

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 Cardinal Oil, LLC		Lease Name: Allen
Address 2650 Overland Avenue		Type (Private/State/Federal/Tribal/Allotted): Private
City Billings State MT Zip Code 59102	Well Number: 10-31-22-27-H1	
Telephone 406-259-2580 Fax	Unit Agreement Name: NA	
Location of well (1/4-1/4 section and footage measurements): SESE, 242 FSL, 1253 FEL		Field Name or Wildcat: Sumatra (Heath)
API Number: 25 087 21750 State County Well		Township, Range, and Section: T10N, R31E, Section 22
Well Type (oil, gas, injection, other): oil		County: Rosebud

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

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

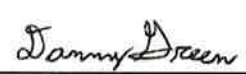
Describe Proposed or Completed Operations:

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.

After the casing integrity test and cement bond log, the well will be hydraulically fracture stimulated with approximately 14500000 lbs of 100 mesh sand in 190500 bbls of friction reduced water at a maximum rate of 80 bbls/min. The stimulation will be pumped through the intermediate casing, and a wireline plug and perforate conveyance method will be employed to segment the treatment into 29 intervals across the lateral. Please refer to the attached chemical disclosure for further information.

BOARD USE ONLY	
Approved DEC 08 2020	Date
	Name
	Petroleum Engineer Title

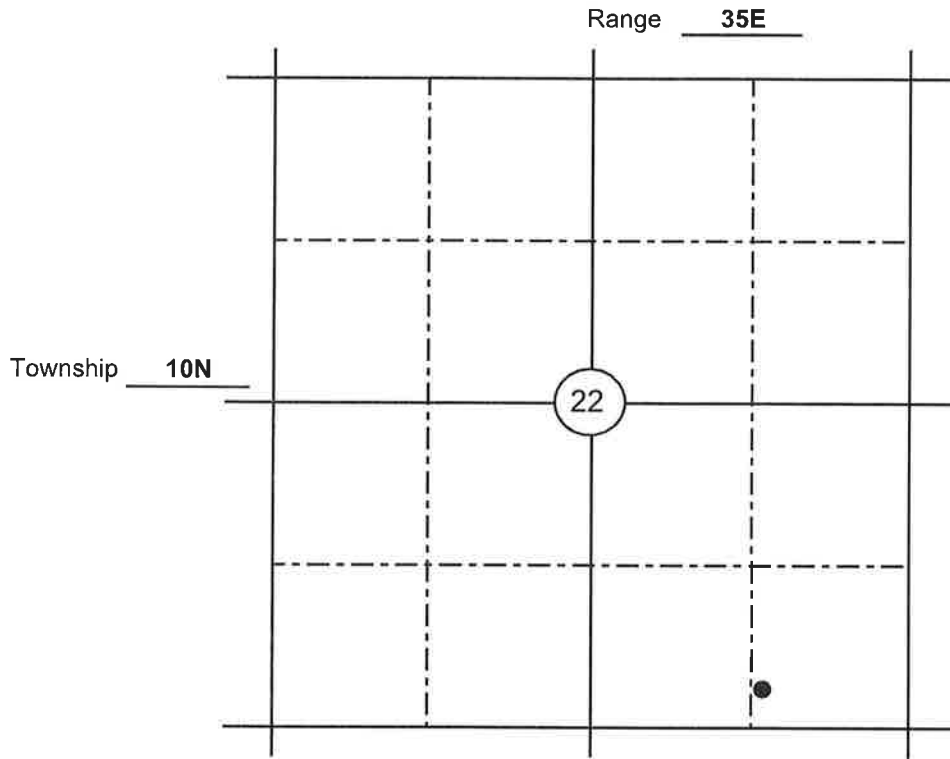
The undersigned hereby certifies that the information contained on this application is true and correct:

12/8/2020	
Date	Signed (Agent)
Danny Green, Petroleum Engineering Consultant	
Print Name and Title	
Telephone: _____	406-855-6208

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.



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CONDITIONS OF APPROVAL

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

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

Hydraulic Fracturing Fluid Product Component Information Disclosure

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Job Start Date:	12/17/2020 (proposed)
Job End Date:	12/23/2020 (proposed)
State:	Montana
County:	Rosebud
API Number:	25-087-21750-00-00
Operator Name:	Cardinal Oil, LLC
Well Name/Well Number:	Allen 10-31-22-27-H1
Federal Well:	No
Indian Well:	No
Longitude:	-107.800045
Latitude:	46.611583
Datum:	NAD83
True Vertical Depth (TVD):	5,207
Total Base Water Volume (gal):	8,004,000
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	Operator	Carrier	Water	7732-18-5	100.00%	82.04564%	
FWB114D	ChampionX	Breaker	Ammonium Persulfate	7727-54-0	80.00%	0.00394%	
ASP FSC200	ChampionX	Scale Inhibitor	Vinylidene Chloride, Methyl Acrylate Copolymer	25038-72-6	20.00%	0.00098%	
			Water	7732-18-5	60.00%	0.00885%	
			Ethylene Glycol	107-21-1	15.00%	0.00221%	
			2-Propenoic Acid, Polymer with Sodium Phosphinate, Sodium Salt	129898-01-7	15.00%	0.00221%	
			Sodium Chloride	7647-14-5	4.00%	0.00059%	
			Calcium Chloride	10043-52-4	4.00%	0.00059%	
			Diethylene Glycol	111-46-6	0.50%	0.00007%	
			Sodium Hydroxide	1310-73-2	0.50%	0.00007%	
			Potassium Chloride	7447-40-7	0.10%	0.00001%	
Product 6191	ChampionX	Surfactant	Water	7732-18-5	70.00%	0.02854%	
			Poly (Oxy-1,2-Ethanedyl), Alpha-Isodecyl-Omega-Hydroxy	61827-42-7	20.00%	0.00816%	
			Quaternary Ammonium Compounds, Dicooco Alkydimethyl Chlorides	61789-77-3	1.00%	0.00041%	
			Isopropanol	67-63-0	1.00%	0.00041%	
			Amines, Dicooco Alkymethyl Hydrochloride	61788-62-3	0.10%	0.00002%	
			Amines, Dicooco Alkymethyl Hydrochloride	NA	0.10%	0.00004%	
			Sodium Chloride	7647-14-5	0.10%	0.00004%	
			Methane, Chloro-	74-87-3	0.10%	0.00004%	
BIOC1139W	ChampionX	Biocide	Isopropanol	67-63-0	30.00%	0.00889%	
			Water	7732-18-5	20.00%	0.00459%	
			Ethylene Glycol	107-21-1	20.00%	0.00459%	
			Quaternary Ammonium Compounds, Benzyl-C12-16-Alkydimethyl Chlorides	68424-85-1	20.00%	0.00459%	
			Glutaraldehyde	111-30-8	4.50%	0.00103%	

FFR4100	ChampionX		Ethanol	64-17-5	4.50%	0.00103%
		Friction Reducer	Methanol	67-56-1	0.10%	0.00002%
			Water	7732-18-5	40.00%	0.01968%
			1-Propanesulfonic Acid, 2-Methyl-2-[(1-Oxo-2-Propenyl) Amino]-, Monosodium Salt, Polymer with 2-Propanamide Distillates (Petroleum), Hydrotreated Light	38193-60-1	20.00%	0.00984%
			Sodium Chloride	64742-47-8	20.00%	0.00984%
			Alcohols, C11-14-Iso-, C13-Rich, Ethoxylated	7647-14-5	5.00%	0.00246%
			Sorbitan, (Z)-9-Octadecenoate (2:3)	78330-21-9	5.00%	0.00246%
			Alcohols, C9-11-Iso-, C10-Rich	8007-43-0	5.00%	0.00246%
			Sorbitan, Monooleate, Polyoxyethylene Derivs	88526-85-2	1.00%	0.00049%
			Acrylamide	9005-65-6	1.00%	0.00049%
			Tetrasodium EDTA	79-06-1	0.10%	0.00005%
			Acetic Acid, Potassium Salt	64-02-8	0.10%	0.00005%
			Sulfuric Acid, Copper (2+) Salt (1:1)	127-08-2	0.10%	0.00005%
			Acetic Acid	7758-96-7	0.10%	0.00005%
Crystalline Silica, Quartz	Twenty Four Seven Sands	Proppant	Crystalline Silica in the form of Quartz	64-19-7	0.10%	0.00005%
				14808-60-7	100.00%	17.82175%

* Total Water Volume sources may include various types of water including fresh water, produced water, and recycled water

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

*** If you are calculating a percentage of total ingredients do not add the water volume below the green line to the water volume above the green line

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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Jones, Benjamin

From: Danny Green <dannyrgreen@outlook.com>
Sent: Tuesday, December 8, 2020 2:12 PM
To: Jones, Benjamin
Subject: [EXTERNAL] Allen 10-31-22-27-H1 Fracture Simulation Maximum Treating Pressure

Ben,

As discussed, our maximum fracture treating pressure will be limited to 9,500 psi on the Allen 10-31-22-27-H1 stimulation project. Please let me know if you have any questions or concerns. Thanks.

Danny Green
cell 406-855-6208
dannyrgreen@outlook.com

MONTANA BOARD OF OIL AND GAS ATTACHMENT TO FORM 2 “CONDITIONS OF APPROVAL”

A. Field Inspector must be notified at least **24 hours** in advance of the start of fracture stimulation operation.

B. 36.22.1106 SAFETY AND WELL CONTROL REQUIREMENTS – HYDRAULIC FRACTURING

(1) New and existing wells which will be stimulated by hydraulic fracturing must demonstrate suitable and safe mechanical configuration for the stimulation treatment proposed.

(2) Prior to initiation of fracture stimulation, the operator must evaluate the well. If the operator proposes hydraulic fracturing through production casing or through intermediate casing, **the casing must be tested to the maximum anticipated treating pressure**. If the casing fails the pressure test it must be repaired or the operator must use a temporary casing string (fracturing string).

(a) If the operator proposes hydraulic fracturing through a fracturing string, it must be strung into a liner or run on a packer set not less than 100 feet below the cement top of the production or intermediate casing and must be tested to not less than maximum anticipated treating pressure minus the annulus pressure applied between the fracturing string and the production or immediate casing.

(3) A casing pressure test will be considered successful if the pressure applied has been held for 30 minutes with no more than ten percent pressure loss.

(4) A **pressure relief valve(s)** must be installed on the treating lines between pumps and wellhead to limit the line pressure to the test pressure determined above; the well **must be equipped with a remotely controlled shut-in device** unless waived by the board administrator should the factual situation warrant.

(5) **The surface casing valve must remain open** while hydraulic fracturing operations are in progress; the annular space between the fracturing string and the intermediate or production casing must be monitored and may be pressurized to a pressure not to exceed the pressure rating of the lowest rated component that would be exposed to pressure should the fracturing string fail.

History: 82-11-111, MCA; IMP, 82-11-111, MCA; NEW, 2011 MAR p. 1686, Eff. 8/26/11.