



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 HSOP16 201
47-033-05949-00-00

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.

A handwritten signature in blue ink, appearing to read 'James A. Martin', is written over a printed name and title.

James A. Martin
Chief

Operator's Well Number: J OSBORN HSOP16 201
Farm Name: JUDY M OSBORN (LE) (JUDY M OSBORN IRREV⁶)
U.S. WELL NUMBER: 47-033-05949-00-00
Horizontal 6A New Drill
Date Modification Issued: 10/05/2021

Promoting a healthy environment.

10/08/2021



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,

A handwritten signature in cursive script that reads "Jon Sheldon".

Jon Sheldon
Chief Operating Officer

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

10/08/2021



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 JOsbornHSOP16 Well Number 201.

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 7,110' TVD) and existing conventional natural gas wells in the partially-depleted, relatively high permeability Benson formations (approximately 4,700' 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.

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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.

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September 16, 2021

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

RE: J Osborn HSOP 16 201, API# 47-033-05949 – Expedited Modification due to spacing changes

Dear Laura:

Enclosed please find the modification for the J Osborn HSOP 16 201, (API# 47-033-05949). This permit is being modified due to adjusting the well bore spacing and moving it 450' to the west. The well head locations remained the same. This well was originally permitted to 25,563' the modification is permitted to 26,158'. Same leases just longer due to the extended 450' kickout distance.

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

*CHK# 117498
Amt \$5150
Date 09/16/21*

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

Sincerely,

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

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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 201 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 Oil Underground Storage

Other

(b) If Gas Shallow Deep

Horizontal

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: 26,158 ft

11) Proposed Horizontal Leg Length: 17,492 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

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

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18) **CASING AND TUBING PROGRAM**

TYPE	Size (in)	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling (ft)	INTERVALS: Left in Well (ft)	CEMENT: Fill-up (Cu. Ft.)/CTS
Conductor	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	26,158	26,158 ✓	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% CaCl ₂	1.2
Fresh Water	13.375	17.5	0.38	2,730	900	Class A, 3% CaCl ₂	1.2
Coal							
Intermediate	9.625	12.25	0.395	3,950	1,500	Class A, 3% CaCl ₂	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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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 1/2" hole and drill to fresh water casing (Surface) to the programmed depth, Run 13- 3/8" casing and cement to surface. The rig will continue drilling a 12- 1/4" intermediate hole to the programmed depth, run 9- 5/8" casing and cement to surface. The rig will then continue to drill an 8- 3/4" hole to a designed KOP. We will then start drilling the curve and lateral section to the programmed total measured depth, run 5 1/2" casing and cement according to the program.

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

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

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

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

23) Describe centralizer placement for each casing string:

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 1/2" – one semi rigid centralizer on every joint from TD of casing to end of curve. Then every other joint to KOP. Every third joint from KOP to 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.

4703305949



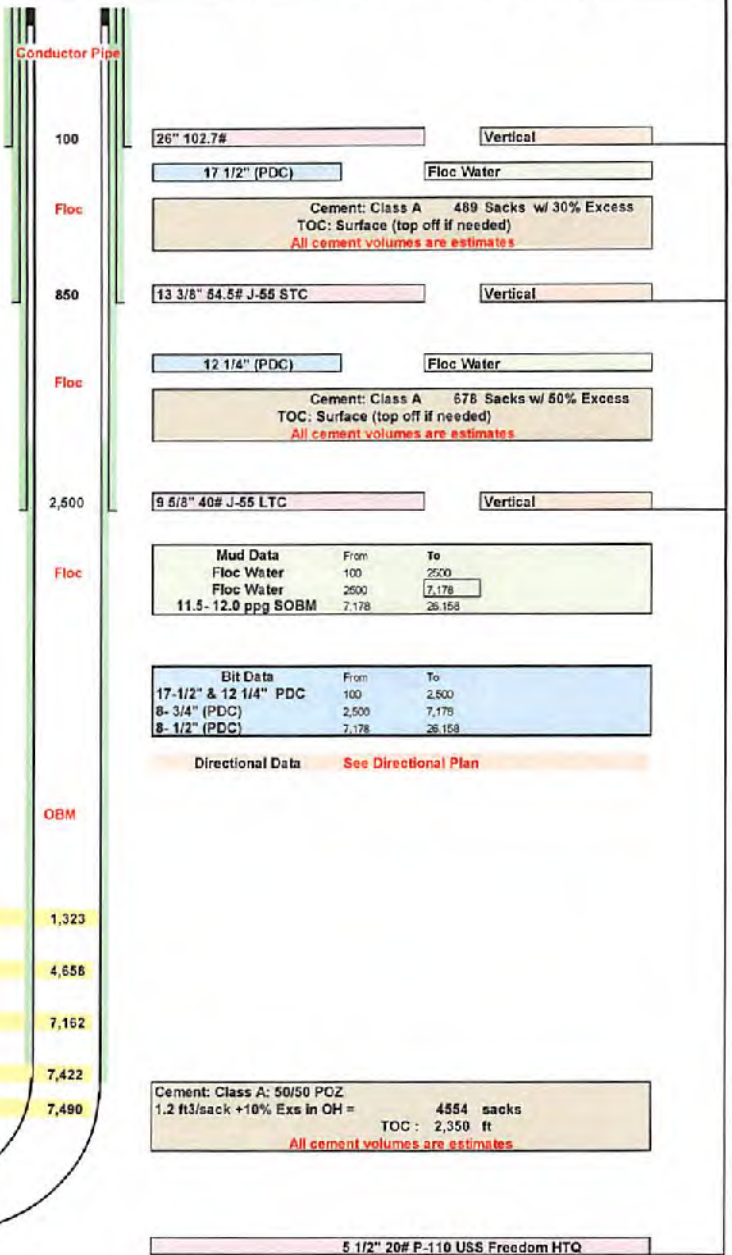
Arsenal Resources
J. Osborn HSOP 16 201
Casing Design
Directional Plan # 3 KLX

Other Names: N/A
Surface Location: TBD
Bottom Hole Location: TBD
Total Depth: 26,158 MD (ft)
7,510 TVD (ft)

County: Harrison
State: West Virginia
AFE #: XX API #: XX
RKB: 25
Ground Level: 1,164

Logs	Significant Formations (TVD)	Depth (ft) MD	Depth (ft) TVD	Hole Size	Casing and Cement	Mud	Directional & Surveys
------	------------------------------	---------------	----------------	-----------	-------------------	-----	-----------------------

None	Section 1		100	Conductor Pipe	26" 102.7#		Vertical
None	Section 2			Floc	17 1/2" (PDC)	Cement: Class A 489 Sacks w/ 30% Excess TOC: Surface (top off if needed) All cement volumes are estimates	Floc Water
Possible CBL after cement job			850		13 3/8" 84.5# J-55 STC		Vertical
None	Section 3			Floc	12 1/4" (PDC)	Cement: Class A 678 Sacks w/ 50% Excess TOC: Surface (top off if needed) All cement volumes are estimates	Floc Water
Possible CBL after cement job			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 26,158
						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 26,158
						Directional Data	See Directional Plan
							OBM
							Big Lime
							1,323
							1st Elk Siltsstone
							4,656
							Tully Lime
							7,162
							Purcell (Limestone)
							7,422
							Lower Marcellus
							7,490
							26,158 MD
							7510 TVD



Revision 1

Note: Not drawn to scale

Date Last Revised: 16-Sep-21
Ross Schweitzer

Cement Outside Casing
Seal Assembly in Annulus

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9/16/2021

Alliance Petroleum Corporation
4150 Belden Village Ave. NW Ste 410
Canton, OH 44718-2253

RE: J Osborn HSOP16 Well Pad

Dear Sir/Madam,

Arsenal Resources has developed a Marcellus pad, J Osborn HSOP16 201, 202, 203, and 204 wells, 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 7,110 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 J Osborn HSOP16 201, 202, 203, and 204 wells during 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 304-926-0449.

Sincerely,

Ross Schweitzer
Sr. Director of Drilling, Construction and Permitting

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AOR Attached 'A'

10/08/2021

Area of Review Report - J Osborn HSOP 16 Pad, 201 Lateral, Harrison County, WV

Well Name	API Number	Operator Name / Address	Well Type	Latitude	Longitude	Total Depth	Perforated Formation(s)	Producing Zones not Perforated
Faris 11	033-02180	Diversified Resources Inc	Plugged-10/26/1989	39.261115	-80.22539	4555	Benson	NA
Faris 11	033-01972	Diversified Resources Inc	Reassigned to permit 033-02180	NA	NA	NA	NA	NA
Webb 2	033-01975	Alliance Petroleum Corporation	Existing	39.255618	-80.222889	2684	Thirty-foot, Fifth	NA
B-430	033-02601	Braxton Oil & Gas Corp.	Existing	39.236644	-80.213618	4700	Benson	NA
Parks 1	033-00413	Alliance Petroleum Corporation	Existing	39.221791	-80.207282	2439	Fifth	NA
Faris 8	033-01019	PDC	Plugged 3/1/1977	39.245592	-80.220627	4497	Benson	NA
Parks 3	033-01183	Alliance Petroleum Corporation	Existing	39.222309	-80.210372	4646	Benson	NA
Davis 2	033-03979	PDC	Plugged 7/7/1994	39.216594	-80.207486	NA	NA	

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BHL is located on topo map 12,720 feet south of Latitude: 39° 15' 00"
 SHL is located on topo map 9,364 feet south of Latitude: 39° 17' 30"

BHL is located on topo map 11,091 feet west of Longitude: 80° 10' 00"
 SHL is located on topo map 2,298 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	CAROLYN S. HARRON	15-330/3
4	DAVID A. & TAMMERA L. FARIS	15-330/24
5	CHARLES E. REED 1/2 INTEREST GERALD W. BURNER ET AL 1/2 INTEREST	15-330/25
6	GORDON F. OSBORN (LE) (BRIAN MATTHEW OSBORN)	15-350/3
7	GORDON F. OSBORN (LE) (BRIAN MATTHEW OSBORN)	15-350/3.3
8	GORDON F. & DONNA R. OSBORN (BRIAN MATTHEW OSBORN)	15-350/3.1
9	CHRISTOPHER PATRICK OSBORN	15-350/3.2
10	CHRISTOPHER ENEIX	15-350/15
11	CYNTHIA M. IQUINTO	15-350/14.1
12	JOSPEH ALBERT HONCE	15-350/14.2
13	ANNESE FRANK	15-350/16.3
14	JEFFREY A. CRISLIP	15-350/14
15	MICHAEL DAVID & REBECCA JANE CONLEY	15-350/16
16	MICHAEL HONCE	15-350/12
17	NICHOLAS A. & MEGHAN A. FLESHER	15-350/22
18	PATRICIA L. MOORE	15-350/23
19	*PATRICIA L. MOORE	15-350/23.6
20	CHARLES W. CLEVINGER IRR TRUST	15-370/10
21	CHARLES W. CLEVINGER IRR TRUST	15-370/11
22	CHARLES W. CLEVINGER IRR TRUST	15-370/12
23	SHAWN R. NEWBROUGH	15-370/21
24	JOHN JAMES JONES C/O ANTHONY JONES	15-370/27
25	CHARLES A. & JOYCE G. MATHENY	15-370/28

	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	MICHAEL A. OSBORN ET UX	15-350/4
F	XTO ENERGY INC.	15-350/3
		15-350/3.3
		15-350/3.1
G	REBECCA A. COMPTON; JAMES MICHAEL COMPTON & JENNIFER NORA COMPTON	15-350/18.1
		15-350/18.3
		15-350/18
		15-350/18.9
H	PATRICIA MOORE	15-350/23.2
		*15-350/23.6
		15-350/23
	TRACY H. McDONALD	P/O 15-350/23.1
J	CHARLES W. CLEVINGER IRR TRUST	15-370/10
		15-370/11
		15-370/12
K	N. D. PARKS ET AL	15-370/21
L	JOHN JAMES JONES	P/O 15-370/27
M	JOHN JAMES JONES AUDREY U. DAVIS ET UX.	P/O 15-370/27
		15-370/28.1
		15-370/28
N	GEORGE T. FARRIS, ET AL	15-350/4
		15-350/10
		15-350/11
		15-350/12
		15-350/14



THRASHER
 THE THRASHER GROUP, INC.
 600 WHITE OAKS BLVD.
 BRIDGEPORT, WV 26330
 PHONE 304-824-4108

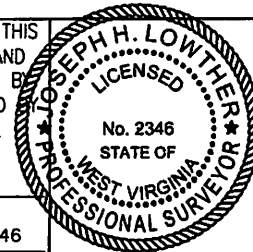
SURFACE HOLE LOCATION (SHL)	APPROX. LANDING POINT	BOTTOM HOLE LOCATION (BHL)
UTM 17-NAD83(M) N:4346582.310 E:5667481.23 NAD83_WY NORTH (FT) N:279795.329 E:1765216.814	UTM 17-NAD83(M) N:4345981.580 E:566754.480 NAD83_WY NORTH (FT) N:277797.050 E:1762863.840	UTM 17-NAD83(M) N:4340953.020 E:568577.530 NAD83_WY NORTH (FT) N:261262.570 E:1768572.720

SEE PAGE 2 FOR PLAT DUE TO LENGTH OF LATERAL

FILE #: J OSBORN HSOP 16 201
 DRAWING #: J OSBORN HSOP 16 201
 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



(+) 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 16 201
 API WELL #: 47 33 05949 H6A
 STATE COUNTY PERMIT

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

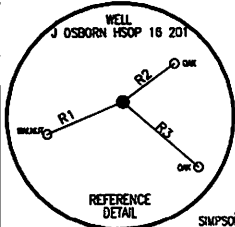
WATERSHED: SIMPSON CREEK ELEVATION: 1163.30'±
 COUNTY/DISTRICT: HARRISON / SIMPSON QUADRANGLE: ROSEMONT, WV 7.5'
 SURFACE OWNER: JUDY M OSBORN (LE) (JUDY M OSBORN IRREVOCABLE TRUST) ACREAGE: 70.00±
 OIL & GAS ROYALTY OWNER: GOBEL OSBORN, ET AL ACREAGE: 1,596.97±
 DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE
 PLUG OFF OLD FORMATION PERFORATE NEW FORMATION PLUG & ABANDON
 CLEAN OUT & REPLUG OTHER CHANGE (SPECIFY): _____

TARGET FORMATION: MARCELLUS ESTIMATED DEPTH: (LATERAL) TD: 7,510'± TMD: 26,159'±
 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 16 201

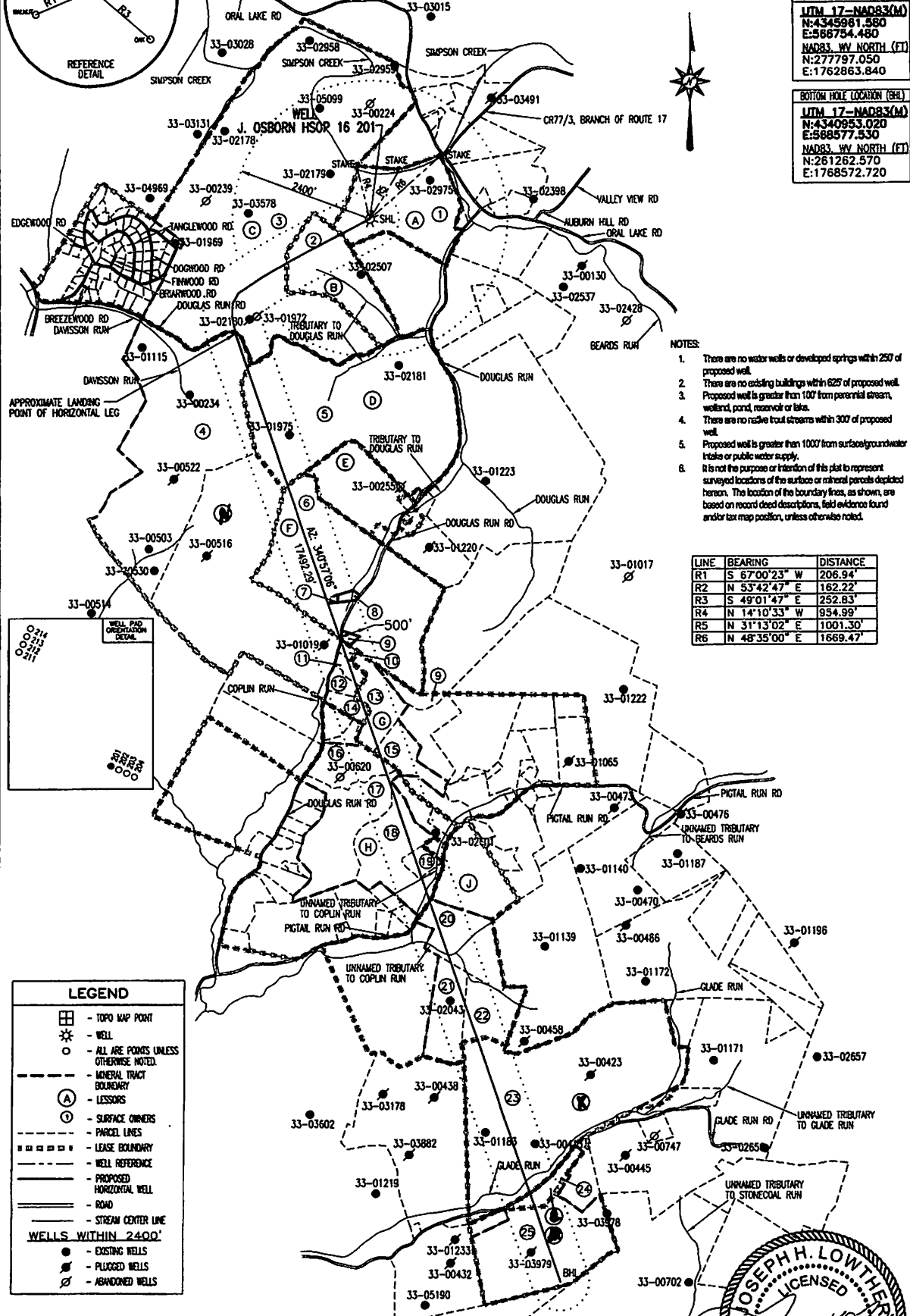
PAGE 2 OF 2



SURFACE HOLE LOCATION (SHL)
 UTM 17-NAD83(M)
 N:434882.310
 E:867461.23
 NAD83_WY NORTH (FT)
 N:279795.329
 E:1765216.814

APPROX. LANDING POINT
 UTM 17-NAD83(M)
 N:434981.580
 E:866754.480
 NAD83_WY NORTH (FT)
 N:277797.050
 E:1762863.840

BOTTOM HOLE LOCATION (BHL)
 UTM 17-NAD83(M)
 N:4340953.020
 E:868577.530
 NAD83_WY NORTH (FT)
 N:261262.570
 E:1768572.720



- 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 herein. 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 67°00'23" W	206.94'
R2	N 53°42'47" E	162.22'
R3	S 49°01'47" E	252.83'
R4	N 14°10'33" W	954.99'
R5	N 31°13'02" E	1001.30'
R6	N 48°35'00" E	1669.47'

LEGEND

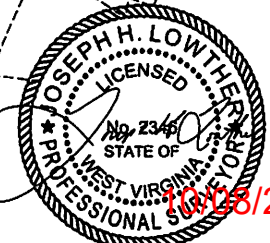
- TOPO MAP POINT
- WELL
- ALL ARE POINTS UNLESS OTHERWISE NOTED
- MENSURAL TRACT BOUNDARY
- LESSORS
- SURFACE OWNERS
- PARCEL LINES
- LEASE BOUNDARY
- WELL REFERENCE
- PROPOSED HORIZONTAL WELL
- ROAD
- STREAM CENTER LINE

WELLS WITHIN 2400'

- EXISTING WELLS
- PLUGGED WELLS
- ABANDONED WELLS

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

SEPTEMBER 24, 2021



10/28/2021



ARSENAL
R E S O U R C E S

SITE SAFETY PLAN

LOS BORN HSOP16 WELL PAD, #201

911 Address:

**2687 Coplin Run Rd
Bridgeport, WV 26330**

*SDW
9/14/2021*

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WV Department of
Environmental Protection

1

10/08/2021

BHL is located on topo map 12,720 feet south of Latitude: 39° 15' 00"
 SHL is located on topo map 9,364 feet south of Latitude: 39° 17' 30"

BHL is located on topo map 1,091 feet west of Longitude: 80° 10' 00"
 SHL is located on topo map 2,736 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	CAROLYN S. HARRON	15-330/3
4	DAVID A. & TAMMERA L. FARIS	15-330/24
5	CHARLES E. REED 1/2 INTEREST GERALD W. BURNER ET AL 1/2 INTEREST	15-330/25
6	GORDON F. OSBORN (LE) (BRIAN MATTHEW OSBORN)	15-350/3
7	GORDON F. OSBORN (LE) (BRIAN MATTHEW OSBORN)	15-350/3.3
8	GORDON F. & DONNA R. OSBORN (BRIAN MATTHEW OSBORN)	15-350/3.1
9	CHRISTOPHER PATRICK OSBORN	15-350/3.2
10	CHRISTOPHER ENEIX	15-350/15
11	CYNTHIA M. IQUINTO	15-350/14.1
12	JOSPEH ALBERT HONCE	15-350/14.2
13	ANNESE FRANK	15-350/16.3
14	JEFFREY A. CRISLIP	15-350/14
15	MICHAEL DAVID & REBECCA JANE CONLEY	15-350/16
16	MICHAEL HONCE	15-350/12
17	NICHOLAS A. & MEGHAN A. FLESHER	15-350/22
18	PATRICIA L. MOORE	15-350/23
19	*PATRICIA L. MOORE	15-350/23.6
20	CHARLES W. CLEVINGER IRR TRUST	15-370/10
21	CHARLES W. CLEVINGER IRR TRUST	15-370/11
22	CHARLES W. CLEVINGER IRR TRUST	15-370/12
23	SHAWN R. NEWBROUGH	15-370/21
24	JOHN JAMES JONES C/O ANTHONY JONES	15-370/27
25	CHARLES A. & JOYCE G. MATHENY	15-370/28

	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	MICHAEL A. OSBORN ET UX XTO ENERGY INC.	15-350/4 15-350/3 15-350/3.3 15-350/3.1
G	REBECCA A. COMPTON; JAMES MICHAEL COMPTON & JENNIFER NORA COMPTON	15-350/16.1 15-350/16.3 15-350/16 15-350/16.9
H	PATRICIA MOORE TRACY H. MCDONALD	15-350/23.2 *15-350/23.6 15-350/23 P/O 15-350/23.1
J	CHARLES W. CLEVINGER IRR TRUST	15-370/10 15-370/11 15-370/12 15-370/21
K	N. D. PARKS ET AL	15-370/21
L	JOHN JAMES JONES	P/O 15-370/27
M	JOHN JAMES JONES AUDREY U. DAVIS ET UX.	P/O 15-370/27 15-370/28.1 15-370/28
N	GEORGE T. FARRIS, ET AL	15-350/4 15-350/10 15-350/11 15-350/12 15-350/14



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

SURFACE HOLE LOCATION (SHL)	APPROX. LANDING POINT	BOTTOM HOLE LOCATION (BHL)
UTM 17-NAD83(M) N:4346582.310 E:567461.23 NAD83, WV NORTH (FT) N:279795.329 E:1765216.814	UTM 17-NAD83(M) N:4345961.580 E:566754.480 NAD83, WV NORTH (FT) N:277797.050 E:1762863.840	UTM 17-NAD83(M) N:4340953.020 E:568577.530 NAD83, WV NORTH (FT) N:261262.570 E:1768572.720

SEE PAGE 2 FOR PLAT DUE TO LENGTH OF LATERAL

FILE #: J OSBORN HSOP 16 201
 DRAWING #: J OSBORN HSOP 16 201
 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



(+) 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 16 201
 API WELL #: 47 33 05949 #6A
 STATE 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: 1,596.97±

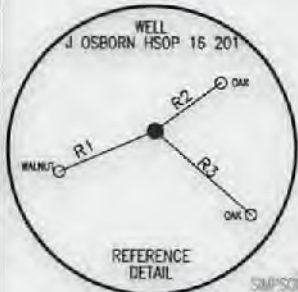
DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE
 PLUG OFF OLD FORMATION PERFORATE NEW FORMATION PLUG & ABANDON
 CLEAN OUT & REPLUG OTHER CHANGE (SPECIFY): _____

TARGET FORMATION: MARCELLUS ESTIMATED DEPTH: (LATERAL)TVD: 7,510'± TMD: 26,159'±
 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 16 201

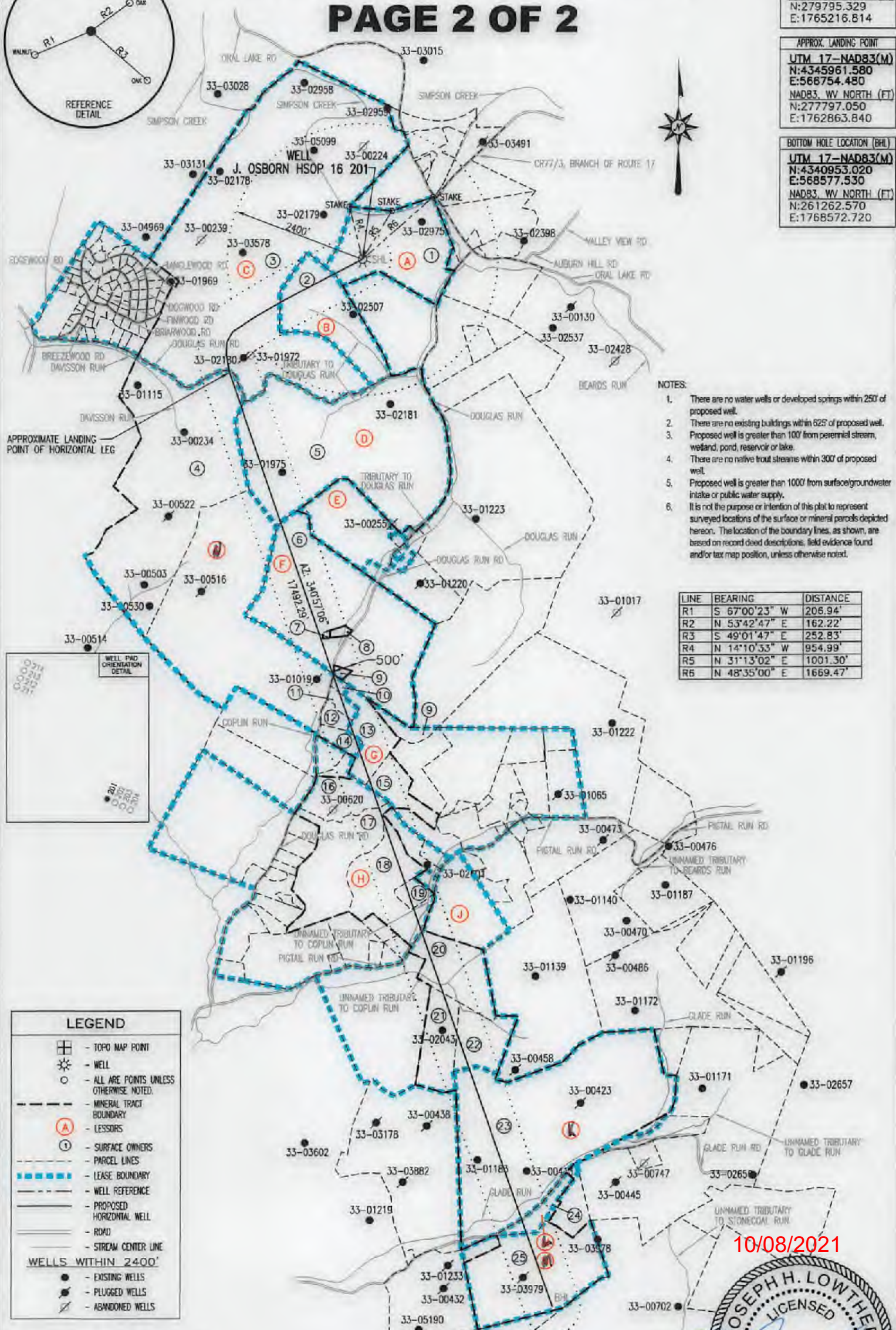
PAGE 2 OF 2



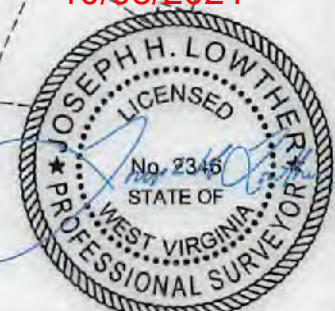
SURFACE HOLE LOCATION (SHL)
 UTM 17-NAD83(M)
 N:4346582.310
 E:567461.23
 NAD83, WV NORTH (FT)
 N:279795.329
 E:1765216.814

APPROX. LANDING POINT
 UTM 17-NAD83(M)
 N:4345961.580
 E:566754.480
 NAD83, WV NORTH (FT)
 N:277797.050
 E:1762863.840

BOTTOM HOLE LOCATION (BHL)
 UTM 17-NAD83(M)
 N:4340953.020
 E:568577.530
 NAD83, WV NORTH (FT)
 N:261262.570
 E:1768572.720



10/08/2021



**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 *Jon Sheldon*

Its: COO

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Page 1 of 16 WV Department of
Environmental Protection

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Attachment to WW-6A1, J Osborn 201

Letter Designation/Number Designation on Plat	Grantor, Lessor, Assignor, etc.	Grantee, Lessee, Assignee, etc.	Royalty	Book/Page	Acreage
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	
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	
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

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 WV
 SEP 20 2021

Attachment to WW-6A1, J Osborn 201

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	
	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	

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 (00008352)
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 Department of

Attachment to WW-6A1, J Osborn 201

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 (00008887)	Michael A. and Roberta Osborn, husband and wife	Mar Key, LLC	14.00%	1579/637	41.03
F (00008601)	XTO Energy, Inc.	Mar Key, LLC	14.50%	1628/983	139
G (00008178)	Rebecca A. Compton	Mar Key, LLC	14.00%	1610/832	164.48
G (00008179)	James Michael Compton	Mar Key, LLC	14.00%	1610/834	164.48
G (00008180)	Jennifer Nora Corton, fka Jennifer Nora Compton	Mar Key, LLC	14.00%	1610/836	164.48
H (00008222)	Ralph L. McDonald and L. June McDonald, husband and wife	Mar Key, LLC	15.00%	1611/621	395.2025
H (00008226)	Kevin L. McDonald, married acting on his sole and separate property	Mar Key, LLC	15.00%	1611/631	395.2025
H (00008249)	Mark Edward McDonald, single, remainderman	Mar Key, LLC	15.00%	1612/125	395.2025
H (00008283)	Alma L. Carson	Mar Key, LLC	15.00%	1615/748	395.2025
H (00008284)	M. Ruth Cutlip, a single woman	Mar Key, LLC	15.00%	1615/758	395.2025
H (00008285)	Tracy H. McDonald, a widower	Mar Key, LLC	15.00%	1615/768	395.2025

Attachment to WW-6A1, J Osborn 201

Letter Designation/Number Designation on Plat	Grantor, Lessor, Assignor, etc.	Grantee, Lessee, Assignee, etc.	Royalty	Book/Page	Acreage
H (00008286)	Gloria Glover McDonald, widow, with a life estate	Mar Key, LLC	15.00%	1615/778	395.2025
H (00008287)	Karen Renee McDonald, remainderman	Mar Key, LLC	15.00%	1615/788	395.2025
H (00008213)	Patricia L. Moore, single	W.B. Berry	12.50%	1095/1067	42
	W.B. Berry	Berry Energy Consultants and Managers, Inc.		1108/429	
	Berry Energy Consultants and Managers, Inc.	J&J Enterprises, Inc.		1110/898	
	J&J Enterprises, Inc.	Eastern American Energy Corporation		1200/1110	
	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	
H (00008215)	James K. Tilford and Ruth M. Tilfors, his wife	W.B. Berry	12.50%	1097/507	42
	W.B. Berry	Berry Energy Consultants and Managers, Inc.		1108/429	
	Berry Energy Consultants and Managers, Inc.	J&J Enterprises, Inc.		1110/898	
	J&J Enterprises, Inc.	Eastern American Energy Corporation		1200/1110	
	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	
J (00007235)	Charles W. Cleavenger Irrevocable Trust dated July 15, 2015	Mar Key, LLC	14.00%	1578/1072	205.85
K (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	

Attachment to WW-6A1, J Osborn 201

Letter Designation/Number Designation on Plat	Grantor, Lessor, Assignor, etc.	Grantee, Lessee, Assignee, etc.	Royalty	Book/Page	Acreage
	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	
L (00007752)	John James Jones, married	Mar Key, LLC	12.50%	1587/510	5.75
M (00004070)	Audry U Davis and Lucille P. Davis, his wife	Petroleum Development Corporation	12.50%	1244/556	96.5
	Petroleum Development Corporation	PDC Mountaineer, LLC		1440/364	
	PDC Mountaineer, LLC	River Ridge Energy, LLC		59/1263	
N (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	

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

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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.

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West Virginia Secretary of State — Online Data Services

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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

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WV Department of
Environmental Protection

10/08/2021

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

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SEP 20 2021

WV Department of
Environmental Protection

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

2013

2012

2011

2010

2009

2008

2007

2006

2005

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

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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]

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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 Kiesel
Title: CEO

PDC MOUNTAINEER, LLC

By: 
Name: Robert Kiesel
Title: CEO

PDC MOUNTAINEER HOLDINGS, LLC

By: 
Name: Robert Kiesel
Title: CEO

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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]

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

RIVER RIDGE ENERGY, LLC

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

RIVER RIDGE HOLDINGS, LLC

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

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ARSENAL
R E S O U R C E S

SITE SAFETY PLAN

LOS BORN HSOP16 WELL PAD, #201

911 Address:

**2687 Coplin Run Rd
Bridgeport, WV 26330**

*SDW
9/14/2021*

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**J OSBORN HSOP16 Well Pad, #201 Site Safety Plan
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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.

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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

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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 (SO₂). Under certain conditions this gas may be equally as dangerous as H₂S. A pump type detector device, which determines the percent of SO₂ in air through concentrations in ppm, will be available. Although normal air movement is sufficient to dissipate this material to safe levels, the SO₂ 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.

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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.

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Meeting Date: _____

Pre-Spud Meeting

J OSBORN HSOP16 Well Pad, #201

NAME

TITLE

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

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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.

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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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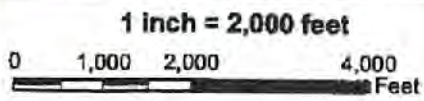
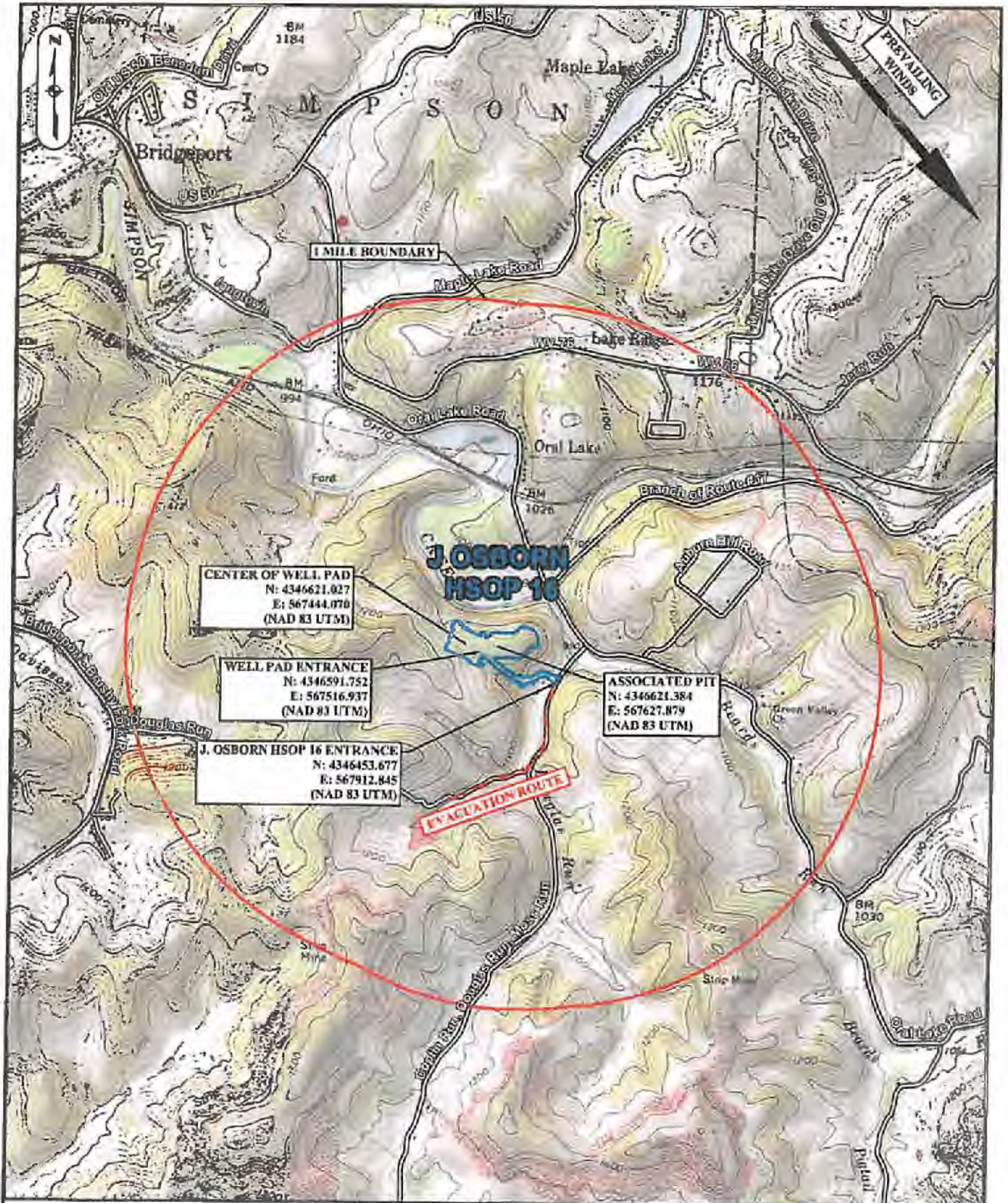
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B. Topographic Map

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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**PREVAILING WINDS
& EVACUATION MAP**

Blue Mountain
 A part of THE THRASHER GROUP

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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 (SO₂). Under certain conditions this gas may be equally as dangerous as H₂S. A pump type detector device, which determines the percent of SO₂ in air through concentrations in ppm, will be available. Although normal air movement is sufficient to dissipate this material to safe levels, the SO₂ 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.

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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 1/2" 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 1/4" 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 3/4" 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 3/4" or 8 1/2" hole.
6. Drill 8 3/4" or 8 1/2" 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" 20# 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 #201 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:

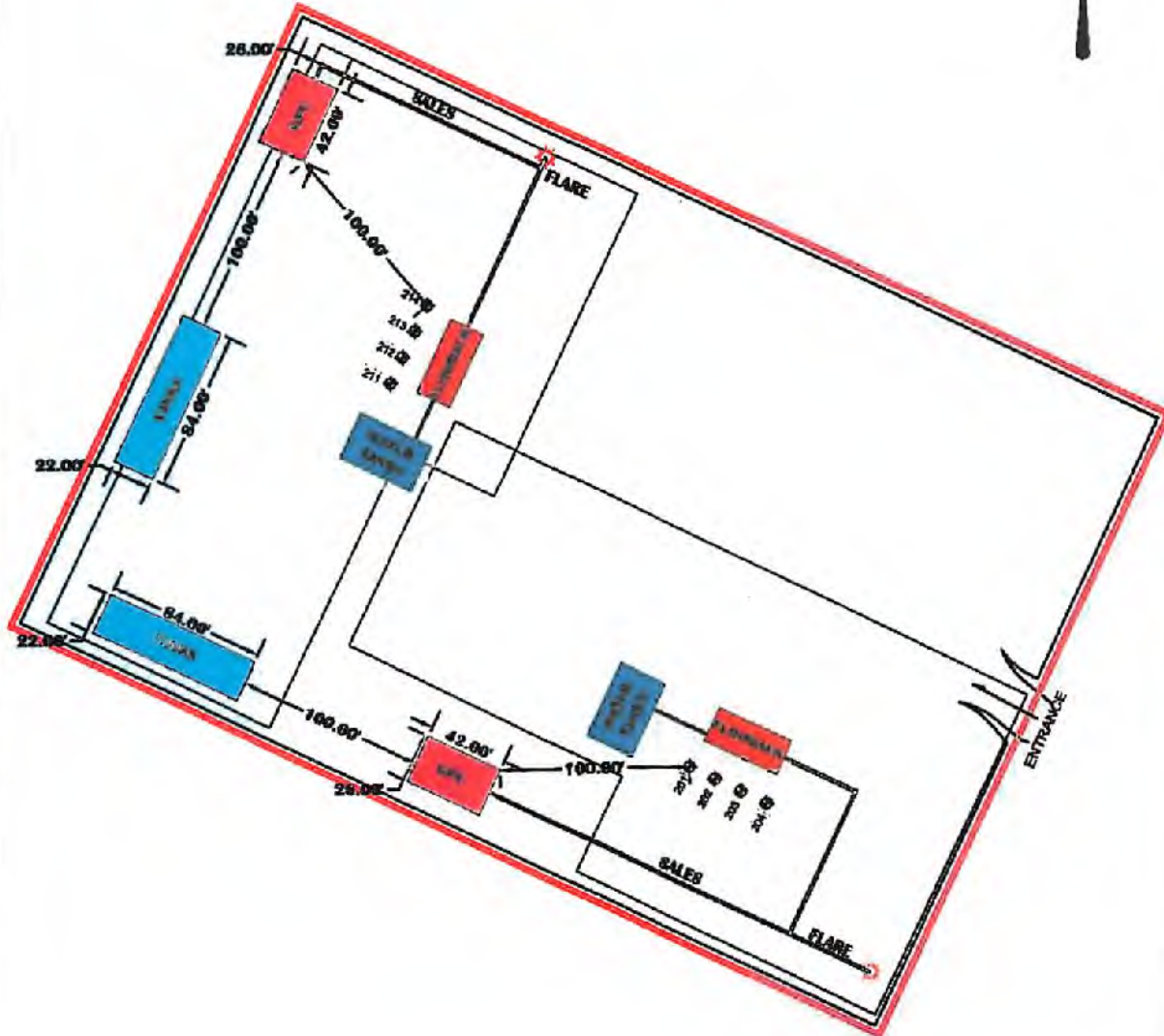
Casing & Tubing Program						
Casing Type	Size	Grade	Weight /FT	For Drilling	Left in Well	Fill Up
Conductor	26"		102.7#	80'	80'	CTS
Fr. Water	13.375"	J-55	54.5#	800'	800'	CTS
Intermediate	9.625"	J-55	40#	2,500'	2,500'	CTS
Production	5.5"	P-110	23#	26,158'	26,158'	TOC @ 2,350'
Tubing						

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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J OSBORN HSOP 16

SIMPSON DISTRICT, HARRISON COUNTY WEST VIRGINIA



MADE WELL LOCATIONS

WELL	LATITUDE	LONGITUDE	NORTHING	EASTING	LATITUDE	LONGITUDE	NUMBER	UTM/Easting	UTM/Northing	PROPOSED KEY	PROPOSED KEY
201	38°10'57.45"	-80°13'04.70"	270760.328	1760211.884	38.182628	-80.217897	4344432.31	567491.33	1184.30	1183.30	
202	38°10'57.39"	-80°13'04.81"	270760.328	1760212.613	38.182628	-80.217917	4344432.45	567492.40	1184.30	1183.30	
203	38°10'57.33"	-80°13'04.44"	270762.013	1760244.012	38.182628	-80.217900	4344432.86	567492.86	1184.30	1183.30	
204	38°10'57.41"	-80°13'04.27"	270778.339	1760229.811	38.182628	-80.217853	4344432.75	567492.75	1184.30	1183.30	
211	38°10'58.41"	-80°13'08.89"	270664.828	1760008.418	38.182628	-80.218848	4344432.31	567411.33	1184.30	1183.30	
212	38°10'58.54"	-80°13'08.77"	280008.834	1760002.734	38.182628	-80.218847	4344432.44	567411.33	1184.30	1183.30	
213	38°10'58.57"	-80°13'08.88"	280009.142	1760008.949	38.182628	-80.218848	4344432.88	567411.33	1184.30	1183.30	
214	38°10'59.81"	-80°13'08.81"	280008.748	1760078.368	38.182628	-80.218853	4344432.84	567411.33	1184.30	1183.30	



LEGEND

- PROPOSED WELL
- RIG FOOTPRINT
- EDGE OF BERM

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

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PAD LAYOUT
J OSBORN HSOP 16

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



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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.

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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.

R. Schweitzer

Ross Schweitzer
Sr. Director of Drilling, Construction and Permitting

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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.

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Section 5 -BOP and Well Control

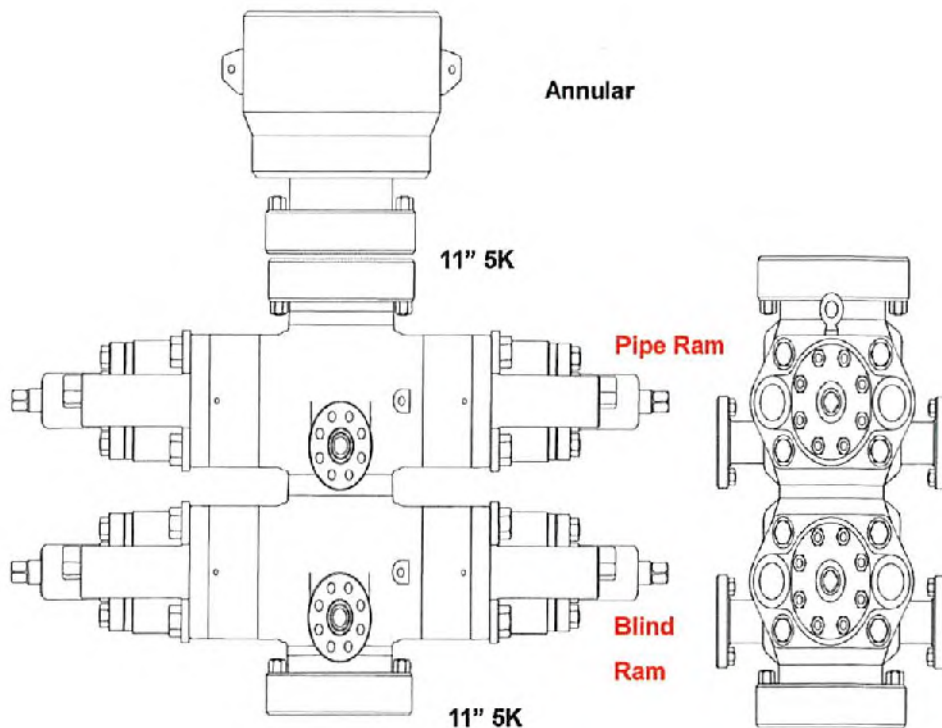
A. BOP Equipment

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

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11" 5K Double Ram BOP



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Choke & Kill, 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

MW 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

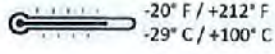
Reinforcement: high tensile steel wire spiral layers

Thermal Blanket: 1500° continuous ratings,

non-flammable, non-conductive

Armor Wall: .144"

Max Length: 150 feet



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	10,000	15,000	23.1
CK-64 Armor	4	8			26.3
CK-4810K Red	3	5.31			22.3
CK-5610K Red	3½	5.81			25.0
CK-6410K Red	4	4.75	10,000	15,000	36.1
CK-4810K Armor	3	6.5			26.0
CK-5610K Armor	3½	7			29.0
CK-6410K Armor	4	8			32.8

MW BOP Control Line

For blowout preventer lines.

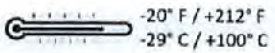
Tube: for hydraulic BOP actuation

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.



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.



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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 nipping 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 nipping 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.

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F. Inspector Notification

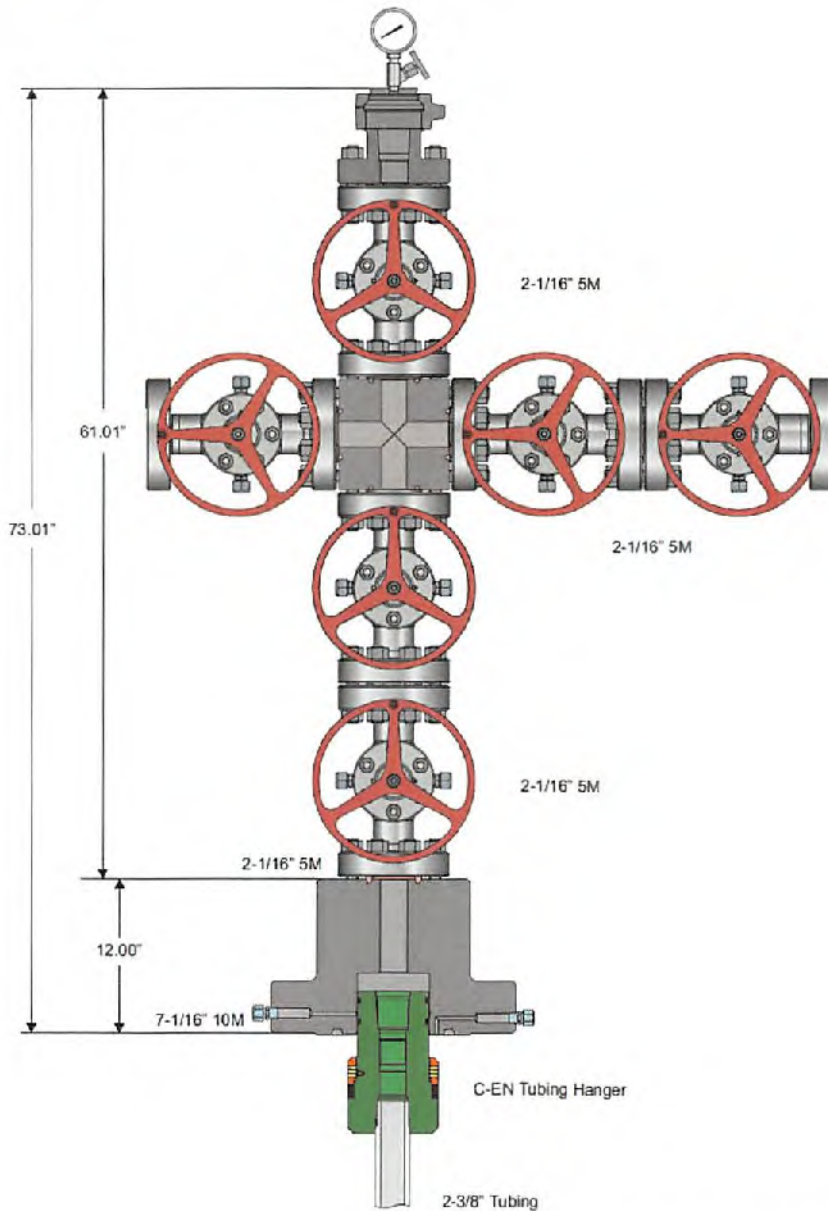
A detailed record of significant drilling events will be recorded in Arsenal Resources well log book. The state inspector will be notified upon any significant drilling events including the encounter of Hydrogen Sulfide Gas, lost circulation, fluid entry, abnormal pressures, etc.

G. Wellhead Assembly

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

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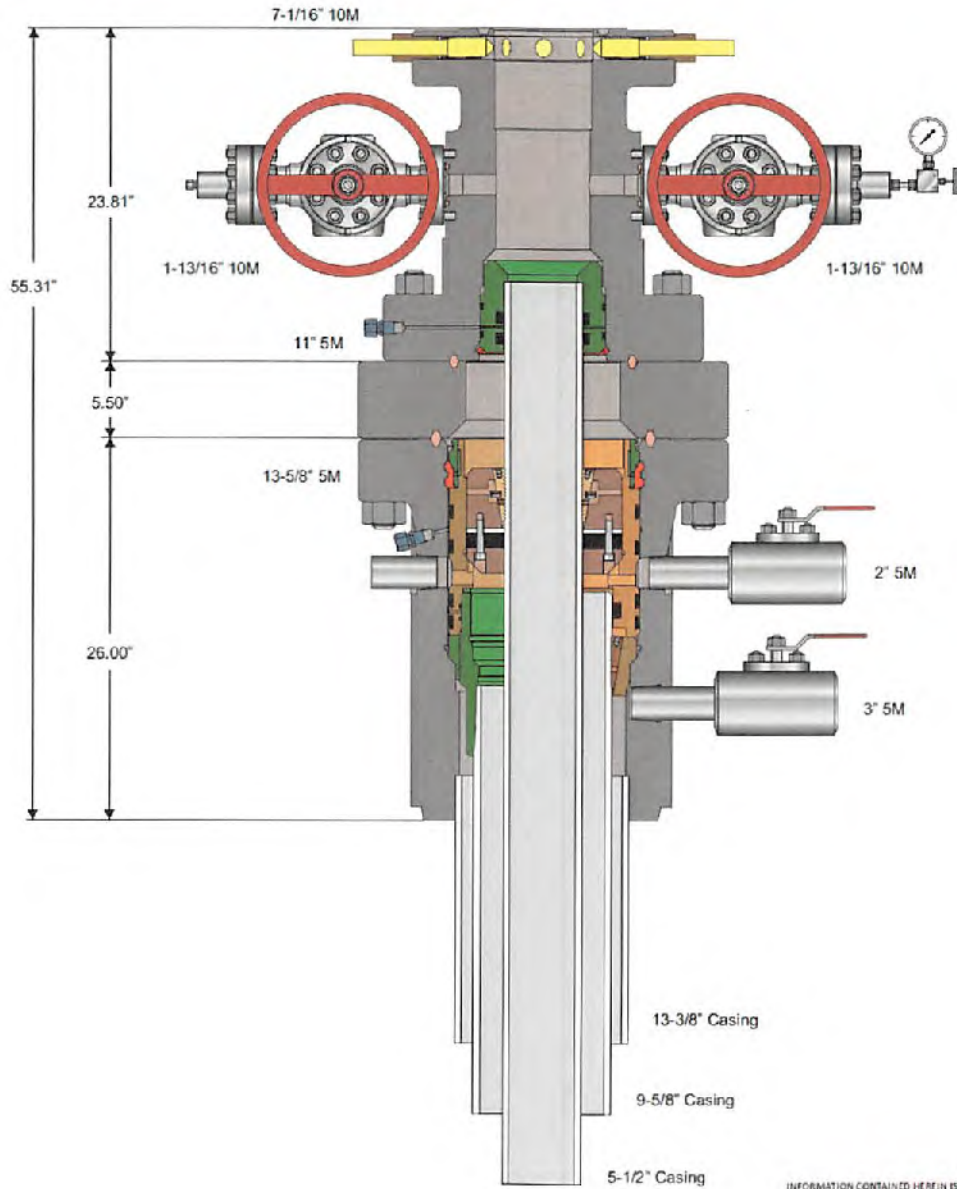
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H. Well Kill Procedures

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.

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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 H₂S Fixed Monitor w/2 relays (relays location in doghouse & company man trailer)
- 4 H₂S 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.

H2S 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

<u>QTY</u>	<u>DESCRIPTION</u>
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 ₂ S monitors
1	Portable Tri-Gas Hand Held Meter (O ₂ , LEL, H ₂ S)
1	Gastech Manual Impingement Pump Type Detector
2	Boxes H ₂ S Tubes Various Ranges
2	Boxes SO ₂ Tubes Various Ranges
1	Calibration Gas
1	Set Paper Work for Records: Training, Cal, Inspection, other

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Additional Safety Related Equipment

<u>QTY</u>	<u>Description</u>
2	Windssocks 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

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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.**

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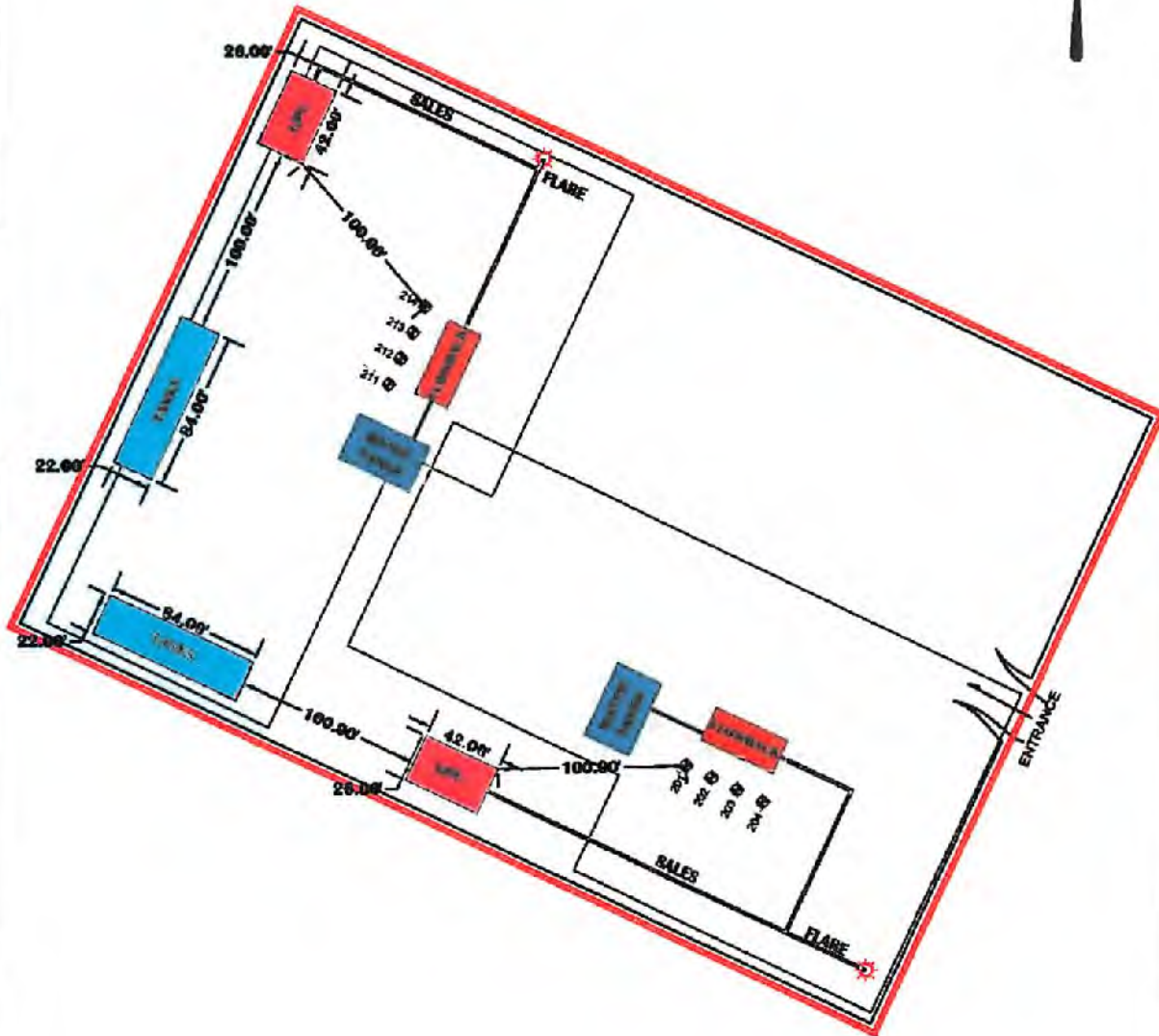
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J OSBORN HSOP 16

SIMPSON DISTRICT, HARRISON COUNTY WEST VIRGINIA



MADE'S WELL LOCATIONS

WELL	LATITUDE	LONGITUDE	NORTHING	EASTING	(LATITUDE/DEC)	(LONGITUDE/DEC)	UTM NORTHING	UTM EASTING	EGM96 ELEV	PROPOSED DEPTH
200	38°13'57.45"	-80°13'04.79"	175275.259	175211.814	39.233986	-80.217897	4344852.21	587481.95	1183.50'	1183.50'
201	38°13'57.20"	-80°13'04.81"	175275.899	175230.415	39.233842	-80.217847	4344850.46	587485.40	1183.50'	1183.50'
202	38°13'57.33"	-80°13'04.44"	175273.871	175244.015	39.234223	-80.217900	4344878.89	587488.58	1184.50'	1183.50'
203	38°13'57.20"	-80°13'04.27"	175277.539	175257.811	39.234508	-80.217853	4344878.73	587475.75	1183.14'	1183.50'
210	38°13'56.41"	-80°13'02.85"	175284.238	175205.419	39.233853	-80.218248	4344842.51	587411.55	1182.33'	1183.50'
211	38°13'56.24"	-80°13'08.77"	175208.554	175205.754	39.233853	-80.218547	4344844.48	587415.20	1182.33'	1183.50'
212	38°13'56.88"	-80°13'08.89"	175232.140	175205.819	39.233878	-80.218523	4344850.84	587415.08	1182.33'	1183.50'
213	38°13'56.81"	-80°13'08.61"	175235.745	175207.543	39.233844	-80.218503	4344854.84	587415.91	1184.89'	1183.50'



LEGEND

- PROPOSED WELL
- RIG FOOTPRINT
- EDGE OF BERM

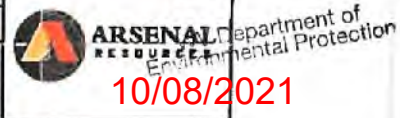
WEST VIRGINIA STATE PLANE COORDINATES
NORTH ZONE
UTM COORDINATES ZONE 17 NORTH 98
NOTE: BEARING CREATED ON 11"x17" PAPER.

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PAD LAYOUT
J OSBORN HSOP 16

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



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.

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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.

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Arsenal Resources
Harrison County, West Virginia
J Osborn HSOP16, #201

Anti-collision Report (Attached)

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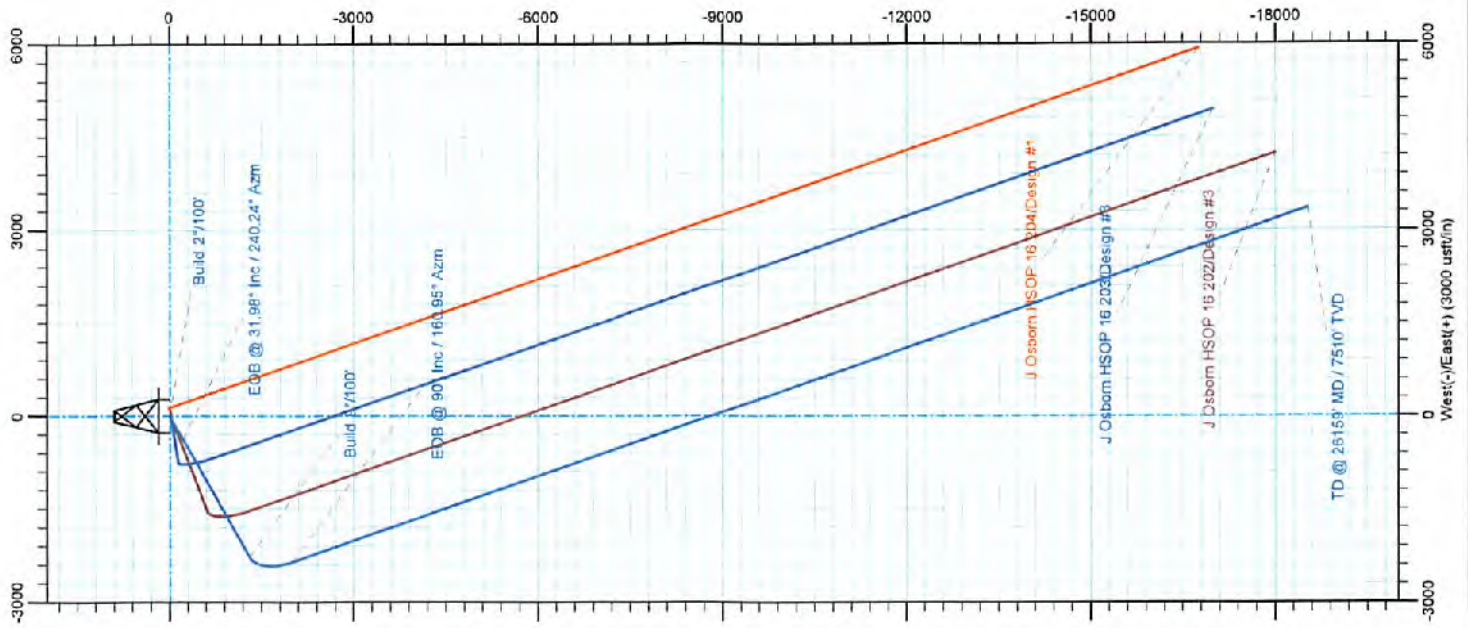
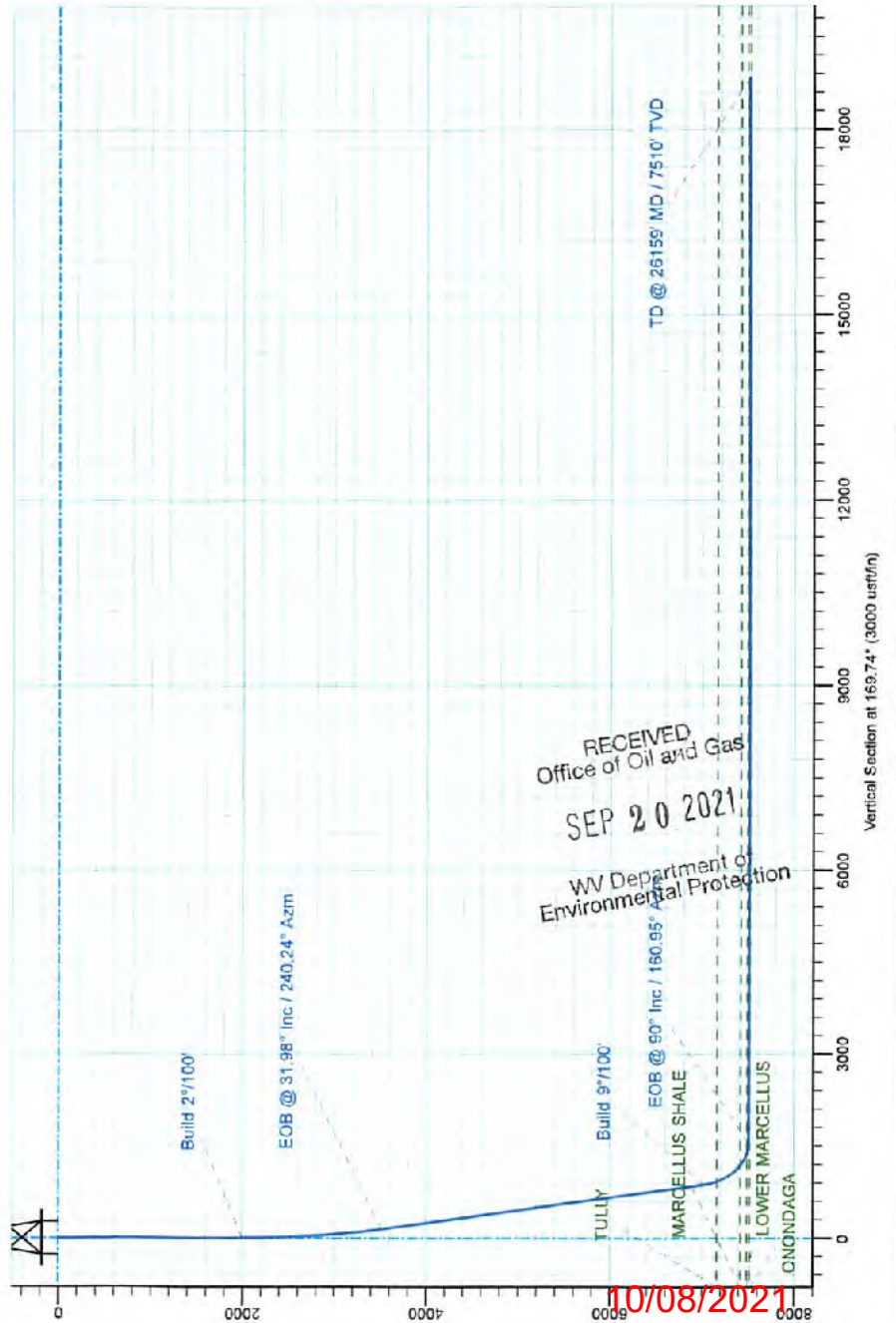
ARSENAL
N E S O U R C E S



Arsenal Resources
Harrison County, West Virginia NAD 83
J Osborn HSOP 16 Pad
J Osborn HSOP 16 201
Design #3

ANNOTATIONS

MD	Inc	Azi	TVD	+N/-S	+E/-W	V/Sect	Departure	Annotation
2000.0	0.00	0.00	2000.0	0.0	0.0	0.0	0.0	Build 2°/100°
3598.8	31.98	240.24	3517.1	-215.8	-377.3	145.1	434.7	EOB @ 31.98° Inc / 240.24° Azm
7729.1	31.98	240.24	7020.7	-1301.5	-2276.1	875.1	2621.9	Build 9°/100°
8656.4	90.00	160.95	7510.0	-1998.3	-2353.0	1547.0	3389.4	EOB @ 90° Inc / 160.95° Azm
26158.7	90.00	160.95	7510.0	-18532.8	3355.9	18834.2	20881.6	TD @ 26159' MD / 7510' TVD





ARSENAL
R E S O U R C E S

Arsenal Resources

Harrison County, West Virginia NAD 83

J Osborn HSOP 16 Pad

J Osborn HSOP 16 201

Wellbore #1

Plan: Design #3

KLX Well Planning Report

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Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
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 16 201	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 16 201					
Well Position	+N/-S	19.0 usft	Northing:	279,795.33 usft	Latitude:	39° 15' 57.449 N
	+E/-W	-40.8 usft	Easting:	1,765,216.81 usft	Longitude:	80° 13' 4.788 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	51,718.61755450

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 0.0 169.74

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	
2,000.0	0.00	0.00	2,000.0	0.0	0.0	0.00	0.00	0.00	0.00	
3,598.8	31.98	240.24	3,517.1	-215.8	-377.3	2.00	2.00	0.00	240.24	
7,729.1	31.98	240.24	7,020.7	-1,301.5	-2,276.1	0.00	0.00	0.00	0.00	
8,666.4	90.00	160.95	7,510.0	-1,998.3	-2,353.0	9.00	6.19	-8.46	-80.88	LP J Osborn HSOP
26,158.7	90.00	160.95	7,510.0	-18,532.8	3,355.9	0.00	0.00	0.00	0.00	PBHL J Osborn HS

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Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
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 16 201	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	0.00
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	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	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	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	0.00
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	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	0.00
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	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	0.00
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	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	0.00
1,100.0	0.00	0.00	1,100.0	0.0	0.0	0.0	0.00	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	0.00
1,300.0	0.00	0.00	1,300.0	0.0	0.0	0.0	0.00	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	0.00
1,500.0	0.00	0.00	1,500.0	0.0	0.0	0.0	0.00	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	0.00
1,700.0	0.00	0.00	1,700.0	0.0	0.0	0.0	0.00	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	0.00
1,900.0	0.00	0.00	1,900.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
Build 2°/100'										
2,000.0	0.00	0.00	2,000.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00
2,100.0	2.00	240.24	2,100.0	-0.9	-1.5	0.6	2.00	2.00	0.00	0.00
2,200.0	4.00	240.24	2,199.8	-3.5	-6.1	2.3	2.00	2.00	0.00	0.00
2,300.0	6.00	240.24	2,299.5	-7.8	-13.6	5.2	2.00	2.00	0.00	0.00
2,400.0	8.00	240.24	2,398.7	-13.8	-24.2	9.3	2.00	2.00	0.00	0.00
2,500.0	10.00	240.24	2,497.5	-21.6	-37.8	14.5	2.00	2.00	0.00	0.00
2,600.0	12.00	240.24	2,595.6	-31.1	-54.3	20.9	2.00	2.00	0.00	0.00
2,700.0	14.00	240.24	2,693.1	-42.2	-73.9	28.4	2.00	2.00	0.00	0.00
2,800.0	16.00	240.24	2,789.6	-55.1	-96.3	37.0	2.00	2.00	0.00	0.00
2,900.0	18.00	240.24	2,885.3	-69.6	-121.7	46.8	2.00	2.00	0.00	0.00
3,000.0	20.00	240.24	2,979.8	-85.8	-150.0	57.7	2.00	2.00	0.00	0.00
3,100.0	22.00	240.24	3,073.2	-103.5	-181.1	69.6	2.00	2.00	0.00	0.00
3,200.0	24.00	240.24	3,165.2	-122.9	-215.0	82.7	2.00	2.00	0.00	0.00
3,300.0	26.00	240.24	3,255.8	-143.9	-251.7	96.8	2.00	2.00	0.00	0.00
3,400.0	28.00	240.24	3,344.9	-166.5	-291.1	111.9	2.00	2.00	0.00	0.00
3,500.0	30.00	240.24	3,432.4	-190.5	-333.2	128.1	2.00	2.00	0.00	0.00
EOB @ 31.98° Inc / 240.24° Azm										
3,598.8	31.98	240.24	3,517.1	-215.8	-377.3	145.1	2.00	2.00	0.00	0.00
3,600.0	31.98	240.24	3,518.1	-216.1	-377.9	145.3	0.00	0.00	0.00	0.00
3,700.0	31.98	240.24	3,602.9	-242.4	-423.9	163.0	0.00	0.00	0.00	0.00
3,800.0	31.98	240.24	3,687.8	-268.7	-469.8	180.6	0.00	0.00	0.00	0.00
3,900.0	31.98	240.24	3,772.6	-294.9	-515.8	198.3	0.00	0.00	0.00	0.00
4,000.0	31.98	240.24	3,857.4	-321.2	-561.8	216.0	0.00	0.00	0.00	0.00
4,100.0	31.98	240.24	3,942.2	-347.5	-607.7	233.7	0.00	0.00	0.00	0.00
4,200.0	31.98	240.24	4,027.1	-373.8	-653.7	251.3	0.00	0.00	0.00	0.00
4,300.0	31.98	240.24	4,111.9	-400.1	-699.7	269.0	0.00	0.00	0.00	0.00
4,400.0	31.98	240.24	4,196.7	-426.4	-745.7	286.7	0.00	0.00	0.00	0.00
4,500.0	31.98	240.24	4,281.6	-452.7	-791.6	304.4	0.00	0.00	0.00	0.00
4,600.0	31.98	240.24	4,366.4	-478.9	-837.6	322.0	0.00	0.00	0.00	0.00
4,700.0	31.98	240.24	4,451.2	-505.2	-883.6	339.7	0.00	0.00	0.00	0.00
4,800.0	31.98	240.24	4,536.0	-531.5	-929.5	357.4	0.00	0.00	0.00	0.00
4,900.0	31.98	240.24	4,620.9	-557.8	-975.5	375.1	0.00	0.00	0.00	0.00
5,000.0	31.98	240.24	4,705.7	-584.1	-1,021.5	392.7	0.00	0.00	0.00	0.00

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Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
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 16 201	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	31.98	240.24	4,790.5	-610.4	-1,067.5	410.4	0.00	0.00	0.00	
5,200.0	31.98	240.24	4,875.3	-636.7	-1,113.4	428.1	0.00	0.00	0.00	
5,300.0	31.98	240.24	4,960.2	-663.0	-1,159.4	445.8	0.00	0.00	0.00	
5,400.0	31.98	240.24	5,045.0	-689.2	-1,205.4	463.4	0.00	0.00	0.00	
5,500.0	31.98	240.24	5,129.8	-715.5	-1,251.3	481.1	0.00	0.00	0.00	
5,600.0	31.98	240.24	5,214.7	-741.8	-1,297.3	498.8	0.00	0.00	0.00	
5,700.0	31.98	240.24	5,299.5	-768.1	-1,343.3	516.5	0.00	0.00	0.00	
5,800.0	31.98	240.24	5,384.3	-794.4	-1,389.2	534.1	0.00	0.00	0.00	
5,900.0	31.98	240.24	5,469.1	-820.7	-1,435.2	551.8	0.00	0.00	0.00	
6,000.0	31.98	240.24	5,554.0	-847.0	-1,481.2	569.5	0.00	0.00	0.00	
6,100.0	31.98	240.24	5,638.8	-873.2	-1,527.2	587.2	0.00	0.00	0.00	
6,200.0	31.98	240.24	5,723.6	-899.5	-1,573.1	604.8	0.00	0.00	0.00	
6,300.0	31.98	240.24	5,808.4	-925.8	-1,619.1	622.5	0.00	0.00	0.00	
6,400.0	31.98	240.24	5,893.3	-952.1	-1,665.1	640.2	0.00	0.00	0.00	
6,500.0	31.98	240.24	5,978.1	-978.4	-1,711.0	657.9	0.00	0.00	0.00	
6,600.0	31.98	240.24	6,062.9	-1,004.7	-1,757.0	675.5	0.00	0.00	0.00	
6,700.0	31.98	240.24	6,147.8	-1,031.0	-1,803.0	693.2	0.00	0.00	0.00	
6,800.0	31.98	240.24	6,232.6	-1,057.3	-1,849.0	710.9	0.00	0.00	0.00	
6,900.0	31.98	240.24	6,317.4	-1,083.5	-1,894.9	728.6	0.00	0.00	0.00	
7,000.0	31.98	240.24	6,402.2	-1,109.8	-1,940.9	746.2	0.00	0.00	0.00	
7,100.0	31.98	240.24	6,487.1	-1,136.1	-1,986.9	763.9	0.00	0.00	0.00	
7,200.0	31.98	240.24	6,571.9	-1,162.4	-2,032.8	781.6	0.00	0.00	0.00	
7,300.0	31.98	240.24	6,656.7	-1,188.7	-2,078.8	799.3	0.00	0.00	0.00	
7,400.0	31.98	240.24	6,741.6	-1,215.0	-2,124.8	816.9	0.00	0.00	0.00	
7,500.0	31.98	240.24	6,826.4	-1,241.3	-2,170.7	834.6	0.00	0.00	0.00	
7,600.0	31.98	240.24	6,911.2	-1,267.5	-2,216.7	852.3	0.00	0.00	0.00	
7,700.0	31.98	240.24	6,996.0	-1,293.8	-2,262.7	870.0	0.00	0.00	0.00	
Build 9°/100'										
7,729.1	31.98	240.24	7,020.7	-1,301.5	-2,276.1	875.1	0.00	0.00	0.00	
7,750.0	32.32	236.77	7,038.4	-1,307.3	-2,285.5	879.1	9.00	1.65	-16.63	
7,800.0	33.52	228.78	7,080.4	-1,323.7	-2,307.1	891.5	9.00	2.40	-15.97	
7,850.0	35.19	221.38	7,121.7	-1,343.6	-2,327.0	907.5	9.00	3.35	-14.81	
TULLY										
7,899.9	37.28	214.63	7,162.0	-1,366.9	-2,345.2	927.2	9.00	4.18	-13.50	
7,900.0	37.28	214.63	7,162.0	-1,366.9	-2,345.2	927.2	9.00	4.54	-12.83	
7,950.0	39.72	208.54	7,201.2	-1,393.4	-2,361.4	950.4	9.00	4.87	-12.17	
8,000.0	42.44	203.08	7,238.9	-1,423.0	-2,375.7	976.9	9.00	5.44	-10.92	
8,050.0	45.39	198.19	7,274.9	-1,455.4	-2,387.9	1,006.7	9.00	5.91	-9.80	
8,100.0	48.53	193.78	7,309.0	-1,490.6	-2,397.9	1,039.5	9.00	6.28	-8.82	
8,150.0	51.83	189.78	7,341.1	-1,528.2	-2,405.7	1,075.0	9.00	6.59	-7.99	
8,200.0	55.24	186.14	7,370.8	-1,568.0	-2,411.2	1,113.2	9.00	6.84	-7.28	
8,250.0	58.76	182.79	7,398.0	-1,609.8	-2,414.5	1,153.8	9.00	7.03	-6.70	
MARCELLUS SHALE										
8,298.7	62.27	179.76	7,422.0	-1,652.2	-2,415.4	1,195.3	9.00	7.19	-6.21	
8,300.0	62.36	179.69	7,422.6	-1,653.3	-2,415.4	1,196.4	9.00	7.26	-6.00	
8,350.0	66.02	176.78	7,444.4	-1,698.2	-2,414.0	1,240.9	9.00	7.33	-5.81	
8,400.0	69.74	174.04	7,463.2	-1,744.4	-2,410.3	1,287.0	9.00	7.43	-5.49	
8,450.0	73.49	171.42	7,479.0	-1,791.5	-2,404.2	1,334.4	9.00	7.51	-5.23	
LOWER MARCELLUS										
8,493.0	76.74	169.26	7,490.0	-1,832.4	-2,397.3	1,375.9	9.00	7.57	-5.04	
8,500.0	77.28	168.91	7,491.6	-1,839.1	-2,396.0	1,382.8	9.00	7.59	-4.96	
8,550.0	81.09	166.47	7,501.0	-1,887.1	-2,385.5	1,431.8	9.00	7.62	-4.88	
8,600.0	84.91	164.08	7,507.1	-1,935.1	-2,372.9	1,481.3	9.00	7.65	-4.78	

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Well Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
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 16 201	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)	
8,850.0	88.74	161.72	7,509.8	-1,982.8	-2,358.2	1,530.8	9.00	7.67	-4.72	
EOB @ 90° Inc / 160.95° Azm										
8,666.4	90.00	160.95	7,510.0	-1,998.3	-2,353.0	1,547.0	9.00	7.67	-4.71	
8,700.0	90.00	160.95	7,510.0	-2,030.1	-2,342.0	1,580.3	0.00	0.00	0.00	
8,800.0	90.00	160.95	7,510.0	-2,124.6	-2,309.4	1,679.1	0.00	0.00	0.00	
8,900.0	90.00	160.95	7,510.0	-2,219.1	-2,276.7	1,777.9	0.00	0.00	0.00	
9,000.0	90.00	160.95	7,510.0	-2,313.6	-2,244.1	1,876.8	0.00	0.00	0.00	
9,100.0	90.00	160.95	7,510.0	-2,408.2	-2,211.4	1,975.6	0.00	0.00	0.00	
9,200.0	90.00	160.95	7,510.0	-2,502.7	-2,178.8	2,074.4	0.00	0.00	0.00	
9,300.0	90.00	160.95	7,510.0	-2,597.2	-2,146.2	2,173.2	0.00	0.00	0.00	
9,400.0	90.00	160.95	7,510.0	-2,691.7	-2,113.5	2,272.1	0.00	0.00	0.00	
9,500.0	90.00	160.95	7,510.0	-2,786.3	-2,080.9	2,370.9	0.00	0.00	0.00	
9,600.0	90.00	160.95	7,510.0	-2,880.8	-2,048.2	2,469.7	0.00	0.00	0.00	
9,700.0	90.00	160.95	7,510.0	-2,975.3	-2,015.6	2,568.5	0.00	0.00	0.00	
9,800.0	90.00	160.95	7,510.0	-3,069.8	-1,983.0	2,667.4	0.00	0.00	0.00	
9,900.0	90.00	160.95	7,510.0	-3,164.3	-1,950.3	2,766.2	0.00	0.00	0.00	
10,000.0	90.00	160.95	7,510.0	-3,258.9	-1,917.7	2,865.0	0.00	0.00	0.00	
10,100.0	90.00	160.95	7,510.0	-3,353.4	-1,885.0	2,963.8	0.00	0.00	0.00	
10,200.0	90.00	160.95	7,510.0	-3,447.9	-1,852.4	3,062.7	0.00	0.00	0.00	
10,300.0	90.00	160.95	7,510.0	-3,542.4	-1,819.8	3,161.5	0.00	0.00	0.00	
10,400.0	90.00	160.95	7,510.0	-3,637.0	-1,787.1	3,260.3	0.00	0.00	0.00	
10,500.0	90.00	160.95	7,510.0	-3,731.5	-1,754.5	3,359.2	0.00	0.00	0.00	
10,600.0	90.00	160.95	7,510.0	-3,826.0	-1,721.9	3,458.0	0.00	0.00	0.00	
10,700.0	90.00	160.95	7,510.0	-3,920.5	-1,689.2	3,556.8	0.00	0.00	0.00	
10,800.0	90.00	160.95	7,510.0	-4,015.1	-1,656.6	3,655.6	0.00	0.00	0.00	
10,900.0	90.00	160.95	7,510.0	-4,109.6	-1,623.9	3,754.5	0.00	0.00	0.00	
11,000.0	90.00	160.95	7,510.0	-4,204.1	-1,591.3	3,853.3	0.00	0.00	0.00	
11,100.0	90.00	160.95	7,510.0	-4,298.6	-1,558.7	3,952.1	0.00	0.00	0.00	
11,200.0	90.00	160.95	7,510.0	-4,393.2	-1,526.0	4,050.9	0.00	0.00	0.00	
11,300.0	90.00	160.95	7,510.0	-4,487.7	-1,493.4	4,149.8	0.00	0.00	0.00	
11,400.0	90.00	160.95	7,510.0	-4,582.2	-1,460.7	4,248.6	0.00	0.00	0.00	
11,500.0	90.00	160.95	7,510.0	-4,676.7	-1,428.1	4,347.4	0.00	0.00	0.00	
11,600.0	90.00	160.95	7,510.0	-4,771.2	-1,395.5	4,446.2	0.00	0.00	0.00	
11,700.0	90.00	160.95	7,510.0	-4,865.8	-1,362.8	4,545.1	0.00	0.00	0.00	
11,800.0	90.00	160.95	7,510.0	-4,960.3	-1,330.2	4,643.9	0.00	0.00	0.00	
11,900.0	90.00	160.95	7,510.0	-5,054.8	-1,297.5	4,742.7	0.00	0.00	0.00	
12,000.0	90.00	160.95	7,510.0	-5,149.3	-1,264.9	4,841.6	0.00	0.00	0.00	
12,100.0	90.00	160.95	7,510.0	-5,243.9	-1,232.3	4,940.4	0.00	0.00	0.00	
12,200.0	90.00	160.95	7,510.0	-5,338.4	-1,199.6	5,039.2	0.00	0.00	0.00	
12,300.0	90.00	160.95	7,510.0	-5,432.9	-1,167.0	5,138.0	0.00	0.00	0.00	
12,400.0	90.00	160.95	7,510.0	-5,527.4	-1,134.3	5,236.9	0.00	0.00	0.00	
12,500.0	90.00	160.95	7,510.0	-5,622.0	-1,101.7	5,335.7	0.00	0.00	0.00	
12,600.0	90.00	160.95	7,510.0	-5,716.5	-1,069.1	5,434.5	0.00	0.00	0.00	
12,700.0	90.00	160.95	7,510.0	-5,811.0	-1,036.4	5,533.3	0.00	0.00	0.00	
12,800.0	90.00	160.95	7,510.0	-5,905.5	-1,003.8	5,632.2	0.00	0.00	0.00	
12,900.0	90.00	160.95	7,510.0	-6,000.0	-971.1	5,731.0	0.00	0.00	0.00	
13,000.0	90.00	160.95	7,510.0	-6,094.6	-938.5	5,829.8	0.00	0.00	0.00	
13,100.0	90.00	160.95	7,510.0	-6,189.1	-905.9	5,928.6	0.00	0.00	0.00	
13,200.0	90.00	160.95	7,510.0	-6,283.6	-873.2	6,027.5	0.00	0.00	0.00	
13,300.0	90.00	160.95	7,510.0	-6,378.1	-840.6	6,126.3	0.00	0.00	0.00	
13,400.0	90.00	160.95	7,510.0	-6,472.7	-808.0	6,225.1	0.00	0.00	0.00	
13,500.0	90.00	160.95	7,510.0	-6,567.2	-775.3	6,324.0	0.00	0.00	0.00	
13,600.0	90.00	160.95	7,510.0	-6,661.7	-742.7	6,422.8	0.00	0.00	0.00	
13,700.0	90.00	160.95	7,510.0	-6,756.2	-710.0	6,521.6	0.00	0.00	0.00	

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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)	
13,800.0	90.00	160.95	7,510.0	-6,850.8	-677.4	6,620.4	0.00	0.00	0.00	
13,900.0	90.00	160.95	7,510.0	-6,945.3	-644.8	6,719.3	0.00	0.00	0.00	
14,000.0	90.00	160.95	7,510.0	-7,039.8	-612.1	6,818.1	0.00	0.00	0.00	
14,100.0	90.00	160.95	7,510.0	-7,134.3	-579.5	6,916.9	0.00	0.00	0.00	
14,200.0	90.00	160.95	7,510.0	-7,228.9	-546.8	7,015.7	0.00	0.00	0.00	
14,300.0	90.00	160.95	7,510.0	-7,323.4	-514.2	7,114.6	0.00	0.00	0.00	
14,400.0	90.00	160.95	7,510.0	-7,417.9	-481.6	7,213.4	0.00	0.00	0.00	
14,500.0	90.00	160.95	7,510.0	-7,512.4	-448.9	7,312.2	0.00	0.00	0.00	
14,600.0	90.00	160.95	7,510.0	-7,606.9	-416.3	7,411.0	0.00	0.00	0.00	
14,700.0	90.00	160.95	7,510.0	-7,701.5	-383.6	7,509.9	0.00	0.00	0.00	
14,800.0	90.00	160.95	7,510.0	-7,796.0	-351.0	7,608.7	0.00	0.00	0.00	
14,900.0	90.00	160.95	7,510.0	-7,890.5	-318.4	7,707.5	0.00	0.00	0.00	
15,000.0	90.00	160.95	7,510.0	-7,985.0	-285.7	7,806.3	0.00	0.00	0.00	
15,100.0	90.00	160.95	7,510.0	-8,079.6	-253.1	7,905.2	0.00	0.00	0.00	
15,200.0	90.00	160.95	7,510.0	-8,174.1	-220.4	8,004.0	0.00	0.00	0.00	
15,300.0	90.00	160.95	7,510.0	-8,268.6	-187.8	8,102.8	0.00	0.00	0.00	
15,400.0	90.00	160.95	7,510.0	-8,363.1	-155.2	8,201.7	0.00	0.00	0.00	
15,500.0	90.00	160.95	7,510.0	-8,457.7	-122.5	8,300.5	0.00	0.00	0.00	
15,600.0	90.00	160.95	7,510.0	-8,552.2	-89.9	8,399.3	0.00	0.00	0.00	
15,700.0	90.00	160.95	7,510.0	-8,646.7	-57.2	8,498.1	0.00	0.00	0.00	
15,800.0	90.00	160.95	7,510.0	-8,741.2	-24.6	8,597.0	0.00	0.00	0.00	
15,900.0	90.00	160.95	7,510.0	-8,835.8	8.0	8,695.8	0.00	0.00	0.00	
16,000.0	90.00	160.95	7,510.0	-8,930.3	40.7	8,794.6	0.00	0.00	0.00	
16,100.0	90.00	160.95	7,510.0	-9,024.8	73.3	8,893.4	0.00	0.00	0.00	
16,200.0	90.00	160.95	7,510.0	-9,119.3	106.0	8,992.3	0.00	0.00	0.00	
16,300.0	90.00	160.95	7,510.0	-9,213.8	138.6	9,091.1	0.00	0.00	0.00	
16,400.0	90.00	160.95	7,510.0	-9,308.4	171.2	9,189.9	0.00	0.00	0.00	
16,500.0	90.00	160.95	7,510.0	-9,402.9	203.9	9,288.7	0.00	0.00	0.00	
16,600.0	90.00	160.95	7,510.0	-9,497.4	236.5	9,387.6	0.00	0.00	0.00	
16,700.0	90.00	160.95	7,510.0	-9,591.9	269.1	9,486.4	0.00	0.00	0.00	
16,800.0	90.00	160.95	7,510.0	-9,686.5	301.8	9,585.2	0.00	0.00	0.00	
16,900.0	90.00	160.95	7,510.0	-9,781.0	334.4	9,684.1	0.00	0.00	0.00	
17,000.0	90.00	160.95	7,510.0	-9,875.5	367.1	9,782.9	0.00	0.00	0.00	
17,100.0	90.00	160.95	7,510.0	-9,970.0	399.7	9,881.7	0.00	0.00	0.00	
17,200.0	90.00	160.95	7,510.0	-10,064.6	432.3	9,980.5	0.00	0.00	0.00	
17,300.0	90.00	160.95	7,510.0	-10,159.1	465.0	10,079.4	0.00	0.00	0.00	
17,400.0	90.00	160.95	7,510.0	-10,253.6	497.6	10,178.2	0.00	0.00	0.00	
17,500.0	90.00	160.95	7,510.0	-10,348.1	530.3	10,277.0	0.00	0.00	0.00	
17,600.0	90.00	160.95	7,510.0	-10,442.6	562.9	10,375.8	0.00	0.00	0.00	
17,700.0	90.00	160.95	7,510.0	-10,537.2	595.5	10,474.7	0.00	0.00	0.00	
17,800.0	90.00	160.95	7,510.0	-10,631.7	628.2	10,573.5	0.00	0.00	0.00	
17,900.0	90.00	160.95	7,510.0	-10,726.2	660.8	10,672.3	0.00	0.00	0.00	
18,000.0	90.00	160.95	7,510.0	-10,820.7	693.5	10,771.1	0.00	0.00	0.00	
18,100.0	90.00	160.95	7,510.0	-10,915.3	726.1	10,870.0	0.00	0.00	0.00	
18,200.0	90.00	160.95	7,510.0	-11,009.8	758.7	10,968.8	0.00	0.00	0.00	
18,300.0	90.00	160.95	7,510.0	-11,104.3	791.4	11,067.6	0.00	0.00	0.00	
18,400.0	90.00	160.95	7,510.0	-11,198.8	824.0	11,166.5	0.00	0.00	0.00	
18,500.0	90.00	160.95	7,510.0	-11,293.4	856.7	11,265.3	0.00	0.00	0.00	
18,600.0	90.00	160.95	7,510.0	-11,387.9	889.3	11,364.1	0.00	0.00	0.00	
18,700.0	90.00	160.95	7,510.0	-11,482.4	921.9	11,462.9	0.00	0.00	0.00	
18,800.0	90.00	160.95	7,510.0	-11,576.9	954.6	11,561.8	0.00	0.00	0.00	
18,900.0	90.00	160.95	7,510.0	-11,671.5	987.2	11,660.6	0.00	0.00	0.00	
19,000.0	90.00	160.95	7,510.0	-11,766.0	1,019.9	11,759.4	0.00	0.00	0.00	
19,100.0	90.00	160.95	7,510.0	-11,860.5	1,052.5	11,858.2	0.00	0.00	0.00	

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Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
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 16 201	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)	
19,200.0	90.00	160.95	7,510.0	-11,955.0	1,085.1	11,957.1	0.00	0.00	0.00	
19,300.0	90.00	160.95	7,510.0	-12,049.5	1,117.8	12,055.9	0.00	0.00	0.00	
19,400.0	90.00	160.95	7,510.0	-12,144.1	1,150.4	12,154.7	0.00	0.00	0.00	
19,500.0	90.00	160.95	7,510.0	-12,238.6	1,183.0	12,253.5	0.00	0.00	0.00	
19,600.0	90.00	160.95	7,510.0	-12,333.1	1,215.7	12,352.4	0.00	0.00	0.00	
19,700.0	90.00	160.95	7,510.0	-12,427.6	1,248.3	12,451.2	0.00	0.00	0.00	
19,800.0	90.00	160.95	7,510.0	-12,522.2	1,281.0	12,550.0	0.00	0.00	0.00	
19,900.0	90.00	160.95	7,510.0	-12,616.7	1,313.6	12,648.8	0.00	0.00	0.00	
20,000.0	90.00	160.95	7,510.0	-12,711.2	1,346.2	12,747.7	0.00	0.00	0.00	
20,100.0	90.00	160.95	7,510.0	-12,805.7	1,378.9	12,846.5	0.00	0.00	0.00	
20,200.0	90.00	160.95	7,510.0	-12,900.3	1,411.5	12,945.3	0.00	0.00	0.00	
20,300.0	90.00	160.95	7,510.0	-12,994.8	1,444.2	13,044.2	0.00	0.00	0.00	
20,400.0	90.00	160.95	7,510.0	-13,089.3	1,476.8	13,143.0	0.00	0.00	0.00	
20,500.0	90.00	160.95	7,510.0	-13,183.8	1,509.4	13,241.8	0.00	0.00	0.00	
20,600.0	90.00	160.95	7,510.0	-13,278.4	1,542.1	13,340.6	0.00	0.00	0.00	
20,700.0	90.00	160.95	7,510.0	-13,372.9	1,574.7	13,439.5	0.00	0.00	0.00	
20,800.0	90.00	160.95	7,510.0	-13,467.4	1,607.4	13,538.3	0.00	0.00	0.00	
20,900.0	90.00	160.95	7,510.0	-13,561.9	1,640.0	13,637.1	0.00	0.00	0.00	
21,000.0	90.00	160.95	7,510.0	-13,656.4	1,672.6	13,735.9	0.00	0.00	0.00	
21,100.0	90.00	160.95	7,510.0	-13,751.0	1,705.3	13,834.8	0.00	0.00	0.00	
21,200.0	90.00	160.95	7,510.0	-13,845.5	1,737.9	13,933.6	0.00	0.00	0.00	
21,300.0	90.00	160.95	7,510.0	-13,940.0	1,770.6	14,032.4	0.00	0.00	0.00	
21,400.0	90.00	160.95	7,510.0	-14,034.5	1,803.2	14,131.2	0.00	0.00	0.00	
21,500.0	90.00	160.95	7,510.0	-14,129.1	1,835.8	14,230.1	0.00	0.00	0.00	
21,600.0	90.00	160.95	7,510.0	-14,223.6	1,868.5	14,328.9	0.00	0.00	0.00	
21,700.0	90.00	160.95	7,510.0	-14,318.1	1,901.1	14,427.7	0.00	0.00	0.00	
21,800.0	90.00	160.95	7,510.0	-14,412.6	1,933.8	14,526.6	0.00	0.00	0.00	
21,900.0	90.00	160.95	7,510.0	-14,507.2	1,966.4	14,625.4	0.00	0.00	0.00	
22,000.0	90.00	160.95	7,510.0	-14,601.7	1,999.0	14,724.2	0.00	0.00	0.00	
22,100.0	90.00	160.95	7,510.0	-14,696.2	2,031.7	14,823.0	0.00	0.00	0.00	
22,200.0	90.00	160.95	7,510.0	-14,790.7	2,064.3	14,921.9	0.00	0.00	0.00	
22,300.0	90.00	160.95	7,510.0	-14,885.2	2,096.9	15,020.7	0.00	0.00	0.00	
22,400.0	90.00	160.95	7,510.0	-14,979.8	2,129.6	15,119.5	0.00	0.00	0.00	
22,500.0	90.00	160.95	7,510.0	-15,074.3	2,162.2	15,218.3	0.00	0.00	0.00	
22,600.0	90.00	160.95	7,510.0	-15,168.8	2,194.9	15,317.2	0.00	0.00	0.00	
22,700.0	90.00	160.95	7,510.0	-15,263.3	2,227.5	15,416.0	0.00	0.00	0.00	
22,800.0	90.00	160.95	7,510.0	-15,357.9	2,260.1	15,514.8	0.00	0.00	0.00	
22,900.0	90.00	160.95	7,510.0	-15,452.4	2,292.8	15,613.6	0.00	0.00	0.00	
23,000.0	90.00	160.95	7,510.0	-15,546.9	2,325.4	15,712.5	0.00	0.00	0.00	
23,100.0	90.00	160.95	7,510.0	-15,641.4	2,358.1	15,811.3	0.00	0.00	0.00	
23,200.0	90.00	160.95	7,510.0	-15,736.0	2,390.7	15,910.1	0.00	0.00	0.00	
23,300.0	90.00	160.95	7,510.0	-15,830.5	2,423.3	16,009.0	0.00	0.00	0.00	
23,400.0	90.00	160.95	7,510.0	-15,925.0	2,456.0	16,107.8	0.00	0.00	0.00	
23,500.0	90.00	160.95	7,510.0	-16,019.5	2,488.6	16,206.6	0.00	0.00	0.00	
23,600.0	90.00	160.95	7,510.0	-16,114.1	2,521.3	16,305.4	0.00	0.00	0.00	
23,700.0	90.00	160.95	7,510.0	-16,208.6	2,553.9	16,404.3	0.00	0.00	0.00	
23,800.0	90.00	160.95	7,510.0	-16,303.1	2,586.5	16,503.1	0.00	0.00	0.00	
23,900.0	90.00	160.95	7,510.0	-16,397.6	2,619.2	16,601.9	0.00	0.00	0.00	
24,000.0	90.00	160.95	7,510.0	-16,492.1	2,651.8	16,700.7	0.00	0.00	0.00	
24,100.0	90.00	160.95	7,510.0	-16,586.7	2,684.5	16,799.6	0.00	0.00	0.00	
24,200.0	90.00	160.95	7,510.0	-16,681.2	2,717.1	16,898.4	0.00	0.00	0.00	
24,300.0	90.00	160.95	7,510.0	-16,775.7	2,749.7	16,997.2	0.00	0.00	0.00	
24,400.0	90.00	160.95	7,510.0	-16,870.2	2,782.4	17,096.0	0.00	0.00	0.00	
24,500.0	90.00	160.95	7,510.0	-16,964.8	2,815.0	17,194.9	0.00	0.00	0.00	

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Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
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 16 201	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #3		

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)
24,600.0	90.00	160.95	7,510.0	-17,059.3	2,847.7	17,293.7	0.00	0.00	0.00
24,700.0	90.00	160.95	7,510.0	-17,153.8	2,880.3	17,392.5	0.00	0.00	0.00
24,800.0	90.00	160.95	7,510.0	-17,248.3	2,912.9	17,491.4	0.00	0.00	0.00
24,900.0	90.00	160.95	7,510.0	-17,342.9	2,945.6	17,590.2	0.00	0.00	0.00
25,000.0	90.00	160.95	7,510.0	-17,437.4	2,978.2	17,689.0	0.00	0.00	0.00
25,100.0	90.00	160.95	7,510.0	-17,531.9	3,010.8	17,787.8	0.00	0.00	0.00
25,200.0	90.00	160.95	7,510.0	-17,626.4	3,043.5	17,886.7	0.00	0.00	0.00
25,300.0	90.00	160.95	7,510.0	-17,721.0	3,076.1	17,985.5	0.00	0.00	0.00
25,400.0	90.00	160.95	7,510.0	-17,815.5	3,108.8	18,084.3	0.00	0.00	0.00
25,500.0	90.00	160.95	7,510.0	-17,910.0	3,141.4	18,183.1	0.00	0.00	0.00
25,600.0	90.00	160.95	7,510.0	-18,004.5	3,174.0	18,282.0	0.00	0.00	0.00
25,700.0	90.00	160.95	7,510.0	-18,099.0	3,206.7	18,380.8	0.00	0.00	0.00
25,800.0	90.00	160.95	7,510.0	-18,193.6	3,239.3	18,479.6	0.00	0.00	0.00
25,900.0	90.00	160.95	7,510.0	-18,288.1	3,272.0	18,578.4	0.00	0.00	0.00
26,000.0	90.00	160.95	7,510.0	-18,382.6	3,304.6	18,677.3	0.00	0.00	0.00
26,100.0	90.00	160.95	7,510.0	-18,477.1	3,337.2	18,776.1	0.00	0.00	0.00
TD @ 26159' MD / 7510' TVD									
26,158.7	90.00	160.95	7,510.0	-18,532.8	3,355.9	18,834.2	0.00	0.00	0.00

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
LP J Osborn HSOP 11 - plan hits target center - Point	0.00	360.00	7,510.0	-1,998.3	-2,353.0	277,797.05	1,762,863.84	39° 15' 37.512 N	80° 13' 34.500 W
PBHL J Osborn HSOP - plan hits target center - Point	0.00	360.00	7,510.0	-18,532.8	3,355.9	261,262.57	1,768,572.72	39° 12' 54.540 N	80° 12' 20.268 W

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
7,899.9	7,162.0	TULLY		0.00	
8,298.7	7,422.0	MARCELLUS SHALE		0.00	
8,493.0	7,490.0	LOWER MARCELLUS		0.00	

Measured Depth (usft)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Comment
2,000.0	2,000.0	0.0	0.0	Build 2°/100'
3,598.8	3,517.1	-215.8	-377.3	EOB @ 31.98° Inc / 240.24° Azm
7,729.1	7,020.7	-1,301.5	-2,276.1	Build 9°/100'
8,666.4	7,510.0	-1,998.3	-2,353.0	EOB @ 90° Inc / 160.95° Azm
26,158.7	7,510.0	-18,532.8	3,355.9	TD @ 26159' MD / 7510' TVD

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Arsenal Resources

**Harrison County, West Virginia NAD 83
J Osborn HSOP 16 Pad
J Osborn HSOP 16 201**

**Wellbore #1
Design #3**

KLX Anticollision Report

13 September, 2021



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WV Department of
Environmental Protection

10/08/2021

Company:	Arsenal Resources	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
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 16 201	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
Depth Range:	Unlimited
Results Limited by:	Maximum ellipse separation of 1,000.0 usft
Warning Levels Evaluated at:	2.00 Sigma
Error Model:	ISCWSA
Scan Method:	Closest Approach 3D
Error Surface:	Pedal Curve

Survey Tool Program	Date	9/13/2021
From (usft)	To (usft)	Survey (Wellbore)
0.0	26,158.7	Design #3 (Wellbore #1)
		Tool Name
		MWD default
		Description
		MWD - Standard

Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
J Osborn HSOP 16 Pad						
J Osborn HSOP 16 202 - Wellbore #1 - Design #3	2,686.1	2,688.3	9.3	-1.9	0.828	Level 1, CC
J Osborn HSOP 16 202 - Wellbore #1 - Design #3	2,700.0	2,702.3	9.3	-2.0	0.825	Level 1, ES, SF
J Osborn HSOP 16 203 - Wellbore #1 - Design #3	2,000.0	2,000.0	30.0	21.3	3.446	CC, ES
J Osborn HSOP 16 203 - Wellbore #1 - Design #3	25,200.0	25,113.4	2,002.4	1,324.2	2.953	SF
J Osborn HSOP 16 204 - Curve & Lateral - Design #1	2,000.0	1,999.3	45.0	36.5	5.289	CC, ES
J Osborn HSOP 16 204 - Curve & Lateral - Design #1	25,313.6	24,574.3	3,029.1	2,354.5	4.490	SF
J Osborn HSOP 16 204 - Pilot Hole - Design #1	2,000.0	1,999.3	45.0	36.3	5.170	CC, ES
J Osborn HSOP 16 204 - Pilot Hole - Design #1	2,100.0	2,099.3	46.0	36.9	5.041	SF

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)	Vertical Depth (usft)	Offset Measured Depth (usft)	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	114.96	-6.3	13.6	15.0				
100.0	100.0	100.0	100.0	0.1	0.1	114.96	-6.3	13.6	15.0	14.8	91.419		
200.0	200.0	200.0	200.0	0.3	0.3	114.96	-6.3	13.6	15.0	14.4	24.446		
300.0	300.0	300.0	300.0	0.5	0.5	114.96	-6.3	13.6	15.0	13.9	14.109		
400.0	400.0	400.0	400.0	0.8	0.8	114.96	-6.3	13.6	15.0	13.5	9.916		
500.0	500.0	500.0	500.0	1.0	1.0	114.96	-6.3	13.6	15.0	13.0	7.644		
600.0	600.0	600.0	600.0	1.2	1.2	114.96	-6.3	13.6	15.0	12.6	6.220		
700.0	700.0	700.0	700.0	1.4	1.4	114.96	-6.3	13.6	15.0	12.1	5.242		
800.0	800.0	800.0	800.0	1.7	1.7	114.96	-6.3	13.6	15.0	11.7	4.531		
900.0	900.0	900.0	900.0	1.9	1.9	114.96	-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	114.96	-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	114.96	-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	114.96	-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	114.96	-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	114.96	-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	114.96	-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	114.96	-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	114.96	-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	114.96	-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	114.96	-6.3	13.6	15.0	6.7	1.817		

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

Company:	Arsenal Resources	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
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 16 201	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)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Reference (usft)	Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
2,000.0	2,000.0	2,000.0	2,000.0	4.4	4.4	114.96	-6.3	13.6	15.0	6.3	1.723		
2,100.0	2,100.0	2,100.4	2,100.3	4.6	4.6	-125.88	-7.0	12.0	14.8	5.7	1.625		
2,200.0	2,199.8	2,200.7	2,200.6	4.7	4.8	-127.79	-8.9	7.1	14.2	4.7	1.500		
2,300.0	2,299.5	2,301.1	2,300.5	4.9	5.0	-131.34	-12.1	-1.1	13.3	3.4	1.349	Level 3	
2,400.0	2,398.7	2,401.4	2,400.1	5.2	5.2	-137.18	-15.6	-12.5	12.1	1.9	1.183	Level 2	
2,500.0	2,497.5	2,501.7	2,499.2	5.4	5.4	-145.44	-22.4	-27.2	10.8	0.2	1.019	Level 2	
2,600.0	2,595.6	2,602.0	2,597.6	5.7	5.7	-160.64	-29.4	-45.0	9.7	-1.2	0.887	Level 1	
2,695.1	2,679.5	2,688.3	2,681.7	5.9	5.9	-177.31	-36.5	-63.0	9.3	-1.9	0.828	Level 1, CC	
2,700.0	2,693.1	2,702.3	2,695.3	6.0	6.0	179.71	-37.7	-66.1	9.3	-2.0	0.825	Level 1, ES, SF	
2,800.0	2,789.6	2,802.5	2,792.1	6.3	6.3	158.16	-47.3	-90.3	10.2	-1.5	0.851	Level 1	
2,900.0	2,885.3	2,902.8	2,887.9	6.7	6.8	140.27	-58.1	-117.6	12.5	-0.2	0.984	Level 1	
3,000.0	2,979.8	3,002.9	2,982.6	7.2	7.2	127.75	-70.0	-148.1	16.1	2.2	1.163	Level 2	
3,100.0	3,073.2	3,102.9	3,076.1	7.7	7.8	121.34	-83.0	-180.8	20.8	5.9	1.391	Level 3	
3,200.0	3,165.2	3,202.7	3,169.4	8.3	8.3	123.39	-95.9	-213.7	27.4	11.5	1.724		
3,300.0	3,255.8	3,302.2	3,262.6	9.0	8.9	129.14	-108.8	-246.5	36.1	19.5	2.170		
3,400.0	3,344.9	3,401.5	3,355.4	9.8	9.5	135.65	-121.7	-279.1	47.5	30.3	2.757		
3,500.0	3,432.4	3,500.2	3,447.7	10.6	10.2	141.64	-134.5	-311.7	61.9	44.2	3.497		
3,598.8	3,517.1	3,597.2	3,538.5	11.6	10.8	146.62	-147.1	-343.5	79.4	61.3	4.377		
3,600.0	3,518.1	3,598.4	3,539.6	11.6	10.8	146.68	-147.3	-344.0	79.7	61.5	4.389		
3,700.0	3,602.9	3,696.3	3,631.1	12.5	11.4	150.51	-160.0	-376.3	99.3	80.6	5.321		
3,800.0	3,687.8	3,794.2	3,722.7	13.6	12.1	153.07	-172.7	-408.5	119.1	99.9	6.190		
3,900.0	3,772.6	3,892.1	3,814.2	14.6	12.8	154.90	-185.4	-440.7	139.2	119.3	6.994		
4,000.0	3,857.4	3,990.0	3,905.8	15.7	13.4	156.27	-198.1	-473.0	159.3	138.8	7.738		
4,100.0	3,942.2	4,087.9	3,997.3	16.7	14.1	157.33	-210.8	-505.2	179.6	158.2	8.425		
4,200.0	4,027.1	4,185.8	4,088.9	17.8	14.8	158.17	-223.5	-537.4	199.8	177.8	9.060		
4,300.0	4,111.9	4,283.6	4,180.4	18.9	15.5	158.86	-236.2	-569.7	220.1	197.3	9.647		
4,400.0	4,196.7	4,381.5	4,272.0	20.0	16.2	159.43	-248.9	-601.9	240.5	216.9	10.152		
4,500.0	4,281.6	4,479.4	4,363.5	21.1	16.9	159.92	-261.5	-634.1	260.8	236.4	10.697		
4,600.0	4,366.4	4,577.3	4,455.1	22.2	17.6	160.33	-274.3	-666.4	281.2	256.0	11.167		
4,700.0	4,451.2	4,675.2	4,546.6	23.3	18.3	160.69	-287.0	-698.6	301.5	275.6	11.605		
4,800.0	4,536.0	4,773.1	4,638.2	24.4	19.0	161.00	-299.7	-730.9	321.9	295.1	12.013		
4,900.0	4,620.9	4,871.0	4,729.7	25.5	19.7	161.28	-312.4	-763.1	342.3	314.7	12.395		
5,000.0	4,705.7	4,968.8	4,821.3	26.7	20.4	161.52	-325.1	-795.3	362.7	334.3	12.752		
5,100.0	4,790.5	5,066.7	4,912.8	27.8	21.1	161.74	-337.8	-827.6	383.1	353.8	13.088		
5,200.0	4,875.3	5,164.6	5,004.4	28.9	21.8	161.94	-350.6	-859.8	403.5	373.4	13.402		
5,300.0	4,960.2	5,262.5	5,095.9	30.0	22.5	162.11	-363.3	-892.0	423.9	393.0	13.598		
5,400.0	5,045.0	5,360.4	5,187.6	31.2	23.2	162.26	-376.0	-924.3	444.4	412.6	13.977		
5,500.0	5,129.8	5,458.3	5,279.0	32.3	23.9	162.42	-388.7	-956.5	464.8	432.1	14.240		
5,600.0	5,214.7	5,556.2	5,370.6	33.4	24.7	162.56	-401.4	-988.7	485.2	451.7	14.489		
5,700.0	5,299.5	5,654.0	5,462.1	34.6	25.4	162.66	-414.1	-1,021.0	505.6	471.3	14,724		
5,800.0	5,384.3	5,751.9	5,553.7	35.7	26.1	162.80	-426.8	-1,053.2	525.0	490.8	14,946		
5,900.0	5,469.1	5,849.8	5,645.2	36.8	26.8	162.90	-439.5	-1,085.5	545.5	510.4	15.157		
6,000.0	5,554.0	5,947.7	5,736.8	38.0	27.5	163.00	-452.2	-1,117.7	565.9	530.0	15.358		
6,100.0	5,638.8	6,045.6	5,828.3	39.1	28.2	163.09	-464.9	-1,149.9	587.3	549.6	15,549		
6,200.0	5,723.6	6,143.5	5,919.8	40.2	29.0	163.17	-477.6	-1,182.2	607.8	569.1	15,730		
6,300.0	5,808.4	6,241.4	6,011.4	41.4	29.7	163.25	-490.3	-1,214.4	628.2	588.7	15,903		
6,400.0	5,893.3	6,339.3	6,102.9	42.5	30.4	163.33	-503.0	-1,246.6	648.5	608.3	16,067		
6,500.0	5,978.1	6,437.1	6,194.5	43.7	31.1	163.40	-515.7	-1,278.9	669.1	627.8	16,225		
6,600.0	6,062.9	6,535.0	6,286.0	44.8	31.9	163.46	-528.4	-1,311.1	689.5	647.4	16,375		
6,700.0	6,147.8	6,632.9	6,377.6	45.9	32.6	163.53	-541.1	-1,343.3	710.0	667.0	16,519		
6,800.0	6,232.6	6,730.8	6,469.1	47.1	33.3	163.59	-553.8	-1,375.5	730.4	686.5	16,656		
6,900.0	6,317.4	6,828.7	6,560.7	48.2	34.0	163.64	-566.5	-1,407.8	750.8	706.1	16,788		

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Company:	Arsenal Resources	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
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 16 201	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)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
7,000.0	6,402.2	6,926.6	6,652.2	49.4	34.8	163.69	-579.2	-1,440.1	771.3	725.7	16.914		
7,100.0	6,487.1	7,024.5	6,743.8	50.5	35.5	163.74	-591.9	-1,472.3	791.7	745.2	17.035		
7,200.0	6,571.9	7,122.3	6,835.3	51.7	36.2	163.79	-604.6	-1,504.5	812.2	764.8	17.152		
7,300.0	6,656.7	7,224.9	6,931.3	52.8	37.0	163.84	-618.0	-1,538.3	832.6	784.3	17.255		
7,400.0	6,741.6	7,324.9	7,027.3	53.9	38.4	163.89	-631.3	-1,572.1	853.0	804.7	17.358		
7,500.0	6,826.4	7,426.9	7,124.3	55.1	39.5	172.18	-793.7	-1,619.8	845.0	797.7	17.932		
7,600.0	6,911.2	7,527.5	7,221.7	56.2	40.2	178.17	-895.7	-1,620.8	842.9	799.2	19.293		
7,658.9	6,959.6	7,582.9	7,270.1	57.0	40.5	-178.26	-953.5	-1,616.0	841.8	797.4	18.931		
7,700.0	6,996.0	7,689.1	7,368.1	57.4	40.7	-176.83	-976.2	-1,613.3	842.1	797.1	18.890		
7,729.1	7,020.7	7,791.3	7,458.2	57.7	40.8	-175.58	-995.7	-1,610.7	842.9	797.3	18.450		
7,750.0	7,038.4	7,906.2	7,554.8	57.9	40.8	-171.71	-1,009.0	-1,609.7	843.9	797.8	18.280		
7,800.0	7,080.4	7,940.9	7,598.7	58.4	41.0	-162.73	-1,040.4	-1,603.5	847.7	800.3	17.998		
7,850.0	7,121.7	7,974.4	7,642.6	58.9	41.2	-154.28	-1,071.1	-1,597.6	853.3	804.7	17.574		
7,900.0	7,162.0	8,008.9	7,686.5	59.4	41.3	-146.45	-1,101.3	-1,591.3	860.6	810.9	17.326		
7,950.0	7,201.2	8,038.6	7,729.8	59.9	41.5	-139.26	-1,131.0	-1,584.4	869.3	818.6	17.161		
8,000.0	7,238.9	8,059.6	7,772.8	60.4	41.6	-132.70	-1,160.4	-1,577.0	879.2	827.8	17.080		
8,050.0	7,274.9	8,100.0	7,816.7	60.8	41.8	-126.73	-1,189.2	-1,569.2	890.2	838.0	17.057		
8,100.0	7,309.0	8,130.1	7,859.6	61.3	41.9	-121.29	-1,217.9	-1,560.9	901.9	849.2	17.106		
8,150.0	7,341.1	8,159.8	7,903.5	61.7	42.0	-116.35	-1,246.2	-1,552.3	914.2	861.2	17.232		
8,200.0	7,370.8	8,189.1	7,947.4	62.1	42.2	-111.87	-1,274.0	-1,543.2	926.9	873.7	17.423		
8,250.0	7,398.0	8,222.1	7,991.3	62.5	42.3	-107.66	-1,305.2	-1,532.5	939.7	886.3	17.588		
8,300.0	7,422.6	8,262.9	8,035.2	62.9	42.5	-103.69	-1,343.8	-1,519.2	952.1	898.1	17.616		
8,350.0	7,444.4	8,305.9	8,079.1	63.3	42.7	-100.21	-1,384.4	-1,505.2	963.7	909.0	17.511		
8,400.0	7,463.2	8,350.8	8,123.0	63.6	43.0	-97.23	-1,426.8	-1,490.5	974.1	918.7	17.558		
8,450.0	7,479.0	8,397.2	8,166.9	63.9	43.3	-94.76	-1,470.7	-1,475.4	983.2	926.9	17.461		
8,500.0	7,491.6	8,444.9	8,210.8	64.2	43.6	-92.81	-1,515.8	-1,459.8	990.6	933.4	17.306		
8,550.0	7,501.0	8,493.7	8,254.7	64.5	43.9	-91.37	-1,561.9	-1,443.9	996.2	938.0	17.104		
8,600.0	7,507.1	8,543.2	8,300.6	64.7	44.2	-90.45	-1,608.7	-1,427.7	999.9	940.6	16.848		
8,650.0	7,509.8	8,593.1	8,346.5	65.0	44.6	-90.03	-1,655.8	-1,411.4	1,001.6	941.1	16.546		
8,666.4	7,510.0	8,609.4	8,392.4	65.0	44.7	-90.00	-1,671.3	-1,406.1	1,001.7	940.8	16.440		
8,700.0	7,510.0	8,643.1	8,436.3	65.2	44.9	-90.00	-1,703.1	-1,395.1	1,001.7	939.9	16.213		
8,800.0	7,510.0	8,743.1	8,536.3	65.7	45.8	-90.00	-1,797.6	-1,362.5	1,001.7	937.3	16.653		
8,900.0	7,510.0	8,843.1	8,636.3	66.3	46.6	-90.00	-1,892.2	-1,329.8	1,001.7	934.6	14.919		
9,000.0	7,510.0	8,943.1	8,736.3	66.8	47.5	-90.00	-1,986.7	-1,297.2	1,001.7	931.7	14.313		
9,100.0	7,510.0	9,043.1	8,836.3	67.5	48.6	-90.00	-2,081.2	-1,264.6	1,001.7	928.8	13.737		
9,200.0	7,510.0	9,143.1	8,936.3	68.1	49.6	-90.00	-2,175.7	-1,231.9	1,001.7	925.8	13.191		
9,300.0	7,510.0	9,243.1	9,036.3	68.8	50.7	-90.00	-2,270.2	-1,199.3	1,001.7	922.7	12.676		
9,400.0	7,510.0	9,343.1	9,136.3	69.6	51.9	-90.00	-2,364.8	-1,166.7	1,001.7	919.6	12.190		
9,500.0	7,510.0	9,443.1	9,236.3	70.4	53.1	-90.00	-2,459.3	-1,134.0	1,001.7	916.3	11.732		
9,558.4	7,510.0	9,501.5	9,290.7	70.8	53.8	-90.00	-2,514.5	-1,114.9	1,001.7	914.5	11.482		
9,600.0	7,510.0	9,543.1	9,334.3	71.2	54.4	-90.00	-2,553.8	-1,101.4	1,001.7	913.1	11.300		
9,700.0	7,510.0	9,643.1	9,434.3	72.0	55.7	-90.00	-2,648.3	-1,068.7	1,001.7	909.8	10.894		
9,800.0	7,510.0	9,743.1	9,534.3	72.9	57.0	-90.00	-2,742.9	-1,036.1	1,001.7	906.4	10.512		
9,900.0	7,510.0	9,843.1	9,634.3	73.9	58.4	-90.00	-2,837.4	-1,003.5	1,001.7	903.1	10.161		
10,000.0	7,510.0	9,943.1	9,734.3	74.8	59.8	-90.00	-2,931.9	-970.8	1,001.7	899.6	9.812		
10,100.0	7,510.0	10,043.1	9,834.3	75.8	61.2	-90.00	-3,026.4	-938.2	1,001.7	896.2	9.492		
10,200.0	7,510.0	10,143.1	9,934.3	76.9	62.7	-90.00	-3,121.0	-905.5	1,001.7	892.7	9.190		
10,250.0	7,510.0	10,193.1	9,984.3	77.4	63.4	-90.00	-3,168.3	-889.2	1,001.7	891.0	9.049		
10,300.0	7,510.0	10,243.1	10,034.3	78.0	64.2	-90.00	-3,215.5	-872.9	1,001.7	889.2	8.904		
10,400.0	7,510.0	10,343.1	10,134.3	79.1	65.7	-90.00	-3,310.0	-840.3	1,001.7	885.7	8.634		
10,500.0	7,510.0	10,443.1	10,234.3	80.2	67.3	-90.00	-3,404.5	-807.6	1,001.7	882.2	8.379		
10,600.0	7,510.0	10,543.1	10,334.3	81.4	68.8	-90.00	-3,499.1	-775.0	1,001.7	878.6	8.137		

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Anticollision Report



Company:	Arsenal Resources	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
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 16 201	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)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning		
10,700.0	7,510.0	10,643.1	7,510.0	82.6	70.4	-90.00	-3,593.6	-742.3	1,001.7	875.0	7.907			
10,800.0	7,510.0	10,743.1	7,510.0	83.8	72.0	-90.00	-3,698.1	-709.7	1,001.7	871.5	7.689			
10,900.0	7,510.0	10,843.1	7,510.0	85.1	73.6	-90.00	-3,782.6	-677.1	1,001.7	867.9	7.482			
11,000.0	7,510.0	10,943.1	7,510.0	86.4	75.3	-90.00	-3,877.1	-644.4	1,001.7	864.2	7.286			
11,100.0	7,510.0	11,043.1	7,510.0	87.7	76.9	-90.00	-3,971.7	-611.8	1,001.7	860.6	7.098			
11,200.0	7,510.0	11,143.1	7,510.0	89.0	78.6	-90.00	-4,066.2	-579.1	1,001.7	857.0	6.920			
11,300.0	7,510.0	11,243.1	7,510.0	90.4	80.3	-90.00	-4,160.7	-546.5	1,001.7	853.3	6.750			
11,400.0	7,510.0	11,343.1	7,510.0	91.6	82.0	-90.00	-4,255.2	-513.9	1,001.7	849.7	6.587			
11,500.0	7,510.0	11,443.1	7,510.0	93.2	83.7	-90.00	-4,349.8	-481.2	1,001.7	846.0	6.432			
11,600.0	7,510.0	11,543.1	7,510.0	94.6	85.4	-90.00	-4,444.3	-448.6	1,001.7	842.3	6.284			
11,700.0	7,510.0	11,643.1	7,510.0	96.1	87.1	-90.00	-4,538.8	-415.9	1,001.7	838.6	6.142			
11,800.0	7,510.0	11,743.1	7,510.0	97.6	88.8	-90.00	-4,633.3	-383.3	1,001.7	834.9	6.006			
11,900.0	7,510.0	11,843.1	7,510.0	99.1	90.6	-90.00	-4,727.9	-350.7	1,001.7	831.2	5.876			
12,000.0	7,510.0	11,943.1	7,510.0	100.6	92.3	-90.00	-4,822.4	-318.0	1,001.7	827.5	5.751			
12,055.6	7,510.0	11,998.7	7,510.0	101.4	93.3	-90.00	-4,875.0	-299.9	1,001.7	825.6	5.685			
12,100.0	7,510.0	12,043.1	7,510.0	102.1	94.1	-90.00	-4,916.9	-285.4	1,001.7	823.8	5.631			
12,200.0	7,510.0	12,143.1	7,510.0	103.6	95.8	-90.00	-5,011.4	-252.8	1,001.7	820.1	5.516			
12,300.0	7,510.0	12,243.1	7,510.0	105.2	97.6	-90.00	-5,105.9	-220.1	1,001.7	816.3	5.403			
12,400.0	7,510.0	12,343.1	7,510.0	106.7	99.4	-90.00	-5,200.5	-187.5	1,001.7	812.7	5.299			
12,500.0	7,510.0	12,443.1	7,510.0	108.3	101.1	-90.00	-5,295.0	-154.8	1,001.7	808.9	5.196			
12,600.0	7,510.0	12,543.1	7,510.0	109.9	102.9	-90.00	-5,389.5	-122.2	1,001.7	805.2	5.097			
12,700.0	7,510.0	12,643.1	7,510.0	111.5	104.7	-90.00	-5,484.0	-89.6	1,001.7	801.6	5.002			
12,710.7	7,510.0	12,653.8	7,510.0	111.7	104.9	-90.00	-5,494.2	-85.1	1,001.7	801.2	4.994			
12,800.0	7,510.0	12,743.1	7,510.0	113.1	106.5	-90.00	-5,578.6	-56.9	1,001.7	797.7	4.910			
12,900.0	7,510.0	12,843.1	7,510.0	114.8	108.3	-90.00	-5,673.1	-24.3	1,001.7	794.0	4.822			
13,000.0	7,510.0	12,943.1	7,510.0	116.4	110.1	-90.00	-5,767.6	8.4	1,001.7	790.2	4.736			
13,100.0	7,510.0	13,043.1	7,510.0	118.1	111.9	-90.00	-5,862.1	41.0	1,001.7	786.5	4.654			
13,200.0	7,510.0	13,143.1	7,510.0	119.7	113.7	-90.00	-5,956.7	73.6	1,001.7	782.7	4.574			
13,300.0	7,510.0	13,243.1	7,510.0	121.4	115.6	-90.00	-6,051.2	106.3	1,001.7	779.0	4.497			
13,400.0	7,510.0	13,343.1	7,510.0	123.1	117.4	-90.00	-6,145.7	138.9	1,001.7	775.2	4.422			
13,500.0	7,510.0	13,443.1	7,510.0	124.8	119.2	-90.00	-6,240.2	171.6	1,001.7	771.4	4.350			
13,600.0	7,510.0	13,543.1	7,510.0	126.4	121.0	-90.00	-6,334.8	204.2	1,001.7	767.7	4.280			
13,700.0	7,510.0	13,643.1	7,510.0	128.1	122.9	-90.00	-6,429.3	236.8	1,001.7	763.9	4.212			
13,800.0	7,510.0	13,743.1	7,510.0	129.9	124.7	-90.00	-6,523.8	269.5	1,001.7	760.1	4.146			
13,900.0	7,510.0	13,843.1	7,510.0	131.6	126.5	-90.00	-6,618.3	302.1	1,001.7	756.3	4.082			
14,000.0	7,510.0	13,943.1	7,510.0	133.3	128.4	-90.00	-6,712.8	334.8	1,001.7	752.6	4.020			
14,100.0	7,510.0	14,043.1	7,510.0	135.0	130.2	-90.00	-6,807.4	367.4	1,001.7	748.8	3.960			
14,200.0	7,510.0	14,143.1	7,510.0	136.7	132.0	-90.00	-6,901.9	400.0	1,001.7	745.0	3.902			
14,258.3	7,510.0	14,201.3	7,510.0	137.8	133.1	-90.00	-6,957.0	419.1	1,001.7	742.8	3.869			
14,300.0	7,510.0	14,243.1	7,510.0	138.5	133.9	-90.00	-6,996.4	432.7	1,001.7	741.2	3.845			
14,400.0	7,510.0	14,343.1	7,510.0	140.2	135.7	-90.00	-7,090.9	465.3	1,001.7	737.4	3.790			
14,500.0	7,510.0	14,443.1	7,510.0	142.0	137.6	-90.00	-7,185.5	498.0	1,001.7	733.6	3.737			
14,600.0	7,510.0	14,543.1	7,510.0	143.7	139.4	-90.00	-7,280.0	530.6	1,001.7	729.9	3.685			
14,700.0	7,510.0	14,643.1	7,510.0	145.5	141.3	-90.00	-7,374.5	563.2	1,001.7	726.1	3.634			
14,800.0	7,510.0	14,743.1	7,510.0	147.3	143.1	-90.00	-7,469.0	595.9	1,001.7	722.3	3.585			
14,900.0	7,510.0	14,843.1	7,510.0	149.0	145.0	-90.00	-7,563.6	628.5	1,001.7	718.5	3.537			
14,930.3	7,510.0	14,873.4	7,510.0	149.6	145.6	-90.00	-7,592.2	638.4	1,001.7	717.4	3.523			
15,000.0	7,510.0	14,943.1	7,510.0	150.8	146.8	-90.00	-7,668.1	661.1	1,001.7	714.7	3.490			
15,100.0	7,510.0	15,043.1	7,510.0	152.6	148.7	-90.00	-7,752.6	693.8	1,001.7	710.9	3.444			
15,200.0	7,510.0	15,143.1	7,510.0	154.4	150.6	-90.00	-7,847.1	726.4	1,001.7	707.1	3.400			
15,300.0	7,510.0	15,243.1	7,510.0	156.1	152.4	-90.00	-7,941.7	759.1	1,001.7	703.3	3.357			
15,400.0	7,510.0	15,343.1	7,510.0	157.9	154.3	-90.00	-8,036.2	791.7	1,001.7	699.5	3.315			

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



Anticollision Report



Company:	Arsenal Resources	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
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 16 201	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)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning
15,500.0	7,510.0	15,443.1	7,510.0	159.7	156.2	-90.00	-8,130.7	824.3	1,001.7	695.7	3.273	
15,500.0	7,510.0	15,543.1	7,510.0	161.5	158.0	-90.00	-8,225.2	857.0	1,001.7	691.9	3.233	
15,700.0	7,510.0	15,643.1	7,510.0	163.3	159.9	-90.00	-8,319.7	889.6	1,001.7	688.1	3.194	
15,750.2	7,510.0	15,693.2	7,510.0	164.2	160.8	-90.00	-8,367.2	906.0	1,001.7	686.2	3.175	
15,800.0	7,510.0	15,743.1	7,510.0	165.1	161.8	-90.00	-8,414.3	922.3	1,001.7	684.3	3.156	
15,900.0	7,510.0	15,843.1	7,510.0	166.9	163.6	-90.00	-8,508.8	954.9	1,001.7	680.5	3.118	
16,000.0	7,510.0	15,943.1	7,510.0	168.7	165.5	-90.00	-8,603.3	997.5	1,001.7	676.7	3.082	
16,083.4	7,510.0	16,026.4	7,510.0	170.2	167.1	-90.00	-8,682.1	1,014.8	1,001.7	673.5	3.052	
16,100.0	7,510.0	16,043.1	7,510.0	170.5	167.4	-90.00	-8,697.8	1,020.2	1,001.7	672.9	3.046	
16,187.8	7,510.0	16,130.9	7,510.0	172.1	169.0	-90.00	-8,780.6	1,048.8	1,001.7	669.6	3.016	
16,200.0	7,510.0	16,143.1	7,510.0	172.4	169.3	-90.00	-8,792.4	1,052.8	1,001.7	669.1	3.011	
16,300.0	7,510.0	16,243.1	7,510.0	174.2	171.1	-90.00	-8,886.9	1,095.5	1,001.7	665.3	2.977	
16,394.2	7,510.0	16,337.2	7,510.0	175.9	172.9	-90.00	-8,975.9	1,116.2	1,001.7	661.7	2.946	
16,400.0	7,510.0	16,343.1	7,510.0	176.0	173.0	-90.00	-8,981.4	1,118.1	1,001.7	661.6	2.944	
16,500.0	7,510.0	16,443.1	7,510.0	177.8	174.9	-90.00	-9,075.9	1,150.7	1,001.7	657.7	2.911	
16,600.0	7,510.0	16,543.1	7,510.0	179.6	176.8	-90.00	-9,170.5	1,183.4	1,001.7	653.8	2.879	
16,700.0	7,510.0	16,643.1	7,510.0	181.5	178.7	-90.00	-9,265.0	1,216.0	1,001.7	650.0	2.848	
16,800.0	7,510.0	16,743.1	7,510.0	183.3	180.6	-90.00	-9,359.5	1,248.7	1,001.7	646.2	2.818	
16,900.0	7,510.0	16,843.1	7,510.0	185.1	182.4	-90.00	-9,454.0	1,281.3	1,001.7	642.4	2.788	
16,958.4	7,510.0	16,901.4	7,510.0	185.2	183.5	-90.00	-9,509.2	1,300.3	1,001.7	640.2	2.771	
17,000.0	7,510.0	16,943.1	7,510.0	185.9	184.3	-90.00	-9,548.5	1,313.9	1,001.7	638.6	2.759	
17,100.0	7,510.0	17,043.1	7,510.0	188.8	186.2	-90.00	-9,643.1	1,346.5	1,001.7	634.8	2.730	
17,200.0	7,510.0	17,143.1	7,510.0	190.6	188.1	-90.00	-9,737.6	1,379.2	1,001.7	631.0	2.702	
17,300.0	7,510.0	17,243.1	7,510.0	192.5	190.0	-90.00	-9,832.1	1,411.9	1,001.7	627.2	2.674	
17,400.0	7,510.0	17,343.1	7,510.0	194.3	191.8	-90.00	-9,926.6	1,444.5	1,001.7	623.3	2.647	
17,500.0	7,510.0	17,443.1	7,510.0	196.1	193.7	-90.00	-10,021.2	1,477.1	1,001.7	619.5	2.621	
17,600.0	7,510.0	17,543.1	7,510.0	198.0	195.6	-90.00	-10,115.7	1,509.8	1,001.7	616.7	2.595	
17,700.0	7,510.0	17,643.1	7,510.0	199.8	197.5	-90.00	-10,210.2	1,542.4	1,001.7	613.9	2.570	
17,800.0	7,510.0	17,743.1	7,510.0	201.7	199.4	-90.00	-10,304.7	1,575.0	1,001.7	608.1	2.545	
17,900.0	7,510.0	17,843.1	7,510.0	203.5	201.3	-90.00	-10,399.3	1,607.7	1,001.7	604.3	2.520	
18,000.0	7,510.0	17,943.1	7,510.0	205.4	203.2	-90.00	-10,493.8	1,640.3	1,001.7	600.4	2.496	
18,100.0	7,510.0	18,043.1	7,510.0	207.2	205.1	-90.00	-10,588.3	1,673.0	1,001.7	596.6	2.473	
18,200.0	7,510.0	18,143.1	7,510.0	209.1	206.9	-90.00	-10,682.8	1,705.6	1,001.7	592.8	2.450	
18,300.0	7,510.0	18,243.1	7,510.0	210.9	208.8	-90.00	-10,777.4	1,738.2	1,001.7	589.0	2.427	
18,357.7	7,510.0	18,300.8	7,510.0	212.0	209.9	-90.00	-10,831.9	1,757.1	1,001.7	586.8	2.414	
18,400.0	7,510.0	18,343.1	7,510.0	212.8	210.7	-90.00	-10,871.9	1,770.9	1,001.7	585.2	2.405	
18,500.0	7,510.0	18,443.1	7,510.0	214.6	212.6	-90.00	-10,966.4	1,803.5	1,001.7	581.3	2.383	
18,600.0	7,510.0	18,543.1	7,510.0	216.5	214.5	-90.00	-11,060.9	1,836.2	1,001.7	577.5	2.361	
18,700.0	7,510.0	18,643.1	7,510.0	218.3	216.4	-90.00	-11,155.4	1,868.8	1,001.7	573.7	2.340	
18,800.0	7,510.0	18,743.1	7,510.0	220.2	218.3	-90.00	-11,250.0	1,901.4	1,001.7	569.9	2.320	
18,900.0	7,510.0	18,843.1	7,510.0	222.1	220.2	-90.00	-11,344.5	1,934.1	1,001.7	566.0	2.299	
19,000.0	7,510.0	18,943.1	7,510.0	223.9	222.1	-90.00	-11,439.0	1,966.7	1,001.7	562.2	2.279	
19,100.0	7,510.0	19,043.1	7,510.0	225.8	224.0	-90.00	-11,533.5	1,999.4	1,001.7	558.4	2.260	
19,146.5	7,510.0	19,089.5	7,510.0	226.7	224.9	-90.00	-11,577.5	2,014.5	1,001.7	556.7	2.251	
19,200.0	7,510.0	19,143.1	7,510.0	227.7	225.9	-90.00	-11,621.5	2,032.0	1,001.7	554.8	2.240	
19,300.0	7,510.0	19,243.1	7,510.0	229.5	227.8	-90.00	-11,722.5	2,064.6	1,001.7	550.9	2.221	
19,400.0	7,510.0	19,343.1	7,510.0	231.4	229.7	-90.00	-11,817.1	2,097.3	1,001.7	546.9	2.203	
19,500.0	7,510.0	19,443.1	7,510.0	233.3	231.6	-90.00	-11,911.8	2,129.9	1,001.7	543.1	2.184	
19,600.0	7,510.0	19,543.1	7,510.0	235.1	233.5	-90.00	-12,006.2	2,162.6	1,001.7	539.3	2.166	
19,700.0	7,510.0	19,643.1	7,510.0	237.0	235.4	-90.00	-12,100.7	2,195.2	1,001.7	535.5	2.148	
19,800.0	7,510.0	19,743.1	7,510.0	238.9	237.3	-90.00	-12,195.2	2,227.8	1,001.7	531.6	2.131	
19,900.0	7,510.0	19,843.1	7,510.0	240.7	239.2	-90.00	-12,289.7	2,260.5	1,001.7	527.8	2.114	

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

Company:	Arsenal Resources	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
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 16 201	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)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Reference (usft)	Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning		
20,000.0	7,510.0	19,943.1	7,510.0	242.6	241.1	-90.00	-12,384.3	2,293.1	1,001.7	524.0	2.097			
20,100.0	7,510.0	20,043.1	7,510.0	244.5	243.0	-90.00	-12,478.8	2,325.8	1,001.7	520.1	2.090			
20,200.0	7,510.0	20,143.1	7,510.0	246.3	244.9	-90.00	-12,573.3	2,358.4	1,001.7	516.3	2.064			
20,300.0	7,510.0	20,243.1	7,510.0	248.2	246.8	-90.00	-12,667.8	2,391.0	1,001.7	512.5	2.048			
20,328.9	7,510.0	20,272.0	7,510.0	248.8	247.3	-90.00	-12,695.2	2,400.5	1,001.7	511.5	2.043			
20,400.0	7,510.0	20,343.1	7,510.0	250.1	248.7	-90.00	-12,762.3	2,423.7	1,001.7	508.7	2.032			
20,500.0	7,510.0	20,443.1	7,510.0	252.0	250.6	-90.00	-12,856.9	2,458.3	1,001.7	504.8	2.016			
20,600.0	7,510.0	20,543.1	7,510.0	253.8	252.5	-90.00	-12,951.4	2,489.0	1,001.7	501.0	2.001			
20,700.0	7,510.0	20,643.1	7,510.0	255.7	254.4	-90.00	-13,045.9	2,521.6	1,001.7	497.2	1.985			
20,800.0	7,510.0	20,743.1	7,510.0	257.6	256.3	-90.00	-13,140.4	2,554.2	1,001.7	493.4	1.970			
20,856.6	7,510.0	20,799.6	7,510.0	258.7	257.4	-90.00	-13,193.9	2,572.7	1,001.7	491.2	1.962			
20,900.0	7,510.0	20,843.1	7,510.0	259.5	258.2	-90.00	-13,235.0	2,588.9	1,001.7	489.5	1.956			
21,000.0	7,510.0	20,943.1	7,510.0	261.4	260.1	-90.00	-13,329.5	2,619.5	1,001.7	485.7	1.941			
21,100.0	7,510.0	21,043.1	7,510.0	263.2	262.0	-90.00	-13,424.0	2,652.1	1,001.7	481.9	1.927			
21,200.0	7,510.0	21,143.1	7,510.0	265.1	263.9	-90.00	-13,518.5	2,684.8	1,001.7	478.0	1.913			
21,300.0	7,510.0	21,243.1	7,510.0	267.0	265.8	-90.00	-13,613.1	2,717.4	1,001.7	474.2	1.899			
21,400.0	7,510.0	21,343.1	7,510.0	268.9	267.7	-90.00	-13,707.6	2,750.1	1,001.7	470.4	1.885			
21,500.0	7,510.0	21,443.1	7,510.0	270.8	269.6	-90.00	-13,802.1	2,782.7	1,001.7	466.6	1.872			
21,600.0	7,510.0	21,543.1	7,510.0	272.6	271.5	-90.00	-13,896.6	2,815.3	1,001.7	462.7	1.858			
21,700.0	7,510.0	21,643.1	7,510.0	274.5	273.4	-90.00	-13,991.2	2,848.0	1,001.7	458.9	1.845			
21,800.0	7,510.0	21,743.1	7,510.0	276.4	275.3	-90.00	-14,085.7	2,880.6	1,001.7	455.1	1.832			
21,900.0	7,510.0	21,843.1	7,510.0	278.3	277.2	-90.00	-14,180.2	2,913.3	1,001.7	451.2	1.820			
21,915.9	7,510.0	21,859.9	7,510.0	278.6	277.5	-90.00	-14,195.2	2,918.4	1,001.7	450.6	1.818			
22,000.0	7,510.0	21,943.1	7,510.0	280.2	279.1	-90.00	-14,274.7	2,945.9	1,001.7	447.4	1.807			
22,055.4	7,510.0	21,999.4	7,510.0	281.2	280.2	-90.00	-14,327.1	2,964.0	1,001.7	445.3	1.800			
22,100.0	7,510.0	22,043.1	7,510.0	282.1	281.0	-90.00	-14,369.2	2,978.5	1,001.7	443.6	1.795			
22,200.0	7,510.0	22,143.1	7,510.0	284.0	282.9	-90.00	-14,463.8	3,011.2	1,001.7	439.7	1.782			
22,300.0	7,510.0	22,243.1	7,510.0	285.9	284.8	-90.00	-14,558.3	3,043.8	1,001.7	435.9	1.770			
22,400.0	7,510.0	22,343.1	7,510.0	287.7	286.7	-90.00	-14,652.8	3,076.5	1,001.7	432.1	1.758			
22,418.2	7,510.0	22,361.3	7,510.0	288.1	287.1	-90.00	-14,657.0	3,082.4	1,001.7	431.5	1.757			
22,500.0	7,510.0	22,443.1	7,510.0	289.6	288.7	-90.00	-14,747.3	3,109.1	1,001.7	428.2	1.747			
22,600.0	7,510.0	22,543.1	7,510.0	291.5	290.6	-90.00	-14,841.9	3,141.7	1,001.7	424.4	1.735			
22,700.0	7,510.0	22,643.1	7,510.0	293.4	292.5	-90.00	-14,936.4	3,174.4	1,001.7	420.6	1.724			
22,800.0	7,510.0	22,743.1	7,510.0	295.3	294.4	-90.00	-15,030.9	3,207.0	1,001.7	416.7	1.712			
22,900.0	7,510.0	22,843.1	7,510.0	297.2	296.3	-90.00	-15,125.4	3,239.7	1,001.7	412.9	1.701			
23,000.0	7,510.0	22,943.1	7,510.0	299.1	298.2	-90.00	-15,220.0	3,272.3	1,001.7	409.1	1.690			
23,100.0	7,510.0	23,043.1	7,510.0	301.0	300.1	-90.00	-15,314.5	3,304.9	1,001.7	405.2	1.679			
23,200.0	7,510.0	23,143.1	7,510.0	302.8	302.0	-90.00	-15,409.0	3,337.6	1,001.7	401.4	1.669			
23,300.0	7,510.0	23,243.1	7,510.0	304.7	303.9	-90.00	-15,503.5	3,370.2	1,001.7	397.6	1.658			
23,400.0	7,510.0	23,343.1	7,510.0	306.6	305.8	-90.00	-15,598.0	3,402.9	1,001.7	393.7	1.648			
23,500.0	7,510.0	23,443.1	7,510.0	308.5	307.7	-90.00	-15,692.6	3,435.5	1,001.7	389.9	1.637			
23,600.0	7,510.0	23,543.1	7,510.0	310.4	309.6	-90.00	-15,787.1	3,468.1	1,001.7	386.1	1.627			
23,700.0	7,510.0	23,643.1	7,510.0	312.3	311.5	-90.00	-15,881.6	3,500.8	1,001.7	382.2	1.617			
23,800.0	7,510.0	23,743.1	7,510.0	314.2	313.6	-90.00	-15,976.1	3,533.4	1,001.7	378.4	1.607			
23,900.0	7,510.0	23,843.1	7,510.0	316.1	315.4	-90.00	-16,070.7	3,566.0	1,001.7	374.6	1.597			
24,000.0	7,510.0	23,943.1	7,510.0	318.0	317.3	-90.00	-16,165.2	3,598.7	1,001.7	370.7	1.588			
24,100.0	7,510.0	24,043.1	7,510.0	319.9	319.2	-90.00	-16,259.7	3,631.3	1,001.7	366.8	1.578			
24,200.0	7,510.0	24,143.1	7,510.0	321.8	321.1	-90.00	-16,354.2	3,664.0	1,001.7	363.1	1.569			
24,300.0	7,510.0	24,243.1	7,510.0	323.7	323.0	-90.00	-16,448.8	3,696.6	1,001.7	359.2	1.559			
24,339.0	7,510.0	24,282.0	7,510.0	324.4	323.7	-90.00	-16,485.6	3,709.3	1,001.7	357.8	1.556			
24,400.0	7,510.0	24,343.1	7,510.0	325.6	324.9	-90.00	-16,543.3	3,729.2	1,001.7	355.4	1.550			
24,500.0	7,510.0	24,443.1	7,510.0	327.5	326.8	-90.00	-16,637.8	3,761.9	1,001.7	351.6	1.541			

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



Anticollision Report



Company:	Arsenal Resources	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
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 16 201	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)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	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	
24,600.0	7,510.0	24,543.1	7,510.0	329.4	328.7	-90.00	-16,732.3	3,794.5	1,001.7	347.7	1.532		
24,700.0	7,510.0	24,643.1	7,510.0	331.3	330.6	-90.00	-16,826.9	3,827.2	1,001.7	343.9	1.523		
24,800.0	7,510.0	24,743.1	7,510.0	333.1	332.8	-90.00	-16,921.4	3,859.8	1,001.7	340.1	1.514		
24,900.0	7,510.0	24,843.1	7,510.0	335.0	334.5	-90.00	-17,015.9	3,892.4	1,001.7	336.2	1.505		
25,000.0	7,510.0	24,943.1	7,510.0	336.9	336.4	-90.00	-17,110.4	3,925.1	1,001.7	332.4	1.497	Level 3	
25,100.0	7,510.0	25,043.1	7,510.0	338.8	338.3	-90.00	-17,204.9	3,957.7	1,001.7	328.6	1.488	Level 3	
25,200.0	7,510.0	25,143.1	7,510.0	340.7	340.2	-90.00	-17,299.5	3,990.4	1,001.7	324.7	1.480	Level 3	
25,300.0	7,510.0	25,243.1	7,510.0	342.6	342.1	-90.00	-17,394.0	4,023.0	1,001.7	320.9	1.471	Level 3	
25,308.4	7,510.0	25,251.4	7,510.0	342.8	342.3	-90.00	-17,401.9	4,025.7	1,001.7	320.6	1.471	Level 3	
25,400.0	7,510.0	25,343.1	7,510.0	344.5	344.0	-90.00	-17,488.5	4,055.6	1,001.7	317.1	1.463	Level 3	
25,500.0	7,510.0	25,443.1	7,510.0	346.4	345.9	-90.00	-17,583.0	4,088.3	1,001.7	313.2	1.455	Level 3	
25,600.0	7,510.0	25,543.1	7,510.0	348.3	347.8	-90.00	-17,677.6	4,120.9	1,001.7	309.4	1.447	Level 3	
25,700.0	7,510.0	25,643.1	7,510.0	350.2	349.7	-90.00	-17,772.1	4,153.6	1,001.7	305.6	1.439	Level 3	
25,800.0	7,510.0	25,743.1	7,510.0	352.1	351.7	-90.00	-17,866.6	4,186.2	1,001.7	301.7	1.431	Level 3	
25,900.0	7,510.0	25,842.3	7,510.0	354.0	353.6	-90.00	-17,960.4	4,218.6	1,001.8	298.0	1.423	Level 3	
26,000.0	7,510.0	25,977.1	7,510.0	355.9	354.2	-90.00	-17,993.3	4,230.0	1,004.0	304.4	1.435	Level 3	
26,100.0	7,510.0	25,977.1	7,510.0	357.8	354.2	-90.00	-17,993.3	4,230.0	1,015.4	329.6	1.481	Level 3	
26,158.7	7,510.0	25,877.1	7,510.0	358.9	354.2	-90.00	-17,993.3	4,230.0	1,027.2	352.0	1.521		

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Company:	Arsenal Resources	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
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 16 201	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 16 203 - 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)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Semi Major Reference (usft)	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	114.96	-12.7	27.2	30.0				
100.0	100.0	100.0	100.0	0.1	0.1	114.96	-12.7	27.2	30.0	29.8	182.839		
200.0	200.0	200.0	200.0	0.3	0.3	114.96	-12.7	27.2	30.0	29.4	48.891		
300.0	300.0	300.0	300.0	0.5	0.5	114.96	-12.7	27.2	30.0	28.9	29.218		
400.0	400.0	400.0	400.0	0.8	0.8	114.96	-12.7	27.2	30.0	28.5	19.832		
500.0	500.0	500.0	500.0	1.0	1.0	114.96	-12.7	27.2	30.0	28.0	15.289		
600.0	600.0	600.0	600.0	1.2	1.2	114.96	-12.7	27.2	30.0	27.6	12.439		
700.0	700.0	700.0	700.0	1.4	1.4	114.96	-12.7	27.2	30.0	27.1	10.485		
800.0	800.0	800.0	800.0	1.7	1.7	114.96	-12.7	27.2	30.0	26.7	9.061		
900.0	900.0	900.0	900.0	1.9	1.9	114.96	-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	114.96	-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	114.96	-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	114.96	-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	114.96	-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	114.96	-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	114.96	-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	114.96	-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	114.96	-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	114.96	-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	114.96	-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	114.96	-12.7	27.2	30.0	21.3	3.446	CC, ES	
2,100.0	2,100.0	2,100.0	2,100.0	4.6	4.6	-127.89	-12.7	27.2	31.0	21.9	3.399		
2,200.0	2,199.8	2,199.8	2,199.8	4.7	4.8	-134.71	-12.7	27.2	34.5	25.0	3.516		
2,300.0	2,298.5	2,298.5	2,298.5	4.9	5.0	-143.28	-12.7	27.2	41.1	31.2	4.130		
2,400.0	2,398.7	2,398.7	2,398.7	5.2	5.2	-151.32	-12.7	27.2	51.4	41.0	4.958		
2,500.0	2,497.5	2,497.5	2,497.5	5.4	5.5	-157.77	-12.7	27.2	55.6	54.8	6.090		
2,600.0	2,595.6	2,595.6	2,598.4	5.7	5.7	-162.81	-12.9	25.5	82.0	70.8	7.321		
2,700.0	2,693.1	2,700.0	2,699.9	6.0	5.9	-165.91	-13.8	20.3	98.6	87.0	8.515		
2,800.0	2,789.6	2,802.1	2,801.6	6.3	6.1	-170.47	-15.2	11.5	115.6	103.6	9.659		
2,900.0	2,885.3	2,904.7	2,903.4	6.7	6.3	-173.69	-17.1	-1.0	132.9	120.5	10.756		
3,000.0	2,979.8	3,007.8	3,005.2	7.2	5.6	-176.57	-19.7	-17.1	150.5	137.8	11.809		
3,100.0	3,073.2	3,107.6	3,103.2	7.7	6.8	-179.30	-22.6	-35.5	169.3	156.1	12.841		
3,200.0	3,165.2	3,204.9	3,198.7	8.3	7.1	178.63	-25.5	-53.6	191.5	177.9	14.029		
3,300.0	3,255.8	3,301.3	3,293.4	9.0	7.4	177.01	-28.4	-71.5	217.3	203.2	15.373		
3,400.0	3,344.9	3,396.8	3,387.2	9.8	7.7	175.78	-31.2	-89.3	246.6	232.0	16.845		
3,500.0	3,432.4	3,491.3	3,480.0	10.6	8.0	174.85	-34.0	-105.9	279.3	264.1	18.424		
3,598.8	3,517.1	3,583.4	3,570.4	11.6	8.2	174.16	-36.7	-124.0	314.8	289.1	20.072		
3,600.0	3,518.1	3,584.6	3,571.6	11.6	8.3	174.15	-36.7	-124.2	315.2	299.6	20.093		
3,700.0	3,602.9	3,677.1	3,662.5	12.6	8.6	173.89	-39.5	-141.4	352.8	336.6	21.733		
3,800.0	3,687.8	3,769.8	3,753.5	13.6	8.9	173.31	-42.2	-158.7	390.4	373.6	23.248		
3,900.0	3,772.6	3,862.4	3,844.5	14.6	9.2	173.01	-45.0	-175.9	428.0	410.6	24.649		
4,000.0	3,857.4	3,955.1	3,935.5	15.7	9.5	172.75	-47.7	-193.1	465.6	447.7	25.944		
4,100.0	3,942.2	4,047.7	4,026.5	16.7	9.8	172.53	-50.4	-210.4	503.2	484.7	27.144		
4,200.0	4,027.1	4,140.3	4,117.4	17.8	10.2	172.34	-53.2	-227.5	540.9	521.7	28.256		
4,300.0	4,111.9	4,233.0	4,208.4	18.9	10.5	172.17	-55.9	-244.9	578.5	558.7	29.288		
4,400.0	4,199.7	4,325.6	4,299.4	20.0	10.9	172.03	-58.7	-262.1	616.1	595.7	30.248		
4,500.0	4,281.6	4,418.3	4,390.4	21.1	11.2	171.90	-61.4	-279.3	653.7	632.8	31.141		
4,600.0	4,366.4	4,510.9	4,481.4	22.2	11.6	171.79	-64.1	-296.6	691.4	669.8	31.673		
4,700.0	4,451.2	4,603.5	4,572.3	23.3	11.9	171.68	-66.9	-313.8	729.0	706.8	32.751		
4,800.0	4,536.0	4,696.2	4,683.3	24.4	12.3	171.59	-69.6	-331.0	766.7	743.8	33.477		
4,900.0	4,620.9	4,788.8	4,754.3	25.5	12.6	171.51	-72.4	-348.3	804.3	780.8	34.157		
5,000.0	4,705.7	4,881.4	4,845.3	26.7	13.0	171.43	-75.1	-365.5	842.0	817.8	34.754		

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

Company:	Arsenal Resources	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
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 16 201	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 16 203 - 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)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore +N/-S (usft)	Centre +E/-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
5,100.0	4,790.5	4,974.1	4,936.3	27.8	13.3	171.35	-77.8	-382.7	879.5	854.7	35.393		
5,200.0	4,875.3	5,066.7	5,027.2	28.9	13.7	171.30	-80.5	-400.0	917.2	891.7	35.955		
5,300.0	4,950.2	5,159.4	5,118.2	30.0	14.1	171.24	-83.3	-417.2	954.9	926.7	36.485		
5,400.0	5,045.0	5,252.0	5,209.2	31.2	14.4	171.18	-86.1	-434.4	992.5	965.7	36.984		
5,500.0	5,129.8	5,344.8	5,300.2	32.3	14.8	171.13	-88.8	-451.7	1,030.2	1,002.7	37.456		
5,600.0	5,214.7	5,437.3	5,391.2	33.4	15.2	171.09	-91.5	-468.9	1,067.8	1,039.7	37.901		
5,700.0	5,299.5	5,529.9	5,482.2	34.6	15.5	171.04	-94.3	-486.1	1,105.5	1,076.6	38.323		
5,800.0	5,384.3	5,622.5	5,573.1	35.7	15.9	171.00	-97.0	-503.4	1,143.1	1,113.6	38.722		
5,900.0	5,469.1	5,715.2	5,664.1	36.8	16.3	170.96	-99.8	-520.6	1,180.8	1,150.6	39.101		
6,000.0	5,554.0	5,807.8	5,755.1	38.0	16.7	170.93	-102.5	-537.8	1,218.4	1,187.6	39.460		
6,100.0	5,638.8	5,900.5	5,846.1	39.1	17.0	170.89	-105.3	-555.1	1,256.1	1,224.5	39.802		
6,200.0	5,723.5	5,993.1	5,937.1	40.2	17.4	170.86	-108.0	-572.3	1,293.7	1,261.5	40.127		
6,300.0	5,808.4	6,085.8	6,028.0	41.4	17.8	170.83	-110.7	-589.5	1,331.4	1,298.5	40.436		
6,400.0	5,893.3	6,178.4	6,119.0	42.5	18.2	170.80	-113.5	-606.8	1,369.0	1,335.4	40.731		
6,500.0	5,978.1	6,271.0	6,210.0	43.7	18.5	170.78	-116.2	-624.0	1,406.7	1,372.4	41.013		
6,600.0	6,062.9	6,363.7	6,301.0	44.8	18.9	170.75	-119.0	-641.2	1,444.3	1,409.4	41.282		
6,700.0	6,147.8	6,456.3	6,392.0	45.9	19.3	170.73	-121.7	-658.5	1,482.0	1,446.3	41.539		
6,800.0	6,232.6	6,548.9	6,482.9	47.1	19.7	170.70	-124.4	-675.7	1,519.6	1,483.3	41.784		
6,900.0	6,317.4	6,641.6	6,573.9	48.2	20.1	170.68	-127.2	-692.9	1,557.3	1,520.2	42.020		
7,000.0	6,402.2	6,734.2	6,664.9	49.4	20.4	170.66	-129.9	-710.2	1,595.0	1,557.2	42.245		
7,100.0	6,487.1	6,826.9	6,755.9	50.5	20.8	170.64	-132.7	-727.4	1,632.6	1,594.2	42.462		
7,200.0	6,571.9	6,919.5	6,846.9	51.7	21.2	170.62	-135.4	-744.6	1,670.3	1,631.1	42.669		
7,300.0	6,656.7	7,012.2	6,938.4	52.8	22.7	170.60	-138.2	-761.8	1,707.9	1,668.0	42.866		
7,400.0	6,741.5	7,104.9	7,029.9	53.9	23.4	170.58	-141.0	-779.0	1,745.5	1,704.9	43.054		
7,500.0	6,826.4	7,197.6	7,121.4	55.1	23.9	170.56	-143.8	-796.2	1,783.1	1,741.8	43.233		
7,600.0	6,911.2	7,290.3	7,208.9	56.2	24.2	170.55	-146.6	-813.4	1,820.7	1,778.7	43.403		
7,700.0	6,996.0	7,383.0	7,307.9	57.4	24.4	170.54	-149.4	-830.6	1,858.3	1,815.6	43.564		
7,729.1	7,020.7	7,412.9	7,338.4	57.7	24.4	170.54	-149.7	-833.3	1,863.7	1,821.0	43.588		
7,750.0	7,038.4	7,431.7	7,356.8	57.9	24.5	170.54	-150.0	-836.0	1,869.1	1,826.4	43.611		
7,800.0	7,080.4	7,481.2	7,406.3	58.4	24.5	170.54	-150.5	-841.5	1,879.7	1,837.0	43.648		
7,850.0	7,121.7	7,530.7	7,450.9	58.9	24.6	170.54	-151.0	-847.0	1,890.3	1,847.6	43.685		
7,900.0	7,162.0	7,580.3	7,500.0	59.4	24.8	170.54	-151.5	-852.5	1,900.9	1,858.2	43.722		
7,950.0	7,201.2	7,629.9	7,550.0	59.9	24.9	170.54	-152.0	-858.0	1,911.5	1,868.8	43.759		
8,000.0	7,238.9	7,679.6	7,600.0	60.4	25.1	170.54	-152.5	-863.5	1,922.1	1,879.4	43.796		
8,050.0	7,274.9	7,729.3	7,650.0	60.8	25.3	170.54	-153.0	-869.0	1,932.7	1,890.0	43.833		
8,100.0	7,309.0	7,779.0	7,700.0	61.3	25.5	170.54	-153.5	-874.5	1,943.3	1,900.6	43.870		
8,150.0	7,341.1	7,828.7	7,750.0	61.7	25.8	170.54	-154.0	-880.0	1,953.9	1,911.2	43.907		
8,200.0	7,370.8	7,878.4	7,800.0	62.1	26.1	170.54	-154.5	-885.5	1,964.5	1,921.8	43.944		
8,250.0	7,398.0	7,928.1	7,850.0	62.5	26.4	170.54	-155.0	-891.0	1,975.1	1,932.4	43.981		
8,300.0	7,422.6	7,977.8	7,900.0	62.9	26.8	170.54	-155.5	-896.5	1,985.7	1,943.0	44.018		
8,350.0	7,444.4	8,027.5	7,950.0	63.3	27.3	170.54	-156.0	-902.0	1,996.3	1,953.6	44.055		
8,400.0	7,463.2	8,077.2	7,950.0	63.6	27.7	170.54	-156.5	-907.5	1,996.3	1,953.6	44.055		
8,450.0	7,479.0	8,126.9	7,950.0	63.9	28.2	170.54	-157.0	-913.0	1,996.3	1,953.6	44.055		
8,500.0	7,491.6	8,176.6	7,950.0	64.2	28.8	170.54	-157.5	-918.5	1,996.3	1,953.6	44.055		
8,550.0	7,501.0	8,226.3	7,950.0	64.5	29.4	170.54	-158.0	-924.0	1,996.3	1,953.6	44.055		
8,600.0	7,507.1	8,276.0	7,950.0	64.7	30.0	170.54	-158.5	-929.5	1,996.3	1,953.6	44.055		
8,650.0	7,509.8	8,325.7	7,950.0	65.0	30.5	170.54	-159.0	-935.0	1,996.3	1,953.6	44.055		
8,665.4	7,510.0	8,331.1	7,950.0	65.0	30.8	170.54	-159.0	-935.0	1,996.3	1,953.6	44.055		
8,700.0	7,510.0	8,336.5	7,950.0	65.2	31.3	170.54	-159.0	-935.0	1,996.3	1,953.6	44.055		
8,800.0	7,510.0	8,341.9	7,950.0	65.7	32.5	170.54	-159.0	-935.0	1,996.3	1,953.6	44.055		
8,900.0	7,510.0	8,347.3	7,950.0	66.3	34.0	170.54	-159.0	-935.0	1,996.3	1,953.6	44.055		
9,000.0	7,510.0	8,352.7	7,950.0	66.8	35.5	170.54	-159.0	-935.0	1,996.3	1,953.6	44.055		

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



Anticollision Report



Company:	Arsenal Resources	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
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 16 201	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 16 203 - 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)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	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		
9,100.0	7,510.0	8,991.6	7,510.0	67.5	37.0	-90.00	-1,754.4	-318.1	2,003.0	1,931.7	28.087			
9,200.0	7,510.0	9,091.6	7,510.0	68.1	38.6	-90.00	-1,848.9	-285.5	2,003.0	1,928.6	26.915			
9,300.0	7,510.0	9,191.6	7,510.0	68.8	40.1	-90.00	-1,943.4	-252.8	2,003.0	1,925.4	25.815			
9,400.0	7,510.0	9,291.6	7,510.0	69.5	41.7	-90.00	-2,038.0	-220.2	2,003.0	1,922.2	24.794			
9,500.0	7,510.0	9,391.6	7,510.0	70.4	43.4	-90.00	-2,132.5	-187.5	2,003.0	1,918.9	23.818			
9,600.0	7,510.0	9,491.6	7,510.0	71.2	45.0	-90.00	-2,227.0	-154.9	2,003.0	1,915.6	22.912			
9,700.0	7,510.0	9,591.6	7,510.0	72.0	46.7	-90.00	-2,321.5	-122.3	2,003.0	1,912.2	22.062			
9,800.0	7,510.0	9,691.6	7,510.0	72.9	48.4	-90.00	-2,416.1	-89.6	2,003.0	1,908.8	21.270			
9,900.0	7,510.0	9,791.6	7,510.0	73.9	50.1	-90.00	-2,510.6	-57.0	2,003.0	1,905.4	20.519			
10,000.0	7,510.0	9,891.6	7,510.0	74.8	51.8	-90.00	-2,605.1	-24.4	2,003.0	1,901.9	19.816			
10,100.0	7,510.0	9,991.6	7,510.0	75.8	53.5	-90.00	-2,699.6	8.3	2,003.0	1,898.4	19.154			
10,200.0	7,510.0	10,091.6	7,510.0	76.9	55.3	-90.00	-2,794.1	40.9	2,003.0	1,894.9	18.532			
10,300.0	7,510.0	10,191.6	7,510.0	78.0	57.1	-90.00	-2,888.7	73.6	2,003.0	1,891.4	17.945			
10,400.0	7,510.0	10,291.6	7,510.0	79.1	58.9	-90.00	-2,983.2	106.2	2,003.0	1,887.8	17.391			
10,500.0	7,510.0	10,391.6	7,510.0	80.2	60.7	-90.00	-3,077.7	138.8	2,003.0	1,884.3	16.868			
10,600.0	7,510.0	10,491.6	7,510.0	81.4	62.5	-90.00	-3,172.2	171.5	2,003.0	1,880.7	16.373			
10,700.0	7,510.0	10,591.6	7,510.0	82.6	64.3	-90.00	-3,266.8	204.1	2,003.0	1,877.1	15.904			
10,800.0	7,510.0	10,691.6	7,510.0	83.8	66.1	-90.00	-3,361.3	236.7	2,003.0	1,873.5	15.460			
10,900.0	7,510.0	10,791.6	7,510.0	85.1	67.9	-90.00	-3,455.8	269.4	2,003.0	1,869.8	15.039			
11,000.0	7,510.0	10,891.6	7,510.0	86.4	69.7	-90.00	-3,550.3	302.0	2,003.0	1,866.2	14.639			
11,100.0	7,510.0	10,991.6	7,510.0	87.7	71.5	-90.00	-3,644.9	334.7	2,003.0	1,862.5	14.258			
11,200.0	7,510.0	11,091.6	7,510.0	89.0	73.3	-90.00	-3,739.4	367.3	2,003.0	1,858.9	13.896			
11,300.0	7,510.0	11,191.6	7,510.0	90.4	75.2	-90.00	-3,833.9	399.9	2,003.0	1,855.2	13.551			
11,400.0	7,510.0	11,291.6	7,510.0	91.8	77.0	-90.00	-3,928.4	432.6	2,003.0	1,851.5	13.221			
11,500.0	7,510.0	11,391.6	7,510.0	93.2	78.9	-90.00	-4,022.9	465.2	2,003.0	1,847.8	12.907			
11,600.0	7,510.0	11,491.6	7,510.0	94.6	80.7	-90.00	-4,117.5	497.9	2,003.0	1,844.1	12.607			
11,700.0	7,510.0	11,591.6	7,510.0	96.1	82.5	-90.00	-4,212.0	530.5	2,003.0	1,840.4	12.320			
11,800.0	7,510.0	11,691.6	7,510.0	97.6	84.4	-90.00	-4,306.5	563.1	2,003.0	1,836.7	12.045			
11,900.0	7,510.0	11,791.6	7,510.0	99.1	86.3	-90.00	-4,401.0	595.8	2,003.0	1,833.0	11.782			
12,000.0	7,510.0	11,891.6	7,510.0	100.6	88.1	-90.00	-4,495.6	628.4	2,003.0	1,829.3	11.530			
12,100.0	7,510.0	11,991.6	7,510.0	102.1	90.0	-90.00	-4,590.1	661.1	2,003.0	1,825.6	11.287			
12,200.0	7,510.0	12,091.6	7,510.0	103.6	91.8	-90.00	-4,684.6	693.7	2,003.0	1,821.8	11.055			
12,300.0	7,510.0	12,191.6	7,510.0	105.2	93.7	-90.00	-4,779.1	726.3	2,003.0	1,818.1	10.832			
12,400.0	7,510.0	12,291.6	7,510.0	106.7	95.6	-90.00	-4,873.7	758.9	2,003.0	1,814.4	10.617			
12,500.0	7,510.0	12,391.6	7,510.0	108.3	97.4	-90.00	-4,968.2	791.6	2,003.0	1,810.6	10.410			
12,600.0	7,510.0	12,491.6	7,510.0	109.9	99.3	-90.00	-5,062.7	824.3	2,003.0	1,806.9	10.212			
12,700.0	7,510.0	12,591.6	7,510.0	111.5	101.2	-90.00	-5,157.2	856.9	2,003.0	1,803.1	10.020			
12,800.0	7,510.0	12,691.6	7,510.0	113.1	103.1	-90.00	-5,251.8	889.5	2,003.0	1,799.4	9.835			
12,900.0	7,510.0	12,791.6	7,510.0	114.8	104.9	-90.00	-5,346.3	922.2	2,003.0	1,795.6	9.657			
13,000.0	7,510.0	12,891.6	7,510.0	116.4	106.8	-90.00	-5,440.8	954.8	2,003.0	1,791.8	9.485			
13,100.0	7,510.0	12,991.6	7,510.0	118.1	108.7	-90.00	-5,535.3	987.5	2,003.0	1,788.1	9.319			
13,200.0	7,510.0	13,091.6	7,510.0	119.7	110.6	-90.00	-5,629.8	1,020.1	2,003.0	1,784.3	9.158			
13,300.0	7,510.0	13,191.6	7,510.0	121.4	112.5	-90.00	-5,724.4	1,052.7	2,003.0	1,780.5	9.003			
13,400.0	7,510.0	13,291.6	7,510.0	123.1	114.3	-90.00	-5,818.9	1,085.4	2,003.0	1,776.8	8.853			
13,412.1	7,510.0	13,303.7	7,510.0	123.3	114.6	-90.00	-5,830.3	1,089.3	2,003.0	1,776.4	8.839			
13,500.0	7,510.0	13,391.6	7,510.0	124.8	115.2	-90.00	-5,913.4	1,118.0	2,003.0	1,773.0	8.708			
13,600.0	7,510.0	13,491.6	7,510.0	125.4	118.1	-90.00	-6,007.9	1,150.6	2,003.0	1,769.2	8.567			
13,700.0	7,510.0	13,591.6	7,510.0	128.1	120.0	-90.00	-6,102.5	1,183.3	2,003.0	1,765.4	8.431			
13,800.0	7,510.0	13,691.6	7,510.0	129.9	121.9	-90.00	-6,197.0	1,215.9	2,003.0	1,761.7	8.299			
13,900.0	7,510.0	13,791.6	7,510.0	131.6	123.8	-90.00	-6,291.5	1,248.6	2,003.0	1,757.9	8.171			
14,000.0	7,510.0	13,891.6	7,510.0	133.3	125.7	-90.00	-6,386.0	1,281.2	2,003.0	1,754.1	8.047			
14,100.0	7,510.0	13,991.6	7,510.0	135.0	127.6	-90.00	-6,480.6	1,313.8	2,003.0	1,750.3	7.925			

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

Company:	Arsenal Resources	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
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 16 201	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 16 203 - 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)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Semi Major Reference (usft)	Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning
14,200.0	7,510.0	14,091.6	7,510.0	136.7	129.5	-80.00	-6,575.1	1,348.5	2,003.0	1,745.5	7.809	
14,300.0	7,510.0	14,191.6	7,510.0	138.5	131.4	-90.00	-6,669.6	1,379.1	2,003.0	1,742.7	7.595	
14,400.0	7,510.0	14,291.6	7,510.0	140.2	133.2	-90.00	-6,764.1	1,411.8	2,003.0	1,738.9	7.585	
14,500.0	7,510.0	14,391.6	7,510.0	142.0	135.1	-90.00	-6,858.7	1,444.4	2,003.0	1,735.1	7.477	
14,600.0	7,510.0	14,491.6	7,510.0	143.7	137.0	-90.00	-6,953.2	1,477.0	2,003.0	1,731.3	7.373	
14,700.0	7,510.0	14,591.6	7,510.0	145.5	138.9	-90.00	-7,047.7	1,509.7	2,003.0	1,727.5	7.271	
14,800.0	7,510.0	14,691.6	7,510.0	147.3	140.8	-90.00	-7,142.2	1,542.3	2,003.0	1,723.8	7.172	
14,900.0	7,510.0	14,791.6	7,510.0	149.0	142.7	-90.00	-7,236.7	1,575.0	2,003.0	1,720.0	7.076	
15,000.0	7,510.0	14,891.6	7,510.0	150.8	144.6	-90.00	-7,331.3	1,607.6	2,003.0	1,716.2	6.982	
15,100.0	7,510.0	14,991.6	7,510.0	152.6	146.5	-90.00	-7,425.8	1,640.2	2,003.0	1,712.4	6.891	
15,175.2	7,510.0	15,057.8	7,510.0	153.9	148.0	-90.00	-7,497.8	1,665.1	2,003.0	1,709.5	6.825	
15,200.0	7,510.0	15,091.6	7,510.0	154.4	148.4	-90.00	-7,520.3	1,672.9	2,003.0	1,708.6	6.802	
15,300.0	7,510.0	15,191.6	7,510.0	155.1	150.3	-90.00	-7,614.8	1,705.5	2,003.0	1,704.7	6.715	
15,400.0	7,510.0	15,291.6	7,510.0	157.9	152.2	-90.00	-7,709.4	1,738.2	2,003.0	1,700.9	6.631	
15,500.0	7,510.0	15,391.6	7,510.0	159.7	154.1	-90.00	-7,803.9	1,770.8	2,003.0	1,697.1	6.548	
15,600.0	7,510.0	15,491.6	7,510.0	161.5	156.0	-90.00	-7,898.4	1,803.4	2,003.0	1,693.3	6.468	
15,700.0	7,510.0	15,591.6	7,510.0	163.3	157.9	-90.00	-7,992.9	1,836.1	2,003.0	1,689.5	6.389	
15,800.0	7,510.0	15,691.6	7,510.0	165.1	159.8	-90.00	-8,087.5	1,868.7	2,003.0	1,685.7	6.313	
15,808.8	7,510.0	15,700.4	7,510.0	165.3	160.0	-90.00	-8,095.7	1,871.5	2,003.0	1,685.5	6.308	
15,900.0	7,510.0	15,791.6	7,510.0	166.9	161.7	-90.00	-8,182.0	1,901.4	2,003.0	1,681.9	6.238	
16,000.0	7,510.0	15,891.6	7,510.0	168.7	163.6	-90.00	-8,276.5	1,934.0	2,003.0	1,678.1	6.165	
16,100.0	7,510.0	15,991.6	7,510.0	170.5	165.5	-90.00	-8,371.0	1,966.6	2,003.0	1,674.3	6.093	
16,200.0	7,510.0	16,091.6	7,510.0	172.4	167.5	-90.00	-8,465.5	1,999.3	2,003.0	1,670.5	6.023	
16,300.0	7,510.0	16,191.6	7,510.0	174.2	169.4	-90.00	-8,560.1	2,031.9	2,003.0	1,666.7	5.955	
16,400.0	7,510.0	16,291.6	7,510.0	176.0	171.3	-90.00	-8,654.6	2,064.5	2,003.0	1,662.9	5.888	
16,500.0	7,510.0	16,391.6	7,510.0	177.8	173.2	-90.00	-8,749.1	2,097.2	2,003.0	1,659.0	5.823	
16,600.0	7,510.0	16,491.6	7,510.0	179.5	175.1	-90.00	-8,843.6	2,129.8	2,003.0	1,655.2	5.759	
16,700.0	7,510.0	16,591.6	7,510.0	181.5	177.0	-90.00	-8,938.2	2,162.5	2,003.0	1,651.4	5.697	
16,800.0	7,510.0	16,691.6	7,510.0	183.3	178.9	-90.00	-9,032.7	2,195.1	2,003.0	1,647.6	5.636	
16,900.0	7,510.0	16,791.6	7,510.0	185.1	180.8	-90.00	-9,127.2	2,227.7	2,003.0	1,643.8	5.576	
17,000.0	7,510.0	16,891.6	7,510.0	186.9	182.7	-90.00	-9,221.7	2,260.4	2,003.0	1,640.0	5.517	
17,100.0	7,510.0	16,991.6	7,510.0	188.8	184.6	-90.00	-9,316.3	2,293.0	2,003.0	1,636.1	5.460	
17,200.0	7,510.0	17,091.6	7,510.0	190.6	186.5	-90.00	-9,410.8	2,325.7	2,003.0	1,632.3	5.403	
17,300.0	7,510.0	17,191.6	7,510.0	192.5	188.4	-90.00	-9,505.3	2,358.3	2,003.0	1,628.5	5.348	
17,400.0	7,510.0	17,291.6	7,510.0	194.3	190.3	-90.00	-9,599.8	2,390.9	2,003.0	1,624.7	5.294	
17,500.0	7,510.0	17,391.6	7,510.0	196.1	192.2	-90.00	-9,694.4	2,423.6	2,003.0	1,620.9	5.242	
17,600.0	7,510.0	17,491.6	7,510.0	198.0	194.2	-90.00	-9,788.9	2,456.2	2,003.0	1,617.1	5.190	
17,700.0	7,510.0	17,591.6	7,510.0	199.8	196.1	-90.00	-9,883.4	2,488.9	2,003.0	1,613.2	5.139	
17,800.0	7,510.0	17,691.6	7,510.0	201.7	198.0	-90.00	-9,977.9	2,521.5	2,003.0	1,609.4	5.089	
17,900.0	7,510.0	17,791.6	7,510.0	203.5	199.9	-90.00	-10,072.4	2,554.1	2,003.0	1,605.6	5.040	
18,000.0	7,510.0	17,891.6	7,510.0	205.4	201.8	-90.00	-10,167.0	2,586.8	2,003.0	1,601.8	4.992	
18,100.0	7,510.0	17,991.6	7,510.0	207.2	203.7	-90.00	-10,261.5	2,619.4	2,003.0	1,597.9	4.945	
18,200.0	7,510.0	18,091.6	7,510.0	209.1	205.6	-90.00	-10,356.0	2,652.1	2,003.0	1,594.1	4.899	
18,300.0	7,510.0	18,191.6	7,510.0	210.9	207.5	-90.00	-10,450.5	2,684.7	2,003.0	1,590.3	4.853	
18,400.0	7,510.0	18,291.6	7,510.0	212.8	209.4	-90.00	-10,545.1	2,717.3	2,003.0	1,586.5	4.809	
18,500.0	7,510.0	18,391.6	7,510.0	214.6	211.3	-90.00	-10,639.6	2,750.0	2,003.0	1,582.7	4.765	
18,600.0	7,510.0	18,491.6	7,510.0	216.5	213.3	-90.00	-10,734.1	2,782.6	2,003.0	1,578.8	4.722	
18,700.0	7,510.0	18,591.6	7,510.0	218.3	215.2	-90.00	-10,828.6	2,815.3	2,003.0	1,575.0	4.680	
18,707.5	7,510.0	18,599.1	7,510.0	218.5	215.3	-90.00	-10,835.8	2,817.7	2,003.0	1,574.8	4.678	
18,800.0	7,510.0	18,691.6	7,510.0	220.2	217.1	-90.00	-10,929.3	2,847.9	2,003.0	1,571.2	4.638	
18,900.0	7,510.0	18,791.6	7,510.0	222.1	219.0	-90.00	-11,017.7	2,880.5	2,003.0	1,567.4	4.598	
19,000.0	7,510.0	18,891.6	7,510.0	223.9	220.8	-90.00	-11,112.2	2,913.2	2,003.0	1,563.5	4.558	

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West Virginia Department of Environmental Protection
COMPASS 5000.15 Build 910

10/08/2021



Anticollision Report



Company:	Arsenal Resources	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
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 16 201	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 16 203 - 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)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
19,100.0	7,510.0	18,991.6	7,510.0	225.8	222.8	-90.00	-11,205.7	2,945.8	2,003.0	1,559.7	4.518		
19,200.0	7,510.0	19,091.6	7,510.0	227.7	224.7	-90.00	-11,301.3	2,978.5	2,003.0	1,555.9	4.480		
19,215.6	7,510.0	19,108.2	7,510.0	228.0	225.0	-90.00	-11,316.9	2,983.9	2,003.0	1,555.3	4.474		
19,300.0	7,510.0	19,191.6	7,510.0	229.5	226.5	-90.00	-11,395.8	3,011.1	2,003.0	1,552.1	4.442		
19,400.0	7,510.0	19,291.6	7,510.0	231.4	228.5	-90.00	-11,490.3	3,043.7	2,003.0	1,548.2	4.404		
19,500.0	7,510.0	19,391.6	7,510.0	233.3	230.5	-90.00	-11,584.8	3,076.4	2,003.0	1,544.4	4.368		
19,600.0	7,510.0	19,491.6	7,510.0	235.1	232.4	-90.00	-11,679.3	3,109.0	2,003.0	1,540.6	4.331		
19,700.0	7,510.0	19,591.6	7,510.0	237.0	234.3	-90.00	-11,773.9	3,141.5	2,003.0	1,536.7	4.296		
19,800.0	7,510.0	19,691.6	7,510.0	238.9	236.2	-90.00	-11,868.4	3,174.3	2,003.0	1,532.9	4.261		
19,823.9	7,510.0	19,715.5	7,510.0	239.3	236.7	-90.00	-11,891.0	3,182.1	2,003.0	1,532.1	4.253		
19,900.0	7,510.0	19,791.6	7,510.0	240.7	238.1	-90.00	-11,962.9	3,206.9	2,003.0	1,529.1	4.226		
20,000.0	7,510.0	19,891.6	7,510.0	242.6	240.0	-90.00	-12,057.4	3,239.5	2,003.0	1,525.3	4.193		
20,100.0	7,510.0	19,991.6	7,510.0	244.5	241.9	-90.00	-12,152.0	3,272.2	2,003.0	1,521.4	4.159		
20,200.0	7,510.0	20,091.6	7,510.0	246.3	243.9	-90.00	-12,246.5	3,304.8	2,003.0	1,517.6	4.126		
20,300.0	7,510.0	20,191.6	7,510.0	248.2	245.8	-90.00	-12,341.0	3,337.5	2,003.0	1,513.8	4.094		
20,400.0	7,510.0	20,291.6	7,510.0	250.1	247.7	-90.00	-12,435.5	3,370.1	2,003.0	1,509.9	4.062		
20,500.0	7,510.0	20,391.6	7,510.0	252.0	249.5	-90.00	-12,530.1	3,402.8	2,003.0	1,506.1	4.031		
20,600.0	7,510.0	20,491.6	7,510.0	253.8	251.5	-90.00	-12,624.6	3,435.4	2,003.0	1,502.3	4.000		
20,700.0	7,510.0	20,591.6	7,510.0	255.7	253.4	-90.00	-12,719.1	3,468.0	2,003.0	1,498.5	3.970		
20,800.0	7,510.0	20,691.6	7,510.0	257.6	255.3	-90.00	-12,813.6	3,500.7	2,003.0	1,494.6	3.940		
20,900.0	7,510.0	20,791.6	7,510.0	259.5	257.3	-90.00	-12,908.1	3,533.3	2,003.0	1,490.8	3.910		
21,000.0	7,510.0	20,891.6	7,510.0	261.4	259.2	-90.00	-13,002.7	3,566.0	2,003.0	1,487.0	3.881		
21,100.0	7,510.0	20,991.6	7,510.0	263.2	261.1	-90.00	-13,097.2	3,598.6	2,003.0	1,483.1	3.853		
21,200.0	7,510.0	21,091.6	7,510.0	265.1	263.0	-90.00	-13,191.7	3,631.2	2,003.0	1,479.3	3.825		
21,202.3	7,510.0	21,093.9	7,510.0	265.2	263.1	-90.00	-13,193.9	3,632.0	2,003.0	1,479.3	3.825		
21,300.0	7,510.0	21,191.6	7,510.0	267.0	264.9	-90.00	-13,288.2	3,663.9	2,003.0	1,475.5	3.797		
21,400.0	7,510.0	21,291.6	7,510.0	268.9	266.8	-90.00	-13,382.8	3,696.5	2,003.0	1,471.6	3.769		
21,500.0	7,510.0	21,391.6	7,510.0	270.8	268.8	-90.00	-13,477.3	3,729.2	2,003.0	1,467.8	3.743		
21,600.0	7,510.0	21,491.6	7,510.0	272.6	270.7	-90.00	-13,569.8	3,761.8	2,003.0	1,464.0	3.716		
21,700.0	7,510.0	21,591.6	7,510.0	274.5	272.5	-90.00	-13,664.3	3,794.4	2,003.0	1,460.1	3.690		
21,800.0	7,510.0	21,691.6	7,510.0	276.4	274.5	-90.00	-13,758.9	3,827.1	2,003.0	1,456.3	3.664		
21,900.0	7,510.0	21,791.6	7,510.0	278.3	276.4	-90.00	-13,853.4	3,859.7	2,003.0	1,452.5	3.638		
22,000.0	7,510.0	21,891.6	7,510.0	280.2	278.3	-90.00	-13,947.9	3,892.4	2,003.0	1,448.7	3.613		
22,100.0	7,510.0	21,991.6	7,510.0	282.1	280.2	-90.00	-14,042.4	3,925.0	2,003.0	1,444.8	3.588		
22,200.0	7,510.0	22,091.6	7,510.0	284.0	282.2	-90.00	-14,137.0	3,957.6	2,003.0	1,441.0	3.564		
22,300.0	7,510.0	22,191.6	7,510.0	285.9	284.1	-90.00	-14,231.5	3,990.3	2,003.0	1,437.2	3.540		
22,400.0	7,510.0	22,291.6	7,510.0	287.7	286.0	-90.00	-14,326.0	4,022.9	2,003.0	1,433.3	3.516		
22,500.0	7,510.0	22,391.6	7,510.0	289.6	287.9	-90.00	-14,420.5	4,055.5	2,003.0	1,429.5	3.492		
22,600.0	7,510.0	22,491.6	7,510.0	291.5	289.8	-90.00	-14,515.0	4,088.2	2,003.0	1,425.7	3.469		
22,608.2	7,510.0	22,499.8	7,510.0	291.7	289.0	-90.00	-14,522.8	4,090.9	2,003.0	1,425.4	3.468		
22,700.0	7,510.0	22,591.6	7,510.0	293.4	291.7	-90.00	-14,609.6	4,120.8	2,003.0	1,421.8	3.446		
22,800.0	7,510.0	22,691.6	7,510.0	295.3	293.7	-90.00	-14,704.1	4,153.5	2,003.0	1,418.0	3.424		
22,900.0	7,510.0	22,791.6	7,510.0	297.2	295.6	-90.00	-14,798.6	4,186.1	2,003.0	1,414.2	3.401		
22,957.9	7,510.0	22,849.5	7,510.0	298.3	296.7	-90.00	-14,853.3	4,205.0	2,003.0	1,412.0	3.389		
23,000.0	7,510.0	22,891.6	7,510.0	299.1	297.5	-90.00	-14,893.1	4,218.7	2,003.0	1,410.3	3.379		
23,100.0	7,510.0	22,991.6	7,510.0	301.0	299.4	-90.00	-14,987.7	4,251.4	2,003.0	1,406.5	3.358		
23,200.0	7,510.0	23,091.6	7,510.0	302.8	301.3	-90.00	-15,082.2	4,284.0	2,003.0	1,402.7	3.336		
23,300.0	7,510.0	23,191.6	7,510.0	304.7	303.2	-90.00	-15,176.7	4,316.7	2,003.0	1,398.8	3.315		
23,400.0	7,510.0	23,291.6	7,510.0	306.6	305.2	-90.00	-15,271.2	4,349.3	2,003.0	1,395.0	3.294		
23,500.0	7,510.0	23,391.6	7,510.0	308.5	307.1	-90.00	-15,365.8	4,381.9	2,003.0	1,391.1	3.274		
23,600.0	7,510.0	23,491.6	7,510.0	310.4	309.0	-90.00	-15,460.3	4,414.6	2,003.0	1,387.3	3.253		
23,700.0	7,510.0	23,591.6	7,510.0	312.3	310.9	-90.00	-15,554.8	4,447.2	2,003.0	1,383.5	3.233		

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

Company:	Arsenal Resources	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
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 16 201	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 16 203 - 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)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning		
23,800.0	7,510.0	23,691.6	7,510.0	314.2	312.8	-90.00	-15,649.3	4,479.9	2,003.0	1,379.6	3.213			
23,900.0	7,510.0	23,791.6	7,510.0	316.1	314.7	-90.00	-15,743.9	4,512.5	2,003.0	1,375.8	3.194			
24,000.0	7,510.0	23,891.6	7,510.0	318.0	316.7	-90.00	-15,838.4	4,545.1	2,003.0	1,372.0	3.174			
24,100.0	7,510.0	23,991.6	7,510.0	319.9	318.6	-90.00	-15,932.9	4,577.8	2,003.0	1,368.1	3.155			
24,200.0	7,510.0	24,091.6	7,510.0	321.8	320.5	-90.00	-16,027.4	4,610.4	2,003.0	1,364.3	3.136			
24,300.0	7,510.0	24,191.6	7,510.0	323.7	322.4	-90.00	-16,121.9	4,643.1	2,003.0	1,360.5	3.117			
24,400.0	7,510.0	24,291.6	7,510.0	325.6	324.3	-90.00	-16,216.5	4,675.7	2,003.0	1,356.6	3.099			
24,500.0	7,510.0	24,391.6	7,510.0	327.5	326.2	-90.00	-16,311.0	4,708.3	2,003.0	1,352.8	3.081			
24,600.0	7,510.0	24,491.6	7,510.0	329.4	328.2	-90.00	-16,405.5	4,741.0	2,003.0	1,349.0	3.062			
24,700.0	7,510.0	24,591.6	7,510.0	331.3	330.1	-90.00	-16,500.0	4,773.6	2,003.0	1,345.1	3.045			
24,800.0	7,510.0	24,691.6	7,510.0	333.1	332.0	-90.00	-16,594.6	4,806.3	2,003.0	1,341.3	3.027			
24,900.0	7,510.0	24,791.6	7,510.0	335.0	333.9	-90.00	-16,689.1	4,838.9	2,003.0	1,337.5	3.010			
25,000.0	7,510.0	24,891.6	7,510.0	336.9	335.8	-90.00	-16,783.6	4,871.5	2,003.0	1,333.6	2.992			
25,100.0	7,510.0	24,991.6	7,510.0	338.8	337.8	-90.00	-16,878.1	4,904.2	2,003.0	1,329.8	2.975			
25,200.0	7,510.0	25,113.4	7,510.0	340.7	340.1	-90.00	-16,993.5	4,943.3	2,002.4	1,324.2	2.953 SF			
25,221.9	7,510.0	25,113.4	7,510.0	341.2	340.1	-90.00	-16,993.5	4,943.3	2,002.3	1,324.5	2.954			
25,300.0	7,510.0	25,113.4	7,510.0	342.6	340.1	-90.00	-16,993.5	4,943.3	2,003.8	1,327.5	2.953			
25,400.0	7,510.0	25,113.4	7,510.0	344.5	340.1	-90.00	-16,993.5	4,943.3	2,010.2	1,337.1	2.986			
25,500.0	7,510.0	25,113.4	7,510.0	346.4	340.1	-90.00	-16,993.5	4,943.3	2,021.6	1,353.2	3.025			
25,600.0	7,510.0	25,113.4	7,510.0	348.3	340.1	-90.00	-16,993.5	4,943.3	2,037.7	1,375.7	3.078			
25,700.0	7,510.0	25,113.4	7,510.0	350.2	340.1	-90.00	-16,993.5	4,943.3	2,058.6	1,404.4	3.146			
25,800.0	7,510.0	25,113.4	7,510.0	352.1	340.1	-90.00	-16,993.5	4,943.3	2,084.1	1,438.8	3.230			
25,900.0	7,510.0	25,113.4	7,510.0	354.0	340.1	-90.00	-16,993.5	4,943.3	2,114.0	1,478.8	3.328			
26,000.0	7,510.0	25,113.4	7,510.0	355.9	340.1	-90.00	-16,993.5	4,943.3	2,148.2	1,524.0	3.442			
26,100.0	7,510.0	25,113.4	7,510.0	357.8	340.1	-90.00	-16,993.5	4,943.3	2,186.4	1,574.0	3.570			
26,158.7	7,510.0	25,113.4	7,510.0	358.9	340.1	-90.00	-16,993.5	4,943.3	2,211.1	1,605.9	3.654			

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Anticollision Report



Company:	Arsenal Resources	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
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 16 201	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)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Reference (usft)	Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
0.0	0.0	100.0	100.0	0.0	0.0	114.96	-19.0	40.8	110.3				
100.0	100.0	100.0	100.0	0.1	0.0	114.96	-19.0	40.8	45.0	44.9	547.159		
133.6	133.6	132.9	132.9	0.2	0.0	114.96	-19.0	40.8	45.0	44.8	231.295		
200.0	200.0	199.3	199.3	0.3	0.1	114.96	-19.0	40.8	45.0	44.6	107.555		
300.0	300.0	299.3	299.3	0.5	0.3	114.96	-19.0	40.8	45.0	44.1	51.896		
400.0	400.0	399.3	399.3	0.8	0.6	114.96	-19.0	40.8	45.0	43.7	34.178		
500.0	500.0	499.3	499.3	1.0	0.8	114.96	-19.0	40.8	45.0	43.2	25.479		
600.0	600.0	599.3	599.3	1.2	1.0	114.96	-19.0	40.8	45.0	42.8	20.310		
700.0	700.0	699.3	699.3	1.4	1.2	114.96	-19.0	40.8	45.0	42.3	16.884		
800.0	800.0	799.3	799.3	1.7	1.5	114.96	-19.0	40.8	45.0	41.9	14.448		
900.0	900.0	899.3	899.3	1.9	1.7	114.96	-19.0	40.8	45.0	41.4	12.625		
1,000.0	1,000.0	999.3	999.3	2.1	1.9	114.96	-19.0	40.8	45.0	41.0	11.211		
1,100.0	1,100.0	1,099.3	1,099.3	2.3	2.1	114.96	-19.0	40.8	45.0	40.5	10.082		
1,200.0	1,200.0	1,199.3	1,199.3	2.5	2.4	114.96	-19.0	40.8	45.0	40.1	9.160		
1,300.0	1,300.0	1,299.3	1,299.3	2.8	2.6	114.96	-19.0	40.8	45.0	39.6	8.392		
1,400.0	1,400.0	1,399.3	1,399.3	3.0	2.8	114.96	-19.0	40.8	45.0	39.2	7.743		
1,500.0	1,500.0	1,499.3	1,499.3	3.2	3.0	114.96	-19.0	40.8	45.0	38.7	7.187		
1,600.0	1,600.0	1,599.3	1,599.3	3.5	3.3	114.96	-19.0	40.8	45.0	38.3	6.706		
1,700.0	1,700.0	1,699.3	1,699.3	3.7	3.5	114.96	-19.0	40.8	45.0	37.8	6.285		
1,800.0	1,800.0	1,799.3	1,799.3	3.9	3.7	114.96	-19.0	40.8	45.0	37.4	5.913		
1,900.0	1,900.0	1,899.3	1,899.3	4.1	3.9	114.96	-19.0	40.8	45.0	36.9	5.584		
2,000.0	2,000.0	1,999.3	1,999.3	4.4	4.2	114.96	-19.0	40.8	45.0	36.5	5.289 CC, ES		
2,100.0	2,100.0	2,099.3	2,099.3	4.6	4.4	-127.03	-19.0	40.8	46.0	37.1	5.151		
2,200.0	2,199.8	2,199.1	2,199.1	4.7	4.6	-131.83	-19.0	40.8	49.4	40.0	5.281		
2,300.0	2,299.5	2,298.8	2,298.8	4.9	4.8	-138.45	-19.0	40.8	55.6	45.8	5.593		
2,400.0	2,398.7	2,398.0	2,398.0	5.2	5.1	-145.44	-19.0	40.8	65.2	55.0	6.407		
2,500.0	2,497.5	2,496.8	2,496.8	5.4	5.3	-151.78	-19.0	40.8	78.6	68.0	7.419		
2,600.0	2,595.6	2,591.9	2,591.9	5.7	5.5	-157.04	-18.5	42.2	97.4	86.4	8.859		
2,700.0	2,693.1	2,684.6	2,684.6	6.0	5.7	-161.22	-17.1	46.4	123.2	111.8	10.935		
2,800.0	2,789.6	2,775.8	2,775.4	6.3	5.9	-164.33	-14.9	53.3	155.5	143.8	13.250		
2,900.0	2,885.3	2,856.6	2,857.8	6.7	6.1	-166.64	-12.4	61.0	192.2	180.0	15.829		
3,000.0	2,979.8	2,960.0	2,958.9	7.2	6.3	-168.36	-9.9	68.5	232.2	219.7	18.505		
3,100.0	3,073.2	3,049.9	3,048.5	7.7	6.5	-169.67	-7.4	75.0	275.5	262.5	21.268		
3,200.0	3,166.2	3,138.3	3,136.6	8.3	6.7	-170.69	-5.0	83.3	322.0	308.6	24.073		
3,300.0	3,255.8	3,225.0	3,222.8	9.0	6.9	-171.50	-2.7	90.5	371.6	357.8	26.936		
3,400.0	3,344.9	3,309.8	3,307.4	9.8	7.1	-172.15	-0.3	97.5	424.2	410.0	29.837		
3,500.0	3,432.4	3,392.8	3,390.1	10.6	7.3	-172.69	1.9	104.4	479.8	465.2	32.756		
3,598.8	3,517.1	3,472.8	3,469.8	11.6	7.5	-173.12	4.1	111.0	537.6	522.5	35.680		
3,600.0	3,518.1	3,473.8	3,470.8	11.6	7.5	-173.13	4.1	111.1	538.3	523.2	35.716		
3,700.0	3,602.9	3,553.8	3,550.4	12.6	7.7	-173.65	6.3	117.7	598.2	582.7	38.582		
3,800.0	3,687.8	3,647.4	3,643.7	13.6	7.9	-174.15	8.6	124.9	657.5	641.6	41.077		
3,800.0	3,772.6	3,755.3	3,751.5	14.6	8.1	-174.65	10.3	129.7	714.3	697.8	43.105		
4,000.0	3,857.4	3,860.5	3,856.7	15.7	8.3	-175.10	10.6	130.9	768.0	750.9	44.872		
4,100.0	3,942.2	3,945.4	3,941.5	16.7	8.5	-175.41	10.6	130.9	820.9	803.3	46.653		
4,200.0	4,027.1	4,030.2	4,026.4	17.8	8.7	-175.69	10.6	130.9	873.7	855.6	48.304		
4,300.0	4,111.9	4,115.0	4,111.2	18.9	8.8	-175.94	10.6	130.9	926.6	908.0	49.858		
4,400.0	4,196.7	4,199.8	4,196.0	20.0	9.0	-176.15	10.6	130.9	979.4	960.3	51.316		
4,500.0	4,281.6	4,284.7	4,280.9	21.1	9.2	-176.33	10.6	130.9	1,032.3	1,012.7	52.692		
4,600.0	4,366.4	4,369.5	4,365.7	22.2	9.4	-176.53	10.6	130.9	1,085.2	1,065.1	53.989		
4,700.0	4,451.2	4,454.3	4,450.5	23.3	9.6	-176.69	10.6	130.9	1,138.1	1,117.5	55.216		
4,800.0	4,536.0	4,539.2	4,535.3	24.4	9.8	-176.84	10.6	130.9	1,191.0	1,169.8	56.373		
4,900.0	4,620.9	4,624.0	4,620.2	25.5	10.0	-176.97	10.6	130.9	1,243.9	1,222.2	57.469		

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

Company:	Arsenal Resources	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
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 16 201	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)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	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	4,705.7	4,708.8	4,705.0	28.7	10.1	-177.10	10.6	130.9	1,296.8	1,274.6	58.507		
5,100.0	4,790.5	4,793.6	4,789.8	27.8	10.3	-177.21	10.6	130.9	1,349.7	1,327.0	58.492		
5,200.0	4,875.3	4,878.5	4,874.6	28.9	10.5	-177.32	10.6	130.9	1,402.6	1,379.4	60.427		
5,300.0	4,950.2	4,963.3	4,959.5	30.0	10.7	-177.41	10.6	130.9	1,455.5	1,431.8	61.316		
5,400.0	5,045.0	5,048.1	5,044.3	31.2	10.9	-177.50	10.6	130.9	1,508.4	1,484.2	62.182		
5,500.0	5,129.8	5,133.0	5,129.1	32.3	11.1	-177.59	10.6	130.9	1,561.3	1,536.5	62.967		
5,600.0	5,214.7	5,217.8	5,214.0	33.4	11.3	-177.67	10.6	130.9	1,614.3	1,588.9	63.735		
5,700.0	5,299.5	5,302.6	5,299.8	34.6	11.5	-177.74	10.6	130.9	1,667.2	1,641.3	64.467		
5,800.0	5,384.3	5,387.4	5,383.6	35.7	11.6	-177.81	10.6	130.9	1,720.1	1,693.7	65.167		
5,900.0	5,469.1	5,472.3	5,468.4	36.8	11.8	-177.88	10.6	130.9	1,773.0	1,746.1	65.836		
6,000.0	5,554.0	5,557.1	5,553.3	38.0	12.0	-177.94	10.6	130.9	1,826.0	1,798.5	66.478		
6,100.0	5,638.8	5,641.9	5,638.1	39.1	12.2	-178.00	10.6	130.9	1,878.9	1,850.9	67.089		
6,200.0	5,723.6	5,726.7	5,722.9	40.2	12.4	-178.05	10.6	130.9	1,931.8	1,903.3	67.676		
6,300.0	5,808.4	5,811.6	5,807.7	41.4	12.6	-178.10	10.6	130.9	1,984.8	1,955.7	68.239		
6,400.0	5,893.3	5,896.4	5,892.6	42.5	12.8	-178.15	10.6	130.9	2,037.7	2,008.1	68.779		
6,500.0	5,978.1	5,981.2	5,977.4	43.7	13.0	-178.20	10.6	130.9	2,090.6	2,060.5	69.298		
6,600.0	6,062.9	6,066.1	6,062.2	44.8	13.2	-178.24	10.6	130.9	2,143.5	2,112.9	69.797		
6,700.0	6,147.8	6,150.9	6,147.1	45.9	13.3	-178.29	10.6	130.9	2,196.5	2,165.3	70.277		
6,800.0	6,232.6	6,235.7	6,231.9	47.1	13.5	-178.33	10.6	130.9	2,249.5	2,217.7	70.739		
6,900.0	6,317.4	6,320.5	6,316.7	48.2	13.7	-178.36	10.6	130.9	2,302.4	2,270.1	71.184		
7,000.0	6,402.2	6,405.4	6,401.5	49.4	13.9	-178.40	10.6	130.9	2,355.3	2,322.5	71.613		
7,100.0	6,487.1	6,513.8	6,509.9	50.5	14.1	-178.41	9.5	131.2	2,408.2	2,374.6	71.751		
7,200.0	6,571.9	6,731.6	6,720.9	51.7	14.5	-177.20	-37.4	147.4	2,458.0	2,423.2	70.693		
7,300.0	6,656.7	6,813.8	6,876.1	52.8	15.0	-174.91	-126.4	178.2	2,504.2	2,468.0	69.288		
7,400.0	6,741.6	7,047.6	6,969.8	53.9	15.5	-172.65	-216.4	209.2	2,549.0	2,511.4	67.925		
7,500.0	6,826.4	7,142.2	7,023.0	55.1	16.1	-170.80	-260.3	234.7	2,594.2	2,555.4	66.812		
7,600.0	6,911.2	7,209.9	7,053.7	56.2	16.6	-169.39	-347.3	254.4	2,640.8	2,600.9	66.114		
7,700.0	6,996.0	7,259.7	7,072.1	57.4	17.0	-168.30	-391.0	269.5	2,686.4	2,648.6	65.824		
7,729.1	7,020.7	7,271.7	7,076.0	57.7	17.1	-168.04	-401.8	273.2	2,704.0	2,662.9	65.806		
7,750.0	7,038.4	7,280.1	7,078.6	57.9	17.2	-163.81	-409.3	275.8	2,714.6	2,673.3	65.807		
7,800.0	7,080.4	7,301.0	7,084.6	58.4	17.4	-154.01	-428.3	282.4	2,740.0	2,698.3	65.868		
7,850.0	7,121.7	7,323.0	7,090.1	58.9	17.6	-144.80	-448.3	289.3	2,765.5	2,723.4	65.769		
7,900.0	7,162.0	7,345.8	7,095.1	59.4	17.8	-136.32	-468.4	296.6	2,790.9	2,748.4	65.716		
7,950.0	7,201.2	7,368.3	7,099.5	59.9	18.1	-128.60	-491.2	304.1	2,815.9	2,773.0	65.627		
8,000.0	7,238.9	7,393.4	7,103.0	60.4	18.3	-121.64	-513.7	311.9	2,840.4	2,797.1	65.521		
8,050.0	7,274.9	7,418.0	7,105.7	60.8	18.6	-115.42	-536.8	319.9	2,864.3	2,820.5	65.386		
8,100.0	7,308.0	7,443.0	7,107.5	61.3	18.9	-109.89	-560.4	328.0	2,897.2	2,843.0	65.230		
8,150.0	7,341.1	7,468.3	7,108.3	61.7	19.2	-104.98	-584.3	336.3	2,909.1	2,864.4	65.048		
8,200.0	7,370.8	7,501.5	7,108.3	62.1	19.6	-100.57	-615.7	347.1	2,929.8	2,884.4	64.599		
8,250.0	7,398.0	7,539.9	7,108.3	62.6	20.1	-96.68	-652.0	359.6	2,949.0	2,902.8	63.934		
8,300.0	7,422.6	7,580.8	7,108.3	62.9	20.6	-93.31	-690.6	373.0	2,965.5	2,919.5	63.174		
8,350.0	7,444.4	7,623.7	7,108.3	63.3	21.2	-90.44	-731.2	387.0	2,982.1	2,934.2	62.299		
8,400.0	7,463.2	7,668.6	7,108.3	63.6	21.8	-88.04	-773.6	401.6	2,995.8	2,948.9	61.322		
8,450.0	7,479.0	7,715.0	7,108.3	63.9	22.4	-86.09	-817.5	416.8	3,007.3	2,957.4	60.262		
8,500.0	7,491.6	7,762.8	7,108.3	64.2	23.1	-84.57	-862.7	432.4	3,016.5	2,965.5	59.114		
8,550.0	7,501.0	7,811.5	7,108.3	64.5	23.8	-83.45	-908.7	448.3	3,023.4	2,971.2	57.910		
8,600.0	7,507.1	7,861.0	7,108.3	64.7	24.5	-82.74	-955.5	464.4	3,027.9	2,974.5	56.644		
8,650.0	7,509.8	7,910.9	7,108.3	65.0	25.3	-82.42	-1,002.7	480.7	3,030.0	2,975.2	55.347		
8,665.4	7,510.0	7,927.2	7,108.3	65.0	25.8	-82.40	-1,018.1	486.0	3,030.1	2,974.9	54.912		
8,700.0	7,510.0	7,960.9	7,108.3	65.2	26.1	-82.40	-1,049.9	497.0	3,030.1	2,974.0	54.025		
8,800.0	7,510.0	8,060.9	7,108.3	65.7	27.7	-82.40	-1,144.4	529.6	3,030.1	2,971.2	51.478		
8,900.0	7,510.0	8,160.9	7,108.3	66.3	29.3	-82.40	-1,239.0	562.3	3,030.1	2,968.3	49.071		

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

Company:	Arsenal Resources	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
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 16 201	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)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning		
9,000.0	7,510.0	8,260.9	7,108.3	66.8	30.9	-82.40	-1,333.5	594.9	3,030.1	2,965.3	46.813			
9,100.0	7,510.0	8,360.9	7,108.3	67.5	32.6	-82.40	-1,428.0	627.6	3,030.1	2,962.3	44.700			
9,200.0	7,510.0	8,460.9	7,108.3	68.1	34.3	-82.40	-1,522.6	660.2	3,030.1	2,959.1	42.727			
9,300.0	7,510.0	8,560.9	7,108.3	68.8	36.1	-82.40	-1,617.1	692.8	3,030.1	2,955.9	40.886			
9,400.0	7,510.0	8,660.9	7,108.3	69.6	37.8	-82.40	-1,711.6	725.5	3,030.1	2,952.7	39.169			
9,500.0	7,510.0	8,760.9	7,108.3	70.4	39.6	-82.40	-1,806.1	758.1	3,030.0	2,949.4	37.568			
9,600.0	7,510.0	8,860.9	7,108.3	71.2	41.4	-82.40	-1,900.7	790.7	3,030.0	2,946.0	36.074			
9,700.0	7,510.0	8,960.9	7,108.3	72.0	43.2	-82.40	-1,995.2	823.4	3,030.0	2,942.7	34.679			
9,800.0	7,510.0	9,060.9	7,108.3	72.9	45.0	-82.40	-2,089.7	856.0	3,030.0	2,939.2	33.375			
9,900.0	7,510.0	9,160.9	7,108.3	73.9	46.8	-82.40	-2,184.2	888.6	3,030.0	2,935.8	32.156			
10,000.0	7,510.0	9,260.9	7,108.3	74.8	48.6	-82.40	-2,278.8	921.3	3,030.0	2,932.3	31.013			
10,100.0	7,510.0	9,360.9	7,108.3	75.8	50.4	-82.40	-2,373.3	953.9	3,030.0	2,928.8	29.942			
10,200.0	7,510.0	9,460.9	7,108.3	76.9	52.3	-82.40	-2,467.8	986.5	3,030.0	2,925.3	28.937			
10,300.0	7,510.0	9,560.9	7,108.3	78.0	54.1	-82.40	-2,562.3	1,019.2	3,030.0	2,921.8	27.991			
10,400.0	7,510.0	9,660.9	7,108.3	79.1	56.0	-82.40	-2,656.9	1,051.8	3,030.0	2,918.2	27.101			
10,500.0	7,510.0	9,760.9	7,108.3	80.2	57.8	-82.40	-2,751.4	1,084.4	3,030.0	2,914.6	26.262			
10,600.0	7,510.0	9,860.9	7,108.3	81.4	59.7	-82.40	-2,845.9	1,117.1	3,030.0	2,911.0	25.470			
10,700.0	7,510.0	9,960.9	7,108.3	82.6	61.5	-82.40	-2,940.4	1,149.7	3,030.0	2,907.4	24.722			
10,800.0	7,510.0	10,060.9	7,108.3	83.8	63.4	-82.40	-3,035.0	1,182.3	3,030.0	2,903.8	24.014			
10,900.0	7,510.0	10,160.9	7,108.3	85.1	65.3	-82.40	-3,129.5	1,215.0	3,030.0	2,900.2	23.343			
11,000.0	7,510.0	10,260.9	7,108.3	86.4	67.1	-82.40	-3,224.0	1,247.6	3,030.0	2,896.5	22.707			
11,100.0	7,510.0	10,360.9	7,108.3	87.7	69.0	-82.40	-3,318.5	1,280.2	3,030.0	2,892.9	22.103			
11,200.0	7,510.0	10,460.9	7,108.3	89.0	70.9	-82.40	-3,413.1	1,312.9	3,030.0	2,889.2	21.530			
11,300.0	7,510.0	10,560.9	7,108.3	90.4	72.8	-82.40	-3,507.6	1,345.5	3,029.9	2,885.5	20.983			
11,400.0	7,510.0	10,660.9	7,108.3	91.8	74.5	-82.40	-3,602.1	1,378.1	3,029.9	2,881.9	20.463			
11,500.0	7,510.0	10,760.9	7,108.3	93.2	76.5	-82.40	-3,696.6	1,410.8	3,029.9	2,878.2	19.967			
11,600.0	7,510.0	10,860.9	7,108.3	94.6	78.4	-82.40	-3,791.2	1,443.4	3,029.9	2,874.5	19.494			
11,700.0	7,510.0	10,960.9	7,108.3	96.1	80.3	-82.40	-3,885.7	1,476.0	3,029.9	2,870.8	19.042			
11,800.0	7,510.0	11,060.9	7,108.3	97.6	82.2	-82.40	-3,980.2	1,508.7	3,029.9	2,867.1	18.610			
11,900.0	7,510.0	11,160.9	7,108.3	99.1	84.1	-82.40	-4,074.7	1,541.3	3,029.9	2,863.4	18.196			
12,000.0	7,510.0	11,260.9	7,108.3	100.6	86.0	-82.40	-4,169.3	1,573.9	3,029.9	2,859.7	17.800			
12,100.0	7,510.0	11,360.9	7,108.3	102.1	87.9	-82.40	-4,263.8	1,606.6	3,029.9	2,856.0	17.420			
12,200.0	7,510.0	11,460.9	7,108.3	103.6	89.8	-82.40	-4,358.3	1,639.2	3,029.9	2,852.2	17.056			
12,300.0	7,510.0	11,560.9	7,108.3	105.2	91.6	-82.39	-4,452.8	1,671.8	3,029.9	2,848.5	16.706			
12,400.0	7,510.0	11,660.9	7,108.3	106.7	93.5	-82.39	-4,547.4	1,704.5	3,029.9	2,844.8	16.370			
12,500.0	7,510.0	11,760.9	7,108.3	108.3	95.4	-82.39	-4,641.9	1,737.1	3,029.9	2,841.1	16.046			
12,600.0	7,510.0	11,860.9	7,108.3	109.9	97.3	-82.39	-4,736.4	1,769.7	3,029.9	2,837.3	15.736			
12,700.0	7,510.0	11,960.9	7,108.3	111.5	99.2	-82.39	-4,830.9	1,802.4	3,029.9	2,833.6	15.436			
12,800.0	7,510.0	12,060.9	7,108.3	113.1	101.1	-82.39	-4,925.5	1,835.0	3,029.9	2,829.8	15.148			
12,900.0	7,510.0	12,160.9	7,108.3	114.8	103.0	-82.39	-5,020.0	1,867.6	3,029.9	2,826.1	14.870			
13,000.0	7,510.0	12,260.9	7,108.3	116.4	104.9	-82.39	-5,114.5	1,900.3	3,029.8	2,822.3	14.601			
13,100.0	7,510.0	12,360.9	7,108.3	118.1	106.8	-82.39	-5,209.0	1,932.9	3,029.8	2,818.6	14.343			
13,200.0	7,510.0	12,460.9	7,108.3	119.7	108.7	-82.39	-5,303.6	1,965.5	3,029.8	2,814.8	14.092			
13,300.0	7,510.0	12,560.9	7,108.3	121.4	110.6	-82.39	-5,398.1	1,998.2	3,029.8	2,811.1	13.851			
13,400.0	7,510.0	12,660.9	7,108.3	123.1	112.6	-82.39	-5,492.6	2,030.8	3,029.8	2,807.3	13.617			
13,500.0	7,510.0	12,760.9	7,108.3	124.8	114.5	-82.39	-5,587.1	2,063.4	3,029.8	2,803.6	13.391			
13,600.0	7,510.0	12,860.9	7,108.3	126.4	116.4	-82.39	-5,681.7	2,096.1	3,029.8	2,799.8	13.173			
13,700.0	7,510.0	12,960.9	7,108.3	128.1	118.3	-82.39	-5,776.2	2,128.7	3,029.8	2,796.0	12.961			
13,800.0	7,510.0	13,060.9	7,108.3	129.8	120.2	-82.39	-5,870.7	2,161.3	3,029.8	2,792.3	12.755			
13,900.0	7,510.0	13,160.9	7,108.3	131.6	122.1	-82.39	-5,965.2	2,194.0	3,029.8	2,788.5	12.557			
14,000.0	7,510.0	13,260.9	7,108.3	133.3	124.0	-82.39	-6,059.8	2,226.6	3,029.8	2,784.7	12.364			
14,100.0	7,510.0	13,360.9	7,108.3	135.0	125.9	-82.39	-6,154.3	2,259.2	3,029.8	2,781.0	12.177			

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



Anticollision Report



Company:	Arsenal Resources	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
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 16 201	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: C-MWD default													Offset Well Error:	0.0 usft
Reference Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning		
14,200.0	7,510.0	13,460.9	7,108.3	138.7	127.8	-82.39	-8,248.8	2,291.9	3,029.8	2,777.2	11.995			
14,300.0	7,510.0	13,560.9	7,108.3	138.5	129.7	-82.39	-8,343.3	2,324.5	3,029.8	2,773.4	11.819			
14,400.0	7,510.0	13,660.9	7,108.3	140.2	131.6	-82.39	-8,437.9	2,357.1	3,029.8	2,769.6	11.647			
14,500.0	7,510.0	13,760.9	7,108.3	142.0	133.5	-82.39	-8,532.4	2,389.8	3,029.8	2,765.9	11.481			
14,600.0	7,510.0	13,860.9	7,108.3	143.7	135.4	-82.39	-8,626.9	2,422.4	3,029.8	2,762.1	11.319			
14,700.0	7,510.0	13,960.9	7,108.3	145.5	137.4	-82.39	-8,721.4	2,455.0	3,029.8	2,758.3	11.162			
14,800.0	7,510.0	14,060.9	7,108.3	147.3	139.3	-82.39	-8,816.0	2,487.7	3,029.7	2,754.5	11.009			
14,900.0	7,510.0	14,160.9	7,108.3	149.0	141.2	-82.39	-8,910.5	2,520.3	3,029.7	2,750.7	10.860			
15,000.0	7,510.0	14,260.9	7,108.3	150.8	143.1	-82.39	-7,005.0	2,552.9	3,029.7	2,747.0	10.715			
15,100.0	7,510.0	14,360.9	7,108.3	152.5	145.0	-82.39	-7,099.5	2,585.6	3,029.7	2,743.2	10.573			
15,200.0	7,510.0	14,460.9	7,108.3	154.4	146.9	-82.39	-7,194.1	2,618.2	3,029.7	2,739.4	10.436			
15,300.0	7,510.0	14,560.9	7,108.3	156.1	148.8	-82.39	-7,288.6	2,650.9	3,029.7	2,735.6	10.301			
15,400.0	7,510.0	14,660.9	7,108.3	157.9	150.7	-82.39	-7,383.1	2,683.5	3,029.7	2,731.8	10.171			
15,500.0	7,510.0	14,760.9	7,108.3	159.7	152.6	-82.39	-7,477.6	2,716.1	3,029.7	2,728.0	10.043			
15,600.0	7,510.0	14,860.9	7,108.3	161.5	154.6	-82.39	-7,572.2	2,748.8	3,029.7	2,724.2	9.919			
15,700.0	7,510.0	14,960.9	7,108.3	163.3	156.5	-82.39	-7,666.7	2,781.4	3,029.7	2,720.5	9.797			
15,800.0	7,510.0	15,060.9	7,108.3	165.1	158.4	-82.39	-7,761.2	2,814.0	3,029.7	2,716.7	9.679			
15,900.0	7,510.0	15,160.9	7,108.3	166.9	160.3	-82.39	-7,855.7	2,846.7	3,029.7	2,712.9	9.563			
16,000.0	7,510.0	15,260.9	7,108.3	168.7	162.2	-82.39	-7,950.3	2,879.3	3,029.7	2,709.1	9.450			
16,100.0	7,510.0	15,360.9	7,108.3	170.5	164.1	-82.39	-8,044.8	2,911.9	3,029.7	2,705.3	9.340			
16,200.0	7,510.0	15,460.9	7,108.3	172.4	166.0	-82.39	-8,139.3	2,944.6	3,029.7	2,701.5	9.232			
16,300.0	7,510.0	15,560.9	7,108.3	174.2	168.0	-82.39	-8,233.8	2,977.2	3,029.7	2,697.7	9.127			
16,400.0	7,510.0	15,660.9	7,108.3	176.0	169.9	-82.39	-8,328.4	3,009.8	3,029.7	2,693.9	9.024			
16,500.0	7,510.0	15,760.9	7,108.3	177.8	171.8	-82.39	-8,422.9	3,042.5	3,029.6	2,690.1	8.923			
16,600.0	7,510.0	15,860.9	7,108.3	179.6	173.7	-82.39	-8,517.4	3,075.1	3,029.6	2,686.3	8.825			
16,700.0	7,510.0	15,960.9	7,108.3	181.5	175.6	-82.39	-8,611.9	3,107.7	3,029.6	2,682.5	8.728			
16,800.0	7,510.0	16,060.9	7,108.3	183.3	177.5	-82.39	-8,706.5	3,140.4	3,029.6	2,678.7	8.634			
16,900.0	7,510.0	16,160.9	7,108.3	185.1	179.4	-82.39	-8,801.0	3,173.0	3,029.6	2,674.9	8.542			
17,000.0	7,510.0	16,260.9	7,108.3	186.9	181.4	-82.39	-8,895.5	3,205.6	3,029.6	2,671.1	8.451			
17,100.0	7,510.0	16,360.9	7,108.3	188.8	183.3	-82.39	-8,990.0	3,238.3	3,029.6	2,667.3	8.363			
17,200.0	7,510.0	16,460.9	7,108.3	190.6	185.2	-82.39	-9,084.6	3,270.9	3,029.6	2,663.5	8.276			
17,300.0	7,510.0	16,560.9	7,108.3	192.5	187.1	-82.39	-9,179.1	3,303.5	3,029.6	2,659.7	8.191			
17,400.0	7,510.0	16,660.9	7,108.3	194.3	189.0	-82.39	-9,273.6	3,336.2	3,029.6	2,655.9	8.108			
17,500.0	7,510.0	16,760.9	7,108.3	196.1	190.9	-82.39	-9,368.2	3,368.8	3,029.6	2,652.1	8.027			
17,600.0	7,510.0	16,860.9	7,108.3	198.0	192.8	-82.39	-9,462.7	3,401.4	3,029.6	2,648.3	7.947			
17,700.0	7,510.0	16,960.9	7,108.3	199.8	194.8	-82.39	-9,557.2	3,434.1	3,029.6	2,644.5	7.868			
17,800.0	7,510.0	17,060.9	7,108.3	201.7	196.7	-82.39	-9,651.7	3,466.7	3,029.6	2,640.7	7.792			
17,900.0	7,510.0	17,160.9	7,108.3	203.5	198.6	-82.39	-9,746.3	3,499.3	3,029.6	2,636.9	7.716			
18,000.0	7,510.0	17,260.9	7,108.3	205.4	200.5	-82.39	-9,840.8	3,532.0	3,029.6	2,633.1	7.642			
18,100.0	7,510.0	17,360.9	7,108.3	207.2	202.4	-82.39	-9,935.3	3,564.6	3,029.6	2,629.3	7.570			
18,200.0	7,510.0	17,460.9	7,108.3	209.1	204.4	-82.39	-10,029.8	3,597.2	3,029.6	2,625.5	7.499			
18,300.0	7,510.0	17,560.9	7,108.3	210.9	206.3	-82.39	-10,124.4	3,629.9	3,029.5	2,621.7	7.429			
18,400.0	7,510.0	17,660.9	7,108.3	212.8	208.2	-82.39	-10,218.9	3,662.5	3,029.5	2,617.9	7.360			
18,500.0	7,510.0	17,760.9	7,108.3	214.6	210.1	-82.39	-10,313.4	3,695.1	3,029.5	2,614.1	7.293			
18,600.0	7,510.0	17,860.9	7,108.3	216.5	212.0	-82.39	-10,407.9	3,727.8	3,029.5	2,610.3	7.227			
18,700.0	7,510.0	17,960.9	7,108.3	218.3	213.9	-82.39	-10,502.5	3,760.4	3,029.5	2,606.5	7.162			
18,800.0	7,510.0	18,060.9	7,108.3	220.2	215.9	-82.39	-10,597.0	3,793.0	3,029.5	2,602.7	7.098			
18,900.0	7,510.0	18,160.9	7,108.3	222.1	217.8	-82.39	-10,691.5	3,825.7	3,029.5	2,598.9	7.036			
19,000.0	7,510.0	18,260.9	7,108.3	223.9	219.7	-82.39	-10,786.0	3,858.3	3,029.5	2,595.1	6.974			
19,100.0	7,510.0	18,360.9	7,108.3	225.8	221.6	-82.39	-10,880.6	3,890.9	3,029.5	2,591.3	6.913			
19,200.0	7,510.0	18,460.9	7,108.3	227.7	223.5	-82.39	-10,975.1	3,923.6	3,029.5	2,587.5	6.854			
19,300.0	7,510.0	18,560.9	7,108.3	229.5	225.4	-82.39	-11,069.6	3,956.2	3,029.5	2,583.7	6.796			

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



Anticollision Report



Company:	Arsenal Resources	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
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 16 201	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)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	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	
19,400.0	7,510.0	18,660.9	7,108.3	231.4	227.4	-82.39	-11,164.1	3,988.8	3,029.5	2,579.9	6.738		
19,500.0	7,510.0	18,760.9	7,108.3	233.3	229.3	-82.39	-11,258.7	4,021.5	3,029.5	2,576.1	6.682		
19,600.0	7,510.0	18,860.9	7,108.3	235.1	231.2	-82.39	-11,353.2	4,054.1	3,029.5	2,572.3	6.626		
19,700.0	7,510.0	18,960.9	7,108.3	237.0	233.1	-82.39	-11,447.7	4,086.7	3,029.5	2,568.5	6.571		
19,800.0	7,510.0	19,060.9	7,108.3	238.9	235.0	-82.39	-11,542.2	4,119.4	3,029.5	2,564.7	6.519		
19,900.0	7,510.0	19,160.9	7,108.3	240.7	237.0	-82.39	-11,636.8	4,152.0	3,029.5	2,560.8	6.465		
20,000.0	7,510.0	19,260.9	7,108.3	242.6	238.9	-82.39	-11,731.3	4,184.6	3,029.4	2,557.0	6.413		
20,100.0	7,510.0	19,360.9	7,108.3	244.5	240.8	-82.39	-11,825.8	4,217.3	3,029.4	2,553.2	6.362		
20,200.0	7,510.0	19,460.9	7,108.3	246.3	242.7	-82.39	-11,920.3	4,249.9	3,029.4	2,549.4	6.311		
20,300.0	7,510.0	19,560.9	7,108.3	248.2	244.6	-82.39	-12,014.9	4,282.5	3,029.4	2,545.6	6.261		
20,400.0	7,510.0	19,660.9	7,108.3	250.1	246.5	-82.39	-12,109.4	4,315.2	3,029.4	2,541.8	6.213		
20,500.0	7,510.0	19,760.9	7,108.3	252.0	248.5	-82.39	-12,203.9	4,347.8	3,029.4	2,538.0	6.165		
20,600.0	7,510.0	19,860.9	7,108.3	253.8	250.4	-82.39	-12,298.4	4,380.4	3,029.4	2,534.2	6.117		
20,700.0	7,510.0	19,960.9	7,108.3	255.7	252.3	-82.39	-12,393.0	4,413.1	3,029.4	2,530.4	6.071		
20,800.0	7,510.0	20,060.9	7,108.3	257.6	254.2	-82.39	-12,487.5	4,445.7	3,029.4	2,526.6	6.025		
20,900.0	7,510.0	20,160.9	7,108.3	259.5	256.1	-82.39	-12,582.0	4,478.3	3,029.4	2,522.8	5.979		
21,000.0	7,510.0	20,260.9	7,108.3	261.4	258.1	-82.39	-12,676.5	4,511.0	3,029.4	2,518.9	5.935		
21,100.0	7,510.0	20,360.9	7,108.3	263.2	260.0	-82.39	-12,771.1	4,543.5	3,029.4	2,515.1	5.891		
21,200.0	7,510.0	20,460.9	7,108.3	265.1	261.9	-82.39	-12,865.6	4,576.2	3,029.4	2,511.3	5.848		
21,300.0	7,510.0	20,560.9	7,108.3	267.0	263.8	-82.39	-12,960.1	4,608.9	3,029.4	2,507.5	5.805		
21,400.0	7,510.0	20,660.9	7,108.3	268.9	265.7	-82.39	-13,054.6	4,641.5	3,029.4	2,503.7	5.763		
21,500.0	7,510.0	20,760.9	7,108.3	270.8	267.7	-82.39	-13,149.2	4,674.2	3,029.4	2,499.9	5.722		
21,600.0	7,510.0	20,860.9	7,108.3	272.6	269.6	-82.39	-13,243.7	4,706.8	3,029.4	2,496.1	5.681		
21,700.0	7,510.0	20,960.9	7,108.3	274.5	271.5	-82.39	-13,338.2	4,739.4	3,029.4	2,492.3	5.640		
21,800.0	7,510.0	21,060.9	7,108.3	276.4	273.4	-82.39	-13,432.7	4,772.1	3,029.3	2,488.5	5.601		
21,900.0	7,510.0	21,160.9	7,108.3	278.3	275.3	-82.39	-13,527.3	4,804.7	3,029.3	2,484.7	5.562		
22,000.0	7,510.0	21,260.9	7,108.3	280.2	277.3	-82.39	-13,621.8	4,837.3	3,029.3	2,480.8	5.523		
22,100.0	7,510.0	21,360.9	7,108.3	282.1	279.2	-82.39	-13,716.3	4,870.0	3,029.3	2,477.0	5.485		
22,200.0	7,510.0	21,460.9	7,108.3	284.0	281.1	-82.39	-13,810.8	4,902.6	3,029.3	2,473.2	5.447		
22,300.0	7,510.0	21,560.9	7,108.3	285.8	283.0	-82.39	-13,905.4	4,935.2	3,029.3	2,469.4	5.410		
22,400.0	7,510.0	21,660.9	7,108.3	287.7	284.9	-82.39	-13,999.9	4,967.9	3,029.3	2,465.6	5.374		
22,500.0	7,510.0	21,760.9	7,108.3	289.6	286.9	-82.39	-14,094.4	5,000.5	3,029.3	2,461.8	5.338		
22,600.0	7,510.0	21,860.9	7,108.3	291.5	288.8	-82.39	-14,188.9	5,033.1	3,029.3	2,458.0	5.302		
22,700.0	7,510.0	21,960.9	7,108.3	293.4	290.7	-82.39	-14,283.5	5,065.8	3,029.3	2,454.2	5.267		
22,800.0	7,510.0	22,060.9	7,108.3	295.3	292.6	-82.39	-14,378.0	5,098.4	3,029.3	2,450.3	5.232		
22,900.0	7,510.0	22,160.9	7,108.3	297.2	294.5	-82.39	-14,472.5	5,131.0	3,029.3	2,446.5	5.198		
23,000.0	7,510.0	22,260.9	7,108.3	299.1	296.4	-82.39	-14,567.0	5,163.7	3,029.3	2,442.7	5.165		
23,100.0	7,510.0	22,360.9	7,108.3	301.0	298.4	-82.39	-14,661.6	5,196.3	3,029.3	2,438.9	5.131		
23,200.0	7,510.0	22,460.9	7,108.3	302.8	300.3	-82.39	-14,756.1	5,228.9	3,029.3	2,435.1	5.098		
23,300.0	7,510.0	22,560.9	7,108.3	304.7	302.2	-82.39	-14,850.6	5,261.6	3,029.3	2,431.3	5.066		
23,400.0	7,510.0	22,660.9	7,108.3	306.6	304.1	-82.39	-14,945.1	5,294.2	3,029.3	2,427.5	5.034		
23,500.0	7,510.0	22,760.9	7,108.3	308.5	306.0	-82.39	-15,039.7	5,326.8	3,029.2	2,423.7	5.002		
23,600.0	7,510.0	22,860.9	7,108.3	310.4	308.0	-82.39	-15,134.2	5,359.5	3,029.2	2,419.8	4.971		
23,700.0	7,510.0	22,960.9	7,108.3	312.3	309.9	-82.39	-15,228.7	5,392.1	3,029.2	2,416.0	4.940		
23,800.0	7,510.0	23,060.9	7,108.3	314.2	311.8	-82.39	-15,323.2	5,424.7	3,029.2	2,412.2	4.910		
23,900.0	7,510.0	23,160.9	7,108.3	316.1	313.7	-82.39	-15,417.8	5,457.4	3,029.2	2,408.4	4.879		
24,000.0	7,510.0	23,260.9	7,108.3	318.0	315.6	-82.39	-15,512.3	5,490.0	3,029.2	2,404.6	4.850		
24,100.0	7,510.0	23,360.9	7,108.3	319.9	317.6	-82.39	-15,606.8	5,522.6	3,029.2	2,400.8	4.820		
24,200.0	7,510.0	23,460.9	7,108.3	321.8	319.5	-82.39	-15,701.3	5,555.3	3,029.2	2,397.0	4.791		
24,300.0	7,510.0	23,560.9	7,108.3	323.7	321.4	-82.39	-15,795.8	5,587.9	3,029.2	2,393.1	4.762		
24,400.0	7,510.0	23,660.9	7,108.3	325.6	323.3	-82.39	-15,890.4	5,620.5	3,029.2	2,389.3	4.734		
24,500.0	7,510.0	23,760.9	7,108.3	327.5	325.2	-82.39	-15,984.9	5,653.2	3,029.2	2,385.5	4.706		

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Company:	Arsenal Resources	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
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 16 201	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)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	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	
24,600.0	7,510.0	23,860.9	7,108.3	329.4	327.2	-82.39	-16,079.4	5,685.8	3,029.2	2,381.7	4.678		
24,700.0	7,510.0	23,960.9	7,108.3	331.3	329.1	-82.39	-16,174.0	5,718.4	3,029.2	2,377.9	4.651		
24,800.0	7,510.0	24,060.9	7,108.3	333.1	331.0	-82.39	-16,268.5	5,751.1	3,029.2	2,374.1	4.624		
24,900.0	7,510.0	24,160.9	7,108.3	335.0	332.9	-82.39	-16,363.0	5,783.7	3,029.2	2,370.3	4.597		
25,000.0	7,510.0	24,260.9	7,108.3	336.9	334.9	-82.39	-16,457.5	5,816.3	3,029.2	2,366.4	4.571		
25,100.0	7,510.0	24,360.9	7,108.3	338.8	336.8	-82.39	-16,552.1	5,849.0	3,029.2	2,362.6	4.545		
25,200.0	7,510.0	24,460.9	7,108.3	340.7	338.7	-82.39	-16,646.6	5,881.6	3,029.2	2,358.8	4.519		
25,300.0	7,510.0	24,560.9	7,108.3	342.6	340.6	-82.39	-16,741.1	5,914.2	3,029.1	2,355.0	4.493		
25,313.6	7,510.0	24,574.3	7,108.3	342.9	340.9	-82.39	-16,753.6	5,918.6	3,029.1	2,354.5	4.490 SF		
25,400.0	7,510.0	24,574.3	7,108.3	344.5	340.9	-82.39	-16,753.8	5,918.6	3,030.4	2,355.6	4.491		
25,500.0	7,510.0	24,574.3	7,108.3	346.4	340.9	-82.39	-16,753.6	5,918.6	3,034.9	2,350.7	4.502		
25,600.0	7,510.0	24,574.3	7,108.3	348.3	340.9	-82.39	-16,753.8	5,918.6	3,042.7	2,349.8	4.522		
25,700.0	7,510.0	24,574.3	7,108.3	350.2	340.9	-82.39	-16,753.8	5,918.6	3,053.7	2,342.8	4.552		
25,800.0	7,510.0	24,574.3	7,108.3	352.1	340.9	-82.39	-16,753.6	5,918.6	3,067.9	2,339.7	4.591		
25,900.0	7,510.0	24,574.3	7,108.3	354.0	340.9	-82.39	-16,753.8	5,918.6	3,085.4	2,420.5	4.640		
26,000.0	7,510.0	24,574.3	7,108.3	355.9	340.9	-82.39	-16,753.8	5,918.6	3,105.9	2,445.0	4.699		
26,100.0	7,510.0	24,574.3	7,108.3	357.8	340.9	-82.39	-16,753.8	5,918.6	3,129.6	2,473.1	4.767		
26,158.7	7,510.0	24,574.3	7,108.3	358.9	340.9	-82.39	-16,753.8	5,918.6	3,145.3	2,491.8	4.813		

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Company:	Arsenal Resources	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
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 16 201	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)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Reference (usft)	Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
0.0	0.0	0.0	0.0	0.0	0.0	114.96	-19.0	40.8	45.0				
100.0	100.0	99.3	99.3	0.1	0.1	114.96	-19.0	40.8	45.0	44.8	275.229		
200.0	200.0	199.3	199.3	0.3	0.3	114.96	-19.0	40.8	45.0	44.4	73.527		
300.0	300.0	299.3	299.3	0.5	0.5	114.96	-19.0	40.8	45.0	43.9	42.391		
400.0	400.0	399.3	399.3	0.8	0.8	114.96	-19.0	40.8	45.0	43.5	29.781		
500.0	500.0	499.3	499.3	1.0	1.0	114.96	-19.0	40.8	45.0	43.0	22.952		
600.0	600.0	599.3	599.3	1.2	1.2	114.96	-19.0	40.8	45.0	42.6	18.672		
700.0	700.0	699.3	699.3	1.4	1.4	114.96	-19.0	40.8	45.0	42.1	15.736		
800.0	800.0	799.3	799.3	1.7	1.7	114.96	-19.0	40.8	45.0	41.7	13.599		
900.0	900.0	899.3	899.3	1.9	1.9	114.96	-19.0	40.8	45.0	41.2	11.972		
1,000.0	1,000.0	999.3	999.3	2.1	2.1	114.96	-19.0	40.8	45.0	40.8	10.694		
1,100.0	1,100.0	1,099.3	1,099.3	2.3	2.3	114.96	-19.0	40.8	45.0	40.3	9.681		
1,200.0	1,200.0	1,199.3	1,199.3	2.6	2.6	114.96	-19.0	40.8	45.0	39.9	8.811		
1,300.0	1,300.0	1,299.3	1,299.3	2.8	2.8	114.96	-19.0	40.8	45.0	39.4	8.098		
1,400.0	1,400.0	1,399.3	1,399.3	3.0	3.0	114.96	-19.0	40.8	45.0	39.0	7.492		
1,500.0	1,500.0	1,499.3	1,499.3	3.2	3.2	114.96	-19.0	40.8	45.0	38.5	6.971		
1,600.0	1,600.0	1,599.3	1,599.3	3.5	3.5	114.96	-19.0	40.8	45.0	38.1	6.517		
1,700.0	1,700.0	1,699.3	1,699.3	3.7	3.7	114.96	-19.0	40.8	45.0	37.6	6.118		
1,800.0	1,800.0	1,799.3	1,799.3	3.9	3.9	114.96	-19.0	40.8	45.0	37.2	5.766		
1,900.0	1,900.0	1,899.3	1,899.3	4.1	4.1	114.96	-19.0	40.8	45.0	36.7	5.452		
2,000.0	2,000.0	1,999.3	1,999.3	4.4	4.4	114.96	-19.0	40.8	45.0	36.3	5.170	CC, ES	
2,100.0	2,100.0	2,099.3	2,099.3	4.6	4.6	-127.03	-19.0	40.8	45.0	35.9	5.041	SF	
2,200.0	2,199.8	2,199.1	2,199.1	4.7	4.8	-131.83	-19.0	40.8	49.4	39.8	5.174		
2,300.0	2,299.5	2,298.8	2,298.8	4.9	5.0	-138.45	-19.0	40.8	55.6	45.6	5.582		
2,400.0	2,398.7	2,398.0	2,398.0	5.2	5.2	-145.44	-19.0	40.8	65.2	54.8	6.287		
2,500.0	2,497.5	2,496.8	2,496.8	5.4	5.5	-151.78	-19.0	40.8	78.6	67.8	7.286		
2,600.0	2,595.6	2,594.9	2,594.9	5.7	5.7	-157.02	-19.0	40.8	95.9	84.7	8.552		
2,700.0	2,693.1	2,692.4	2,692.4	6.0	5.9	-161.18	-19.0	40.8	117.0	105.4	10.053		
2,800.0	2,789.6	2,788.9	2,788.9	6.3	6.1	-164.41	-19.0	40.8	141.8	129.7	11.753		
2,900.0	2,885.3	2,884.6	2,884.6	6.7	6.3	-166.92	-19.0	40.8	170.2	157.7	13.621		
3,000.0	2,979.8	2,979.1	2,979.1	7.2	6.6	-168.87	-19.0	40.8	202.1	189.2	15.632		
3,100.0	3,073.2	3,072.5	3,072.5	7.7	6.8	-170.41	-19.0	40.8	237.5	224.1	17.762		
3,200.0	3,165.2	3,164.5	3,164.5	8.3	7.0	-171.64	-19.0	40.8	276.1	262.3	19.994		
3,300.0	3,255.8	3,255.1	3,255.1	9.0	7.2	-172.63	-19.0	40.8	318.1	303.8	22.310		
3,400.0	3,344.9	3,344.2	3,344.2	9.8	7.4	-173.43	-19.0	40.8	363.2	348.5	24.696		
3,500.0	3,432.4	3,431.7	3,431.7	10.6	7.6	-174.09	-19.0	40.8	411.4	396.3	27.140		
3,598.8	3,517.1	3,516.4	3,516.4	11.6	7.8	-174.63	-19.0	40.8	462.1	446.5	29.601		
3,600.0	3,518.1	3,517.4	3,517.4	11.6	7.8	-174.64	-19.0	40.8	462.8	447.1	29.631		
3,700.0	3,602.9	3,602.2	3,602.2	12.6	8.0	-175.19	-19.0	40.8	515.5	499.5	32.063		
3,800.0	3,687.8	3,687.1	3,687.1	13.5	8.1	-175.63	-19.0	40.8	568.4	551.8	34.344		
3,900.0	3,772.6	3,771.9	3,771.9	14.6	8.3	-176.01	-19.0	40.8	621.3	604.2	36.487		
4,000.0	3,857.4	3,856.7	3,856.7	15.7	8.5	-176.32	-19.0	40.8	674.1	656.6	38.499		
4,100.0	3,942.2	3,941.5	3,941.5	16.7	8.7	-176.59	-19.0	40.8	727.0	709.0	40.392		
4,200.0	4,027.1	4,026.4	4,026.4	17.8	8.9	-176.82	-19.0	40.8	779.9	761.4	42.173		
4,300.0	4,111.9	4,111.2	4,111.2	18.9	9.1	-177.02	-19.0	40.8	832.8	813.8	43.851		
4,400.0	4,196.7	4,196.0	4,196.0	20.0	9.3	-177.20	-19.0	40.8	885.7	866.2	45.434		
4,500.0	4,281.5	4,280.9	4,280.9	21.1	9.5	-177.36	-19.0	40.8	938.6	918.6	46.928		
4,600.0	4,366.4	4,365.7	4,365.7	22.2	9.7	-177.50	-19.0	40.8	991.5	971.0	48.341		
4,700.0	4,451.2	4,450.5	4,450.5	23.3	9.9	-177.62	-19.0	40.8	1,044.5	1,023.4	49.676		
4,800.0	4,536.0	4,535.3	4,535.3	24.4	10.1	-177.74	-19.0	40.8	1,097.4	1,075.8	50.944		
4,900.0	4,620.9	4,620.2	4,620.2	25.5	10.2	-177.84	-19.0	40.8	1,150.3	1,128.2	52.144		
5,000.0	4,705.7	4,705.0	4,705.0	26.7	10.4	-177.94	-19.0	40.8	1,203.2	1,180.7	53.283		

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

Company:	Arsenal Resources	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
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 16 201	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)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning		
5,100.0	4,790.5	4,789.8	4,789.8	27.8	10.6	-178.02	-19.0	40.8	1,256.2	1,233.1	54,366			
5,200.0	4,875.3	4,874.5	4,874.5	28.9	10.8	-178.10	-19.0	40.8	1,309.1	1,285.5	55,396			
5,300.0	4,960.2	4,959.5	4,959.5	30.0	11.0	-178.18	-19.0	40.8	1,362.0	1,337.9	56,376			
5,400.0	5,045.0	5,044.3	5,044.3	31.2	11.2	-178.25	-19.0	40.8	1,415.0	1,390.3	57,311			
5,500.0	5,129.8	5,129.1	5,129.1	32.3	11.4	-178.31	-19.0	40.8	1,467.9	1,442.7	58,202			
5,600.0	5,214.7	5,214.0	5,214.0	33.4	11.6	-178.37	-19.0	40.8	1,520.9	1,495.1	59,053			
5,700.0	5,299.5	5,298.8	5,298.8	34.6	11.8	-178.42	-19.0	40.8	1,573.8	1,547.5	59,866			
5,800.0	5,384.3	5,383.6	5,383.6	35.7	12.0	-178.47	-19.0	40.8	1,626.7	1,599.9	60,644			
5,900.0	5,469.1	5,468.4	5,468.4	36.8	12.1	-178.52	-19.0	40.8	1,679.7	1,652.3	61,389			
6,000.0	5,554.0	5,553.3	5,553.3	38.0	12.3	-178.57	-19.0	40.8	1,732.6	1,704.7	62,102			
6,100.0	5,638.8	5,638.1	5,638.1	39.1	12.5	-178.61	-19.0	40.8	1,785.6	1,757.1	62,786			
6,200.0	5,723.6	5,722.9	5,722.9	40.2	12.7	-178.65	-19.0	40.8	1,838.5	1,809.5	63,442			
6,300.0	5,808.4	5,807.7	5,807.7	41.4	12.9	-178.69	-19.0	40.8	1,891.5	1,851.9	64,072			
6,400.0	5,893.3	5,892.6	5,892.6	42.5	13.1	-178.72	-19.0	40.8	1,944.4	1,914.3	64,678			
6,500.0	5,978.1	5,977.4	5,977.4	43.7	13.3	-178.76	-19.0	40.8	1,997.3	1,966.7	65,260			
6,600.0	6,062.9	6,062.2	6,062.2	44.8	13.5	-178.79	-19.0	40.8	2,050.3	2,019.1	65,821			
6,700.0	6,147.8	6,147.1	6,147.1	45.9	13.7	-178.82	-19.0	40.8	2,103.2	2,071.5	66,360			
6,800.0	6,232.6	6,231.9	6,231.9	47.1	13.9	-178.85	-19.0	40.8	2,156.2	2,123.9	66,880			
6,900.0	6,317.4	6,316.7	6,316.7	48.2	14.1	-178.88	-19.0	40.8	2,209.1	2,176.4	67,381			
7,000.0	6,402.2	6,401.5	6,401.5	49.4	14.2	-178.90	-19.0	40.8	2,262.1	2,228.8	67,865			
7,100.0	6,487.1	6,486.4	6,486.4	50.5	14.4	-178.93	-19.0	40.8	2,315.0	2,281.2	68,331			
7,200.0	6,571.9	6,571.2	6,571.2	51.7	14.6	-178.95	-19.0	40.8	2,368.0	2,333.6	68,782			
7,300.0	6,656.7	6,656.0	6,656.0	52.8	14.8	-178.97	-19.0	40.8	2,420.9	2,386.0	69,218			
7,400.0	6,741.6	6,740.9	6,740.9	53.9	15.0	-179.00	-19.0	40.8	2,473.9	2,438.4	69,639			
7,500.0	6,826.4	6,825.7	6,825.7	55.1	15.2	-179.02	-19.0	40.8	2,526.8	2,490.8	70,047			
7,600.0	6,911.2	6,910.5	6,910.5	56.2	15.4	-179.04	-19.0	40.8	2,579.8	2,543.2	70,441			
7,700.0	6,996.0	6,995.3	6,995.3	57.4	15.6	-179.06	-19.0	40.8	2,632.7	2,595.6	70,823			
7,729.1	7,020.7	7,020.0	7,020.0	57.7	15.6	-179.06	-19.0	40.8	2,649.2	2,610.8	70,932			
7,750.0	7,038.4	7,037.7	7,037.7	57.9	15.7	-179.07	-19.0	40.8	2,659.2	2,621.8	71,013			
7,800.0	7,080.4	7,079.7	7,079.7	58.4	15.8	-179.07	-19.0	40.8	2,688.1	2,648.4	71,225			
7,850.0	7,121.7	7,121.0	7,121.0	58.9	15.9	-179.08	-19.0	40.8	2,713.2	2,675.2	71,450			
7,900.0	7,162.0	7,161.3	7,161.3	59.4	16.0	-179.09	-19.0	40.8	2,740.4	2,702.2	71,687			
7,950.0	7,201.2	7,200.5	7,200.5	59.9	16.0	-179.10	-19.0	40.8	2,767.5	2,729.2	71,937			
8,000.0	7,238.9	7,219.3	7,219.3	60.4	16.1	-179.11	-19.0	40.8	2,794.8	2,756.2	72,424			
8,050.0	7,274.9	7,219.3	7,219.3	60.8	16.1	-179.12	-19.0	40.8	2,822.2	2,783.6	73,147			
8,100.0	7,309.0	7,219.3	7,219.3	61.3	16.1	-179.13	-19.0	40.8	2,849.7	2,811.1	73,883			
8,150.0	7,341.1	7,219.3	7,219.3	61.7	16.1	-179.14	-19.0	40.8	2,877.1	2,838.5	74,623			
8,200.0	7,370.8	7,219.3	7,219.3	62.1	16.1	-179.15	-19.0	40.8	2,904.2	2,865.7	75,357			
8,250.0	7,398.0	7,219.3	7,219.3	62.5	16.1	-179.16	-19.0	40.8	2,931.0	2,892.4	76,076			
8,300.0	7,422.5	7,219.3	7,219.3	62.9	16.1	-179.17	-19.0	40.8	2,957.1	2,918.6	76,768			
8,350.0	7,444.4	7,219.3	7,219.3	63.3	16.1	-179.18	-19.0	40.8	2,982.6	2,944.1	77,422			
8,400.0	7,463.2	7,219.3	7,219.3	63.6	16.1	-179.19	-19.0	40.8	3,007.3	2,968.8	78,026			
8,450.0	7,479.0	7,219.3	7,219.3	63.9	16.1	-179.20	-19.0	40.8	3,031.0	2,992.4	78,569			
8,500.0	7,491.5	7,219.3	7,219.3	64.2	16.1	-179.21	-19.0	40.8	3,053.6	3,015.0	79,040			
8,550.0	7,501.0	7,219.3	7,219.3	64.5	16.1	-179.22	-19.0	40.8	3,075.0	3,036.3	79,430			
8,600.0	7,507.1	7,219.3	7,219.3	64.7	16.1	-179.23	-19.0	40.8	3,095.1	3,056.3	79,729			
8,650.0	7,509.8	7,219.3	7,219.3	65.0	16.1	-179.24	-19.0	40.8	3,113.8	3,074.8	79,930			
8,666.4	7,510.0	7,219.3	7,219.3	65.0	16.1	-179.24	-19.0	40.8	3,119.6	3,080.6	79,974			
8,700.0	7,510.0	7,219.3	7,219.3	65.2	16.1	-179.25	-19.0	40.8	3,131.5	3,092.4	80,089			
8,800.0	7,510.0	7,219.3	7,219.3	65.7	16.1	-179.26	-19.0	40.8	3,158.7	3,129.4	80,532			
8,900.0	7,510.0	7,219.3	7,219.3	66.3	16.1	-179.27	-19.0	40.8	3,208.7	3,169.0	80,954			
9,000.0	7,510.0	7,219.3	7,219.3	66.8	16.1	-179.28	-19.0	40.8	3,251.2	3,211.2	81,365			

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Anticollision Report



Company:	Arsenal Resources	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
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 16 201	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)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning	
9,100.0	7,510.0	7,219.3	7,219.3	67.5	16.1	-84.31	-19.0	40.8	3,296.2	3,266.9	81.773		
9,200.0	7,510.0	7,219.3	7,219.3	68.1	16.1	-84.31	-19.0	40.8	3,343.6	3,302.9	82.186		
9,300.0	7,510.0	7,219.3	7,219.3	68.8	16.1	-84.31	-19.0	40.8	3,393.2	3,352.2	82.611		
9,400.0	7,510.0	7,219.3	7,219.3	69.6	16.1	-84.31	-19.0	40.8	3,445.1	3,403.6	83.055		
9,500.0	7,510.0	7,219.3	7,219.3	70.4	16.1	-84.31	-19.0	40.8	3,499.1	3,457.2	83.522		
9,600.0	7,510.0	7,219.3	7,219.3	71.2	16.1	-84.31	-19.0	40.8	3,555.0	3,512.7	84.017		
9,700.0	7,510.0	7,219.3	7,219.3	72.0	16.1	-84.31	-19.0	40.8	3,612.8	3,570.1	84.542		
9,800.0	7,510.0	7,219.3	7,219.3	72.9	16.1	-84.31	-19.0	40.8	3,672.5	3,629.3	85.100		
9,900.0	7,510.0	7,219.3	7,219.3	73.9	16.1	-84.31	-19.0	40.8	3,733.9	3,690.3	85.692		
10,000.0	7,510.0	7,219.3	7,219.3	74.8	16.1	-84.31	-19.0	40.8	3,796.9	3,752.9	86.320		
10,100.0	7,510.0	7,219.3	7,219.3	75.8	16.1	-84.31	-19.0	40.8	3,861.5	3,817.1	86.984		
10,200.0	7,510.0	7,219.3	7,219.3	76.9	16.1	-84.31	-19.0	40.8	3,927.6	3,882.8	87.683		
10,300.0	7,510.0	7,219.3	7,219.3	78.0	16.1	-84.31	-19.0	40.8	3,995.1	3,949.9	88.418		
10,400.0	7,510.0	7,219.3	7,219.3	79.1	16.1	-84.31	-19.0	40.8	4,063.9	4,018.3	89.187		
10,500.0	7,510.0	7,219.3	7,219.3	80.2	16.1	-84.31	-19.0	40.8	4,134.0	4,088.0	89.991		
10,600.0	7,510.0	7,219.3	7,219.3	81.4	16.1	-84.31	-19.0	40.8	4,205.3	4,159.0	90.828		
10,700.0	7,510.0	7,219.3	7,219.3	82.6	16.1	-84.31	-19.0	40.8	4,277.7	4,231.1	91.697		
10,800.0	7,510.0	7,219.3	7,219.3	83.8	16.1	-84.31	-19.0	40.8	4,351.3	4,304.3	92.598		
10,900.0	7,510.0	7,219.3	7,219.3	85.1	16.1	-84.31	-19.0	40.8	4,425.9	4,378.5	93.528		
11,000.0	7,510.0	7,219.3	7,219.3	86.4	16.1	-84.31	-19.0	40.8	4,501.4	4,453.8	94.487		
11,100.0	7,510.0	7,219.3	7,219.3	87.7	16.1	-84.31	-19.0	40.8	4,577.9	4,530.0	95.473		
11,200.0	7,510.0	7,219.3	7,219.3	89.0	16.1	-84.31	-19.0	40.8	4,655.3	4,607.1	96.486		
11,300.0	7,510.0	7,219.3	7,219.3	90.4	16.1	-84.31	-19.0	40.8	4,733.6	4,685.1	97.524		
11,400.0	7,510.0	7,219.3	7,219.3	91.8	16.1	-84.31	-19.0	40.8	4,812.6	4,763.8	98.586		
11,500.0	7,510.0	7,219.3	7,219.3	93.2	16.1	-84.31	-19.0	40.8	4,892.5	4,843.4	99.671		
11,600.0	7,510.0	7,219.3	7,219.3	94.6	16.1	-84.31	-19.0	40.8	4,973.0	4,923.7	100.779		
11,700.0	7,510.0	7,219.3	7,219.3	96.1	16.1	-84.31	-19.0	40.8	5,054.3	5,004.7	101.907		
11,800.0	7,510.0	7,219.3	7,219.3	97.6	16.1	-84.31	-19.0	40.8	5,136.2	5,086.3	103.055		
11,900.0	7,510.0	7,219.3	7,219.3	99.1	16.1	-84.31	-19.0	40.8	5,218.7	5,168.6	104.222		
12,000.0	7,510.0	7,219.3	7,219.3	100.6	16.1	-84.31	-19.0	40.8	5,301.8	5,251.5	105.407		
12,100.0	7,510.0	7,219.3	7,219.3	102.1	16.1	-84.31	-19.0	40.8	5,385.5	5,335.0	106.610		
12,200.0	7,510.0	7,219.3	7,219.3	103.6	16.1	-84.31	-19.0	40.8	5,469.8	5,419.1	107.829		
12,300.0	7,510.0	7,219.3	7,219.3	105.2	16.1	-84.31	-19.0	40.8	5,554.6	5,503.6	109.064		
12,400.0	7,510.0	7,219.3	7,219.3	106.7	16.1	-84.31	-19.0	40.8	5,639.9	5,588.7	110.314		
12,500.0	7,510.0	7,219.3	7,219.3	108.3	16.1	-84.31	-19.0	40.8	5,725.6	5,674.3	111.578		
12,600.0	7,510.0	7,219.3	7,219.3	109.9	16.1	-84.31	-19.0	40.8	5,811.8	5,760.3	112.856		
12,700.0	7,510.0	7,219.3	7,219.3	111.5	16.1	-84.31	-19.0	40.8	5,899.5	5,846.8	114.146		
12,800.0	7,510.0	7,219.3	7,219.3	113.1	16.1	-84.31	-19.0	40.8	5,985.5	5,933.7	115.449		
12,900.0	7,510.0	7,219.3	7,219.3	114.8	16.1	-84.31	-19.0	40.8	6,073.0	6,021.0	116.785		
13,000.0	7,510.0	7,219.3	7,219.3	116.4	16.1	-84.31	-19.0	40.8	6,160.8	6,109.7	118.091		
13,100.0	7,510.0	7,219.3	7,219.3	118.1	16.1	-84.31	-19.0	40.8	6,249.0	6,196.7	119.428		
13,200.0	7,510.0	7,219.3	7,219.3	119.7	16.1	-84.31	-19.0	40.8	6,337.6	6,285.1	120.775		
13,300.0	7,510.0	7,219.3	7,219.3	121.4	16.1	-84.31	-19.0	40.8	6,426.5	6,373.9	122.133		
13,400.0	7,510.0	7,219.3	7,219.3	123.1	16.1	-84.31	-19.0	40.8	6,515.7	6,462.9	123.500		
13,500.0	7,510.0	7,219.3	7,219.3	124.8	16.1	-84.31	-19.0	40.8	6,605.2	6,552.3	124.875		
13,600.0	7,510.0	7,219.3	7,219.3	126.4	16.1	-84.31	-19.0	40.8	6,695.0	6,642.0	126.260		
13,700.0	7,510.0	7,219.3	7,219.3	128.1	16.1	-84.31	-19.0	40.8	6,785.2	6,732.0	127.652		
13,800.0	7,510.0	7,219.3	7,219.3	129.9	16.1	-84.31	-19.0	40.8	6,875.5	6,822.3	129.053		
13,900.0	7,510.0	7,219.3	7,219.3	131.6	16.1	-84.31	-19.0	40.8	6,966.2	6,912.8	130.461		
14,000.0	7,510.0	7,219.3	7,219.3	133.3	16.1	-84.31	-19.0	40.8	7,057.1	7,003.6	131.876		
14,100.0	7,510.0	7,219.3	7,219.3	135.0	16.1	-84.31	-19.0	40.8	7,148.2	7,094.6	133.299		
14,200.0	7,510.0	7,219.3	7,219.3	136.7	16.1	-84.31	-19.0	40.8	7,239.6	7,185.8	134.728		

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



Anticollision Report



Company:	Arsenal Resources	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
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 16 201	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)	Vertical Depth (usft)	Offset Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Separation Factor	Warning		
14,300.0	7,510.0	7,219.3	7,219.3	138.5	16.1	-84.31	-19.0	40.8	7,331.2	7,277.3	136.163			
14,400.0	7,510.0	7,219.3	7,219.3	140.2	16.1	-84.31	-19.0	40.8	7,423.0	7,369.0	137.604			
14,500.0	7,510.0	7,219.3	7,219.3	142.0	16.1	-84.31	-19.0	40.8	7,515.0	7,461.0	139.052			
14,600.0	7,510.0	7,219.3	7,219.3	143.7	16.1	-84.31	-19.0	40.8	7,607.2	7,553.1	140.505			
14,700.0	7,510.0	7,219.3	7,219.3	145.5	16.1	-84.31	-19.0	40.8	7,699.7	7,645.4	141.963			
14,800.0	7,510.0	7,219.3	7,219.3	147.3	16.1	-84.31	-19.0	40.8	7,792.3	7,737.9	143.426			
14,900.0	7,510.0	7,219.3	7,219.3	149.0	16.1	-84.31	-19.0	40.8	7,885.0	7,830.6	144.895			
15,000.0	7,510.0	7,219.3	7,219.3	150.8	16.1	-84.31	-19.0	40.8	7,978.0	7,923.5	146.368			
15,100.0	7,510.0	7,219.3	7,219.3	152.6	16.1	-84.31	-19.0	40.8	8,071.1	8,016.5	147.846			
15,200.0	7,510.0	7,219.3	7,219.3	154.4	16.1	-84.31	-19.0	40.8	8,164.4	8,109.8	149.328			
15,300.0	7,510.0	7,219.3	7,219.3	156.1	16.1	-84.31	-19.0	40.8	8,257.9	8,203.1	150.815			
15,400.0	7,510.0	7,219.3	7,219.3	157.9	16.1	-84.31	-19.0	40.8	8,351.5	8,296.6	152.305			
15,500.0	7,510.0	7,219.3	7,219.3	159.7	16.1	-84.31	-19.0	40.8	8,445.2	8,390.3	153.800			
15,600.0	7,510.0	7,219.3	7,219.3	161.5	16.1	-84.31	-19.0	40.8	8,539.1	8,484.1	155.296			
15,700.0	7,510.0	7,219.3	7,219.3	163.3	16.1	-84.31	-19.0	40.8	8,633.1	8,578.1	156.800			
15,800.0	7,510.0	7,219.3	7,219.3	165.1	16.1	-84.31	-19.0	40.8	8,727.3	8,672.2	158.305			
15,900.0	7,510.0	7,219.3	7,219.3	166.9	16.1	-84.31	-19.0	40.8	8,821.6	8,766.4	159.814			
16,000.0	7,510.0	7,219.3	7,219.3	168.7	16.1	-84.31	-19.0	40.8	8,916.0	8,860.7	161.326			
16,100.0	7,510.0	7,219.3	7,219.3	170.5	16.1	-84.31	-19.0	40.8	9,010.5	8,955.2	162.840			
16,200.0	7,510.0	7,219.3	7,219.3	172.4	16.1	-84.31	-19.0	40.8	9,105.2	9,049.8	164.358			
16,300.0	7,510.0	7,219.3	7,219.3	174.2	16.1	-84.31	-19.0	40.8	9,199.9	9,144.5	165.879			
16,400.0	7,510.0	7,219.3	7,219.3	176.0	16.1	-84.31	-19.0	40.8	9,294.8	9,239.3	167.403			
16,500.0	7,510.0	7,219.3	7,219.3	177.8	16.1	-84.31	-19.0	40.8	9,389.8	9,334.2	168.929			
16,600.0	7,510.0	7,219.3	7,219.3	179.6	16.1	-84.31	-19.0	40.8	9,484.9	9,429.2	170.458			
16,700.0	7,510.0	7,219.3	7,219.3	181.5	16.1	-84.31	-19.0	40.8	9,580.1	9,524.4	171.989			
16,800.0	7,510.0	7,219.3	7,219.3	183.3	16.1	-84.31	-19.0	40.8	9,675.3	9,619.6	173.523			
16,900.0	7,510.0	7,219.3	7,219.3	185.1	16.1	-84.31	-19.0	40.8	9,770.7	9,714.9	175.058			
17,000.0	7,510.0	7,219.3	7,219.3	186.9	16.1	-84.31	-19.0	40.8	9,866.2	9,810.3	176.597			
17,100.0	7,510.0	7,219.3	7,219.3	188.8	16.1	-84.31	-19.0	40.8	9,961.7	9,905.8	178.137			

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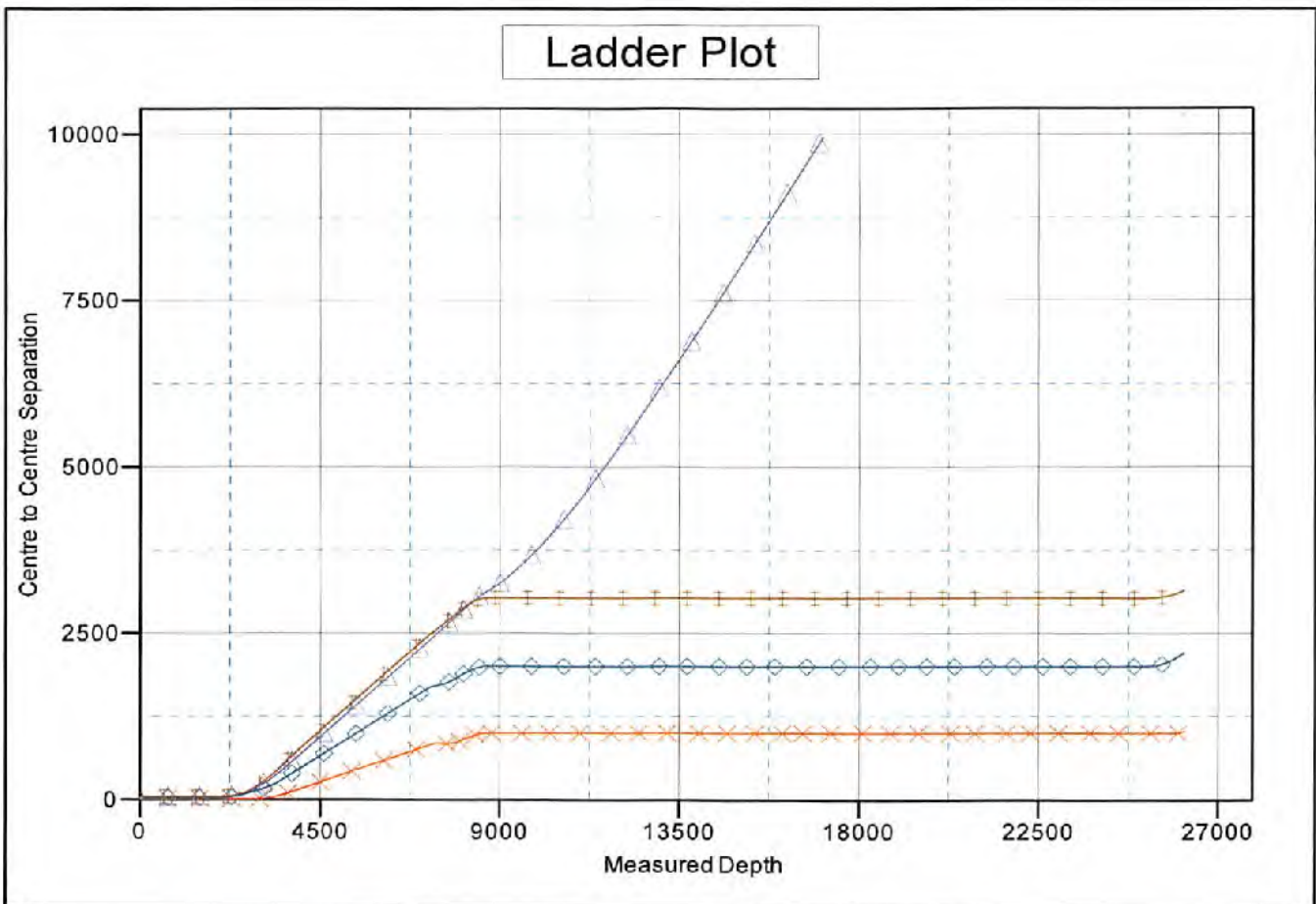
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Company:	Arsenal Resources	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
Project:	Harrison County, West Virginia NAD 83	TVD Reference:	well @ 1191.0usft
Reference Site:	J Osborn HSOP 16 Pad	MD Reference:	well @ 1191.0usft
Site Error:	0.0 usft	North Reference:	Grid
Reference Well:	J Osborn HSOP 16 201	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 16 201
 Coordinate System is US State Plane 1983, West Virginia Northern Zone
 Grid Convergence at Surface is: -0.46"



LEGEND

- SOP 16 202, Wellbore #1, Design #3 V0 — × J Osborn HSOP 16 204, Curve & Lateral, Design #1 V0
- SOP 16 204, Pilot Hole, Design #1 V0 — ◆ J Osborn HSOP 16 203, Wellbore #1, Design #3 V0

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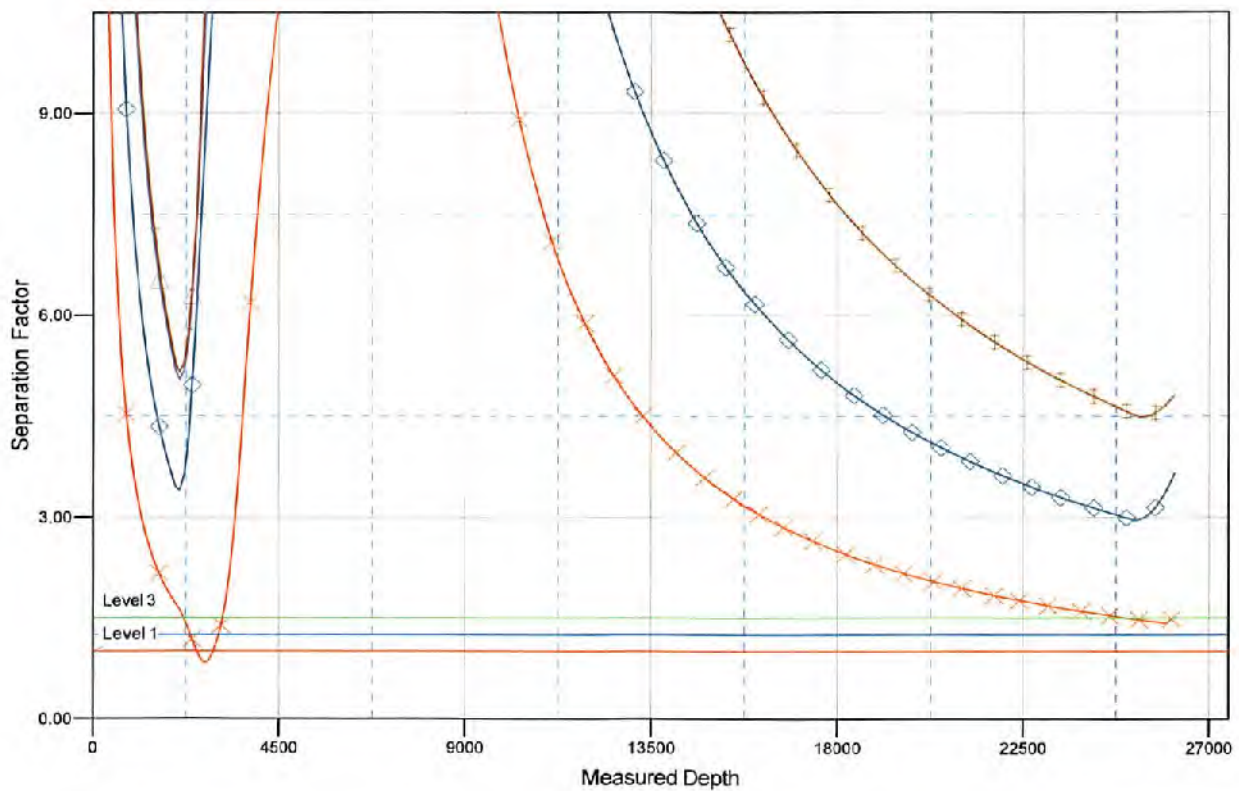
WV Department of
Environmental Protection

Company:	Arsenal Resources	Local Co-ordinate Reference:	Well J Osborn HSOP 16 201
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 16 201	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 16 201
 Coordinate System is US State Plane 1983, West Virginia Northern Zone
 Grid Convergence at Surface is: -0.46°

Separation Factor Plot



LEGEND

- SOP 16 202, Wellbore #1, Design #3 V0
- SOP 16 204, Pilot Hole, Design #1 V0
- J Osborn HSOP 16 204, Curve & Lateral, Design #1 V0
- J Osborn HSOP 16 203, Wellbore #1, Design #3 V0

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Environmental Protection



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**
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 **33-05949 SSP signed.pdf**
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10/08/2021