill on fresh water to the depth of 50 feet below the base of the 5th Sand, at approximately 1,500-2,800 feet. Any change from permitted depth will result in immediate notification to the OOG inspector for approval and subsequent modification to other well casing plans on the same pad will be made immediately to the OOG inspector. Run new, J-55 40#, 9 5/8" casing and hardware to near bottom and cement to surface with Class A cement. Wait at least 8 hrs. on cement prior to drilling.
5. Trip in hole with directional tools and 8 ¾" bit, continue drilling on fresh water to KOP. Then switch to a synthetic base mud system, and drill and build angle at 9 degree doglegs and land well at approximately 90 degrees horizontal in the lower Marcellus. Trip for directional issues or bit as needed, and drill 8 ¾" or 8 ½" hole.
6. Drill 8 3/4" or 8 ½" hole to planned total depth. Condition and prep the hole for casing run, and trip out of the hole. Lay down drilling assembly, and rig up casing crew and handling equipment. Run 5.5" 23# P-110, production casing the entire measured depth of the well. Rig down casing crew and equipment, and rig up

cementing crew. Cement production casing in 2 stages, with the lead and tail consisting of various densities of Class A cement slurry. The top of the production cement will be brought to approximately 150' within the intermediate casing shoe.

Once drilling operations have finished, the J Osborn HSOP16 #203 will be handed over to completions. Arsenal Resources will complete the well, using wireline perforating, and slickwater fracing. The number of stages will be determined once the lateral has been drilled. Each stage will consist of 500,000 lbs. of sand and approximately 870,000 gallons of water.

Well Equipment Set Up Procedure

1. Well set up starts by meeting with completions, flow back, set up contractor, and production supervisor.
2. A discussion is made on where to set surface equipment, GPU's Tanks and lines.
3. Procedure for equipment setup is to level off and gravel GPU and Tank area. Build concrete pad for GPU's and construct tank containment, and then set GPU's and Tanks. Install header pipe and dump lines to tanks. Install Sand traps, Lock-out casing valve and install prefabbed well head fittings, and dig up and install 3" lines to well heads. X-Ray all welds on gas lines; install skillets and block of lines for Hydrostatic test, test pipe. Drain pipe, remove plugs and skillets, bolt piping back up. Finish hooking up ESD Controls.
4. Welding is done in one corner of locations, utilizing flow backs LEL and our Personal LEL Monitors

Wellbore Casing and Cement Information

Geology information pertaining to the depths of freshwater, saltwater, coal, voids, etc., as listed on the Well Permit Application have been identified in the table below:

Geologic Information	
Approximate freshwater strata depths	43', 258', 356', 539', 725'
Approximate saltwater depths	None expected
Approximate coal seam depths	146', 227', 326', 399', 437', 527', 590', 611'
Approximate void depths (coal, karst, other)	None known

1. Casing and Cementing Standards listed on the Well Work Permit Application Casing and Tubing Program Table have been identified in the table below:

Casing & Tubing Program						
Casing Type	Size	Grade	Weight /FT	For Drilling	Left in Well	Fill Up
Conductor	26"		102.7#	80'	80'	CTS
Fr. Water	13.375"	J-55	54.5#	800'	800'	CTS
Intermediate	9.625"	J-55	40#	2,500'	2,500'	CTS
Production	5.5"	P-110	23#	25,113'	25,133'	TOC @ 2,350'
Tubing						

All casing and cement will meet current API standards any special conditions required of the permit that were set forth upon approval.

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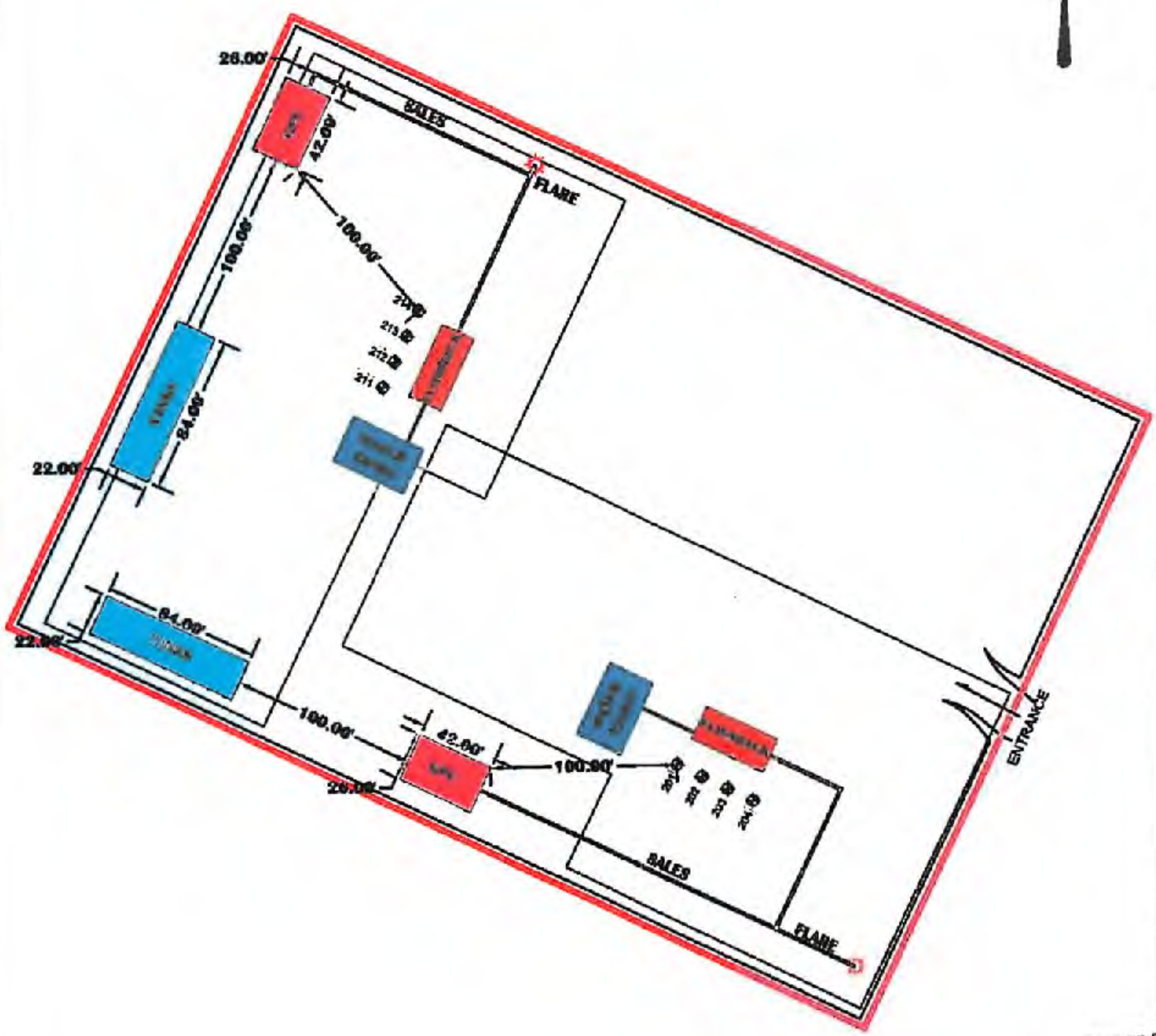
WV Department of
Environmental Protection

10/08/2021

J OSBORN HSOP 16

SIMPSON DISTRICT, HARRISON COUNTY
WEST VIRGINIA



0 60' 120'

NAD83 WELL LOCATIONS

WELL	LATITUDE	LONGITUDE	NORTHING	EASTING	LATITUDE(DEC)	LONGITUDE(DEC)	UTM NORTHING(M)	UTM EASTING(M)	EXISTING ELEV	PROPOSED ELEV
201	39°15'57.45"	-80°13'04.78"	279795.329	1765216.814	39.265958	-80.217997	4346582.31	567461.23	1185.70'	1183.50'
202	39°15'57.39"	-80°13'04.61"	279783.899	1765230.413	39.265942	-80.217947	4346580.45	567465.40	1183.52'	1183.50'
203	39°15'57.33"	-80°13'04.44"	279762.811	1765244.012	39.265925	-80.217900	4346578.56	567468.58	1184.36'	1183.30'
204	39°15'57.28"	-80°13'04.27"	279771.339	1765257.811	39.265908	-80.217853	4346576.73	567473.75	1183.14'	1183.50'
211	39°15'58.41"	-80°13'06.85"	279994.928	1765056.418	39.266003	-80.218588	4346842.31	567411.35	1186.23'	1183.50'
212	39°15'58.54"	-80°13'06.77"	280008.534	1765062.734	39.266539	-80.218547	4346846.48	567413.20	1186.67'	1183.50'
213	39°15'58.65"	-80°13'06.69"	280022.140	1765069.049	39.266575	-80.218528	4346850.66	567415.06	1185.55'	1183.50'
214	39°15'59.81"	-80°13'06.61"	280035.746	1765075.368	39.266614	-80.218503	4346854.84	567416.91	1184.89'	1183.50'

LEGEND

- PROPOSED WELL
- RIG FOOTPRINT
- EDGE OF BERM

WEST VIRGINIA STATE PLANE COORDINATES NORTH ZONE

UTM COORDINATES ZONE 17 NORTH (M)

NOTE: DRAWING CREATED ON 11"X17" PAPER.

Blue Mountain Inc.
11023 MASON DIXON HIGHWAY
BURTON, WV 26562
PHONE: (304) 662-6486

PAD LAYOUT

J OSBORN HSOP 16

DISTRICT: SIMPSON
COUNTY: HARRISON
QUAD: ROSEMONT

SCALE: 1 INCH = 60 FEET
WATERSHED: SIMPSON CREEK
DATE: 19 JUNE 2018

ARSENAL RESOURCES

10/08/2021

B. LEPC Submission

The following page contains a Statement detailing that the plan will be provided to the local emergency planning committee or county emergency services office within at least 7 days from land disturbance or well work.

ARSENAL RESOURCES

Arsenal Resources acknowledges that a copy of this Site Safety Plan will be submitted to the Local Emergency Planning Committee or county emergency services office as listed in the contacts section of this plan, within at least 7 days from land disturbance or well work.

RSchweitzer

Ross Schweitzer
Sr. Director of Drilling, Construction and Permitting

6031 Wallace Road Extension, Suite 300, Wexford, PA 15090 Phone (724) 940-1100 eFax 1-800-428-0981

Section 4 – Chemical Inventory and Safety Data Sheets (SDS)

A. SDS Availability / Location

The SDS sheets will be provided and maintained by the selected contractor(s) and for personnel to reference.

The location of the SDS sheets, how they are referenced, and maintained shall be detailed in each of the operations meetings and the pre-drill or weekly safety meetings with all personnel.

B. Inventory of Mud Materials

1. Inventory: At least 70,965 pounds of barite will be kept on location plus additional weight at the warehouse. At least 2,075 bbls of drilling fluid will be onsite and additional fluid will be stored both on location and at the warehouse.

2. The number and type of mixing units for mixing the mud on site shall be provided by the selected contractor and kept in the production trailer in a designated archive area for reference.

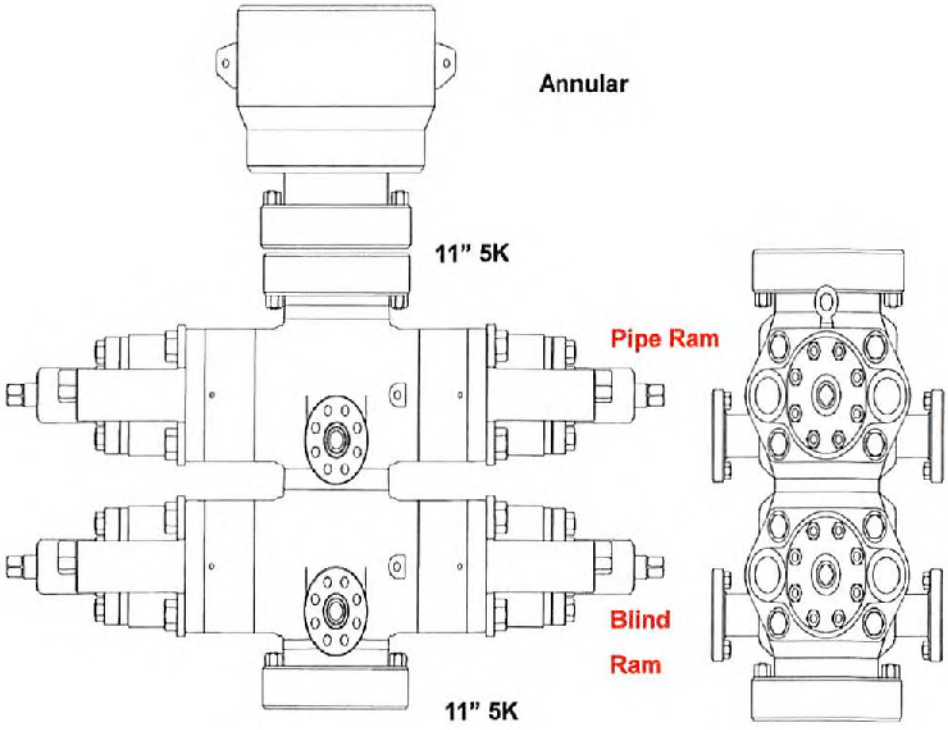
3. The selected driller shall use IADC well control methods. These shall include the Driller's Method, Wait and Weight, Dynamic Volumetric, Migration/Bleed, and Lubrication/Bleed. The primary methods are Driller's Method and Wait and Weight.

Section 5 -BOP and Well Control

A. BOP Equipment

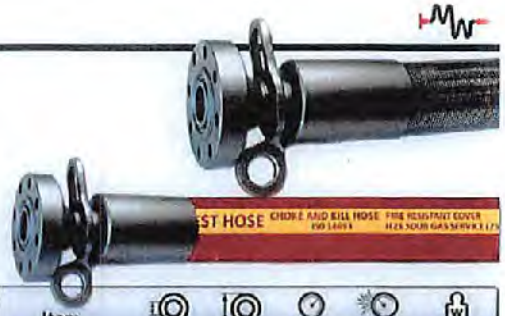
The following pages include schematics and information on the BOP equipment.

11" 5K Double Ram BOP



- Choke & Kill, BOP
- Rotary hose
- Hydraulic hose
- Hammer Unions
- Industrial hose
- Fire hose
- Metal hose, Expansion Joints
- Ducting hose
- Automotive hose
- Crimp Fittings & Machines
- Frac Fittings, Notched KCs
- Cam & Groove, Universal, Shank Fittings
- Valves
- Black Pipe
- Quick Couplings
- Gauges
- Belts, Sheaves, & Bushings
- Steel Adapters
- Brass Adapters

Choke & Kill



Designed as a flexible connection to the choke manifold.
Tube: petroleum resistant for oil based drilling fluids
Cover: ozone, petroleum, and abrasion resistant
Reinforcement: high tensile steel wire spiral layers
Thermal Blanket: 1500° continuous ratings, non-flammable, non-conductive
Armor Wall: .144"
Max Length: 150 feet

-20° F / +212° F
-29° C / +100° C

Item	ID inch	OD inch	WP psi	Test psi	Weight lbs./ft
CK-48 Red	3	4.94	5,000	10,000	14.9
CK-56 Red	3½	5.44			17.7
CK-64 Red	4	6.31			26.4
CK-48 Armor	3	6.5			20.8
CK-56 Armor	3½	7			23.1
CK-64 Armor	4	8			26.3
CK-4810K Red	3	5.31	10,000	15,000	22.3
CK-5610K Red	3½	5.81			25.0
CK-6410K Red	4	4.75			36.1
CK-4810K Armor	3	6.5			26.0
CK-5610K Armor	3½	7			29.0
CK-6410K Armor	4	8			32.8

BOP Control Line

For blowout preventer lines.
Tube: for hydraulic BOP actuation
Thermal Blanket: 1500° continuous rating, non-flammable, non-conductive
Armor Wall: .08"
Popular with a larger hex and longer threads for easier installation of hammer unions.

-20° F / +212° F
-29° C / +100° C

Item	ID inch	OD inch	WP psi	Test psi	Weight lbs./ft
BOP-16 Armor	1	2.06	5,000	10,000	3.9
BOP-32 Armor	2	3.75			11.7
BOP-16	1	1.77			2.1
BOP-32	2	3.09			10.2

Carbon or stainless steel nipples are available and 1/2", 3/4", 1-1/4", and 1-1/2" sizes are available too.


Weld-on Flanges or Hammer Unions


Integral 1002/1502 Hammer Union Fittings


Safety Clamps


Fire Proof Quick Connects


Ring Gaskets

Section 5, continued

B. BOP Testing

Procedure and Schedule for Testing the BOP Stack: For the bottom and horizontal wellbore drilling phase, the BOP equipment shall be function tested upon initial installation, weekly, and after each bit trip. The BOP equipment shall be pressure tested upon initial installation and every twenty-one (21) days thereafter. All pressure tests shall be performed for thirty (30) minutes. Annular preventers should be tested to seventy percent (70%) of the rated capacity and ram preventers should be tested to eighty percent (80%) of the rated capacity.

BOP Schedule: A schedule of BOP equipment installation and operation shall be kept for each applicable string in the Detailed Daily Reports that are kept in the production trailer in a designated archive location for reference.

Adjustments and variances are only permitted with consent of the area drilling/completion manager and WVDEP Inspector.

The Testing will follow the requirements of 35-8 5.7.c.2.

C. BOP Equipment and Assembly Installation Schedule

1. The 13 3/8" Rotating Head will be installed when nippling up on the 13 3/8" casing. It will divert returns to the pit while air drilling this section.

2. The 9 5/8" BOP stack will be installed when nippling up on the 13 3/8" casing. The BOP will be pressure tested using a test plug. The BOP will be tested to a pressure of 250 psi low and 5,000 psi high and the annular to 250 psi low and 2,500 psi high prior to drilling out 8 5/8" casing.

3. When the 10,000 psi BOP stack is in use, a 10,000 psi upper and lower Kelly cock will be employed. They will be tested when the BOP stack is tested.

D. Personnel with Well Control Training

A list of all personnel with approved well control training and current certification recognized by the International Association of Drilling Contractors (IADC) shall be provided to the Office prior to the pre-spud meeting. Current Arsenal Resources employee with Wild Well Control training is Ross Schweitzer.

E. Well Event Record Keeping

Detailed Log: A detailed daily record of events shall be kept during the drilling operation noting any significant event (e.g., lost circulation, presence of hydrogen sulfide, fluid entry, kicks and abnormal pressures). The daily reports will be kept in the production trailer in a designated archive location for reference.

F. Inspector Notification

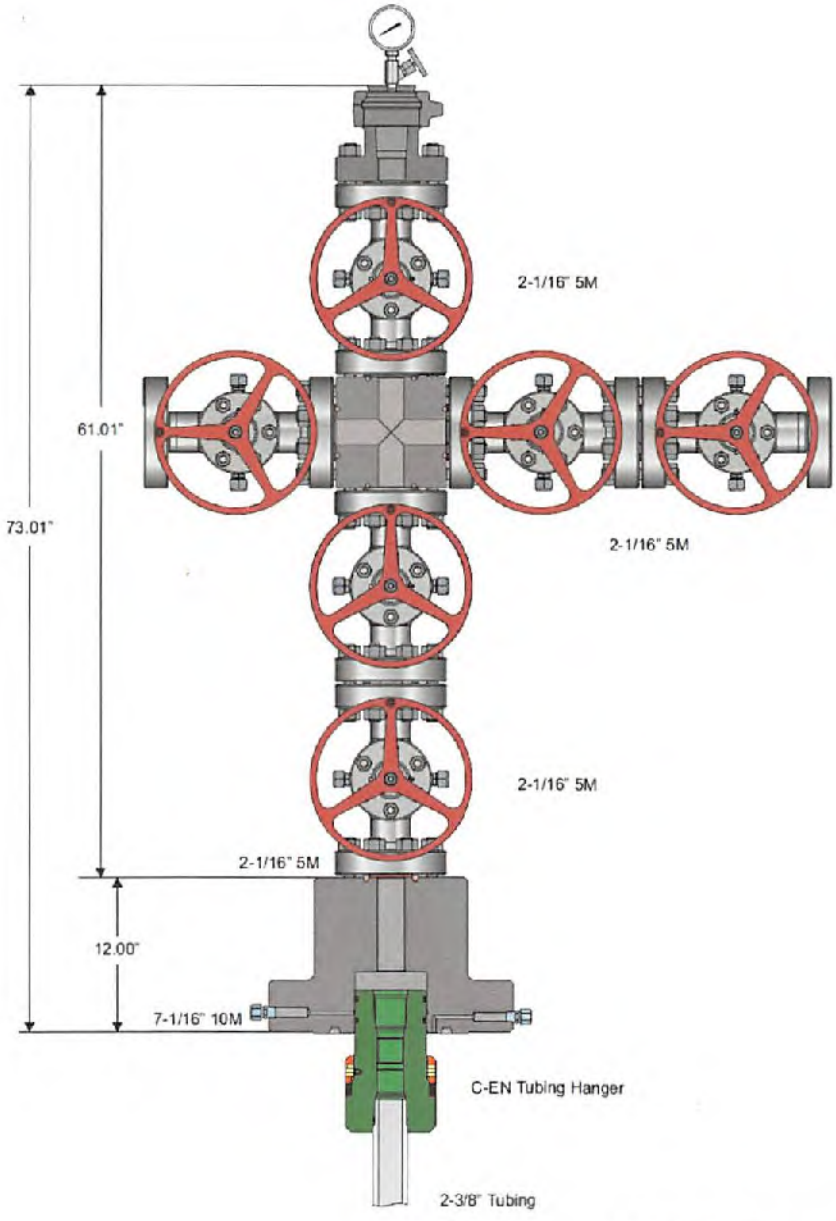
A detailed record of significant drilling events will be recorded in Arsenal Resources well log book. The state inspector will be notified upon any significant drilling events including the encounter of Hydrogen Sulfide Gas, lost circulation, fluid entry, abnormal pressures, etc.

G. Wellhead Assembly

The following pages contain sketches of the anticipated wellhead assemblies that will be used.

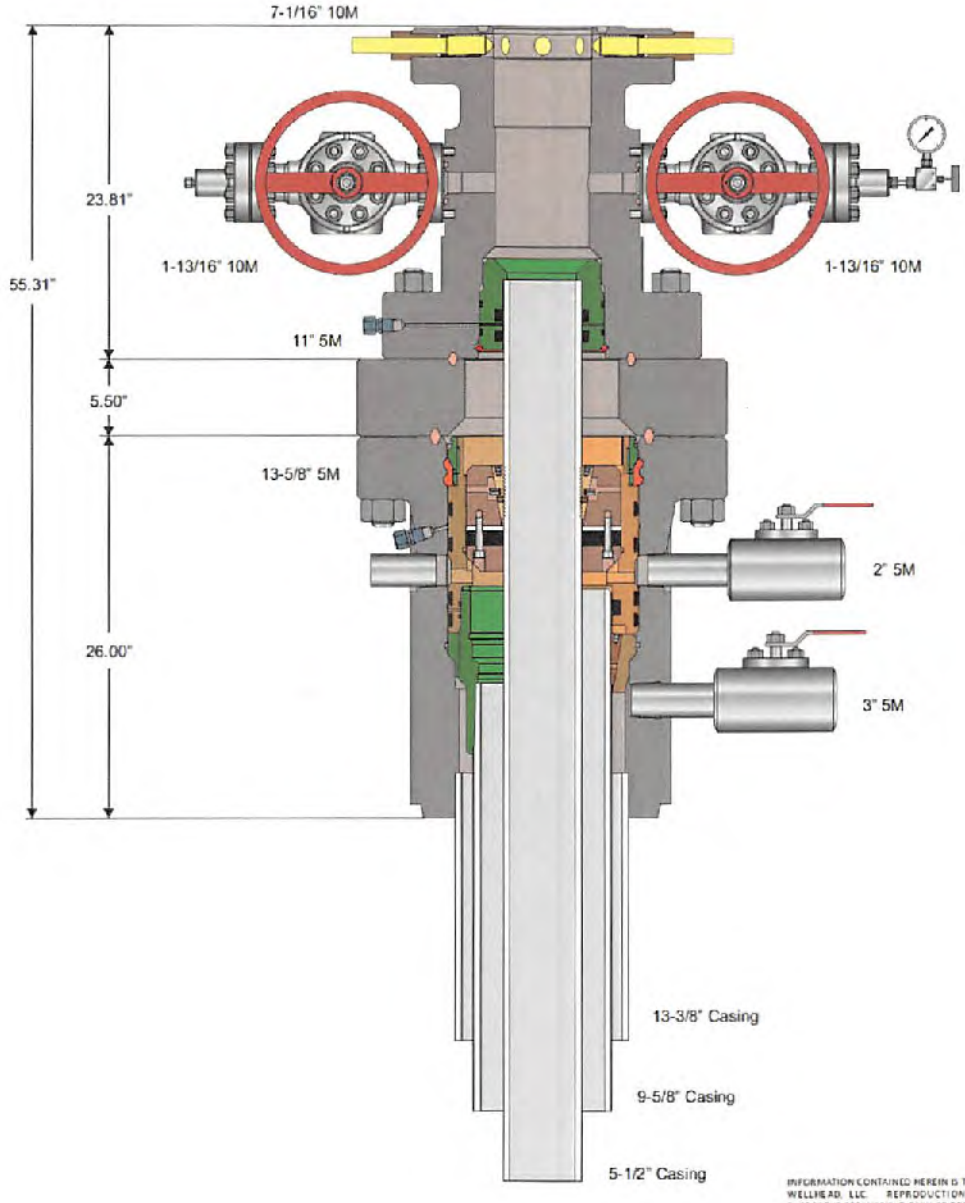
Cactus Wellhead

2-1/16" 5M Production Tree
DUE123



Cactus Wellhead

13-3/8" x 9-5/8" x 5-1/2"
DUE125



H. Well Kill Procedures

1. Inventory: At least 70,965 pounds of barite will be kept on location plus additional weight at the warehouse. At least 2,075 bbls of drilling fluid will be onsite and additional fluid will be stored both on location and at the warehouse.

2. The number and type of mixing units for mixing the mud on site shall be provided by the selected contractor and kept in the production trailer in a designated archive area for reference.

3. The selected driller shall use IADC well control methods. These shall include the Driller's Method, Wait and Weight, Dynamic Volumetric, Migration/Bleed, and Lubrication/Bleed. The primary methods are Driller's Method and Wait and Weight.

Section 6 – Hydrogen Sulfide (H2S)

A. Hydrogen Sulfide (H2S) Detection and Warning Equipment

Arsenal Resources has a MeshGuard LEL and H2S Monitoring system installed on the rig. The system triggers audio and visual alarms if it detects LEL or H2S at action levels.

The system consists of the following:

1 H_2S Fixed Monitor w/2 relays (relays location in doghouse & company man trailer)

4 H_2S Sensors (sensors located on rig floor, cellar, shakers, and mud tank)

2 Explosion Proof Alarms (Light and Siren)

Arsenal Resources employees will utilize MGC multi-gas detectors. The selected contractor foreman shall immediately notify the WV DEP Office of Oil and Gas Inspector and the Office when Hydrogen Sulfide is encountered.

B. H2S Personnel Training

Personnel involved with the monitoring, detection or warning of the presence of Hydrogen Sulfide shall be provided training in a special training session detailing how to use the equipment and issue the necessary warning prior to the operations commencing. This is special Hydrogen Sulfide detection training that will be conducted by the selected contractor.

C. Inspector Notification of H2S Presence

The selected contractor shall immediately contact the WV DEP Office of Oil and Gas Inspector by phone when Hydrogen Sulfide is detected and alert the guard station that no entry to the site shall be granted to unauthorized personnel during that time until the presence of Hydrogen Sulfide is no longer detected and the site is deemed safe by the WV DEP Office of Oil and Gas Inspector or Office Representative.

D. Establishment of Protective Zones

Evacuation and Notification of General Public if an H2S Emergency Occurs:

In the event of an accident that requires notification to the residents within 2,500 feet of the well site, local emergency responders and the Harrison County Emergency Services shall be notified by phone and coordinate alerting the residents by phone or in person and advise them of the appropriate action.

The selected contractor shall maintain the 2,500 foot protection zone during all applicable events such as hydrogen sulfide, blow-outs and flaring by alerting the local emergency

responders and the Harrison County Emergency Services and having them coordinate notifications and evacuation of the protection zone.

E. H2S PPE

Personal Protective Equipment (PPE):
During operations, all personnel shall have on hard hats, safety goggles, fire retardant clothing, steel toe boots and earplugs at all times. Additional PPE may be required for specialized tasks.

Each individual's required PPE will be detailed in the Job Safety Analysis report that is kept in the production trailer in a designated archive area for reference, and shall be reviewed by each individual prior to the start of their shift.

Personnel without the required PPE will not be granted access to the site.

H_2S Safety Services Equipment List:

In the event of an H2S Emergency, Total Safety or TekSolv will be contacted to provide the following:

Hydrogen Sulfide Safety Package

Respiratory Safety Systems

QTY	DESCRIPTION
8	30-minute pressure demand SCBA with Pigtail.
4	4 supplied Air Respirators with 5 minute escape bottles.

Detection and Alarm Safety System

1	Personal H_2S monitors
1	Portable Tri-Gas Hand Held Meter (O_2, LEL, H_2S)
1	Gastech Manual Impingement Pump Type Detector
2	Boxes H_2S Tubes Various Ranges
2	Boxes SO_2 Tubes Various Ranges
1	Calibration Gas
1	Set Paper Work for Records: Training, Cal, Inspection, other

Additional Safety Related Equipment

QTY	Description
2	Windsocks with Pole and Bracket
1	Set Well Condition Sign w/Green, Yellow, Red Flags
1	Primary Safe Briefing Area Sign
1	Secondary Safe Briefing Area Sign
1	Oxygen Resuscitator

Section 7 – Flaring

A. Description and Plan including schematic of installation for duration of flaring activities:

1. Flare Line will be constructed using three inch flare line tubing and anchored with cement anchor blocks. The line will have a dual choke assembly manifold with adjustable manual chokes. A detailed Pad Flaring Diagram is located in Section 7.

2. The selected contractor will designate the system to light the flare and the dedication of the back-up igniters.

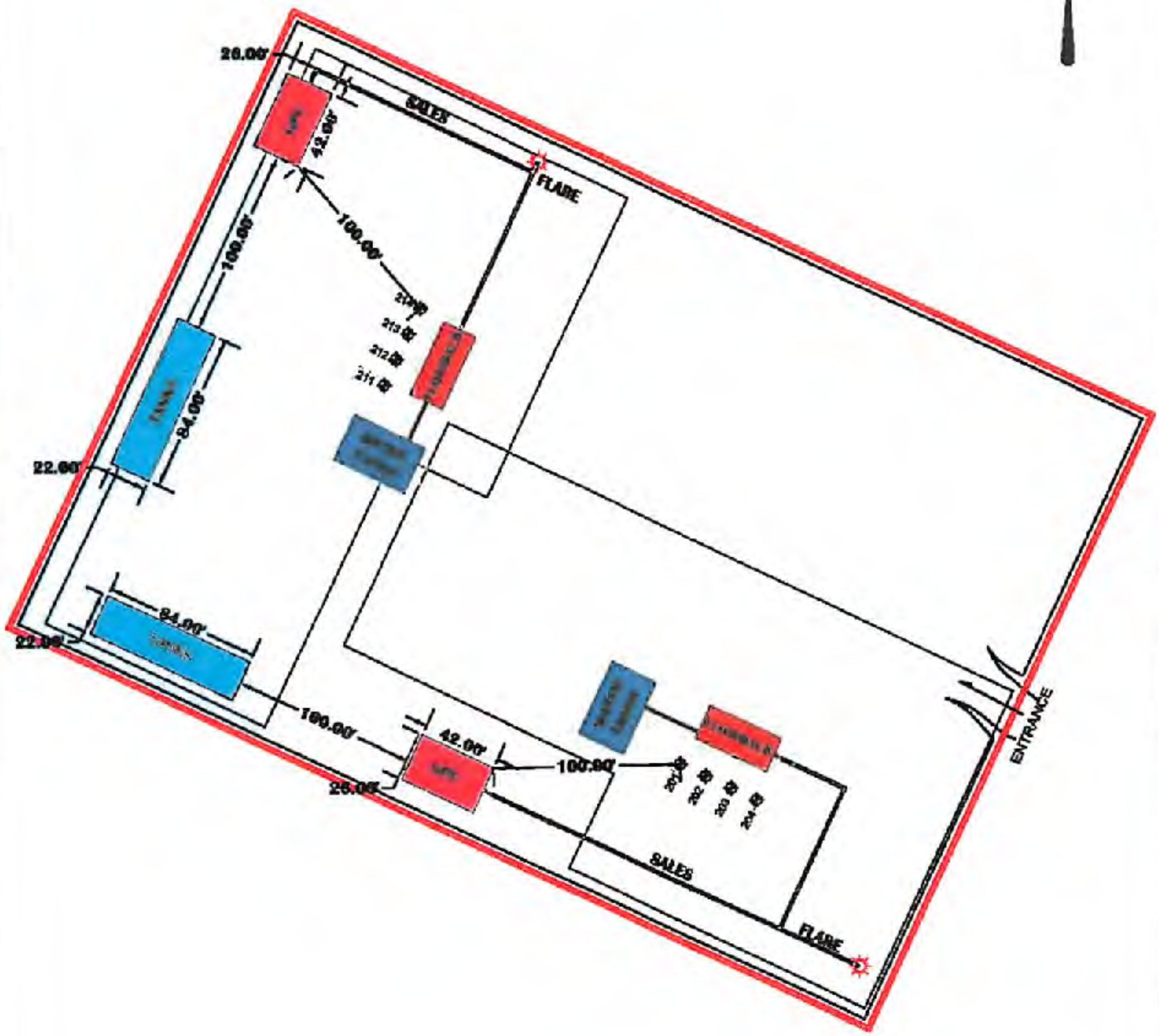
3. The Harrison County Emergency Services and local Volunteer Fire Department shall be notified by the selected contractor foreman prior to lighting the flare when possible, and as soon after lighting the flare as reasonably possible.

4. A minimum distance of 100 feet will be maintained to the nearest flammable material beyond the end of the flare line. The flare line has been placed in order to avoid any distance less than 100 feet to the nearest wooded area. The flare line minimum distances to the nearest flammable material shall be detailed in each of the operations meetings and the pre-drill or weekly safety meetings with all personnel.

5. The estimated flaring operations for this site are anticipated to last no longer than two weeks.

J OSBORN HSOP 16

SIMPSON DISTRICT, HARRISON COUNTY
WEST VIRGINIA



0 60' 120' 180'

NAD83 WELL LOCATIONS

WELL	LATITUDE	LONGITUDE	NORTHING	EASTING	LATITUDE(DEC)	LONGITUDE(DEC)	UTM NORTHING(M)	UTM EASTING(M)	EXISTING ELEV	PROPOSED ELEV
201	39°15'57.45"	-80°13'04.79"	279785.329	1765218.614	39.265958	-80.217997	4346555.31	567461.33	1165.70'	1163.30'
202	39°15'57.39"	-80°13'04.61"	279768.999	1765230.413	39.265942	-80.217947	4346580.45	567480.49	1165.87'	1163.30'
203	39°15'57.33"	-80°13'04.44"	279782.8[illegible]	1765244.012	[illegible]	-80.217900	4346578.69	567469.56	1164.36'	1163.30'
204	39°15'57.26"	-80°13'04.27"	279778.339	1765257.811	[illegible]	-80.217853	4346576.73	567473.75	1163.14'	1163.30'
211	39°15'58.41"	-80°13'06.85"	279824.226	1765058.418	39.266503	-80.218569	4346642.31	567411.35	1166.23'	1163.30'
212	39°15'58.84"	-80°13'06.77"	280008.534	1765062.724	39.266538	-80.218547	4346646.48	567413.20	1166.57'	1163.30'
213	39°15'58.88"	-80°13'06.69"	280022.140	1765060.049	39.266578	-80.218525	4346650.66	567415.06	1165.35'	1163.30'
214	39°15'59.81"	-80°13'06.61"	280035.745	1765075.365	39.266614	-80.218503	4346654.84	567416.91	1164.89'	1163.30'

RECEIVED
Office of Oil and Gas

SEP 20 2021

WV Department of
Environmental Protection

LEGEND
- PROPOSED WELL
- RIG FOOTPRINT
- EDGE OF BERM

WEST VIRGINIA STATE PLANE COORDINATES
NORTH ZONE
UTM COORDINATES ZONE 17 NORTH 83
NOTE: DRAWING CREATED ON 11"x17" PAPER

Blue Mountain Inc.
11023 MASON DIXON HIGHWAY
BURTON, WV 26562
PHONE: (304) 662-6486

PAD LAYOUT

J OSBORN HSOP 16

DISTRICT:	SIMPSON	SCALE:	1 INCH = 60 FEET
COUNTY:	HARRISON	WATERSHED:	SIMPSON CREEK
QUAD:	ROSEMONT	DATE:	19 JUNE 2018

ARSENAL RESOURCES

10/08/2021

Section 8 – Collision Avoidance

A. Established Definitions

Protocol and established safeguard designed to prevent underground collisions during any drilling on multi-well pads.

B. Description of Risk

Arsenal Resources uses an anti-collision protocol on all wells as a safeguard designed to prevent underground collision during any drilling on multi-well pads.

C. Plan Components

1. All surveys will be MWD/EM survey tools in all hole sections, and surveys will be taken every stand (Around 90'). If the SF < 1 surveys will be taken on a more frequent basis, most likely every 30'. We will discuss with the WVDEP Oil and Gas Inspector.

2. All directional and MWD tools will be visually inspected by directional MWD personnel and Arsenal Resources site representatives at a minimum.

3. Surface nudges will be planned by the directional company as needed to maintain a safe SF.

4. The same survey tools that we use in the vertical section will be used.

5. The directional company uses a AC software to maintain a safe SF. Compass is the current company's software.

6. Arsenal Resources will maintain the state minimum SF factors in all whole sections.

    a. Minimum SF standards (thresholds) required – SF > 1.5 shall be obtained early as practical and maintained. Survey every stand (90').
    b. SF > 2 applies when in proximity to any fractured or any producing well that exists on the well pad. Survey every stand (90'). **Additional risk management might be needed as well and will be addressed as needed.

7. Lateral Section
    a. Arsenal Resources will work with the directional companies to maintain delineation, grid connections, and ensure magnetic interference correction is being followed. The onsite Arsenal Resources representative and the directional company's MWD personnel will be responsible for QC/QA.

8. For any existing horizontal or vertical well found adjacent to the lateral section Arsenal Resources will maintain over a 2 SF and will review each well on a case by case basis with a pre-drilled AC program along with continually updating the plan while drilling.

9. Arsenal Resources will attach the wall map showing all wells on the pad spaced at 10' - 15' apart. If there is a fractured well, (live) well, Arsenal Resources will note it in the drawing.

10. When there is an existing wellbore on the pad, Arsenal Resources will attach notes and or surveys for the well.

11. If a collision should occur, the wellbores would be shut in immediately and the well would need to be killed with kill mud. If a survey shows imminent risk for a collision, Arsenal Resources will stop drilling and confirm with a gyro, then evaluate the situation on a case by case basis. If Arsenal Resources can steer away with MWD or a gyro we will, or we will plug back if needed.

12. Arsenal Resources will notify the WVDEP Oil and Gas inspector immediately of any underground collision or if the SF level 1 is determined.

13. Arsenal Resources will provide other supportive resources as needed.

ARSENAL RESOURCES

Arsenal Resources

Harrison County, West Virginia
J Osborn HSOP16, #203

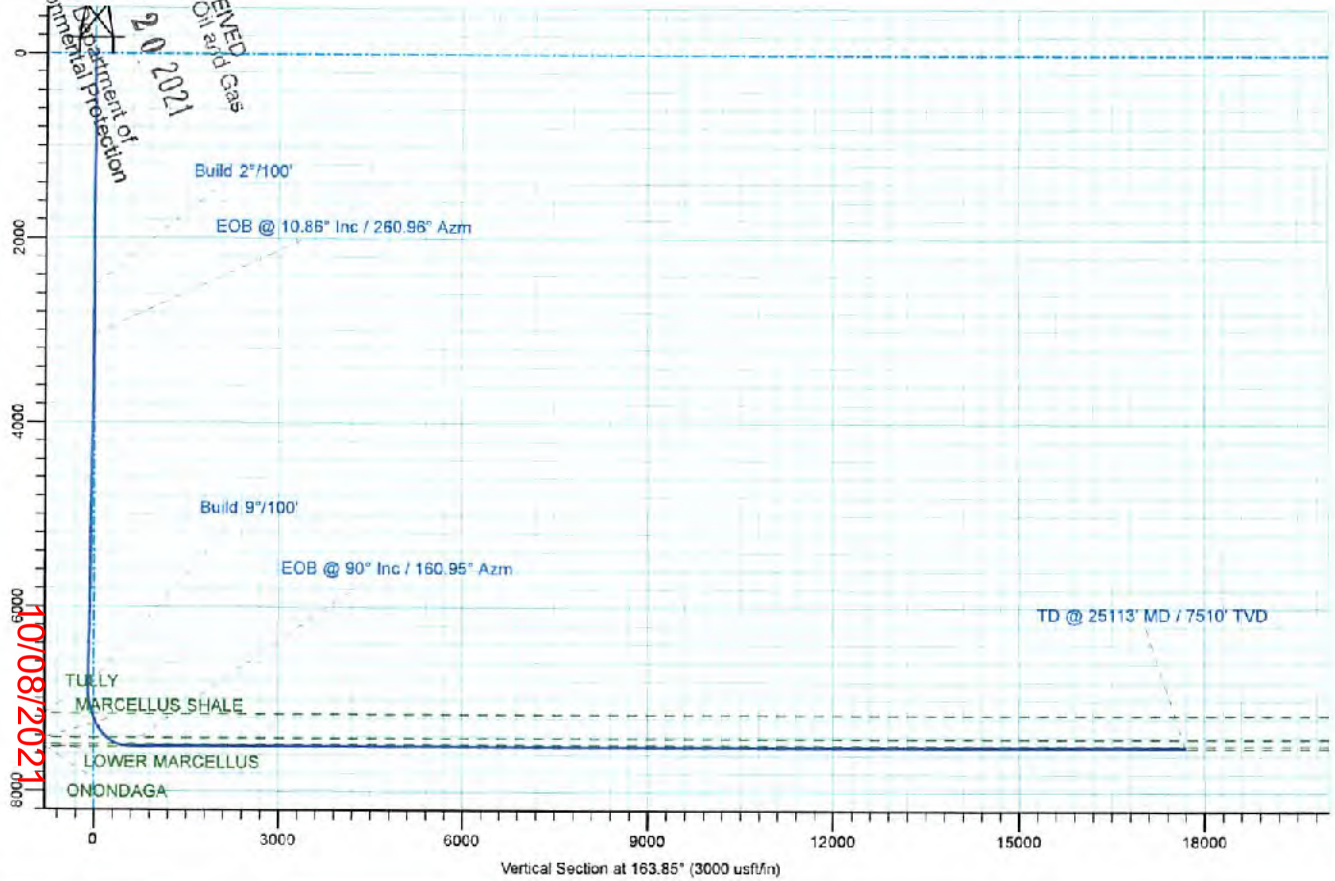
Anti-collision Report (Attached)

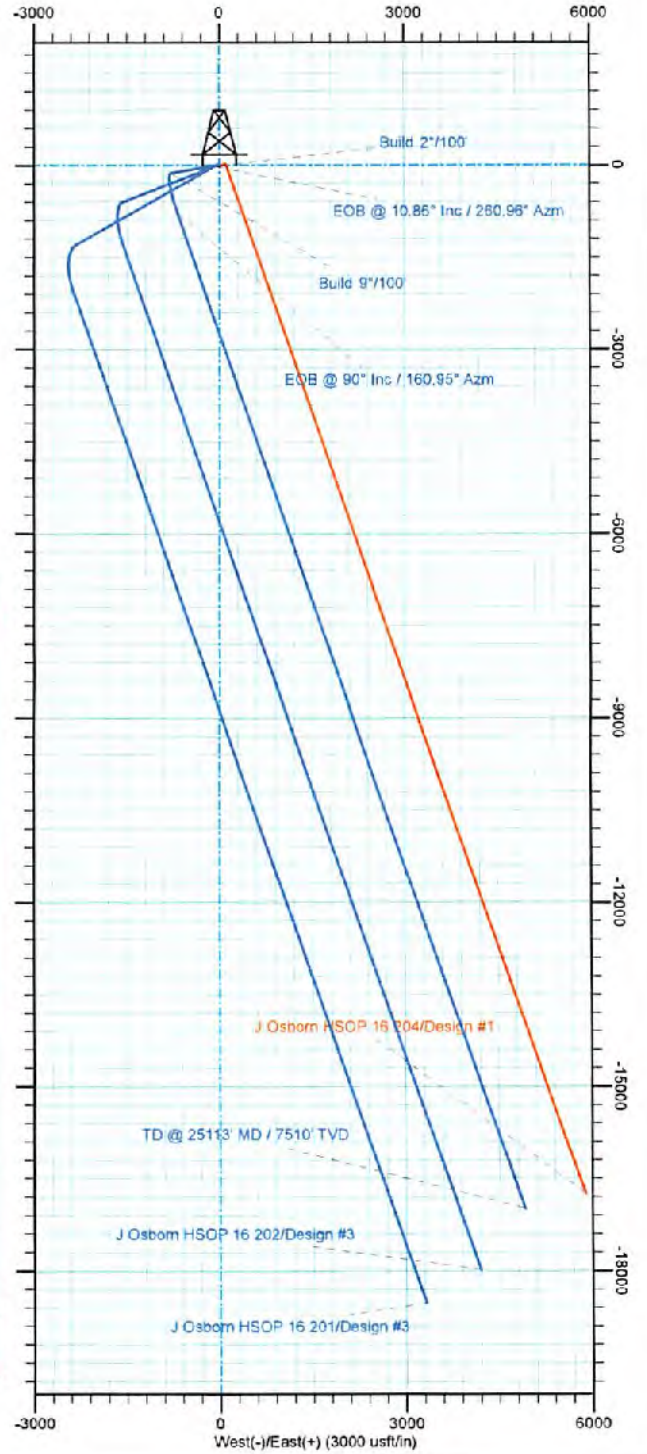
ARSENAL RESOURCES | KLX Directional Drilling

Arsenal Resources
Harrison County, West Virginia NAD 83
J Osborn HSOP 16 Pad
J Osborn HSOP 16 203
Design #3

ANNOTATIONS

MD	Inc	Azi	TVD	+N/-S	+E/-W	VSect	Departure	Annotation
2500.0	0.00	0.00	2500.0	0.0	0.0	0.0	0.0	Build 2°/100'
3042.9	10.86	260.96	3039.7	-8.1	-50.7	-6.3	51.3	EOB @ 10.86° Inc / 260.96° Azm
6936.9	10.86	260.96	6864.0	-123.3	-775.1	-97.1	784.8	Build 9°/100'
7957.8	90.00	160.95	7510.0	-764.5	-682.8	544.5	1454.1	EOB @ 90° Inc / 160.95° Azm
25113.4	90.00	160.95	7510.0	-16980.9	4916.1	17678.2	18609.8	TD @ 25113' MD / 7510' TVD





ARSENAL
RESOURCES

Arsenal Resources

Harrison County, West Virginia NAD 83
J Osborn HSOP 16 Pad
J Osborn HSOP 16 203

Wellbore #1

Plan: Design #3

KLX Well Planning Report

13 September, 2021

KLX
Directional Drilling

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well J Osborn HSOP 16 203
Company:	Arsenal Resources	**TVD Reference:**	WELL @ 1191.0usft
Project:	Harrison County, West Virginia NAD 83	**MD Reference:**	WELL @ 1191.0usft
Site:	J Osborn HSOP 16 Pad	**North Reference:**	Grid
Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #3		

Project	Harrison County, West Virginia NAD 83		
Map System:	US State Plane 1983	**System Datum:**	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	West Virginia Northern Zone		

Site	J Osborn HSOP 16 Pad				
Site Position:		**Northing:**	279,776.33 usft	**Latitude:**	39° 15' 57.265 N
From:	Map	**Easting:**	1,765,257.61 usft	**Longitude:**	80° 13' 4.267 W
Position Uncertainty:	0.0 usft	**Slot Radius:**	13-3/16 "	**Grid Convergence:**	-0.46 °

Well	J Osborn HSOP 16 203					
Well Position	**+N/-S**	6.3 usft	**Northing:**	279,782.67 usft	**Latitude:**	39° 15' 57.326 N
	+E/-W	-13.6 usft	**Easting:**	1,765,244.01 usft	**Longitude:**	80° 13' 4.441 W
Position Uncertainty		0.0 usft	**Wellhead Elevation:**		**Ground Level:**	1,164.0 usft

Wellbore	Wellbore #1			
Magnetics	**Model Name**	**Sample Date**	**Declination (°)**	**Dip Angle (°)**	**Field Strength (nT)**
	IGRF2015	8/14/2018	-8.95	66.38	51,718.58873376

Design	Design #3			
Audit Notes:				
Version:	**Phase:**	PLAN	**Tie On Depth:**	0.0

Vertical Section:	**Depth From (TVD) (usft)**	**+N/-S (usft)**	**+E/-W (usft)**	**Direction (°)**
	0.0	0.0	0.0	163.85

Plan Sections

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
2,500.0	0.00	0.00	2,500.0	0.0	0.0	0.00	0.00	0.00	0.00	
3,042.9	10.86	260.96	3,039.7	-8.1	-50.7	2.00	2.00	0.00	260.96	
6,936.9	10.86	260.96	6,864.0	-123.3	-775.1	0.00	0.00	0.00	0.00	
7,957.8	90.00	160.95	7,510.0	-764.5	-682.8	9.00	7.75	-9.80	-99.84	LP J Osborn HSOP
25,113.4	90.00	160.95	7,510.0	-16,980.9	4,916.1	0.00	0.00	0.00	0.00	PBHL J Osborn HS

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well J Osborn HSOP 16 203
Company:	Arsenal Resources	**TVD Reference:**	WELL @ 1191.0usft
Project:	Harrison County, West Virginia NAD 83	**MD Reference:**	WELL @ 1191.0usft
Site:	J Osborn HSOP 16 Pad	**North Reference:**	Grid
Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #3		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	0.00
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	0.00
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00
1,100.0	0.00	0.00	1,100.0	0.0	0.0	0.0	0.00	0.00	0.00
1,200.0	0.00	0.00	1,200.0	0.0	0.0	0.0	0.00	0.00	0.00
1,300.0	0.00	0.00	1,300.0	0.0	0.0	0.0	0.00	0.00	0.00
1,400.0	0.00	0.00	1,400.0	0.0	0.0	0.0	0.00	0.00	0.00
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	0.00	0.00	0.00
1,600.0	0.00	0.00	1,600.0	0.0	0.0	0.0	0.00	0.00	0.00
1,700.0	0.00	0.00	1,700.0	0.0	0.0	0.0	0.00	0.00	0.00
1,800.0	0.00	0.00	1,800.0	0.0	0.0	0.0	0.00	0.00	0.00
1,900.0	0.00	0.00	1,900.0	0.0	0.0	0.0	0.00	0.00	0.00
2,000.0	0.00	0.00	2,000.0	0.0	0.0	0.0	0.00	0.00	0.00
2,100.0	0.00	0.00	2,100.0	0.0	0.0	0.0	0.00	0.00	0.00
2,200.0	0.00	0.00	2,200.0	0.0	0.0	0.0	0.00	0.00	0.00
2,300.0	0.00	0.00	2,300.0	0.0	0.0	0.0	0.00	0.00	0.00
2,400.0	0.00	0.00	2,400.0	0.0	0.0	0.0	0.00	0.00	0.00
Build 2°/100'									
2,500.0	0.00	0.00	2,500.0	0.0	0.0	0.0	0.00	0.00	0.00
2,600.0	2.00	260.96	2,600.0	-0.3	-1.7	-0.2	2.00	2.00	0.00
2,700.0	4.00	260.96	2,699.8	-1.1	-6.9	-0.9	2.00	2.00	0.00
2,800.0	6.00	260.96	2,799.5	-2.5	-15.5	-1.9	2.00	2.00	0.00
2,900.0	8.00	260.96	2,898.7	-4.4	-27.5	-3.5	2.00	2.00	0.00
3,000.0	10.00	260.96	2,997.5	-6.8	-43.0	-5.4	2.00	2.00	0.00
EOB @ 10.86° Inc / 260.96° Azm									
3,042.9	10.86	260.96	3,039.7	-8.1	-50.7	-6.3	2.00	2.00	0.00
3,100.0	10.86	260.96	3,095.7	-9.7	-61.3	-7.7	0.00	0.00	0.00
3,200.0	10.86	260.96	3,193.9	-12.7	-79.9	-10.0	0.00	0.00	0.00
3,300.0	10.86	260.96	3,292.2	-15.7	-98.5	-12.3	0.00	0.00	0.00
3,400.0	10.86	260.96	3,390.4	-18.6	-117.1	-14.7	0.00	0.00	0.00
3,500.0	10.86	260.96	3,488.6	-21.6	-135.7	-17.0	0.00	0.00	0.00
3,600.0	10.86	260.96	3,586.8	-24.5	-154.3	-19.3	0.00	0.00	0.00
3,700.0	10.86	260.96	3,685.0	-27.5	-172.9	-21.7	0.00	0.00	0.00
3,800.0	10.86	260.96	3,783.2	-30.5	-191.5	-24.0	0.00	0.00	0.00
3,900.0	10.86	260.96	3,881.4	-33.4	-210.1	-26.3	0.00	0.00	0.00
4,000.0	10.86	260.96	3,979.6	-36.4	-228.7	-28.7	0.00	0.00	0.00
4,100.0	10.86	260.96	4,077.8	-39.3	-247.3	-31.0	0.00	0.00	0.00
4,200.0	10.86	260.96	4,176.0	-42.3	-265.9	-33.3	0.00	0.00	0.00
4,300.0	10.86	260.96	4,274.3	-45.2	-284.5	-35.7	0.00	0.00	0.00
4,400.0	10.86	260.96	4,372.5	-48.2	-303.1	-38.0	0.00	0.00	0.00
4,500.0	10.86	260.96	4,470.7	-51.2	-321.7	-40.3	0.00	0.00	0.00
4,600.0	10.86	260.96	4,568.9	-54.1	-340.3	-42.7	0.00	0.00	0.00
4,700.0	10.86	260.96	4,667.1	-57.1	-358.9	-45.0	0.00	0.00	0.00
4,800.0	10.86	260.96	4,765.3	-60.0	-377.5	-47.3	0.00	0.00	0.00
4,900.0	10.86	260.96	4,863.5	-63.0	-396.1	-49.7	0.00	0.00	0.00
5,000.0	10.86	260.96	4,961.7	-66.0	-414.7	-52.0	0.00	0.00	0.00

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well J Osborn HSOP 16 203
Company:	Arsenal Resources	**TVD Reference:**	WELL @ 1191.0usft
Project:	Harrison County, West Virginia NAD 83	**MD Reference:**	WELL @ 1191.0usft
Site:	J Osborn HSOP 16 Pad	**North Reference:**	Grid
Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #3		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,100.0	10.86	260.96	5,059.9	-68.9	-433.3	-54.3	0.00	0.00	0.00
5,200.0	10.86	260.96	5,158.1	-71.9	-452.0	-56.6	0.00	0.00	0.00
5,300.0	10.86	260.96	5,256.3	-74.8	-470.6	-59.0	0.00	0.00	0.00
5,400.0	10.86	260.96	5,354.6	-77.8	-489.2	-61.3	0.00	0.00	0.00
5,500.0	10.86	260.96	5,452.8	-80.7	-507.8	-63.6	0.00	0.00	0.00
5,600.0	10.86	260.96	5,551.0	-83.7	-526.4	-66.0	0.00	0.00	0.00
5,700.0	10.86	260.96	5,649.2	-86.7	-545.0	-68.3	0.00	0.00	0.00
5,800.0	10.86	260.96	5,747.4	-89.6	-563.6	-70.6	0.00	0.00	0.00
5,900.0	10.86	260.96	5,845.6	-92.6	-582.2	-73.0	0.00	0.00	0.00
6,000.0	10.86	260.96	5,943.8	-95.5	-600.8	-75.3	0.00	0.00	0.00
6,100.0	10.86	260.96	6,042.0	-98.5	-619.4	-77.6	0.00	0.00	0.00
6,200.0	10.86	260.96	6,140.2	-101.5	-638.0	-80.0	0.00	0.00	0.00
6,300.0	10.86	260.96	6,238.4	-104.4	-656.6	-82.3	0.00	0.00	0.00
6,400.0	10.86	260.96	6,336.7	-107.4	-675.2	-84.6	0.00	0.00	0.00
6,500.0	10.86	260.96	6,434.9	-110.3	-693.8	-87.0	0.00	0.00	0.00
6,600.0	10.86	260.96	6,533.1	-113.3	-712.4	-89.3	0.00	0.00	0.00
6,700.0	10.86	260.96	6,631.3	-116.2	-731.0	-91.6	0.00	0.00	0.00
6,800.0	10.86	260.96	6,729.5	-119.2	-749.6	-94.0	0.00	0.00	0.00
6,900.0	10.86	260.96	6,827.7	-122.2	-768.2	-96.3	0.00	0.00	0.00
Build 9°/100'									
6,936.9	10.86	260.96	6,864.0	-123.3	-775.1	-97.1	0.00	0.00	0.00
6,950.0	10.72	254.71	6,876.8	-123.8	-777.5	-97.3	9.00	-1.06	-47.77
7,000.0	11.34	231.25	6,925.9	-128.1	-785.8	-95.5	9.00	1.25	-46.91
7,050.0	13.51	212.78	6,974.8	-136.1	-792.8	-89.8	9.00	4.33	-36.95
7,100.0	16.62	200.19	7,023.0	-147.7	-798.4	-80.2	9.00	6.23	-25.17
7,150.0	20.25	191.74	7,070.5	-162.9	-802.7	-66.7	9.00	7.26	-16.91
7,200.0	24.17	185.84	7,116.8	-181.6	-805.5	-49.6	9.00	7.83	-11.79
7,250.0	28.25	181.53	7,161.6	-203.6	-806.8	-28.8	9.00	8.16	-8.62
TULLY									
7,250.4	28.28	181.50	7,162.0	-203.8	-806.8	-28.6	9.00	8.28	-7.45
7,300.0	32.43	178.24	7,204.8	-228.8	-806.7	-4.5	9.00	8.37	-6.57
7,350.0	36.68	175.64	7,245.9	-257.1	-805.2	23.1	9.00	8.50	-5.21
7,400.0	40.98	173.51	7,284.9	-288.3	-802.2	53.9	9.00	8.60	-4.26
7,450.0	45.31	171.72	7,321.3	-322.2	-797.8	87.7	9.00	8.66	-3.58
7,500.0	49.67	170.18	7,355.1	-358.6	-792.0	124.2	9.00	8.71	-3.08
7,550.0	54.04	168.83	7,386.0	-397.3	-784.8	163.4	9.00	8.75	-2.70
7,600.0	58.43	167.62	7,413.8	-437.9	-776.3	204.8	9.00	8.77	-2.42
MARCELLUS SHALE									
7,616.0	59.83	167.25	7,422.0	-451.3	-773.3	218.5	9.00	8.79	-2.27
7,650.0	62.82	166.52	7,438.3	-480.4	-766.5	248.3	9.00	8.80	-2.17
7,700.0	67.23	165.50	7,459.4	-524.4	-755.6	293.6	9.00	8.81	-2.03
7,750.0	71.64	164.54	7,477.0	-569.6	-743.5	340.3	9.00	8.82	-1.91
LOWER MARCELLUS									
7,796.4	75.73	163.70	7,490.0	-612.3	-731.3	384.8	9.00	8.83	-1.81
7,800.0	76.05	163.64	7,490.9	-615.7	-730.3	388.4	9.00	8.83	-1.78
7,850.0	80.47	162.77	7,501.1	-662.6	-716.2	437.3	9.00	8.84	-1.74
7,900.0	84.89	161.92	7,507.4	-709.8	-701.1	486.9	9.00	8.84	-1.70
7,950.0	89.31	161.08	7,510.0	-757.2	-685.3	536.7	9.00	8.84	-1.68
EOB @ 90° Inc / 160.95° Azm									
7,957.8	90.00	160.95	7,510.0	-764.5	-682.8	544.5	9.00	8.84	-1.67
8,000.0	90.00	160.95	7,510.0	-804.4	-669.0	586.7	0.00	0.00	0.00
8,100.0	90.00	160.95	7,510.0	-899.0	-636.3	686.6	0.00	0.00	0.00
8,200.0	90.00	160.95	7,510.0	-993.5	-603.7	786.4	0.00	0.00	0.00

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Company:	Arsenal Resources	**TVD Reference:**	WELL @ 1191.0usft
Project:	Harrison County, West Virginia NAD 83	**MD Reference:**	WELL @ 1191.0usft
Site:	J Osborn HSOP 16 Pad	**North Reference:**	Grid
Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #3		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
8,300.0	90.00	160.95	7,510.0	-1,088.0	-571.0	886.3	0.00	0.00	0.00
8,400.0	90.00	160.95	7,510.0	-1,182.5	-538.4	986.2	0.00	0.00	0.00
8,500.0	90.00	160.95	7,510.0	-1,277.1	-505.8	1,086.0	0.00	0.00	0.00
8,600.0	90.00	160.95	7,510.0	-1,371.6	-473.1	1,185.9	0.00	0.00	0.00
8,700.0	90.00	160.95	7,510.0	-1,466.1	-440.5	1,285.8	0.00	0.00	0.00
8,800.0	90.00	160.95	7,510.0	-1,560.6	-407.9	1,385.7	0.00	0.00	0.00
8,900.0	90.00	160.95	7,510.0	-1,655.2	-375.2	1,485.5	0.00	0.00	0.00
9,000.0	90.00	160.95	7,510.0	-1,749.7	-342.6	1,585.4	0.00	0.00	0.00
9,100.0	90.00	160.95	7,510.0	-1,844.2	-309.9	1,685.3	0.00	0.00	0.00
9,200.0	90.00	160.95	7,510.0	-1,938.7	-277.3	1,785.1	0.00	0.00	0.00
9,300.0	90.00	160.95	7,510.0	-2,033.2	-244.7	1,885.0	0.00	0.00	0.00
9,400.0	90.00	160.95	7,510.0	-2,127.8	-212.0	1,984.9	0.00	0.00	0.00
9,500.0	90.00	160.95	7,510.0	-2,222.3	-179.4	2,084.8	0.00	0.00	0.00
9,600.0	90.00	160.95	7,510.0	-2,316.8	-146.7	2,184.6	0.00	0.00	0.00
9,700.0	90.00	160.95	7,510.0	-2,411.3	-114.1	2,284.5	0.00	0.00	0.00
9,800.0	90.00	160.95	7,510.0	-2,505.9	-81.5	2,384.4	0.00	0.00	0.00
9,900.0	90.00	160.95	7,510.0	-2,600.4	-48.8	2,484.2	0.00	0.00	0.00
10,000.0	90.00	160.95	7,510.0	-2,694.9	-16.2	2,584.1	0.00	0.00	0.00
10,100.0	90.00	160.95	7,510.0	-2,789.4	16.5	2,684.0	0.00	0.00	0.00
10,200.0	90.00	160.95	7,510.0	-2,884.0	49.1	2,783.9	0.00	0.00	0.00
10,300.0	90.00	160.95	7,510.0	-2,978.5	81.7	2,883.7	0.00	0.00	0.00
10,400.0	90.00	160.95	7,510.0	-3,073.0	114.4	2,983.6	0.00	0.00	0.00
10,500.0	90.00	160.95	7,510.0	-3,167.5	147.0	3,083.5	0.00	0.00	0.00
10,600.0	90.00	160.95	7,510.0	-3,262.0	179.7	3,183.3	0.00	0.00	0.00
10,700.0	90.00	160.95	7,510.0	-3,356.6	212.3	3,283.2	0.00	0.00	0.00
10,800.0	90.00	160.95	7,510.0	-3,451.1	244.9	3,383.1	0.00	0.00	0.00
10,900.0	90.00	160.95	7,510.0	-3,545.6	277.6	3,483.0	0.00	0.00	0.00
11,000.0	90.00	160.95	7,510.0	-3,640.1	310.2	3,582.8	0.00	0.00	0.00
11,100.0	90.00	160.95	7,510.0	-3,734.7	342.9	3,682.7	0.00	0.00	0.00
11,200.0	90.00	160.95	7,510.0	-3,829.2	375.5	3,782.6	0.00	0.00	0.00
11,300.0	90.00	160.95	7,510.0	-3,923.7	408.1	3,882.4	0.00	0.00	0.00
11,400.0	90.00	160.95	7,510.0	-4,018.2	440.8	3,982.3	0.00	0.00	0.00
11,500.0	90.00	160.95	7,510.0	-4,112.8	473.4	4,082.2	0.00	0.00	0.00
11,600.0	90.00	160.95	7,510.0	-4,207.3	506.0	4,182.1	0.00	0.00	0.00
11,700.0	90.00	160.95	7,510.0	-4,301.8	538.7	4,281.9	0.00	0.00	0.00
11,800.0	90.00	160.95	7,510.0	-4,396.3	571.3	4,381.8	0.00	0.00	0.00
11,900.0	90.00	160.95	7,510.0	-4,490.9	604.0	4,481.7	0.00	0.00	0.00
12,000.0	90.00	160.95	7,510.0	-4,585.4	636.6	4,581.5	0.00	0.00	0.00
12,100.0	90.00	160.95	7,510.0	-4,679.9	669.2	4,681.4	0.00	0.00	0.00
12,200.0	90.00	160.95	7,510.0	-4,774.4	701.9	4,781.3	0.00	0.00	0.00
12,300.0	90.00	160.95	7,510.0	-4,868.9	734.5	4,881.2	0.00	0.00	0.00
12,400.0	90.00	160.95	7,510.0	-4,963.5	767.2	4,981.0	0.00	0.00	0.00
12,500.0	90.00	160.95	7,510.0	-5,058.0	799.8	5,080.9	0.00	0.00	0.00
12,600.0	90.00	160.95	7,510.0	-5,152.5	832.4	5,180.8	0.00	0.00	0.00
12,700.0	90.00	160.95	7,510.0	-5,247.0	865.1	5,280.6	0.00	0.00	0.00
12,800.0	90.00	160.95	7,510.0	-5,341.6	897.7	5,380.5	0.00	0.00	0.00
12,900.0	90.00	160.95	7,510.0	-5,436.1	930.4	5,480.4	0.00	0.00	0.00
13,000.0	90.00	160.95	7,510.0	-5,530.6	963.0	5,580.3	0.00	0.00	0.00
13,100.0	90.00	160.95	7,510.0	-5,625.1	995.6	5,680.1	0.00	0.00	0.00
13,200.0	90.00	160.95	7,510.0	-5,719.7	1,028.3	5,780.0	0.00	0.00	0.00
13,300.0	90.00	160.95	7,510.0	-5,814.2	1,060.9	5,879.9	0.00	0.00	0.00
13,400.0	90.00	160.95	7,510.0	-5,908.7	1,093.6	5,979.7	0.00	0.00	0.00
13,500.0	90.00	160.95	7,510.0	-6,003.2	1,126.2	6,079.6	0.00	0.00	0.00
13,600.0	90.00	160.95	7,510.0	-6,097.8	1,158.8	6,179.5	0.00	0.00	0.00

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Site:	J Osborn HSOP 16 Pad	**North Reference:**	Grid
Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #3		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
13,700.0	90.00	160.95	7,510.0	-6,192.3	1,191.5	6,279.4	0.00	0.00	0.00
13,800.0	90.00	160.95	7,510.0	-6,286.8	1,224.1	6,379.2	0.00	0.00	0.00
13,900.0	90.00	160.95	7,510.0	-6,381.3	1,256.8	6,479.1	0.00	0.00	0.00
14,000.0	90.00	160.95	7,510.0	-6,475.8	1,289.4	6,579.0	0.00	0.00	0.00
14,100.0	90.00	160.95	7,510.0	-6,570.4	1,322.0	6,678.8	0.00	0.00	0.00
14,200.0	90.00	160.95	7,510.0	-6,664.9	1,354.7	6,778.7	0.00	0.00	0.00
14,300.0	90.00	160.95	7,510.0	-6,759.4	1,387.3	6,878.6	0.00	0.00	0.00
14,400.0	90.00	160.95	7,510.0	-6,853.9	1,419.9	6,978.5	0.00	0.00	0.00
14,500.0	90.00	160.95	7,510.0	-6,948.5	1,452.6	7,078.3	0.00	0.00	0.00
14,600.0	90.00	160.95	7,510.0	-7,043.0	1,485.2	7,178.2	0.00	0.00	0.00
14,700.0	90.00	160.95	7,510.0	-7,137.5	1,517.9	7,278.1	0.00	0.00	0.00
14,800.0	90.00	160.95	7,510.0	-7,232.0	1,550.5	7,377.9	0.00	0.00	0.00
14,900.0	90.00	160.95	7,510.0	-7,326.6	1,583.1	7,477.8	0.00	0.00	0.00
15,000.0	90.00	160.95	7,510.0	-7,421.1	1,615.8	7,577.7	0.00	0.00	0.00
15,100.0	90.00	160.95	7,510.0	-7,515.6	1,648.4	7,677.6	0.00	0.00	0.00
15,200.0	90.00	160.95	7,510.0	-7,610.1	1,681.1	7,777.4	0.00	0.00	0.00
15,300.0	90.00	160.95	7,510.0	-7,704.6	1,713.7	7,877.3	0.00	0.00	0.00
15,400.0	90.00	160.95	7,510.0	-7,799.2	1,746.3	7,977.2	0.00	0.00	0.00
15,500.0	90.00	160.95	7,510.0	-7,893.7	1,779.0	8,077.0	0.00	0.00	0.00
15,600.0	90.00	160.95	7,510.0	-7,988.2	1,811.6	8,176.9	0.00	0.00	0.00
15,700.0	90.00	160.95	7,510.0	-8,082.7	1,844.3	8,276.8	0.00	0.00	0.00
15,800.0	90.00	160.95	7,510.0	-8,177.3	1,876.9	8,376.7	0.00	0.00	0.00
15,900.0	90.00	160.95	7,510.0	-8,271.8	1,909.5	8,476.5	0.00	0.00	0.00
16,000.0	90.00	160.95	7,510.0	-8,366.3	1,942.2	8,576.4	0.00	0.00	0.00
16,100.0	90.00	160.95	7,510.0	-8,460.8	1,974.8	8,676.3	0.00	0.00	0.00
16,200.0	90.00	160.95	7,510.0	-8,555.4	2,007.5	8,776.1	0.00	0.00	0.00
16,300.0	90.00	160.95	7,510.0	-8,649.9	2,040.1	8,876.0	0.00	0.00	0.00
16,400.0	90.00	160.95	7,510.0	-8,744.4	2,072.7	8,975.9	0.00	0.00	0.00
16,500.0	90.00	160.95	7,510.0	-8,838.9	2,105.4	9,075.8	0.00	0.00	0.00
16,600.0	90.00	160.95	7,510.0	-8,933.5	2,138.0	9,175.6	0.00	0.00	0.00
16,700.0	90.00	160.95	7,510.0	-9,028.0	2,170.7	9,275.5	0.00	0.00	0.00
16,800.0	90.00	160.95	7,510.0	-9,122.5	2,203.3	9,375.4	0.00	0.00	0.00
16,900.0	90.00	160.95	7,510.0	-9,217.0	2,235.9	9,475.3	0.00	0.00	0.00
17,000.0	90.00	160.95	7,510.0	-9,311.5	2,268.6	9,575.1	0.00	0.00	0.00
17,100.0	90.00	160.95	7,510.0	-9,406.1	2,301.2	9,675.0	0.00	0.00	0.00
17,200.0	90.00	160.95	7,510.0	-9,500.6	2,333.9	9,774.9	0.00	0.00	0.00
17,300.0	90.00	160.95	7,510.0	-9,595.1	2,366.5	9,874.7	0.00	0.00	0.00
17,400.0	90.00	160.95	7,510.0	-9,689.6	2,399.1	9,974.6	0.00	0.00	0.00
17,500.0	90.00	160.95	7,510.0	-9,784.2	2,431.8	10,074.5	0.00	0.00	0.00
17,600.0	90.00	160.95	7,510.0	-9,878.7	2,464.4	10,174.4	0.00	0.00	0.00
17,700.0	90.00	160.95	7,510.0	-9,973.2	2,497.0	10,274.2	0.00	0.00	0.00
17,800.0	90.00	160.95	7,510.0	-10,067.7	2,529.7	10,374.1	0.00	0.00	0.00
17,900.0	90.00	160.95	7,510.0	-10,162.3	2,562.3	10,474.0	0.00	0.00	0.00
18,000.0	90.00	160.95	7,510.0	-10,256.8	2,595.0	10,573.8	0.00	0.00	0.00
18,100.0	90.00	160.95	7,510.0	-10,351.3	2,627.6	10,673.7	0.00	0.00	0.00
18,200.0	90.00	160.95	7,510.0	-10,445.8	2,660.2	10,773.6	0.00	0.00	0.00
18,300.0	90.00	160.95	7,510.0	-10,540.4	2,692.9	10,873.5	0.00	0.00	0.00
18,400.0	90.00	160.95	7,510.0	-10,634.9	2,725.5	10,973.3	0.00	0.00	0.00
18,500.0	90.00	160.95	7,510.0	-10,729.4	2,758.2	11,073.2	0.00	0.00	0.00
18,600.0	90.00	160.95	7,510.0	-10,823.9	2,790.8	11,173.1	0.00	0.00	0.00
18,700.0	90.00	160.95	7,510.0	-10,918.4	2,823.4	11,272.9	0.00	0.00	0.00
18,800.0	90.00	160.95	7,510.0	-11,013.0	2,856.1	11,372.8	0.00	0.00	0.00
18,900.0	90.00	160.95	7,510.0	-11,107.5	2,888.7	11,472.7	0.00	0.00	0.00
19,000.0	90.00	160.95	7,510.0	-11,202.0	2,921.4	11,572.6	0.00	0.00	0.00

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well J Osborn HSOP 16 203
Company:	Arsenal Resources	**TVD Reference:**	WELL @ 1191.0usft
Project:	Harrison County, West Virginia NAD 83	**MD Reference:**	WELL @ 1191.0usft
Site:	J Osborn HSOP 16 Pad	**North Reference:**	Grid
Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #3		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
19,100.0	90.00	160.95	7,510.0	-11,296.5	2,954.0	11,672.4	0.00	0.00	0.00
19,200.0	90.00	160.95	7,510.0	-11,391.1	2,986.6	11,772.3	0.00	0.00	0.00
19,300.0	90.00	160.95	7,510.0	-11,485.6	3,019.3	11,872.2	0.00	0.00	0.00
19,400.0	90.00	160.95	7,510.0	-11,580.1	3,051.9	11,972.0	0.00	0.00	0.00
19,500.0	90.00	160.95	7,510.0	-11,674.6	3,084.6	12,071.9	0.00	0.00	0.00
19,600.0	90.00	160.95	7,510.0	-11,769.2	3,117.2	12,171.8	0.00	0.00	0.00
19,700.0	90.00	160.95	7,510.0	-11,863.7	3,149.8	12,271.7	0.00	0.00	0.00
19,800.0	90.00	160.95	7,510.0	-11,958.2	3,182.5	12,371.5	0.00	0.00	0.00
19,900.0	90.00	160.95	7,510.0	-12,052.7	3,215.1	12,471.4	0.00	0.00	0.00
20,000.0	90.00	160.95	7,510.0	-12,147.2	3,247.8	12,571.3	0.00	0.00	0.00
20,100.0	90.00	160.95	7,510.0	-12,241.8	3,280.4	12,671.1	0.00	0.00	0.00
20,200.0	90.00	160.95	7,510.0	-12,336.3	3,313.0	12,771.0	0.00	0.00	0.00
20,300.0	90.00	160.95	7,510.0	-12,430.8	3,345.7	12,870.9	0.00	0.00	0.00
20,400.0	90.00	160.95	7,510.0	-12,525.3	3,378.3	12,970.8	0.00	0.00	0.00
20,500.0	90.00	160.95	7,510.0	-12,619.9	3,410.9	13,070.6	0.00	0.00	0.00
20,600.0	90.00	160.95	7,510.0	-12,714.4	3,443.6	13,170.5	0.00	0.00	0.00
20,700.0	90.00	160.95	7,510.0	-12,808.9	3,476.2	13,270.4	0.00	0.00	0.00
20,800.0	90.00	160.95	7,510.0	-12,903.4	3,508.9	13,370.2	0.00	0.00	0.00
20,900.0	90.00	160.95	7,510.0	-12,998.0	3,541.5	13,470.1	0.00	0.00	0.00
21,000.0	90.00	160.95	7,510.0	-13,092.5	3,574.1	13,570.0	0.00	0.00	0.00
21,100.0	90.00	160.95	7,510.0	-13,187.0	3,606.8	13,669.9	0.00	0.00	0.00
21,200.0	90.00	160.95	7,510.0	-13,281.5	3,639.4	13,769.7	0.00	0.00	0.00
21,300.0	90.00	160.95	7,510.0	-13,376.1	3,672.1	13,869.6	0.00	0.00	0.00
21,400.0	90.00	160.95	7,510.0	-13,470.6	3,704.7	13,969.5	0.00	0.00	0.00
21,500.0	90.00	160.95	7,510.0	-13,565.1	3,737.3	14,069.3	0.00	0.00	0.00
21,600.0	90.00	160.95	7,510.0	-13,659.6	3,770.0	14,169.2	0.00	0.00	0.00
21,700.0	90.00	160.95	7,510.0	-13,754.1	3,802.6	14,269.1	0.00	0.00	0.00
21,800.0	90.00	160.95	7,510.0	-13,848.7	3,835.3	14,369.0	0.00	0.00	0.00
21,900.0	90.00	160.95	7,510.0	-13,943.2	3,867.9	14,468.8	0.00	0.00	0.00
22,000.0	90.00	160.95	7,510.0	-14,037.7	3,900.5	14,568.7	0.00	0.00	0.00
22,100.0	90.00	160.95	7,510.0	-14,132.2	3,933.2	14,668.6	0.00	0.00	0.00
22,200.0	90.00	160.95	7,510.0	-14,226.8	3,965.8	14,768.4	0.00	0.00	0.00
22,300.0	90.00	160.95	7,510.0	-14,321.3	3,998.5	14,868.3	0.00	0.00	0.00
22,400.0	90.00	160.95	7,510.0	-14,415.8	4,031.1	14,968.2	0.00	0.00	0.00
22,500.0	90.00	160.95	7,510.0	-14,510.3	4,063.7	15,068.1	0.00	0.00	0.00
22,600.0	90.00	160.95	7,510.0	-14,604.9	4,096.4	15,167.9	0.00	0.00	0.00
22,700.0	90.00	160.95	7,510.0	-14,699.4	4,129.0	15,267.8	0.00	0.00	0.00
22,800.0	90.00	160.95	7,510.0	-14,793.9	4,161.7	15,367.7	0.00	0.00	0.00
22,900.0	90.00	160.95	7,510.0	-14,888.4	4,194.3	15,467.5	0.00	0.00	0.00
23,000.0	90.00	160.95	7,510.0	-14,983.0	4,226.9	15,567.4	0.00	0.00	0.00
23,100.0	90.00	160.95	7,510.0	-15,077.5	4,259.6	15,667.3	0.00	0.00	0.00
23,200.0	90.00	160.95	7,510.0	-15,172.0	4,292.2	15,767.2	0.00	0.00	0.00
23,300.0	90.00	160.95	7,510.0	-15,266.5	4,324.8	15,867.0	0.00	0.00	0.00
23,400.0	90.00	160.95	7,510.0	-15,361.0	4,357.5	15,966.9	0.00	0.00	0.00
23,500.0	90.00	160.95	7,510.0	-15,455.6	4,390.1	16,066.8	0.00	0.00	0.00
23,600.0	90.00	160.95	7,510.0	-15,550.1	4,422.8	16,166.6	0.00	0.00	0.00
23,700.0	90.00	160.95	7,510.0	-15,644.6	4,455.4	16,266.5	0.00	0.00	0.00
23,800.0	90.00	160.95	7,510.0	-15,739.1	4,488.0	16,366.4	0.00	0.00	0.00
23,900.0	90.00	160.95	7,510.0	-15,833.7	4,520.7	16,466.3	0.00	0.00	0.00
24,000.0	90.00	160.95	7,510.0	-15,928.2	4,553.3	16,566.1	0.00	0.00	0.00
24,100.0	90.00	160.95	7,510.0	-16,022.7	4,586.0	16,666.0	0.00	0.00	0.00
24,200.0	90.00	160.95	7,510.0	-16,117.2	4,618.6	16,765.9	0.00	0.00	0.00
24,300.0	90.00	160.95	7,510.0	-16,211.8	4,651.2	16,865.7	0.00	0.00	0.00
24,400.0	90.00	160.95	7,510.0	-16,306.3	4,683.9	16,965.6	0.00	0.00	0.00

Database:	EDM 5000.1 Single User Db	**Local Co-ordinate Reference:**	Well J Osborn HSOP 16 203
Company:	Arsenal Resources	**TVD Reference:**	WELL @ 1191.0usft
Project:	Harrison County, West Virginia NAD 83	**MD Reference:**	WELL @ 1191.0usft
Site:	J Osborn HSOP 16 Pad	**North Reference:**	Grid
Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #3		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
24,500.0	90.00	160.95	7,510.0	-16,400.8	4,716.5	17,065.5	0.00	0.00	0.00
24,600.0	90.00	160.95	7,510.0	-16,495.3	4,749.2	17,165.4	0.00	0.00	0.00
24,700.0	90.00	160.95	7,510.0	-16,589.9	4,781.8	17,265.2	0.00	0.00	0.00
24,800.0	90.00	160.95	7,510.0	-16,684.4	4,814.4	17,365.1	0.00	0.00	0.00
24,900.0	90.00	160.95	7,510.0	-16,778.9	4,847.1	17,465.0	0.00	0.00	0.00
25,000.0	90.00	160.95	7,510.0	-16,873.4	4,879.7	17,564.8	0.00	0.00	0.00
25,100.0	90.00	160.95	7,510.0	-16,967.9	4,912.4	17,664.7	0.00	0.00	0.00
TD @ 25113' MD / 7510' TVD									
25,113.4	90.00	160.95	7,510.0	-16,980.9	4,916.1	17,678.2	0.00	0.00	0.00

Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
LP J Osborn HSOP 1f - plan hits target center - Point	0.00	360.00	7,510.0	-764.5	-682.8	279,018.15	1,764,561.26	39° 15' 49.716 N	80° 13' 13.044 W
PBHL J Osborn HSOF - plan hits target center - Point	0.00	360.00	7,510.0	-16,980.9	4,916.1	262,801.79	1,770,160.10	39° 13' 9.876 N	80° 12' 0.252 W

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
7,250.4	7,162.0	TULLY		0.00	
7,616.0	7,422.0	MARCELLUS SHALE		0.00	
7,796.4	7,490.0	LOWER MARCELLUS		0.00	

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
2,500.0	2,500.0	0.0	0.0	Build 2°/100'
3,042.9	3,039.7	-8.1	-50.7	EOB @ 10.86° Inc / 260.96° Azm
6,936.9	6,864.0	-123.3	-775.1	Build 9°/100'
7,957.8	7,510.0	-764.5	-682.8	EOB @ 90° Inc / 160.95° Azm
25,113.4	7,510.0	-16,980.9	4,916.1	TD @ 25113' MD / 7510' TVD

ARSENAL
RESOURCES

Arsenal Resources

Harrison County, West Virginia NAD 83
J Osborn HSOP 16 Pad
J Osborn HSOP 16 203

Wellbore #1
Design #3

KLX Anticollision Report

13 September, 2021

KLX
Directional Drilling

ARSENAL RESOURCES

Anticollision Report

KLX Directional Drilling

Company:	Arsenal Resources	**Local Co-ordinate Reference:**	Well J Osborn HSOP 16 203
Project:	Harrison County, West Virginia NAD 83	**TVD Reference:**	WELL @ 1191.0usft
Reference Site:	J Osborn HSOP 16 Pad	**MD Reference:**	WELL @ 1191.0usft
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #3	**Offset TVD Reference:**	Offset Datum

Reference	Design #3		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	Stations	**Error Model:**	ISCWSA
Depth Range:	Unlimited	**Scan Method:**	Closest Approach 3D
Results Limited by:	Maximum ellipse separation of 1,000.0 usft	**Error Surface:**	Pedal Curve
Warning Levels Evaluated at:	2.00 Sigma		

Survey Tool Program **Date** 9/13/2021

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.0	25,113.4	Design #3 (Wellbore #1)	MWD default	MWD - Standard

Summary

Site Name Offset Well - Wellbore - Design	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
J Osborn HSOP 16 Pad						
J Osborn HSOP 16 201 - Wellbore #1 - Design #3	2,000.0	2,000.0	30.0	21.3	3.446	CC, ES
J Osborn HSOP 16 201 - Wellbore #1 - Design #3	25,113.4	25,221.9	2,002.3	1,324.4	2.954	SF
J Osborn HSOP 16 202 - Wellbore #1 - Design #3	2,000.0	2,000.0	15.0	6.3	1.723	CC, ES
J Osborn HSOP 16 202 - Wellbore #1 - Design #3	25,113.4	25,164.9	1,000.6	321.5	1.474	Level 3, SF
J Osborn HSOP 16 204 - Curve & Lateral - Design #1	2,500.0	2,499.3	15.0	4.2	1.395	Level 3, CC, ES, SF
J Osborn HSOP 16 204 - Pilot Hole - Design #1	2,500.0	2,499.3	15.0	4.1	1.370	Level 3, CC, ES, SF

Offset Design J Osborn HSOP 16 Pad - J Osborn HSOP 16 201 - Wellbore #1 - Design #3 — Offset Site Error: 0.0 usft

Survey Program: 0-MWD default — Offset Well Error: 0.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
0.0	0.0	0.0	0.0	0.0	0.0	-65.04	12.7	-27.2	30.0			
100.0	100.0	100.0	100.0	0.1	0.1	-65.04	12.7	-27.2	30.0	29.8	182.839	
200.0	200.0	200.0	200.0	0.3	0.3	-65.04	12.7	-27.2	30.0	29.4	48.891	
300.0	300.0	300.0	300.0	0.5	0.5	-65.04	12.7	-27.2	30.0	28.9	28.218	
400.0	400.0	400.0	400.0	0.8	0.8	-65.04	12.7	-27.2	30.0	28.5	19.832	
500.0	500.0	500.0	500.0	1.0	1.0	-65.04	12.7	-27.2	30.0	28.0	15.289	
600.0	600.0	600.0	600.0	1.2	1.2	-65.04	12.7	-27.2	30.0	27.6	12.439	
700.0	700.0	700.0	700.0	1.4	1.4	-65.04	12.7	-27.2	30.0	27.1	10.485	
800.0	800.0	800.0	800.0	1.7	1.7	-65.04	12.7	-27.2	30.0	26.7	9.061	
900.0	900.0	900.0	900.0	1.9	1.9	-65.04	12.7	-27.2	30.0	26.2	7.978	
1,000.0	1,000.0	1,000.0	1,000.0	2.1	2.1	-65.04	12.7	-27.2	30.0	25.8	7.126	
1,100.0	1,100.0	1,100.0	1,100.0	2.3	2.3	-65.04	12.7	-27.2	30.0	25.3	6.439	
1,200.0	1,200.0	1,200.0	1,200.0	2.6	2.6	-65.04	12.7	-27.2	30.0	24.9	5.872	
1,300.0	1,300.0	1,300.0	1,300.0	2.8	2.8	-65.04	12.7	-27.2	30.0	24.4	5.397	
1,400.0	1,400.0	1,400.0	1,400.0	3.0	3.0	-65.04	12.7	-27.2	30.0	24.0	4.993	
1,500.0	1,500.0	1,500.0	1,500.0	3.2	3.2	-65.04	12.7	-27.2	30.0	23.5	4.646	
1,600.0	1,600.0	1,600.0	1,600.0	3.5	3.5	-65.04	12.7	-27.2	30.0	23.1	4.343	
1,700.0	1,700.0	1,700.0	1,700.0	3.7	3.7	-65.04	12.7	-27.2	30.0	22.6	4.078	
1,800.0	1,800.0	1,800.0	1,800.0	3.9	3.9	-65.04	12.7	-27.2	30.0	22.2	3.843	
1,900.0	1,900.0	1,900.0	1,900.0	4.1	4.1	-65.04	12.7	-27.2	30.0	21.7	3.634	
2,000.0	2,000.0	2,000.0	2,000.0	4.4	4.4	-65.04	12.7	-27.2	30.0	21.3	3.446	CC, ES

Company:	Arsenal Resources	**Local Co-ordinate Reference:**	Well J Osborn HSOP 16 203
Project:	Harrison County, West Virginia NAD 83	**TVD Reference:**	WELL @ 1191.0usft
Reference Site:	J Osborn HSOP 16 Pad	**MD Reference:**	WELL @ 1191.0usft
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #3	**Offset TVD Reference:**	Offset Datum

Offset Design J Osborn HSOP 16 Pad - J Osborn HSOP 16 201 - Wellbore #1 - Design #3

Offset Site Error: 0.0 usft

Survey Program: 0-MWD default

Offset Well Error: 0.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
2,100.0	2,100.0	2,099.4	2,099.3	4.6	4.6	-67.64	11.6	-28.7	31.0	21.9	3.399	
2,200.0	2,200.0	2,198.5	2,198.3	4.8	4.7	-74.42	9.2	-33.2	34.5	24.9	3.617	
2,300.0	2,300.0	2,297.1	2,296.6	5.0	4.9	-82.95	5.0	-40.6	41.0	31.1	4.134	
2,400.0	2,400.0	2,395.1	2,393.8	5.3	5.1	-90.95	-0.8	-50.8	51.2	40.9	4.971	
2,500.0	2,500.0	2,492.1	2,489.7	5.5	5.4	-97.38	-8.3	-63.8	65.2	54.5	6.111	
2,600.0	2,600.0	2,588.3	2,584.2	5.7	5.6	-3.24	-17.2	-79.5	81.1	70.1	7.376	
2,700.0	2,699.8	2,683.9	2,677.4	5.9	5.9	-7.17	-27.7	-97.7	97.3	86.0	8.601	
2,800.0	2,799.5	2,778.9	2,769.4	6.1	6.2	-10.53	-39.6	-118.6	113.8	102.0	9.781	
2,900.0	2,898.7	2,873.4	2,859.9	6.3	6.6	-13.51	-52.9	-141.9	130.1	118.2	10.922	
3,000.0	2,997.5	2,967.2	2,948.9	6.5	7.0	-16.23	-67.6	-167.6	146.9	134.7	12.024	
3,042.9	3,039.7	3,007.2	2,986.6	6.6	7.2	-17.33	-74.3	-179.3	154.2	141.8	12.487	
3,100.0	3,095.7	3,060.3	3,036.3	6.8	7.5	-18.74	-83.6	-195.6	164.4	151.9	13.131	
3,200.0	3,193.9	3,152.3	3,121.5	7.1	8.0	-20.82	-100.8	-225.7	185.1	172.3	14.423	
3,300.0	3,292.2	3,243.0	3,204.3	7.4	8.6	-22.44	-119.1	-257.6	209.1	196.0	15.896	
3,400.0	3,390.4	3,332.2	3,284.7	7.7	9.3	-23.67	-138.3	-291.3	236.3	222.8	17.526	
3,500.0	3,488.6	3,419.8	3,362.4	8.0	10.0	-24.59	-158.4	-326.4	266.5	252.7	19.293	
3,600.0	3,586.8	3,505.6	3,437.3	8.3	10.7	-25.27	-179.3	-362.8	299.6	285.5	21.181	
3,700.0	3,685.0	3,589.6	3,509.3	8.6	11.5	-25.76	-200.7	-400.3	335.6	321.1	23.170	
3,800.0	3,783.2	3,681.2	3,587.0	9.0	12.4	-26.17	-224.8	-442.4	373.1	358.1	24.838	
3,900.0	3,881.4	3,773.9	3,665.6	9.3	13.3	-26.51	-249.1	-485.0	410.7	395.1	26.329	
4,000.0	3,979.6	3,865.5	3,744.2	9.7	14.3	-26.79	-273.5	-527.6	448.3	432.1	27.693	
4,100.0	4,077.8	3,959.1	3,822.8	10.0	15.2	-27.03	-297.8	-570.2	485.9	469.1	28.944	
4,200.0	4,176.0	4,051.8	3,901.3	10.4	16.2	-27.23	-322.2	-612.8	523.6	506.2	30.093	
4,300.0	4,274.3	4,144.4	3,979.9	10.8	17.2	-27.40	-346.5	-655.4	561.2	543.2	31.149	
4,400.0	4,372.5	4,237.0	4,058.5	11.1	18.2	-27.56	-370.9	-697.9	598.8	580.2	32.123	
4,500.0	4,470.7	4,329.7	4,137.1	11.5	19.2	-27.69	-395.2	-740.5	636.4	617.2	33.022	
4,600.0	4,568.9	4,422.3	4,215.7	11.9	20.2	-27.81	-419.6	-783.1	674.1	654.2	33.853	
4,700.0	4,667.1	4,515.0	4,294.2	12.3	21.3	-27.92	-443.9	-825.7	711.7	691.2	34.623	
4,800.0	4,765.3	4,607.6	4,372.8	12.7	22.3	-28.02	-468.3	-868.3	749.4	728.2	35.339	
4,900.0	4,863.5	4,700.2	4,451.4	13.1	23.3	-28.10	-492.6	-910.9	787.0	765.1	36.004	
5,000.0	4,961.7	4,792.9	4,530.0	13.4	24.4	-28.18	-517.0	-953.5	824.6	802.1	36.623	
5,100.0	5,059.9	4,885.5	4,608.5	13.8	25.4	-28.25	-541.3	-996.1	862.3	839.1	37.201	
5,200.0	5,158.1	4,978.2	4,687.2	14.2	26.4	-28.32	-565.7	-1,038.6	899.9	876.1	37.742	
5,300.0	5,256.3	5,070.8	4,765.7	14.6	27.5	-28.38	-590.0	-1,081.2	937.5	913.1	38.248	
5,400.0	5,354.5	5,163.4	4,844.3	15.0	28.5	-28.44	-614.4	-1,123.8	975.2	950.0	38.723	
5,500.0	5,452.8	5,256.1	4,922.9	15.4	29.5	-28.49	-638.8	-1,166.4	1,012.9	987.0	39.169	
5,600.0	5,551.0	5,348.7	5,001.5	15.8	30.6	-28.54	-663.1	-1,209.0	1,050.5	1,024.0	39.589	
5,700.0	5,649.2	5,441.4	5,080.1	16.2	31.6	-28.59	-687.5	-1,251.6	1,088.2	1,061.0	39.985	
5,800.0	5,747.4	5,534.0	5,158.7	16.6	32.7	-28.63	-711.8	-1,294.2	1,125.8	1,097.9	40.358	
5,900.0	5,845.6	5,626.6	5,237.2	17.0	33.7	-28.67	-736.2	-1,336.7	1,163.5	1,134.9	40.711	
6,000.0	5,943.8	5,719.3	5,315.8	17.4	34.8	-28.70	-760.5	-1,379.3	1,201.1	1,171.9	41.045	
6,100.0	6,042.0	5,811.9	5,394.4	17.8	35.8	-28.74	-784.9	-1,421.9	1,238.8	1,208.8	41.361	
6,200.0	6,140.2	5,904.5	5,473.0	18.3	36.9	-28.77	-809.2	-1,464.5	1,276.4	1,245.8	41.660	
6,300.0	6,238.4	5,997.2	5,551.6	18.7	37.9	-28.80	-833.6	-1,507.1	1,314.1	1,282.7	41.945	
6,400.0	6,336.7	6,089.8	5,630.2	19.1	39.0	-28.83	-857.9	-1,549.7	1,351.7	1,319.7	42.215	
6,500.0	6,434.9	6,182.5	5,708.7	19.5	40.0	-28.86	-882.3	-1,592.3	1,389.4	1,356.7	42.473	
6,600.0	6,533.1	6,275.1	5,787.3	19.9	41.1	-28.89	-906.6	-1,634.9	1,427.0	1,393.6	42.718	
6,700.0	6,631.3	6,367.7	5,865.9	20.3	42.2	-28.91	-931.0	-1,677.4	1,464.7	1,430.6	42.952	
6,800.0	6,729.5	6,460.4	5,944.5	20.7	43.2	-28.93	-955.3	-1,720.0	1,502.3	1,467.5	43.175	
6,900.0	6,827.7	6,553.0	6,023.1	21.1	44.3	-28.96	-979.7	-1,762.6	1,540.0	1,504.5	43.388	
6,936.9	6,864.0	6,587.2	6,052.1	21.3	44.7	-28.96	-988.7	-1,778.3	1,553.9	1,518.1	43.464	
6,950.0	6,876.8	6,599.4	6,062.4	21.3	44.8	-23.27	-991.9	-1,783.9	1,558.8	1,522.9	43.495	

Company:	Arsenal Resources	**Local Co-ordinate Reference:**	Well J Osborn HSOP 16 203
Project:	Harrison County, West Virginia NAD 83	**TVD Reference:**	WELL @ 1191.0usft
Reference Site:	J Osborn HSOP 16 Pad	**MD Reference:**	WELL @ 1191.0usft
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #3	**Offset TVD Reference:**	Offset Datum

Offset Design J Osborn HSOP 16 Pad - J Osborn HSOP 16 201 - Wellbore #1 - Design #3 — **Offset Site Error:** 0.0 usft

Survey Program: 0-MWD default — **Offset Well Error:** 0.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
7,000.0	6,926.9	6,646.0	6,101.9	21.5	45.3	-1.75	-1,004.1	-1,805.3	1,576.7	1,540.5	43.641	
7,050.0	6,974.8	6,692.7	6,141.6	21.7	45.9	15.07	-1,016.4	-1,826.8	1,593.2	1,556.9	43.819	
7,100.0	7,023.0	6,739.3	6,181.1	21.8	46.4	25.27	-1,028.6	-1,848.3	1,608.4	1,571.9	44.025	
7,150.0	7,070.5	6,785.5	6,220.3	21.9	46.9	33.58	-1,040.8	-1,869.5	1,622.2	1,585.6	44.254	
7,200.0	7,116.6	6,831.0	6,258.9	22.1	47.4	38.56	-1,052.7	-1,890.4	1,634.6	1,597.9	44.496	
7,250.0	7,161.6	6,875.4	6,296.6	22.2	47.9	42.16	-1,064.4	-1,910.8	1,645.7	1,608.9	44.742	
7,300.0	7,204.8	6,918.6	6,333.2	22.3	48.4	44.91	-1,075.8	-1,930.7	1,655.4	1,618.6	44.978	
7,350.0	7,245.9	6,960.3	6,368.5	22.4	48.9	47.14	-1,086.7	-1,949.8	1,663.8	1,627.0	45.190	
7,400.0	7,284.9	7,000.1	6,402.4	22.6	49.4	49.01	-1,097.2	-1,968.2	1,671.1	1,634.3	45.357	
7,450.0	7,321.3	7,037.9	6,434.4	22.7	49.8	50.65	-1,107.1	-1,985.5	1,677.3	1,640.4	45.459	
7,500.0	7,355.1	7,073.5	6,464.6	22.8	50.2	52.10	-1,116.5	-2,001.9	1,682.7	1,645.7	45.473	
7,550.0	7,386.0	7,106.5	6,492.6	22.9	50.6	53.41	-1,125.2	-2,017.1	1,687.2	1,650.0	45.377	
7,600.0	7,413.8	7,136.9	6,518.4	23.1	50.9	54.58	-1,133.2	-2,031.0	1,691.0	1,653.5	45.151	
7,650.0	7,438.3	7,164.4	6,541.7	23.2	51.2	55.63	-1,140.4	-2,043.7	1,694.3	1,656.4	44.782	
7,700.0	7,459.4	7,188.8	6,562.4	23.4	51.5	56.54	-1,146.8	-2,054.9	1,697.1	1,658.8	44.253	
7,750.0	7,477.0	7,210.0	6,580.4	23.6	51.8	57.31	-1,152.4	-2,064.6	1,699.7	1,660.7	43.595	
7,800.0	7,490.9	7,227.9	6,595.6	23.8	52.0	57.92	-1,157.1	-2,072.9	1,702.1	1,662.3	42.790	
7,850.0	7,501.1	7,242.3	6,607.8	24.1	52.1	58.37	-1,160.9	-2,079.5	1,704.4	1,663.7	41.869	
7,900.0	7,507.4	7,253.2	6,617.1	24.4	52.3	58.65	-1,163.7	-2,084.5	1,706.6	1,664.8	40.857	
7,950.0	7,510.0	7,260.6	6,623.3	24.7	52.3	58.74	-1,165.7	-2,087.9	1,708.9	1,666.0	39.786	
7,957.8	7,510.0	7,261.4	6,623.9	24.7	52.4	58.74	-1,165.9	-2,088.2	1,709.3	1,666.1	39.616	
8,000.0	7,510.0	7,265.5	6,627.5	25.0	52.4	58.88	-1,167.0	-2,090.2	1,711.7	1,667.5	38.692	
8,100.0	7,510.0	7,275.4	6,635.8	25.8	52.5	59.21	-1,169.6	-2,094.7	1,721.7	1,674.6	36.558	
8,200.0	7,510.0	7,285.2	6,644.2	25.7	52.6	59.53	-1,172.1	-2,099.2	1,737.3	1,686.9	34.460	
8,300.0	7,510.0	7,295.0	6,652.5	27.7	52.7	59.86	-1,174.7	-2,103.7	1,758.4	1,704.3	32.528	
8,400.0	7,510.0	7,304.9	6,660.9	28.9	52.9	60.19	-1,177.3	-2,108.3	1,784.8	1,727.0	30.910	
8,500.0	7,510.0	7,314.7	6,669.2	30.1	53.0	60.52	-1,179.9	-2,112.8	1,816.3	1,754.9	29.590	
8,600.0	7,510.0	7,324.6	6,677.6	31.4	53.1	60.85	-1,182.5	-2,117.3	1,852.5	1,787.8	28.537	
8,700.0	7,510.0	7,334.4	6,685.9	32.7	53.2	61.18	-1,185.1	-2,121.8	1,893.4	1,825.1	27.718	
8,800.0	7,510.0	7,344.3	6,694.3	34.2	53.3	61.50	-1,187.7	-2,126.4	1,938.5	1,867.0	27.103	
8,900.0	7,510.0	7,354.1	6,702.6	35.6	53.4	61.83	-1,190.3	-2,130.9	1,987.5	1,913.0	26.662	
9,000.0	7,510.0	9,108.4	7,510.0	37.1	67.5	90.00	-2,403.4	-2,235.9	2,003.0	1,931.4	27.986	
9,100.0	7,510.0	9,208.4	7,510.0	38.7	68.2	90.00	-2,498.0	-2,203.3	2,003.0	1,928.3	26.820	
9,200.0	7,510.0	9,308.4	7,510.0	40.3	68.9	90.00	-2,592.5	-2,170.6	2,003.0	1,925.2	25.726	
9,300.0	7,510.0	9,408.4	7,510.0	41.9	69.6	90.00	-2,687.0	-2,138.0	2,003.0	1,921.9	24.701	
9,400.0	7,510.0	9,508.4	7,510.0	43.5	70.4	90.00	-2,781.5	-2,105.3	2,003.0	1,918.6	23.739	
9,500.0	7,510.0	9,608.4	7,510.0	45.2	71.3	90.00	-2,876.1	-2,072.7	2,003.0	1,915.3	22.839	
9,600.0	7,510.0	9,708.4	7,510.0	46.9	72.1	90.00	-2,970.6	-2,040.1	2,003.0	1,911.9	21.994	
9,700.0	7,510.0	9,808.4	7,510.0	48.6	73.0	90.00	-3,065.1	-2,007.4	2,003.0	1,908.5	21.202	
9,800.0	7,510.0	9,908.4	7,510.0	50.3	73.9	90.00	-3,159.6	-1,974.8	2,003.0	1,905.1	20.457	
9,900.0	7,510.0	10,008.4	7,510.0	52.0	74.9	90.00	-3,254.2	-1,942.1	2,003.0	1,901.6	19.758	
10,000.0	7,510.0	10,108.4	7,510.0	53.7	75.9	90.00	-3,348.7	-1,909.5	2,003.0	1,898.1	19.100	
10,100.0	7,510.0	10,208.4	7,510.0	55.5	77.0	90.00	-3,443.2	-1,876.9	2,003.0	1,894.6	18.481	
10,200.0	7,510.0	10,308.4	7,510.0	57.3	78.1	90.00	-3,537.7	-1,844.2	2,003.0	1,891.1	17.897	
10,300.0	7,510.0	10,408.4	7,510.0	59.0	79.2	90.00	-3,632.3	-1,811.6	2,003.0	1,887.5	17.346	
10,400.0	7,510.0	10,508.4	7,510.0	60.8	80.3	90.00	-3,726.8	-1,778.9	2,003.0	1,884.0	16.825	
10,500.0	7,510.0	10,608.4	7,510.0	62.6	81.5	90.00	-3,821.3	-1,746.3	2,003.0	1,880.4	16.332	
10,600.0	7,510.0	10,708.4	7,510.0	64.4	82.7	90.00	-3,915.8	-1,713.7	2,003.0	1,876.8	15.866	
10,700.0	7,510.0	10,808.4	7,510.0	66.2	83.9	90.00	-4,010.3	-1,681.0	2,003.0	1,873.2	15.424	
10,800.0	7,510.0	10,908.4	7,510.0	68.0	85.2	90.00	-4,104.9	-1,648.4	2,003.0	1,869.5	15.004	
10,900.0	7,510.0	11,008.4	7,510.0	69.8	86.5	90.00	-4,199.4	-1,615.7	2,003.0	1,865.9	14.606	
11,000.0	7,510.0	11,108.4	7,510.0	71.7	87.8	90.00	-4,293.9	-1,583.1	2,003.0	1,862.2	14.227	

Company:	Arsenal Resources	**Local Co-ordinate Reference:**	Well J Osborn HSOP 16 203
Project:	Harrison County, West Virginia NAD 83	**TVD Reference:**	WELL @ 1191.0usft
Reference Site:	J Osborn HSOP 16 Pad	**MD Reference:**	WELL @ 1191.0usft
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #3	**Offset TVD Reference:**	Offset Datum

Offset Design J Osborn HSOP 16 Pad - J Osborn HSOP 16 201 - Wellbore #1 - Design #3

Offset Site Error: 0.0 usft

Survey Program: 0-MWD default

Offset Well Error: 0.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
11,100.0	7,510.0	11,208.4	7,510.0	73.5	89.2	90.00	-4,388.4	-1,550.5	2,003.0	1,858.6	13.866	
11,200.0	7,510.0	11,308.4	7,510.0	75.3	90.5	90.00	-4,493.0	-1,517.8	2,003.0	1,854.9	13.522	
11,300.0	7,510.0	11,408.4	7,510.0	77.2	91.9	90.00	-4,577.5	-1,485.2	2,003.0	1,851.2	13.194	
11,400.0	7,510.0	11,508.4	7,510.0	79.0	93.3	90.00	-4,672.0	-1,452.6	2,003.0	1,847.5	12.881	
11,500.0	7,510.0	11,608.4	7,510.0	80.9	94.8	90.00	-4,766.5	-1,419.9	2,003.0	1,843.8	12.582	
11,600.0	7,510.0	11,708.4	7,510.0	82.7	96.2	90.00	-4,861.1	-1,387.3	2,003.0	1,840.1	12.296	
11,700.0	7,510.0	11,808.4	7,510.0	84.6	97.7	90.00	-4,955.6	-1,354.6	2,003.0	1,836.4	12.022	
11,800.0	7,510.0	11,908.4	7,510.0	86.4	99.2	90.00	-5,050.1	-1,322.0	2,003.0	1,832.7	11.760	
11,900.0	7,510.0	12,008.4	7,510.0	88.3	100.7	90.00	-5,144.6	-1,289.4	2,003.0	1,829.0	11.509	
12,000.0	7,510.0	12,108.4	7,510.0	90.1	102.2	90.00	-5,239.1	-1,256.7	2,003.0	1,825.2	11.268	
12,100.0	7,510.0	12,208.4	7,510.0	92.0	103.8	90.00	-5,333.7	-1,224.1	2,003.0	1,821.5	11.036	
12,200.0	7,510.0	12,308.4	7,510.0	93.9	105.3	90.00	-5,428.2	-1,191.4	2,003.0	1,817.8	10.813	
12,300.0	7,510.0	12,408.4	7,510.0	95.7	106.9	90.00	-5,522.7	-1,158.8	2,003.0	1,814.0	10.599	
12,400.0	7,510.0	12,508.4	7,510.0	97.6	108.5	90.00	-5,617.2	-1,126.2	2,003.0	1,810.3	10.393	
12,500.0	7,510.0	12,608.4	7,510.0	99.5	110.1	90.00	-5,711.8	-1,093.5	2,003.0	1,806.5	10.195	
12,600.0	7,510.0	12,708.4	7,510.0	101.3	111.7	90.00	-5,806.3	-1,060.9	2,003.0	1,802.8	10.004	
12,700.0	7,510.0	12,808.4	7,510.0	103.2	113.3	90.00	-5,900.8	-1,028.2	2,003.0	1,799.0	9.820	
12,800.0	7,510.0	12,908.4	7,510.0	105.1	114.9	90.00	-5,995.3	-995.6	2,003.0	1,795.3	9.642	
12,900.0	7,510.0	13,008.4	7,510.0	107.0	116.5	90.00	-6,089.9	-963.0	2,003.0	1,791.5	9.471	
13,000.0	7,510.0	13,108.4	7,510.0	108.9	118.2	90.00	-6,184.4	-930.3	2,003.0	1,787.8	9.305	
13,100.0	7,510.0	13,208.4	7,510.0	110.7	119.9	90.00	-6,278.9	-897.7	2,003.0	1,784.0	9.145	
13,200.0	7,510.0	13,308.4	7,510.0	112.5	121.5	90.00	-6,373.4	-865.0	2,003.0	1,780.2	8.990	
13,300.0	7,510.0	13,408.4	7,510.0	114.5	123.2	90.00	-6,468.0	-832.4	2,003.0	1,776.4	8.841	
13,400.0	7,510.0	13,508.4	7,510.0	116.4	124.9	90.00	-6,562.5	-799.8	2,003.0	1,772.7	8.696	
13,500.0	7,510.0	13,608.4	7,510.0	118.3	126.6	90.00	-6,657.0	-767.1	2,003.0	1,768.9	8.556	
13,600.0	7,510.0	13,708.4	7,510.0	120.2	128.3	90.00	-6,751.5	-734.5	2,003.0	1,765.1	8.420	
13,700.0	7,510.0	13,808.4	7,510.0	122.1	130.0	90.00	-6,846.0	-701.8	2,003.0	1,761.3	8.288	
13,800.0	7,510.0	13,908.4	7,510.0	123.9	131.7	90.00	-6,940.6	-669.2	2,003.0	1,757.5	8.160	
13,900.0	7,510.0	14,008.4	7,510.0	125.8	133.4	90.00	-7,035.1	-636.6	2,003.0	1,753.8	8.036	
14,000.0	7,510.0	14,108.4	7,510.0	127.7	135.2	90.00	-7,129.6	-603.9	2,003.0	1,750.0	7.916	
14,100.0	7,510.0	14,208.4	7,510.0	129.6	136.9	90.00	-7,224.1	-571.3	2,003.0	1,746.2	7.799	
14,200.0	7,510.0	14,308.4	7,510.0	131.5	138.6	90.00	-7,318.7	-538.7	2,003.0	1,742.4	7.686	
14,300.0	7,510.0	14,408.4	7,510.0	133.4	140.4	90.00	-7,413.2	-506.0	2,003.0	1,738.6	7.575	
14,400.0	7,510.0	14,508.4	7,510.0	135.3	142.1	90.00	-7,507.7	-473.4	2,003.0	1,734.8	7.468	
14,500.0	7,510.0	14,608.4	7,510.0	137.2	143.9	90.00	-7,602.2	-440.7	2,003.0	1,731.0	7.364	
14,600.0	7,510.0	14,708.4	7,510.0	139.1	145.6	90.00	-7,696.8	-408.1	2,003.0	1,727.2	7.263	
14,700.0	7,510.0	14,808.4	7,510.0	141.0	147.4	90.00	-7,791.3	-375.5	2,003.0	1,723.4	7.164	
14,800.0	7,510.0	14,908.4	7,510.0	142.9	149.2	90.00	-7,885.8	-342.8	2,003.0	1,719.6	7.068	
14,900.0	7,510.0	15,008.4	7,510.0	144.8	151.0	90.00	-7,980.3	-310.2	2,003.0	1,715.8	6.975	
15,000.0	7,510.0	15,108.4	7,510.0	146.7	152.7	90.00	-8,074.9	-277.5	2,003.0	1,712.0	6.883	
15,081.3	7,510.0	15,189.7	7,510.0	148.2	154.2	90.00	-8,151.7	-251.0	2,003.0	1,708.9	6.811	
15,100.0	7,510.0	15,208.4	7,510.0	148.6	154.5	90.00	-8,169.4	-244.9	2,003.0	1,708.2	6.795	
15,200.0	7,510.0	15,308.4	7,510.0	150.5	156.3	90.00	-8,263.9	-212.3	2,003.0	1,704.4	6.708	
15,300.0	7,510.0	15,408.4	7,510.0	152.4	158.1	90.00	-8,358.4	-179.6	2,003.0	1,700.6	6.624	
15,400.0	7,510.0	15,508.4	7,510.0	154.3	159.9	90.00	-8,452.9	-147.0	2,003.0	1,696.8	6.542	
15,500.0	7,510.0	15,608.4	7,510.0	156.2	161.7	90.00	-8,547.5	-114.3	2,003.0	1,693.0	6.461	
15,600.0	7,510.0	15,708.4	7,510.0	158.1	163.5	90.00	-8,642.0	-81.7	2,003.0	1,689.2	6.383	
15,700.0	7,510.0	15,808.4	7,510.0	160.0	165.3	90.00	-8,736.5	-49.1	2,003.0	1,685.4	6.306	
15,800.0	7,510.0	15,908.4	7,510.0	161.9	167.1	90.00	-8,831.0	-16.4	2,003.0	1,681.6	6.232	
15,900.0	7,510.0	16,008.4	7,510.0	163.8	168.9	90.00	-8,925.6	16.2	2,003.0	1,677.8	6.159	
16,000.0	7,510.0	16,108.4	7,510.0	165.7	170.7	90.00	-9,020.1	48.9	2,003.0	1,674.0	6.087	
16,100.0	7,510.0	16,208.4	7,510.0	167.6	172.5	90.00	-9,114.6	81.5	2,003.0	1,670.2	6.018	

Company:	Arsenal Resources	**Local Co-ordinate Reference:**	Well J Osborn HSOP 16 203
Project:	Harrison County, West Virginia NAD 83	**TVD Reference:**	WELL @ 1191.0usft
Reference Site:	J Osborn HSOP 16 Pad	**MD Reference:**	WELL @ 1191.0usft
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #3	**Offset TVD Reference:**	Offset Datum

Offset Design J Osborn HSOP 16 Pad - J Osborn HSOP 16 201 - Wellbore #1 - Design #3 — **Offset Site Error:** 0.0 usft

Survey Program: 0-MWD default — **Offset Well Error:** 0.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
16,200.0	7,510.0	16,308.4	7,510.0	169.5	174.3	90.00	-9,209.1	114.1	2,003.0	1,666.3	5.949	
16,300.0	7,510.0	16,408.4	7,510.0	171.4	176.1	90.00	-9,303.7	146.8	2,003.0	1,662.6	5.883	
16,400.0	7,510.0	16,508.4	7,510.0	173.3	178.0	90.00	-9,398.2	179.4	2,003.0	1,658.7	5.818	
16,500.0	7,510.0	16,608.4	7,510.0	175.2	179.8	90.00	-9,492.7	212.1	2,003.0	1,654.9	5.754	
16,600.0	7,510.0	16,708.4	7,510.0	177.1	181.6	90.00	-9,587.2	244.7	2,003.0	1,651.1	5.692	
16,700.0	7,510.0	16,808.4	7,510.0	179.0	183.4	90.00	-9,681.7	277.3	2,003.0	1,647.3	5.631	
16,800.0	7,510.0	16,908.4	7,510.0	181.0	185.3	90.00	-9,776.3	310.0	2,003.0	1,643.5	5.571	
16,900.0	7,510.0	17,008.4	7,510.0	182.9	187.1	90.00	-9,870.8	342.6	2,003.0	1,639.6	5.512	
17,000.0	7,510.0	17,108.4	7,510.0	184.8	188.9	90.00	-9,965.3	375.3	2,003.0	1,635.8	5.455	
17,100.0	7,510.0	17,208.4	7,510.0	186.7	190.8	90.00	-10,059.8	407.9	2,003.0	1,632.0	5.399	
17,200.0	7,510.0	17,308.4	7,510.0	188.6	192.6	90.00	-10,154.4	440.5	2,003.0	1,628.2	5.344	
17,300.0	7,510.0	17,408.4	7,510.0	190.5	194.5	90.00	-10,248.9	473.2	2,003.0	1,624.4	5.290	
17,392.0	7,510.0	17,500.4	7,510.0	192.3	196.1	90.00	-10,335.9	503.2	2,003.0	1,620.8	5.241	
17,400.0	7,510.0	17,508.4	7,510.0	192.4	196.3	90.00	-10,343.4	505.8	2,003.0	1,620.6	5.237	
17,500.0	7,510.0	17,608.4	7,510.0	194.3	198.1	90.00	-10,437.9	538.4	2,003.0	1,616.7	5.185	
17,600.0	7,510.0	17,708.4	7,510.0	196.2	200.0	90.00	-10,532.5	571.1	2,003.0	1,612.9	5.135	
17,700.0	7,510.0	17,808.4	7,510.0	198.1	201.8	90.00	-10,627.0	603.7	2,003.0	1,609.1	5.085	
17,800.0	7,510.0	17,908.4	7,510.0	200.0	203.7	90.00	-10,721.5	636.4	2,003.0	1,605.3	5.036	
17,842.4	7,510.0	17,950.8	7,510.0	200.9	204.5	90.00	-10,761.6	650.2	2,003.0	1,603.6	5.015	
17,900.0	7,510.0	18,008.4	7,510.0	202.0	205.5	90.00	-10,816.0	669.0	2,003.0	1,601.4	4.988	
18,000.0	7,510.0	18,108.4	7,510.0	203.9	207.4	90.00	-10,910.6	701.6	2,003.0	1,597.6	4.941	
18,054.0	7,510.0	18,162.4	7,510.0	204.9	208.4	90.00	-10,961.6	719.3	2,003.0	1,595.5	4.915	
18,100.0	7,510.0	18,208.4	7,510.0	205.8	209.2	90.00	-11,005.1	734.3	2,003.0	1,593.8	4.895	
18,200.0	7,510.0	18,308.4	7,510.0	207.7	211.1	90.00	-11,099.6	766.9	2,003.0	1,590.0	4.849	
18,300.0	7,510.0	18,408.4	7,510.0	209.6	212.9	90.00	-11,194.1	799.6	2,003.0	1,586.2	4.805	
18,400.0	7,510.0	18,508.4	7,510.0	211.5	214.8	90.00	-11,288.6	832.2	2,003.0	1,582.3	4.761	
18,500.0	7,510.0	18,608.4	7,510.0	213.4	216.6	90.00	-11,383.2	864.8	2,003.0	1,578.5	4.718	
18,600.0	7,510.0	18,708.4	7,510.0	215.3	218.5	90.00	-11,477.7	897.5	2,003.0	1,574.7	4.676	
18,700.0	7,510.0	18,808.4	7,510.0	217.2	220.4	90.00	-11,572.2	930.1	2,003.0	1,570.9	4.635	
18,800.0	7,510.0	18,908.4	7,510.0	219.2	222.2	90.00	-11,666.7	962.8	2,003.0	1,567.0	4.594	
18,900.0	7,510.0	19,008.4	7,510.0	221.1	224.1	90.00	-11,761.3	995.4	2,003.0	1,563.2	4.554	
19,000.0	7,510.0	19,108.4	7,510.0	223.0	225.9	90.00	-11,855.8	1,028.0	2,003.0	1,559.4	4.515	
19,100.0	7,510.0	19,208.4	7,510.0	224.9	227.8	90.00	-11,950.3	1,060.7	2,003.0	1,555.6	4.476	
19,200.0	7,510.0	19,308.4	7,510.0	226.8	229.7	90.00	-12,044.8	1,093.3	2,003.0	1,551.7	4.438	
19,300.0	7,510.0	19,408.4	7,510.0	228.7	231.5	90.00	-12,139.4	1,126.0	2,003.0	1,547.9	4.401	
19,352.0	7,510.0	19,460.4	7,510.0	229.7	232.5	90.00	-12,188.5	1,142.9	2,003.0	1,546.9	4.382	
19,400.0	7,510.0	19,508.4	7,510.0	230.6	233.4	90.00	-12,233.9	1,158.6	2,003.0	1,544.1	4.364	
19,500.0	7,510.0	19,608.4	7,510.0	232.5	235.3	90.00	-12,328.4	1,191.2	2,003.0	1,540.3	4.328	
19,600.0	7,510.0	19,708.4	7,510.0	234.5	237.1	90.00	-12,422.9	1,223.9	2,003.0	1,536.4	4.293	
19,700.0	7,510.0	19,808.4	7,510.0	236.4	239.0	90.00	-12,517.5	1,256.5	2,003.0	1,532.6	4.258	
19,800.0	7,510.0	19,908.4	7,510.0	238.3	240.9	90.00	-12,612.0	1,289.2	2,003.0	1,528.8	4.224	
19,900.0	7,510.0	20,008.4	7,510.0	240.2	242.8	90.00	-12,706.5	1,321.8	2,003.0	1,524.9	4.190	
20,000.0	7,510.0	20,108.4	7,510.0	242.1	244.6	90.00	-12,801.0	1,354.4	2,003.0	1,521.1	4.156	
20,100.0	7,510.0	20,208.4	7,510.0	244.0	246.5	90.00	-12,895.5	1,387.1	2,003.0	1,517.3	4.124	
20,193.5	7,510.0	20,302.0	7,510.0	245.8	248.3	90.00	-12,984.0	1,417.6	2,003.0	1,513.7	4.093	
20,200.0	7,510.0	20,308.4	7,510.0	245.9	248.4	90.00	-12,990.1	1,419.7	2,003.0	1,513.5	4.091	
20,300.0	7,510.0	20,408.4	7,510.0	247.9	250.3	90.00	-13,084.6	1,452.3	2,003.0	1,509.6	4.060	
20,400.0	7,510.0	20,508.4	7,510.0	249.8	252.1	90.00	-13,179.1	1,485.0	2,003.0	1,505.8	4.028	
20,500.0	7,510.0	20,608.4	7,510.0	251.7	254.0	90.00	-13,273.6	1,517.6	2,003.0	1,502.0	3.998	
20,600.0	7,510.0	20,708.4	7,510.0	253.6	255.9	90.00	-13,368.2	1,550.3	2,003.0	1,498.1	3.967	
20,700.0	7,510.0	20,808.4	7,510.0	255.5	257.8	90.00	-13,462.7	1,582.9	2,003.0	1,494.3	3.937	
20,800.0	7,510.0	20,908.4	7,510.0	257.4	259.6	90.00	-13,557.2	1,615.5	2,003.0	1,490.5	3.908	

Company:	Arsenal Resources	**Local Co-ordinate Reference:**	Well J Osborn HSOP 16 203
Project:	Harrison County, West Virginia NAD 83	**TVD Reference:**	WELL @ 1191.0usft
Reference Site:	J Osborn HSOP 16 Pad	**MD Reference:**	WELL @ 1191.0usft
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #3	**Offset TVD Reference:**	Offset Datum

Offset Design J Osborn HSOP 16 Pad - J Osborn HSOP 16 201 - Wellbore #1 - Design #3 — **Offset Site Error:** 0.0 usft

Survey Program: 0-MWD default — **Offset Well Error:** 0.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
20,888.1	7,510.0	20,996.5	7,510.0	259.1	261.3	90.00	-13,640.4	1,644.3	2,003.0	1,487.1	3.882	
20,900.0	7,510.0	21,008.4	7,510.0	259.3	261.5	90.00	-13,651.7	1,648.2	2,003.0	1,486.6	3.879	
21,000.0	7,510.0	21,108.4	7,510.0	261.3	263.4	90.00	-13,746.3	1,680.8	2,003.0	1,482.8	3.850	
21,100.0	7,510.0	21,208.4	7,510.0	263.2	265.3	90.00	-13,840.8	1,713.5	2,003.0	1,479.0	3.822	
21,200.0	7,510.0	21,308.4	7,510.0	265.1	267.2	90.00	-13,935.3	1,746.1	2,003.0	1,475.2	3.795	
21,300.0	7,510.0	21,408.4	7,510.0	267.0	269.0	90.00	-14,029.8	1,778.7	2,003.0	1,471.3	3.767	
21,400.0	7,510.0	21,508.4	7,510.0	268.9	270.9	90.00	-14,124.3	1,811.4	2,003.0	1,467.5	3.740	
21,500.0	7,510.0	21,608.4	7,510.0	270.8	272.8	90.00	-14,218.9	1,844.0	2,003.0	1,463.7	3.714	
21,500.6	7,510.0	21,609.0	7,510.0	270.8	272.8	90.00	-14,219.5	1,844.2	2,003.0	1,463.6	3.714	
21,600.0	7,510.0	21,708.4	7,510.0	272.7	274.7	90.00	-14,313.4	1,876.7	2,003.0	1,459.8	3.687	
21,700.0	7,510.0	21,808.4	7,510.0	274.7	276.6	90.00	-14,407.9	1,909.3	2,003.0	1,456.0	3.662	
21,800.0	7,510.0	21,908.4	7,510.0	276.6	278.5	90.00	-14,502.4	1,941.9	2,003.0	1,452.2	3.636	
21,871.3	7,510.0	21,979.7	7,510.0	277.9	279.8	90.00	-14,569.9	1,965.2	2,003.0	1,449.4	3.618	
21,900.0	7,510.0	22,008.4	7,510.0	278.5	280.3	90.00	-14,597.0	1,974.6	2,003.0	1,448.3	3.611	
22,000.0	7,510.0	22,108.4	7,510.0	280.4	282.2	90.00	-14,691.5	2,007.2	2,003.0	1,444.5	3.586	
22,100.0	7,510.0	22,208.4	7,510.0	282.3	284.1	90.00	-14,786.0	2,039.9	2,003.0	1,440.7	3.562	
22,200.0	7,510.0	22,308.4	7,510.0	284.2	286.0	90.00	-14,880.5	2,072.5	2,003.0	1,436.8	3.538	
22,300.0	7,510.0	22,408.4	7,510.0	286.2	287.9	90.00	-14,975.1	2,105.1	2,003.0	1,433.0	3.514	
22,400.0	7,510.0	22,508.4	7,510.0	288.1	289.8	90.00	-15,069.6	2,137.8	2,003.0	1,429.2	3.490	
22,500.0	7,510.0	22,608.4	7,510.0	290.0	291.7	90.00	-15,164.1	2,170.4	2,003.0	1,425.3	3.467	
22,600.0	7,510.0	22,708.4	7,510.0	291.9	293.6	90.00	-15,258.6	2,203.1	2,003.0	1,421.5	3.444	
22,700.0	7,510.0	22,808.4	7,510.0	293.8	295.4	90.00	-15,353.2	2,235.7	2,003.0	1,417.7	3.422	
22,800.0	7,510.0	22,908.4	7,510.0	295.7	297.3	90.00	-15,447.7	2,268.3	2,003.0	1,413.8	3.400	
22,900.0	7,510.0	23,008.4	7,510.0	297.7	299.2	90.00	-15,542.2	2,301.0	2,003.0	1,410.0	3.378	
22,982.4	7,510.0	23,090.8	7,510.0	299.2	300.8	90.00	-15,620.1	2,327.9	2,003.0	1,406.8	3.360	
23,000.0	7,510.0	23,108.4	7,510.0	299.6	301.1	90.00	-15,636.7	2,333.6	2,003.0	1,406.2	3.356	
23,100.0	7,510.0	23,208.4	7,510.0	301.5	303.0	90.00	-15,731.2	2,366.2	2,003.0	1,402.3	3.335	
23,200.0	7,510.0	23,308.4	7,510.0	303.4	304.9	90.00	-15,825.8	2,398.9	2,003.0	1,398.5	3.313	
23,300.0	7,510.0	23,408.4	7,510.0	305.3	306.8	90.00	-15,920.3	2,431.5	2,003.0	1,394.7	3.292	
23,400.0	7,510.0	23,508.4	7,510.0	307.2	308.7	90.00	-16,014.8	2,464.2	2,003.0	1,390.8	3.272	
23,500.0	7,510.0	23,608.4	7,510.0	309.2	310.6	90.00	-16,109.3	2,496.8	2,003.0	1,387.0	3.252	
23,600.0	7,510.0	23,708.4	7,510.0	311.1	312.5	90.00	-16,203.9	2,529.4	2,003.0	1,383.2	3.231	
23,700.0	7,510.0	23,808.4	7,510.0	313.0	314.4	90.00	-16,298.4	2,562.1	2,003.0	1,379.3	3.212	
23,800.0	7,510.0	23,908.4	7,510.0	314.9	316.3	90.00	-16,392.9	2,594.7	2,003.0	1,375.5	3.192	
23,900.0	7,510.0	24,008.4	7,510.0	316.8	318.1	90.00	-16,487.4	2,627.4	2,003.0	1,371.7	3.173	
24,000.0	7,510.0	24,108.4	7,510.0	318.7	320.0	90.00	-16,582.0	2,660.0	2,003.0	1,367.8	3.153	
24,023.0	7,510.0	24,131.4	7,510.0	319.2	320.5	90.00	-16,603.7	2,667.5	2,003.0	1,366.9	3.149	
24,100.0	7,510.0	24,208.4	7,510.0	320.7	321.9	90.00	-16,676.5	2,692.6	2,003.0	1,364.0	3.134	
24,200.0	7,510.0	24,308.4	7,510.0	322.6	323.8	90.00	-16,771.0	2,725.3	2,003.0	1,360.1	3.116	
24,300.0	7,510.0	24,408.4	7,510.0	324.5	325.7	90.00	-16,865.5	2,757.9	2,003.0	1,356.3	3.097	
24,400.0	7,510.0	24,508.4	7,510.0	326.4	327.6	90.00	-16,960.1	2,790.6	2,003.0	1,352.5	3.079	
24,497.0	7,510.0	24,605.4	7,510.0	328.3	329.5	90.00	-17,051.7	2,822.2	2,003.0	1,348.8	3.061	
24,500.0	7,510.0	24,608.4	7,510.0	328.3	329.5	90.00	-17,054.6	2,823.2	2,003.0	1,348.6	3.061	
24,600.0	7,510.0	24,708.4	7,510.0	330.2	331.4	90.00	-17,149.1	2,855.8	2,003.0	1,344.8	3.043	
24,673.5	7,510.0	24,781.9	7,510.0	331.7	332.8	90.00	-17,218.6	2,879.8	2,003.0	1,342.0	3.030	
24,700.0	7,510.0	24,808.4	7,510.0	332.2	333.3	90.00	-17,243.6	2,888.5	2,003.0	1,341.0	3.025	
24,800.0	7,510.0	24,908.4	7,510.0	334.1	335.2	90.00	-17,338.1	2,921.1	2,003.0	1,337.1	3.008	
24,891.8	7,510.0	25,000.2	7,510.0	335.8	336.9	90.00	-17,424.9	2,951.1	2,003.0	1,333.6	2.992	
24,900.0	7,510.0	25,008.4	7,510.0	336.0	337.1	90.00	-17,432.7	2,953.8	2,003.0	1,333.3	2.991	
25,000.0	7,510.0	25,108.4	7,510.0	337.9	339.0	90.00	-17,527.2	2,986.4	2,003.0	1,329.5	2.974	
25,100.0	7,510.0	25,208.4	7,510.0	339.8	340.9	90.00	-17,621.7	3,019.0	2,003.0	1,325.6	2.957	
25,113.4	7,510.0	25,221.9	7,510.0	340.1	341.2	90.00	-17,634.4	3,023.4	2,002.3	1,324.4	2.954	SF

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation

Company:	Arsenal Resources	**Local Co-ordinate Reference:**	Well J Osborn HSOP 16 203
Project:	Harrison County, West Virginia NAD 83	**TVD Reference:**	WELL @ 1191.0usft
Reference Site:	J Osborn HSOP 16 Pad	**MD Reference:**	WELL @ 1191.0usft
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #3	**Offset TVD Reference:**	Offset Datum

Company:	Arsenal Resources	**Local Co-ordinate Reference:**	Well J Osborn HSOP 16 203
Project:	Harrison County, West Virginia NAD 83	**TVD Reference:**	WELL @ 1191.0usft
Reference Site:	J Osborn HSOP 16 Pad	**MD Reference:**	WELL @ 1191.0usft
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #3	**Offset TVD Reference:**	Offset Datum

Offset Design J Osborn HSOP 16 Pad - J Osborn HSOP 16 202 - Wellbore #1 - Design #3 — **Offset Site Error:** 0.0 usft

Survey Program: 0-MWD default — **Offset Well Error:** 0.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
0.0	0.0	0.0	0.0	0.0	0.0	-65.04	6.3	-13.6	15.0			
100.0	100.0	100.0	100.0	0.1	0.1	-65.04	6.3	-13.6	15.0	14.8	91.419	
200.0	200.0	200.0	200.0	0.3	0.3	-65.04	6.3	-13.6	15.0	14.4	24.445	
300.0	300.0	300.0	300.0	0.5	0.5	-65.04	6.3	-13.6	15.0	13.9	14.109	
400.0	400.0	400.0	400.0	0.8	0.8	-65.04	6.3	-13.6	15.0	13.5	9.916	
500.0	500.0	500.0	500.0	1.0	1.0	-65.04	6.3	-13.6	15.0	13.0	7.644	
600.0	600.0	600.0	600.0	1.2	1.2	-65.04	6.3	-13.6	15.0	12.6	6.220	
700.0	700.0	700.0	700.0	1.4	1.4	-65.04	6.3	-13.6	15.0	12.1	5.242	
800.0	800.0	800.0	800.0	1.7	1.7	-65.04	6.3	-13.6	15.0	11.7	4.531	
900.0	900.0	900.0	900.0	1.9	1.9	-65.04	6.3	-13.6	15.0	11.2	3.989	
1,000.0	1,000.0	1,000.0	1,000.0	2.1	2.1	-65.04	6.3	-13.6	15.0	10.8	3.563	
1,100.0	1,100.0	1,100.0	1,100.0	2.3	2.3	-65.04	6.3	-13.6	15.0	10.3	3.219	
1,200.0	1,200.0	1,200.0	1,200.0	2.6	2.6	-65.04	6.3	-13.6	15.0	9.9	2.936	
1,300.0	1,300.0	1,300.0	1,300.0	2.8	2.8	-65.04	6.3	-13.6	15.0	9.4	2.699	
1,400.0	1,400.0	1,400.0	1,400.0	3.0	3.0	-65.04	6.3	-13.6	15.0	9.0	2.497	
1,500.0	1,500.0	1,500.0	1,500.0	3.2	3.2	-65.04	6.3	-13.6	15.0	8.5	2.323	
1,600.0	1,600.0	1,600.0	1,600.0	3.5	3.5	-65.04	6.3	-13.6	15.0	8.1	2.172	
1,700.0	1,700.0	1,700.0	1,700.0	3.7	3.7	-65.04	6.3	-13.6	15.0	7.6	2.039	
1,800.0	1,800.0	1,800.0	1,800.0	3.9	3.9	-65.04	6.3	-13.6	15.0	7.2	1.922	
1,900.0	1,900.0	1,900.0	1,900.0	4.1	4.1	-65.04	6.3	-13.6	15.0	6.7	1.817	
2,000.0	2,000.0	2,000.0	2,000.0	4.4	4.4	-65.04	6.3	-13.6	15.0	6.3	1.723	CC, ES
2,100.0	2,100.0	2,099.6	2,099.6	4.6	4.6	-69.47	5.7	-15.2	16.2	7.1	1.779	
2,200.0	2,200.0	2,199.0	2,198.8	4.8	4.7	-79.26	3.8	-20.0	20.4	10.9	2.142	
2,300.0	2,300.0	2,297.8	2,297.3	5.0	4.9	-88.65	0.7	-28.0	28.1	18.2	2.836	
2,400.0	2,400.0	2,396.0	2,394.8	5.3	5.2	-95.40	-3.7	-39.0	39.5	29.3	3.842	
2,500.0	2,500.0	2,493.3	2,490.8	5.5	5.4	-99.85	-9.2	-53.0	54.6	43.9	5.121	
2,600.0	2,600.0	2,589.7	2,585.5	5.7	5.6	-3.81	-15.8	-69.9	71.4	60.4	6.491	
2,700.0	2,699.8	2,685.6	2,679.1	5.9	5.9	-6.11	-23.6	-89.6	88.2	76.8	7.794	
2,800.0	2,799.5	2,780.9	2,771.3	6.1	6.3	-8.04	-32.5	-112.0	104.9	93.3	9.027	
2,900.0	2,898.7	2,875.7	2,862.1	6.3	6.6	-9.74	-42.4	-137.2	121.6	109.7	10.197	
3,000.0	2,997.5	2,969.9	2,951.5	6.5	7.1	-11.31	-53.3	-164.9	138.3	126.1	11.305	
3,042.9	3,039.7	3,010.2	2,989.4	6.6	7.3	-11.94	-58.3	-177.6	145.5	133.1	11.764	
3,100.0	3,095.7	3,065.0	3,040.7	6.8	7.5	-12.79	-65.4	-195.6	155.4	142.8	12.349	
3,200.0	3,193.9	3,163.4	3,132.7	7.1	8.1	-14.06	-78.1	-227.9	173.1	160.0	13.266	
3,300.0	3,292.2	3,261.8	3,224.7	7.4	8.7	-15.09	-90.9	-260.3	190.8	177.3	14.112	
3,400.0	3,390.4	3,360.1	3,316.7	7.7	9.3	-15.95	-103.7	-292.7	208.6	194.6	14.891	
3,500.0	3,488.6	3,458.5	3,408.7	8.0	9.9	-16.68	-116.4	-325.1	226.4	211.9	15.607	
3,600.0	3,586.8	3,556.9	3,500.7	8.3	10.5	-17.30	-129.2	-357.5	244.3	229.3	16.266	
3,700.0	3,685.0	3,655.2	3,592.7	8.6	11.2	-17.83	-142.0	-389.9	262.1	246.6	16.872	
3,800.0	3,783.2	3,753.6	3,684.7	9.0	11.8	-18.30	-154.7	-422.3	280.0	264.0	17.430	
3,900.0	3,881.4	3,851.9	3,776.7	9.3	12.5	-18.71	-167.5	-454.7	298.0	281.4	17.945	
4,000.0	3,979.6	3,950.3	3,868.7	9.7	13.2	-19.07	-180.3	-487.1	315.9	298.7	18.421	
4,100.0	4,077.8	4,048.7	3,960.7	10.0	13.8	-19.40	-193.0	-519.5	333.8	316.1	18.861	
4,200.0	4,176.0	4,147.0	4,052.7	10.4	14.5	-19.69	-205.8	-551.9	351.8	333.5	19.268	
4,300.0	4,274.3	4,245.4	4,144.6	10.8	15.2	-19.95	-218.6	-584.3	369.7	350.9	19.645	
4,400.0	4,372.5	4,343.7	4,236.6	11.1	15.9	-20.19	-231.3	-616.7	387.7	368.3	19.996	
4,500.0	4,470.7	4,442.1	4,328.6	11.5	16.6	-20.41	-244.1	-649.1	405.6	385.7	20.322	
4,600.0	4,568.9	4,540.5	4,420.6	11.9	17.3	-20.61	-256.9	-681.4	423.5	403.1	20.626	
4,700.0	4,667.1	4,638.8	4,512.6	12.3	18.0	-20.79	-269.6	-713.8	441.5	420.5	20.909	
4,800.0	4,765.3	4,737.2	4,604.6	12.7	18.7	-20.96	-282.4	-746.2	459.6	437.9	21.173	
4,900.0	4,863.5	4,835.6	4,696.6	13.1	19.4	-21.12	-295.2	-778.6	477.6	455.3	21.421	
5,000.0	4,961.7	4,933.9	4,788.6	13.4	20.1	-21.26	-307.9	-811.0	495.5	472.7	21.653	

Company:	Arsenal Resources	**Local Co-ordinate Reference:**	Well J Osborn HSOP 16 203
Project:	Harrison County, West Virginia NAD 83	**TVD Reference:**	WELL @ 1191.0usft
Reference Site:	J Osborn HSOP 16 Pad	**MD Reference:**	WELL @ 1191.0usft
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #3	**Offset TVD Reference:**	Offset Datum

Offset Design J Osborn HSOP 16 Pad - J Osborn HSOP 16 202 - Wellbore #1 - Design #3 — **Offset Site Error:** 0.0 usft

Survey Program: 0-MWD default — **Offset Well Error:** 0.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
5,100.0	5,059.9	5,032.3	4,880.6	13.8	20.8	-21.39	-320.7	-843.4	513.5	490.1	21.871	
5,200.0	5,158.1	5,130.6	4,972.6	14.2	21.6	-21.52	-333.5	-875.8	531.5	507.5	22.075	
5,300.0	5,256.3	5,229.0	5,064.6	14.6	22.3	-21.64	-346.2	-908.2	549.5	524.8	22.268	
5,400.0	5,354.6	5,327.4	5,156.6	15.0	23.0	-21.75	-359.0	-940.6	567.5	542.2	22.449	
5,500.0	5,452.8	5,425.7	5,248.6	15.4	23.7	-21.85	-371.8	-973.0	585.5	559.6	22.620	
5,600.0	5,551.0	5,524.1	5,340.6	15.8	24.4	-21.95	-384.5	-1,005.4	603.5	577.0	22.782	
5,700.0	5,649.2	5,622.4	5,432.5	16.2	25.1	-22.04	-397.3	-1,037.8	621.5	594.4	22.934	
5,800.0	5,747.4	5,720.8	5,524.5	16.6	25.9	-22.12	-410.1	-1,070.2	639.5	611.8	23.079	
5,900.0	5,845.6	5,819.2	5,616.5	17.0	26.6	-22.21	-422.8	-1,102.6	657.5	629.2	23.216	
6,000.0	5,943.8	5,917.5	5,708.5	17.4	27.3	-22.28	-435.6	-1,135.0	675.5	646.6	23.348	
6,100.0	6,042.0	6,015.9	5,800.5	17.8	28.0	-22.36	-448.4	-1,167.3	693.5	664.0	23.469	
6,200.0	6,140.2	6,114.3	5,892.5	18.3	28.8	-22.43	-461.1	-1,199.7	711.6	681.4	23.587	
6,300.0	6,238.4	6,212.6	5,984.5	18.7	29.5	-22.49	-473.9	-1,232.1	729.6	698.8	23.699	
6,400.0	6,336.7	6,311.0	6,076.5	19.1	30.2	-22.55	-486.7	-1,264.5	747.6	716.2	23.805	
6,500.0	6,434.9	6,409.3	6,168.5	19.5	30.9	-22.61	-499.4	-1,296.9	765.6	733.6	23.906	
6,600.0	6,533.1	6,507.7	6,260.5	19.9	31.7	-22.67	-512.2	-1,329.3	783.6	750.9	24.003	
6,700.0	6,631.3	6,606.1	6,352.5	20.3	32.4	-22.73	-525.0	-1,361.7	801.6	768.3	24.096	
6,800.0	6,729.5	6,704.4	6,444.5	20.7	33.1	-22.78	-537.7	-1,394.1	819.6	785.7	24.184	
6,900.0	6,827.7	6,802.8	6,536.5	21.1	33.8	-22.83	-550.5	-1,426.5	837.6	803.1	24.269	
6,936.9	6,864.0	6,839.1	6,570.4	21.3	34.1	-22.85	-555.2	-1,438.4	844.3	809.5	24.299	
6,950.0	6,876.8	6,852.0	6,582.5	21.3	34.2	-16.91	-556.9	-1,442.7	846.6	811.8	24.312	
7,000.0	6,925.9	6,901.2	6,628.5	21.5	34.5	5.56	-563.3	-1,458.9	854.9	819.9	24.382	
7,050.0	6,974.8	6,950.2	6,674.4	21.7	34.9	23.38	-569.6	-1,475.0	862.4	827.1	24.475	
7,100.0	7,023.0	6,998.7	6,719.7	21.8	35.3	35.62	-575.9	-1,491.0	869.0	833.5	24.568	
7,150.0	7,070.5	7,046.5	6,764.4	21.9	35.6	44.00	-582.1	-1,506.7	874.8	839.4	24.717	
7,200.0	7,116.8	7,093.1	6,808.0	22.1	36.0	50.07	-588.2	-1,522.1	879.9	844.5	24.854	
7,250.0	7,161.8	7,138.4	6,850.3	22.2	36.3	54.75	-594.1	-1,537.0	884.6	849.2	24.989	
7,300.0	7,204.8	7,182.0	6,891.1	22.3	36.6	58.57	-599.7	-1,551.4	889.1	853.7	25.108	
7,350.0	7,245.9	7,222.8	6,929.3	22.4	36.9	61.76	-605.1	-1,564.8	893.5	858.0	25.199	
7,400.0	7,284.9	7,259.6	6,963.7	22.6	37.2	64.36	-611.2	-1,576.4	898.3	862.7	25.257	
7,450.0	7,321.3	7,297.4	6,998.8	22.7	37.4	66.63	-619.5	-1,587.6	903.5	867.7	25.231	
7,500.0	7,355.1	7,336.5	7,034.8	22.8	37.7	68.66	-630.3	-1,598.3	909.2	873.0	25.110	
7,550.0	7,386.0	7,377.0	7,071.7	22.9	37.9	70.52	-643.8	-1,608.4	915.4	878.6	24.892	
7,600.0	7,413.8	7,419.3	7,109.5	23.1	38.2	72.24	-660.3	-1,617.8	922.1	884.6	24.588	
7,650.0	7,438.3	7,463.7	7,148.2	23.2	38.5	73.87	-680.2	-1,626.4	929.3	890.9	24.214	
7,700.0	7,459.4	7,510.6	7,187.9	23.4	38.7	75.44	-703.9	-1,634.1	936.9	897.5	23.796	
7,750.0	7,477.0	7,560.6	7,228.5	23.6	39.0	76.98	-732.2	-1,640.6	945.0	904.5	23.362	
7,800.0	7,490.9	7,614.2	7,270.0	23.8	39.3	78.52	-765.9	-1,645.6	953.4	911.9	22.939	
7,850.0	7,501.1	7,672.4	7,312.0	24.1	39.6	80.07	-805.8	-1,648.6	962.1	919.5	22.556	
7,900.0	7,507.4	7,736.0	7,354.3	24.4	40.0	81.67	-853.4	-1,649.1	970.9	927.3	22.239	
7,950.0	7,510.0	7,806.5	7,396.0	24.7	40.3	83.34	-910.1	-1,646.2	979.6	935.1	22.010	
7,957.8	7,510.0	7,818.1	7,402.3	24.7	40.4	83.60	-919.8	-1,645.3	981.0	936.3	21.983	
8,000.0	7,510.0	7,886.6	7,436.1	25.0	40.7	85.66	-978.9	-1,638.5	987.8	942.7	21.888	
8,100.0	7,510.0	8,083.4	7,498.8	25.8	41.7	89.36	-1,160.8	-1,600.7	999.4	953.8	21.900	
8,200.0	7,510.0	8,251.5	7,510.0	26.7	42.5	90.00	-1,320.3	-1,550.1	1,001.3	954.5	21.402	
8,300.0	7,510.0	8,351.5	7,510.0	27.7	43.0	90.00	-1,414.8	-1,517.5	1,001.3	952.1	20.359	
8,400.0	7,510.0	8,451.5	7,510.0	28.9	43.6	90.00	-1,509.3	-1,484.9	1,001.3	949.5	19.350	
8,500.0	7,510.0	8,551.5	7,510.0	30.1	44.3	90.00	-1,603.9	-1,452.2	1,001.3	946.8	18.386	
8,600.0	7,510.0	8,651.5	7,510.0	31.4	45.0	90.00	-1,698.4	-1,419.6	1,001.3	944.0	17.473	
8,700.0	7,510.0	8,751.5	7,510.0	32.7	45.8	90.00	-1,792.9	-1,386.9	1,001.3	941.0	16.617	
8,800.0	7,510.0	8,851.5	7,510.0	34.2	46.7	90.00	-1,887.4	-1,354.3	1,001.3	938.0	15.817	
8,900.0	7,510.0	8,951.5	7,510.0	35.6	47.6	90.00	-1,982.0	-1,321.7	1,001.3	934.8	15.071	

Company:	Arsenal Resources	**Local Co-ordinate Reference:**	Well J Osborn HSOP 16 203
Project:	Harrison County, West Virginia NAD 83	**TVD Reference:**	WELL @ 1191.0usft
Reference Site:	J Osborn HSOP 16 Pad	**MD Reference:**	WELL @ 1191.0usft
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #3	**Offset TVD Reference:**	Offset Datum

Offset Design J Osborn HSOP 16 Pad - J Osborn HSOP 16 202 - Wellbore #1 - Design #3 — Offset Site Error: 0.0 usft

Survey Program: 0-MWD default — Offset Well Error: 0.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
9,000.0	7,510.0	9,051.5	7,510.0	37.1	48.6	90.00	-2,076.5	-1,289.0	1,001.3	931.6	14.378	
9,100.0	7,510.0	9,151.5	7,510.0	38.7	49.7	90.00	-2,171.0	-1,256.4	1,001.3	926.4	13.734	
9,200.0	7,510.0	9,251.5	7,510.0	40.3	50.8	90.00	-2,265.5	-1,223.7	1,001.3	925.1	13.136	
9,275.5	7,510.0	9,327.0	7,510.0	41.5	51.7	90.00	-2,336.9	-1,199.1	1,001.3	922.5	12.712	
9,300.0	7,510.0	9,351.5	7,510.0	41.9	52.0	90.00	-2,360.1	-1,191.1	1,001.3	921.7	12.581	
9,400.0	7,510.0	9,451.5	7,510.0	43.5	53.2	90.00	-2,454.6	-1,158.5	1,001.3	918.3	12.064	
9,500.0	7,510.0	9,551.5	7,510.0	45.2	54.5	90.00	-2,549.1	-1,125.8	1,001.3	914.8	11.584	
9,600.0	7,510.0	9,651.5	7,510.0	46.9	55.8	90.00	-2,643.6	-1,093.2	1,001.3	911.4	11.136	
9,700.0	7,510.0	9,751.5	7,510.0	48.6	57.1	90.00	-2,738.2	-1,060.5	1,001.3	907.9	10.718	
9,800.0	7,510.0	9,851.5	7,510.0	50.3	58.5	90.00	-2,832.7	-1,027.9	1,001.3	904.3	10.328	
9,900.0	7,510.0	9,951.5	7,510.0	52.0	59.9	90.00	-2,927.2	-995.3	1,001.3	900.8	9.963	
10,000.0	7,510.0	10,051.5	7,510.0	53.7	61.3	90.00	-3,021.7	-962.6	1,001.3	897.2	9.621	
10,050.9	7,510.0	10,102.4	7,510.0	54.6	62.1	90.00	-3,069.9	-946.0	1,001.3	895.4	9.455	
10,100.0	7,510.0	10,151.5	7,510.0	55.5	62.8	90.00	-3,116.2	-930.0	1,001.3	893.6	9.300	
10,200.0	7,510.0	10,251.5	7,510.0	57.3	64.3	90.00	-3,210.8	-897.4	1,001.3	890.0	8.998	
10,300.0	7,510.0	10,351.5	7,510.0	59.0	65.8	90.00	-3,305.3	-864.7	1,001.3	886.4	8.714	
10,400.0	7,510.0	10,451.5	7,510.0	60.8	67.4	90.00	-3,399.8	-832.1	1,001.3	882.7	8.447	
10,500.0	7,510.0	10,551.5	7,510.0	62.6	69.0	90.00	-3,494.3	-799.4	1,001.3	879.1	8.194	
10,600.0	7,510.0	10,651.5	7,510.0	64.4	70.5	90.00	-3,588.9	-766.8	1,001.3	875.4	7.956	
10,700.0	7,510.0	10,751.5	7,510.0	66.2	72.2	90.00	-3,683.4	-734.2	1,001.3	871.8	7.730	
10,800.0	7,510.0	10,851.5	7,510.0	68.0	73.8	90.00	-3,777.9	-701.5	1,001.3	868.1	7.517	
10,900.0	7,510.0	10,951.5	7,510.0	69.8	75.4	90.00	-3,872.4	-668.9	1,001.3	864.4	7.314	
11,000.0	7,510.0	11,051.5	7,510.0	71.7	77.1	90.00	-3,967.0	-636.2	1,001.3	860.7	7.121	
11,100.0	7,510.0	11,151.5	7,510.0	73.5	78.7	90.00	-4,061.5	-603.6	1,001.3	857.0	6.938	
11,200.0	7,510.0	11,251.5	7,510.0	75.3	80.4	90.00	-4,156.0	-571.0	1,001.3	853.3	6.764	
11,300.0	7,510.0	11,351.5	7,510.0	77.2	82.1	90.00	-4,250.5	-538.3	1,001.3	849.5	6.598	
11,400.0	7,510.0	11,451.5	7,510.0	79.0	83.8	90.00	-4,345.0	-505.7	1,001.3	845.8	6.440	
11,500.0	7,510.0	11,551.5	7,510.0	80.9	85.5	90.00	-4,439.6	-473.0	1,001.3	842.1	6.289	
11,600.0	7,510.0	11,651.5	7,510.0	82.7	87.2	90.00	-4,534.1	-440.4	1,001.3	838.3	6.145	
11,700.0	7,510.0	11,751.5	7,510.0	84.6	89.0	90.00	-4,628.6	-407.8	1,001.3	834.6	6.007	
11,800.0	7,510.0	11,851.5	7,510.0	86.4	90.7	90.00	-4,723.1	-375.1	1,001.3	830.9	5.875	
11,900.0	7,510.0	11,951.5	7,510.0	88.3	92.5	90.00	-4,817.7	-342.5	1,001.3	827.1	5.748	
12,000.0	7,510.0	12,051.5	7,510.0	90.1	94.2	90.00	-4,912.2	-309.8	1,001.3	823.3	5.627	
12,100.0	7,510.0	12,151.5	7,510.0	92.0	96.0	90.00	-5,006.7	-277.2	1,001.3	819.6	5.511	
12,200.0	7,510.0	12,251.5	7,510.0	93.9	97.7	90.00	-5,101.2	-244.6	1,001.3	815.8	5.397	
12,273.4	7,510.0	12,324.8	7,510.0	95.2	99.0	90.00	-5,170.6	-220.6	1,001.3	813.1	5.320	
12,300.0	7,510.0	12,351.5	7,510.0	95.7	99.5	90.00	-5,195.8	-211.9	1,001.3	812.1	5.292	
12,400.0	7,510.0	12,451.5	7,510.0	97.6	101.3	90.00	-5,290.3	-179.3	1,001.3	808.3	5.188	
12,500.0	7,510.0	12,551.5	7,510.0	99.5	103.1	90.00	-5,384.8	-146.6	1,001.3	804.5	5.089	
12,561.3	7,510.0	12,612.7	7,510.0	100.6	104.2	90.00	-5,442.7	-126.7	1,001.3	802.2	5.030	
12,600.0	7,510.0	12,651.5	7,510.0	101.3	104.9	90.00	-5,479.3	-114.0	1,001.3	800.8	4.993	
12,700.0	7,510.0	12,751.5	7,510.0	103.2	106.7	90.00	-5,573.9	-81.4	1,001.3	797.0	4.901	
12,800.0	7,510.0	12,851.5	7,510.0	105.1	108.5	90.00	-5,668.4	-48.7	1,001.3	793.2	4.812	
12,900.0	7,510.0	12,951.5	7,510.0	107.0	110.3	90.00	-5,762.9	-16.1	1,001.3	789.4	4.726	
13,000.0	7,510.0	13,051.5	7,510.0	108.9	112.1	90.00	-5,857.4	16.5	1,001.3	785.6	4.643	
13,100.0	7,510.0	13,151.5	7,510.0	110.7	113.9	90.00	-5,951.9	49.2	1,001.3	781.8	4.563	
13,200.0	7,510.0	13,251.5	7,510.0	112.6	115.7	90.00	-6,046.5	81.8	1,001.3	778.1	4.485	
13,300.0	7,510.0	13,351.5	7,510.0	114.5	117.5	90.00	-6,141.0	114.5	1,001.3	774.3	4.411	
13,400.0	7,510.0	13,451.5	7,510.0	116.4	119.3	90.00	-6,235.5	147.1	1,001.3	770.5	4.338	
13,500.0	7,510.0	13,551.5	7,510.0	118.3	121.2	90.00	-6,330.0	179.7	1,001.3	766.7	4.268	
13,600.0	7,510.0	13,651.5	7,510.0	120.2	123.0	90.00	-6,424.6	212.4	1,001.3	762.9	4.200	
13,700.0	7,510.0	13,751.5	7,510.0	122.1	124.8	90.00	-6,519.1	245.0	1,001.3	759.1	4.134	

Company:	Arsenal Resources	**Local Co-ordinate Reference:**	Well J Osborn HSOP 16 203
Project:	Harrison County, West Virginia NAD 83	**TVD Reference:**	WELL @ 1191.0usft
Reference Site:	J Osborn HSOP 16 Pad	**MD Reference:**	WELL @ 1191.0usft
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #3	**Offset TVD Reference:**	Offset Datum

Offset Design J Osborn HSOP 16 Pad - J Osborn HSOP 16 202 - Wellbore #1 - Design #3

Offset Site Error: 0.0 usft

Survey Program: 0-MWD default

Offset Well Error: 0.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
13,800.0	7,510.0	13,851.5	7,510.0	123.9	126.7	90.00	-6,613.6	277.7	1,001.3	755.3	4.070	
13,900.0	7,510.0	13,951.5	7,510.0	125.8	128.5	90.00	-6,708.1	310.3	1,001.3	751.5	4.008	
14,000.0	7,510.0	14,051.5	7,510.0	127.7	130.3	90.00	-6,802.7	342.9	1,001.3	747.7	3.948	
14,100.0	7,510.0	14,151.5	7,510.0	129.6	132.2	90.00	-6,897.2	375.6	1,001.3	743.9	3.890	
14,200.0	7,510.0	14,251.5	7,510.0	131.5	134.0	90.00	-6,991.7	408.2	1,001.3	740.1	3.833	
14,300.0	7,510.0	14,351.5	7,510.0	133.4	135.9	90.00	-7,086.2	440.9	1,001.3	736.3	3.778	
14,400.0	7,510.0	14,451.5	7,510.0	135.3	137.7	90.00	-7,180.8	473.5	1,001.3	732.5	3.725	
14,500.0	7,510.0	14,551.5	7,510.0	137.2	139.6	90.00	-7,275.3	506.1	1,001.3	728.7	3.673	
14,600.0	7,510.0	14,651.5	7,510.0	139.1	141.4	90.00	-7,369.8	538.8	1,001.3	724.9	3.622	
14,700.0	7,510.0	14,751.5	7,510.0	141.0	143.3	90.00	-7,464.3	571.4	1,001.3	721.1	3.573	
14,783.3	7,510.0	14,834.8	7,510.0	142.6	144.8	90.00	-7,543.1	598.6	1,001.3	717.9	3.533	
14,800.0	7,510.0	14,851.5	7,510.0	142.9	145.1	90.00	-7,558.8	604.1	1,001.3	717.2	3.525	
14,900.0	7,510.0	14,951.5	7,510.0	144.8	147.0	90.00	-7,653.4	636.7	1,001.3	713.4	3.478	
14,903.3	7,510.0	14,954.8	7,510.0	144.9	147.1	90.00	-7,656.5	637.8	1,001.3	713.3	3.477	
15,000.0	7,510.0	15,051.5	7,510.0	146.7	148.9	90.00	-7,747.9	669.3	1,001.3	709.6	3.433	
15,100.0	7,510.0	15,151.5	7,510.0	148.6	150.7	90.00	-7,842.4	702.0	1,001.3	705.8	3.389	
15,200.0	7,510.0	15,251.5	7,510.0	150.5	152.6	90.00	-7,936.9	734.6	1,001.3	702.0	3.346	
15,300.0	7,510.0	15,351.5	7,510.0	152.4	154.5	90.00	-8,031.5	767.3	1,001.3	698.2	3.303	
15,318.2	7,510.0	15,369.7	7,510.0	152.7	154.8	90.00	-8,048.7	773.2	1,001.3	697.5	3.296	
15,400.0	7,510.0	15,451.5	7,510.0	154.3	156.3	90.00	-8,126.0	799.9	1,001.3	694.4	3.262	
15,500.0	7,510.0	15,551.5	7,510.0	156.2	158.2	90.00	-8,220.5	832.5	1,001.3	690.5	3.222	
15,530.9	7,510.0	15,582.4	7,510.0	156.8	158.8	90.00	-8,249.8	842.6	1,001.3	689.4	3.210	
15,600.0	7,510.0	15,651.5	7,510.0	158.1	160.1	90.00	-8,315.0	865.2	1,001.3	686.7	3.183	
15,700.0	7,510.0	15,751.5	7,510.0	160.0	161.9	90.00	-8,409.6	897.8	1,001.3	682.9	3.145	
15,800.0	7,510.0	15,851.5	7,510.0	161.9	163.8	90.00	-8,504.1	930.4	1,001.3	679.1	3.108	
15,900.0	7,510.0	15,951.5	7,510.0	163.8	165.7	90.00	-8,598.6	963.1	1,001.3	675.3	3.071	
16,000.0	7,510.0	16,051.5	7,510.0	165.7	167.5	90.00	-8,693.1	995.7	1,001.3	671.5	3.036	
16,100.0	7,510.0	16,151.5	7,510.0	167.6	169.4	90.00	-8,787.6	1,028.4	1,001.3	667.6	3.001	
16,200.0	7,510.0	16,251.5	7,510.0	169.5	171.3	90.00	-8,882.2	1,061.0	1,001.3	663.8	2.967	
16,300.0	7,510.0	16,351.5	7,510.0	171.4	173.2	90.00	-8,976.7	1,093.6	1,001.3	660.0	2.934	
16,400.0	7,510.0	16,451.5	7,510.0	173.3	175.1	90.00	-9,071.2	1,126.3	1,001.3	656.2	2.901	
16,500.0	7,510.0	16,551.5	7,510.0	175.2	176.9	90.00	-9,165.7	1,158.9	1,001.3	652.4	2.870	
16,600.0	7,510.0	16,651.5	7,510.0	177.1	178.8	90.00	-9,260.3	1,191.6	1,001.3	648.5	2.839	
16,654.7	7,510.0	16,706.2	7,510.0	178.2	179.8	90.00	-9,312.0	1,209.4	1,001.3	646.4	2.822	
16,700.0	7,510.0	16,751.5	7,510.0	179.0	180.7	90.00	-9,354.8	1,224.2	1,001.3	644.7	2.808	
16,800.0	7,510.0	16,851.5	7,510.0	181.0	182.6	90.00	-9,449.3	1,256.8	1,001.3	640.9	2.778	
16,900.0	7,510.0	16,951.5	7,510.0	182.9	184.5	90.00	-9,543.8	1,289.5	1,001.3	637.1	2.749	
16,942.4	7,510.0	16,993.9	7,510.0	183.7	185.3	90.00	-9,584.0	1,303.3	1,001.3	635.4	2.737	
17,000.0	7,510.0	17,051.5	7,510.0	184.8	186.3	90.00	-9,638.4	1,322.1	1,001.3	633.2	2.721	
17,100.0	7,510.0	17,151.5	7,510.0	186.7	188.2	90.00	-9,732.9	1,354.8	1,001.3	629.4	2.693	
17,200.0	7,510.0	17,251.5	7,510.0	188.6	190.1	90.00	-9,827.4	1,387.4	1,001.3	625.6	2.665	
17,300.0	7,510.0	17,351.5	7,510.0	190.5	192.0	90.00	-9,921.9	1,420.0	1,001.3	621.8	2.638	
17,400.0	7,510.0	17,451.5	7,510.0	192.4	193.9	90.00	-10,016.5	1,452.7	1,001.3	617.9	2.612	
17,500.0	7,510.0	17,551.5	7,510.0	194.3	195.8	90.00	-10,111.0	1,485.3	1,001.3	614.1	2.586	
17,600.0	7,510.0	17,651.5	7,510.0	196.2	197.7	90.00	-10,205.5	1,518.0	1,001.3	610.3	2.561	
17,700.0	7,510.0	17,751.5	7,510.0	198.1	199.5	90.00	-10,300.0	1,550.6	1,001.3	606.5	2.536	
17,800.0	7,510.0	17,851.5	7,510.0	200.0	201.4	90.00	-10,394.5	1,583.2	1,001.3	602.6	2.512	
17,900.0	7,510.0	17,951.5	7,510.0	202.0	203.3	90.00	-10,489.1	1,615.9	1,001.3	598.8	2.488	
18,000.0	7,510.0	18,051.5	7,510.0	203.9	205.2	90.00	-10,583.6	1,648.5	1,001.3	595.0	2.464	
18,100.0	7,510.0	18,151.5	7,510.0	205.8	207.1	90.00	-10,678.1	1,681.2	1,001.3	591.2	2.441	
18,200.0	7,510.0	18,251.5	7,510.0	207.7	209.0	90.00	-10,772.6	1,713.8	1,001.3	587.3	2.419	
18,300.0	7,510.0	18,351.5	7,510.0	209.6	210.9	90.00	-10,867.2	1,746.4	1,001.3	583.5	2.397	

Company:	Arsenal Resources	**Local Co-ordinate Reference:**	Well J Osborn HSOP 16 203
Project:	Harrison County, West Virginia NAD 83	**TVD Reference:**	WELL @ 1191.0usft
Reference Site:	J Osborn HSOP 16 Pad	**MD Reference:**	WELL @ 1191.0usft
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #3	**Offset TVD Reference:**	Offset Datum

Offset Design J Osborn HSOP 16 Pad - J Osborn HSOP 16 202 - Wellbore #1 - Design #3 — **Offset Site Error:** 0.0 usft

Survey Program: 0-MWD default — **Offset Well Error:** 0.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
18,400.0	7,510.0	18,451.5	7,510.0	211.5	212.8	90.00	-10,961.7	1,779.1	1,001.3	579.7	2.375	
18,500.0	7,510.0	18,551.5	7,510.0	213.4	214.7	90.00	-11,056.2	1,811.7	1,001.3	575.8	2.354	
18,600.0	7,510.0	18,651.5	7,510.0	215.3	216.6	90.00	-11,150.7	1,844.4	1,001.3	572.0	2.333	
18,700.0	7,510.0	18,751.5	7,510.0	217.2	218.5	90.00	-11,245.3	1,877.0	1,001.3	568.2	2.312	
18,763.5	7,510.0	18,815.0	7,510.0	218.5	219.7	90.00	-11,305.3	1,897.7	1,001.3	565.8	2.299	
18,800.0	7,510.0	18,851.5	7,510.0	219.2	220.4	90.00	-11,339.8	1,909.6	1,001.3	564.4	2.292	
18,900.0	7,510.0	18,951.5	7,510.0	221.1	222.3	90.00	-11,434.3	1,942.3	1,001.3	560.5	2.272	
19,000.0	7,510.0	19,051.5	7,510.0	223.0	224.2	90.00	-11,528.8	1,974.9	1,001.3	556.7	2.252	
19,100.0	7,510.0	19,151.5	7,510.0	224.9	226.0	90.00	-11,623.4	2,007.5	1,001.3	552.9	2.233	
19,200.0	7,510.0	19,251.5	7,510.0	226.8	227.9	90.00	-11,717.9	2,040.2	1,001.3	549.0	2.214	
19,300.0	7,510.0	19,351.5	7,510.0	228.7	229.8	90.00	-11,812.4	2,072.8	1,001.3	545.2	2.195	
19,400.0	7,510.0	19,451.5	7,510.0	230.6	231.7	90.00	-11,906.9	2,105.5	1,001.3	541.4	2.177	
19,500.0	7,510.0	19,551.5	7,510.0	232.5	233.6	90.00	-12,001.4	2,138.1	1,001.3	537.5	2.159	
19,551.4	7,510.0	19,602.8	7,510.0	233.5	234.6	90.00	-12,050.0	2,154.9	1,001.3	535.6	2.150	
19,600.0	7,510.0	19,651.5	7,510.0	234.5	235.5	90.00	-12,096.0	2,170.7	1,001.3	533.7	2.141	
19,700.0	7,510.0	19,751.5	7,510.0	236.4	237.4	90.00	-12,190.5	2,203.4	1,001.3	529.9	2.124	
19,800.0	7,510.0	19,851.5	7,510.0	238.3	239.3	90.00	-12,285.0	2,236.0	1,001.3	526.0	2.107	
19,900.0	7,510.0	19,951.5	7,510.0	240.2	241.2	90.00	-12,379.5	2,268.7	1,001.3	522.2	2.090	
20,000.0	7,510.0	20,051.5	7,510.0	242.1	243.1	90.00	-12,474.1	2,301.3	1,001.3	518.4	2.073	
20,000.8	7,510.0	20,052.3	7,510.0	242.1	243.1	90.00	-12,474.8	2,301.6	1,001.3	518.4	2.073	
20,100.0	7,510.0	20,151.5	7,510.0	244.0	245.0	90.00	-12,568.6	2,333.9	1,001.3	514.6	2.057	
20,200.0	7,510.0	20,251.5	7,510.0	245.9	246.9	90.00	-12,663.1	2,366.6	1,001.3	510.7	2.041	
20,300.0	7,510.0	20,351.5	7,510.0	247.9	248.8	90.00	-12,757.6	2,399.2	1,001.3	506.9	2.025	
20,400.0	7,510.0	20,451.5	7,510.0	249.8	250.7	90.00	-12,852.2	2,431.9	1,001.3	503.1	2.010	
20,500.0	7,510.0	20,551.5	7,510.0	251.7	252.6	90.00	-12,946.7	2,464.5	1,001.3	499.2	1.994	
20,544.4	7,510.0	20,595.8	7,510.0	252.5	253.5	90.00	-12,988.6	2,479.0	1,001.3	497.5	1.988	
20,600.0	7,510.0	20,651.5	7,510.0	253.6	254.5	90.00	-13,041.2	2,497.1	1,001.3	495.4	1.979	
20,611.3	7,510.0	20,662.8	7,510.0	253.8	254.8	90.00	-13,051.9	2,500.8	1,001.3	495.0	1.978	
20,700.0	7,510.0	20,751.5	7,510.0	255.5	256.4	90.00	-13,135.7	2,529.8	1,001.3	491.6	1.964	
20,800.0	7,510.0	20,851.5	7,510.0	257.4	258.3	90.00	-13,230.3	2,562.4	1,001.3	487.7	1.950	
20,826.6	7,510.0	20,878.0	7,510.0	257.9	258.8	90.00	-13,255.3	2,571.1	1,001.3	486.7	1.946	
20,900.0	7,510.0	20,951.5	7,510.0	259.3	260.2	90.00	-13,324.8	2,595.1	1,001.3	483.9	1.935	
20,963.0	7,510.0	21,014.5	7,510.0	260.5	261.4	90.00	-13,384.4	2,615.6	1,001.3	481.5	1.926	
21,000.0	7,510.0	21,051.5	7,510.0	261.3	262.1	90.00	-13,419.3	2,627.7	1,001.3	480.1	1.921	
21,084.3	7,510.0	21,135.8	7,510.0	262.9	263.8	90.00	-13,499.0	2,655.2	1,001.3	476.8	1.909	
21,100.0	7,510.0	21,151.5	7,510.0	263.2	264.1	90.00	-13,513.8	2,660.3	1,001.3	476.2	1.907	
21,200.0	7,510.0	21,251.5	7,510.0	265.1	266.0	90.00	-13,608.3	2,693.0	1,001.3	472.4	1.893	
21,300.0	7,510.0	21,351.5	7,510.0	267.0	267.9	90.00	-13,702.9	2,725.6	1,001.3	468.5	1.880	
21,370.6	7,510.0	21,422.1	7,510.0	268.4	269.2	90.00	-13,769.6	2,748.7	1,001.3	465.8	1.870	
21,400.0	7,510.0	21,451.5	7,510.0	268.9	269.8	90.00	-13,797.4	2,758.3	1,001.3	464.7	1.866	
21,500.0	7,510.0	21,551.5	7,510.0	270.8	271.7	90.00	-13,891.9	2,790.9	1,001.3	460.9	1.853	
21,600.0	7,510.0	21,651.5	7,510.0	272.7	273.6	90.00	-13,986.4	2,823.5	1,001.3	457.0	1.840	
21,700.0	7,510.0	21,751.5	7,510.0	274.7	275.5	90.00	-14,081.0	2,856.2	1,001.3	453.2	1.827	
21,800.0	7,510.0	21,851.5	7,510.0	276.6	277.4	90.00	-14,175.5	2,888.8	1,001.3	449.4	1.814	
21,834.9	7,510.0	21,886.3	7,510.0	277.2	278.0	90.00	-14,208.4	2,900.2	1,001.3	448.0	1.810	
21,900.0	7,510.0	21,951.5	7,510.0	278.5	279.3	90.00	-14,270.0	2,921.4	1,001.3	445.5	1.802	
22,000.0	7,510.0	22,051.5	7,510.0	280.4	281.2	90.00	-14,364.5	2,954.1	1,001.3	441.7	1.789	
22,014.6	7,510.0	22,066.0	7,510.0	280.7	281.5	90.00	-14,378.3	2,958.8	1,001.3	441.1	1.788	
22,100.0	7,510.0	22,151.5	7,510.0	282.3	283.1	90.00	-14,459.1	2,986.7	1,001.3	437.9	1.777	
22,200.0	7,510.0	22,251.5	7,510.0	284.2	285.0	90.00	-14,553.6	3,019.4	1,001.3	434.0	1.765	
22,300.0	7,510.0	22,351.5	7,510.0	286.2	286.9	90.00	-14,648.1	3,052.0	1,001.3	430.2	1.753	
22,400.0	7,510.0	22,451.5	7,510.0	288.1	288.8	90.00	-14,742.6	3,084.6	1,001.3	426.4	1.742	

Company:	Arsenal Resources	**Local Co-ordinate Reference:**	Well J Osborn HSOP 16 203
Project:	Harrison County, West Virginia NAD 83	**TVD Reference:**	WELL @ 1191.0usft
Reference Site:	J Osborn HSOP 16 Pad	**MD Reference:**	WELL @ 1191.0usft
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #3	**Offset TVD Reference:**	Offset Datum

Offset Design J Osborn HSOP 16 Pad - J Osborn HSOP 16 202 - Wellbore #1 - Design #3 — **Offset Site Error:** 0.0 usft

Survey Program: 0-MWD default — **Offset Well Error:** 0.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
22,500.0	7,510.0	22,551.5	7,510.0	290.0	290.7	90.00	-14,837.1	3,117.3	1,001.3	422.5	1.730	
22,551.1	7,510.0	22,602.6	7,510.0	291.0	291.7	90.00	-14,885.4	3,134.0	1,001.3	420.6	1.724	
22,600.0	7,510.0	22,651.5	7,510.0	291.9	292.6	90.00	-14,931.7	3,149.9	1,001.3	418.7	1.719	
22,700.0	7,510.0	22,751.5	7,510.0	293.8	294.5	90.00	-15,026.2	3,182.6	1,001.3	414.9	1.707	
22,800.0	7,510.0	22,851.5	7,510.0	295.7	296.4	90.00	-15,120.7	3,215.2	1,001.3	411.0	1.696	
22,853.5	7,510.0	22,904.9	7,510.0	296.8	297.5	90.00	-15,171.2	3,232.6	1,001.3	409.0	1.690	
22,900.0	7,510.0	22,951.5	7,510.0	297.7	298.4	90.00	-15,215.2	3,247.8	1,001.3	407.2	1.685	
23,000.0	7,510.0	23,051.5	7,510.0	299.6	300.3	90.00	-15,309.8	3,280.5	1,001.3	403.3	1.675	
23,100.0	7,510.0	23,151.5	7,510.0	301.5	302.2	90.00	-15,404.3	3,313.1	1,001.3	399.5	1.664	
23,200.0	7,510.0	23,251.5	7,510.0	303.4	304.1	90.00	-15,498.8	3,345.8	1,001.3	395.7	1.653	
23,300.0	7,510.0	23,351.5	7,510.0	305.3	306.0	90.00	-15,593.3	3,378.4	1,001.3	391.8	1.643	
23,400.0	7,510.0	23,451.5	7,510.0	307.2	307.9	90.00	-15,687.9	3,411.0	1,001.3	388.0	1.633	
23,500.0	7,510.0	23,551.5	7,510.0	309.2	309.8	90.00	-15,782.4	3,443.7	1,001.3	384.2	1.622	
23,600.0	7,510.0	23,651.5	7,510.0	311.1	311.7	90.00	-15,876.9	3,476.3	1,001.3	380.3	1.612	
23,700.0	7,510.0	23,751.5	7,510.0	313.0	313.6	90.00	-15,971.4	3,509.0	1,001.3	376.5	1.603	
23,800.0	7,510.0	23,851.5	7,510.0	314.9	315.5	90.00	-16,066.0	3,541.6	1,001.3	372.6	1.593	
23,900.0	7,510.0	23,951.5	7,510.0	316.8	317.4	90.00	-16,160.5	3,574.2	1,001.3	368.8	1.583	
23,953.2	7,510.0	24,004.6	7,510.0	317.8	318.4	90.00	-16,210.7	3,591.6	1,001.3	366.8	1.578	
24,000.0	7,510.0	24,051.5	7,510.0	318.7	319.3	90.00	-16,255.0	3,606.9	1,001.3	365.0	1.574	
24,100.0	7,510.0	24,151.5	7,510.0	320.7	321.3	90.00	-16,349.5	3,639.5	1,001.3	361.1	1.564	
24,137.4	7,510.0	24,188.9	7,510.0	321.4	322.0	90.00	-16,384.9	3,651.7	1,001.3	359.7	1.561	
24,200.0	7,510.0	24,251.5	7,510.0	322.6	323.2	90.00	-16,444.0	3,672.2	1,001.3	357.3	1.555	
24,300.0	7,510.0	24,351.5	7,510.0	324.5	325.1	90.00	-16,538.6	3,704.8	1,001.3	353.5	1.546	
24,400.0	7,510.0	24,451.5	7,510.0	326.4	327.0	90.00	-16,633.1	3,737.4	1,001.3	349.6	1.537	
24,500.0	7,510.0	24,551.5	7,510.0	328.3	328.9	90.00	-16,727.6	3,770.1	1,001.3	345.8	1.528	
24,600.0	7,510.0	24,651.5	7,510.0	330.2	330.8	90.00	-16,822.1	3,802.7	1,001.3	341.9	1.519	
24,700.0	7,510.0	24,751.5	7,510.0	332.2	332.7	90.00	-16,916.7	3,835.3	1,001.3	338.1	1.510	
24,800.0	7,510.0	24,851.5	7,510.0	334.1	334.6	90.00	-17,011.2	3,868.0	1,001.3	334.3	1.501	
24,900.0	7,510.0	24,951.5	7,510.0	336.0	336.5	90.00	-17,105.7	3,900.6	1,001.3	330.4	1.493	Level 3
25,000.0	7,510.0	25,051.5	7,510.0	337.9	338.4	90.00	-17,200.2	3,933.3	1,001.3	326.6	1.484	Level 3
25,100.0	7,510.0	25,151.5	7,510.0	339.8	340.4	90.00	-17,294.8	3,965.9	1,001.3	322.8	1.476	Level 3
25,113.4	7,510.0	25,164.9	7,510.0	340.1	340.5	90.00	-17,307.5	3,970.3	1,000.6	321.5	1.474	Level 3, SF

Company:	Arsenal Resources	**Local Co-ordinate Reference:**	Well J Osborn HSOP 16 203
Project:	Harrison County, West Virginia NAD 83	**TVD Reference:**	WELL @ 1191.0usft
Reference Site:	J Osborn HSOP 16 Pad	**MD Reference:**	WELL @ 1191.0usft
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #3	**Offset TVD Reference:**	Offset Datum

Offset Design J Osborn HSOP 16 Pad - J Osborn HSOP 16 204 - Curve & Lateral - Design #1

Offset Site Error: 0.0 usft

Survey Program: 0-MWD default

Offset Well Error: 0.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
0.0	0.0	100.0	100.0	0.0	0.0	114.97	-6.3	13.6	101.8			
100.0	100.0	100.0	100.0	0.1	0.0	114.97	-6.3	13.6	15.0	14.9	182.600	
133.6	133.6	132.9	132.9	0.2	0.0	114.97	-6.3	13.6	15.0	14.8	77.103	
200.0	200.0	199.3	199.3	0.3	0.1	114.97	-6.3	13.6	15.0	14.6	36.854	
300.0	300.0	299.3	299.3	0.5	0.3	114.97	-6.3	13.6	15.0	14.1	17.300	
400.0	400.0	399.3	399.3	0.8	0.6	114.97	-6.3	13.6	15.0	13.7	11.393	
500.0	500.0	499.3	499.3	1.0	0.8	114.97	-6.3	13.6	15.0	13.2	8.494	
600.0	600.0	599.3	599.3	1.2	1.0	114.97	-6.3	13.6	15.0	12.8	6.770	
700.0	700.0	699.3	699.3	1.4	1.2	114.97	-6.3	13.6	15.0	12.3	5.628	
800.0	800.0	799.3	799.3	1.7	1.5	114.97	-6.3	13.6	15.0	11.9	4.816	
900.0	900.0	899.3	899.3	1.9	1.7	114.97	-6.3	13.6	15.0	11.4	4.209	
1,000.0	1,000.0	999.3	999.3	2.1	1.9	114.97	-6.3	13.6	15.0	11.0	3.737	
1,100.0	1,100.0	1,099.3	1,099.3	2.3	2.1	114.97	-6.3	13.6	15.0	10.5	3.361	
1,200.0	1,200.0	1,199.3	1,199.3	2.6	2.4	114.97	-6.3	13.6	15.0	10.1	3.053	
1,300.0	1,300.0	1,299.3	1,299.3	2.8	2.6	114.97	-6.3	13.6	15.0	9.6	2.797	
1,400.0	1,400.0	1,399.3	1,399.3	3.0	2.8	114.97	-6.3	13.6	15.0	9.2	2.581	
1,500.0	1,500.0	1,499.3	1,499.3	3.2	3.0	114.97	-6.3	13.6	15.0	8.7	2.396	
1,600.0	1,600.0	1,599.3	1,599.3	3.5	3.3	114.97	-6.3	13.6	15.0	8.3	2.235	
1,700.0	1,700.0	1,699.3	1,699.3	3.7	3.5	114.97	-6.3	13.6	15.0	7.8	2.095	
1,800.0	1,800.0	1,799.3	1,799.3	3.9	3.7	114.97	-6.3	13.6	15.0	7.4	1.971	
1,900.0	1,900.0	1,899.3	1,899.3	4.1	3.9	114.97	-6.3	13.6	15.0	6.9	1.861	
2,000.0	2,000.0	1,999.3	1,999.3	4.4	4.2	114.97	-6.3	13.6	15.0	6.5	1.763	
2,100.0	2,100.0	2,099.3	2,099.3	4.6	4.4	114.97	-6.3	13.6	15.0	6.0	1.674	
2,200.0	2,200.0	2,199.3	2,199.3	4.8	4.6	114.97	-6.3	13.6	15.0	5.6	1.594	
2,300.0	2,300.0	2,299.3	2,299.3	5.0	4.8	114.97	-6.3	13.6	15.0	5.1	1.522	
2,400.0	2,400.0	2,399.3	2,399.3	5.3	5.1	114.97	-6.3	13.6	15.0	4.7	1.455	Level 3
2,500.0	2,500.0	2,499.3	2,499.3	5.5	5.3	114.97	-6.3	13.6	15.0	4.2	1.395	Level 3, CC, ES, SF
2,600.0	2,600.0	2,598.8	2,598.8	5.7	5.5	-152.86	-5.8	15.2	17.8	6.7	1.595	
2,700.0	2,699.8	2,697.6	2,697.4	5.9	5.7	-164.28	-4.2	20.1	27.2	15.6	2.354	
2,800.0	2,799.5	2,795.6	2,795.1	6.1	5.9	-171.88	-1.7	27.7	43.4	31.5	3.637	
2,900.0	2,898.7	2,893.5	2,892.6	6.3	6.1	-175.70	1.0	35.8	63.8	51.5	5.177	
3,000.0	2,997.5	2,990.5	2,989.3	6.5	6.4	-177.76	3.6	43.9	87.8	75.1	6.898	
3,042.9	3,039.7	3,031.9	3,030.5	6.6	6.4	-178.35	4.7	47.3	99.1	86.2	7.686	
3,100.0	3,095.7	3,086.8	3,085.2	6.8	6.6	-178.97	6.2	51.8	114.7	101.5	8.734	
3,200.0	3,193.9	3,183.0	3,181.0	7.1	6.8	-179.73	8.9	59.8	141.9	128.3	10.482	
3,300.0	3,292.2	3,279.2	3,276.9	7.4	7.0	179.76	11.5	67.8	169.1	155.1	12.125	
3,400.0	3,390.4	3,375.4	3,372.7	7.7	7.3	179.38	14.1	75.7	196.3	181.9	13.671	
3,500.0	3,488.6	3,471.7	3,468.6	8.0	7.5	179.10	16.7	83.7	223.5	208.8	15.127	
3,600.0	3,586.8	3,567.9	3,564.4	8.3	7.7	178.88	19.3	91.7	250.8	235.6	16.499	
3,700.0	3,685.0	3,672.2	3,668.4	8.6	7.9	178.73	21.8	99.1	276.9	261.2	17.688	
3,800.0	3,783.2	3,780.4	3,776.6	9.0	8.1	178.70	23.1	103.1	299.5	283.4	18.594	
3,900.0	3,881.4	3,884.5	3,880.7	9.3	8.3	178.77	23.3	103.7	318.9	302.3	19.279	
4,000.0	3,979.6	3,982.7	3,978.9	9.7	8.6	178.84	23.3	103.7	337.7	320.7	19.889	
4,100.0	4,077.8	4,081.0	4,077.1	10.0	8.8	178.90	23.3	103.7	356.5	339.1	20.461	
4,200.0	4,176.0	4,179.2	4,175.3	10.4	9.0	178.96	23.3	103.7	375.4	357.5	21.003	
4,300.0	4,274.3	4,277.4	4,273.6	10.8	9.2	179.01	23.3	103.7	394.2	375.9	21.517	
4,400.0	4,372.5	4,375.6	4,371.8	11.1	9.4	179.05	23.3	103.7	413.0	394.3	22.004	
4,500.0	4,470.7	4,473.8	4,470.0	11.5	9.6	179.09	23.3	103.7	431.9	412.6	22.467	
4,600.0	4,568.9	4,572.0	4,568.2	11.9	9.8	179.13	23.3	103.7	450.7	431.0	22.908	
4,700.0	4,667.1	4,670.2	4,666.4	12.3	10.1	179.17	23.3	103.7	469.5	449.4	23.327	
4,800.0	4,765.3	4,768.4	4,764.6	12.7	10.3	179.20	23.3	103.7	488.4	467.8	23.726	
4,900.0	4,863.5	4,866.6	4,862.8	13.1	10.5	179.23	23.3	103.7	507.2	486.2	24.107	

Company:	Arsenal Resources	**Local Co-ordinate Reference:**	Well J Osborn HSOP 16 203
Project:	Harrison County, West Virginia NAD 83	**TVD Reference:**	WELL @ 1191.0usft
Reference Site:	J Osborn HSOP 16 Pad	**MD Reference:**	WELL @ 1191.0usft
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #3	**Offset TVD Reference:**	Offset Datum

Offset Design J Osborn HSOP 16 Pad - J Osborn HSOP 16 204 - Curve & Lateral - Design #1 — **Offset Site Error:** 0.0 usft

Survey Program: 0-MWD default — **Offset Well Error:** 0.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
5,000.0	4,961.7	4,964.8	4,961.0	13.4	10.7	179.26	23.3	103.7	526.0	504.6	24.470	
5,100.0	5,059.9	5,063.1	5,059.2	13.8	10.9	179.28	23.3	103.7	544.9	522.9	24.818	
5,200.0	5,158.1	5,161.3	5,157.4	14.2	11.1	179.31	23.3	103.7	563.7	541.3	25.150	
5,300.0	5,256.3	5,259.5	5,255.6	14.6	11.4	179.33	23.3	103.7	582.6	559.7	25.468	
5,400.0	5,354.6	5,357.7	5,353.9	15.0	11.6	179.35	23.3	103.7	601.4	578.1	25.773	
5,500.0	5,452.8	5,455.9	5,452.1	15.4	11.8	179.37	23.3	103.7	620.2	596.4	26.065	
5,600.0	5,551.0	5,554.1	5,550.3	15.8	12.0	179.39	23.3	103.7	639.1	614.8	26.345	
5,700.0	5,649.2	5,652.3	5,648.5	16.2	12.2	179.40	23.3	103.7	657.9	633.2	26.614	
5,800.0	5,747.4	5,750.5	5,746.7	16.6	12.5	179.42	23.3	103.7	676.7	651.6	26.873	
5,900.0	5,845.6	5,848.7	5,844.9	17.0	12.7	179.44	23.3	103.7	695.6	669.9	27.121	
6,000.0	5,943.8	5,946.9	5,943.1	17.4	12.9	179.45	23.3	103.7	714.4	688.3	27.361	
6,100.0	6,042.0	6,045.1	6,041.3	17.8	13.1	179.47	23.3	103.7	733.2	706.7	27.591	
6,200.0	6,140.2	6,143.4	6,139.5	18.3	13.3	179.48	23.3	103.7	752.1	725.0	27.813	
6,300.0	6,238.4	6,241.6	6,237.7	18.7	13.5	179.49	23.3	103.7	770.9	743.4	28.027	
6,400.0	6,336.7	6,339.8	6,336.0	19.1	13.8	179.50	23.3	103.7	789.8	761.8	28.233	
6,500.0	6,434.9	6,438.0	6,434.2	19.5	14.0	179.52	23.3	103.7	808.6	780.2	28.433	
6,600.0	6,533.1	6,525.3	6,521.5	19.9	14.2	179.56	21.4	104.3	827.8	799.0	28.705	
6,700.0	6,631.3	6,600.0	6,595.4	20.3	14.3	-179.64	11.8	107.6	849.1	819.9	29.129	
6,800.0	6,729.5	6,678.1	6,670.9	20.7	14.4	-178.32	-6.9	114.1	872.9	843.4	29.631	
6,900.0	6,827.7	6,750.0	6,737.8	21.1	14.6	-176.63	-31.8	122.7	899.9	870.2	30.278	
6,936.9	6,864.0	6,770.1	6,755.9	21.3	14.6	-176.09	-40.0	125.5	910.8	881.0	30.594	
6,950.0	6,876.8	6,778.3	6,763.2	21.3	14.6	-169.36	-43.5	126.7	914.8	885.0	30.705	
7,000.0	6,925.9	6,809.5	6,790.5	21.5	14.7	-144.14	-57.6	131.6	929.9	900.1	31.144	
7,050.0	6,974.8	6,840.3	6,816.9	21.7	14.8	-124.01	-72.8	136.9	945.0	915.1	31.588	
7,100.0	7,023.0	6,871.0	6,842.2	21.8	14.9	-109.90	-89.1	142.5	959.8	929.8	32.030	
7,150.0	7,070.5	6,900.0	6,865.4	21.9	14.9	-100.08	-105.6	148.2	974.2	944.2	32.481	
7,200.0	7,116.8	6,931.7	6,889.9	22.1	15.0	-92.90	-124.7	154.8	988.2	958.1	32.875	
7,250.0	7,161.6	6,961.9	6,912.1	22.2	15.2	-87.48	-144.0	161.4	1,001.5	971.4	33.260	
7,300.0	7,204.8	7,000.0	6,938.8	22.3	15.3	-83.15	-169.6	170.3	1,014.1	983.8	33.501	
7,350.0	7,245.9	7,022.0	6,953.5	22.4	15.4	-79.82	-185.1	175.6	1,025.8	995.5	33.905	
7,400.0	7,284.9	7,050.0	6,971.3	22.6	15.6	-77.05	-205.5	182.7	1,036.7	1,006.3	34.181	
7,450.0	7,321.3	7,081.7	6,990.4	22.7	15.7	-74.75	-229.5	191.0	1,046.5	1,016.1	34.323	
7,500.0	7,355.1	7,111.6	7,007.1	22.8	15.9	-72.86	-252.9	199.0	1,055.4	1,024.7	34.425	
7,550.0	7,386.0	7,150.0	7,026.9	22.9	16.2	-71.28	-284.0	209.8	1,063.2	1,032.2	34.301	
7,600.0	7,413.8	7,171.2	7,036.9	23.1	16.3	-70.06	-301.6	215.8	1,069.8	1,038.7	34.373	
7,650.0	7,438.3	7,200.0	7,049.6	23.2	16.5	-69.08	-326.1	224.3	1,075.2	1,043.8	34.234	
7,700.0	7,459.4	7,230.8	7,061.8	23.4	16.8	-68.33	-352.8	233.5	1,079.5	1,047.7	33.958	
7,750.0	7,477.0	7,260.6	7,072.4	23.6	17.0	-67.81	-379.1	242.6	1,082.5	1,050.3	33.611	
7,800.0	7,490.9	7,300.0	7,084.3	23.8	17.4	-67.53	-414.7	254.9	1,084.3	1,051.5	33.010	
7,850.0	7,501.1	7,320.3	7,089.5	24.1	17.6	-67.40	-433.2	261.3	1,084.8	1,051.6	32.649	
7,900.0	7,507.4	7,350.0	7,096.0	24.4	17.9	-67.49	-460.5	270.7	1,084.1	1,050.3	32.055	
7,950.0	7,510.0	7,380.3	7,101.2	24.7	18.2	-67.78	-488.8	280.5	1,082.2	1,047.7	31.375	
7,957.8	7,510.0	7,385.0	7,101.9	24.7	18.3	-67.84	-493.2	282.0	1,081.8	1,047.2	31.265	
8,000.0	7,510.0	7,410.5	7,105.0	25.0	18.5	-68.00	-517.1	290.2	1,079.9	1,044.7	30.680	
8,100.0	7,510.0	7,475.5	7,108.3	25.8	19.3	-68.16	-578.5	311.4	1,077.8	1,041.1	29.359	
8,136.1	7,510.0	7,505.3	7,108.3	26.1	19.6	-68.16	-606.6	321.1	1,077.8	1,040.4	28.817	
8,200.0	7,510.0	7,569.2	7,108.3	26.7	20.4	-68.16	-667.0	342.0	1,077.8	1,038.9	27.730	
8,300.0	7,510.0	7,669.2	7,108.3	27.7	21.8	-68.16	-761.5	374.6	1,077.8	1,036.5	26.083	
8,400.0	7,510.0	7,769.2	7,108.3	28.9	23.2	-68.16	-856.1	407.3	1,077.8	1,033.9	24.531	
8,500.0	7,510.0	7,869.2	7,108.3	30.1	24.7	-68.16	-950.6	439.9	1,077.8	1,031.1	23.087	
8,600.0	7,510.0	7,969.2	7,108.3	31.4	26.2	-68.16	-1,045.1	472.5	1,077.8	1,028.2	21.755	
8,700.0	7,510.0	8,069.2	7,108.3	32.7	27.8	-68.16	-1,139.6	505.2	1,077.8	1,025.3	20.532	

Company:	Arsenal Resources	**Local Co-ordinate Reference:**	Well J Osborn HSOP 16 203
Project:	Harrison County, West Virginia NAD 83	**TVD Reference:**	WELL @ 1191.0usft
Reference Site:	J Osborn HSOP 16 Pad	**MD Reference:**	WELL @ 1191.0usft
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #3	**Offset TVD Reference:**	Offset Datum

Offset Design J Osborn HSOP 16 Pad - J Osborn HSOP 16 204 - Curve & Lateral - Design #1

Survey Program: 0-MWD default

Offset Site Error: 0.0 usft

Offset Well Error: 0.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
8,800.0	7,510.0	8,169.2	7,108.3	34.2	29.4	-68.16	-1,234.2	537.8	1,077.8	1,022.3	19.411	
8,900.0	7,510.0	8,269.2	7,108.3	35.6	31.1	-68.16	-1,328.7	570.4	1,077.8	1,019.2	18.386	
9,000.0	7,510.0	8,369.2	7,108.3	37.1	32.8	-68.16	-1,423.2	603.1	1,077.8	1,016.0	17.448	
9,100.0	7,510.0	8,469.2	7,108.3	38.7	34.5	-68.16	-1,517.7	635.7	1,077.8	1,012.8	16.589	
9,200.0	7,510.0	8,569.2	7,108.3	40.3	36.2	-68.16	-1,612.3	668.3	1,077.8	1,009.6	15.801	
9,300.0	7,510.0	8,669.2	7,108.3	41.9	38.0	-68.16	-1,706.8	701.0	1,077.8	1,006.3	15.077	
9,400.0	7,510.0	8,769.2	7,108.3	43.5	39.7	-68.16	-1,801.3	733.6	1,077.8	1,003.0	14.410	
9,500.0	7,510.0	8,869.2	7,108.3	45.2	41.5	-68.16	-1,895.8	766.2	1,077.7	999.6	13.795	
9,600.0	7,510.0	8,969.2	7,108.3	46.9	43.3	-68.16	-1,990.4	798.9	1,077.7	996.3	13.227	
9,700.0	7,510.0	9,069.2	7,108.3	48.6	45.1	-68.16	-2,084.9	831.5	1,077.7	992.9	12.700	
9,800.0	7,510.0	9,169.2	7,108.3	50.3	46.9	-68.16	-2,179.4	864.1	1,077.7	989.5	12.211	
9,900.0	7,510.0	9,269.2	7,108.3	52.0	48.8	-68.16	-2,273.9	896.8	1,077.7	986.1	11.757	
10,000.0	7,510.0	9,369.2	7,108.3	53.7	50.6	-68.16	-2,368.5	929.4	1,077.7	982.6	11.333	
10,100.0	7,510.0	9,469.2	7,108.3	55.5	52.4	-68.16	-2,463.0	962.0	1,077.7	979.2	10.937	
10,200.0	7,510.0	9,569.2	7,108.3	57.3	54.3	-68.16	-2,557.5	994.7	1,077.7	975.7	10.567	
10,300.0	7,510.0	9,669.2	7,108.3	59.0	56.1	-68.16	-2,652.0	1,027.3	1,077.7	972.3	10.220	
10,400.0	7,510.0	9,769.2	7,108.3	60.8	58.0	-68.16	-2,746.6	1,059.9	1,077.7	968.8	9.894	
10,500.0	7,510.0	9,869.2	7,108.3	62.6	59.8	-68.16	-2,841.1	1,092.6	1,077.7	965.3	9.588	
10,600.0	7,510.0	9,969.2	7,108.3	64.4	61.7	-68.16	-2,935.6	1,125.2	1,077.7	961.8	9.299	
10,700.0	7,510.0	10,069.2	7,108.3	66.2	63.5	-68.16	-3,030.1	1,157.8	1,077.7	958.3	9.026	
10,800.0	7,510.0	10,169.2	7,108.3	68.0	65.4	-68.16	-3,124.7	1,190.5	1,077.7	954.8	8.769	
10,900.0	7,510.0	10,269.2	7,108.3	69.8	67.3	-68.16	-3,219.2	1,223.1	1,077.7	951.3	8.526	
11,000.0	7,510.0	10,369.2	7,108.3	71.7	69.2	-68.16	-3,313.7	1,255.7	1,077.7	947.7	8.295	
11,100.0	7,510.0	10,469.2	7,108.3	73.5	71.0	-68.16	-3,408.2	1,288.4	1,077.7	944.2	8.076	
11,200.0	7,510.0	10,569.2	7,108.3	75.3	72.9	-68.16	-3,502.8	1,321.0	1,077.7	940.7	7.868	
11,300.0	7,510.0	10,669.2	7,108.3	77.2	74.8	-68.16	-3,597.3	1,353.6	1,077.6	937.2	7.671	
11,400.0	7,510.0	10,769.2	7,108.3	79.0	76.7	-68.16	-3,691.8	1,386.3	1,077.6	933.6	7.482	
11,500.0	7,510.0	10,869.2	7,108.3	80.9	78.6	-68.16	-3,786.3	1,418.9	1,077.6	930.1	7.303	
11,600.0	7,510.0	10,969.2	7,108.3	82.7	80.5	-68.15	-3,880.9	1,451.5	1,077.6	926.5	7.132	
11,700.0	7,510.0	11,069.2	7,108.3	84.6	82.3	-68.15	-3,975.4	1,484.2	1,077.6	923.0	6.968	
11,800.0	7,510.0	11,169.2	7,108.3	86.4	84.2	-68.15	-4,069.9	1,516.8	1,077.6	919.4	6.812	
11,900.0	7,510.0	11,269.2	7,108.3	88.3	86.1	-68.15	-4,164.4	1,549.4	1,077.6	915.9	6.663	
12,000.0	7,510.0	11,369.2	7,108.3	90.1	88.0	-68.15	-4,259.0	1,582.1	1,077.6	912.3	6.519	
12,100.0	7,510.0	11,469.2	7,108.3	92.0	89.9	-68.15	-4,353.5	1,614.7	1,077.6	908.8	6.382	
12,200.0	7,510.0	11,569.2	7,108.3	93.9	91.8	-68.15	-4,448.0	1,647.3	1,077.6	905.2	6.250	
12,300.0	7,510.0	11,669.2	7,108.3	95.7	93.7	-68.15	-4,542.5	1,680.0	1,077.6	901.6	6.124	
12,400.0	7,510.0	11,769.2	7,108.3	97.6	95.6	-68.15	-4,637.1	1,712.6	1,077.6	898.1	6.003	
12,500.0	7,510.0	11,869.2	7,108.3	99.5	97.5	-68.15	-4,731.6	1,745.2	1,077.6	894.5	5.886	
12,600.0	7,510.0	11,969.2	7,108.3	101.3	99.4	-68.15	-4,826.1	1,777.9	1,077.6	890.9	5.773	
12,700.0	7,510.0	12,069.2	7,108.3	103.2	101.3	-68.15	-4,920.6	1,810.5	1,077.6	887.4	5.665	
12,800.0	7,510.0	12,169.2	7,108.3	105.1	103.2	-68.15	-5,015.2	1,843.1	1,077.6	883.8	5.561	
12,900.0	7,510.0	12,269.2	7,108.3	107.0	105.1	-68.15	-5,109.7	1,875.8	1,077.6	880.2	5.460	
13,000.0	7,510.0	12,369.2	7,108.3	108.9	107.0	-68.15	-5,204.2	1,908.4	1,077.6	876.6	5.363	
13,100.0	7,510.0	12,469.2	7,108.3	110.7	108.9	-68.15	-5,298.7	1,941.0	1,077.6	873.1	5.269	
13,200.0	7,510.0	12,569.2	7,108.3	112.6	110.8	-68.15	-5,393.3	1,973.7	1,077.5	869.5	5.179	
13,300.0	7,510.0	12,669.2	7,108.3	114.5	112.7	-68.15	-5,487.8	2,006.3	1,077.5	865.9	5.091	
13,400.0	7,510.0	12,769.2	7,108.3	116.4	114.6	-68.15	-5,582.3	2,038.9	1,077.5	862.3	5.007	
13,500.0	7,510.0	12,869.2	7,108.3	118.3	116.5	-68.15	-5,676.8	2,071.6	1,077.5	858.7	4.925	
13,600.0	7,510.0	12,969.2	7,108.3	120.2	118.4	-68.15	-5,771.4	2,104.2	1,077.5	855.1	4.845	
13,700.0	7,510.0	13,069.2	7,108.3	122.1	120.3	-68.15	-5,865.9	2,136.9	1,077.5	851.6	4.769	
13,800.0	7,510.0	13,169.2	7,108.3	123.9	122.2	-68.15	-5,960.4	2,169.5	1,077.5	848.0	4.694	
13,900.0	7,510.0	13,269.2	7,108.3	125.8	124.1	-68.15	-6,054.9	2,202.1	1,077.5	844.4	4.622	

Company:	Arsenal Resources	**Local Co-ordinate Reference:**	Well J Osborn HSOP 16 203
Project:	Harrison County, West Virginia NAD 83	**TVD Reference:**	WELL @ 1191.0usft
Reference Site:	J Osborn HSOP 16 Pad	**MD Reference:**	WELL @ 1191.0usft
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #3	**Offset TVD Reference:**	Offset Datum

Offset Design J Osborn HSOP 16 Pad - J Osborn HSOP 16 204 - Curve & Lateral - Design #1 — **Offset Site Error:** 0.0 usft

Survey Program: 0-MWD default — **Offset Well Error:** 0.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
14,000.0	7,510.0	13,369.2	7,108.3	127.7	126.1	-68.15	-6,149.5	2,234.8	1,077.5	840.8	4.552	
14,100.0	7,510.0	13,469.2	7,108.3	129.6	128.0	-68.15	-6,244.0	2,267.4	1,077.5	837.2	4.484	
14,200.0	7,510.0	13,569.2	7,108.3	131.5	129.9	-68.15	-6,338.5	2,300.0	1,077.5	833.6	4.418	
14,300.0	7,510.0	13,669.2	7,108.3	133.4	131.8	-68.15	-6,433.0	2,332.7	1,077.5	830.0	4.354	
14,400.0	7,510.0	13,769.2	7,108.3	135.3	133.7	-68.15	-6,527.6	2,365.3	1,077.5	826.4	4.292	
14,500.0	7,510.0	13,869.2	7,108.3	137.2	135.6	-68.15	-6,622.1	2,397.9	1,077.5	822.9	4.232	
14,600.0	7,510.0	13,969.2	7,108.3	139.1	137.5	-68.15	-6,716.6	2,430.6	1,077.5	819.3	4.173	
14,700.0	7,510.0	14,069.2	7,108.3	141.0	139.4	-68.15	-6,811.1	2,463.2	1,077.5	815.7	4.116	
14,800.0	7,510.0	14,169.2	7,108.3	142.9	141.3	-68.15	-6,905.7	2,495.8	1,077.5	812.1	4.060	
14,900.0	7,510.0	14,269.2	7,108.3	144.8	143.2	-68.15	-7,000.2	2,528.5	1,077.5	808.5	4.006	
15,000.0	7,510.0	14,369.2	7,108.3	146.7	145.2	-68.15	-7,094.7	2,561.1	1,077.5	804.9	3.953	
15,100.0	7,510.0	14,469.2	7,108.3	148.6	147.1	-68.15	-7,189.2	2,593.7	1,077.4	801.3	3.902	
15,200.0	7,510.0	14,569.2	7,108.3	150.5	149.0	-68.15	-7,283.8	2,626.4	1,077.4	797.7	3.851	
15,300.0	7,510.0	14,669.2	7,108.3	152.4	150.9	-68.15	-7,378.3	2,659.0	1,077.4	794.1	3.803	
15,400.0	7,510.0	14,769.2	7,108.3	154.3	152.8	-68.15	-7,472.8	2,691.6	1,077.4	790.5	3.755	
15,500.0	7,510.0	14,869.2	7,108.3	156.2	154.7	-68.15	-7,567.3	2,724.3	1,077.4	786.9	3.709	
15,600.0	7,510.0	14,969.2	7,108.3	158.1	156.6	-68.15	-7,661.9	2,756.9	1,077.4	783.3	3.663	
15,700.0	7,510.0	15,069.2	7,108.3	160.0	158.5	-68.15	-7,756.4	2,789.5	1,077.4	779.7	3.619	
15,800.0	7,510.0	15,169.2	7,108.3	161.9	160.5	-68.15	-7,850.9	2,822.2	1,077.4	776.1	3.576	
15,900.0	7,510.0	15,269.2	7,108.3	163.8	162.4	-68.15	-7,945.4	2,854.8	1,077.4	772.5	3.534	
16,000.0	7,510.0	15,369.2	7,108.3	165.7	164.3	-68.15	-8,040.0	2,887.4	1,077.4	768.9	3.493	
16,100.0	7,510.0	15,469.2	7,108.3	167.6	166.2	-68.15	-8,134.5	2,920.1	1,077.4	765.3	3.452	
16,200.0	7,510.0	15,569.2	7,108.3	169.5	168.1	-68.15	-8,229.0	2,952.7	1,077.4	761.7	3.413	
16,300.0	7,510.0	15,669.2	7,108.3	171.4	170.0	-68.15	-8,323.6	2,985.3	1,077.4	758.1	3.375	
16,400.0	7,510.0	15,769.2	7,108.3	173.3	171.9	-68.15	-8,418.1	3,018.0	1,077.4	754.5	3.337	
16,500.0	7,510.0	15,869.2	7,108.3	175.2	173.9	-68.15	-8,512.6	3,050.6	1,077.4	750.9	3.300	
16,600.0	7,510.0	15,969.2	7,108.3	177.1	175.8	-68.15	-8,607.1	3,083.2	1,077.4	747.3	3.264	
16,700.0	7,510.0	16,069.2	7,108.3	179.0	177.7	-68.15	-8,701.7	3,115.9	1,077.4	743.7	3.229	
16,800.0	7,510.0	16,169.2	7,108.3	181.0	179.6	-68.15	-8,796.2	3,148.5	1,077.4	740.1	3.195	
16,900.0	7,510.0	16,269.2	7,108.3	182.9	181.5	-68.15	-8,890.7	3,181.1	1,077.4	736.5	3.161	
17,000.0	7,510.0	16,369.2	7,108.3	184.8	183.4	-68.15	-8,985.2	3,213.8	1,077.3	732.9	3.128	
17,100.0	7,510.0	16,469.2	7,108.3	186.7	185.4	-68.15	-9,079.8	3,246.4	1,077.3	729.3	3.095	
17,200.0	7,510.0	16,569.2	7,108.3	188.6	187.3	-68.15	-9,174.3	3,279.0	1,077.3	725.7	3.064	
17,300.0	7,510.0	16,669.2	7,108.3	190.5	189.2	-68.15	-9,268.8	3,311.7	1,077.3	722.1	3.033	
17,400.0	7,510.0	16,769.2	7,108.3	192.4	191.1	-68.15	-9,363.3	3,344.3	1,077.3	718.5	3.002	
17,500.0	7,510.0	16,869.2	7,108.3	194.3	193.0	-68.15	-9,457.9	3,376.9	1,077.3	714.9	2.972	
17,600.0	7,510.0	16,969.2	7,108.3	196.2	194.9	-68.15	-9,552.4	3,409.6	1,077.3	711.3	2.943	
17,700.0	7,510.0	17,069.2	7,108.3	198.1	196.8	-68.15	-9,646.9	3,442.2	1,077.3	707.7	2.915	
17,800.0	7,510.0	17,169.2	7,108.3	200.0	198.8	-68.15	-9,741.4	3,474.8	1,077.3	704.1	2.886	
17,900.0	7,510.0	17,269.2	7,108.3	202.0	200.7	-68.15	-9,836.0	3,507.5	1,077.3	700.5	2.859	
18,000.0	7,510.0	17,369.2	7,108.3	203.9	202.6	-68.15	-9,930.5	3,540.1	1,077.3	696.9	2.832	
18,100.0	7,510.0	17,469.2	7,108.3	205.8	204.5	-68.15	-10,025.0	3,572.7	1,077.3	693.3	2.805	
18,200.0	7,510.0	17,569.2	7,108.3	207.7	206.4	-68.15	-10,119.5	3,605.4	1,077.3	689.7	2.779	
18,300.0	7,510.0	17,669.2	7,108.3	209.6	208.3	-68.15	-10,214.1	3,638.0	1,077.3	686.0	2.754	
18,400.0	7,510.0	17,769.2	7,108.3	211.5	210.3	-68.15	-10,308.6	3,670.6	1,077.3	682.4	2.728	
18,500.0	7,510.0	17,869.2	7,108.3	213.4	212.2	-68.15	-10,403.1	3,703.3	1,077.3	678.8	2.704	
18,600.0	7,510.0	17,969.2	7,108.3	215.3	214.1	-68.15	-10,497.6	3,735.9	1,077.3	675.2	2.680	
18,700.0	7,510.0	18,069.2	7,108.3	217.2	216.0	-68.15	-10,592.2	3,768.5	1,077.3	671.6	2.656	
18,800.0	7,510.0	18,169.2	7,108.3	219.2	217.9	-68.15	-10,686.7	3,801.2	1,077.3	668.0	2.632	
18,900.0	7,510.0	18,269.2	7,108.3	221.1	219.9	-68.15	-10,781.2	3,833.8	1,077.2	664.4	2.609	
19,000.0	7,510.0	18,369.2	7,108.3	223.0	221.8	-68.15	-10,875.7	3,866.4	1,077.2	660.8	2.587	
19,100.0	7,510.0	18,469.2	7,108.3	224.9	223.7	-68.15	-10,970.3	3,899.1	1,077.2	657.2	2.565	

Company:	Arsenal Resources	**Local Co-ordinate Reference:**	Well J Osborn HSOP 16 203
Project:	Harrison County, West Virginia NAD 83	**TVD Reference:**	WELL @ 1191.0usft
Reference Site:	J Osborn HSOP 16 Pad	**MD Reference:**	WELL @ 1191.0usft
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #3	**Offset TVD Reference:**	Offset Datum

Offset Design J Osborn HSOP 16 Pad - J Osborn HSOP 16 204 - Curve & Lateral - Design #1

Survey Program: 0-MWD default

Offset Site Error: 0.0 usft

Offset Well Error: 0.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
19,200.0	7,510.0	18,569.2	7,108.3	226.8	225.6	-68.15	-11,064.8	3,931.7	1,077.2	553.6	2.543	
19,300.0	7,510.0	18,669.2	7,108.3	228.7	227.5	-68.15	-11,159.3	3,964.3	1,077.2	550.0	2.521	
19,400.0	7,510.0	18,769.2	7,108.3	230.6	229.4	-68.15	-11,253.8	3,997.0	1,077.2	546.4	2.500	
19,500.0	7,510.0	18,869.2	7,108.3	232.5	231.4	-68.15	-11,348.4	4,029.6	1,077.2	542.8	2.480	
19,600.0	7,510.0	18,969.2	7,108.3	234.5	233.3	-68.15	-11,442.9	4,062.2	1,077.2	539.2	2.459	
19,700.0	7,510.0	19,069.2	7,108.3	236.4	235.2	-68.15	-11,537.4	4,094.9	1,077.2	535.6	2.439	
19,800.0	7,510.0	19,169.2	7,108.3	238.3	237.1	-68.15	-11,631.9	4,127.5	1,077.2	531.9	2.419	
19,900.0	7,510.0	19,269.2	7,108.3	240.2	239.0	-68.15	-11,726.5	4,160.2	1,077.2	528.3	2.400	
20,000.0	7,510.0	19,369.2	7,108.3	242.1	241.0	-68.14	-11,821.0	4,192.8	1,077.2	524.7	2.381	
20,100.0	7,510.0	19,469.2	7,108.3	244.0	242.9	-68.14	-11,915.5	4,225.4	1,077.2	521.1	2.362	
20,200.0	7,510.0	19,569.2	7,108.3	245.9	244.8	-68.14	-12,010.0	4,258.1	1,077.2	517.5	2.343	
20,300.0	7,510.0	19,669.2	7,108.3	247.9	246.7	-68.14	-12,104.6	4,290.7	1,077.2	513.9	2.325	
20,400.0	7,510.0	19,769.2	7,108.3	249.8	248.6	-68.14	-12,199.1	4,323.3	1,077.2	510.3	2.307	
20,500.0	7,510.0	19,869.2	7,108.3	251.7	250.5	-68.14	-12,293.6	4,356.0	1,077.2	506.7	2.290	
20,600.0	7,510.0	19,969.2	7,108.3	253.6	252.5	-68.14	-12,388.1	4,388.6	1,077.2	503.1	2.272	
20,700.0	7,510.0	20,069.2	7,108.3	255.5	254.4	-68.14	-12,482.7	4,421.2	1,077.2	499.5	2.255	
20,800.0	7,510.0	20,169.2	7,108.3	257.4	256.3	-68.14	-12,577.2	4,453.9	1,077.1	495.9	2.238	
20,900.0	7,510.0	20,269.2	7,108.3	259.3	258.2	-68.14	-12,671.7	4,486.5	1,077.1	492.3	2.221	
21,000.0	7,510.0	20,369.2	7,108.3	261.3	260.1	-68.14	-12,766.2	4,519.1	1,077.1	488.6	2.205	
21,100.0	7,510.0	20,469.2	7,108.3	263.2	262.1	-68.14	-12,860.8	4,551.8	1,077.1	485.0	2.189	
21,200.0	7,510.0	20,569.2	7,108.3	265.1	264.0	-68.14	-12,955.3	4,584.4	1,077.1	481.4	2.173	
21,300.0	7,510.0	20,669.2	7,108.3	267.0	265.9	-68.14	-13,049.8	4,617.0	1,077.1	477.8	2.157	
21,400.0	7,510.0	20,769.2	7,108.3	268.9	267.8	-68.14	-13,144.3	4,649.7	1,077.1	474.2	2.142	
21,500.0	7,510.0	20,869.2	7,108.3	270.8	269.7	-68.14	-13,238.9	4,682.3	1,077.1	470.6	2.127	
21,600.0	7,510.0	20,969.2	7,108.3	272.7	271.7	-68.14	-13,333.4	4,714.9	1,077.1	467.0	2.111	
21,700.0	7,510.0	21,069.2	7,108.3	274.7	273.6	-68.14	-13,427.9	4,747.6	1,077.1	463.4	2.097	
21,800.0	7,510.0	21,169.2	7,108.3	276.6	275.5	-68.14	-13,522.4	4,780.2	1,077.1	459.8	2.082	
21,900.0	7,510.0	21,269.2	7,108.3	278.5	277.4	-68.14	-13,617.0	4,812.8	1,077.1	456.2	2.068	
22,000.0	7,510.0	21,369.2	7,108.3	280.4	279.3	-68.14	-13,711.5	4,845.5	1,077.1	452.5	2.053	
22,100.0	7,510.0	21,469.2	7,108.3	282.3	281.3	-68.14	-13,806.0	4,878.1	1,077.1	448.9	2.039	
22,200.0	7,510.0	21,569.2	7,108.3	284.2	283.2	-68.14	-13,900.5	4,910.7	1,077.1	445.3	2.026	
22,300.0	7,510.0	21,669.2	7,108.3	286.2	285.1	-68.14	-13,995.1	4,943.4	1,077.1	441.7	2.012	
22,400.0	7,510.0	21,769.2	7,108.3	288.1	287.0	-68.14	-14,089.6	4,976.0	1,077.1	438.1	1.998	
22,500.0	7,510.0	21,869.2	7,108.3	290.0	288.9	-68.14	-14,184.1	5,008.6	1,077.1	434.5	1.985	
22,600.0	7,510.0	21,969.2	7,108.3	291.9	290.8	-68.14	-14,278.6	5,041.3	1,077.0	430.9	1.972	
22,700.0	7,510.0	22,069.2	7,108.3	293.8	292.8	-68.14	-14,373.2	5,073.9	1,077.0	427.3	1.959	
22,800.0	7,510.0	22,169.2	7,108.3	295.7	294.7	-68.14	-14,467.7	5,106.5	1,077.0	423.7	1.945	
22,900.0	7,510.0	22,269.2	7,108.3	297.7	296.6	-68.14	-14,562.2	5,139.2	1,077.0	420.1	1.934	
23,000.0	7,510.0	22,369.2	7,108.3	299.6	298.5	-68.14	-14,656.7	5,171.8	1,077.0	416.4	1.921	
23,100.0	7,510.0	22,469.2	7,108.3	301.5	300.4	-68.14	-14,751.3	5,204.4	1,077.0	412.8	1.909	
23,200.0	7,510.0	22,569.2	7,108.3	303.4	302.4	-68.14	-14,845.8	5,237.1	1,077.0	409.2	1.897	
23,300.0	7,510.0	22,669.2	7,108.3	305.3	304.3	-68.14	-14,940.3	5,269.7	1,077.0	405.6	1.885	
23,400.0	7,510.0	22,769.2	7,108.3	307.2	306.2	-68.14	-15,034.8	5,302.3	1,077.0	402.0	1.873	
23,500.0	7,510.0	22,869.2	7,108.3	309.2	308.1	-68.14	-15,129.4	5,335.0	1,077.0	398.4	1.861	
23,600.0	7,510.0	22,969.2	7,108.3	311.1	310.0	-68.14	-15,223.9	5,367.6	1,077.0	394.8	1.850	
23,700.0	7,510.0	23,069.2	7,108.3	313.0	312.0	-68.14	-15,318.4	5,400.2	1,077.0	391.2	1.838	
23,800.0	7,510.0	23,169.2	7,108.3	314.9	313.9	-68.14	-15,412.9	5,432.9	1,077.0	387.6	1.827	
23,900.0	7,510.0	23,269.2	7,108.3	316.8	315.8	-68.14	-15,507.5	5,465.5	1,077.0	384.0	1.816	
24,000.0	7,510.0	23,369.2	7,108.3	318.7	317.7	-68.14	-15,602.0	5,498.1	1,077.0	380.3	1.805	
24,100.0	7,510.0	23,469.2	7,108.3	320.7	319.6	-68.14	-15,696.5	5,530.8	1,077.0	376.7	1.794	
24,200.0	7,510.0	23,569.2	7,108.3	322.6	321.6	-68.14	-15,791.0	5,563.4	1,077.0	373.1	1.784	
24,300.0	7,510.0	23,669.2	7,108.3	324.5	323.5	-68.14	-15,885.6	5,596.0	1,077.0	369.5	1.773	

Company:	Arsenal Resources	**Local Co-ordinate Reference:**	Well J Osborn HSOP 16 203
Project:	Harrison County, West Virginia NAD 83	**TVD Reference:**	WELL @ 1191.0usft
Reference Site:	J Osborn HSOP 16 Pad	**MD Reference:**	WELL @ 1191.0usft
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #3	**Offset TVD Reference:**	Offset Datum

Offset Design J Osborn HSOP 16 Pad - J Osborn HSOP 16 204 - Curve & Lateral - Design #1 — **Offset Site Error:** 0.0 usft

Survey Program: 0-MWD default — **Offset Well Error:** 0.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
24,400.0	7,510.0	23,769.2	7,108.3	326.4	325.4	-68.14	-15,980.1	5,628.7	1,077.0	465.9	1.762	
24,500.0	7,510.0	23,869.2	7,108.3	328.3	327.3	-68.14	-16,074.6	5,661.3	1,076.9	462.3	1.752	
24,600.0	7,510.0	23,969.2	7,108.3	330.2	329.2	-68.14	-16,169.1	5,693.9	1,076.9	458.7	1.742	
24,700.0	7,510.0	24,069.2	7,108.3	332.2	331.2	-68.14	-16,263.7	5,726.6	1,076.9	455.1	1.732	
24,800.0	7,510.0	24,169.2	7,108.3	334.1	333.1	-68.14	-16,358.2	5,759.2	1,076.9	451.4	1.722	
24,900.0	7,510.0	24,269.2	7,108.3	336.0	335.0	-68.14	-16,452.7	5,791.8	1,076.9	447.8	1.712	
25,000.0	7,510.0	24,369.2	7,108.3	337.9	336.9	-68.14	-16,547.3	5,824.5	1,076.9	444.2	1.702	
25,100.0	7,510.0	24,469.2	7,108.3	339.8	338.9	-68.14	-16,641.8	5,857.1	1,076.9	440.6	1.692	
25,105.4	7,510.0	24,474.5	7,108.3	339.9	339.0	-68.14	-16,646.9	5,858.9	1,076.9	440.4	1.692	
25,113.4	7,510.0	24,482.6	7,108.3	340.1	339.1	-68.15	-16,654.5	5,861.5	1,077.6	440.7	1.692	

Company:	Arsenal Resources	**Local Co-ordinate Reference:**	Well J Osborn HSOP 16 203
Project:	Harrison County, West Virginia NAD 83	**TVD Reference:**	WELL @ 1191.0usft
Reference Site:	J Osborn HSOP 16 Pad	**MD Reference:**	WELL @ 1191.0usft
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #3	**Offset TVD Reference:**	Offset Datum

Offset Design J Osborn HSOP 16 Pad - J Osborn HSOP 16 204 - Pilot Hole - Design #1 — **Offset Site Error:** 0.0 usft

Survey Program: 0-MWD default — **Offset Well Error:** 0.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
0.0	0.0	0.0	0.0	0.0	0.0	114.97	-6.3	13.6	15.0			
100.0	100.0	99.3	99.3	0.1	0.1	114.97	-6.3	13.6	15.0	14.8	91.748	
200.0	200.0	199.3	199.3	0.3	0.3	114.97	-6.3	13.6	15.0	14.4	24.510	
300.0	300.0	299.3	299.3	0.5	0.5	114.97	-6.3	13.6	15.0	13.9	14.131	
400.0	400.0	399.3	399.3	0.8	0.8	114.97	-6.3	13.6	15.0	13.5	9.927	
500.0	500.0	499.3	499.3	1.0	1.0	114.97	-6.3	13.6	15.0	13.0	7.651	
600.0	600.0	599.3	599.3	1.2	1.2	114.97	-6.3	13.6	15.0	12.6	6.224	
700.0	700.0	699.3	699.3	1.4	1.4	114.97	-6.3	13.6	15.0	12.1	5.246	
800.0	800.0	799.3	799.3	1.7	1.7	114.97	-6.3	13.6	15.0	11.7	4.533	
900.0	900.0	899.3	899.3	1.9	1.9	114.97	-6.3	13.6	15.0	11.2	3.991	
1,000.0	1,000.0	999.3	999.3	2.1	2.1	114.97	-6.3	13.6	15.0	10.8	3.565	
1,100.0	1,100.0	1,099.3	1,099.3	2.3	2.3	114.97	-6.3	13.6	15.0	10.3	3.221	
1,200.0	1,200.0	1,199.3	1,199.3	2.6	2.6	114.97	-6.3	13.6	15.0	9.9	2.937	
1,300.0	1,300.0	1,299.3	1,299.3	2.8	2.8	114.97	-6.3	13.6	15.0	9.4	2.700	
1,400.0	1,400.0	1,399.3	1,399.3	3.0	3.0	114.97	-6.3	13.6	15.0	9.0	2.498	
1,500.0	1,500.0	1,499.3	1,499.3	3.2	3.2	114.97	-6.3	13.6	15.0	8.5	2.324	
1,600.0	1,600.0	1,599.3	1,599.3	3.5	3.5	114.97	-6.3	13.6	15.0	8.1	2.172	
1,700.0	1,700.0	1,699.3	1,699.3	3.7	3.7	114.97	-6.3	13.6	15.0	7.6	2.040	
1,800.0	1,800.0	1,799.3	1,799.3	3.9	3.9	114.97	-6.3	13.6	15.0	7.2	1.922	
1,900.0	1,900.0	1,899.3	1,899.3	4.1	4.1	114.97	-6.3	13.6	15.0	6.7	1.817	
2,000.0	2,000.0	1,999.3	1,999.3	4.4	4.4	114.97	-6.3	13.6	15.0	6.3	1.724	
2,100.0	2,100.0	2,099.3	2,099.3	4.6	4.6	114.97	-6.3	13.6	15.0	5.8	1.639	
2,200.0	2,200.0	2,199.3	2,199.3	4.8	4.8	114.97	-6.3	13.6	15.0	5.4	1.562	
2,300.0	2,300.0	2,299.3	2,299.3	5.0	5.0	114.97	-6.3	13.6	15.0	4.9	1.492	Level 3
2,400.0	2,400.0	2,399.3	2,399.3	5.3	5.3	114.97	-6.3	13.6	15.0	4.5	1.428	Level 3
2,500.0	2,500.0	2,499.3	2,499.3	5.5	5.5	114.97	-6.3	13.6	15.0	4.1	1.370	Level 3, CC, ES, SF
2,600.0	2,600.0	2,599.3	2,599.3	5.7	5.7	-149.37	-6.3	13.6	16.5	5.1	1.447	Level 3
2,700.0	2,699.8	2,699.1	2,699.1	5.9	5.9	-156.58	-6.3	13.6	21.1	9.3	1.792	
2,800.0	2,799.5	2,798.8	2,798.8	6.1	6.1	-163.31	-6.3	13.6	29.4	17.1	2.402	
2,900.0	2,898.7	2,898.0	2,898.0	6.3	6.4	-168.13	-6.3	13.6	41.2	28.5	3.258	
3,000.0	2,997.5	2,996.8	2,996.8	6.5	6.6	-171.34	-6.3	13.6	56.6	43.5	4.332	
3,042.9	3,039.7	3,039.0	3,039.0	6.6	6.7	-172.36	-6.3	13.6	64.3	51.0	4.854	
3,100.0	3,096.7	3,096.0	3,096.0	6.8	6.8	-173.46	-6.3	13.6	75.0	61.5	5.559	
3,200.0	3,193.9	3,193.2	3,193.2	7.1	7.0	-174.77	-6.3	13.6	93.7	79.8	6.736	
3,300.0	3,292.2	3,291.5	3,291.5	7.4	7.3	-175.64	-6.3	13.6	112.5	98.1	7.844	
3,400.0	3,390.4	3,389.7	3,389.7	7.7	7.5	-176.27	-6.3	13.6	131.3	116.5	8.887	
3,500.0	3,488.6	3,487.9	3,487.9	8.0	7.7	-176.74	-6.3	13.6	150.1	134.9	9.869	
3,600.0	3,586.8	3,586.1	3,586.1	8.3	7.9	-177.10	-6.3	13.6	168.9	153.2	10.795	
3,700.0	3,685.0	3,684.3	3,684.3	8.6	8.1	-177.39	-6.3	13.6	187.7	171.6	11.670	
3,800.0	3,783.2	3,782.5	3,782.5	9.0	8.4	-177.63	-6.3	13.6	206.5	190.0	12.496	
3,900.0	3,881.4	3,880.7	3,880.7	9.3	8.6	-177.83	-6.3	13.6	225.3	208.4	13.278	
4,000.0	3,979.6	3,978.9	3,978.9	9.7	8.8	-177.99	-6.3	13.6	244.2	226.7	14.019	
4,100.0	4,077.8	4,077.1	4,077.1	10.0	9.0	-178.14	-6.3	13.6	263.0	245.1	14.721	
4,200.0	4,176.0	4,175.3	4,175.3	10.4	9.2	-178.26	-6.3	13.6	281.8	263.5	15.388	
4,300.0	4,274.3	4,273.6	4,273.6	10.8	9.5	-178.37	-6.3	13.6	300.6	281.9	16.021	
4,400.0	4,372.5	4,371.8	4,371.8	11.1	9.7	-178.47	-6.3	13.6	319.5	300.3	16.624	
4,500.0	4,470.7	4,470.0	4,470.0	11.5	9.9	-178.55	-6.3	13.6	338.3	318.6	17.198	
4,600.0	4,568.9	4,568.2	4,568.2	11.9	10.1	-178.63	-6.3	13.6	357.1	337.0	17.745	
4,700.0	4,667.1	4,666.4	4,666.4	12.3	10.3	-178.70	-6.3	13.6	376.0	355.4	18.266	
4,800.0	4,765.3	4,764.6	4,764.6	12.7	10.6	-178.76	-6.3	13.6	394.8	373.8	18.765	
4,900.0	4,863.5	4,862.8	4,862.8	13.1	10.8	-178.82	-6.3	13.6	413.6	392.1	19.241	
5,000.0	4,961.7	4,961.0	4,961.0	13.4	11.0	-178.87	-6.3	13.6	432.5	410.5	19.697	

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation

Company:	Arsenal Resources	**Local Co-ordinate Reference:**	Well J Osborn HSOP 16 203
Project:	Harrison County, West Virginia NAD 83	**TVD Reference:**	WELL @ 1191.0usft
Reference Site:	J Osborn HSOP 16 Pad	**MD Reference:**	WELL @ 1191.0usft
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #3	**Offset TVD Reference:**	Offset Datum

Offset Design J Osborn HSOP 16 Pad - J Osborn HSOP 16 204 - Pilot Hole - Design #1 — Offset Site Error: 0.0 usft

Survey Program: 0-MWD default — Offset Well Error: 0.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
5,100.0	5,059.9	5,059.2	5,059.2	13.8	11.2	-178.92	-6.3	13.6	451.3	428.9	20.133	
5,200.0	5,158.1	5,157.4	5,157.4	14.2	11.4	-178.95	-6.3	13.6	470.1	447.3	20.551	
5,300.0	5,256.3	5,255.6	5,255.6	14.6	11.7	-179.00	-6.3	13.6	489.0	465.6	20.952	
5,400.0	5,354.6	5,353.9	5,353.9	15.0	11.9	-179.04	-6.3	13.6	507.8	484.0	21.336	
5,500.0	5,452.8	5,452.1	5,452.1	15.4	12.1	-179.07	-6.3	13.6	526.6	502.4	21.706	
5,600.0	5,551.0	5,550.3	5,550.3	15.8	12.3	-179.10	-6.3	13.6	545.5	520.8	22.061	
5,700.0	5,649.2	5,648.5	5,648.5	16.2	12.6	-179.13	-6.3	13.6	564.3	539.1	22.402	
5,800.0	5,747.4	5,746.7	5,746.7	16.6	12.8	-179.16	-6.3	13.6	583.2	557.5	22.731	
5,900.0	5,845.6	5,844.9	5,844.9	17.0	13.0	-179.19	-6.3	13.6	602.0	575.9	23.048	
6,000.0	5,943.8	5,943.1	5,943.1	17.4	13.2	-179.21	-6.3	13.6	620.8	594.2	23.353	
6,100.0	6,042.0	6,041.3	6,041.3	17.8	13.4	-179.23	-6.3	13.6	639.7	612.6	23.647	
6,200.0	6,140.2	6,139.5	6,139.5	18.3	13.7	-179.26	-6.3	13.6	658.5	631.0	23.931	
6,300.0	6,238.4	6,237.7	6,237.7	18.7	13.9	-179.28	-6.3	13.6	677.3	649.3	24.205	
6,400.0	6,336.7	6,336.0	6,336.0	19.1	14.1	-179.30	-6.3	13.6	696.2	667.7	24.469	
6,500.0	6,434.9	6,434.2	6,434.2	19.5	14.3	-179.32	-6.3	13.6	715.0	686.1	24.725	
6,600.0	6,533.1	6,532.4	6,532.4	19.9	14.5	-179.33	-6.3	13.6	733.8	704.5	24.972	
6,700.0	6,631.3	6,630.6	6,630.6	20.3	14.8	-179.35	-6.3	13.6	752.7	722.8	25.212	
6,800.0	6,729.5	6,728.8	6,728.8	20.7	15.0	-179.37	-6.3	13.6	771.5	741.2	25.443	
6,900.0	6,827.7	6,827.0	6,827.0	21.1	15.2	-179.38	-6.3	13.6	790.3	759.6	25.668	
6,936.9	6,864.0	6,863.3	6,863.3	21.3	15.3	-179.39	-6.3	13.6	797.3	766.3	25.749	
6,950.0	6,876.8	6,876.1	6,876.1	21.3	15.3	-173.03	-6.3	13.6	799.7	768.7	25.778	
7,000.0	6,925.9	6,925.2	6,925.2	21.5	15.4	-149.42	-6.3	13.6	808.6	777.4	25.883	
7,050.0	6,974.8	6,974.1	6,974.1	21.7	15.5	-131.12	-6.3	13.6	816.8	785.3	25.968	
7,100.0	7,023.0	7,022.3	7,022.3	21.8	15.6	-119.02	-6.3	13.6	824.2	792.6	26.035	
7,150.0	7,070.5	7,069.8	7,069.8	21.9	15.7	-111.33	-6.3	13.6	831.1	799.3	26.088	
7,200.0	7,116.8	7,116.1	7,116.1	22.1	15.9	-106.44	-6.3	13.6	837.5	805.5	26.130	
7,250.0	7,161.6	7,160.9	7,160.9	22.2	16.0	-103.33	-6.3	13.6	843.8	811.6	26.168	
7,300.0	7,204.8	7,204.1	7,204.1	22.3	16.0	-101.38	-6.3	13.6	850.0	817.5	26.207	
7,350.0	7,245.9	7,219.3	7,219.3	22.4	16.1	-99.19	-6.3	13.6	856.7	824.2	26.378	
7,400.0	7,284.9	7,219.3	7,219.3	22.6	16.1	-96.73	-6.3	13.6	865.6	833.2	26.717	
7,450.0	7,321.3	7,219.3	7,219.3	22.7	16.1	-94.42	-6.3	13.6	876.6	844.3	27.157	
7,500.0	7,355.1	7,219.3	7,219.3	22.8	16.1	-92.19	-6.3	13.6	889.5	857.4	27.682	
7,550.0	7,386.0	7,219.3	7,219.3	22.9	16.1	-90.00	-6.3	13.6	904.3	872.3	28.274	
7,600.0	7,413.8	7,219.3	7,219.3	23.1	16.1	-87.81	-6.3	13.6	920.7	888.9	28.915	
7,650.0	7,438.3	7,219.3	7,219.3	23.2	16.1	-85.61	-6.3	13.6	938.6	906.9	29.587	
7,700.0	7,459.4	7,219.3	7,219.3	23.4	16.1	-83.40	-6.3	13.6	957.8	926.1	30.274	
7,750.0	7,477.0	7,219.3	7,219.3	23.6	16.1	-81.18	-6.3	13.6	978.0	946.4	30.960	
7,800.0	7,490.9	7,219.3	7,219.3	23.8	16.1	-78.98	-6.3	13.6	999.1	967.5	31.635	
7,850.0	7,501.1	7,219.3	7,219.3	24.1	16.1	-76.79	-6.3	13.6	1,020.9	989.3	32.288	
7,900.0	7,507.4	7,219.3	7,219.3	24.4	16.1	-74.65	-6.3	13.6	1,043.2	1,011.5	32.913	
7,950.0	7,510.0	7,219.3	7,219.3	24.7	16.1	-72.56	-6.3	13.6	1,066.0	1,034.1	33.505	
7,957.8	7,510.0	7,219.3	7,219.3	24.7	16.1	-72.24	-6.3	13.6	1,069.5	1,037.7	33.596	
8,000.0	7,510.0	7,219.3	7,219.3	25.0	16.1	-72.24	-6.3	13.6	1,089.5	1,057.5	34.105	
8,100.0	7,510.0	7,219.3	7,219.3	25.8	16.1	-72.24	-6.3	13.6	1,141.6	1,109.4	35.472	
8,200.0	7,510.0	7,219.3	7,219.3	26.7	16.1	-72.24	-6.3	13.6	1,199.8	1,167.4	37.019	
8,300.0	7,510.0	7,219.3	7,219.3	27.7	16.1	-72.24	-6.3	13.6	1,263.3	1,230.7	38.724	
8,400.0	7,510.0	7,219.3	7,219.3	28.9	16.1	-72.24	-6.3	13.6	1,331.3	1,298.4	40.567	
8,500.0	7,510.0	7,219.3	7,219.3	30.1	16.1	-72.24	-6.3	13.6	1,403.1	1,370.1	42.531	
8,600.0	7,510.0	7,219.3	7,219.3	31.4	16.1	-72.24	-6.3	13.6	1,478.1	1,445.0	44.599	
8,700.0	7,510.0	7,219.3	7,219.3	32.7	16.1	-72.24	-6.3	13.6	1,556.0	1,522.8	46.757	
8,800.0	7,510.0	7,219.3	7,219.3	34.2	16.1	-72.24	-6.3	13.6	1,636.3	1,602.9	48.994	
8,900.0	7,510.0	7,219.3	7,219.3	35.6	16.1	-72.24	-6.3	13.6	1,718.7	1,685.2	51.297	

Company:	Arsenal Resources	**Local Co-ordinate Reference:**	Well J Osborn HSOP 16 203
Project:	Harrison County, West Virginia NAD 83	**TVD Reference:**	WELL @ 1191.0usft
Reference Site:	J Osborn HSOP 16 Pad	**MD Reference:**	WELL @ 1191.0usft
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #3	**Offset TVD Reference:**	Offset Datum

Offset Design J Osborn HSOP 16 Pad - J Osborn HSOP 16 204 - Pilot Hole - Design #1

Survey Program: 0-MWD default

Offset Site Error: 0.0 usft

Offset Well Error: 0.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
9,000.0	7,510.0	7,219.3	7,219.3	37.1	16.1	-72.24	-6.3	13.6	1,802.8	1,769.2	53.659	
9,100.0	7,510.0	7,219.3	7,219.3	38.7	16.1	-72.24	-6.3	13.6	1,888.5	1,854.8	56.072	
9,200.0	7,510.0	7,219.3	7,219.3	40.3	16.1	-72.24	-6.3	13.6	1,975.5	1,941.8	58.529	
9,300.0	7,510.0	7,219.3	7,219.3	41.9	16.1	-72.24	-6.3	13.6	2,063.8	2,030.0	61.024	
9,400.0	7,510.0	7,219.3	7,219.3	43.5	16.1	-72.24	-6.3	13.6	2,153.0	2,119.1	63.554	
9,500.0	7,510.0	7,219.3	7,219.3	45.2	16.1	-72.24	-6.3	13.6	2,243.2	2,209.2	66.113	
9,600.0	7,510.0	7,219.3	7,219.3	46.9	16.1	-72.24	-6.3	13.6	2,334.1	2,300.1	68.699	
9,700.0	7,510.0	7,219.3	7,219.3	48.6	16.1	-72.24	-6.3	13.6	2,425.8	2,391.8	71.308	
9,800.0	7,510.0	7,219.3	7,219.3	50.3	16.1	-72.24	-6.3	13.6	2,518.1	2,484.0	73.938	
9,900.0	7,510.0	7,219.3	7,219.3	52.0	16.1	-72.24	-6.3	13.6	2,611.0	2,576.9	76.586	
10,000.0	7,510.0	7,219.3	7,219.3	53.7	16.1	-72.24	-6.3	13.6	2,704.3	2,670.2	79.251	
10,100.0	7,510.0	7,219.3	7,219.3	55.5	16.1	-72.24	-6.3	13.6	2,798.2	2,764.0	81.930	
10,200.0	7,510.0	7,219.3	7,219.3	57.3	16.1	-72.24	-6.3	13.6	2,892.4	2,858.2	84.623	
10,300.0	7,510.0	7,219.3	7,219.3	59.0	16.1	-72.24	-6.3	13.6	2,987.0	2,952.8	87.328	
10,400.0	7,510.0	7,219.3	7,219.3	60.8	16.1	-72.24	-6.3	13.6	3,082.0	3,047.8	90.043	
10,500.0	7,510.0	7,219.3	7,219.3	62.6	16.1	-72.24	-6.3	13.6	3,177.3	3,143.0	92.768	
10,600.0	7,510.0	7,219.3	7,219.3	64.4	16.1	-72.24	-6.3	13.6	3,272.8	3,238.6	95.501	
10,700.0	7,510.0	7,219.3	7,219.3	66.2	16.1	-72.24	-6.3	13.6	3,368.6	3,334.3	98.242	
10,800.0	7,510.0	7,219.3	7,219.3	66.0	16.1	-72.24	-6.3	13.6	3,464.7	3,430.4	100.991	
10,900.0	7,510.0	7,219.3	7,219.3	69.8	16.1	-72.24	-6.3	13.6	3,560.9	3,526.6	103.745	
11,000.0	7,510.0	7,219.3	7,219.3	71.7	16.1	-72.24	-6.3	13.6	3,657.4	3,623.1	106.506	
11,100.0	7,510.0	7,219.3	7,219.3	73.5	16.1	-72.24	-6.3	13.6	3,754.1	3,719.7	109.271	
11,200.0	7,510.0	7,219.3	7,219.3	75.3	16.1	-72.24	-6.3	13.6	3,850.9	3,816.5	112.042	
11,300.0	7,510.0	7,219.3	7,219.3	77.2	16.1	-72.24	-6.3	13.6	3,947.9	3,913.5	114.816	
11,400.0	7,510.0	7,219.3	7,219.3	79.0	16.1	-72.24	-6.3	13.6	4,045.0	4,010.6	117.595	
11,500.0	7,510.0	7,219.3	7,219.3	80.9	16.1	-72.24	-6.3	13.6	4,142.3	4,107.8	120.377	
11,600.0	7,510.0	7,219.3	7,219.3	82.7	16.1	-72.24	-6.3	13.6	4,239.6	4,205.2	123.162	
11,700.0	7,510.0	7,219.3	7,219.3	84.6	16.1	-72.24	-6.3	13.6	4,337.2	4,302.7	125.950	
11,800.0	7,510.0	7,219.3	7,219.3	86.4	16.1	-72.24	-6.3	13.6	4,434.8	4,400.3	128.740	
11,900.0	7,510.0	7,219.3	7,219.3	88.3	16.1	-72.24	-6.3	13.6	4,532.5	4,498.0	131.532	
12,000.0	7,510.0	7,219.3	7,219.3	90.1	16.1	-72.24	-6.3	13.6	4,630.3	4,595.9	134.327	
12,100.0	7,510.0	7,219.3	7,219.3	92.0	16.1	-72.24	-6.3	13.6	4,728.2	4,693.8	137.123	
12,200.0	7,510.0	7,219.3	7,219.3	93.9	16.1	-72.24	-6.3	13.6	4,826.2	4,791.7	139.921	
12,300.0	7,510.0	7,219.3	7,219.3	95.7	16.1	-72.24	-6.3	13.6	4,924.3	4,889.8	142.720	
12,400.0	7,510.0	7,219.3	7,219.3	97.6	16.1	-72.24	-6.3	13.6	5,022.5	4,988.0	145.520	
12,500.0	7,510.0	7,219.3	7,219.3	99.5	16.1	-72.24	-6.3	13.6	5,120.7	5,086.2	148.321	
12,600.0	7,510.0	7,219.3	7,219.3	101.3	16.1	-72.24	-6.3	13.6	5,219.0	5,184.5	151.122	
12,700.0	7,510.0	7,219.3	7,219.3	103.2	16.1	-72.24	-6.3	13.6	5,317.3	5,282.8	153.925	
12,800.0	7,510.0	7,219.3	7,219.3	105.1	16.1	-72.24	-6.3	13.6	5,415.8	5,381.2	156.727	
12,900.0	7,510.0	7,219.3	7,219.3	107.0	16.1	-72.24	-6.3	13.6	5,514.2	5,479.7	159.531	
13,000.0	7,510.0	7,219.3	7,219.3	108.9	16.1	-72.24	-6.3	13.6	5,612.8	5,578.2	162.334	
13,100.0	7,510.0	7,219.3	7,219.3	110.7	16.1	-72.24	-6.3	13.6	5,711.3	5,676.8	165.137	
13,200.0	7,510.0	7,219.3	7,219.3	112.6	16.1	-72.24	-6.3	13.6	5,810.0	5,775.4	167.941	
13,300.0	7,510.0	7,219.3	7,219.3	114.5	16.1	-72.24	-6.3	13.6	5,908.6	5,874.0	170.744	
13,400.0	7,510.0	7,219.3	7,219.3	116.4	16.1	-72.24	-6.3	13.6	6,007.4	5,972.7	173.547	
13,500.0	7,510.0	7,219.3	7,219.3	118.3	16.1	-72.24	-6.3	13.6	6,106.1	6,071.5	176.349	
13,600.0	7,510.0	7,219.3	7,219.3	120.2	16.1	-72.24	-6.3	13.6	6,204.9	6,170.3	179.151	
13,700.0	7,510.0	7,219.3	7,219.3	122.1	16.1	-72.24	-6.3	13.6	6,303.8	6,269.1	181.953	
13,800.0	7,510.0	7,219.3	7,219.3	123.9	16.1	-72.24	-6.3	13.6	6,402.6	6,368.0	184.753	
13,900.0	7,510.0	7,219.3	7,219.3	125.8	16.1	-72.24	-6.3	13.6	6,501.5	6,466.9	187.554	
14,000.0	7,510.0	7,219.3	7,219.3	127.7	16.1	-72.24	-6.3	13.6	6,600.5	6,565.8	190.353	
14,100.0	7,510.0	7,219.3	7,219.3	129.6	16.1	-72.24	-6.3	13.6	6,699.5	6,664.8	193.151	

Company:	Arsenal Resources	**Local Co-ordinate Reference:**	Well J Osborn HSOP 16 203
Project:	Harrison County, West Virginia NAD 83	**TVD Reference:**	WELL @ 1191.0usft
Reference Site:	J Osborn HSOP 16 Pad	**MD Reference:**	WELL @ 1191.0usft
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #3	**Offset TVD Reference:**	Offset Datum

Offset Design J Osborn HSOP 16 Pad - J Osborn HSOP 16 204 - Pilot Hole - Design #1

Offset Site Error: 0.0 usft

Survey Program: 0-MWD default

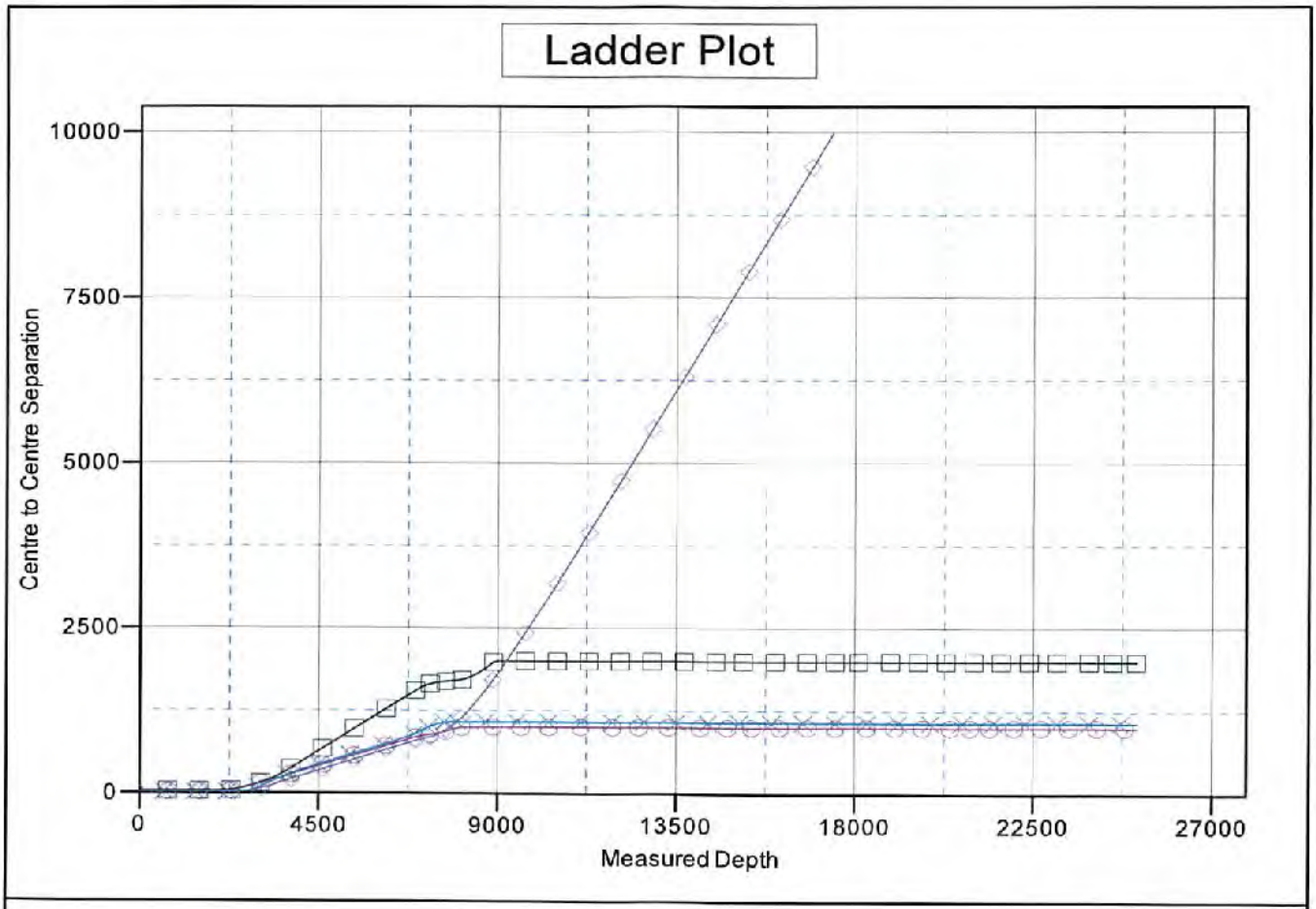
Offset Well Error: 0.0 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
14,200.0	7,510.0	7,219.3	7,219.3	131.5	16.1	-72.24	-6.3	13.6	6,798.5	6,763.8	195.949	
14,300.0	7,510.0	7,219.3	7,219.3	133.4	16.1	-72.24	-6.3	13.6	6,897.5	6,862.8	198.745	
14,400.0	7,510.0	7,219.3	7,219.3	135.3	16.1	-72.24	-6.3	13.6	6,996.5	6,961.8	201.540	
14,500.0	7,510.0	7,219.3	7,219.3	137.2	16.1	-72.24	-6.3	13.6	7,095.6	7,060.9	204.335	
14,600.0	7,510.0	7,219.3	7,219.3	139.1	16.1	-72.24	-6.3	13.6	7,194.7	7,160.0	207.127	
14,700.0	7,510.0	7,219.3	7,219.3	141.0	16.1	-72.24	-6.3	13.6	7,293.9	7,259.1	209.919	
14,800.0	7,510.0	7,219.3	7,219.3	142.9	16.1	-72.24	-6.3	13.6	7,393.0	7,358.3	212.709	
14,900.0	7,510.0	7,219.3	7,219.3	144.8	16.1	-72.24	-6.3	13.6	7,492.2	7,457.4	215.498	
15,000.0	7,510.0	7,219.3	7,219.3	145.7	16.1	-72.24	-6.3	13.6	7,591.4	7,556.6	218.286	
15,100.0	7,510.0	7,219.3	7,219.3	148.6	16.1	-72.24	-6.3	13.6	7,690.6	7,655.8	221.071	
15,200.0	7,510.0	7,219.3	7,219.3	150.5	16.1	-72.24	-6.3	13.6	7,789.9	7,755.1	223.856	
15,300.0	7,510.0	7,219.3	7,219.3	152.4	16.1	-72.24	-6.3	13.6	7,889.1	7,854.3	226.638	
15,400.0	7,510.0	7,219.3	7,219.3	154.3	16.1	-72.24	-6.3	13.6	7,988.4	7,953.6	229.419	
15,500.0	7,510.0	7,219.3	7,219.3	156.2	16.1	-72.24	-6.3	13.6	8,087.7	8,052.9	232.198	
15,600.0	7,510.0	7,219.3	7,219.3	158.1	16.1	-72.24	-6.3	13.6	8,187.0	8,152.2	234.976	
15,700.0	7,510.0	7,219.3	7,219.3	160.0	16.1	-72.24	-6.3	13.6	8,286.4	8,251.5	237.752	
15,800.0	7,510.0	7,219.3	7,219.3	161.9	16.1	-72.24	-6.3	13.6	8,385.7	8,350.8	240.525	
15,900.0	7,510.0	7,219.3	7,219.3	163.8	16.1	-72.24	-6.3	13.6	8,485.1	8,450.2	243.297	
16,000.0	7,510.0	7,219.3	7,219.3	165.7	16.1	-72.24	-6.3	13.6	8,584.5	8,549.6	246.067	
16,100.0	7,510.0	7,219.3	7,219.3	167.6	16.1	-72.24	-6.3	13.6	8,683.8	8,648.9	248.835	
16,200.0	7,510.0	7,219.3	7,219.3	169.5	16.1	-72.24	-6.3	13.6	8,783.2	8,748.3	251.601	
16,300.0	7,510.0	7,219.3	7,219.3	171.4	16.1	-72.24	-6.3	13.6	8,882.7	8,847.7	254.365	
16,400.0	7,510.0	7,219.3	7,219.3	173.3	16.1	-72.24	-6.3	13.6	8,982.1	8,947.2	257.127	
16,500.0	7,510.0	7,219.3	7,219.3	175.2	16.1	-72.24	-6.3	13.6	9,081.5	9,046.6	259.886	
16,600.0	7,510.0	7,219.3	7,219.3	177.1	16.1	-72.24	-6.3	13.6	9,181.0	9,146.0	262.643	
16,700.0	7,510.0	7,219.3	7,219.3	179.0	16.1	-72.24	-6.3	13.6	9,280.5	9,245.5	265.399	
16,800.0	7,510.0	7,219.3	7,219.3	181.0	16.1	-72.24	-6.3	13.6	9,379.9	9,345.0	268.151	
16,900.0	7,510.0	7,219.3	7,219.3	182.9	16.1	-72.24	-6.3	13.6	9,479.4	9,444.4	270.902	
17,000.0	7,510.0	7,219.3	7,219.3	184.8	16.1	-72.24	-6.3	13.6	9,578.9	9,543.9	273.650	
17,100.0	7,510.0	7,219.3	7,219.3	186.7	16.1	-72.24	-6.3	13.6	9,678.4	9,643.4	276.396	
17,200.0	7,510.0	7,219.3	7,219.3	188.6	16.1	-72.24	-6.3	13.6	9,778.0	9,742.9	279.140	
17,300.0	7,510.0	7,219.3	7,219.3	190.5	16.1	-72.24	-6.3	13.6	9,877.5	9,842.5	281.881	
17,400.0	7,510.0	7,219.3	7,219.3	192.4	16.1	-72.24	-6.3	13.6	9,977.0	9,942.0	284.619	

Company:	Arsenal Resources	**Local Co-ordinate Reference:**	Well J Osborn HSOP 16 203
Project:	Harrison County, West Virginia NAD 83	**TVD Reference:**	WELL @ 1191.0usft
Reference Site:	J Osborn HSOP 16 Pad	**MD Reference:**	WELL @ 1191.0usft
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #3	**Offset TVD Reference:**	Offset Datum

Reference Depths are relative to WELL @ 1191.0usft
Offset Depths are relative to Offset Datum
Central Meridian is 79° 30' 0.000 W

Coordinates are relative to: J Osborn HSOP 16 203
Coordinate System is US State Plane 1983, West Virginia Northern Zone
Grid Convergence at Surface is: -0.46°

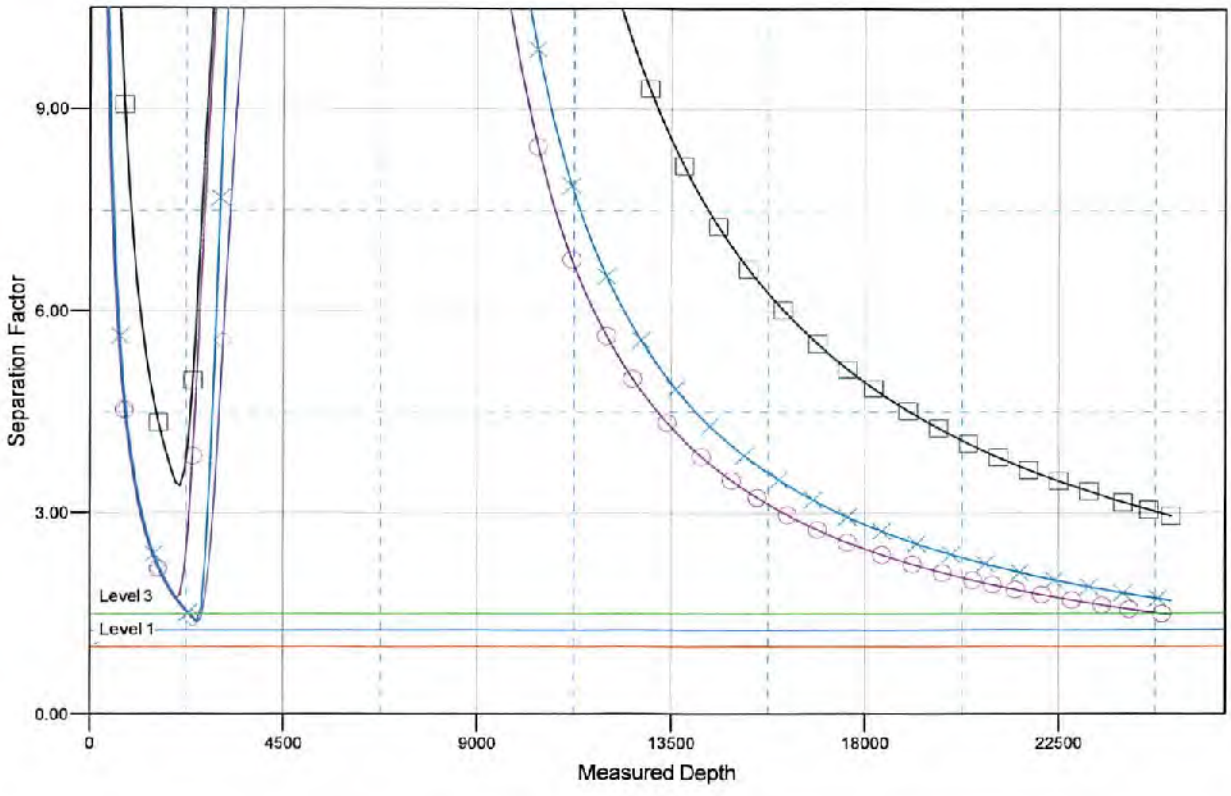


Company:	Arsenal Resources	**Local Co-ordinate Reference:**	Well J Osborn HSOP 16 203
Project:	Harrison County, West Virginia NAD 83	**TVD Reference:**	WELL @ 1191.0usft
Reference Site:	J Osborn HSOP 16 Pad	**MD Reference:**	WELL @ 1191.0usft
Site Error:	0.0 usft	**North Reference:**	Grid
Reference Well:	J Osborn HSOP 16 203	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.0 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	Wellbore #1	**Database:**	EDM 5000.1 Single User Db
Reference Design:	Design #3	**Offset TVD Reference:**	Offset Datum

Reference Depths are relative to WELL @ 1191.0usft
Offset Depths are relative to Offset Datum
Central Meridian is 79° 30' 0.000 W

Coordinates are relative to: J Osborn HSOP 16 203
Coordinate System is US State Plane 1983, West Virginia Northern Zone
Grid Convergence at Surface is: -0.46°

Separation Factor Plot



LEGEND

SOP 16 201, Wellbore #1, Design #3 V0
SOP 16 202, Wellbore #1, Design #3 V0
J Osborn HSOP 16 204, Pilot Hole, Design #1 V0
J Osborn HSOP 16 204, Curve & Lateral, Design #1 V0

ARSENAL RESOURCES

Purpose

The purpose of this pad-specific Hydraulic Fracturing Monitoring Plan is to identify and notify conventional well operators near Arsenal Resources hydraulic fracturing in Harrison County, WV prior to hydraulic fracturing at JOsborn HSOP 16 203.

Due to the apparent presence of unique geological conditions, the potential for communication between deep geologic zones exists in this area. This potential communication, via natural gas, water, or both, may occur between hydraulically fractured wells in the Marcellus formation (approximately 7,200' TVD) and existing conventional natural gas wells in the partially-depleted, relatively high permeability Benson formations (approximately 4,810' TVD).
The plan is being implemented as an additional safety measure to be utilized in conjunction with best management practices and emergency action plans for this site. These additional measures include pre-notification of conventional well operators of the timing and location of the hydraulic fracturing, establishment of measures conventional well operators should implement, and assurance that the Division of Oil and Gas is notified of the timeline, as well as any issues that may arise during fracturing.

1. **Communications with Conventional Operators.**

Arsenal Resources, using available data (WV Geological Survey, WVDEP Website, and IHS data service), has identified all known conventional wells and well operators within 500 feet of this pad and the lateral sections. A map showing these wells along with a list of the wells and operators is included in Attachment A.
Upon approval of this plan, Arsenal Resources will notify these operators, via letter, of the hydraulic fracturing schedule for these wells. A copy of this letter is included in Attachment B.
The letter provides recommendations to these conventional operators to 1) increase their monitoring of their wells during that time period, 2) ensure that their well head equipment is sound, and 3) provide immediate notification to Arsenal Resources and the OOG in the event of any changes in their well conditions.
Specifically, the letter recommends that conventional well operators conduct the following activities during and after fracturing operations:

1. Inspect their surface equipment prior to fracturing to establish integrity and establish pre-frac well conditions.
2. Observe wells closely during and after fracturing and monitor for abnormal increases in water, gas or pressure.
3. Inspect or install master valves rated to 3,000 psi or other necessary equipment for wellhead integrity.
4. Notify the OOG and ARSENAL RESOURCES if any changes in water, gas production, pressure or other anomalies are identified.

ARSENAL RESOURCES

2. **Reporting**

Arsenal Resources will provide information relating to the hydraulic fracturing schedule, communication with conventional operators, and ongoing monitoring of the work upon request of OOG or immediately after any event of any noted abnormalities.

6031 Wallace Road Extension, Suite 300, Wexford, PA 15090 Phone (724) 940-1100 eFax 1-800-428-0981

BHL is located on topo map 11,168 feet south of Latitude: 39°15'00"
SHL is located on topo map 9,376 feet south of Latitude: 39°17'30"

BHL is located on topo map 9,515 feet west of Longitude: 80°10'00"
SHL is located on topo map 2,709 feet west of Longitude: 80°12'30"

	SURFACE OWNER	DIST-TM/PAR
1	JUDY M. OSBORN (LE) (JUDY M. OSBORN IRREVOCABLE TRUST)	15-330/5
2	CHARLES THOMAS DAVIS II, ET AL	15-330/4
3	CHARLES THOMAS DAVIS II, ET AL	15-330/5.1
4	CHARLES E. REED 1/2 INTEREST GERALD W. BURNER ET AL 1/2 INTEREST	15-330/25
5	PAUL E. BALL	15-330/29
6	MICHAEL A. & ROBERTA OSBORN	15-350/4.2
7	MICHAEL A. & ROBERTA OSBORN	15-330/26.1
8	JASON OSBORN	15-350/4.3
9	RUSSELL E. RUTAN JR. & DOROTHY L. & JOHN TIMOTHY BELOTTE	15-350/5
10	GOBEL G. OSBORN JR. (LE) (MICHAEL BRUCE & JASON OSBORN)	15-350/6
11	R. MARK & DIANA L. HACKETT	15-350/18
12	DONALD N. & CYNTHIA J. MCHENRY	15-350/16.2
13	CALEB L. & JENNIFER L. CUTRIGHT	15-350/17.8
14*	BRIAN J. & ANDREA L. MILLS	15-350/17.7
15*	BRIAN J. & ANDREA L. MILLS	15-350/17.6
16*	GARY & MARGARET WHEELER	15-350/17.2
17*	BRIAN J. & ANDREA L. MILLS	15-350/17.5
18*	JASON MICHAEL SLEETH	15-350/17.1
19*	CALEB L. & JENNIFER L. CUTRIGHT	15-350/17.3
20*	JAY D. & TIFFANY B. WILLIAMS	15-350/27.1
21*	JAY D. & TIFFANY BROOKE WILLIAMS	15-350/26.1
22*	LEWIS FRANKLIN & PAMELA MULLEN	15-350/25
23	CALEB L. CUTRIGHT	15-350/16.7
24	CHRISTOPHER F. & PAMELA MULLEN	15-350/25.3
25	LEWIS FRANKLIN & PAMELA MULLEN	15-350/27
26	CHARLES W. CLEVENGER IRR TRUST	15-370/13
27	SHAWN R. NEWBROUGH	15-370/21
28	EIP III WEST VIRGINIA LLC	15-371/7.1
29	EIP III WEST VIRGINIA LLC	15-371/7
30*	EIP III WEST VIRGINIA LLC	15-370/29

	LESSOR	DIST-TM/PAR
A	GOBEL OSBORN, ET AL	15-330/5
B	J. EARL TETER, WIDOWER, ET AL	1-330-5.1
C	CHARLES THOMAS DAVIS, ET UX	15-330/4
D	GEORGE T. FARIS, ET AL	15-330/3
E	JOHN B. WEBB ET AL	15-330/25
F	THE BOARD OF EDUCATION OF THE COUNTY OF HARRISON	15-330/29
G	MARY ALICE HAFER REV TRUST MICHAEL A. OSBORN ET UX	15-330/26.1
H	MARY ALICE HAFER	15-330/26
J	NORVIL D. LANTZ	15-350/5
K	ALDERSON BROADDUS COLLEGE & AMP FUND III, LP	15-350/6
L	MARY LANCASTER CASTILOW ET AL	15-350/18
M	REBECCA A. COMPTON; JAMES MICHAEL COMPTON & JENNIFER NORA COMPTON	15-350/16.2 15-350/17.7 15-350/17.6 15-350/17.8 15-350/17.5 15-350/17.2 15-350/17.3 15-350/17.1
N	GRAFTON COAL COMPANY	P/O 15-350/25.3 P/O 15-350/26.1
P	LEWIS FRANKLIN MULLEN	15-350/25 15-350/25
Q	W. R. JOHNSON ET AL	15-350/27 15-350/27.1 15-370/13
R	N. D. PARKS ET AL	15-370/29 15-371/7 15-371/7.1 15-370/21

SHL

BHL

SURFACE HOLE LOCATION (SHL)	APPROX. LANDING POINT	BOTTOM HOLE LOCATION (BHL)
UTM 17-NAD83(M)	UTM 17-NAD83(M)	UTM 17-NAD83(M)
N:4346578.590	N:4346342.210	N:4341430.010
E:567469.580	E:567265.440	E:569053.360
NAD83, WV NORTH (FT)	NAD83, WV NORTH (FT)	NAD83, WV NORTH (FT)
N:279782.659	N:279018.150	N:262801.790
E:1765244.012	E:1764561.260	E:1770160.100

THRASHER

THE THRASHER GROUP, INC.
600 WHITE OAKS BLVD.
BRIDGEPORT, WV 26330
PHONE 304-624-4108

SEE PAGE 2 FOR PLAT DUE TO LENGTH OF LATERAL

FILE #: J OSBORN HSOP 16 203

DRAWING #: J OSBORN HSOP 16 203

SCALE: 1" = 2000'

MINIMUM DEGREE OF ACCURACY: 1/2500

PROVEN SOURCE OF ELEVATION: U.S.G.S. MONUMENT THOMAS 1498.81'

I, THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND THE REGULATIONS ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

Signed: Joseph H. Lowther

R.P.E.: _____ L.L.S.: P.S. No. 2346

JOSEPH H. LOWTHER ★ LICENSED ★ No. 2346 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS

WVDEP
OFFICE OF OIL & GAS
601 57TH STREET
CHARLESTON, WV 25304

DATE: SEPTEMBER 13, 2021

OPERATOR'S WELL #: J OSBORN HSOP 16 203

API WELL #: 47 (STATE) 33 (COUNTY) _____ (PERMIT)

Well Type: ☐ Oil ☐ Waste Disposal ☒ Production ☐ Deep
☒ Gas ☐ Liquid Injection ☐ Storage ☒ Shallow

WATERSHED: SIMPSON CREEK ELEVATION: 1163.30'±

COUNTY/DISTRICT: HARRISON / SIMPSON QUADRANGLE: ROSEMONT, WV 7.5'

SURFACE OWNER: JUDY M OSBORN (LE) (JUDY M OSBORN IRREVOCABLE TRUST) ACREAGE: 70.00±

OIL & GAS ROYALTY OWNER: GOBEL OSBORN, ET AL ACREAGE: 1,607.99±

DRILL ☒ CONVERT ☐ DRILL DEEPER ☐ REDRILL ☐ FRACTURE OR STIMULATE ☒
PLUG OFF OLD FORMATION ☐ PERFORATE NEW FORMATION ☐ PLUG & ABANDON ☐
CLEAN OUT & REPLUG ☐ OTHER CHANGE ☐ (SPECIFY): _____

TARGET FORMATION: MARCELLUS ESTIMATED DEPTH: (LATERAL)TVD: 7,510'± TMD: 25,113'±

WELL OPERATOR ARSENAL RESOURCES DESIGNATED AGENT GARY SHORT
Address 6031 WALLACE ROAD EXTENSION, SUITE 300 Address 633 WEST MAIN ST.
City WEXFORD State PA Zip Code 15090 City BRIDGEPORT State WV Zip Code 26330

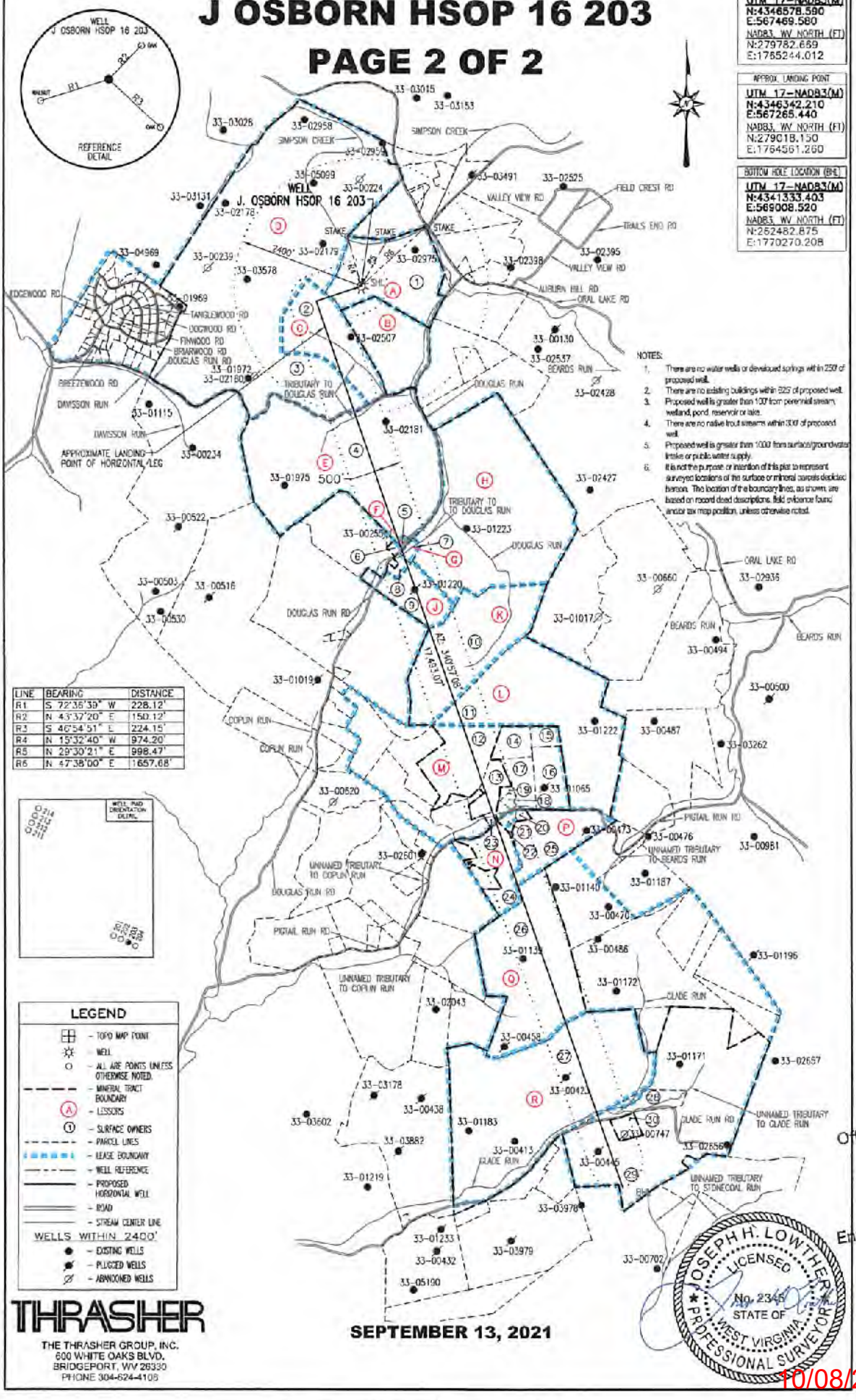
RECEIVED
Office of Oil and Gas
SEP 20 2021
WV Department of Environmental Protection

10/08/2021

AOR Attachment "A"

J OSBORN HSOP 16 203

PAGE 2 OF 2



NOTES:

1. There are no water wells or developed springs within 250' of proposed well.
2. There are no existing buildings within 625' of proposed well.
3. Proposed well is greater than 100' from perennial stream, wetland, pond, reservoir or lake.
4. There are no native trout streams within 300' of proposed well.
5. Proposed well is greater than 1000' from surface/groundwater intake or public water supply.
6. It is not the purpose or intention of this plat to represent surveyed locations of the surface or mineral parcels depicted hereon. The location of the boundary lines, as shown, are based on record deed descriptions, field evidence found and/or tax map position, unless otherwise noted.

THRASHER

THE THRASHER GROUP, INC.
600 WHITE OAKS BLVD.
BRIDGEPORT, WV 26330
PHONE 304-624-4108

SEPTEMBER 13, 2021

JOSEPH H. LOWTHER
LICENSED
No. 2345
STATE OF
WEST VIRGINIA
PROFESSIONAL SURVEYOR

RECEIVED
Office of Oil and Gas
SEP 20 2021
WV Department of Environmental Protection

10/08/2021

AOR Attachment 'A'

Stansberry, Wade A <wade.a.stansberry@wv.gov>

Expedited Modification Horizontal H6A Well Work Permit (API: 47-033-05941 & 47-033-05949)

1 message

Stansberry, Wade A <wade.a.stansberry@wv.gov> Tue, Oct 5, 2021 at 10:51 AM
To: Ross Schweitzer <rschweitzer@arsenalresources.com>, "Ward, Samuel D" <samuel.d.ward@wv.gov>, dpalmer@harrisoncountywv.com, mcopeland@harrisoncountywv.com

I have attached a copy of the newly issued well permit number "**J OSBORN HSOP**". This will serve as your copy.

If you have any questions, then please contact us here at the Office of Oil and Gas.

Thank you,

Wade A. Stansberry

Environmental Resource Specialist 3

West Virginia Department of Environmental Protection

Office of Oil & Gas

601 57th St. SE

Charleston, WV 25304

(304) 926-0499 ext. 41115

(304) 926-0452 fax

Wade.A.Stansberry@wv.gov

4 attachments

- **47-033-05941 - mod.pdf** 1853K
- **47-033-05949 - mod.pdf** 2033K
- **33-05941 SSP mod signed.pdf** 6472K
- **33-05949 SSP signed.pdf** 6121K

10/08/2021