FORM NO. 2 R 10/09

ARM 36.22.307, 601, 605, 1003, 1004, 1011, 1013, 1103, 1222, 1240, 1301, 1306, 1309, and 1417

Submit In Quadruplicate To:

MONTANA BOARD OF OIL AND GAS CONSERVATION
2535 ST. JOHNS AVENUE
BILLINGS, MONTANA 59102

SUNDRY NOTICES AND REPORT OF WELLS

Operator Vanguard Natural Resources

Address PO Box 569

City POWELL State WY Zip Code 82435

Telephone 307-754-7300 Fax 307-754-7350

Lease Name: EBET2

Type (Private/State/Federal/Tribal/Allotted): FEDERAL

Well Number: #390

RECEIVED
NOV - 9 2017
MONTANA BOARD OF OIL & GAS CONSERVATION • BILLINGS

Location of well (1/4-1/4 section and footage measurements): SENE 2381' FNL and 325' FEL

Unit Agreement Name: ELK BASIN UNIT

Field Name or Wildcat: ELK BASIN

Township, Range, and Section: Section 27, T9S-R23#

County: Carbon County, MT

API Number: 25 | 009 | 21302
State County Well

Well Type (oil, gas, injection, other): oil

Indicate below with an X the nature of this notice, report, or other data:

Notice of Intention to Change Plans	☐	Subsequent Report of Mechanical Integrity Test	☐
Notice of Intention to Run Mechanical Integrity Test	☐	Subsequent Report of Stimulation or Treatment	☐
Notice of Intention to Stimulate or to Chemically Treat	☑	Subsequent Report of Perforation or Cementing	☐
Notice of Intention to Perforate or to Cement	☐	Subsequent Report of Well Abandonment	☐
Notice of Intention to Abandon Well	☐	Subsequent Report of Pulled or Altered Casing	☐
Notice of Intention to Pull or Alter Casing	☐	Subsequent Report of Drilling Waste Disposal	☐
Notice of Intention to Change Well Status	☐	Subsequent Report of Production Waste Disposal	☐
Supplemental Well History	☐	Subsequent Report of Change in Well Status	☐
Other (specify) _____	☐	Subsequent Report of Gas Analysis (ARM 36.22.1222)	☐
_____	☐	_____	☐

Describe Proposed or Completed Operations:

Describe planned or completed work in detail. Attach maps, well-bore configuration diagrams, analyses, or other information as necessary. Indicate the intended starting date for proposed operations or the completion date for completed operations.

Please see following documents. Well is yet to be drilled.

BOARD USE ONLY

Approved NOV 14 2017
Date

Accepted for record purposes only

Name Title

The undersigned hereby certifies that the information contained on this application is true and correct:

11/3/2017
Date

Signed (Agent)

Brian Redick, Engineer
Print Name and Title

Telephone: 307-754-7374

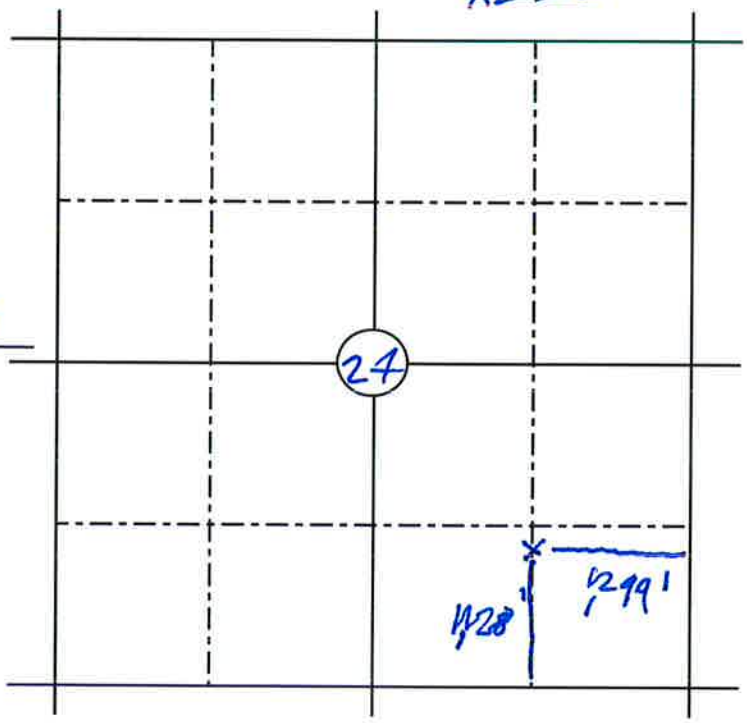
SUPPLEMENTAL INFORMATION

NOTE: Additional information or attachments may be required by Rule or by special request.

Plot the location of the well or site that is the subject of this notice or report.

Range R23E

Township 9S



BOARD USE ONLY	CONDITIONS OF APPROVAL

The operator must comply with the following condition(s) of approval:

Failure to comply with the conditions of approval may void this permit.

VANGUARD OPERATING, LLC

Field: Elk Basin Unit 2
WELL # 390
Carbon County, Montana
WINS#

Stimulation proposed procedure: 5/25/2017:

Discussion:

Current Status: New drill well

Production: Embar/Tensleep

Well Details: Proposed

SHL: SENE, 2381' FNL and 325' FEL, Sec. 27, T9S, R23E
BHL: SESE, 1315' FSL and 1190' FEL, Sec. 27, T9N, R23E

Expected BHT: 145 deg F

Estimated Ground Level Elevation: 4550'
Estimated Kelly Bushing Elevation: 4570'

Estimated Tops of Geological Markers and Formations Expected to Contain Water, Oil and Gas and Other Minerals:

Formation	MD	TVD
Eagle	750'	750'
Cody	1437'	1437'
1st Frontier Sand	2850'	2768'
2nd Frontier Sand	3730'	3553'
Cloverly	4540'	4276'
Sundance	4987'	4674'
Chugwater	5563'	5188'
Embar	6115'	5680'
7" Casing	6130'	
Tensleep	6123'	5687'
Amsden	6267'	5816'
TD	6338'	

00921302

Casing Program:

Hole Size	SETTING DEPTH (FROM)	(TO)	Casing Size	Casing Weight	Casing Grade	Thread	Condition
12-1/4"	Surface	0-300'	9-5/8"	40#	K-55	LT&C	New
8-3/4"	Production	0-6130'	7"	23#	K-55	LT&C	New
6"	Open Hole	6130'-TD	None				

Production interval:

Embar: *6115 – 6185' (70')*

Tensleep: *6169 – 6284' (115')*
Porosity: 8-12%
BHP: 50-100 psi
Perm: 60 md
Frac gradient: ~.433 psi/ft
Expected BHT: 145 deg F

Emergency Medical Services:

Powell Valley Healthcare
777 Avenue H
Powell, WY 82435
307.754.2267
800.428.1398

Contact Information:

Name	Title	Office #	Cell #
Don Adams	Production Foreman	307-754-7318	307-254=0954
Mark Vredenburg	Engineer Powell	307-754-7324	307-272-2706
Keith Froebel	Operations Manager	832-377-2236	281-889-1241

Area Map: Go to Elk Basin main office located 16 miles nth of Powell, Wyoming on Highway 295, and ask for specific directions to the well.

Drilling Procedure

Cementing Program

Casing Type	Casing Size	Cement Description
Surface	9-5/8"	135 sx Class G w/ 4% Gel, 3% CaCl2, ½ lbm/sk Flocele circulated to surface with 100% excess.
Production	7"	Stage 1: LEAD: 75 sx Lite 65/35 Poz w/ ¼ lbm/sk Flocele, 50% excess TAIL: 150 sx Class G w/2% Gel, ¼ lbm/sk Flocele, 30% excess Stage 2: LEAD: 100 sx Lite 65/35 Poz w/1/4 lbm/sk Flocele, 30% excess TAIL: 150 sx Class G w/ 2% Gel, 30% excess
Note: Actual volumes to be calculated from caliper log.		

Mud Program

Interval	Weight	Viscosity	Fluid Loss (API filtrate)	Remarks
0'-300'	8.4-9.2	29-48	12 ml or less	Freshwater drilling fluid
300'-6130'	8.8-9.5	36-56	8 ml or less	LSND/DAP
6130'-TD	7.9			Lease crude
Note: Sufficient mud materials to maintain mud properties, control lost circulation and to contain "kicks" will be available at wellsite.				

Testing, Logging and Core Programs

Cores	None anticipated;
Testing	None anticipated;
Surveys	TOTCO every 500'
Logging	Mud Logging f/300'-TD, Cased Hole logs f/300'-6130'. CBL on cemented production casing.

Anticipated Abnormal Pressures or Temperatures

No abnormal pressures or temperatures or other hazards are anticipated.

BHT anticipated to be 145 deg F.

Maximum anticipated bottom hole pressure equals approximately 2632 psi* and maximum anticipated surface pressure equals approximately 1222 psi** (bottom hole pressure minus the pressure of a partially evacuated hole calculated at 0.22 psi/foot).

*Max Mud Wt x 0.052 x TVD = A (bottom hole pressure)
**Maximum surface pressure= A- (0.22 x TVD)

H2S Contingency Plan

The primary purpose of this contingency plan is to guide location personnel in the responses expected of them in the event that hydrogen sulfide (H S) is liberated during the drilling program.

Hydrogen Sulfide is extremely hazardous affecting the health and safety of those working around it. Drilling and producing operations of hydrocarbons containing toxic gases can, however, be performed safely and without incident when the necessary precautions are taken and the outlined safety procedures are followed. It is imperative that sulfide resistant materials be used, that the proper safety equipment be used, that this equipment be properly maintained, and that all safety regulations be complied with.

The procedures outlined in this plan are for your safety and the safety of all others: therefore, it is requirement that they be followed.

H2S is anticipated and the following will be in place:

1. The drilling rig, see Figure 3, will be situated at such a location that prevailing winds blow across the rig toward the flare pit.

2. Two (2) SAFETY BRIEFING AREAS will be established not less than 200 feet from the wellhead and in locations so that at least one SAFE BRIEFING AREA will be up-wind of the well at all times.

3. Protective equipment will be stored in strategic locations around the well-site and each of the SAFE BRIEFING AREAS. Such equipment will include Self Contained Breathing Apparatus (SCBA), First Aid Kits, Stretchers, and Hydrogen Sulfide Hand Operated Detectors. In the event of an emergency, personnel should assemble at the up-wind SAFE BRIEFING AREA for instructions from their supervisor.

4. Windsocks or streamers will be utilized to give wind directions at several elevations; i.e., tree top, derrick floor level, and 6 to 8 feet above ground level. PERSONNEL SHOULD DEVELOP THE PRACTICE OF ROUTINE OBSERVATION OF WIND DIRECTION.

5. Windbreakers and rig curtains can be removed from around the derrick floor and monkey board, if hazardous amounts of H S encountered.

6. Explosion proof ventilating fans if required will be positioned to ensure adequate circulation at the derrick floor, cellar area and any other location where hydrogen sulfide is accumulating in excess of 10 PPM.

7. A kill line of ample strength and securely staked should be laid to the well head from a safe location to permit pumping into the well in an emergency.

8. When approaching a depth where Hydrogen Sulfide may be encountered, the MUD SHOULD BE MAINTAINED IN AN OVER BALANCED CONDITION TO PRECLUDE THE ENTRY OF FORMATION FLUIDS INTO THE WELLBORE and thereby restrict the Hydrogen Sulfide to be treated to that contained in the formation drilled.

9. When approaching a depth where Hydrogen Sulfide may be encountered, appropriate operational danger or caution sign(s) shall be displayed along all controlled accesses to the site. The sign(s) shall be legible and large enough to be read by all persons entering the well site and be placed a minimum of 200 feet, but no more than 500 feet, from the well site which allo.ws vehicles to turn around at a safe distance prior to reaching the site. Each sign shall be painted in a high visibility red, black and white or yellow with black lettering. An appropriate operational danger or caution sign(s) shall also be displayed at the controlled accesses 1 ½ miles to from the location.

10. 24-hour radio or telephone communication will be provided at the rig. Emergency telephone numbers will be prominently posted: SHERIFF'S DEPARTMENT, LIFE FLIGHT AMBULANCE, HOSPITALS, DOCTORS, AND OPERATORS' SUPERVISORY PERSONNEL.

11. Filter-type gas masks are not suitable for protection from Hydrogen Sulfide on drilling rigs. Pressure demand, SCBA'S will be provided for use in any Hydrogen Sulfide concentration. They are not physically exhausting to use, are rugged and dependable, and require little maintenance.

12. SCBA'S will be stored on racks and protected from the weather. Rig crew equipment will be located at readily accessible location on the rig floor. For hygienic reasons, SCBA'S are to be cleaned and sterilized at regular intervals. Employees working derricks will be equipped with a connection through a quick- disconnect from this system of breathing air so that if he must evacuate the derrick he will have a full air bottle with his SABA Pac. A six outlet air supply manifold will be installed on the rig floor for continuous use by crews and supervisory personnel working in a "Mask On" situation. The multi-bottle supply cylinders are to be located approximately 200 feet from the well. A minimum of 3,000 cu. ft. compressed breathing air will be on location at all times.

13. A H2S monitor/alarm system which can be heard during operations. The sensors shall be located at the shale shaker, in the sub structure close to BOP and on the floor close to the driller. When the alarm is sounded, personnel must assemble at the BRIEFING AREA designated SAFE. Alarms will consist of a low alarm which will be set at 10 ppm and will be indicated with a flashing red light. The high alarm will be set at 15 ppm and will be indicated with a siren and the low alarm indicator.

14. There will be No Smoking on rig floor or near wellhead. Designated Smoking Areas will be provided by the Drilling Supervisor.

15. Safety meetings and training sessions will be held at frequent intervals by the Safety Advisor, the Drilling Supervisor, or the Rig Supervisor. All personnel required to work on location will be thoroughly familiar with the use, care and servicing of the following: Personal protective equipment such as respirators, and gas detection equipment.

16. All personnel who will be working at the well-site will be properly trained in H2S drilling and contingency procedures in accordance with the general training requirements outlined in the American Petroleum Institute's (API) Recommended Practice (RP) 49 (April 15, 1987 or subsequent editions) for Safe Drilling of Wells Containing Hydrogen Sulfide, Section 2. The training shall be accomplished prior to a well coming under the terms of BLM Onshore Order 6 (i.e. 3 days or 500 feet of known or probable H2S zone). In addition weekly H2S and well control drills for all personnel in each working crew shall be conducted. The initial training session for each well shall include a review of the site specific Drilling Operations Plan and, if applicable, the Public Protection Plan.

17. All training sessions and drills shall be recorded on the driller's log or its equivalent.

18. All electric lighting, wiring and electrical devices within 100 feet of the well will be put in vapor-proof condition to minimize the possibility of explosion.

19. Blowout preventers should meet or exceed the recommendations for hydrogen sulfide service (API RP 53). Choke manifolds will be of similar materials.

20. Inspection of installation, operation, and testing of blowout preventers, choke manifolds, etc., dressed for Hydrogen Sulfide services, will be conducted regularly.

21. Every person involved in the operation will be informed of the characteristics of Hydrogen Sulfide and its dangers, safe procedures to use when it is encountered, and recommended first aid procedures. This will be done through frequent safety talks and training sessions.

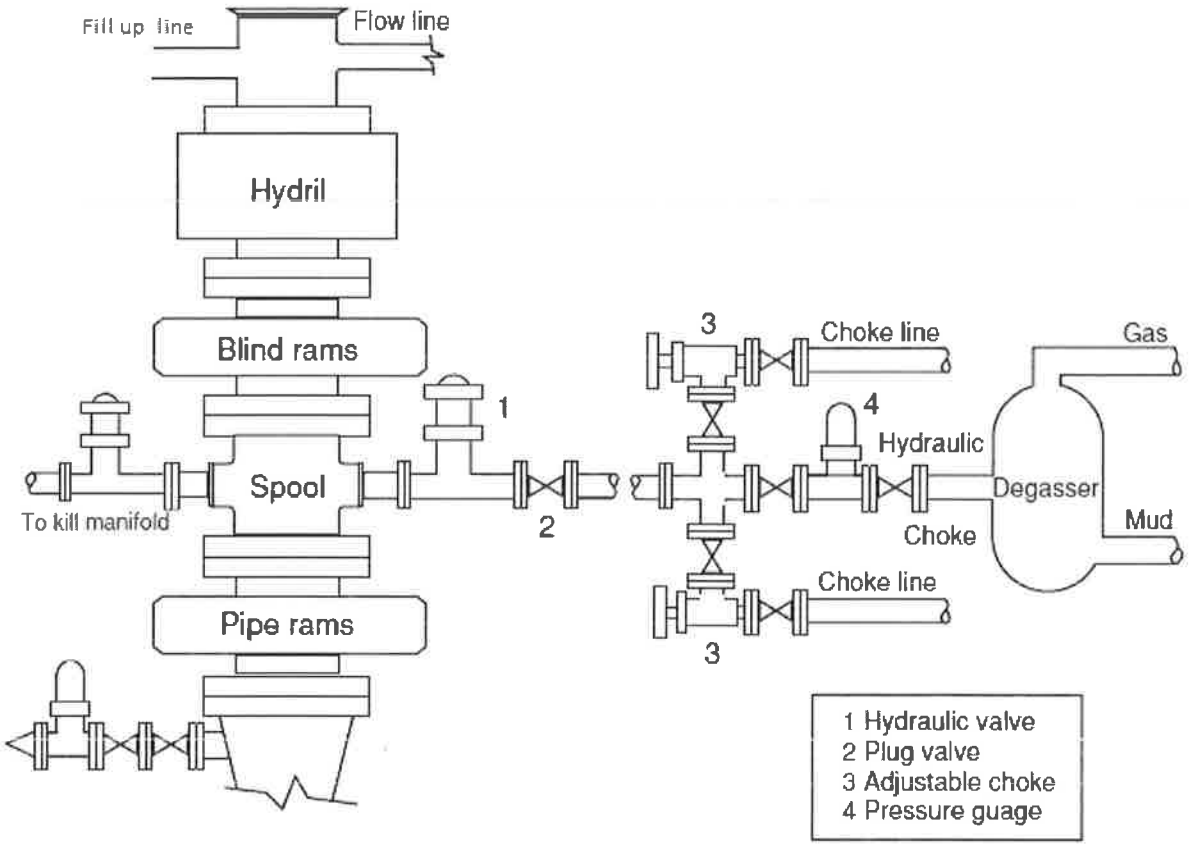
22. Operational danger or caution sign(s) shall be displayed along all controlled accesses to the site. sign shall be highly visible and the sign(s) shall be legible and large enough to be read by all persons entering the well site and be placed a minimum of 200 feet but no more than 500 feet from the well site and at a location which allows vehicles to turn around at a safe distance prior to reaching the site.

23. When H2S is detected in excess of 10 ppm at any detection point, red flag(s) shall be displayed. When H2S is detected in excess of 10 ppm at any detection point, all non-essential personnel shall be moved to a safe area and essential personnel (i.e., those necessary to maintain control of the well) shall wear pressure-demand type protective breathing apparatus. Once accomplished, operations may proceed.

A flare system shall be designed and installed to safely gather and burn H2S-bearing gas. Flare lines shall be located as far from the operating site as feasible and in a manner to compensate for wind changes. The flare line(s) mouth(s) shall be located not less than 150 feet from the well-bore. Flare lines shall be straight

unless targeted with running tees. The flare system shall be equipped with a suitable and safe means of ignition. Where non-combustible gas is to be flared, the system shall be provided with supplemental fuel to maintain ignition.

BOP/Choke Manifold Diagram:



Completion Procedure:

NOTE: All depths are KB, unless otherwise noted.

1. Verify rig anchors have been tested.
2. Dig workover pit on well location. (Drilling pit might still be available)
3. Hold pre job safety meeting and discuss procedure.
4. MIRU Service Unit and equipment needed for stimulation procedure.

Phase 1: Prepare Well for stimulation of the Embar/Tensleep OH section:

NOTE: If Workover rig deepens the well, start at step 5, if well already deepened, proceed to step 7.

5. Run CBL if required with Wire line.
6. RIH with drill string and bit, drill out 7" float collar, shoe joint and float shoe. POOH, run back in with drill bit for OH drilling and drill to TD
7. RIH with work string, sand back Open hole to ~20' past bottom of Tensleep zone (~6300'), let sand settle and tag sand. POOH, fill casing, and pressure test casing to 80% of burst pressure, establish injection rate down csg into OH with water, record all pump rates and pressures, ISIP, 5/10/15 minute pressures after ISIP. Swab well for evaluation.
8. **Rig up stimulation service company**. Pressure test pumps and lines to 10,000 psi. Pump the following stimulation procedure.

Note: Rig up pressure relieve valve on annulus, maintain 500 psi and monitor.

Anticipated surface frac pressure *~2000 psi, assume down 7" 23# csg at 35 bpm, assuming a .55 psi/ft frac gradient.* Use breakdown pressures and rates to calculate ~treating pressure at time of job. The Tensleep is under pressured, probably will not hold a fluid column.

Trt-Stage	Stage Desc	Fluid Desc	Rate-Liq+Prop (bbl/min)	Clean Volume (Gal)	Proppant	Prop Conc. (lbm/gal)	Prop. Mass (lbm)
1	FET	Slick water	35	10000			
	Pre Pad	Xlink fluid	35	3000	100 mesh	1	3000
2	Pad	Xlink fluid	35	10000			
3	SLF	Xlink fluid	35	2000	12/20	1	2000
4	SLF	Xlink fluid	35	3000	12/20	2	6000
5	SLF	Xlink fluid	35	4000	12/20	3	12000
6	SLF	Xlink fluid	35	5000	12/20	4	20000
7	SLF	Xlink fluid	35	3000	12/20	5	15000
8	Flush	Slick water	35	~3000			
	ISIP 5-10-15 min						

	Totals			45000			55,000 lbs + 3000 lbs 100 mesh

NOTE: Frac fluid to be a crosslinked, *25 ppt* gelled water, containing fluid loss control, nonionic surfactant, clay control, breakers and normal frac chemicals as needed.

NOTE: Monitor FET to obtain closure pressure and leak off parameters as needed.

9. Swab for evaluation and clean up with work over rig. Swab for a few days

Cost estimate: $220,000

- Includes 3 days to drill out OH, 10 days to do completion work and swab for evaluation

Wells in the area that were stimulated in the past.

EBET2-215: 1967 Original Drill

Notch Tensleep 5,868'
250 gal 15% HCL 6,000# 20-40, 4000# 10-20 Sand 30.3 BPM
2,000-2,150 psi. ISIP 1,250 psi
Notch Tensleep 5,838'
250 gal 15% HCL 6,000# 20-40, 4000# 10-20 Sand 31 BPM
1,800-2,000 psi. ISIP 1,250 psi
Notch 5,800'
250 gal 15% HCL 6,000# 20-40, 4000# 10-20 Sand 24.6 BPM
1,900-3,300 psi. ISIP 1,500 psi
Set CICR @ 5,826'.
Sqz w/ 200 sx cmt
DO to 5,787'
Notch Tensleep 5,759'
250 gal 15% HCL 3,500# 20-40, 1,500# 10-20 Sand 9.9 BPM
2,700-3,350 psi. ISIP 1,350 psi
DO cmt to 5,808'
Notched Tensleep 5,800'
250 gal 15% HCL 3,000# 20-40, 2,000# 10-20 Sand 16.7 BPM
3,300-3,350 psi. ISIP 850 psi

EBET2-212: Crude oil fracs, 78,82,83, 87. No pumping data.

EBET2-024: 1/17/1978: 10000 lb sand oil frac down tubing 3600-4400 psi. 12/7/65, sand water frac down tubing, 20000 lbs 20/40, 3000 lbs 10/20. No pressure data.

EBET2-330: Diesel sand frac 1988, 53000 gallons, 77000 lbs, 1-5 ppg 35 bpm, 45000 lbs 20/40, 32000 lbs 12/20. Displaced at 26 bpm, 2180 psi, ISIP 1820 psi

EBET2-331: 1990: 35 bpm down 5 ½" casing at ~ 2600 psi broke back to ~2000 psi, 1-4 ppg. 52,000 gallons gelled diesel and 50620 lbs of 12/20 sand OH from 5834-6070'

EBET2-340: 1991: frac down 5 ½" casing at 35 bpm, ~1500 psi. 3000 gallons gelled diesel, 32000 lbs 20/40 (1-4 ppg), 18500 lbs 12/20 (4-4.5 ppg)

Brian H. Sheets
Consulting Engineer

PRESSURE PUMPING LLC

Vanguard Operating LLC
EBU2 #390

Carbon County, MT
Sec 27, T 9S, R 23E
Frac

Prepared for : Mr. Brian Redick
Vanguard Operating LLC

bredick@vnrenergy.com

Prepared by: Rick Boyce
QES PRESSURE PUMPING LLC
(307) 388-4331

October 12, 2017

Service Point: Gillette, WY: (307) 686-4914

Account Manager: Rick Boyce
(307) 388-4331

Vanguard Operating LLC
EBU2 #390
Sec 27, T 9S, R 23E
Carbon County, MT
12-Oct-17

JOB DATA

Purpose Of Treatment:	**Enhance Production**
Job Type:	**Frac**
Treating Conductor:	**3.5"**
Est. Average Pump Rate (bpm):	**35**
Est. Average. Treating PSI:	**2,000**
Max. Pressure (psi):	

Fluid Requirements:	Fluid Description	Volume	U.O.M.
	Slickwater	13,000	Gallons
	40# Xlink	30,000	Gallons

Proppant/Divert Requirements:	Proppant/Divert Description	Volume	U.O.M.
	100 Mesh Sand	3,000	lb
	20/40 Northern White Sand	55,000	lb

Well/Job Data:	Well/Job Data Description
Formation:	Tensleep
Perforated Interval (ft):	
Packer Set @ (ft):	
Temperature (°F):	110 degF

Information/Directions/Comments:

QES Pressure Pumping LLC may incorporate the daily use of Knight Fire Suppression Systems (Fire Suppressant System/Certified Firefighter/EMT Personnel) on all fracturing jobs for the safety of "ALL" personnel & equipment on the well site during the pressure pumping operation.

Vanguard Operating LLC
EBU2 #390
Sec 27, T 9S, R 23E
Carbon County, MT
12-Oct-17

Pump Schedule

Perforations: _____

Maximum Pressure (psi):
Est. Treating Pressure (psi):

STG No.	Proppant Lbs./Gal.	Stage Gals.	Fluid Type or Comment	Proppant Type or Stage Description	Stage/lbs. Proppant	Clean Rate (bpm)	Clean Bbls.	Slurry Rate (bpm)	Slurry Bbls.	Stage Time
1		10,000	Slickwater	Pre-Pad		35.0	238	35	238	6.8
2	1	3,000	40# Xlink	SLF, 100 Mesh	3,000	33.5	71	35	75	2.1
3		10,000	40# Xlink	Pad		35.0	238	35	238	6.8
4	1	2,000	40# Xlink	SLF, 20/40 White	2,000	33.5	48	35	50	1.4
5	2	3,000	40# Xlink	SLF, 20/40 White	6,000	32.1	71	35	78	2.2
6	3	4,000	40# Xlink	SLF, 20/40 White	12,000	30.8	95	35	108	3.1
7	4	5,000	40# Xlink	SLF, 20/40 White	20,000	29.6	119	35	141	4.0
8	5	3,000	40# Xlink	SLF, 20/40 White	15,000	28.5	71	35	88	2.5
9		3,000	Slickwater	Flush		35.0	71	35	71	2.0
	Totals	43,000 gls			58,000 lbs		1,024 bbl		1,087 bbl	0.52 hrs

Pump Schedule Comments:

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Vanguard Operating LLC
EBU2 #390
Sec 27, T 9S, R 23E
Carbon County, MT
12-Oct-17

FLUID DESCRIPTION

Fluid 1: Slickwater
Fluid 2: 40# Xlink

MATERIAL'S	U.O.M.	LOADING PER/1000 GALLONS									Totals
		Fluid 1 13,000	Fluid 2 30,000	Fluid 3	Fluid 4	Fluid 5	Fluid 6	Fluid 7	Fluid 8	Fluid 9	
WG-1SLR, Slurried Guar Gel	gal		10.0								300
BIO-2L, Liquid Biocide (THPS)	gal	0.2	0.2								9
NE-1, Non Emulsifier (Nonionic)	gal	2.0	2.0								86
XLB-2, Borate Crosslinker	gal		1.0								30
Buffer-4L, High pH (sodium hydroxide)	gal		1.00								30
KCL-2Sub, KCl Substitute (anionic product tolerar	gal	2.0	2.00								86
B-1, Oxidizer Breaker (AP)	lb	2.00	2.00								86
FR-1, Friction Reducer (Cationic)	gal	0.50									7
											0
											0
											0
											0
											0
											0
											0
											0
Fluid and Storage Requirements:											

QES

PRESSURE PUMPING LLC

CAS INFORMATION:

Additive	Max Loading/ 1000 Gal	Specific Gravity	Additive Quantity	Mass (lbs)
WATER (Customer Supplied)	1,000.00	1.00	43,000	358,835
WG-1SLR, GUAR SLURRY	10.00	1.04	300	2,609
BIO-2L, BIOCIDE	0.20	1.00	9	75
NE-1, NON EMULSIFIER	2.00	0.95	86	683
XLB-2, CROSSLINKER	1.00	1.05	30	263
BUFFER -4L	1.00	1.22	30	305
KCl-2SUB, KCl SUBSTITUTE	1.00	1.08	86	777
B-1, BREAKER	1.00	2.55	86	86
FR-1, FRICTION REDUCER	0.50	1.05	7	61
SAND	5,000.00	2.65	58,000	58,000
				Total Slurry Mass (Lbs)
				421,694

Name	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Total Component Mass in HF Fluid (lbs)	Maximum Ingredient Concentration in HF Fluid (% by mass)**
WATER (Customer Supplied)	Water	7732-18-5	100.00%	358,835	85.09371%
SAND	Silica Quartz	14808-60-7	100.00%	58,000	13.75405%
WG-1SLR, GUAR SLURRY	Solvent Naptha (pet.) heavy aliphatic	64742-47-8	60.00%	1,565	0.37117%
	Guar Gum	9000-30-0	50.00%	1,304	0.30931%
NE-1, NON EMULSIFIER	Methanol	67-56-1	30.00%	205	0.04855%
KCl-2SUB, KCl SUBSTITUTE	Choline Chloride	67-48-1	70.00%	544	0.12890%
	Water	7732-18-5	30.00%	233	0.05524%
FR-1, FRICTION REDUCER	Hydrotreated light distallate	064742-47-8	30.00%	18	0.00436%
	Sodium Chloride	7647-14-5	5.00%	3	0.00073%
	Oxylalkylated alcohol	69227-21-0	5.00%	3	0.00073%
BUFFER -4L	Sodium Hydroxide	1310-73-2	30.00%	92	0.02173%
	Water	7732-18-5	70.00%	214	0.05070%
XLB-2, CROSSLINKER	Boric Acid	10043-35-3	10.00%	26	0.00625%
	Sodium Borate	13840-56-7	5.00%	13	0.00312%
	Glycerol	56-81-5	5.00%	13	0.00312%
B-1, BREAKER	Ammonium persulfate	7727-54-0	100.00%	86	0.02039%
BIO-2L, BIOCIDE	Tetrakis(hydroxymethyl) Phosphonium Sulfate	55566-30-8	20.00%	15	0.00356%
	Water	7732-18-5	80.00%	60	0.01425%

100.00%

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Vanguard Operating LLC
EBU2 #390
Sec 27, T 9S, R 23E
Carbon County, MT
12-Oct-17

PRODUCT DESCRIPTION

WG-1SLR, Slurried Guar Gel

FC5451

General Information: WG-1SLR, Slurried Guar Gel is a preslurried form of a high-yield guar gum for preparing fracturing fluids. It provides exceptionally fast, "fisheye"-free hydration even in cold water.

Uses & Applications: WG-1SLR, Slurried Guar Gel can be used wherever conventional guar is used. The slurry is 4 pounds of guar per gallon of slurry. The rapid hydration allows "on the fly" mixing with fairly low-volume hydration tank in line to the blender.

Density in Sp.Gr.: 1.019

Specs: Tan/yellowish slurry liquid-Water soluble

BIO-2L, Liquid Biocide (THPS)

FC5281

General Information: BIO-2L, Liquid is a liquid biocide based on Tetrakis (Hydroxymethal) Phosphonium Sulfate) (THPS), for use in oilfield water applications such as fracturing fluids. Used as directed , it is a highly effective and economical in controlling most sulfate -reducing and acid-producing bacteria as well as algae and fungi. Biocide, Liquid penetrates biofilms and works synergistically with chlorine- and bromine- based biocides.

Uses & Applications: BIO-2L, Liquid is best added to frac or flush water as water is transferred. Loadings as low as .1 gpt have been shown to be effective in relatively clean water. Dosages as high as 1 gpt may be required in badly contaminated waters.

Density in Sp.Gr.: 0.95

Specs: Clear colorless liquid-Water soluble

NE-1, Non Emulsifier (Nonionic)

FC5575

General Information: NE-1 is a highly effective inexpensive nonionic nonemulsifier for oilfield acid and fracs.

Uses & Applications: NE-1 typically is used at 1 to 4 gpt.

Density in Sp.Gr.: 0.898

Specs: Pale yellow liquid-Water soluble

XLB-2, Borate Crosslinker

FC5502

General Information: XLB-2 is a highly concentrated and cost effective borate crosslinker for fracturing fluids based on guar, HPG or CMHPG.

Uses & Applications: XLB-2 is typically added "on the fly" at loadings of .7 to 1.5 gpt in a base gel buffered to a pH around 10.

Density in Sp.Gr.: 1.15

Specs: Clear liquid-Water soluble

Buffer-4L, High pH (sodium hydroxide)

FC5528

General Information: Buffer-4L, liquid caustic is used in water base fluid to increase the pH.

Uses & Applications: Buffer-4L, liquid caustic are used as increase pH in cleanup and stimulation fluids when required.

Density in Sp.Gr.: 1.53

Specs: Clear liquid-Water soluble

KCL-2Sub, KCl Substitute (anionic product tolerant)

FC5301

General Information: KCL-2Sub is a slightly cationic highly concentrated liquid potassium chloride substitute for oilfield use. Unlike many other KCl substitutes, KCL Substitute is very low in toxicity and contains no surfactants. KCL-2Sub is a 70% Choline Chloride base clay protection product. KCL-2Sub can be used with an Anionic Friction Reducer with little to no effect on the efficiency of the anionic friction reducer.

Uses & Applications: KCL-2Sub can be used in any application where the stabilization of formation clays are required. KCL Substitute typical loadings of .5 to 1 gpt will give the base fluid the equivalent clay stabilization of 2% dry potassium chloride in most formations.

Density in Sp.Gr.: 1.13

Specs: Clear liquid-Water soluble

Vanguard Operating LLC
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PRODUCT DESCRIPTION

B-1, Oxidizer Breaker (AP)

FC5475

General Information	B-1, APS is an oxidative breaker for fracturing fluids at low to moderate temperatures.
Uses & Applications	B-1, APS is typically used in fracturing treatments at loadings of .2 to 2 ppt of fluid. Fluid temperatures most appropriate for Ammonium persulfate are from around 80° F to 190° F.
Density in Sp.Gr.	1.98
Specs	White granules-Water soluble

FR-1, Friction Reducer (Cationic)

FC5425

General Information	FR-1, Friction Reducer (emulsion polymer)(cationic acrylate polymers, surfactants in mineral oil base) is an easily-handled, highly efficient Cationic Friction Reducer for fresh water, brines and acids. Loadings as low as .25 gpt of FR-1 yields similar friction reduction as other Cationic Friction Reduces at 2-3 times higher loadings. All emulsion polymers including FR-1 are sensitive to freezing and contamination by other chemicals and water.
Uses & Applications	FR-1, Friction Reducer can be used wherever thin fluids are pumped into turbulent flow to drastically reduce friction pressures encountered. The most common applications are in pumping acid and water-based fluids through coil tubing, jointed tubing and casing at particularly high rates. The use of Anionic surfactants and non-emulsifiers may interfere with the friction reduction properties of FR-1
Density in Sp.Gr.	1.06
Specs	Creamy white to greenish liquid-Water soluble, limited by viscosity

General Information	
Uses & Applications	
Density in Sp.Gr.	
Specs	

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Specs	

General Information	
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Density in Sp.Gr.	
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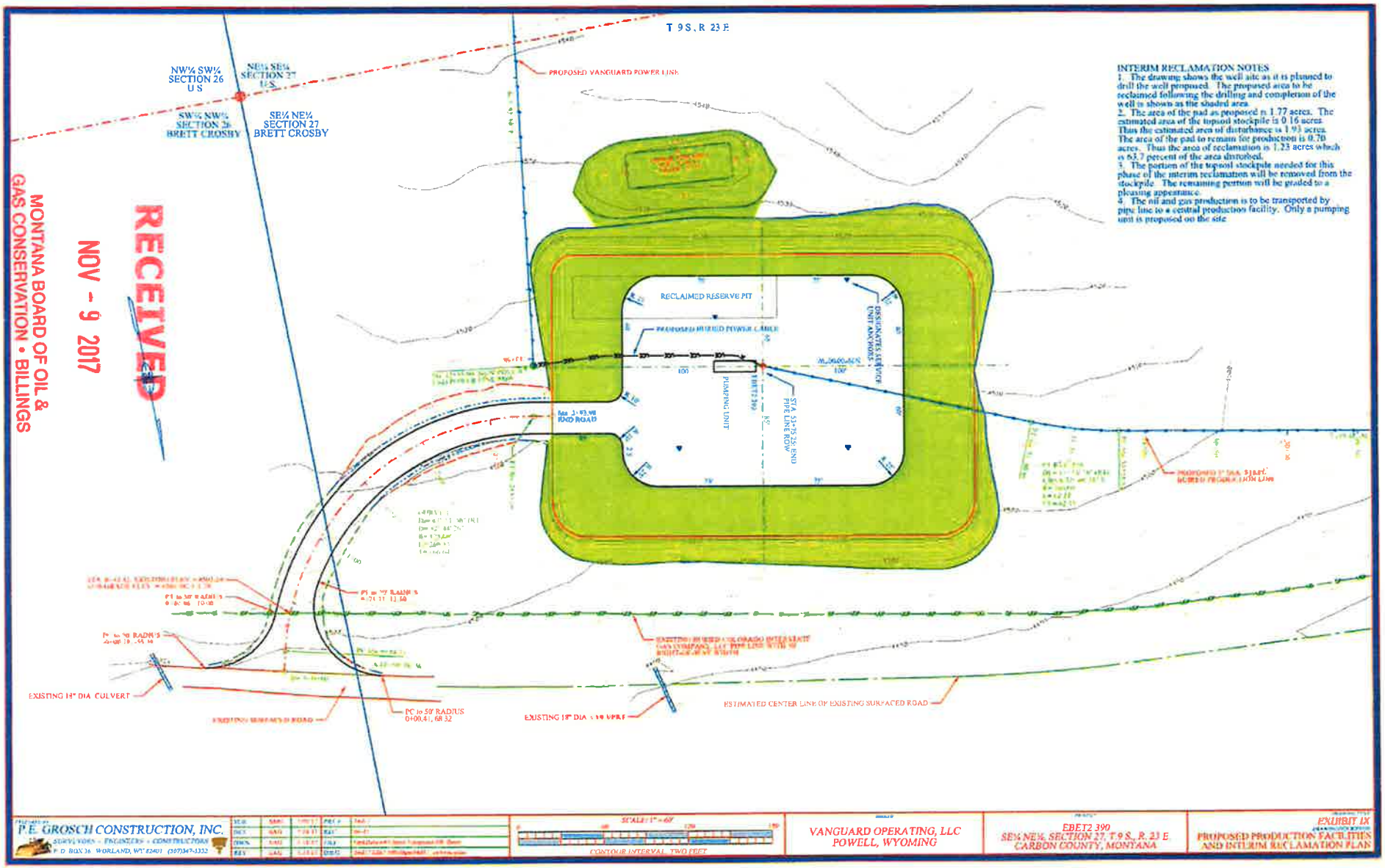
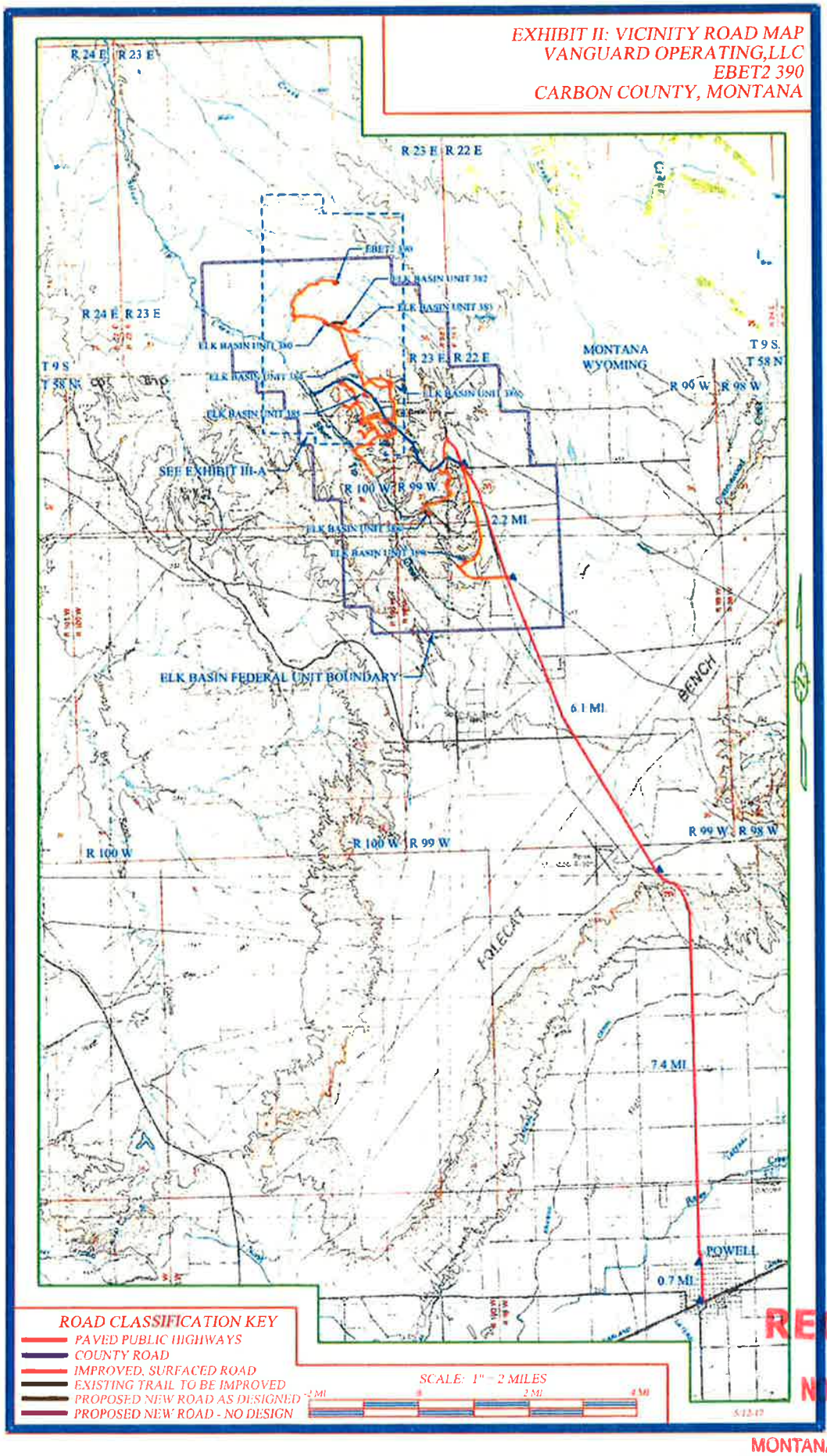
General Information	
Uses & Applications	
Density in Sp.Gr.	
Specs	





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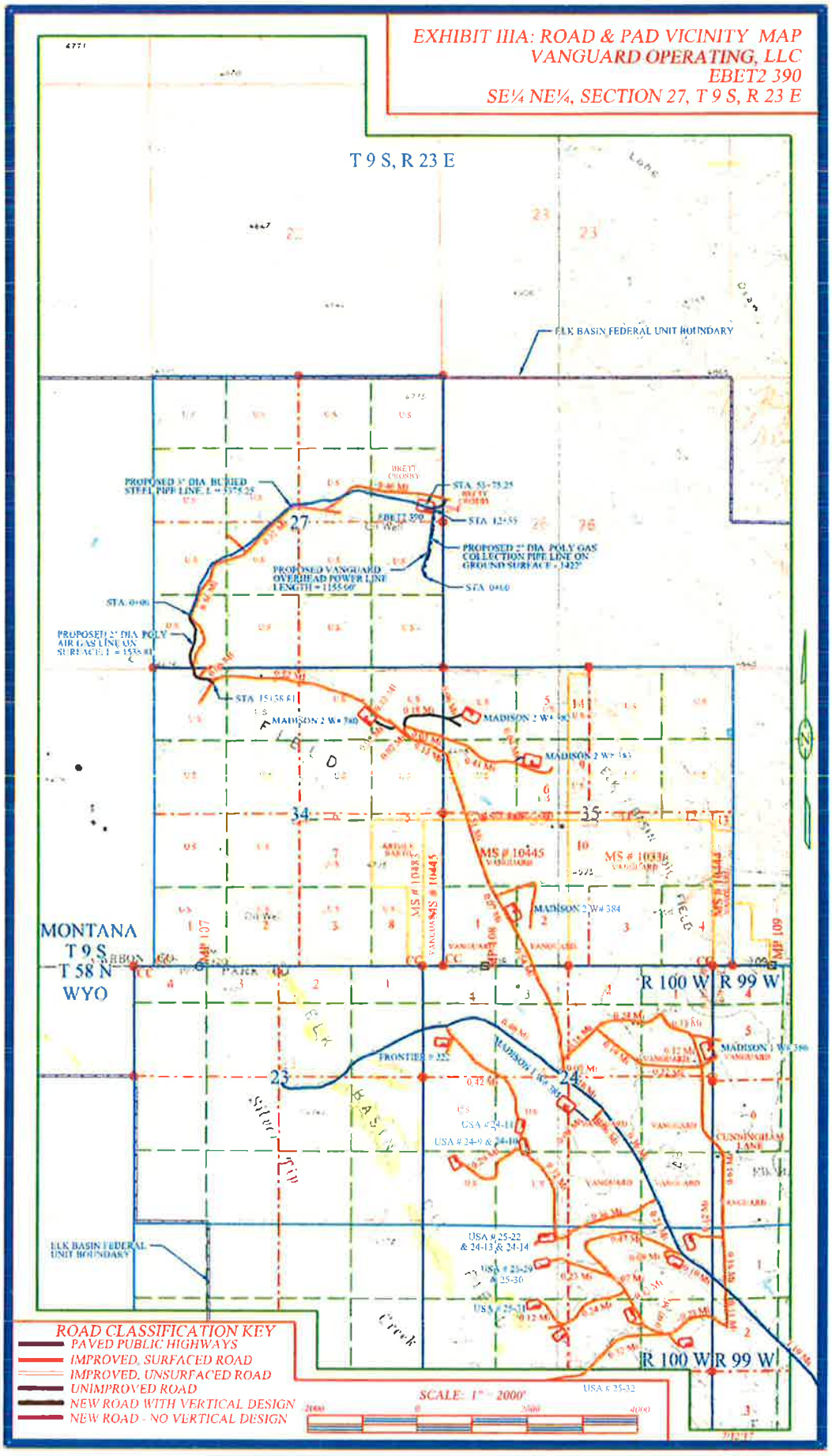
EXHIBIT IIIA: ROAD & PAD VICINITY MAP
VANGUARD OPERATING, LLC
EBET2 390
SE¼ NE¼, SECTION 27, T 9 S, R 23 E
T 9 S, R 23 E
ELK BASIN FEDERAL UNIT BOUNDARY
PROPOSED 3" DIA BURIED STEEL PIPE LINE L = 5375.25'
STA 53+75.25
STA 12+55
EBET 390
PROPOSED 2" DIA POLY GAS COLLECTION PIPE LINE ON GROUND SURFACE = 1322'
PROPOSED VANGUARD OVERHEAD POWER LINE LENGTH = 1155.60'
STA 0+00
PROPOSED 2" DIA POLY AIR GAS LINE ON SURFACE L = 1535.81'
STA 15+38.81
MADISON 2 W# 380
MADISON 2 W# 383
MADISON 2 W# 384
MS # 10445
MS # 10483
MONTANA
T 9 S
T 58 N
WYO
R 100 W
R 99 W
FRONTIER # 322
USA # 24-11
USA # 24-9 & 24-10
USA # 25-22 & 24-13 & 24-14
USA # 25-29 & 25-30
USA # 25-31
USA # 25-32
CUNNINGHAM LANE
ELK BASIN FEDERAL UNIT BOUNDARY
ROAD CLASSIFICATION KEY
PAVED PUBLIC HIGHWAYS
IMPROVED, SURFACED ROAD
IMPROVED, UNSURFACED ROAD
UNIMPROVED ROAD
NEW ROAD WITH VERTICAL DESIGN
NEW ROAD - NO VERTICAL DESIGN
SCALE: 1" = 2000'