

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

API 47-091-01325 County Taylor District Fetterman
Quad Gladesville Pad Name UNB Field/Pool Name _____
Farm name MacDonald, Charles E. Well Number 211
Operator (as registered with the OOG) Arsenal Resources
Address 6031 Wallace Rd. Ext City Wexford State PA Zip 15090

As Drilled location NAD 83/UTM Attach an as-drilled plat, profile view, and deviation survey
Top hole Northing 4365462.07 Easting 590882.67
Landing Point of Curve Northing 4365178.84 Easting 590538.94
Bottom Hole Northing 4367189.54 Easting 589892.04

Elevation (ft) 1878 GL Type of Well New Existing Type of Report Interim Final
Permit Type Deviated Horizontal Horizontal 6A Vertical Depth Type Deep Shallow
Type of Operation Convert Deepen Drill Plug Back Redrilling Rework Stimulate
Well Type Brine Disposal CBM Gas Oil Secondary Recovery Solution Mining Storage Other _____
Type of Completion Single Multiple Fluids Produced Brine Gas NGL Oil Other _____
Drilled with Cable Rotary

Drilling Media Surface hole Air Mud Fresh Water Intermediate hole Air Mud Fresh Water Brine
Production hole Air Mud Fresh Water Brine
Mud Type(s) and Additive(s)
Oil Based Muds

Date permit issued 03/24/2017 Date drilling commenced 04/17/2017 Date drilling ceased 04/28/2017
Date completion activities began 09/09/2017 Date completion activities ceased 09/29/2017
Verbal plugging (Y/N) N/A Date permission granted N/A Granted by N/A

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

Freshwater depth(s) ft 350' Open mine(s) (Y/N) depths N
Salt water depth(s) ft 910' Void(s) encountered (Y/N) depths N
Coal depth(s) ft 438' (Lower Kittanning) Cavern(s) encountered (Y/N) depths N
Is coal being mined in area (Y/N) N

Reviewed by:
[Signature]

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API 47-091 - 01325 Farm name MacDonald, Charles E. Well number 211

CASING STRINGS	Hole Size	Casing Size	Depth	New or Used	Grade wt/ft	Basket Depth(s)	Did cement circulate (Y/N) * Provide details below*
Conductor	30"	24"	80'	New	94.0	NA	Y
Surface	17.5"	13 3/8"	516'	New	54.50	120'	Y
Coal							
Intermediate 1	12 1/4"	9 5/8"	1,536'	New	40.00	NA	Y
Intermediate 2							
Intermediate 3							
Production	8 1/2"	5 1/2"	15,850'	New	20.00	NA	N
Tubing							
Packer type and depth set							

Comment Details Cement to surface on Conductor, Surface, and Intermediate. Production Top of Cement at 1300 ft

CEMENT DATA	Class/Type of Cement	Number of Sacks	Slurry wt (ppg)	Yield (ft ³ /sks)	Volume (ft ³)	Cement Top (MD)	WOC (hrs)
Conductor	A	230	15.6	1.2	276	Surface	8+
Surface	A	520	15.60	1.2	614	Surface	8+
Coal							
Intermediate 1	A	264/172	14.50/15.70	1.55/1.29	409/222	Surface	8+
Intermediate 2							
Intermediate 3							
Production	A	1351/1590	13.80/15.00	1.33/1.30	1797/2067	1300'	8+
Tubing							

Drillers TD (ft) 15,854 ft Loggers TD (ft) NA

Deepest formation penetrated Marcellus Plug back to (ft) NA

Plug back procedure NA

Kick off depth (ft) KOP of Curve at 7,270'. No plug

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

Well cored Yes No Conventional Sidewall Were cuttings collected Yes No

DESCRIBE THE CENTRALIZER PLACEMENT USED FOR EACH CASING STRING _____

20" - 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.

WAS WELL COMPLETED AS SHOT HOLE Yes No DETAILS Well completed in 35 stages, 1400 perforations

WAS WELL COMPLETED OPEN HOLE? Yes No DETAILS _____

WERE TRACERS USED Yes No TYPE OF TRACER(S) USED _____

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PERFORATION RECORD

Stage No.	Perforation date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formation(s)
	See Attached				

Please insert additional pages as applicable.

STIMULATION INFORMATION PER STAGE

Complete a separate record for each stimulation stage.

Stage No.	Stimulations Date	Ave Pump Rate (BPM)	Ave Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)	Amount of Nitrogen/other (units)
	See Attached							

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Please insert additional pages as applicable.

Perforation Record

Stage No.	Perforation Date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formations (s)
35	9/28/2017 22:08	8,806	8,968	40	Marcellus Shale
34	9/28/2017 16:58	9,006	9,168	40	Marcellus Shale
33	9/28/2017 3:11	9,206	9,368	40	Marcellus Shale
32	9/27/2017 10:29	9,406	9,568	40	Marcellus Shale
31	9/26/2017 21:48	9,606	9,768	40	Marcellus Shale
30	9/26/2017 10:12	9,806	9,968	40	Marcellus Shale
29	9/25/2017 22:33	10,006	10,168	40	Marcellus Shale
28	9/25/2017 10:03	10,206	10,368	40	Marcellus Shale
27	9/24/2017 22:51	10,406	10,568	40	Marcellus Shale
26	9/24/2017 10:00	10,606	10,768	40	Marcellus Shale
25	9/23/2017 23:01	10,806	10,968	40	Marcellus Shale
24	9/23/2017 11:33	11,006	11,168	40	Marcellus Shale
23	9/22/2017 22:24	11,206	11,368	40	Marcellus Shale
22	9/22/2017 10:11	11,406	11,568	40	Marcellus Shale
21	9/21/2017 23:25	11,606	11,768	40	Marcellus Shale
20	9/21/2017 8:56	11,806	11,968	40	Marcellus Shale
19	9/20/2017 23:59	12,006	12,168	40	Marcellus Shale
18	9/20/2017 12:02	12,206	12,368	40	Marcellus Shale
17	9/16/2017 22:27	12,406	12,568	40	Marcellus Shale
16	9/16/2017 10:28	12,606	12,768	40	Marcellus Shale
15	9/15/2017 23:40	12,806	12,968	40	Marcellus Shale
14	9/15/2017 10:41	13,006	13,168	40	Marcellus Shale
13	9/15/2017 23:01	13,206	13,368	40	Marcellus Shale
12	9/14/2017 11:22	13,406	13,568	40	Marcellus Shale
11	9/13/2017 22:23	13,606	13,768	40	Marcellus Shale
10	9/13/2017 11:06	13,806	13,968	40	Marcellus Shale
9	9/12/2017 23:11	14,006	14,168	40	Marcellus Shale
8	9/12/2017 11:04	14,206	14,368	40	Marcellus Shale
7	9/11/2017 23:09	14,406	14,568	40	Marcellus Shale
6	9/11/2017 11:18	14,606	14,768	40	Marcellus Shale
5	9/10/2017 23:37	14,806	14,968	40	Marcellus Shale
4	9/10/2017 11:11	15,006	15,168	40	Marcellus Shale
3	9/9/2017 23:49	15,206	15,368	40	Marcellus Shale
2	9/9/2017 12:33	15,406	15,568	40	Marcellus Shale
1	8/6/2017 12:02	15,606	15,764	40	Marcellus Shale

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Stimulation Information Per Stage

Stage No.	Stimulations Date	Ave Pump Rate (BPM)	Ave Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)
1	09/09/2017	74	7524	6056	4,741	506,040	12,181
2	09/09/2017	68	7944	7346	5,513	501,280	15,223
3	09/10/2017	71	8095	6402	5,582	502,680	13,652
4	09/10/2017	67	8217	7749	5,774	493,800	15,261
5	09/11/2017	73	8344	7212	6,042	502,720	14,427
6	09/11/2017	67	8069	6736	5,136	501,140	13,657
7	09/12/2017	68	8474	6591	5,229	503,460	12,890
8	09/12/2017	66	8091	6721	5,345	493,440	13,753
9	09/13/2017	74	8288	6605	5,177	502,180	12,723
10	09/13/2017	79	8294	6478	6,359	497,420	12,873
11	09/14/2017	73	8444	7186	5,062	500,520	14,703
12	09/14/2017	68	8184	6593	5,248	505,200	14,643
13	09/15/2017	78	8338	7167	5,821	502,380	12,831
14	09/15/2017	62	8275	6633	5,060	503,720	15,525
15	09/16/2017	77	8168	6793	6,075	497,660	11,847
16	09/16/2017	72	8169	7064	5,861	504,400	14,713
17	09/20/2017	79	8322	6572	5,947	502,720	11,329
18	09/20/2017	65	8108	7353	5,731	503,600	13,001
19	09/21/2017	67	8473	6915	5,968	502,500	16,941
20	09/21/2017	72	8124	7054	6,302	497,420	12,337
21	09/22/2017	77	8008	6836	5,388	506,380	11,734
22	09/22/2017	70	7978	6980	5,340	503,020	12,658
23	09/23/2017	74	8107	6707	5,916	388,580	9,196
24	09/23/2017	70	7769	6785	5,354	500,100	12,368
25	09/24/2017	80	7833	6909	6,340	497,440	11,145
26	09/24/2017	69	8055	6880	5,013	501,200	14,475
27	09/25/2017	81	7835	6543	5,685	501,320	11,324
28	09/25/2017	70	7983	6904	5,675	500,080	12,687
29	09/26/2017	78	7819	6419	5,514	508,040	12,025
30	09/26/2017	78	7935	7055	6,105	502,960	11,614
31	09/27/2017	74	8185	6570	6,110	501,340	12,932
32	09/27/2017	78	7944	7036	6,097	503,520	13,274
33	09/28/2017	56	8201	7572	5,452	503,820	13,744
34	09/28/2017	78	8138	7424	5,294	502,840	12,461
35	09/29/2017	73	8255	7314	5,513	503,620	14,172

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<u>PRODUCING FORMATION(S)</u>	<u>DEPTHS</u>		
Marcellus Shale	7979	TVD	8631 MD
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Please insert additional pages as applicable.

GAS TEST Build up Drawdown Open Flow OIL TEST Flow Pump

SHUT-IN PRESSURE Surface _____ psi Bottom Hole _____ psi DURATION OF TEST _____ hrs

OPEN FLOW Gas _____ mcfpd Oil _____ bpd NGL _____ bpd Water _____ bpd GAS MEASURED BY Estimated Orifice Pilot

LITHOLOGY/ FORMATION	TOP DEPTH IN FT NAME TVD	BOTTOM DEPTH IN FT TVD	TOP DEPTH IN FT MD	BOTTOM DEPTH IN FT MD	DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H ₂ S, ETC)
Sand/silt	0	7607	0	8005	Sand/silt
Burket	7607	7632	8005	8039	Shale
Tully	7632	7730	8039	8176	Limestone
Mahantango	7730	7968	8176	8593	Shale
Marcellus	7968	7979	8593	8631	Shale
Purcell	7979	7983	8631	8658	Limestone
Lower Marcellus	7983	7710	8658	15854	Shale

Please insert additional pages as applicable.

Drilling Contractor H&P
Address 1437 South Boulder Ave. City Tulsa State OK Zip 74119

Logging Company NA
Address _____ City _____ State _____ Zip _____

Cementing Company Universal Well Services
Address 18360 Technology Dr. Box 4 City Meadville State PA Zip 16335

Stimulating Company Keane Group
Address 2121 Sage Road City Houston State TX Zip 77056

Please insert additional pages as applicable.

Completed by Arsenal Resources Eddie Carder Telephone 304-629-6309
Signature [Signature] Title PERMITTING MANAGER Date 1/2/2018

Submittal of Hydraulic Fracturing Chemical Disclosure Information Attach copy of FRACFOCUS Registry
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Hydraulic Fracturing Fluid Product Component Information Disclosure

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Job Start Date:	9/9/2017
Job End Date:	9/29/2017
State:	West Virginia
County:	Taylor
API Number:	47-091-01325-00-00
Operator Name:	Arsenal Resources
Well Name and Number:	UNB 211H
Latitude:	39.43391200
Longitude:	-79.94397800
Datum:	NAD83
Federal Well:	NO
Indian Well:	NO
True Vertical Depth:	7,988
Total Base Water Volume (gal):	18,965,058
Total Base Non Water Volume:	0



Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Ascent	Carrier/Base Fluid	Water	7732-18-5	100.00000	89.61245	None
			Crystalline silica: Quartz (SiO2)	14808-60-7	100.00000	9.90444	None
Hydrochloric Acid (7.5%)	Keane	Acid Inhibitor	Water	7732-18-5	92.50000	0.32050	None
			Hydrochloric Acid	7647-01-0	7.50000	0.02599	None
KFR-16FW	Keane	Friction Reducer	Water	7732-18-5	60.00000	0.06614	None
			Distillates (petroleum), hydrotreated light	64742-47-8	20.00000	0.02205	None
			ammonium chloride	12125-02-9	1.50000	0.00165	None
			oleic acid diethanolamide	93-83-4	1.50000	0.00165	None
			alcohols, C12-16, ethoxylated	68551-12-2	1.00000	0.00110	None
MBC-516	Keane	Biocide	Water	7732-18-5	56.70000	0.00545	None
			Glutaral	111-30-8	26.70000	0.00257	None

			didecyldimethylammonium chloride	7173-51-5	8.00000	0.00077	None
			quaternary ammonium compounds, benzyl-C12-16-alkyldimethyl, chlorides	68424-85-1	5.30000	0.00051	None
			ethonal	64-17-5	2.80000	0.00027	None
KLSI-21	Keane	Scale Inhibitor					
			polyphosphoric acids, esters with triethanolamine, sodium salts	68131-72-6	30.00000	0.00456	None
KAI-12	Keane	Acid Inhibitor					
			Ethylene glycol	107-21-1	40.00000	0.00063	None
			dipropylene glycol, monomethyl ether	34590-94-8	20.00000	0.00031	None
			Tar bases, quinoline derivs., benzyl chloride-quaternized	72480-70-7	10.00000	0.00016	None
			Ethoxylated alcohol	68131-39-5	10.00000	0.00016	None
			formic acid	64-18-6	10.00000	0.00016	None
			Cinnamaldehyde	104-55-2	10.00000	0.00016	None
			isoproyl alcohol	67-63-0	5.00000	0.00008	None
Ingredients shown above are subject to 29 CFR 1910.1200(i) and appear on Material Safety Data Sheets (MSDS). Ingredients shown below are Non-MSDS.							
Other Chemical(s)	Listed Above	See Trade Name(s) List					
			Water	7732-18-5	92.50000	0.32050	
			Distillates (petroleum), hydrotreated light	64742-47-8	20.00000	0.02205	
			Glutaral	111-30-8	26.70000	0.00257	
			oleic acid diethanolamide	93-83-4	1.50000	0.00165	
			ammonium chloride	12125-02-9	1.50000	0.00165	
			alcohols, C12-16, ethoxylated	68551-12-2	1.00000	0.00110	
			didecyldimethylammonium chloride	7173-51-5	8.00000	0.00077	
			quaternary ammonium compounds, benzyl-C12-16-alkyldimethyl, chlorides	68424-85-1	5.30000	0.00051	
			dipropylene glycol, monomethyl ether	34590-94-8	20.00000	0.00031	
			ethonal	64-17-5	2.80000	0.00027	
			Cinnamaldehyde	104-55-2	10.00000	0.00016	
			Ethoxylated alcohol	68131-39-5	10.00000	0.00016	
			Tar bases, quinoline derivs., benzyl chloride-quaternized	72480-70-7	10.00000	0.00016	
			formic acid	64-18-6	10.00000	0.00016	
			isoproyl alcohol	67-63-0	5.00000	0.00008	
			Water	7732-18-5	85.00000	0.00001	

* Total Water Volume sources may include fresh water, produced water, and/or recycled water

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

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

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

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Latitude: 39°27'30" 7,779' SHL

10,961' BHL

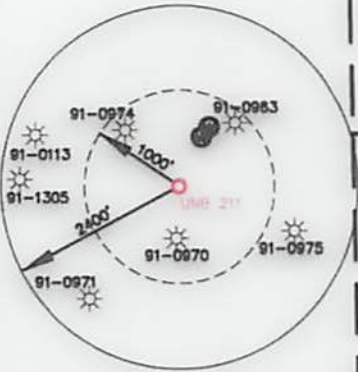
THRASHER

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

NOTES ON SURVEY

- COORDINATES SYSTEM IS UTM, NAD 83 DATUM, ZONE 17, U.S. FOOT AND WELL COORDINATES ESTABLISHED USING SURVEY GRADE GPS.
- SURFACE AND ROYALTY OWNER INFORMATION AND THEIR BOUNDARIES SHOWN HEREON WERE PLOTTED FROM DEEDS AND/OR TAX PARCEL MAPS PROVIDED BY CLIENT AND FIELD LOCATIONS.
- THIS PLAT DOES NOT REPRESENT A BOUNDARY SURVEY OF THE PARCELS SHOWN HEREON.
- NO DWELLINGS AND BUILDINGS WITHIN 625 FEET OF PROPOSED OF CENTER OF PAD.
- NO WATER WELLS OR DEVELOPED SPRINGS WITHIN 250 FEET OF PROPOSED WELL.
- NO PERENNIAL STREAMS, LAKES, PONDS, RESERVOIRS OR WETLANDS WITHIN 100 FEET OF THE LIMITS OF DISTURBANCE.
- NO NATURALLY PRODUCING TROUT STREAM WITHIN 300 FEET OF LIMITS OF DISTURBANCE.

GRID NORTH
UTM, NAD83 DATUM, ZONE 17, US FT



PROPOSED COORDINATES
UTM (NAD83, ZONE 17, METERS):

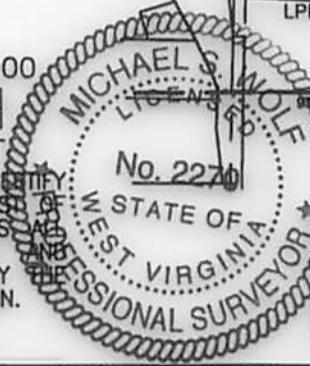
SURFACE HOLE LOCATION (SHL):	NORTHING: 4,365,462.07	EASTING: 590,882.67
LANDING POINT LOCATION (LPL):	NORTHING: 4,365,152.13	EASTING: 590,548.04
BOTTOM HOLE LOCATION (BHL):	NORTHING: 4,367,181.87	EASTING: 589,888.21

AS-DRILLED COORDINATES
UTM (NAD83, ZONE 17, METERS):

SURFACE HOLE LOCATION (SHL):	NORTHING: 4,365,462.07	EASTING: 590,882.67
LANDING POINT LOCATION (LPL):	NORTHING: 4,365,178.84	EASTING: 590,518.94
BOTTOM HOLE LOCATION (BHL):	NORTHING: 4,367,189.54	EASTING: 589,892.04



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 REGULATIONS ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.



BL	TM	PAR	OWNER	ACRES
A	3	18	N/F CHARLES E. MACDONALD	222.75
B	6	7	VIRGINIA MORGAN BREWER	230.00
C	3	19.1	N/F CHARLES EDWARD & LAVERNE MACDONALD & SURV	20.28
D	3	20	N/F CHARLES EDWARD & LAVERNE MACDONALD & SURV	37.00
E	3	19	N/F BEVERLY HORNEBECK TRUSTEE OF THE BEVERLY HORNEBECK LIVING TRUST	24.50
F	27	4	N/F BEVERLY HORNEBECK TRUSTEE OF THE BEVERLY HORNEBECK LIVING TRUST	152.00

(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS
WVDEP
OFFICE OF OIL & GAS
601 57TH STREET
CHARLESTON, WV 25034

MINIMUM DEGREE OF ACCURACY: 1/200
PROVEN SURVEY SOURCE OF GRADE GPS ELEVATION: (NAVD 88, US FT)

UNB NO. 211
OPERATOR'S WELL #: 47
API WELL #: 091
STATE COUNTY PERMIT

WELL TYPE: OIL WASTE DISPOSAL PRODUCTION DEEP GAS LIQUID INJECTION STORAGE SHALLOW

WATERSHED: WHITE DAY CREEK
DISTRICT: FETTERMAN COUNTY: TAYLOR ELEVATION: 1878'
SURFACE OWNER: CHARLES MacDONALD QUADRANGLE: GLADESVILLE 7.5'
OIL & GAS ROYALTY OWNER: JP MORGAN ACREAGE: ± 222.75
ACREAGE: ± 686.51 (LEASE)

DRILL DRILL DEEPER REDRILL FRACTURE OR STIMULATE PLUG OFF OLD FORMATION PERFORATE NEW FORMATION

CONVERT PLUG & ABANDON CLEAN OUT & REPLUG OTHER CHANGE (SPECIFY) AS-DRILLED

TARGET FORMATION: MARCELLUS SHALE ESTIMATED DEPTH: 7,988 TVD 15,854 TMD

WELL OPERATOR: ARSENAL RESOURCES DESIGNATED AGENT: WILLIAM VEIGEL
ADDRESS: 6031 WALLACE ROAD EXTENSION #300 ADDRESS: 65 PPROFESSIONAL PLACE, SUITE 200
CITY: WEXFORD STATE: PA ZIP CODE: 15090 CITY: BRIDGEPORT STATE: WV ZIP CODE: 26330

LEGEND:	— LEASE BOUNDARY	— DATE: 09-29-2017
○ PROPOSED SURFACE HOLE / BOTTOM HOLE	— AS-DRILLED PATH	DRAWN BY: R.DOERR
☀ EXISTING / PRODUCING WELLHEAD	— PROPOSED PATH	SCALE: 1" = 2000'
LPL LANDING POINT LOCATION		DRAWING NO: XXXXX
☉ EXISTING WATER WELL		WELL LOCATION PLAT
☪ EXISTING SPRING		

Longitude: 79°55'00"

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