

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

FORM 3

AMENDED REPORT

APPLICATION FOR PERMIT TO DRILL						1. WELL NAME and NUMBER Twist Canyon Federal 21-2					
2. TYPE OF WORK DRILL NEW WELL <input checked="" type="checkbox"/> REENTER P&A WELL <input type="checkbox"/> DEEPEN WELL <input type="checkbox"/>						3. FIELD OR WILDCAT WILDCAT					
4. TYPE OF WELL Oil Well Coalbed Methane Well: NO						5. UNIT or COMMUNITIZATION AGREEMENT NAME WOLVERINE					
6. NAME OF OPERATOR WOLVERINE GAS & OIL COMPANY OF UTAH, LLC						7. OPERATOR PHONE 435 896-1943					
8. ADDRESS OF OPERATOR 1140 N. Centennial Park Dr., Richfield, UT, 84701						9. OPERATOR E-MAIL ciron@wolvgas.com					
10. MINERAL LEASE NUMBER (FEDERAL, INDIAN, OR STATE) UTU-80587			11. MINERAL OWNERSHIP FEDERAL <input checked="" type="checkbox"/> INDIAN <input type="checkbox"/> STATE <input type="checkbox"/> FEE <input type="checkbox"/>			12. SURFACE OWNERSHIP FEDERAL <input checked="" type="checkbox"/> INDIAN <input type="checkbox"/> STATE <input type="checkbox"/> FEE <input type="checkbox"/>					
13. NAME OF SURFACE OWNER (if box 12 = 'fee')						14. SURFACE OWNER PHONE (if box 12 = 'fee')					
15. ADDRESS OF SURFACE OWNER (if box 12 = 'fee')						16. SURFACE OWNER E-MAIL (if box 12 = 'fee')					
17. INDIAN ALLOTTEE OR TRIBE NAME (if box 12 = 'INDIAN')			18. INTEND TO COMMINGLE PRODUCTION FROM MULTIPLE FORMATIONS YES <input type="checkbox"/> (Submit Commingling Application) NO <input checked="" type="checkbox"/>			19. SLANT VERTICAL <input type="checkbox"/> DIRECTIONAL <input checked="" type="checkbox"/> HORIZONTAL <input type="checkbox"/>					
20. LOCATION OF WELL		FOOTAGES		QTR-QTR	SECTION	TOWNSHIP	RANGE	MERIDIAN			
LOCATION AT SURFACE		580 FSL 78 FEL		SESE	21	21.0 S	1.0 E	S			
Top of Uppermost Producing Zone		1636 FSL 1649 FEL		NWSE	21	21.0 S	1.0 E	S			
At Total Depth		1636 FSL 1649 FEL		NWSE	21	21.0 S	1.0 E	S			
21. COUNTY SEVIER			22. DISTANCE TO NEAREST LEASE LINE (Feet) 1636			23. NUMBER OF ACRES IN DRILLING UNIT 40					
27. ELEVATION - GROUND LEVEL 6115			25. DISTANCE TO NEAREST WELL IN SAME POOL (Applied For Drilling or Completed) 2250			26. PROPOSED DEPTH MD: 14600 TVD: 14293					
28. BOND NUMBER WYB000616			29. SOURCE OF DRILLING WATER / WATER RIGHTS APPROVAL NUMBER IF APPLICABLE Salina City								
Hole, Casing, and Cement Information											
String	Hole Size	Casing Size	Length	Weight	Grade & Thread	Max Mud Wt.	Cement	Sacks	Yield	Weight	
Cond	26	20	0 - 400	94.0	J-55 Buttress	9.0	Class G	780	1.16	15.6	
Surf	17.5	13.375	0 - 4000	68.0	J-55 Buttress	10.0	Rockies Lite	1026	3.49	11.5	
							Premium Plus	500	1.16	15.6	
I1	12.25	9.625	0 - 4000	47.0	L-80 Buttress	10.5	Rockies Lite	940	3.49	11.5	
			4000 - 11000	53.5	L-80 LT&C	10.5	Premium Plus	180	1.16	15.8	
			11000 - 13000	62.8	P-110 LT&C	10.5	None				
L1	8.5	5.5	12800 - 14600	20.0	N-80 LT&C	9.0	Light (Hibond)	330	1.45	14.5	
ATTACHMENTS											
VERIFY THE FOLLOWING ARE ATTACHED IN ACCORDANCE WITH THE UTAH OIL AND GAS CONSERVATION GENERAL RULES											
<input checked="" type="checkbox"/> WELL PLAT OR MAP PREPARED BY LICENSED SURVEYOR OR ENGINEER					<input checked="" type="checkbox"/> COMPLETE DRILLING PLAN						
<input type="checkbox"/> AFFIDAVIT OF STATUS OF SURFACE OWNER AGREEMENT (IF FEE SURFACE)					<input type="checkbox"/> FORM 5. IF OPERATOR IS OTHER THAN THE LEASE OWNER						
<input checked="" type="checkbox"/> DIRECTIONAL SURVEY PLAN (IF DIRECTIONALLY OR HORIZONTALLY DRILLED)					<input checked="" type="checkbox"/> TOPOGRAPHICAL MAP						
NAME Charles Irons			TITLE Senior Landman			PHONE 435 896-1943					
SIGNATURE			DATE 06/03/2011			EMAIL ciron@wolvgas.com					
API NUMBER ASSIGNED 43041500070000			APPROVAL			 Permit Manager					

WOLVERINE GAS AND OIL COMPANY OF UTAH, LLC

DRILLING PLAN

Twist Canyon Federal 21-2

SHL: 580' FSL' & 78' FEL Section 21, T21S-R1E, SLB &M
BHL: 1636' FSL & 1649' FEL Section 21, T21S-R1E, SLB &M
Sevier County, Utah

Plan Summary:

This plan covers the drilling of an exploratory test to evaluate a Navajo target. This well will be directionally drilled from a new pad to a measured depth of 14,600' MD to test the Jurassic Navajo. Well bore issues caused by subsurface geologic irregularities, plastic salts, faults, possible loss circulation and hole instabilities are expected to be the primary drilling concerns in this area. Abnormal pressure is not anticipated.

The planned location is as follows:

Surface Location: 580' FSL, & 78' FEL, Section 21, T21S, R1E, S.L.B. & M.

Bottom Hole Location @ total depth 1636' FSL & 1649' FEL, Section 21, T21S, R1E, S.L.B. & M.

It is anticipated that a Boart rig will be used to set twenty-inch conductor to approximately 400' (50 feet into the Arapien) to cover the volcanic sand and volcanic tuff. A 17.5" hole will be drilled to approximately 4000' MD with a fresh water mud, where 13-3/8" surface casing will be set and cemented to surface. A 12-1/4" hole, using an OBM, will be drilled to approximately 12,800 TVD, where the well will be logged and then 9-5/8" casing will be set and cemented into the top of the Twin Creek. Then, an 8-1/2" hole, using a light chloride mud, will be drilled to 14,600' MD, through the Navajo, where the well will be logged and evaluated. If prospective, a 5.5" production liner will be set across the Navajo and cemented to overlap the 9-5/8" casing from 14,600' MD to 12,600' MD.

The well will be directionally drilled with a kick off point of 5000' where the well will build to 20 degrees from vertical and hold 20 degrees from 5000' to 10400'. At 10400' the well will begin to drop angle and will be vertical by approximately 12000'. The well will continue to be drilled vertically to approximately 14,600', the projected TD.

Activities for this well are expected to commence as soon as possible with the site construction beginning with permit approval, and with drilling operations commencing September 2011.

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Well Name: Twist Canyon Federal 21-2

Surface Location: 580' FSL & 78' FEL, Section 21, T21S, R1E, S.L.B. & M
 SE/4 of the SE/4 Section 21, T21S, R1W, S.L.B. & M.
 Sevier County, Utah

TD Bottom-Hole Location: 1636' FSL & 1649' FEL Section 21, T23S, R1E, S.L.B. & M
 SE/4 of NW/4 of the SE/4 Section 21, T23S, R1W, S.L.B. & M.
 Sevier County, Utah

Elevations: 6115' GL (graded), 6137' DF (est.)

I. Geology:

Tops of important geologic markers and anticipated oil (O), gas (G), or water (W), content are as follows:

<u>Formation</u>	<u>TVD Interval (DF)</u>	<u>MD Interval (DF)</u>	<u>Contents</u>	<u>Pressure Gradient</u>
Black Cap : Volcanic sandstone	surface	surface		
Albinus Tuff : Volcanic-welded Tuff	100'	100'		
Arapien	350'	350'		
Twin Creek	12,591'	12,900'	O, G, W	0.44 psi/ft
Navajo	12,943'	13,250'	O, G, W	0.44 psi/ft
Proposed TD	14,293'	14,600'		

II. Well Control:

The contracted drilling rig will have a minimum 5M BOP system. BOPE will be in place on the 13-3/8" surface casing and tested as a 5M system prior to drilling out the surface casing shoe. See attached schematic of BOPE.

A. The BOPE will, as a minimum, include the following:

Wellhead Equipment (5M Min.):

<u>BOPE Item</u>	<u>Flange Size and Rating</u>
Annular Preventer	13-5/8" 3M
Double Rams (5" Pipe - top, Blind - bottom)	13-5/8" 5M
Drilling Spool w/ 2 side outlets (4" Choke Line, 4" Kill Line)	13-5/8" 5M x 13-5/8" 5M
Single Ram (Pipe)	13-5/8" 5M
Casing Head (13-5/8" SOW w/ two 2-1/16" SSO's)	13-5/8" 5M

Auxiliary Equipment (5M Min.):

<u>BOPE Item</u>
Choke Line with 2 valves (3" minimum)
Kill Line with 2 valves and one check valve (2" Minimum)
2 Chokes with one remotely controlled at a location readily accessible to the driller
Upper and lower kelly cock valves with handles
Safety Valves to fit all drill string connections in use
Inside BOP or float sub
Pressure gauge on choke manifold
Fill-up line above the uppermost preventer
Wear bushing in casing head

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- B. **Choke manifold** will be functionally equipped and sized at a minimum as shown on the attached diagram. All choke lines will be straight lines unless turns have tee blocks or are targeted with running tees, and all choke lines will be anchored. All valves (except chokes) in the kill line choke manifold and choke line will be full opening and allow straight through flow.
- C. **System accumulator** will have sufficient capacity to open the hydraulically-controlled gate valve and close all rams plus the annular preventer (3 ram system will have added 50 percent safety factor to compensate for any fluid loss in the control system or preventers) and retain a minimum pressure of 200 psi above pre-charge on the closing manifold without use of the closing unit pumps. The fluid reservoir capacity shall be double the usable fluid volume of the accumulator system capacity and the fluid level of the reservoir shall be maintained at the manufacturer's recommendations. The accumulator will have two (2) independent power sources available to close the preventers. Nitrogen bottles may be one of those sources, and if so, will have charge maintained per manufacturer's specifications.
- D. **Accumulator pre-charge pressure test** will be conducted prior to connecting the closing unit to the BOP stack and at least once every 6 months. The accumulator pressure will be corrected if the measured precharge pressure is found to be above or below the maximum or minimum specified limits. Only nitrogen gas will be used to precharge.
- E. **Power for the closing unit pumps** will be available to the unit at all times so that the pumps will automatically start when the closing valve manifold pressure has decreased to the pre-set level.
- F. **Accumulator pump capacity** will be such that, with the accumulator system isolated from service, the pumps will be capable of opening the hydraulically-operated gate valve (if so equipped), plus closing the annular preventer on the smallest size drill pipe to be used within 2 minutes, and retaining a minimum of 200 psi above the specified accumulator pre-charge pressure.
- G. **Locking devices**, either manual (i.e., hand wheels) or automatic, will be installed on the ram type preventers. A valve will be installed in the closing line as close as possible to the annular preventer to act as a locking device. This valve shall be maintained in the open position and shall be closed only when the power source for the accumulator system is inoperative.
- H. **Remote controls** will be readily accessible to the driller and will be capable of both opening and closing all preventers. Master controls shall be at the accumulator and shall be capable of opening and closing all preventers and the choke line valve.
- I. **Well control equipment testing** will be performed using clear water when the equipment is initially installed, whenever any seal subject to test pressure is broken, following related repairs, and as a minimum, every 30-day interval. The tests will apply to all related well control equipment.

Ram type preventers and associated equipment will be isolated and tested to 5000 psi. The annular preventer will be tested to 2500 psi. Pressure shall be maintained for at least 10 minutes or until requirements of test are met, whichever is longer, for all tests. A casing head valve will be open below the test plug during testing of the BOP stack. Valves will be tested from the working pressure side with all down-stream valves open. Kill line valves will be tested with the check valve held open or the ball removed.

Pipe and blind rams will be activated each trip, but not more than once a day. The annular preventers will be functionally operated at least weekly. A pit level drill will be conducted weekly for each crew. All BOPE drills and tests will be recorded in the IADC driller's log.

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III. Casing and Cementing:

A. Casing Program (all new casing):

<u>Hole Size</u>	<u>Casing Size</u>	<u>Weight</u>	<u>Grade</u>	<u>Connection</u>	<u>Coupling Diameter</u>	<u>Setting Depth</u>
26"	20"	94	J-55	BTC	21.00	0' - 400' GL
17.5"	13-3/8"	68	J-55	BTC	14.375	0' - 4000' DF
12.25"	9.625"	47	L-80	BTC	10.625	0 - 4000' DF
12.25"	9.625"	53.5	L-80	LTC	10.625	4000' - 11,000' DF
12.25"	9.875"	62.8	P-110	LTC	10.625	11,000' - 13,000' DF
8.5"	5.5"	20	N-80	LTC	6.050	12,800' - 14,600' DF

20-inch conductor-set at 400' DF (~50 into Arapien)

The conductor will be set by Boart. The casing will be 20", 94#/ft, J-55 BTC. It will be cemented with Class G neat cement, or equivalent, using a tremie pipe, placed in stages in the 20" x 26" annulus. The collapse strength of the conductor is 520 psi, and burst strength is 2,110 psi.

13-3/8", 68 #/ft, J-55 BTC casing set at 4000' MD DF (into Arapien)

The 17.5" hole/13-3/8" casing section will be drilled into the Arapien, where casing will be set to approximately 4000 feet, and cemented to surface. The casing design parameters are detailed below:

Burst: Worst case burst load occurs, while drilling the 12.25" hole section, if the well experiences an influx of gas from ~ 12,600 feet TVD (~ 12,900' MD). Assume the casing is 70% filled with gas. In that case, assuming a fresh water pore pressure gradient to 12,600 ft, 10 ppg fluid inside the casing and a gas gradient equal to 0.1 psi/ft, maximum burst differential pressure would occur at the surface: $P = 0.433 \times 12,600 - 0.3 \times 12,600 \times 0.052 \times 10 - 0.1 \times 0.7 \times 12,600 = 2608$ psi. The selected casing, 13-3/8" 68# J-55 BTC, has burst strength of 3450 psi. The burst design factor is $DF_b = 3450/2608 = 1.32$ which is > 1.1 , therefore OK.

Collapse: Worst case collapse load occurs if the casing is evacuated during drilling, although this is very unlikely and has not been seen drilling in the Arapien or Navajo in this region. However, assuming a fluid level drop to 3000', this casing would have a collapse load, assuming a pore pressure of 0.44 psi/ft, of $P_c = 0.44 \text{ psi/ft} \times 3000' = 1320$ psi. The selected casing has collapse strength of 1950 psi. The collapse design factor is: $DF_c = 1950/1320 = 1.48$, which is > 1.126 , therefore OK.

Alternative Collapse, Salt Considerations: The Arapien formation contains salt stringers throughout. The salt stringers, due to creep, can apply unusually high collapse loads to the casing. Wolverine standard design for this area is to design for 1 psi/ft of depth external pressure with a hydrostatic gradient of mud inside the pipe and with a minimum design factor of 1.0.

Maximum salt induced pressure applied to the 13-3/8" casing occurs at 4000' TVD:

$P = 4000 \times 1.0 - 0.052 \times 10 \text{ ppg} \times 4000 = 1920$ psi. The 13-3/8" casing has collapse strength of 1950. The collapse design factor across the salts in the J-55 casing is: $DF_c = 1950/1920 = 1.02$, which is ≥ 1.0 , therefore OK.

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Tension: String weight in air is: $T = 68 \times 4000 = 272,000$ lbs. Tube strength is 1069 kips; joint strength (BTC) is 1140 kips. The tension design factor in air is: $DFt = 1069000/272,000 = 3.9$, which is ≥ 1.8 , therefore OK.

Cementing Program -13-3/8":

13-3/8" casing will be cemented from setting depth (4000' MD DF) to surface in a single stage using the following mix. Hardware will include a float shoe, shoe joint, float collar, wiper plugs, and a minimum of one centralizer per joint on the bottom three (3) casing joints. Water or other pre-flush fluid pumped ahead of the slurry will separate cement from the drilling fluids. Cement volumes are based on 50% excess in the openhole, 3500 feet of 11.5 ppg lead cement from surface to 1500' and 500 feet 15.6 ppg tail cement from 3500 to 4000 feet.

Cement: Lead: 1026 sacks Rockies LT, 11.5 ppg, 3.49 cf/sx Yield

Tail: 500 sacks Premium, 15.6 ppg, 1.16 cf/sx Yield

9-5/8", 47#/ft BTC, 53.5 #/ft L-80, 9-7/8" 62.8 #/ft P-110 casing set at 13,000' MD DF (~12693' TVD)

The 12-1/4" hole/9-5/8" casing section will be drilled directionally with Patterson Rig 304 through the Arapien and into the top of the Twin Creek, where 9-5/8" casing will be set with 4000' of 47 #/ft (from 0 to 4000') and 6900' of 53.5 #/ft from 4000' to 10900' and 2000' of 9-7/8" 62.8 #/ft P-110 from 10900 to 12900' and cemented to ~4000' (minimum depth). The casing design parameters are detailed below:

Burst: Worst case burst load during drilling occurs if the well experiences an influx of gas from 14,200 feet TVD. Assume the casing is filled with gas. In that case, assuming a fresh water pore pressure gradient to 14,200 ft TVD and a gas gradient equal to 0.1 psi/ft, maximum burst differential pressure would occur at the surface:
 $P = 0.433 \times 14,600 - 0.1 \times 14,200 = 4902$ psi. The selected casing, 9-5/8" 47 #/ft L-80 BTC, has burst strength of 6870 psi. The burst design factor is $DFc = 6870/4902 = 1.40$, which is ≥ 1.1 , therefore OK.

Collapse: Worst case collapse load, during drilling, occurs if the casing is evacuated during loss circulation or during a kick if mud is displaced from the hole, although this is very unlikely and has not been seen drilling the Arapien or Navajo in this region. Even with a fluid level drop of 10,000' (highly unlikely, but used for illustration), the collapse pressure attributed to fresh water pore pressure gradient is: $P = 0.433 \times 10,000' = 4330$ psi. The selected casing has collapse strength of 6620 psi. The collapse design factor is $DFc = 6620/4330 = 1.53$, which is > 1.125 , therefore OK.

Alternate Collapse, salt considerations: The Arapien formation contains salt stringers throughout. The salt stringers, due to creep, can apply unusually high collapse loads to the casing. Wolverine standard design for this area is to design for 1 psi/ft of depth external pressure with a hydrostatic gradient of mud inside the pipe and with a minimum design factor of 1.0. Arapien is predicted to occur from 350' to 12,591' TVD.

Maximum salt induced pressure applied to the 53.5# L-80 casing would be at 10,600' TVD and on the 9-7/8" 62.8#/ft at 12691 (base of Arapien): For 9-5/8" 53.5 #/ft casing: $P = 10591 \times 1.0 - 0.052 \times 10 \text{ ppg} \times 10591 = 5084$ psi. 9-5/8" 53.5 #/ft L-80 has collapse strength of 6620. The collapse design factor across the salts in the L-80 casing is: $DFc = 6620/5084 = 1.3$, which is greater than 1.0, therefore OK. For the 9-7/8" 62.8#/ft casing: $P = 12591 \times 1.0 - 0.052 \times 10 \text{ ppg} \times 12591 = 6044$ psi. 9-7/8" 62.8 #/ft P-110 has collapse strength of 10,280 psi. The collapse design factor across the salts in the 9-7/8" casing is: $DFc = 10280/6044 = 1.7$, which is greater than 1.0, therefore OK.

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Tension: String weight in air is: $T = 4000 \times 47 + 53.5 \times 7000 + 2000 \times 62.8 = 688,100$ lbs. Weight in 10 ppg, with a buoyancy factor of 0.85 is 584,885 lbs. Joint strength for 47# BTC is 1,122,000; tube strength is 1,086,000 kips. The tension design factor in air is: $DFt = 1086000/584885 = 1.86$, which is ≥ 1.8 , therefore OK.

Cementing Program- 9-5/8":

9-5/8" casing will be cemented from setting depth 13,000 to 3500' (500 feet inside casing) in two stages using the following mix. Hardware will include a float shoe, two shoe joints, float collar, wipers plugs, and a minimum of one centralizer per joint on the bottom three (3) casing joints with additional centralizers based on the location of salt zones. The stage tool will be planned for ~7000' MD. A pre-flush fluid will be pumped ahead of the slurry to separate cement from the drilling fluids. Cement volumes are based on 20% excess in the openhole, 6000 feet of cement from 7000-13,000 feet for stage 1, which includes a 500' tail from 12,500-13,000', and for stage 2: 3500 feet of cement from 3500 to 7000 feet for stage 2, as follows:

Cement: Stage 1: 580 sacks Rockies LT, 11.5 ppg, 3.49 cf/sx Yield, followed by 500' tail with
 180 sacks Premium, 15.8 ppg, 1.16 cu. Ft/sacks Yield
 Stage 2: 360 sacks, Rockies LT, 11.5 ppg, 3.49 cf/sx Yield

5.5", 20 #/ft, N-80 (or L-80) LTC set from 12,800' to 14,600' MD

The 8.5" hole/5.5" liner section will be drilled directionally with Patterson Rig 304 through the target Navajo, where the formations will be logged and evaluated. If warranted a 5.5" liner would be set across the prospective pay zone and cemented to inside the 9-5/8" liner. The casing grade is programmed for either N-80 or L-80 depending on casing inventory. The casing design parameters are detailed below:

Burst: Worst case burst load occurs at ~ 12,900 ft TVD/13200' MD, just above a packer, with a tubing leak at surface. Assume a fresh water pore pressure gradient, the well is producing from perforations at 13,000' TVD, the tubing is filled with gas and the packer fluid has a gradient of 0.465 psi/ft.
 $P = 0.433 \times 13000 - 0.1 \times 13000 + 0.465 \times 12900 - 0.433 \times 12900 = 4742$ psi. The selected casing, 5.5" 20#/ft N-80 has burst strength of 9190 psi. The burst design factor is: $DFb = 9190/4742 = 1.94$, which is ≥ 1.1 , therefore OK.

Collapse: Worst case collapse load occurs if the casing is evacuated. Collapse pressure attributed to fresh water pore pressure gradient is: $P = 0.433 \times 13200 = 5815$ psi. The selected casing has collapse strength of 8830 psi. The collapse design factor is $DFc = 8830/5815 = 1.52$, which is > 1.125 , therefore OK.

Tension: String weight in air is: $T = 20 \times (14600-12800) = 36,000$. Joint strength is 338,000 lbs; body strength is 397,000 lbs. The tension design factor in air is: $DFt = 338,000/36000 = 9.4$, which is ≥ 1.8 , therefore OK.

Cementing Program-5.5" liner:

This is a liner cement job. 8.5" hole will be drilled from 13,000' to 14,600' MD. The liner will be suspended from drill pipe and a liner hanger. The 5.5" liner will be cemented over its entire length (~ 1800 feet of length from 12,800' to 14600' MD) in a single stage using the following mix. Hardware will include a float shoe, two

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shoe joints, float collar, liner wiper plug, and a minimum of one centralizer per joint. Water or other preflush fluid pumped ahead of the slurry will separate cement from the drilling fluids.

Cement: 330 sacks Bondcem, 14.5 ppg, 1.45 cf/sk Yield

Casing with same or greater burst, collapse, and tension rating may be substituted for any of the planned casing sizes depending on availability and actual conditions. A minimum of 20 percent silica will be added to the cement slurry if bottom-hole temperature exceeds 230 °F.

- Other:
- The BLM will be notified at least twenty-four hours prior to running and cementing the surface and production casing strings.
 - Actual cement slurries for all casing will be based on final service company recommendations.
 - The size, weight, grade, type of thread, number of joints, and footage of all casing run will be recorded in the driller's log. The amount and type of all cement pumped will be recorded in the driller's log.
 - Adequate time will be allowed before drilling out for the cement at the casing shoe to achieve a minimum 500-psi compressive strength.
 - All casing strings will be tested to 1500 psi before drilling out and if pressure declines by more than 10 percent in 30 minutes, corrective action will be taken.
 - Before drilling more than 20 feet of new hole below each casing string, a pressure integrity test of the casing shoe will be performed to a minimum of the mud weight equivalent anticipated to control the pore pressure to the next casing depth or at total depth of the well.

IV. Mud Program:

<u>Depth</u>	<u>Mud Weight (ppg)</u>	<u>Mud Type</u>	<u>PV/YP</u>	<u>Fluid Loss</u>
0-400'	9	Fresh water mud	10/10	<20
400 - 4000'	9-10	FW to Salt Mud	8/15	<20
4000'- 12800'	9-10.5	OBM	18/10	<12
12800-14600'	9	LSND Water Mud	12/18	<8

- A. After mudding up, slow pump rates will be taken daily and recorded in the driller's log.
- B. Visual mud monitoring equipment will be in place to detect volume changes indicating loss or gain of circulating fluid volume.
- C. Abnormal pressures are not anticipated. In the event such pressures are to be anticipated, electronic/mechanical mud monitoring equipment will be in place and include as a minimum; pit volume totalizer (PVT); stroke counter; and flow sensor.
- D. A mud test will be performed every 24 hours after mudding up to determine, as applicable: density, viscosity, gel strength, filtration, and pH.

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- E. The 10M BOPE system is not required for conditions on this well.
- F. Gas detecting equipment will be installed in the mud return system after surface casing is installed, and hydrocarbon gas shall be monitored for pore pressure changes. The presence of Hydrogen Sulfide gas is possible so appropriate precautions will be taken in the event that it is encountered.
- G. A flare system designed to gather and burn all gas will be available. The flare line discharge will be located at least 150 feet from the well head and it will be positioned downwind of the prevailing wind direction. The flare line will have straight lines unless turns are targeted with running tees and it will be anchored. The flare system will have an effective method for ignition.
- H. Abnormal pressure is not expected. If abnormal pressure is to be anticipated, a mud-gas separator (gas buster) will be installed and operable beginning at a point at least 500 feet above any anticipated hydrocarbon zone of interest.

V. Evaluation:

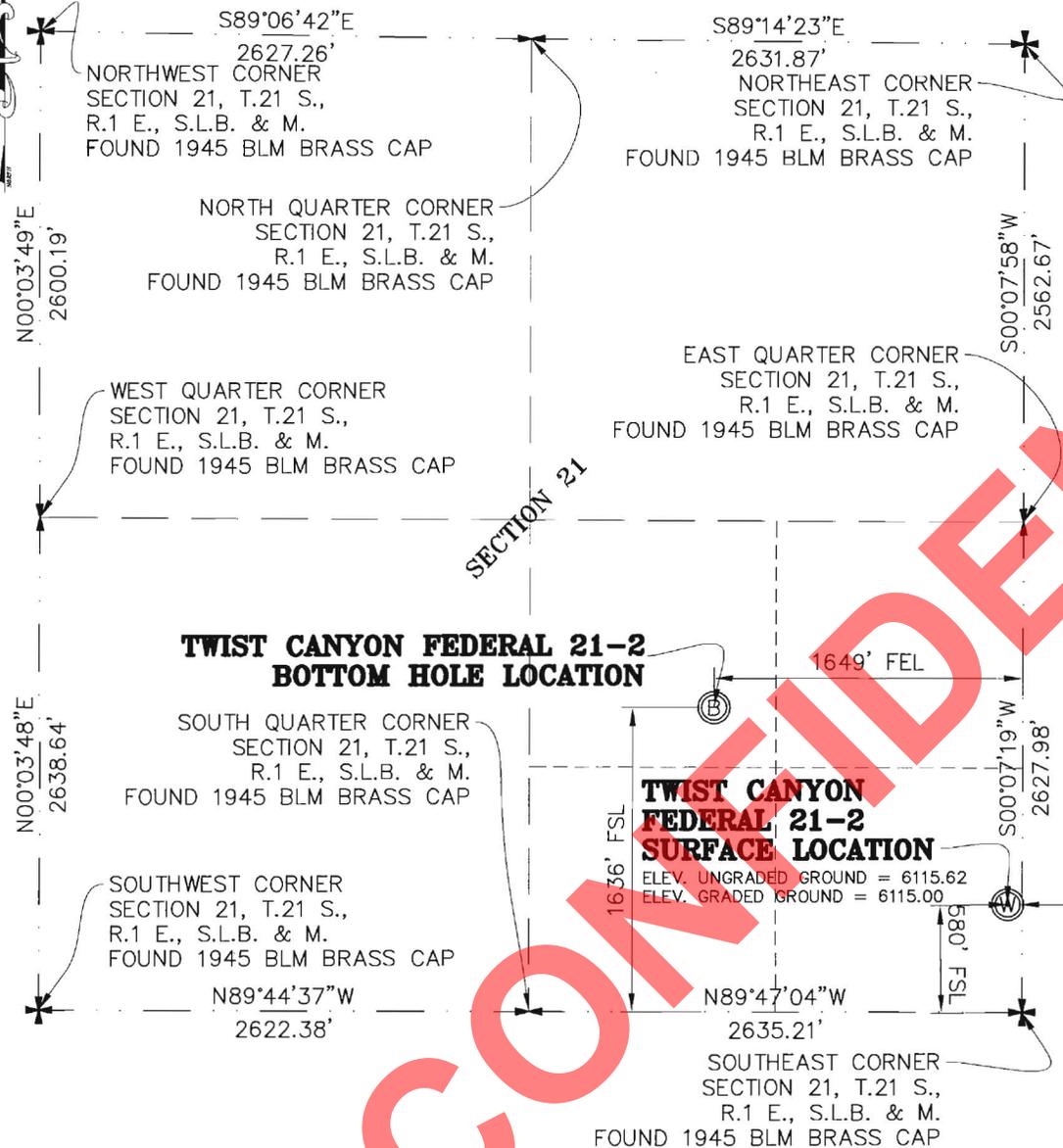
- A. Mud Log: a mud logger will collect samples from surface casing to TD. A mud logging unit will be in operation from a depth of approximately 2000 feet to TD. Samples will be caught, cleaned, bagged, and marked as required.
- B. Drill Stem Tests: There are no DSTs planned.
- C. Coring: There are no cores planned.
- D. Wireline Logs: Wireline logs will be run as hole conditions allow from total depth to surface casing to assist in determining lithology and potential for hydrocarbon recovery. The logging tools will at a minimum survey resistivity, gamma radiation, and porosity logs.

VI. Expected Bottom-Hole Pressure and Abnormal Conditions:

- A. Hydrogen Sulfide: The presence of Hydrogen Sulfide (H₂S) gas is possible and appropriate safety procedures are to be in place before penetrating the Twin Creek Formation.
- B. Pressure: No abnormally pressured zones are expected in this well. The pressure gradient for all potentially productive formations is expected to be approximately 0.44 psi/ft.
- C. Temperature: Static bottom-hole temperature at TD is expected to be approximately 275 °F.

end

SECTION 21, T.21 S., R.1 E., S.L.B. & M.



PROJECT
WOLVERINE GAS AND OIL COMPANY OF UTAH, LLC
 WELL LOCATION, LOCATED AS SHOWN
 IN THE SE 1/4 OF THE SE 1/4 OF
 SECTION 21, T.21 S., R.1 E., S.L.B. & M.
 SEVIER COUNTY, UTAH

LEGEND

- SECTION CORNER AS NOTED
- QUARTER CORNER AS NOTED
- PROPOSED SURFACE LOCATION
- PROPOSED BOTTOM HOLE LOCATION

NOTE: THE PURPOSE OF THIS SURVEY WAS TO PLAT
 TWIST CANYON FEDERAL 21-2
 LOCATED IN THE SE 1/4 OF THE SE 1/4 OF
 SECTION 21, T.21 S., R.1 E., S.L.B. & M.
 SEVIER COUNTY, UTAH.

BASIS OF ELEVATION

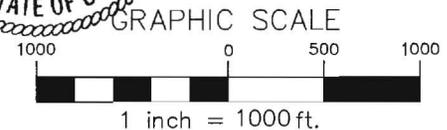
ELEVATION BASED ON AN OPUS SOLUTION WHICH WAS
 PERFORMED ON CP-1 LOCATED AT THE PAD SITE

CERTIFICATE

THIS IS TO CERTIFY THAT THIS PLAT WAS PREPARED FROM
 FIELD NOTES OF ACTUAL SURVEYS MADE BY ME UNDER
 MY SUPERVISION, AND THAT THE SAME ARE TRUE AND
 CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.



6/2/11
 DATE



BASIS OF BEARING

BASIS OF BEARING USED WAS N89°47'04\"W BETWEEN THE SOUTHEAST CORNER
 AND THE SOUTH 1/4 CORNER OF SECTION 21, T.21 S., R.1 E., S.L.B. & M.

COORDINATE DATUM = NAD 83

SURFACE LOCATION

WELL LATITUDE: 38°57'43.571\" OR 38.962103

WELL LONGITUDE: -111°47'39.656\" OR -111.794349

BOTTOM HOLE LOCATION

WELL LATITUDE: 38°57'54.014\" OR 38.965004

WELL LONGITUDE: -111°47'59.562\" OR -111.799878

Savage Surveying, Inc.

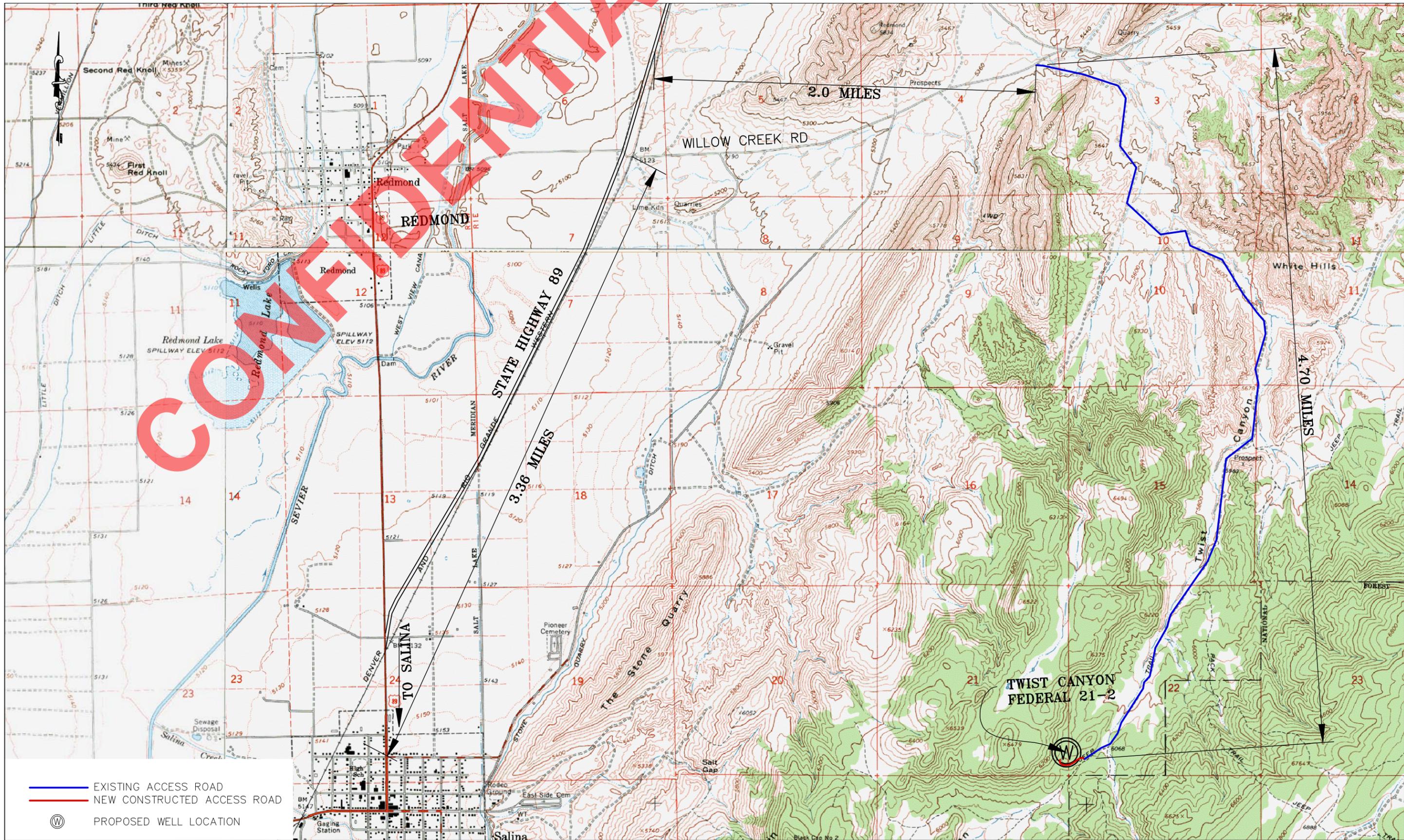
1925 South Industrial Park Rd.
 Richfield, UT 84701
 Office: 435-896-8635
 Fax: 435-896-0220



LOCATION PLAT TWIST CANYON FEDERAL 21-2

WOLVERINE GAS AND OIL COMPANY OF UTAH, LLC

DESIGNED BY:	SURVEYED BY:	CHECKED BY:	DATE	PROJECT NUMBER	SHEET NUMBER
T.M.	T.K.S.	R.W.S.	06/01/11	1102-005S	1



— EXISTING ACCESS ROAD
— NEW CONSTRUCTED ACCESS ROAD
W PROPOSED WELL LOCATION

Savage Surveying, Inc.

1825 South Industrial Park Rd.
 Richfield, UT 84701
 Office: 435-890-8335
 Fax: 435-890-0220



TWIST CANYON FEDERAL 21-2
WOLVERINE GAS AND OIL COMPANY OF UTAH, LLC.

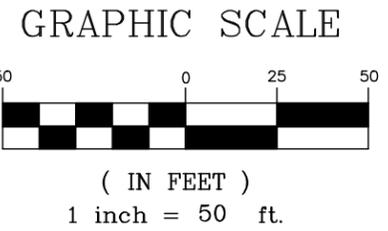
ENGINEER T.M.	SCALE NOT TO SCALE	SHEET NO. COVER
CHECKED R.W.S.	PROJECT 1102-006S DWG. NO: 1102-006S	
DRAWN D.G.	DATE 06/01/11	



CONFIDENTIAL

LEGEND

	SECTION LINE
	SLIT FENCE
	EXISTING MAJOR CONTOURS
	EXISTING MINOR CONTOURS
	DESIGN MAJOR CONTOURS
	DESIGN MINOR CONTOURS



Savage Surveying, Inc.

1825 South Industrial park Rd.
Richfield, UT 84701
Office: 435-890-8335
Fax: 435-890-0220

TWIST CANYON FEDERAL 21-2
WOLVERINE GAS AND OIL COMPANY OF UTAH, LLC.

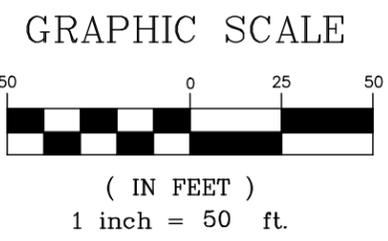
ENGINEER T.M.	SCALE 1" = 50'	SHEET NO. 2 OF 5
CHECKED R.W.S.	PROJECT 1102-006S DWG. NO. 1102-006S	
DRAWN D.G.	DATE 06/01/11	

CONFIDENTIAL



LEGEND

	SECTION LINE
	SLIT FENCE
	EXISTING MAJOR CONTOURS
	EXISTING MINOR CONTOURS
	DESIGN MAJOR CONTOURS
	DESIGN MINOR CONTOURS



Savage Surveying, Inc.
 1825 South Industrial park Rd.
 Richfield, UT 84701
 Office: 435-890-8335
 Fax: 435-890-0220

TWIST CANYON FEDERAL 21-2
WOLVERINE GAS AND OIL COMPANY OF UTAH, LLC.

ENGINEER T.M.	SCALE 1" = 50'	SHEET NO. 3 OF 5
CHECKED R.W.S.	PROJECT 1102-005S DWG. NO: 1102-005S	
DRAWN D.G.	DATE 06/01/11	

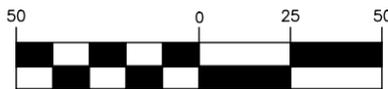
CONFIDENTIAL



LEGEND

	SECTION LINE
	SLIT FENCE
	EXISTING MAJOR CONTOURS
	EXISTING MINOR CONTOURS
	DESIGN MAJOR CONTOURS
	DESIGN MINOR CONTOURS

GRAPHIC SCALE



(IN FEET)
1 inch = 50 ft.



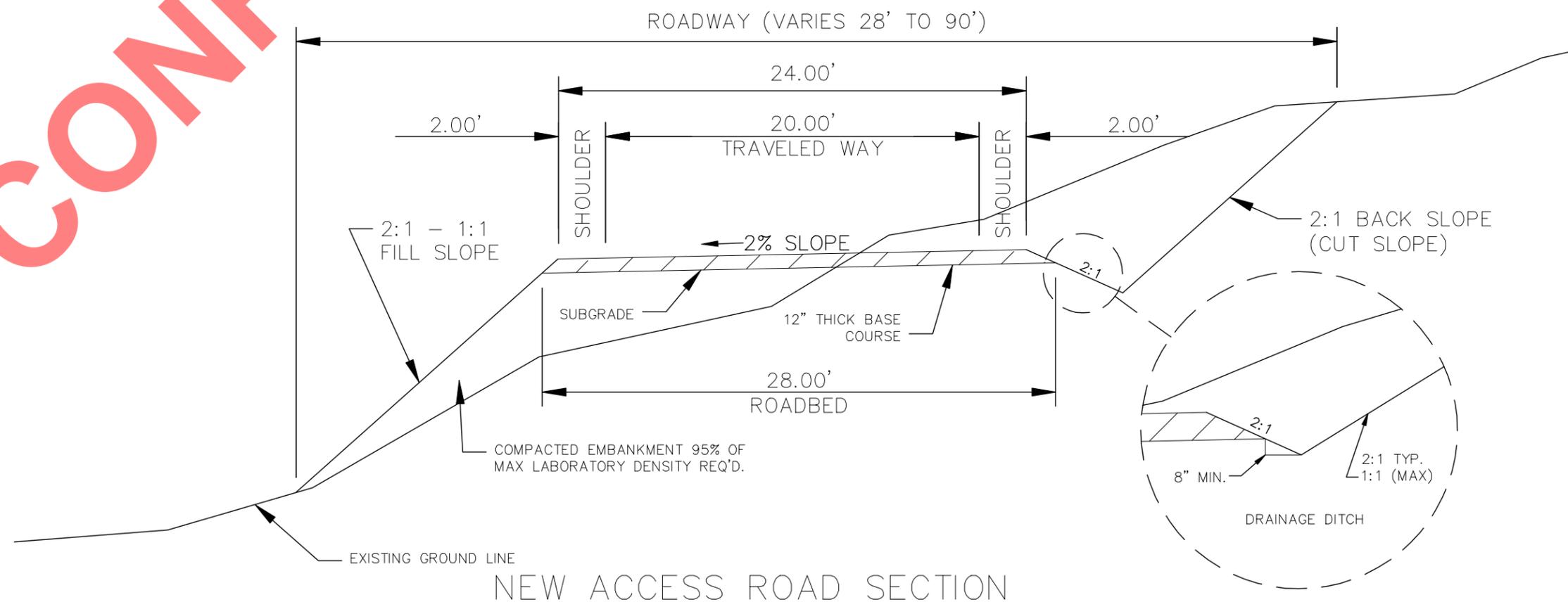
Savage Surveying, Inc.

1825 South Industrial park Rd.
Richfield, UT 84701
Office: 435-890-8335
Fax: 435-890-0220

**TWIST CANYON FEDERAL 21-2
WOLVERINE GAS AND OIL COMPANY OF UTAH, LLC.**

ENGINEER T.M.	SCALE 1" = 50'	SHEET NO. 4 OF 5
CHECKED R.W.S.	PROJ: 1102-005S DWG. NO: 1102-005S	
DRAWN D.G.	DATE 06/01/11	

CONFIDENTIAL



Savage Surveying, Inc.

1825 South Industrial park Rd.
Richfield, UT 84701
Office: 435-890-8335
Fax: 435-890-0220



TWIST CANYON FEDERAL 21-2
WOLVERINE GAS AND OIL COMPANY OF UTAH, LLC.

ENGINEER T.M.	SCALE NOT TO SCALE	SHEET NO. 5 OF 5
CHECKED R.W.S.	PROJ: 1102-005S DWG. NO: 1102-005S	
DRAWN D.G.	DATE 06/01/11	

Twist Canyon Federal 21-2
Proposed Directional for APD

County/State: Sevier County, Utah

Proposed Surface Location: 580' FSL & 78' FEL Section 21 T21S-R01E

Proposed BHL: 1636' FSL & 1649' FEL Section 21 T21S-R01E

Survey Depth (ft)	Incl (°)	Azimuth (°)	Course Lgth (ft)	TVD (ft)	VS (ft)	Coordinates			Closure		DLS (°/100')	Bld Rate (°/100')	Wlk Rate (°/100')	
						N/S (ft)	E/W (ft)	Dist (ft)	Ang (°)					
0	0	0												
100.00	0.00	0.00	100	100.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
200.00	0.00	0.00	100	200.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
300.00	0.00	0.00	100	300.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
400.00	0.00	0.00	100	400.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
500.00	0.00	0.00	100	500.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
600.00	0.00	0.00	100	600.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
700.00	0.00	0.00	100	700.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
800.00	0.00	0.00	100	800.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
900.00	0.00	0.00	100	900.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
1,000.00	0.00	0.00	100	1000.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
1,100.00	0.00	0.00	100	1100.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
1,200.00	0.00	0.00	100	1200.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
1,300.00	0.00	0.00	100	1300.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
1,400.00	0.00	0.00	100	1400.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
1,500.00	0.00	0.00	100	1500.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
1,600.00	0.00	0.00	100	1600.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
1,700.00	0.00	0.00	100	1700.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
1,800.00	0.00	0.00	100	1800.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
1,900.00	0.00	0.00	100	1900.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
2,000.00	0.00	0.00	100	2000.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
2,100.00	0.00	0.00	100	2100.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
2,200.00	0.00	0.00	100	2200.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
2,300.00	0.00	0.00	100	2300.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
2,400.00	0.00	0.00	100	2400.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
2,500.00	0.00	0.00	100	2500.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
2,600.00	0.00	0.00	100	2600.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
2,700.00	0.00	0.00	100	2700.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
2,800.00	0.00	0.00	100	2800.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
2,900.00	0.00	0.00	100	2900.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
3,000.00	0.00	0.00	100	3000.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
3,100.00	0.00	0.00	100	3100.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
3,200.00	0.00	0.00	100	3200.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
3,300.00	0.00	0.00	100	3300.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
3,400.00	0.00	0.00	100	3400.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
3,500.00	0.00	0.00	100	3500.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
3,600.00	0.00	0.00	100	3600.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
3,700.00	0.00	0.00	100	3700.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
3,800.00	0.00	0.00	100	3800.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
3,900.00	0.00	0.00	100	3900.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
4,000.00	0.00	0.00	100	4000.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
4,100.00	0.00	0.00	100	4100.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
4,200.00	0.00	0.00	100	4200.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
4,300.00	0.00	0.00	100	4300.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
4,400.00	0.00	0.00	100	4400.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
4,500.00	0.00	303.00	100	4500.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	300.0
4,600.00	0.00	303.00	100	4600.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	3.0
4,700.00	0.00	303.00	100	4700.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
4,800.00	0.00	303.00	100	4800.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
4,900.00	0.00	303.00	100	4900.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
5,000.00	0.00	303.00	100	5000.00	0.00	0.00	N	0.00	E	0.00	0.00	0.00	0.0	0.0
5,100.00	2.00	303.00	100	5099.98	1.75	0.95	N	1.46	W	1.75	303.00	2.00	2.0	0.0
5,200.00	4.00	303.00	100	5199.84	6.98	3.80	N	5.85	W	6.98	303.00	2.00	2.0	0.0
5,300.00	6.00	303.00	100	5299.45	15.69	8.55	N	13.16	W	15.69	303.00	2.00	2.0	0.0
5,400.00	8.00	303.00	100	5398.70	27.88	15.18	N	23.38	W	27.88	303.00	2.00	2.0	0.0
5,500.00	10.00	303.00	100	5497.47	43.52	23.70	N	36.50	W	43.52	303.00	2.00	2.0	0.0
5,600.00	12.00	303.00	100	5595.62	62.60	34.10	N	52.50	W	62.60	303.00	2.00	2.0	0.0
5,700.00	14.00	303.00	100	5693.06	85.10	46.35	N	71.37	W	85.10	303.00	2.00	2.0	0.0
5,800.00	16.00	303.00	100	5789.64	110.98	60.44	N	93.07	W	110.98	303.00	2.00	2.0	0.0
5,900.00	18.00	303.00	100	5885.27	140.21	76.37	N	117.59	W	140.21	303.00	2.00	2.0	0.0

6,000.00	20.00	303.00	100	5979.82	172.77	94.10	N	144.90	W	172.77	303.00	2.00	2.0	0.0
6,100.00	20.00	303.00	100	6073.78	206.97	112.72	N	173.58	W	206.97	303.00	0.00	0.0	0.0
6,200.00	20.00	303.00	100	6167.75	241.17	131.35	N	202.26	W	241.17	303.00	0.00	0.0	0.0
6,300.00	20.00	303.00	100	6261.72	275.37	149.98	N	230.95	W	275.37	303.00	0.00	0.0	0.0
6,400.00	20.00	303.00	100	6355.69	309.58	168.61	N	259.63	W	309.58	303.00	0.00	0.0	0.0
6,500.00	20.00	303.00	100	6449.66	343.78	187.23	N	288.32	W	343.78	303.00	0.00	0.0	0.0
6,600.00	20.00	303.00	100	6543.63	377.98	205.86	N	317.00	W	377.98	303.00	0.00	0.0	0.0
6,700.00	20.00	303.00	100	6637.60	412.18	224.49	N	345.68	W	412.18	303.00	0.00	0.0	0.0
6,800.00	20.00	303.00	100	6731.57	446.38	243.12	N	374.37	W	446.38	303.00	0.00	0.0	0.0
6,900.00	20.00	303.00	100	6825.54	480.59	261.75	N	403.05	W	480.59	303.00	0.00	0.0	0.0
7,000.00	20.00	303.00	100	6919.51	514.79	280.37	N	431.74	W	514.79	303.00	0.00	0.0	0.0
7,100.00	20.00	303.00	100	7013.48	548.99	299.00	N	460.42	W	548.99	303.00	0.00	0.0	0.0
7,200.00	20.00	303.00	100	7107.45	583.19	317.63	N	489.11	W	583.19	303.00	0.00	0.0	0.0
7,300.00	20.00	303.00	100	7201.42	617.39	336.26	N	517.79	W	617.39	303.00	0.00	0.0	0.0
7,400.00	20.00	303.00	100	7295.39	651.60	354.88	N	546.47	W	651.60	303.00	0.00	0.0	0.0
7,500.00	20.00	303.00	100	7389.35	685.80	373.51	N	575.16	W	685.80	303.00	0.00	0.0	0.0
7,600.00	20.00	303.00	100	7483.32	720.00	392.14	N	603.84	W	720.00	303.00	0.00	0.0	0.0
7,700.00	20.00	303.00	100	7577.29	754.20	410.77	N	632.53	W	754.20	303.00	0.00	0.0	0.0
7,800.00	20.00	303.00	100	7671.26	788.40	429.40	N	661.21	W	788.40	303.00	0.00	0.0	0.0
7,900.00	20.00	303.00	100	7765.23	822.61	448.02	N	689.90	W	822.61	303.00	0.00	0.0	0.0
8,000.00	20.00	303.00	100	7859.20	856.81	466.65	N	718.58	W	856.81	303.00	0.00	0.0	0.0
8,100.00	20.00	303.00	100	7953.17	891.01	485.28	N	747.26	W	891.01	303.00	0.00	0.0	0.0
8,200.00	20.00	303.00	100	8047.14	925.21	503.91	N	775.95	W	925.21	303.00	0.00	0.0	0.0
8,300.00	20.00	303.00	100	8141.11	959.41	522.53	N	804.63	W	959.41	303.00	0.00	0.0	0.0
8,400.00	20.00	303.00	100	8235.08	993.62	541.16	N	833.32	W	993.62	303.00	0.00	0.0	0.0
8,500.00	20.00	303.00	100	8329.05	1027.82	559.79	N	862.00	W	1027.82	303.00	0.00	0.0	0.0
8,600.00	20.00	303.00	100	8423.02	1062.02	578.42	N	890.69	W	1062.02	303.00	0.00	0.0	0.0
8,700.00	20.00	303.00	100	8516.99	1096.22	597.05	N	919.37	W	1096.22	303.00	0.00	0.0	0.0
8,800.00	20.00	303.00	100	8610.95	1130.42	615.67	N	948.05	W	1130.42	303.00	0.00	0.0	0.0
8,900.00	20.00	303.00	100	8704.92	1164.63	634.30	N	976.74	W	1164.63	303.00	0.00	0.0	0.0
9,000.00	20.00	303.00	100	8798.89	1198.83	652.93	N	1005.42	W	1198.83	303.00	0.00	0.0	0.0
9,100.00	20.00	303.00	100	8892.86	1233.03	671.56	N	1034.11	W	1233.03	303.00	0.00	0.0	0.0
9,200.00	20.00	303.00	100	8986.83	1267.23	690.18	N	1062.79	W	1267.23	303.00	0.00	0.0	0.0
9,300.00	20.00	303.00	100	9080.80	1301.43	708.81	N	1091.47	W	1301.43	303.00	0.00	0.0	0.0
9,400.00	20.00	303.00	100	9174.77	1335.64	727.44	N	1120.16	W	1335.64	303.00	0.00	0.0	0.0
9,500.00	20.00	303.00	100	9268.74	1369.84	746.07	N	1148.84	W	1369.84	303.00	0.00	0.0	0.0
9,600.00	20.00	303.00	100	9362.71	1404.04	764.70	N	1177.53	W	1404.04	303.00	0.00	0.0	0.0
9,700.00	20.00	303.00	100	9456.68	1438.24	783.32	N	1206.21	W	1438.24	303.00	0.00	0.0	0.0
9,800.00	20.00	303.00	100	9550.65	1472.44	801.95	N	1234.90	W	1472.44	303.00	0.00	0.0	0.0
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10,300.00	20.00	303.00	100	10020.49	1643.45	895.09	N	1378.32	W	1643.45	303.00	0.00	0.0	0.0
10,400.00	20.00	303.00	100	10114.46	1677.66	913.72	N	1407.00	W	1677.66	303.00	0.00	0.0	0.0
10,500.00	18.00	303.00	100	10209.01	1710.21	931.45	N	1434.30	W	1710.21	303.00	2.00	-2.0	0.0
10,600.00	16.00	303.00	100	10304.64	1739.45	947.37	N	1458.82	W	1739.45	303.00	2.00	-2.0	0.0
10,700.00	14.00	303.00	100	10401.22	1765.33	961.47	N	1480.53	W	1765.33	303.00	2.00	-2.0	0.0
10,800.00	12.00	303.00	100	10498.66	1787.82	973.72	N	1499.39	W	1787.82	303.00	2.00	-2.0	0.0
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12,300.00	0.00	303.00	100	11993.16	1883.56	1025.86	N	1579.69	W	1883.56	303.00	0.00	0.0	0.0
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12,500.00	0.00	303.00	100	12193.16	1883.56	1025.86	N	1579.69	W	1883.56	303.00	0.00	0.0	0.0
12,600.00	0.00	303.00	100	12293.16	1883.56	1025.86	N	1579.69	W	1883.56	303.00	0.00	0.0	0.0
12,700.00	0.00	303.00	100	12393.16	1883.56	1025.86	N	1579.69	W	1883.56	303.00	0.00	0.0	0.0
12,800.00	0.00	303.00	100	12493.16	1883.56	1025.86	N	1579.69	W	1883.56	303.00	0.00	0.0	0.0

12,900.00	0.00	303.00	100	12593.16	1883.56	1025.86	N	1579.69	W	1883.56	303.00	0.00	0.0	0.0
13,000.00	0.00	303.00	100	12693.16	1883.56	1025.86	N	1579.69	W	1883.56	303.00	0.00	0.0	0.0
13,100.00	0.00	303.00	100	12793.16	1883.56	1025.86	N	1579.69	W	1883.56	303.00	0.00	0.0	0.0
13,200.00	0.00	303.00	100	12893.16	1883.56	1025.86	N	1579.69	W	1883.56	303.00	0.00	0.0	0.0
13,300.00	0.00	303.00	100	12993.16	1883.56	1025.86	N	1579.69	W	1883.56	303.00	0.00	0.0	0.0
13,400.00	0.00	303.00	100	13093.16	1883.56	1025.86	N	1579.69	W	1883.56	303.00	0.00	0.0	0.0
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14,200.00	0.00	303.00	100	13893.16	1883.56	1025.86	N	1579.69	W	1883.56	303.00	0.00	0.0	0.0
14,300.00	0.00	303.00	100	13993.16	1883.56	1025.86	N	1579.69	W	1883.56	303.00	0.00	0.0	0.0
14,400.00	0.00	303.00	100	14093.16	1883.56	1025.86	N	1579.69	W	1883.56	303.00	0.00	0.0	0.0
14,500.00	0.00	303.00	100	14193.16	1883.56	1025.86	N	1579.69	W	1883.56	303.00	0.00	0.0	0.0
14,600.00	0.00	303.00	100	14293.16	1883.56	1025.86	N	1579.69	W	1883.56	303.00	0.00	0.0	0.0
14,700.00	0.00	303.00	100	14393.16	1883.56	1025.86	N	1579.69	W	1883.56	303.00	0.00	0.0	0.0

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SURFACE USE PLAN OF OPERATIONS

For inclusion with Application for Permit to Drill

Name of Operator: Wolverine Gas and Oil Company of Utah, LLC
Address: 1140 North Centennial Park Drive
Richfield, Utah 84701

Twist Canyon Federal 21-2

Surface Well Location: 580' FSL & 78' FEL, (being in SE/4 SE/4)
Section 21, T21S, R1E, SLB&M
Sevier County, Utah

Bottom Hole Location: 1636' FSL & 1649' FEL, (being in NW/4 SE/4)
Section 21, T21S, R1E, SLB&M
Sevier County, Utah

Access Road Location: Access road is to be an upgrade of Twist Canyon Road, an RS 2477 county road that leaves Willow Creek Road (a Class B maintained county road) in the NE4NE4 of Section 4, and crosses BLM land in Sections 4, 3, 10, 11, 14, 15 and 22. A new lease road, about 900 feet in length, is to be constructed off Twist Canyon Road in the SW4SW4 of Section 22 to the well in Section 21. All said lands are under lease and are unitized under the Wolverine Federal Unit.

State surface use is not required for construction and drilling of the referenced well and access road. Federal surface use is being requested with the associated Application for Permit to Drill (APD) through the BLM – Richfield Field Office.

The dirt contractor will be provided with an approved copy of the surface use plan of operations and conditions of approval before initiating construction.

A Federal onsite inspection was conducted on March 30, 2011, with the following individuals present:

- Charlie Irons – Wolverine Gas and Oil Company of Utah
- Paul Spiering – Wolverine Gas and Oil Company of Utah
- Ryan Savage – Savage Surveying
- Glen Nebeker – Jones & DeMille Engineering – NEPA Specialist
- Mark Rickenbach – Sevier County Road Department
- Stan Andersen - BLM Supervisory Natural Resource Specialist
- Wayne Wetzel – BLM Acting Field Office Manager
- Chris Colton - BLM Natural Resource Specialist
- Rod Lee - BLM Environmental Coordinator
- Burke Williams – BLM Range Conservationist
- Larry Greenwood – BLM Biologist
- Myron Jeffs – BLM Recreation Specialist

Resource concerns arising from that meeting are incorporated in the plan below.

Existing Roads:

The vicinity map in the APD packet shows the proposed well location and its proximity to the town of Salina, Utah (being 3 ½ miles due east of Salina).

Driving directions: From Salina, Utah, travel north on US 89, under Utah Department of Transportation (UDOT) maintenance approximately 4 miles to Willow Creek Road (a gravel Class B county-maintained road), proceed easterly about 2.3 miles then turn south onto Twist Canyon Road. Follow Twist Canyon Road approximately 5 miles to the lease road turnoff to the Twist Canyon Federal 21-2 well pad. The surface condition of Willow Creek Road is considered adequate to bear rig-related traffic without improvement.

Access Roads to be Constructed and Reconstructed:

Proposed access will require an upgrade to Twist Canyon Road, consisting of importing granular material in order to establish a 1-foot thick road base on a 14-foot roadbed, with a traveled way of 12 feet. If it is economically feasible road base material may be obtained from a section of bank along Willow Creek Road in the NW4NW4 of Section 3 that would be cut for the dual purpose of providing better visibility for the county road, and providing a source of road base for the north portion of Twist Canyon Road. Some additional material will be obtained from the excess cut involved in constructing the well pad, to be used on the south portion of Twist Canyon Road. The remainder of road base material required will be imported from an approved source.

Twist Canyon Road will also require realignment of centerline in 15 areas in order to eliminate sharp turns and/or steep wash crossings that rig traffic cannot handle. See construction drawings for details. In those areas where realignment occurs the old portion of road will be scarified and seeded with the BLM approved seed mix in the first Fall period (October 1—December 1). The upgrade to Twist Canyon Road will also include the installation of 37 truck turnouts to allow opposing traffic to pass. Each turnout will consist of a ten-foot wide area adjacent to the travelled way, 100 feet in length, with a forty foot transition on both ends. See construction drawings for location of turnouts and see typical sheet for detail.

The upgrade will also include the maintenance of 43 existing water bars and the installation of 47 culverts, two of which will be replacements of existing culverts. See construction drawings for culvert specifications and locations, and locations of other features.

A new road (the lease road) is to be constructed, leaving Twist Canyon Road at a point in the SW4SW4 of Section 22 and climbing southwesterly around the slope of a small hill, thence curving northerly to enter onto the well pad. The lease road will be approximately 900 feet long and will have a roadbed 24 feet wide, with a traveled way of 20 feet. One culvert will be installed in the lease road.

Total length of new constructed access road is 900 feet. Total length of upgraded Twist Canyon Road is 24,700 feet, or 4.68 miles. Approval for road construction is requested through the BLM Application for Permit to Drill as a lease right under the Wolverine Federal Unit.

Road construction, operation and maintenance will be in compliance with the terms and conditions of the Conditions of Approval, the American Association of State Highway and Transportation (AASHTO) safety standards, and will meet criteria for the Manual of Uniform Traffic Control Devices (MUTCD) manual for signs.

Energy dissipating structures and silt fences will be utilized to minimize erosion that may result from the road construction.

A sign will be placed by the lease road as it leaves the main Twist Canyon Road to discourage the public from driving to the well pad.

All existing county roads, realigned roads and the new lease road will be maintained and kept in good repair during all phases of operation. Vehicle operators will obey posted speed restrictions and observe safe speeds commensurate with road and weather conditions.

Location of Existing Wells within a one-mile radius :

Well	Type/status	Surface Location	Bottom Hole Location
Wolverine State Twist Canyon 16-1	Dry hole/P&A	SW4NW4 Section 16	SW4SE4 Section 16
Twist Canyon Federal 21-1	Lost hole/P&A	NW4NW4 Section 21	NE4SW4 Section 21
Twist Canyon Federal 21-1A	Rig skid/Dry hole/P&A	NW4NW4 Section 21	NE4SW4 Section 21

Location of Existing and/or Proposed Facilities if Well is Productive:

(a) On well pad –A temporary testing facility may be constructed on this location in the event drilling is successful, consisting of treater/separator, tanks and related components. The facility would be surrounded by a dike of sufficient capacity to contain the storage capacity of the largest tank. All loading lines and valves would be located inside the berm surrounding the tank battery.

(b) *Off well pad* – It is not possible to know whether an off-well pad production facility would be necessary in the event of a discovery. The Operator will submit this information for approval at such time as production requirements are determined.

Location and Type of Water Supply (Rivers, Creeks, Lakes, Ponds and Wells):

The Operator intends to purchase water for drilling purposes from the City of Salina, under contract for sale dated 9-27-2007. Water will be loaded from a hydrant north of Pioneer Cemetery on Slaughterhouse Road in the SE4NW4 Section 19-T21S-R1E, and transported by tankers to the location, using county roads and the approved lease roads. Should additional water sources be pursued they will be properly permitted through the State of Utah – Division of Water Rights. The BLM will be notified of any changes in water supply.

Construction Materials:

Natural earth materials used for fill on the well pad will be taken from cuts made in construction of the pad. Imported granular borrow from an approved source will be applied to the surface of the well pad and access road where deemed necessary. No construction materials will be removed from federal lands.

Methods for Handling Waste Disposal:

The reserve pit will be used for the disposal of waste mud and drill cuttings. All borehole fluids and salts will be contained in the reserve pit. It will be located in cut material and will be lined with 12 mil minimum thickness plastic nylon reinforced liner material. The liner will overlay a felt liner pad only if sharp rock edges result from excavation. The pit liner will overlap the top of the pit walls and be covered with dirt and/or rocks to hold it in place. No trash, scrap pipe, etc. that could puncture the liner will be disposed of in the pit. Pit walls will be sloped no greater than 2:1. A minimum 2-foot freeboard will be maintained in the pit at all times during the drilling and completion operations. After evaporation of fluids, back-fill of sub-soil and compaction to prevent settling will occur within 90 days of cessation of pit use. If necessary, any remaining fluids will be pumped out of the pit and transported off site.

In addition to conventional water-based drilling mud the operator plans to use oil based mud (OBM). The pit is to be partitioned into two sections, separated by an earthen barrier over which the liner is laid. There will be no mingling of the two fluid types. Upon encountering certain anticipated salts in the Arapien shale the rig will convert over to OBM and continue its use to the target depth. Reclamation of the OBM pit is described below.

No chemicals subject to reporting under SARA Title III (hazardous materials) in an amount greater than 10,000 pounds will be used, produced, stored, transported, or disposed of in association with the drilling, testing, or completion of the well. Furthermore, no extremely hazardous substances, as defined in 40 CFR 355, in threshold planning quantities, will be used, produced, stored, transported, or disposed of in association with the drilling, testing, or completion of the well.

Wastewater will not be discharged on the surface at this site and the drilling of the well will not require a wastewater management plan.

All rubbish and debris will be kept in containers on the well site, and will be hauled to an approved disposal site upon completion of drilling operations and as needed during such operations. There will be no chemical disposal of any type.

Self-contained, portable toilets will be used for human waste, and the waste will be disposed at an approved human waste disposal facility. Sanitation will comply with local and state regulations.

Ancillary Facilities:

No ancillary facilities are anticipated at this time.

Well Site Layout:

Pad Location and Layout Drawings in the APD packet show the proposed well site layout including location of the reserve pit and access road onto the pad, turnaround areas, parking areas, living facilities, soil material stockpiles, and the orientation of the rig with respect to the pad and other facilities. Cross section sheets in said packet show cuts and fills required for construction, and their relationship to topography. As detailed above under Methods for Handling Waste Disposal, the reserve pit will be lined and appropriate measures as described above will be taken to prevent leakage. The pit will be fenced on three sides during drilling operations and then the fourth side will be

immediately fenced when the rig is moved off location.

An escape exit will be built into the north end of the well pad where vehicles could leave the pad and drive cross-country to the Twist Canyon Road in the event of an emergency.

The pad and road designs are consistent with BLM specifications.

A pre-construction meeting with responsible company representative and contractors will be conducted at the project site prior to commencement of surface-disturbing activities. The pad and road will be construction-staked (centerline and exterior boundaries) prior to this meeting.

All surface disturbing activities will be supervised by a qualified, responsible company representative who is aware of the terms and conditions of approval from the BLM under the APD.

All cut and fill slopes will be such that stability can be maintained for the life of the activity.

The stockpiled topsoil (first 6 inches or maximum available) will be isolated in a berm by the well pad. Topsoil will be stockpiled for reclamation in such a way as to prevent soil loss and contamination, and will be seeded in the first Fall period (October 1—December 1) following construction, using the BLM approved seed mix.

Trees and large rocks that are disturbed during construction will be saved for use in reclamation.

Water spraying may be implemented if necessary to minimize dust.

Plans for Reclamation of the Surface:

(For further specifications see Addendum to Surface Plan of Operations, attached hereto)

Interim Reclamation: In the event production is achieved the Operator will perform interim reclamation of the site. Interim reclamation will consist of reclamation of the reserve pit and reclamation of that portion of the well pad not needed for ongoing operations.

After evaporation of fluids, the water-based portion of the pit will be back-filled with sub-soil and/or rock and compacted to prevent settling. The portion of the reserve pit liner which is exposed above the cuttings will be cut and removed from the site and disposed in an authorized landfill.

After removal of any standing oil in the OBM portion of the pit the oil-soaked cuttings will be treated *in situ* by a solidification/stabilization process that involves the addition of a Portland cement-based reagent, followed by thorough mixing of reagent with cuttings to form a homogenous slurry. Hydrocarbons and chlorides in the waste will be broken up into very small particles during the mixing process and the resultant cement lattice prevents them from re-coalescing within the processed waste and reduces their release to the surrounding environment to an insignificant rate. The contents of the OBM portion of the pit then dry and solidify into concrete. The portion of the reserve pit liner which is exposed above the cuttings will be cut and removed from the site and disposed in an authorized landfill. The pit will be backfilled and compacted to prevent settling.

The reclaimed pit area will be surfaced with granular borrow to render it a usable part of the well pad. All portions of the pad no longer necessary for well workover, testing or treating will be contoured to match the surrounding terrain to the best extent practicable. Stockpiled topsoil will be evenly distributed thereon, scarified and seeded as per BLM conditions of approval.

Final Reclamation: In the event the well is a dry hole, or at such time that all production ceases and the well has been plugged and abandoned, the Operator will perform final reclamation of the site. Final reclamation will consist of reclamation of the reserve pit, the well pad and the constructed lease road back to Twist Canyon Road.

Reclamation of the reserve pit is the same as described under interim reclamation, except that the surface will be contoured along with the surrounding area so as to match the original contour to the best extent possible.

Road base material used in the construction of the lease road and pad will be removed from the site and distributed on Twist Canyon Road, or as directed by the Authorized Officer. If the reserve pit has adequate capacity, then some

or all of the road base material may be buried in the reserve pit, provided that the granular is not contaminated by oil or other waste materials. The lease road will be contoured using an excavator or similar equipment, rather than simply ripping the surface.

Subsoil from the portions of the well pad that are fill will be distributed onto the pad in order to reestablish the original slope to the best extent possible. The portions that are cut will be filled to match the original slope of the land to the best extent possible. Topsoil from the stockpile will then be evenly distributed over the entire impacted area, including the lease road. The entire impacted area will be scarified and seeded in late fall, using the seed mix and methods described in BLM conditions of approval. Final reclamation will take place within 180 days after plugging date of the last well on site, depending on weather, season and other extenuating circumstances.

During the life of the project and until the site is released from liability for reclamation, the project will be inspected at least annually for noxious weeds. If invasive noxious weeds are found, the weeds will be treated to eliminate further reproduction, and treatment shall continue until the weeds have been eradicated. If noxious weeds are found, the BLM will be notified of their occurrence.

Surface Ownership:

The surface of the proposed well site, the lease road and access road are federally owned and administered by the Bureau of Land Management, United States Department of Interior.

Other Information:

Heavy equipment used to construct and rehabilitate the well pad, lease road and access road will be sprayed and cleaned to remove any noxious or invasive weeds and seeds, prior to entering the project site. Any other equipment and vehicles that have been used in other locations where noxious weeds or seeds could have attached to the equipment will also be sprayed and cleaned.

All equipment and vehicles will be confined to the access road, lease road and well pad.

Bighorn Archaeological Consultants, LLC, has conducted a Class I and Class III Cultural Resource Inventory and has submitted the report to the appropriate agencies.

In the event vertebrate fossils are encountered during construction activities the BLM will be notified immediately to determine the appropriate course of action.

Glen Nebeker, NEPA Specialist, Jones & DeMille Engineering, will prepare an EA for the proposed operation.

No stream alteration or drainage crossings are involved that require additional State or Federal approval.

All permanent structures, including pumping units, constructed or installed will be painted a flat, non-reflective color as described on page 40 of the Gold Book (Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development, 4th Edition 2006). Permanent structures are defined as being on location for six months or longer. Facilities required to comply with Occupational Safety and Health Act (OSHA) shall be excluded.

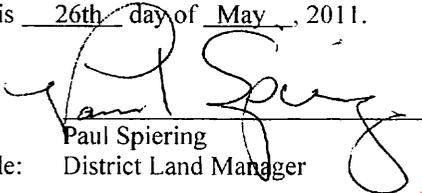
Fire suppression equipment will be available to suppress any wildfires caused by construction or related activities. In the event of a wildfire the Richfield Interagency Fire Center (435) 896-8404 will be notified.

Operator Certification

I hereby certify that I, or someone under my direct supervision, have inspected the drill site and access route proposed herein; that I am familiar with the conditions which currently exist; that I, or someone under my direct supervision, have full knowledge of state and Federal laws applicable to this operation; that the statements made in this APD package are, to the best of my knowledge, true and correct; and that the work associated with the operations proposed herein will be performed in conformity with this APD package and the terms and conditions under which it is approved. I also certify that I, or the company I represent, am responsible for the operations conducted under this application. These statements are subject to the provisions of 18 U.S.C. 1001 for the filing of false statements.

Executed this 26th day of May, 2011.

Signature:



Paul Spiering

Position/Title: District Land Manager

Address: Wolverine Gas and Oil Company of Utah, LLC
1140 N Centennial Park Drive
Richfield, Utah 84701

Telephone: 435-896-1943

Field Representative: Charlie Irons
Position/Title: Senior Landman

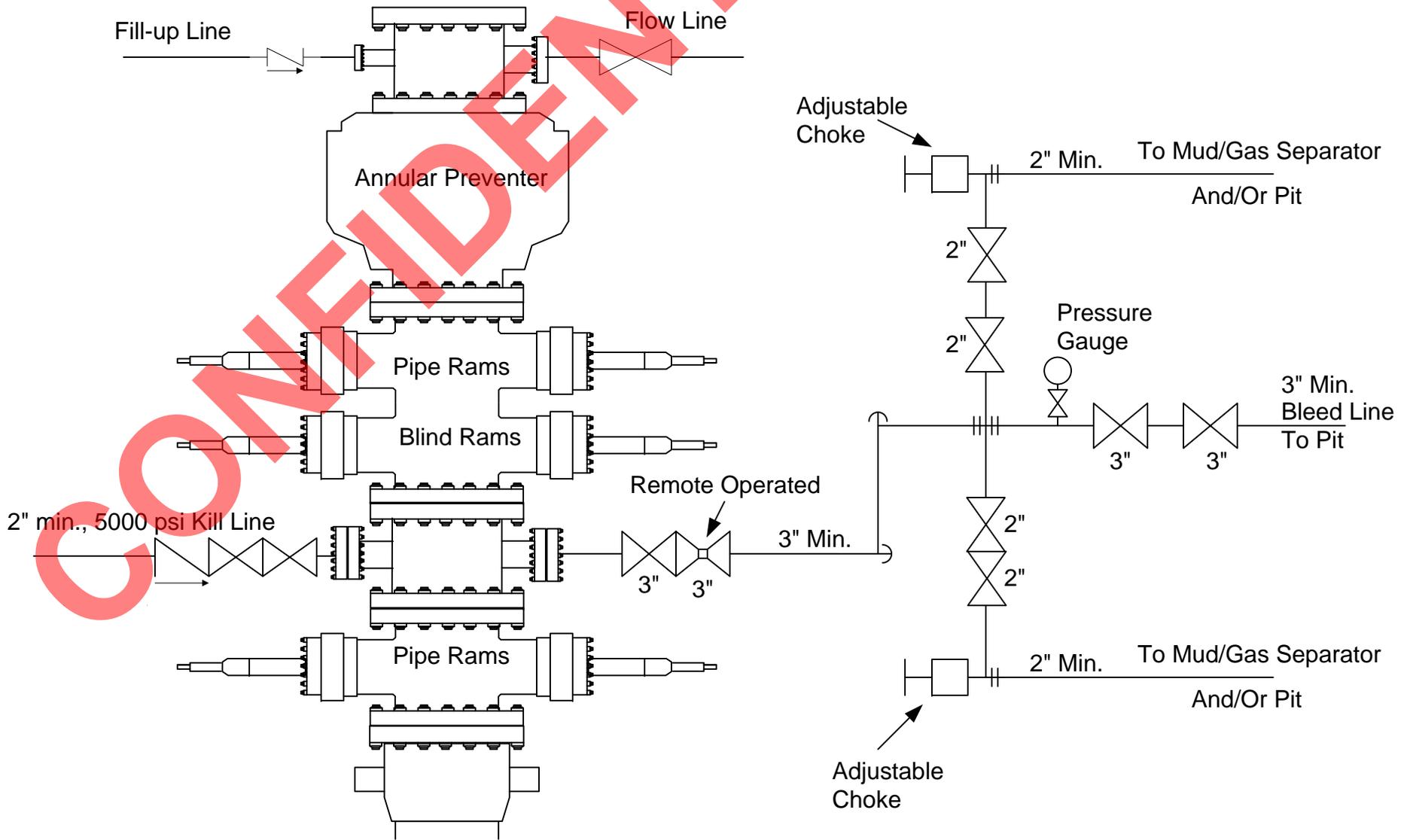
Address: Wolverine Gas and Oil Company of Utah, LLC
1140 N Centennial Park Drive
Richfield, Utah 84701

Telephone: 435-201-3327

Agents not directly employed by the operator must submit a letter from the operator authorizing that agent to act or file this application on their behalf.

5k BOPE Schematic

(Not to Scale)



H2S Drilling Operations Plan

Wolverine Gas and Oil Company of Utah, LLC

Twist Canyon Federal 21-2

**Section 21
Township 21S - Range 01E
Sevier County, Utah**

GL Elevation: 6115 feet

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**One Riverfront Plaza
55 Campau, NW
Grand Rapids, Michigan 49503-2616**

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IX. Reference Material for Hydrogen Sulfide and Sulfur Dioxide

X. Attachments-Maps, Diagrams

Introduction

This H2S contingency plan has been prepared for the Twist Canyon Federal 21-2 well, which will be located on a newly constructed drilling pad in Section 21, T23S-R01E, Sevier County, UT. This Plan is intended as a guide for personnel working at the well site should an accidental release of natural gas containing hydrogen sulfide occur during drilling or completion operations. Operational requirements included installation of gas monitors and safety equipment on the drill site, personnel training, and response procedures. All personnel, including anyone who may travel to location on an unscheduled basis, must review and be familiar with onsite duties as well as the safety equipment involved. For the plan to be effective, the cooperation and participation of all personnel working at the well site is required.

Hydrocarbon gas with concentrations of H2S from wells drilled along the Salina Hinge Line has been detected in low levels (in producing wells, not during drilling) in the Covenant Field (located about 10 miles south of this proposed well) and in gas produced at Providence (located about 10 miles north of this prospect). In the previous Twist Canyon exploration well, drilled into Navajo, no H2S was detected. This Navajo test will encounter Navajo in separate structure. Therefore, this plan is provided as a tool to prepare drilling operations before drilling the untested Navajo structure. Other Navajo tests along this trend have no or low concentrations of H2S: Twist Canyon wells-none detected; Carter Peak well-none detected; Arapien Valley 24-1-less than 5 ppm in extended production tests. Therefore, exposure to H2S by the general public is very unlikely during drilling or completion operations. Furthermore, adjacent properties are not occupied by structures or residents.

Even assuming a release of 2,000,000 cubic feet/day with a concentration of 0.009 mole volume, the 100 ppm radius of exposure (as calculated in accordance with BLM Onshore Order No. 6) is 155' and the 500 ppm radius of exposure is 72', both of which would fall within the actual well pad site; access to the well pad will be restricted to essential personnel during drilling.

Directions

Driving directions to location:

From the town of Salina, take State Highway 89 north approximately 3.4 miles to Willow Creek Road. Turn left (east) on Willow Creek Road and go approximately 2 miles. Take Twist Canyon Road south-southeasterly approximately 4.7 miles to pad access road and turn back to the west and continue approximately 0.25 miles to well pad.

I. Duties & Responsibilities

In order to assure proper execution of the contingency plan, it is essential that one person be responsible for and requisite authority for implementing the procedures outlined in this plan. The order of responsibility will be as follows:

1. Wolverine supervisor on location - if unable to perform his/ her duties;
2. Alternate Wolverine representative - if unable to perform his/ her duties;
3. Rig Supervisor/Toolpusher - if unable to perform his/her duties;
4. Safety consultant representative - if available.

A. All Personnel

1. Always be alert for possible H2S alarms - both audible and visual.
2. Be familiar with location of Safe Briefing Areas (SBA) and protective breathing equipment.
3. Develop "wind awareness". Be aware of prevailing wind direction as well as nearby uphill areas should there be no wind.
4. Familiarize yourself with nearest escape routes for safe evacuation.
5. Should H2S alarm sound, DON'T PANIC - remain calm and follow instructions of person in charge.
6. If the H2S alarms sound:
 - a. Essential personnel shall don the appropriate respiratory protective equipment and follow safety procedures. They will continue to wear respiratory protective equipment until the area is deemed safe (H2S concentration less than 10 PPM).
 - b. Non-essential personnel shall evacuate to the appropriate safe briefing area using escape-breathing systems. They are to wait there for further instructions from the Wolverine foreman or the designated person in charge.
 - c. Initiate rescue protocol if necessary and following training procedures.

B. Wellsite Supervisor

1. The Wellsite Supervisor will confirm that all personnel on location at any time are trained in H2S safety and aware of above list of duties.
2. The Wellsite Supervisor will ensure that all personnel observe all safety and emergency procedures.
3. The Wellsite Supervisor will make an effort to keep the number of personnel on location to a minimum and to ensure that only essential personnel are on location during critical operations.
4. Should an extreme danger condition exist, the Wellsite Supervisor will:
 - a. Assess the situation and advise all personnel by appropriate means of communication.
 - b. Be responsible for determining that the extreme danger condition is warranted and have the red flag posted at location entrance.
 - c. Go to safe briefing area. Give clear instructions relative to hazard on location and actions for personnel to follow.
 - d. Notify company and regulatory groups of current situation as required per company policy and regulatory protocol. Follow appropriate procedures for emergency services notification.
 - e. Proceed to well and supervise operations with rig supervisor. Take action to control and reduce the H2S hazard.
 - f. Ensure that essential personnel are properly protected with supplied air breathing equipment and that non-essential personnel are in a "poison gas free" area.
 - g. Authorize evacuation of any persons/residents in area surrounding the well location.
 - h. Commence any ignition procedures if ignition criteria are met.

C. Rig Supervisor/Toolpusher

1. If the Wellsite Supervisor is unable to perform his/her duties and an alternate Wolverine representative is also unable or unavailable to perform his/her duties, the rig supervisor will assume command of wellsite operations and all responsibilities listed above for Wellsite Supervisor.
2. The Rig Supervisor will ensure that all rig personnel are properly trained to work in H2S environment, fully understand the purpose of H2S alarms, and know actions to take when alarms activate. He/She will ensure that all crew personnel understand the buddy system, safe briefing areas, and individual duties as well as emergency evacuation procedures.

3. Should any extreme danger operational condition arise, the Rig Supervisor shall assist the Wellsite Supervisor by:
 - a. Proceeding to the rig floor and assist in supervising rig operations.
 - b. Ensuring that only essential working personnel remain in hazardous areas.
 - c. Ensuring that all crewmembers that remain in hazardous area, wear respiratory protective equipment until notified that area is "clear" of any toxic gases.
 - d. Assigning rig crewmember or other service representative to block entrance to location. No unauthorized personnel are to be allowed entry to location.
 - e. Helping to determine hazardous "danger zones" on location using portable detection equipment, and positioning electric fans to move gas in any high concentration areas.

D. Safety Consultant

1. During normal operations (no H₂S present), the safety consultant will be responsible for the following:
 - a. Ensuring that all wellsite safety equipment is in place and operational.
 - b. Ensuring that all wellsite personnel are familiar with location safety layout and operation of all safety equipment.
 - c. Assisting the Wellsite Supervisor in performing weekly H₂S drills for location personnel.
2. When an operational condition is classified as extreme danger, the safety consultant will be responsible for the following:
 - a. Accounting for all wellsite personnel.
 - b. Assessing any injuries and directing first aid measures.
 - c. Ensuring that all safety and monitoring equipment are functioning properly and available.
 - d. Monitoring the safety of wellsite personnel.
 - e. Maintaining close communication with the Wellsite Supervisor.
 - f. Being prepared to assist Wellsite Supervisor with support for rig crew or other personnel using breathing equipment.
 - g. Being prepared to assist the Wellsite Supervisor with emergency procedures including possible well ignition.
 - h. Being prepared to assist with evacuation of any area residents or other personnel in the immediate area.

E. Drilling Manager

1. The Wolverine Drilling Manager will be responsible for notifying and maintaining contact with the company Production Manager and/or other company supervisory personnel as required.
2. Maintaining communication with the Wellsite Supervisor and providing any other assistance that might be required.
3. Travelling to wellsite if appropriate
4. Assisting Wellsite Supervisor with all other notifications – including both company and regulatory.

II. Well Location Layout

A. Location

1. An attached well site diagram depict location and rig orientation, prevailing wind direction, terrain of surrounding area, location of briefing areas, access roads, location of flare lines and pits, location of caution/danger signs, and location of wind indicators.
2. If practical, the drilling rig will be situated to allow for the prevailing winds to blow across the rig toward the circulation tanks or at right angles to the lines from the BOP stack to the circulation tanks or as near this configuration as possible.
3. If practical, there will be 2 roads from location with one at each end of location or as dictated by prevailing winds and terrain. If an alternate road is not practical, a clearly marked footpath to a safe area will be provided. The auxiliary escape route will be kept available and passable at all times so that a shift in wind direction will not prevent escape from the location if an emergency should occur.
4. The entrance(s) to the location will be designed to be barricaded if necessary because of a hydrogen sulfide emergency condition.
5. A minimum of 2 safe briefing areas (SBA) will be designated for assembly of personnel during emergency conditions. These will be located at least 150 feet from the wellbore and in such a location that at least one area will be upwind of the well at all times. Upon recognition of an emergency situation, all personnel will be trained to assemble at the designated briefing area for instructions.
6. Smoking areas will be established and smoking will be allowed only at those established smoking areas.
7. Reliable 24-hour telephone communications will be available at the wellsite supervisor's office.
8. The drilling rig will have a continuous electronic H₂S detection system that will be located to detect the presence of hydrogen sulfide in areas where it is most likely to appear on site. The sensor head locations will be: 1) rig floor by driller's console, 2) substructure area near the bell nipple, 3) the shale shaker, 4) the mud mixing area.

Additional sensors will be positioned at the discretion of the drilling foreman. At least 1 light and 1 siren will be placed on the rig to indicate the presence of hydrogen sulfide. The light and siren will be strategically placed to be visible to all personnel on the drill site.

9. Equipment to indicate wind direction will be installed at prominent locations and will be visible at all times during drilling operations. At least 2 wind direction indicators (i.e. windsocks) will be placed at separate elevations (i.e. near ground level and rig floor height). At least 1 wind direction indicator will be clearly visible from all principal working areas at all times so that wind direction can be easily determined. In addition, a wind direction indicator will be provided at each of the two briefing areas if the other wind direction indicators on location are not visible from the briefing areas.
10. Operational danger or caution sign(s) will be displayed along all controlled accesses to the site. The sign(s) will be legible and large enough to be read by all persons entering the wellsite and be placed a minimum of 200 feet but not more than 500 feet from the wellsite and at a location which allows vehicles to turn around at a safe distance prior to reaching the site.
11. Protective safety equipment will be available for all essential personnel. There will be five 30-minute SCBA and five air line breathing units with emergency escape cylinders located at the drilling floor or dog house, one SCBA and air line unit will be located in the derrick (for derrick man), one 30-minute SCBA per person will be located by the quarters of all personnel on location, and 30-minute SCBA and escape units will be distributed as needed near the shaker, mud tanks, and any other area where escape from an H₂S contaminated area could be difficult. A safety trailer containing the compressed breathing air will be located near the well site and air lines will be run from the safety trailer to where the air line breathing units are located.

III. Safety Procedures

A. Training

When this plan is in effect, all personnel who come onto the location must be properly trained in hydrogen sulfide, nitrogen, and oxygen deficient atmospheres safety. The personnel shall carry documentation with them indicating that the training has occurred within the previous 12 months. All training will comply with federal and state regulatory guidelines. There will be a training session that reviews this site specific H₂S plan and the H₂S PPP (if applicable) for all personnel in each work crew on location. Training will also include weekly H₂S and well control drills. All training sessions and drills are to be recorded in the driller's log, as well as in the safety trailer logbook.

Training topics shall include at a minimum:

1. Hazards and characteristics of hydrogen sulfide, nitrogen, and oxygen deficient atmospheres and symptoms of exposure to these gases.

2. Proper use, care and limitations of respiratory protective equipment with hands-on practice.
3. Use of both fixed and portable toxic gas detection equipment.
4. Work practices to reduce chances for toxic gas exposure and procedures for confined space.
5. First aid for toxic gas exposure and resuscitation equipment.
6. The buddy system.
7. Emergency evacuation procedures.
8. A review of the contingency plan for the well.

B. Operating Conditions

A three color- flag warning system will be used to notify personnel approaching the drill site as to operating conditions on the wellsite. This system is in compliance with BLM Onshore Order 6 and follows industry standards.

Green Flag - Potential Danger

Yellow Flag - Moderate Danger

Red Flag- Extreme Danger - Do not approach if red flag is flying.

A red warning flag will be displayed when H₂S is detected in excess of 10 ppm at any detection point.

The operational danger or caution signs located near the entrance to the location will be painted a high visibility red, black and white, or yellow with black lettering. They will be legible and large enough to be read by all persons entering the wellsite and will read "DANGER – POISON GAS – HYDROGEN SULFIDE" and in small lettering "Do not approach if Red Flag is Flying".

All sign(s) and, when appropriate, flag(s) will be visible to all personnel approaching the location under normal lighting and weather conditions.

Location access will be monitored and controlled during "non-routine" operations such as perforating, pressurized pumping, and well testing of potential H₂S bearing formations. The number of personnel on location will be restricted to "essential" personnel only

C. Warning System Response and Evacuation Plan

When H₂S is detected in excess of 10 ppm at any detection point indicating that an extreme danger condition exists, all non-essential personnel will be moved to a safe area and essential personnel (i.e., those necessary to maintain control of the well) shall don a pressure-demand type protective breathing apparatus. Once accomplished, operations may proceed.

The prevailing wind is from the west-southwest. The lands adjacent to the well site include federal land, unoccupied by residents.

If an H₂S emergency situation arises, the Wellsite Supervisor will contact local authorities to authorize and work in coordination with them to evacuate and restrict non-essential personnel from areas near the wellsite where H₂S concentration levels could potentially exceed 10 ppm. All associated regulatory agencies will then be notified as soon as possible.

D. Emergency Rescue Procedures

Well site personnel should not attempt emergency rescues unless they have been properly trained. A trained person who discovers another person overcome by hydrogen sulfide **should not attempt to rescue without donning the proper breathing equipment.** When making an emergency rescue always use the following procedures:

1. Don rescue breathing equipment before attempting to rescue someone.
2. Remove the victim from the contaminated area to an area free of gas by traveling upwind or cross wind. Be certain that you are in a safe area before removing your breathing equipment.
3. If the victim is not breathing, initiate mouth-to-mouth resuscitation immediately. Follow CPR guidelines and replace mouth-to-mouth with a bag mask resuscitator if available.
4. Treat the victim for shock, keeping the victim warm and calm. Never leave the victim alone.
5. Any personnel who experience hydrogen sulfide exposure must be taken to a hospital for examination and their supervisor notified of the incident.
6. Their supervisor shall follow the company Emergency Preparedness plan.

IV. H2S Safety Equipment on Well Location Procedures

<u>Item</u>	<u>Amount</u>	<u>Description</u>
1.	1	Safety trailer with a cascade system of 10-300 cu. ft bottles of compressed breathing air complete with high-pressure regulators.
2.	At least 1000 ft.	Low-pressure airline equipped with Hanson locking fittings. This airline will be rigged up with manifolds to supply breathing air to the rig floor, substructure, derrick, shale shaker area, and mud mixing areas. Three high-pressure refill hoses will be attached to cascade systems for cylinder refill.
3.	Twelve (12)	Scott 30-minute self-contained breathing apparatuses (SCBA).
4.	Twelve (12)	Scott airline units with emergency escape cylinders.
5.	One (1)	4-channel continuous electronic H2S monitors with audible and visual alarms. The set points for these alarms are 10 ppm for the low alarm and 15 ppm for the high alarm.
6.	Two (2)	Sensidyne portable hand operated pump type detection units with tubes for hydrogen sulfide and sulfur dioxide.
7.	One (1)	Oxygen resuscitator with spare oxygen cylinder.
8.	One (1)	Trauma first aid kit.
9.	One (1)	Stokes stretcher and one (1) KED
10.	Four (4)	Windsocks.
11.	At least one (1)	Well condition sign with 3 flag system.
12.	Two (2)	Safe Briefing Area (SBA) signs.
13.	One (1)	Fire blanket.
14.	One (1)	Set air splints.
15.	Two (2)	Electric explosion proof fans.
16.	One (1)	Bullhorn and chalk board.
17.	Three (3)	300 cu. ft. air bottles for the safe briefing area.
18.	Two (2)	30# fire extinguishers.
19.	Six (6)	Battery powered voice microphones for communication when wearing air masks.
20.	One (1)	Battery powered combustible gas meter.

V. Operating Procedures and Equipment

1. If zones containing in excess of 100 ppm of H₂S gas are encountered while drilling with air, gas, mist, other non-mud circulating mediums for aerated mud, the well will be killed with a water-based mud and mud will be used thereafter as the circulating medium for continued drilling.
2. A flare system will be designed and installed to safely gather and burn H₂S-bearing gas and it will be equipped with a suitable and safe means of ignition. If noncombustible gas is to be flared, the system will have a supplemental fuel to maintain ignition.
3. Flare lines will 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) will be located not less than 150 feet from the wellbore. Flare lines will be straight unless targeted with running tees.
4. If SO₂ is to be released as a result of flaring of H₂S, portable SO₂ detection equipment will be available for checking the SO₂ level in the flare impact area. If the flare impact area reaches a sustained ambient threshold level of 2 ppm or greater of SO₂ in air and includes any occupied residence, school, church, park, or place of business, or other area where the public could reasonably be expected to frequent, the PPP will be implemented.
5. The choke manifold included as a component of the well control system will have at least one remote controlled choke with controls readily accessible to the drilling or other authorized personnel.
6. A rotating head will be installed and operable.
7. A mud-gas separator will be rigged up and manifolded to the choke and flare system.
8. The drilling mud will be a water-based system maintained with a pH of 10 or greater. Corrosion inhibitor additives will be in the mud. Sufficient scavenger chemicals will be available on location and will be used to scavenge or neutralize any H₂S in the drilling fluid. Mud weight will be maintained as needed to control pressure in any formations encountered.
9. All equipment that has potential for exposure to H₂S will be suitable for H₂S service. The casing head and spools, blowout preventer assembly, rotating head, kill lines, choke, choke manifold and lines, valves, mud-gas separator and other related equipment will have metallurgical standards conforming to NACE MR0175/ISO 15156. Elastomers, packing, and similar inner parts exposed to H₂S will be resistant at the maximum anticipated temperature of exposure. Drill strings, surface casing, intermediate casing, and BOP shear rams are exempt from these requirements.
10. All respiratory protective, H₂S detection, and other needed safety equipment will be in place and ready for use, and all rig crews and other service personnel will be trained in its use when this plan is effective.

11. There will be a continuous electronic H₂S detection system that will automatically activate visible and audible alarms if hydrogen sulfide is detected. The visible light will activate if 10 ppm H₂S is present. The audible siren will activate if 15 ppm H₂S or higher concentration is present. There will be at least four H₂S sensors in place on the drilling rig. Additional alarm lights & sirens may be added to ensure that all personnel on the drill site are able to notice the alarms at any time. All H₂S detection equipment will be calibrated as recommended by the manufacturer and calibration records will be maintained on location.
12. Both 30-minute self-contained breathing apparatuses (SCBA) and workline units with escape cylinders will be available on location. There will be sufficient numbers of this supplied air breathing equipment on location to ensure that all personnel on location have equipment available to them. All respiratory protective equipment will use nose cups to prevent fogging in temperatures below 32°F. Spectacle kits will be available for personnel that require corrective lenses when working under mask.
13. Electronic voice-microphones will be available for essential personnel to use when working under mask to facilitate communication.
14. Additional breathing equipment will be provided for non routine operations that require additional service personnel on the well location to ensure that all personnel on the well location have a dedicated supplied air respirator.
15. Electric explosion-proof ventilating fans (bug blowers) will be available to provide air movement in enclosed areas where gas might accumulate.
16. Any drill stem test performed on any formation potentially containing H₂S will be done with a minimal number of personnel at the drilling site as necessary to safely operate the test equipment. Any such drill-stem test will be conducted only during daylight hours and will be a closed chamber test with no fluids allowed to flow from surface.
17. Any production testing of an H₂S bearing formation will be done with proper wellhead and other equipment in place to allow a controlled test through separation equipment and flare as needed. Any such test would be conducted with monitoring and warning devices in place and proper safety equipment available.

VI. Well Ignition Procedures

If it should become apparent that an uncontrolled release of hydrogen sulfide to the atmosphere might endanger the health and safety of the public or well site personnel, the Wolverine Wellsite Supervisor will make a decision to ignite the well. The following procedure should be followed before attempting to ignite the well.

- A. Ignition equipment - The following equipment will be available for on-site for use by the ignition team.
 1. Two 12 gauge flare guns with flare shells
 2. Two 500 ft. Fire resistant retrieval ropes

3. One portable combustible gas meter
4. Self contained breathing apparatus (SCBA) for each member of the ignition team.
5. One backup vehicle with communication equipment

B. Ignition Procedures

1. The Wellsite Supervisor will ensure that well site personnel are evacuated to a safe area upwind of the well bore prior to any ignition action.
2. The Wellsite Supervisor and a designated partner "buddy" backed up by well site safety personnel will comprise the ignition team. All team members will be wearing 30 minute SCBAs.
3. The backup crew will be positioned near a radio-equipped vehicle at a safe distance from the sour gas release. They will standby to rescue the actual team igniting the well.
4. The partner of the ignition team will carry a combustible gas/ hydrogen sulfide meter to continuously monitor the area in which they are working and define the perimeter of the gas cloud.
5. The Wellsite Supervisor will carry the flare gun and shells.
6. The ignition team will determine the hazardous area and establish safe working perimeters. Once this is identified the team will proceed upwind of the leak and fire into the area with flare gun. If trouble is encountered in trying to light the leak, retry to ignite by firing the flare shells at 45 and 90 angles to the gas source, but DO NOT approach closer to the leak.
7. After ignition, monitor for sulfur dioxide and work with the support group to restrict access to the contaminated area.

VII. Residents – Public in Radius of Exposure

Exposure to H₂S by the general public is very unlikely during drilling or completion operations. The prevailing wind direction is from the west-northwest. The lands adjacent to the well site include cultivated farm land to the north, east and south. Further to the east approximately 3000' is Cristenberg Road. UT highway 137 is located to the west of the well site. West of the highway 137 is undeveloped, mountainous land. The city of Mayfield is approximately 1.5 miles to the southeast.

Even assuming a release of 2,000,000 cubic feet/day with a concentration of 0.009 mole volume, the 100 ppm radius of exposure (as calculated in accordance with BLM Onshore Order No. 6) is 155' and the 500 ppm radius of exposure is 72', both of which would fall within the actual well pad site; the well pad will be fenced and have controlled access during drilling.

VIII. Emergency Phone Directory

A. Wolverine Gas and Oil Company of Utah, LLC

Onsite Drilling Wellsite Supervisor – Wolverine)	Rig# 970-812-0022
Jack Magill (Drilling Engineer Consultant)	office 308-848-3279 Cell 303-868-6408
Tony Cook (Production Forman – Wolverine)	office 435-896-2956 cell 435-201-1622 truck 435-201-2871
Ed Higuera (Operations Manager – Wolverine)	office 616-458-1150 Cell 616-690-0023

B. Emergency Services Phone List

1. Sevier Valley Medical Center - Richfield, UT 435 - 896-8271
2. Gunnison Valley Hospital, Sanpete County 435 - 528-7246
3. Ambulance Services – Sevier County, UT 911 or 435-896-6471
4. Ambulance Services – Sanpete County, UT 911 or 435-835-2191
5. Sheriff Department - Sevier County, UT 911 or 435-896-6471
6. Sheriff Department – Sanpete County, UT 911 or 435-835-2191
7. Highway Patrol - Utah 800 - 222-0038
8. Fire Department - Sevier County 911 or 435-896-6471
9. Al McKee, BLM – Salt Lake City, UT (cell phone) 801- 828-7498
10. Utah Division Oil, Gas & Mining - Salt Lake City, UT 801- 538-5277
11. Medical Helicopter - Air Med- Salt Lake City, UT 800 - 453-0120
12. Utah OSHA (Mark LeBlanc) 801- 530-6862
13. Sevier Valley Medical Center - Richfield, UT 435-896-8271

C. Nearest Hospital

The nearest hospital to the site is the Gunnison Valley Hospital, located at 64 East 100 North, Gunnison UT, which is approximately 8 miles north on State Highway 89 from the Willow Creek intersection (about 15 miles from the well pad) to East 100 North Street. A map and directions to the hospital can be found in Section X-Attachments.

IX. Reference Material for Hydrogen Sulfide and Sulfur Dioxide

If gas should be produced, it could be a mixture of Carbon Dioxide, Hydrogen Sulfide, and Methane.

TOXICITY OF VARIOUS GASES

<u>Common Name</u>	<u>Chemical Formula</u>	<u>Specific Gravity of Air=1</u>	<u>1 Threshold Limit</u>	<u>2 Hazardous Limit</u>	<u>3 Lethal Concern</u>
Hydrogen Cyanide	HCN	0.94	10 ppm	150 ppm/hr	300 ppm
Hydrogen Sulfide	H ₂ S	1.18	10 ppm	250 ppm/hr	600 ppm
Sulfur Dioxide	SO ₂	2.21	2 ppm	-----	1,000 ppm
Chloride	CL ₁	2.45	1 ppm	4 ppm/hr	1,000 ppm
Carbon Monoxide	CO	0.97	50 ppm	400 ppm/hr	1,000 ppm
Carbon Dioxide	CO ₂	1.52	5,000 ppm	5%	10%
Methane	CH ₄	0.55	90,000 ppm	Combustible Above 5% in Air	-----

1. Threshold = Concentration at which it is believed that all workers may repeatedly be exposed, day after day, without adverse side effects.

2. Hazardous = Concentration that may cause death.

3. Lethal = Concentration that will cause death with short-term exposure.

HYDROGEN SULFIDE

GENERAL PROPERTIES

Hydrogen Sulfide itself is a colorless and transparent gas and is flammable. It is heavier than air and, hence, may accumulate in low places.

Although the slightest presence of H₂S in the air is normally detectable by its characteristic "Rotten Egg" odor, it is dangerous to rely on the odor as a means of detecting excessive concentrations because the sense of smell is rapidly lost allowing lethal concentrations to be accumulated without warning. The following table indicates the poisonous nature of Hydrogen Sulfide, which is more toxic than Carbon Monoxide.

COMMON NAMES: Sour Gas, Rotten Egg Gas, Sulphurated Hydrogen, Hydrogen sulfide, Stink Damp, H₂S, Acid Gas, Sweet Gas* (* H₂S is a sweet tasting Gas, but often the word "tasting" is left out).

PHYSICAL-CHEMICAL PROPERTIES

Chemical Formula.....	H ₂ S
1. Specific Gravity (Air = 1.000).....	1.193 (@ 77°F)
2. Color	None
3. Odor	Compared to Rotten Eggs
4. Odor Threshold	0.13 part of 1 ppm
5. Corrosivity	Reacts with metals, plastics, tissues and nerves.
6. Solubility in Water	4.0 to 1 in H ₂ O @ 32°F
	2.6 to 1 in H ₂ O @ 68°F
7. Effects on Humans.....	Olfactory nerves, respiratory nerves, irritates sensitive membranes in eyes, nose, and throat.
8. Vapor Pressure	19.6 atmospheres at 25°C
9. Explosive Limits	4.3% to 46% by volume in air.
10. Ignition Temperature.....	18°F (Burns with a pale blue flame)
11. Molecular Weight.....	34.08
12. Conversion Factors.....	1 mg/1 of air = 717 ppm (at 25°C and 760 mm HG). 1 ppm = 0.00139 mg/1 of air.
13. pH.....	3 in water

INDUSTRIAL OCCURRENCES

Hydrogen Sulfide exposures occur in certain processes in the petroleum industry, chemical plants, chemical laboratories, sulfur and gypsum mines, viscose rayon and rubber industries, tanneries, and in the manufacture of some chemicals, dyes, and pigments. It may be encountered in excavations in the swampy or filled ground. It is produced when sulfur-containing organic matter decomposes, and it can therefore be found in sewage or organic-waste treatment plants. A common sewer gas, it may find its way into utility manhole, particularly dangerous when encountered in tanks, vessels, and other enclosed spaces.

TOXIC PROPERTIES

Hydrogen Sulfide is an extremely toxic and irritating gas. Free Hydrogen Sulfide in the blood reduces its oxygen carrying capacity, thereby depressing the nervous system. Sufficiently high concentrations can cause blockage of the phrenic nerve, resulting in immediate collapse and death due to respiratory failure and asphyxiation.

Because Hydrogen Sulfide is oxidized quite rapidly to sulfates in the body, no permanent after effects occur in cases of recovery from acute exposures unless oxygen deprivation of the nervous system is prolonged. However, in cases of acute exposures, there is always the possibility that pulmonary edema may develop. It is also reported that symptoms such as nervousness, dry nonproductive coughing, nausea, headache, and insomnia, lasting up to about 3 days have occurred after acute exposures to Hydrogen Sulfide.

At low concentrations the predominant effect of Hydrogen Sulfide is on the eyes and respiratory tract. Eye irritation, conjunctivitis, pain, lacrimation, keratitis, and photophobia may persist for several days. Respiratory tract symptoms include coughing, painful breathing, and pain in the nose and throat.

There is no evidence that repeated exposures to Hydrogen Sulfide results in accumulative or systemic poisoning. Effects such as eye irritation, respiratory tract irritation, slow pulse rate, lassitude, digestive disturbances, and cold sweats may occur, but these symptoms disappear in a relatively short time after removal from the exposure. Repeated exposure to Hydrogen Sulfide does not appear to cause any increase or decrease in susceptibility to this gas.

The paralytic effect of Hydrogen Sulfide on the olfactory nerve is probably the most significant property of the gas. This paralysis may create a false sense of security. A worker can be overcome after the typical rotten-egg odor has disappeared. Rather than the characteristic Hydrogen Sulfide odor, some victims of sudden acute overexposure have reported a brief sickeningly sweet odor just prior to unconsciousness.

Subjective olfactory responses to various concentrations of Hydrogen Sulfide may be summarized as follows:

0.02 ppm	No odor
0.13 ppm	Minimal perceptible odor
0.77 ppm	Faint, but readily perceptible odor
4.60 ppm	Easily detectable, moderate odor
27.0 ppm	Strong, unpleasant odor, but not intolerable

Physiological responses to various concentrations of Hydrogen Sulfide have been reported as follows:

10 ppm	Beginning eye irritation
50-100 ppm	Slight conjunctivitis and respiratory tract irritation after 1 hour exposure
100 ppm	Coughing, eye irritation, loss of sense of smell after 2-15 minutes. Altered respiration, pain in the eyes, and drowsiness after 15-30 minutes, followed by throat irritation after 1 hour. Several hours ¹ exposure results in gradual increase in severity of these symptoms and death may occur within the next 48 hours
200-300 ppm	Marked conjunctivitis and respiratory tract irritation after 1 hour exposure
500-700 ppm	Loss of consciousness and possibly death in 30 minutes
700 ppm	Rapid unconsciousness, cessation of respiration, and death
1000-2000 ppm	Unconsciousness at once, with early cessation of respiration and death in a few minutes. Death may occur even if individual is removed to fresh air at once.

ACCEPTABLE CONCENTRATIONS

ACCEPTABLE EIGHT-HOUR TIME-WEIGHTED AVERAGE

To avoid discomfort, the Time-Weighted average concentration of Hydrogen Sulfide shall not exceed 10 ppm.

ACCEPTABLE CEILING CONCENTRATION

The acceptable concentration for protection of health for an eight-hour, five-day week shall be 20 ppm. Fluctuations are to occur below this concentration.

**ACCEPTABLE MAXIMUM FOR PEAKS ABOVE ACCEPTABLE
BASE LINE FOR CONTINUOUS EXPOSURE**

A single-peak concentration not exceeding 50 ppm for a maximum of 10 minutes is allowable provided that the daily time-weighted average is not exceeded.

H₂S EQUIVALENTS

Parts per Million	Percents	Grains per 100 cu. Ft.
1	0.0001	0.055
10	0.001	0.55
18	0.0018	1.0
100	0.01	5.5
1000	0.1	55.5
10000	1.0	555.5

Grains per 100 cu. Ft. = % by volume Mole 636.4
1% by volume = 10,000 ppm

SULFUR DIOXIDE

Sulfur Dioxide (SO₂) is a colorless, transparent gas and is non-flammable.

Sulfur Dioxide is produced during the burning of H₂S. Although SO₂ is heavier than air, it will be picked up by a breeze and carried downwind at elevated temperatures. While Sulfur Dioxide is extremely irritating to the eyes and mucous membranes of the upper respiratory tract, it has exceptionally good warning powers in this respect.

CONCENTRATIONS

EFFECTS

%SO₂ **ppm**

0.0002 2

0.0005 5

0.0012 12

0.015 150

0.05 500

Safe for eight (8) hour exposure

Pungent odor - normally a person can detect SO₂ in this range.

Throat irritation, coughing, constriction of the chest, tearing and smarting of the eyes.

So irritating that it can only be endured for a few minutes.

Causes a sense of suffocation, even with the first breath.

PHYSICAL PROPERTIES AND CHARACTERISTICS

- Chemical Formula.....SO₂
- 1. Specific Gravity2.212
- 2. ColorNone
- 3. Flammable.....No
- 4. OdorCharacteristic, pungent, gives ample warning of its presence.
- 5. CorrosivityDry---not corrosive to ordinary metals. Wet--corrosive to most common metals.
- 6. Allowable Concentrations.....2 ppm (ACGIH and OSHA)
- 7. Effects on Humans.....Irritates eyes, throat and upper respiratory system

TOXIC PROPERTIES

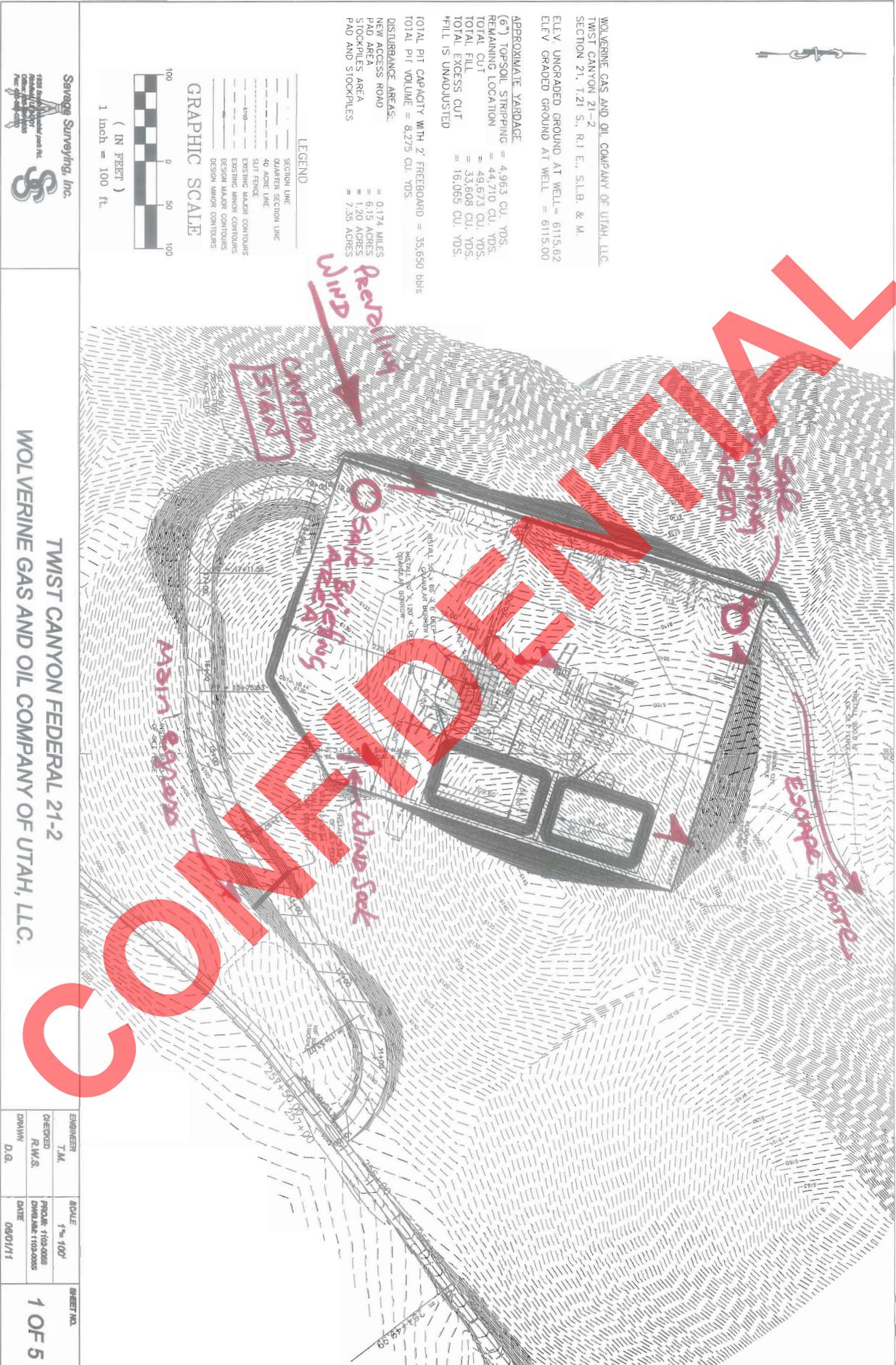
Sulfur Dioxide is an irritating gas in its vapor form and the odor is so intensely irritating that concentrations of 3 to 5 parts per million in the air are readily detectable by the normal person. In higher concentrations, the severely irritating effect of the gas makes it unlikely that any person would be able to remain in a Sulfur Dioxide contaminated atmosphere unless they were unconscious or trapped.

Sulfur Dioxide gas is intensely irritating to the eyes, throat, and upper respiratory system. Inhalation of this gas in concentrations of 8 to 12 parts per million in air causes throat irritation, coughing, constriction of the chest, tearing and smarting of the eyes. 150 parts per million is so extremely irritating that it can be endured only for a few minutes. 500 parts per million is so acutely irritating to the upper respiratory tract that it causes a sense of suffocation, even with the first breath.

Out of numerous reported exposures to Sulfur Dioxide, there are few references that would indicate pneumonia as an after effect.

X. Attachments-Maps, Diagrams

CONFIDENTIAL

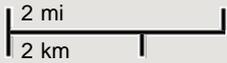
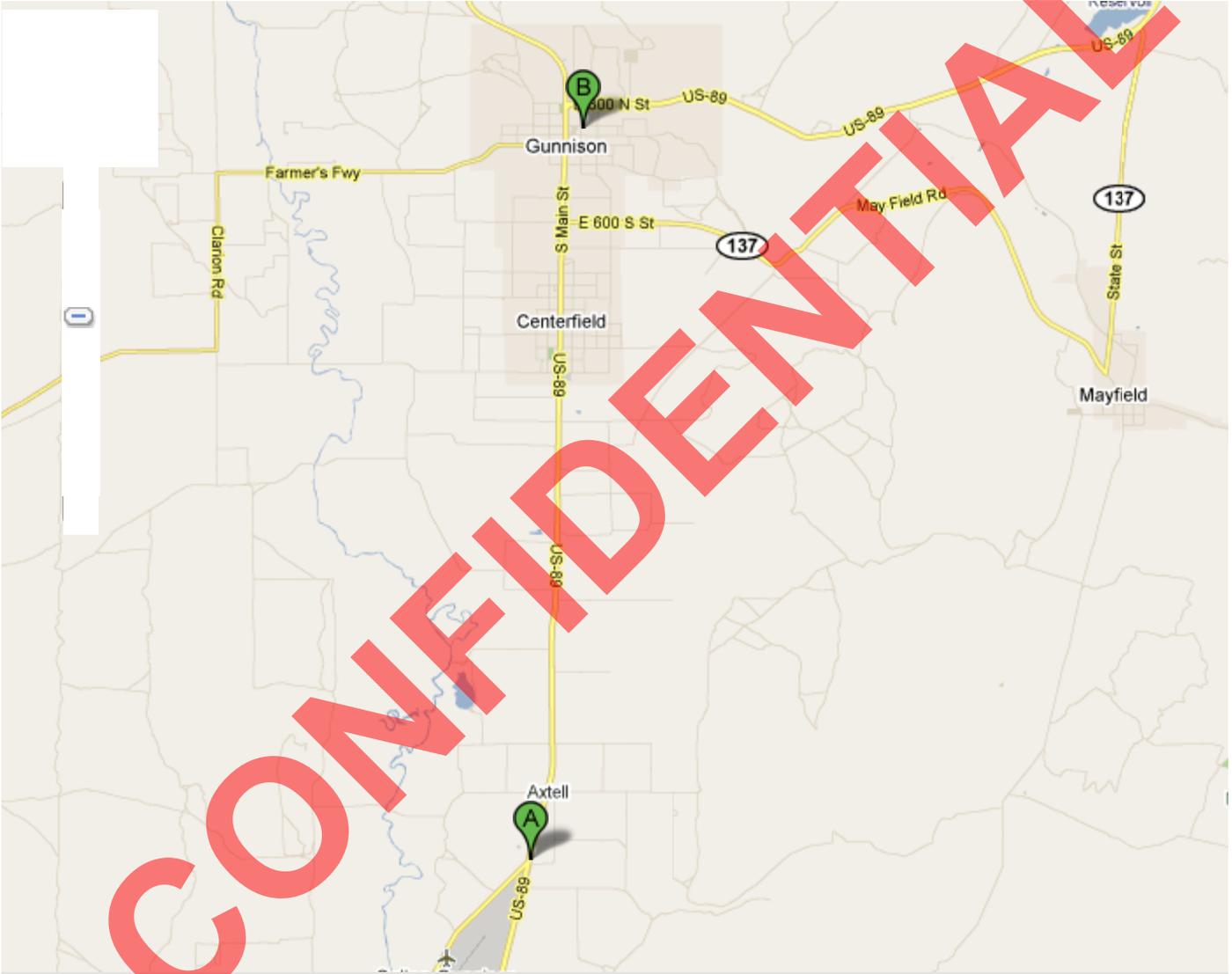


Show for all steps: Text only | [Maps](#) | [Street View](#)
Roll over the directions to customize each step.

Include large map



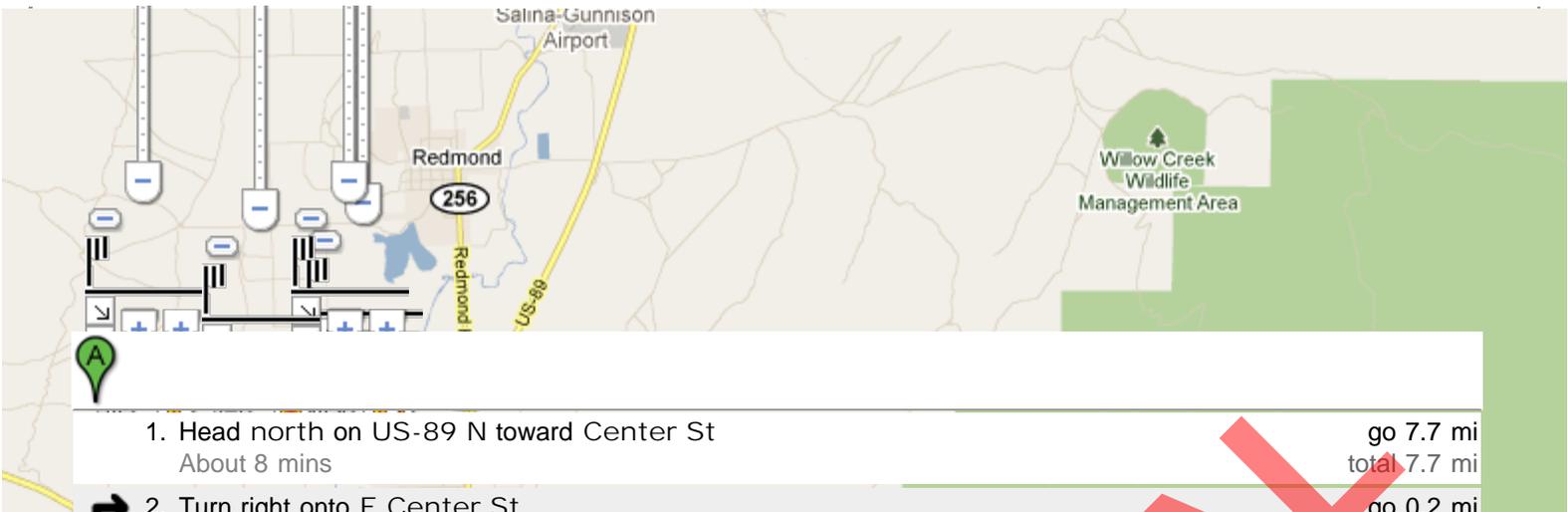
Directions to Gunnison Valley Hospital: Pratt Von MD
64 E 100 N, Gunnison, UT 84634 - (435) 528-7246
7.9 mi – about 9 mins



©2011 Google - Map data ©2011 Google - [Terms of Use](#)

US-89 N

RECEIVED: Jun 07 2011



- 1. Head north on US-89 N toward Center St
About 8 mins
go 7.7 mi
total 7.7 mi
- 2. Turn right onto E Center St
go 0.2 mi
total 7.8 mi
- 3. Take the 1st left onto N 100 E St
Destination will be on the right
go 351 ft
total 7.9 mi

B Gunnison Valley Hospital: Pratt Von MD
64 E 100 N, Gunnison, UT 84634 - (435) 528-7246

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Map data ©2011 Google

Directions weren't right? Please find your route on maps.google.com and click "Report a problem" at the bottom left.

CONFIDENTIAL

WOLVERINE GAS AND OIL COMPANY OF UTAH, LLC

Energy Exploration in Partnership with the Environment



June 1, 2011

Diana Mason
Permitting—Petroleum Technician
Utah Division of Oil, Gas and Mining
P.O. Box 145801
Salt Lake City, Utah 84114-5801

Re: Application for Permit to Drill (Utah ePermit #3910)
Wolverine Gas and Oil Company of Utah, LLC
Twist Canyon Federal 21-2
Exception location/ directional drilling letter

Dear Mrs. Mason:

Wolverine Gas and Oil Company of Utah, LLC (Wolverine) hereby submits this letter with the attached plats, as part of the *Application for Permit to Drill* (APD) for the referenced well:

- R649-3-2 Exception Plat showing proposed BHL;
- R649-3-11 Directional Drilling Application Plat showing proposed BHL;

The City of Salina will be the source for water during drilling and completion operations on this proposed well. The surface at the planned drill site is owned in fee by the United States, administered by Bureau of Land Management.

The proposed location is within 460' of a drilling unit boundary, so an exception to spacing (R649-3-2) is hereby requested for the well based on restrictive topography relative to and the need to drill at an optimum structural location. Wolverine is the only owner and operator within 460' of the proposed well location.

This letter and the accompanying plats are also intended to serve as an application for directionally drilling the well per R649-3-11. Wolverine is the owner of all oil and gas within 460 feet from all points along the intended wellbore for the well. Information relating to R649-3-11 is as follows:

Wolverine Gas and Oil Company of Utah, LLC
1140 N Centennial Park Drive. Richfield, Utah 84701. Phone: 435-896-1943, Fax: 435-893-2134

RECEIVED: Jun. 07, 2011

Operator: Wolverine Gas and Oil Company of Utah, LLC

Address: 1140 N Centennial Park Drive
Richfield, Utah 84701

Well: Twist Canyon Federal 21-2

Field: Wildcat

Reservoir: Navajo

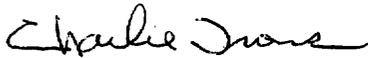
County: Sevier

Reason: Restrictive topography and to minimize surface impact

Please accept this letter as Wolverine's written request for confidential treatment of all information contained in and relating to this application and proposed well.

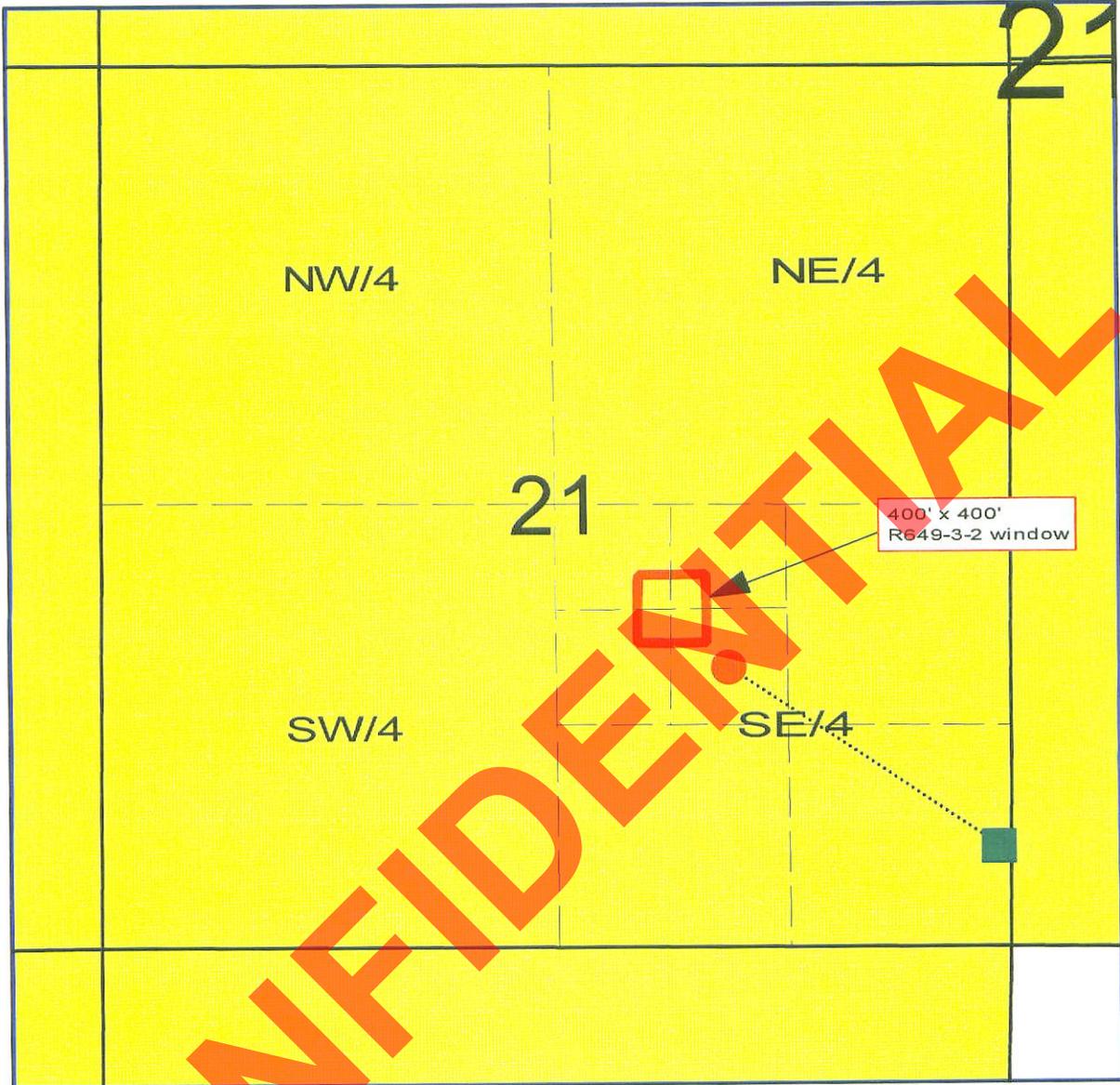
Thank you for consideration of this application. Please feel free to contact me or Paul Spiering of this office if you have any questions or need additional information.

Sincerely,



Charlie Irons
Senior Landman

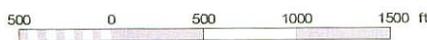
CONFIDENTIAL



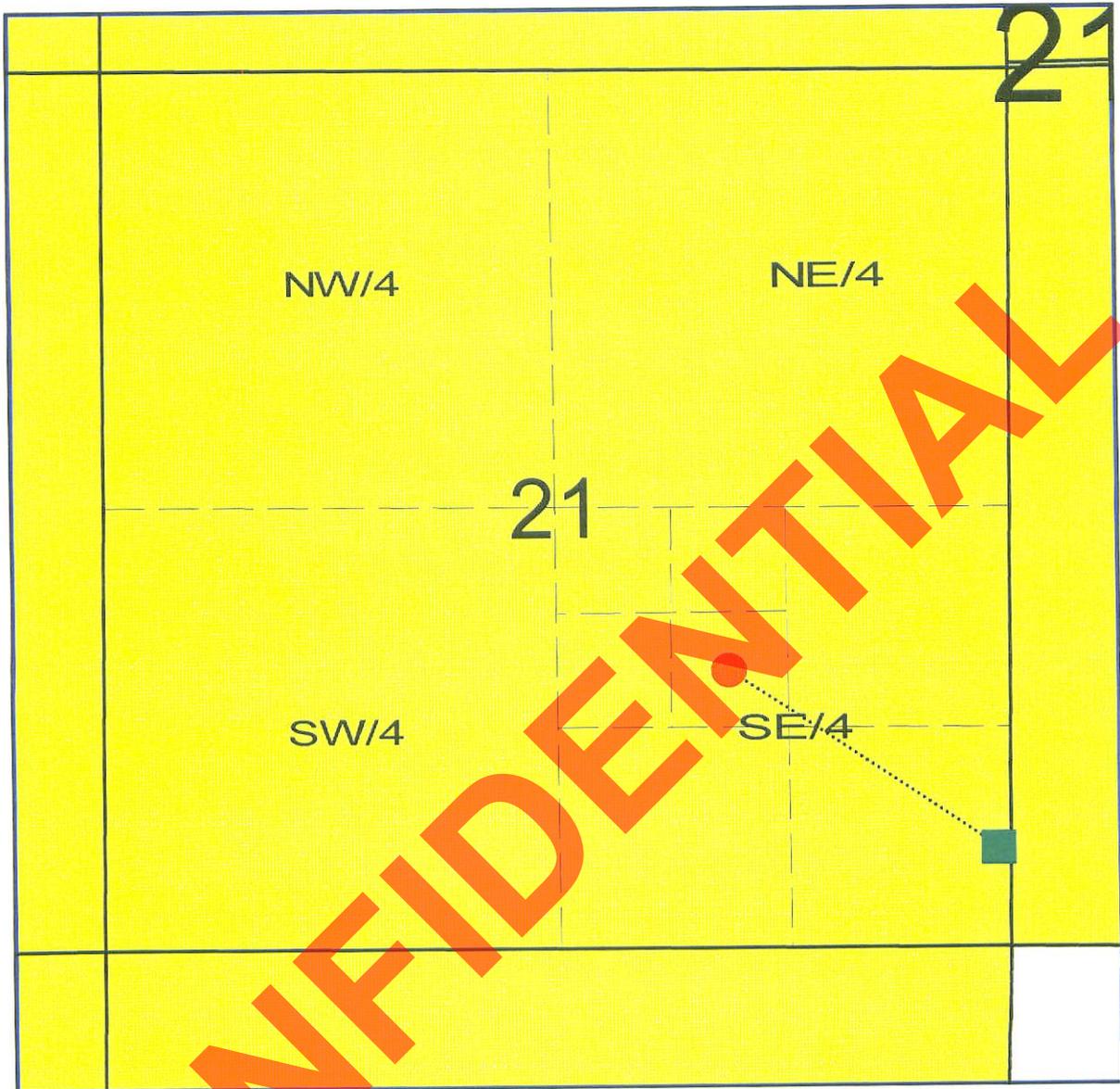
Twist Canyon Federal 21-2 Well Location

SHL: 580' FSL, 78' FEL, Sec. 21, T21S, R1E, Sevier Co., UT
 BHL: 1636' FSL, 1649' FEL, Sec. 21, T21S, R1E, Sevier Co., UT

- PROPOSED SHL
- PROPOSED BHL
- Wolverine Gas and Oil Lease



	WOLVERINE GAS & OIL Company of Utah, LLC (Operator) <i>Energy Exploration in Partnership with the Environment</i> ONE RIVERFRONT PLAZA SE CAMPBELL, N.W. GRAND RAPIDS, MI 49503-2016 (616) 456-1150
	EXCEPTION LOCATION & OWNERSHIP PLAT (R649-3-2)
Date: 6/1/2011	Author: Filename: Document in mjl Twist Canyon Proposed Well Dev.gmp

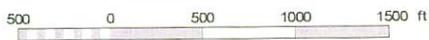


Twist Canyon Federal 21-2 Well Location

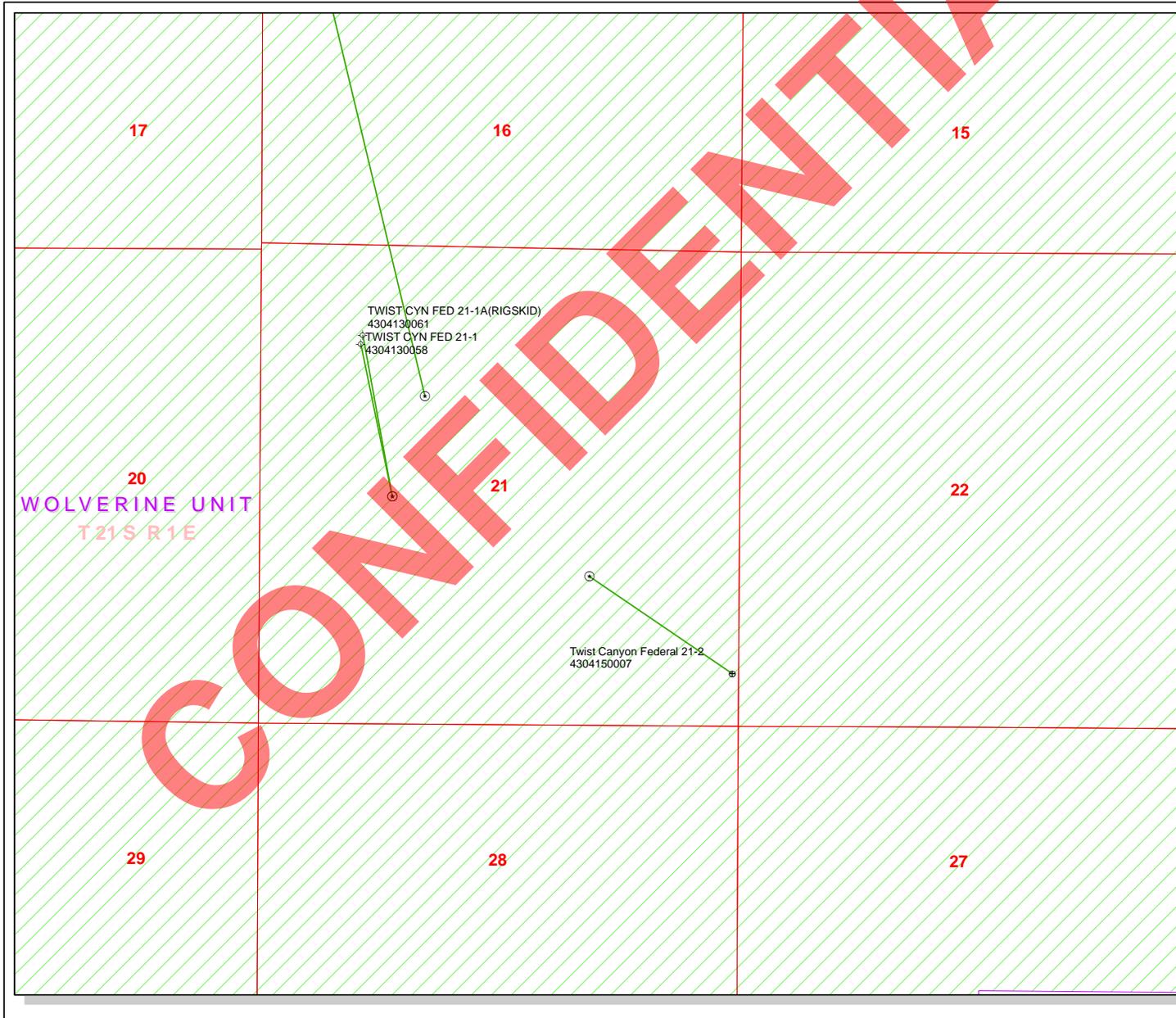
SHL: 580' FSL, 78' FEL, Sec. 21, T21S, R1E, Sevier Co., UT

BHL: 1636' FSL, 1649' FEL, Sec. 21, T21S, R1E, Sevier Co., UT

- PROPOSED SHL
- PROPOSED BHL
- Wolverine Gas and Oil Lease



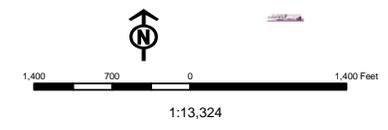
	WOLVERINE GAS & OIL Company of Utah, LLC (Operator) <i>Energy Exploration in Partnership with the Environment</i> ONE RIVERFRONT PLAZA 55 CAMPAU, N.W. GRAND RAPIDS, MI 49503-2616 (616) 456-1150
DIRECTIONAL DRILLING APPLICATION PLAT (R649-3-11)	
Date: 6/1/2011	Author: Filename: Document in mjl Twist Canyon Proposed Well Dev.gmp



API Number: 4304150007
Well Name: Twist Canyon Federal 21-2
Township T2.1 . Range R0.1 . Section 21
Meridian: SLBM
 Operator: WOLVERINE GAS & OIL COMPANY OF UTAH, LLC

Map Prepared:
 Map Produced by Diana Mason

- | | |
|---------------|------------------------------------|
| Units | Wells Query |
| STATUS | Status |
| ACTIVE | APD - Approved Permit |
| EXPLORATORY | DRL - Spudded (Drilling Commenced) |
| GAS STORAGE | GIW - Gas Injection |
| NF PP OIL | GS - Gas Storage |
| NF SECONDARY | LA - Location Abandoned |
| PI OIL | LOC - New Location |
| PP GAS | OPS - Operation Suspended |
| PP GEOTHERML | PA - Plugged Abandoned |
| PP OIL | PGW - Producing Gas Well |
| SECONDARY | POW - Producing Oil Well |
| TERMINATED | RET - Returned APD |
| Fields | SGW - Shut-in Gas Well |
| Unknown | SOW - Shut-in Oil Well |
| ABANDONED | TA - Temp. Abandoned |
| ACTIVE | TW - Test Well |
| COMBINED | WDW - Water Disposal |
| INACTIVE | WIW - Water Injection Well |
| STORAGE | WSW - Water Supply Well |
| TERMINATED | |
| Sections | |
| Township | |



WORKSHEET APPLICATION FOR PERMIT TO DRILL

APD RECEIVED: 6/3/2011

API NO. ASSIGNED: 43041500070000

WELL NAME: Twist Canyon Federal 21-2

OPERATOR: WOLVERINE GAS & OIL COMPANY OF UTAH, LLC (N1655)

PHONE NUMBER: 435 896-1943

CONTACT: Charles Irons

PROPOSED LOCATION: SESE 21 210S 010E

Permit Tech Review:

SURFACE: 0580 FSL 0078 FEL

Engineering Review:

BOTTOM: 1636 FSL 1649 FEL

Geology Review:

COUNTY: SEVIER

LATITUDE: 38.96208

LONGITUDE: -111.79362

UTM SURF EASTINGS: 431240.00

NORTHINGS: 4312660.00

FIELD NAME: WILDCAT

LEASE TYPE: 1 - Federal

LEASE NUMBER: UTU-80587

PROPOSED PRODUCING FORMATION(S): NAVAJO

SURFACE OWNER: 1 - Federal

COALBED METHANE: NO

RECEIVED AND/OR REVIEWED:

- PLAT
- Bond: FEDERAL - WYB000616
- Potash
- Oil Shale 190-5
- Oil Shale 190-3
- Oil Shale 190-13
- Water Permit: Salina City
- RDCC Review:
- Fee Surface Agreement
- Intent to Commingle

Commingling Approved

LOCATION AND SITING:

- R649-2-3.
- Unit: WOLVERINE
- R649-3-2. General
- R649-3-3. Exception
- Drilling Unit
- Board Cause No: R649-3-11
- Effective Date:
- Siting:
- R649-3-11. Directional Drill

Comments: Presite Completed
APD IS IN UPOD:

Stipulations: 1 - Exception Location - dmason
4 - Federal Approval - dmason
15 - Directional - dmason
23 - Spacing - dmason



GARY R. HERBERT
Governor

GREGORY S. BELL
Lieutenant Governor

State of Utah

DEPARTMENT OF NATURAL RESOURCES

MICHAEL R. STYLER
Executive Director

Division of Oil, Gas and Mining

JOHN R. BAZA
Division Director

Permit To Drill

Well Name: Twist Canyon Federal 21-2
API Well Number: 43041500070000
Lease Number: UTU-80587
Surface Owner: FEDERAL
Approval Date: 6/7/2011

Issued to:

WOLVERINE GAS & OIL COMPANY OF UTAH, LLC, 1140 N. Centennial Park Dr., Richfield, UT 84701

Authority:

Pursuant to Utah Code Ann. §40-6-1 et seq., and Utah Administrative Code R649-3-1 et seq., the Utah Division of Oil, Gas and Mining issues conditions of approval, and permit to drill the listed well. This permit is issued in accordance with the requirements of R649-3-11. The expected producing formation or pool is the NAVAJO Formation(s), completion into any other zones will require filing a Sundry Notice (Form 9). Completion and commingling of more than one pool will require approval in accordance with R649-3-22.

Duration:

This approval shall expire one year from the above date unless substantial and continuous operation is underway, or a request for extension is made prior to the expiration date

Exception Location:

Appropriate information has been submitted to DOGM and administrative approval of the requested exception location is hereby granted.

General:

Compliance with the requirements of Utah Admin. R. 649-1 et seq., the Oil and Gas Conservation General Rules, and the applicable terms and provisions of the approved Application for permit to drill.

Conditions of Approval:

State approval of this well does not supercede the required federal approval, which must be obtained prior to drilling.

In accordance with Utah Admin. R.649-3-11, Directional Drilling, the operator shall submit a complete angular deviation and directional survey report to the Division within 30 days following completion of the well.

This proposed well is located in an area for which drilling units (well spacing patterns) have not been established through an order of the Board of Oil, Gas and Mining (the "Board"). In order to avoid the possibility of waste or injury to correlative rights, the operator is requested, once the well has been drilled, completed, and has produced, to analyze geological and engineering data generated therefrom, as well as any similar data from surrounding areas if available. As soon as is practicable after completion of its analysis, and if the analysis suggests an area larger than the quarter-quarter

section upon which the well is located is being drained, the operator is requested to seek an appropriate order from the Board establishing drilling and spacing units in conformance with such analysis by filing a Request for Agency Action with the Board.

Notification Requirements:

The operator is required to notify the Division of Oil, Gas and Mining of the following actions during drilling of this well:

- Within 24 hours following the spudding of the well – contact Carol Daniels at 801-538-5284 (please leave a voicemail message if not available)
OR
submit an electronic sundry notice (pre-registration required) via the Utah Oil & Gas website at <http://oilgas.ogm.utah.gov>

Reporting Requirements:

All reports, forms and submittals as required by the Utah Oil and Gas Conservation General Rules will be promptly filed with the Division of Oil, Gas and Mining, including but not limited to:

- Entity Action Form (Form 6) – due within 5 days of spudding the well
- Monthly Status Report (Form 9) – due by 5th day of the following calendar month
- Requests to Change Plans (Form 9) – due prior to implementation
- Written Notice of Emergency Changes (Form 9) – due within 5 days
- Notice of Operations Suspension or Resumption (Form 9) – due prior to implementation
- Report of Water Encountered (Form 7) – due within 30 days after completion
- Well Completion Report (Form 8) – due within 30 days after completion or plugging

Approved By:



For John Rogers
Associate Director, Oil & Gas

43-0411-50007



United States Department of the Interior



BUREAU OF LAND MANAGEMENT

Utah State Office
P.O. Box 45155
Salt Lake City, UT 84145-0155
<http://www.blm.gov/ut/st/en.html>

IN REPLY REFER TO:
3160
UTU80800X
(UT922100)

JUN 26 2012

RECEIVED

JUN 28 2012

DIV. OF OIL, GAS & MINING

*Twist Cyn Fed 21-2
21S 1E 21*

Mr. Richard Moritz
One Riverfront Plaza
55 Campau, N.W.
Grand Rapids, MI 49503-2616

Re: Automatic Contraction
Wolverine Unit
Sanpete & Sevier Counties, Utah

Dear Mr. Moritz:

Your letter of June 20, 2012, describes the lands automatically eliminated effective March 16, 2012, from the Wolverine Unit Area, Sanpete & Sevier Counties, Utah, pursuant to Section 2(e) of the unit agreement and requests our concurrence. The lands you have described contain 68,062.645 acres, more or less, and contain all legal subdivisions, no parts of which are in the 7th Revision of the Navajo Participating Area "A" and the Initial Navajo 1 Formation - Carbon Sequestration a/k/a Providence Participating Area. As a result of the automatic elimination, the unit is reduced to 2,080.92 acres.

The following Federal Leases are entirely eliminated from the unit area.

UTU 73155	UTU 74851	UTU 78183	UTU 82687
UTU 73157	UTU 74852	UTU 80587	UTU 82690
UTU 73158	UTU 74853	UTU 80906	UTU 80951
UTU 73160	UTU 74854	UTU 80908	
UTU 73529	UTU 76453	UTU 80909	
UTU 73530	UTU 76454	UTU 80910	
UTU 74370	UTU 76455	UTU 80911	
UTU 74850	UTU 76456	UTU 80955	

The following Federal Leases are partially eliminated from the unit area.

UTU 73156	UTU 73528	UTU 80907
-----------	-----------	-----------



GARY R. HERBERT
Governor

GREG BELL
Lieutenant Governor

State of Utah

DEPARTMENT OF NATURAL RESOURCES

MICHAEL R. STYLER
Executive Director

Division of Oil, Gas and Mining August 31, 2012

JOHN R. BAZA
Division Director

Wolverine Operating Company of Utah, LLC
1140 N. Centennial Park Dr.
Richfield UT 84701

Re: APD Rescinded – Twist Cyn Fed 21-2, Sec. 21 T. 21S, R. 1E
Sevier County, Utah API No. 43-041-50007

Ladies and Gentlemen:

The Application for Permit to Drill (APD) for the subject well was approved by the Division of Oil, Gas and Mining (Division) on June 7, 2011. No drilling activity at this location has been reported to the division. Therefore, approval to drill the well is hereby rescinded, effective August 31, 2012.

A new APD must be filed with this office for approval prior to the commencement of any future work on the subject location.

If any previously unreported operations have been performed on this well location, it is imperative that you notify the Division immediately.

Sincerely,

Diana Mason
Environmental Scientist

cc: Well File
Bureau of Land Management, Richfield Office



United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Richfield Field Office

150 East 900 North

Richfield, UT 84701

(435) 896-1500 Fax: (435) 896-1550



IN REPLY REFER TO:

3160

Wolverine Oil and Gas Company of Utah, LLC
55 Campau NW
Grand Rapids, MI 49503-2616

RECEIVED
JULY 15 2013

DIV. OF OIL, GAS & MINING

Re: Notice of Expiration
Twist Canyon Federal 21-2
API # 4304150007
Sec. 21, T21S, R1E SLM
Sevier County, Utah
Lease No. UTU-80587

The Application for Permit to Drill (APD) the above-referenced well was approved on July 14, 2011. No extension of the original APD was requested. According to our records, no known activity has transpired at the approved location. In view of the foregoing, this office is notifying you that the approval of the referenced application has expired. If you intend to drill at this location in the future, a new Application for Permit to Drill must be submitted.

If you have any questions regarding this matter, please contact me at (435) 896-1532.

Sincerely,

Stan L. Andersen
Supervisory NRS

cc: UDOGM

bcc: Price Field Office
Well File
Reading File