

FORM NO. 22 R 10/09	SUBMIT IN QUADRUPPLICATE TO:	ARM 36.22.307 ARM 36.22.601	Lease Name: Gehringer 24-13
MONTANA BOARD OF OIL AND GAS CONSERVATION 2535 ST. JOHNS AVENUE, BILLINGS, MONTANA 59102			Lease Type (Private/State/Federal): Private
Application for Permit To:			Well Number: #2H
Drill <input checked="" type="checkbox"/>	Deepen <input type="checkbox"/>	Re-enter <input type="checkbox"/>	Field Name or Wildcat: Elm Coulee, Northeast
Oil <input checked="" type="checkbox"/>	Gas <input type="checkbox"/>	Other <input type="checkbox"/>	
Operator: Kraken Operating, LLC Address: 9821 Katy Freeway Suite 460 City: Houston State: TX Zip: 77024 Telephone Number: 713-360-7705			Unit Name (if applicable): N/A
Surface Location of Well (quarter-quarter and footage measurements): 320' FNL & 1691' FEL of NWNE 25-T28N-R58E			Objective Formation(s): Bakken
Proposed Total Depth and Bottom-hole Location(s) if directional or horizontal well: TD: 21,003' MD, 10,030' TVD BHL : 205' FNL & 654' FWL of NWNW 13-T28N-R58E			Township, Range, and Section: T28N, R58E, Sec 25
			County: Roosevelt
			Elevation (indicate GL or KB): 2012
Size and description of drilling/spacing unit and applicable order, if any: 1280 acres (Sections 13 & 24, T28N-R58E)/ Order 2014-232		Formation at total depth: Bakken	Anticipated Spud Date: 3/1/2018

Hole Size	Casing Size	Weight / Foot	Grade (API)	Depth	Sacks of Cement	Type of Cement
13 1/2	9 5/8	36	J-55	1,790'	586	See Attached
8 3/4	7	32	P-110	10,631'	701	See Attached
6	4 1/2	11.6 & 13.5	P-110	9,609' - 21,003'	592	See Attached

Describe Proposed Operations:
Describe or attach labeled diagram of blowout preventer equipment. Indicate if air drilled or describe mud program.

BOARD USE ONLY		The undersigned hereby certifies that the information contained on this application is true and correct: Signed (Agent) <u>L. J. B. B.</u> Title <u>Drilling Engineer</u> Date <u>10/11/2017</u> Telephone Number <u>713-494-4049</u>
Approved (date) <u>DEC 06 2017</u>	Permit Fee <u>\$150.00</u>	
By <u>[Signature]</u>	Check Number <u>213101</u>	
Title <u>Petroleum Engineer</u>	Permit Expires <u>JUN 07 2018</u> Permit Number <u>52238</u>	
THIS PERMIT IS SUBJECT TO THE CONDITIONS OF APPROVAL STATED ON THE BACK		API Number: 25 - <u>085 - 21987</u>

Samples Required: NONE ALL _____ FROM _____ feet to _____ feet
Core chips to address below, full cores to USGS, Core Laboratory, Arvada, CO. Required samples must be washed, dried and delivered prepaid to:
Montana Board of Oil and Gas Conservation
2535 St. Johns Avenue
Billings, MT 59102

SUPPLEMENTAL INFORMATION

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

1. Attach a survey plat certified by a registered surveyor. The survey plat must show the location of the well with reference to the nearest lines of an established public survey.
2. Attach an 8 1/2 x 11" photocopy of that portion of a topographic map showing the well location, the access route from county or other established roads, residences, and water wells within a 1/2 mile radius of the well.
3. Attach a sketch of the well site showing the dimensions and orientation of the site, the size and location of pits, topsoil stockpile, and the estimated cut/fill at the corners and centerstake. (Note: the diagram need not be done by an engineer or surveyor). Attach a sketch of a top view and two side views of the reserve pit(s), if utilized. The reserve pit sketch must show the length, width, depth, cut and fill, amount of freeboard, area of topsoil stockpile, and the height and width of berms.
4. Describe the type and amount of material or liner, if any, to be used to seal the reserve pit. If a synthetic liner is used, indicate the liner thickness (mils), bursting strength, tensile strength, tear strength, puncture resistance, hydrostatic resistance, or attach the manufacturer's specifications.
5. Describe the proposed plan for the treatment and/or the disposal of reserve pit fluids and solids after the well is drilled. If the operator intends to dispose of or treat the reserve pit contents off-site, specify the location and the method of waste treatment and disposal. (Note: The operator must comply with all applicable federal, state, county, and local laws and regulations with regard to the handling, transportation, treatment, and disposal of solid wastes.)
6. Does construction of the access road or location, or some other aspect of the drilling operation require additional federal, state, or local permits or authorizations? If yes, indicate the type of permit or authorization required:
 - No additional permits needed
 - 310 Permit (apply through county conservation district)
 - Air quality permit (apply through Montana Department of Environmental Quality)
 - Water discharge permit (apply through Montana Department of Environmental Quality)
 - Water use permit (apply through Montana Department of Natural Resources and Conservation)
 - Solid waste disposal permit (apply through Montana Department of Environmental Quality)
 - State lands drilling authorization (apply through Montana Department of Natural Resources and Conservation)
 - Federal drilling permit (specify agency)
 - Other federal, state, county, or local permit or authorization: (specify type) _____

NOTICES:

1. Date and time of spudding must be reported to the Board verbally or in writing within 72 hours after the commencement of drilling operations.
2. The operator must give notice of drilling operations to the surface owner as required by Section 82-10-503, MCA, before the commencement of any surface activity.

BOARD USE ONLY	CONDITIONS OF APPROVAL
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The operator must comply with the following condition(s) of approval:

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



Kraken Operating, LLC

48 Stage P&P Design

State: MT
County: Roosevelt County
API#: TBD
AFE#: TBD

Prepared for: Matt Bauerschlag
Prepared by: Alejandro Haiek

February 4, 2016



Completion Data

Contact Information

Company:	Kraken Operating, LLC
Company Rep.:	Matt Bauerschlag
Billing Address:	9821 Katy Freeway Suite 460 Houston, TX 77024
Sales Engineer:	Alejandro Haiek
Contact Info:	(661) 345-3450

Well Information

Well Name:	48 Stage P&P Design
State:	MT
County:	Roosevelt County
API No.:	TBD
Legal:	S - T - R
Formation:	Middle Bakken

Completion Information

Completion Type:	Plug & Perf
No. Stages:	48
Stimulation Fluid:	XL Borate
BHST:	200 F
AFE No:	TBD

Intermediate Casing

Depth	Size & Weight	Grade	Vol. (bbl)
9,000'	7.0" - 29 lb/ft	P-110	334.3
			0.0
			0.0
			0.0
			0.0

Liner/Production String

Type	Depth	Size & Weight	Grade	Vol. (bbl)
Liner Top	9,000'			139.9
Liner	20,000'	4.5" - 11.6 lb/ft	P-110	
Frac String	9,000'	4.5" - 11.6 lb/ft	L-80	

Stage Intervals

Stage #	Top	Btm	Vol. (bbl)
Stage 1	19,700'	19,875'	307.5
Stage 2	19,500'	19,675'	304.4
Stage 3	19,300'	19,475'	301.3
Stage 4	19,100'	19,275'	298.2
Stage 5	18,900'	19,075'	295.1
Stage 6	18,700'	18,875'	292.0
Stage 7	18,500'	18,675'	288.8
Stage 8	18,300'	18,475'	285.7
Stage 9	18,100'	18,275'	282.6
Stage 10	17,900'	18,075'	279.5
Stage 11	17,700'	17,875'	276.4
Stage 12	17,500'	17,675'	273.3
Stage 13	17,300'	17,475'	270.2
Stage 14	17,100'	17,275'	267.1
Stage 15	16,900'	17,075'	264.0
Stage 16	16,700'	16,875'	260.9
Stage 17	16,500'	16,675'	257.8
Stage 18	16,300'	16,475'	254.7
Stage 19	16,100'	16,275'	251.6
Stage 20	15,900'	16,075'	248.4
Stage 21	15,700'	15,875'	245.3
Stage 22	15,500'	15,675'	242.2
Stage 23	15,300'	15,475'	239.1
Stage 24	15,100'	15,275'	236.0
Stage 25	14,900'	15,075'	232.9

Stage #	Top	Btm.	Vol. (bbl)
Stage 26	14,700'	14,875'	229.8
Stage 27	14,500'	14,675'	226.7
Stage 28	14,300'	14,475'	223.6
Stage 29	14,100'	14,275'	220.5
Stage 30	13,900'	14,075'	217.4
Stage 31	13,700'	13,875'	214.3
Stage 32	13,500'	13,675'	211.1
Stage 33	13,300'	13,475'	208.0
Stage 34	13,100'	13,275'	204.9
Stage 35	12,900'	13,075'	201.8
Stage 36	12,700'	12,875'	198.7
Stage 37	12,500'	12,675'	195.6
Stage 38	12,300'	12,475'	192.5
Stage 39	12,100'	12,275'	189.4
Stage 40	11,900'	12,075'	186.3
Stage 41	11,700'	11,875'	183.2
Stage 42	11,500'	11,675'	180.1
Stage 43	11,300'	11,475'	177.0
Stage 44	11,100'	11,275'	173.9
Stage 45	10,900'	11,075'	170.7
Stage 46	10,700'	10,875'	167.6
Stage 47	10,500'	10,675'	164.5
Stage 48	10,300'	10,475'	161.4
Stage 49			0.0
Stage 50			0.0

Estimated completions data only.



Operator: Kraken Operating, LLC
 Well Name: 48 Stage P&P Design
 County: Roosevelt County
 API#: TBD

Stimulation Summary

Horsepower Requirements	
Max Pressure:	TBD
Anticipated Treating Pressure:	7,000 psi
Annulus Pressure Required:	TBD
Design Rate:	45 bpm
Min. HHP Required:	7,721 hhp

Fluid Requirements	
Acid Volume:	24,000 gal
Pump Down Volume:	bbbl
Total Clean Fluid:	131,314 bbl
Tanks Required:	292

Chemical Requirements			
Gel	83,760 lb	Corr. Inhib.	240 gal
I - XL	4,734 gal	FE Cont.	120 gal
pH	1,578 gal		
FR	429 gal		
Surf.	5,045 gal	Cap AP	1,578 lb
Bio.	1,261 lb	AP	258 lb

Proppant Requirements	
40-70 Mesh White Sand	192,000 lb
30-50 Mesh White Sand	9,808,000 lb

Notes:



Operator: Kraken Operating, LLC
Well Name: 48 Stage P&P Design
County: Roosevelt County
API#: TBD

Fluid Descriptions

15% HCl		per 1,000 gal
Corrosion Inhibitor		10.0 gal
Iron Control		5.0 gal

SlickRock		per 1,000 gal
Anionic Friction Reducer		0.50 gal
Surfactant		1.00 gal
Dry Biocide (DAZOMET)		0.25 lb

20# Linear		per 1,000 gal
PSG Polymer		20.00 lb
Surfactant		1.00 gal
Dry Biocide (DAZOMET)		0.25 lb
AP Breaker		0.25 lb

20# RockSolid		per 1,000 gal
PSG Polymer		20.00 lb
Instant Borate Crosslinker		1.50 gal
High pH Activator		0.50 gal
Surfactant		1.00 gal
Dry Biocide (DAZOMET)		0.25 lb
Encapsulated AP Breaker		0.50 lb

NOTE: Fluid descriptions are based upon lab results from previous treatments. Actual systems will be determined from lab tests conducted prior to the treatment.



Operator: Kraken Operating, LLC
 Well Name: 48 Stage P&P Design
 County: Roosevelt County
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Pump Schedule

Treatment No.	Stage Name	Fluid Type	Rate (bpm)	Fluid Volume (gal)	Comm. Fluid Volume (gal)	Slurry Volume (gal)	Comm. Slurry Volume (gal)	Stage Time (mm:ss)	Comm. Pump Time (h:mm:ss)	Prop Conc. (ppa)	Proppant Type	Prop Stage Volume (lbs)	Comm. Prop Volume (lbs)
1	Injection	SlickRock	12	500	500	500	500	01:00	0:01:00			-	-
	Acid	15% HCl	12	500	1,000	500	1,000	01:00	0:01:59			-	-
	Pad	SlickRock	45	8,000	9,000	8,000	9,000	04:14	0:06:13			-	-
	Scour	20# Linear	45	8,000	17,000	8,181	17,181	04:20	0:10:33	0.50	40-70 Mesh White Sand	4,000	4,000
	Pad	20# Linear	45	13,500	30,500	13,500	30,681	07:09	0:17:41			-	4,000
	1.0 PPA	20# RockSolid	45	9,500	40,000	9,930	40,611	05:15	0:22:57	1.00	30-50 Mesh White Sand	9,500	13,500
	2.0 PPA	20# RockSolid	45	9,500	49,500	10,360	50,971	05:29	0:28:25	2.00	30-50 Mesh White Sand	19,000	32,500
	3.0 PPA	20# RockSolid	45	11,167	60,667	12,683	63,653	06:43	0:35:08	3.00	30-50 Mesh White Sand	33,501	66,001
	4.0 PPA	20# RockSolid	45	25,500	86,167	30,115	93,769	15:56	0:51:04	4.00	30-50 Mesh White Sand	102,000	168,001
	4.0 PPA	20# RockSolid	45	10,083	96,250	11,908	105,676	06:18	0:57:22	4.00	30-50 Mesh White Sand	40,332	208,333
	Flush	SlickRock	45	12,915	109,165	12,915	118,591	06:50	1:04:12			-	208,333
2-48	Pumpdown	SlickRock	12	10,000	5,438,641	10,000	5,879,682	19:50	63:49:44			-	9,791,651
	Acid	15% HCl	12	500	5,437,141	500	5,880,182	01:00	63:50:43			-	9,791,651
	Pad	SlickRock	45	8,000	5,445,141	8,000	5,888,182	04:14	63:54:57			-	9,791,651
	Scour	20# Linear	45	8,000	5,453,141	8,181	5,896,363	04:20	63:59:17	0.50	40-70 Mesh White Sand	4,000	9,795,651
	Pad	20# Linear	45	13,500	5,466,641	13,500	5,909,863	07:09	64:06:25			-	9,795,651
	1.0 PPA	20# RockSolid	45	9,500	5,476,141	9,930	5,919,793	05:15	64:11:41	1.00	30-50 Mesh White Sand	9,500	9,805,151
	2.0 PPA	20# RockSolid	45	9,500	5,485,641	10,360	5,930,153	05:29	64:17:09	2.00	30-50 Mesh White Sand	19,000	9,824,151
	3.0 PPA	20# RockSolid	45	11,167	5,496,808	12,683	5,942,836	06:43	64:23:52	3.00	30-50 Mesh White Sand	33,501	9,857,652
	4.0 PPA	20# RockSolid	45	25,500	5,522,308	30,115	5,972,951	15:56	64:39:48	4.00	30-50 Mesh White Sand	102,000	9,959,652
	4.0 PPA	20# RockSolid	45	10,083	5,532,391	11,908	5,984,859	06:18	64:46:06	4.00	30-50 Mesh White Sand	40,332	9,999,984
	Flush	SlickRock	45	6,780	5,539,171	6,780	5,991,639	03:35	64:49:41			-	9,999,984

Fluid Type	Volume
15% HCl	24,000 gal
SlickRock	1,327,171 gal
20# Linear	1,032,000 gal
20# RockSolid	3,156,000 gal
Total	131,885 bbl

Proppant Type	Total
40-70 Mesh White Sand	192,000 lb
30-50 Mesh White Sand	9,808,000 lb
	lb
	lb
Total	10,000,000 lb



Operator: Kraken Operating, LLC
 Well Name: 48 Stage P&P Design
 County: Roosevelt County
 API#: TBD

Additives

Treatment No.	Stage Name	Fluid Type	Fluid Volume (gal)	Gel (ppt)	I - XL (gpt)	pH (gpt)	FR (gpt)	Surf. (gpt)	Bio. (ppt)	Corr. Inhib. (gpt)	FE Cont. (gpt)	Add 9 (gpt)	Add 10 (gpt)	Breaker		
														Cap AP (ppt)	AP (ppt)	
1	Injection	SlickRock	500				0.5	1	0.25							
	Acid	15% HCl	500							10	5					
	Pad	SlickRock	8,000				0.5	1	0.25							
	Scour	20# Linear	8,000	20				1	0.25							0.25
	Pad	20# Linear	13,500	20				1	0.25							0.25
	1.0 PPA	20# RockSolid	9,500	20	1.5	0.5		1	0.25							0.5
	2.0 PPA	20# RockSolid	9,500	20	1.5	0.5		1	0.25							0.5
	3.0 PPA	20# RockSolid	11,167	20	1.5	0.5		1	0.25							0.5
	4.0 PPA	20# RockSolid	25,500	20	1.5	0.5		1	0.25							0.5
	4.0 PPA	20# RockSolid	10,083	20	1.5	0.5		1	0.25							0.5
Flush	SlickRock	12,915				0.5	1	0.25								
2-48	Pumpdown	SlickRock	10,000													
	Acid	15% HCl	500							10	5					
	Pad	SlickRock	8,000				0.5	1	0.25							
	Scour	20# Linear	8,000	20				1	0.25							0.25
	Pad	20# Linear	13,500	20				1	0.25							0.25
	1.0 PPA	20# RockSolid	9,500	20	1.5	0.5		1	0.25							0.5
	2.0 PPA	20# RockSolid	9,500	20	1.5	0.5		1	0.25							0.5
	3.0 PPA	20# RockSolid	11,167	20	1.5	0.5		1	0.25							0.5
	4.0 PPA	20# RockSolid	25,500	20	1.5	0.5		1	0.25							0.5
	4.0 PPA	20# RockSolid	10,083	20	1.5	0.5		1	0.25							0.5
Flush	SlickRock	6,780				0.5	1	0.25								

	Gel	I - XL	pH	FR	Surf.	Bio.	Corr. Inhib.	FE Cont.	Add 9	Add 10	Cap AP	AP
	lb	gal	gal	gal	gal	lb	gal	gal	gal	gal	lb	lb
Total	83,760	4,734	1,578	429	5,045	1,261	240	120	-	-	1,578	258

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DEC - 5 2017

MONTANA BOARD OF OIL & GAS CONSERVATION - BILLINGS

Hydraulic Fracturing Fluid Product Component Information Disclosure

Standard Kraken Operating, LLC 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)**
Water	Operator	Carrier	Water	7732-18-5	100.00000	84.15251
Crystalline Silica, Quartz / Unimin Corp	Frac Vendor	Sand				
Produced Brine Water	Operator	Carrier	Crystalline Silica in the form of Quartz	14808-60-7	99.90000	14.80390
FRP-1S	Frac Vendor	Friction reduction	Produced Brine Water	7732-18-5	100.00000	0.69021
			Petroleum distillates, hydrotreated light	64742-47-8	45.00000	0.03147
			Poly(oxy-1,2-ethanediyl), a-tridecyl-w-hydroxy-, branched	69011-36-5	3.00000	0.00210
HCL-15	Frac Vendor	Solvent	Water	7732-18-5	85.00000	0.01603
			Hydrochloric Acid	7647-01-0	15.00000	0.00283
B-2512WA	Aquaserv	Biocide	Acetone	67-64-1	40.00000	0.00144
			Glutaraldehyde	111-30-8	30.00000	0.00108
			Didecyl dimethyl ammonium	7173-51-5	10.00000	0.00036
			Quaternary ammonium compounds, benzyl-C12-C16-	68424-85-1	5.00000	0.00018
			Ethanol	64-17-5	3.00000	0.00011
SFT-92W	Frac Vendor	Flowback Additive				
			Methanol	67-56-1	30.00000	0.00138
			Benzenesulfonic acid, mono-c10-14-alkyl derivs.	68584-22-5	10.00000	0.00046
			Sulfonic acids, C14-16-alkane hydroxy and C14-16-alkene, sodium	68439-57-6	5.00000	0.00023
			Sodium Hydroxide	1310-73-2	1.00000	0.00005
Liberty Clean Out Fluid	Frac Vendor	Cleanup Solution	Naphtha (petroleum) hydrotreated heavy	64742-96-7	100.00000	0.00119
Bioclear 5000	Lubrizol	Biocide	2,2-dibromo-3-nitropropionamide	10222-01-2	10.00000	0.00010
ACI-102HT	WST	Acid Corrosion Inhibitor				
			Ethylene Glycol	107-21-1	40.00000	0.00003
			Water	7732-18-5	25.00000	0.00002
			Dimethyl Formamide	68-12-2	15.00000	0.00001
			Isoquinoline	119-65-3	10.00000	0.00001
			2-Butoxyethanol	111-76-2	5.00000	0.00000

