State of New Mexico
Energy, Minerals and Natural Resources Department

Susana Martinez
Governor

Tony Delfin
Acting Cabinet Secretary

David R. Catanach, Division Director
Oil Conservation Division

New Mexico Oil Conservation Division approval and conditions listed below are made in accordance with OCD Rule 19.15.7.11 and are in addition to the actions approved by BLM on the following 3160-4 or 3160-5 form.

Operator Signature Date: 7/14/2016
Well information:

frmWellFilterSub													
API WELL #	Well Name	Well #	Operator Name	Type	Stat	County	Surf_Owner	UL	Sec	Twp	N/S	Rng	W/E
30-045-34154-00-00	UTE INDIANS A	063	XTO ENERGY, INC	G	A	San Juan	U	E	25	32	N	14	W

Application Type:

☐ P&A ☐ Drilling/Casing Change ☐ Location Change

☐ Recomplete/DHC (For hydraulic fracturing operations review EPA Underground injection control Guidance #84)

X Other: Deepen well to test formations.

Conditions of Approval:
Must submit mud log for review
Must supply C-102 for the Leadville (WC32N14W25;Leadville (G) – pool number 98208) 160 acre spacing
Must supply C-102 for the Devonian (WC32N14W25;Devonain (G) – pool number 98209) 320 acre spacing
Must submit a plan for the deepened portion of the well following testing (plugging or casing)

If zones are productive file C-104 and completion reports before returning to production.

NMOCD Approved by Signature

8/11/16
Date

1220 South St. Francis Drive • Santa Fe, New Mexico 87505
Phone (505) 476-3460 • Fax (505) 476-3462 • www.emnrd.state.nm.us/ocd

Form 3160-5
(August 2007)

RECEIVED
ELECTRONIC REPORT
JUL 14 2016
BUREAU OF LAND MANAGEMENT

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
OMB NO. 1004-0135
Expires: July 31, 2010

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to re-enter an abandoned well. Use form 3160-3 (APD) for such proposals.

SUBMIT IN TRIPLICATE - Other instructions on reverse side.

5. Lease Serial No.
142060462

6. If Indian, Allottee or Tribe Name
UTE MOUNTAIN UTE

7. If Unit or CA/Agreement, Name and/or No.
NMNM125937

1. Type of Well
☐ Oil Well ☒ Gas Well ☐ Other

8. Well Name and No.
UTE INDIANS A 63

2. Name of Operator
XTO ENERGY

Contact: CHERYLENE WESTON
E-Mail: cherylene_weston@xtoenergy.com

9. API Well No.
30-045-34154-00-S1

3a. Address
382 CR 3100
AZTEC, NM 87410

3b. Phone No. (include area code)
Ph: 505-333-3190

10. Field and Pool, or Exploratory
UTE DOME

4. Location of Well *(Footage, Sec., T., R., M., or Survey Description)*

Sec 25 T32N R14W SWNW Tract E 1955FNL 730FWL
36.960820 N Lat, 108.266820 W Lon

11. County or Parish, and State
SAN JUAN COUNTY, NM

12. CHECK APPROPRIATE BOX(ES) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION			
☒ Notice of Intent	☐ Acidize	☒ Deepen	☐ Production (Start/Resume)	☐ Water Shut-Off
☐ Subsequent Report	☐ Alter Casing	☐ Fracture Treat	☐ Reclamation	☐ Well Integrity
☐ Final Abandonment Notice	☐ Casing Repair	☐ New Construction	☐ Recomplete	☐ Other
	☐ Change Plans	☐ Plug and Abandon	☐ Temporarily Abandon	
	☐ Convert to Injection	☐ Plug Back	☐ Water Disposal	

13. Describe Proposed or Completed Operation (clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recomplete horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be performed or provide the Bond No. on file with BLM/BIA. Required subsequent reports shall be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompletion in a new interval, a Form 3160-4 shall be filed once testing has been completed. Final Abandonment Notices shall be filed only after all requirements, including reclamation, have been completed, and the operator has determined that the site is ready for final inspection.)

XTO Energy Inc. submitted a deepening sundry on 6/29/16 for this well. The sundry was returned by BLM with a request for additional information on 6/30/16.

The requested information is provided:

1) Drilling fluids and cuttings management (page 4 of procedure)

2) Pad Layout - XTO will stay within the originally permitted well pad. The pad corners and mid lines will be re-flagged prior to the work being commenced. (page 5 of procedure)

3) H2S Contingency Plan is attached

Notify NMOCD 24 hrs prior to beginning operations

SEE ATTACHED CONDITIONS OF APPROVAL

OIL CONS. DIV DIST. 3
AUG 04 2016

14. I hereby certify that the foregoing is true and correct.

Electronic Submission #344730 verified by the BLM Well Information System
For XTO ENERGY, sent to the Durango
Committed to AFMSS for processing by TRACEY AYZE on 07/14/2016 (16TA0936SE)

Name *(Printed/Typed)* CHERYLENE WESTON — Title SR. PERMITTING ANALYST

Signature (Electronic Submission) — Date 07/14/2016

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved By _____ Title MSC Date 8/1/2016

Conditions of approval, if any, are attached. Approval of this notice does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.

Office TRES RIOS FIELD OFFICE

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

**** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED ****

NMOCD

Additional data for EC transaction #344730 that would not fit on the form

32. Additional remarks, continued

4) XTO will commence the work upon completion of 2 other deepening projects in the vicinity (approx. November 1st). The duration of the rig work will be 30 days.

XTO Energy **3160**
Tribal Lease: 142060462
Well: Ute A #63
Location: 1955' FNL & 730' FWL
Sec. 25, T. 32 N., R. 14 W.
San Juan County, New Mexico

Conditions of Approval – Paradox Squeeze Procedure:

1. Notify this office at least **72 hours** prior to commencing squeezing operations.

3. Materials used will be accurately measured.

8. A blowout preventer and related equipment shall be installed and tested prior to working in a wellbore with any exposed zones (a) that are overpressured, (b) where pressures are unknown, or (c) known to contain H_2S.

9. Within 30 days after squeezing of the well, file 4 copies of a Subsequent Report Sundry Notice to this office. This report should include the following information:

a. Date(s) of squeezing operations.
b. Procedure used to squeeze the well.
c. Depth of plugs.
d. Type and volume of squeeze.
e. Results of the MIT after squeezing.

10. If the well fails the MIT, notify this office immediately. Dan Rabinowitz, 970-385-1363.

XTO Energy **3160**
Tribal Lease: 142060462
Well: Ute A # 63
Surface Location: 1955' FNL & 730' FWL
Sec. 25, T. 32 N., R. 14 W.
San Juan County, New Mexico

Conditions of Approval - Deepening:

1. Notify this office at least **3 days** prior to drilling out the plugs

For the above procedures, Operators must talk to BLM personnel directly. Do not leave messages on answering machines. Contact Dan Rabinowitz, BLM Petroleum Engineer: office: 970-385-1363, or Rod Brashear: office: 970-385-1347, and cell: 970-799-1244.

2. All BOP tests will be performed with a test plug in place. BOP will be tested to full stack working pressure and annular preventer to 50% maximum stack working pressure. All accumulators will be function tested as per Onshore Order #2. All 2M or greater systems require **adjustable** chokes as per Onshore Order #2.

3. If a BLM Inspector is not present during the initial BOP test, please provide chart record.

4. Submit copies of all logs to this office both paper and in Log ASCII Standard (LAS) format.

5. If any operations are to start over the weekend, notify this office by noon Friday. If any problems arise after hours or on weekends, call BLM personnel using the home phone or cell phone numbers listed on the following 'INFORMATIONAL NOTICE - APD's'. Do not leave messages on answering machines.

6. The tops of all major identifiable geologic units (formations) from the casing shoe to TD will be logged and recorded.

7. Stabilized bottomhole pressure measurements and flowrates must be collected and submitted to the BLM.

8. The operator is to follow Onshore Order #6, Hydrogen Sulfide Operations.

Continued on Page 2.

9. Please provide the following information if possible. All tests and operations on any well on subject lands shall be conducted at Operator's sole discretion.

All Wire Line Logs - Fields & Final Print (Electrical, Radioactive, Sonic, Velocity, Cement Bond, Temperature, etc with digitized and log analysis).

Drill Stem Tests - Field and Final Reports.

Core Analysis - Field and Final Reports.

Mud Log - Final Report.

Structure and Isopach Maps.

Location (Surveyors) Plat.

Application to Drill (Drilling Permit).

Daily Drilling Reports, Daily Work Over Reports and Final Drilling Report Summary.

Directional Survey.

Geological Summary Report.

Completion Report.

Production Tests (All Production Tests during Completion, AOF, Potential, GOR, etc).

30 Day Well Production Test Record

Bottom Hole Pressure Surveys including build up tests.

Shut in Surface Pressure Surveys.

Gas, Oil and Water Analyses.

State and/or BLM Completion Reports.

State and/or BLM and/or MMS Monthly Production and OGOR Reports.

Additional Governmental Permits and Reports.

Drilling Contracts.

Operating Agreements.

Oil and Gas Sales Contracts.

Plug and Abandon Reports.

Monthly, Gas and/or Plant Products Purchasing Statements.

Well Bore Profiles.

Division Orders/Title Opinions.

AFEs.

Final Drill and Completion Costs.

Other wellfile information as requested by the Tribal Department of Energy.

Department Of Interior- Bureau of Land Management -Tres Rios Field Office –SUPO Review

Well Name/Number: N/A **Operator:** XTO **Surface/Mineral Ownership:** UMU/UMU

Leases: **Location: (STR, QQ)**

API: **PAD(), ACCESS (), PIPELINE ()**

NEPA DOCUMENT TYPE/I.D.:

REQUIREMENTS AT ALL SITES:

NOTIFICATION:

- The BLM Minerals Division Physical Scientist/Natural Resources: (970) 385-1242 shall be notified 5 days prior to the onset of pad/road construction.
- The BLM Minerals Division Physical Scientist/Natural Resources Specialist: (970) 385-1242 shall be notified at least 48 hours prior to commencement of interim and/or final surface reclamation activities.
- The BLM Minerals Division Physical Scientist/Natural Resources Specialist: (970) 385-1242 shall be contacted prior to surface reclamation procedures for specific requirements and seed mixtures.
- NO SURFACE DISTURBANCE shall begin until the Edge of Disturbance Corners and Midline markers of the permitted area have been re-established and are clearly marked.

GENERAL REQUIREMENTS:

- Any cement wash or other fluids should not be mixed with dry cuttings, but placed in a self-contained tank, surrounded by a lined containment dike of 110% of contained volumes for storage and removed for disposal at an approved location off-reservation.
- Polymer additives, Gel fluids, Saline Frac fluids or other non-fresh water based fluids stored on site to facilitate horizontal drilling/frac operations/any completion should be surrounded by 110-125% containment dikes covered by 20 mil minimum thickness impermeable barrier surrounding and beneath storage tanks to protect against potential spills.

- **Any free liquid accumulating should be vacuumed off to insure a minimum of 2ft. of freeboard on all tanks and pits consistently and removed to an approved facility.**
- **All stormwater mitigations will be in accordance with BLM gold book BMP standards and practices.**

AT THIS PROJECT SPECIFICALLY:

1. Operator shall review the NTL-3A and report gas vented or flared to atmosphere that exceed the limits set forth within the notice, to the Tres Rios Field Office, NRS Ryan Joyner at 970. 385.1242.

2. Operator shall notify the Tres Rios Field Office NRS Ryan Joyner at 970.385.1242 if the flare contingency pits are used.

3. Operator will report all spills and leakages of fluids to the Tres Rios Field Office NRS Ryan Joyner at 970.385.1242.

4. Operator shall keep all chemicals (dry and wet) in sealed containers, impervious to weather, underlain with plastic sheeting to prevent exposure to the environment.

_____ _____

Ryan N.Joyner
Physical Scientist/ Natural Resource Specialist
BLM-Minerals Division

Date: 7/28/2016

Ute Indians A #63
Paradox Squeeze Procedure
San Juan County, New Mexico/ API 30-045-34154
Sec 25, T32N, R14W

Formation:	Paradox
Production Csg:	5.5",17#, L-80 Casing @ 9,497'
PBTD:	9,454'
Perforations:	8,438' – 8,510'; 8,613' – 8,678'; 8,770' – 8,858'; 8,970' – 9,045'; 9,085' – 9,203'; 9,220' – 9,267'

WARNING: The Paradox formation produces H_2S and CO_2. Ensure that all necessary monitoring equipment and personnel are on location for all operations. All personnel on location must have H_2S safety training, must be clean shaven, and must be capable of using an SCBA. All flow equipment must be rated for sour gas.

Comply with all Tribal, NMOCD, BLM, and XTO safety regulations.

1. MIRU PU.
2. ND WH. NU 5K, H_2S-trimmed BOP and H_2S-trimmed kill spool.
3. TOH & LD BHA.
4. TIH 5-1/2" 10K CICR, 1 jt 2-3/8" tbg, SN & 2-3/8" tbg. Set CICR @ 9,210'. Sting out fr/CICR.
5. MIRU cmt equip. Sting into CICR. EIR into 9,220' – 9,267' perforations.
6. Pump Plug #1 w/50 sxs Type G neat cmt (mixed @ 15.8 ppg & 1.15 cu ft/sx yield, 40.25 cu ft). Flsh dwn tbg w/fresh water. Disp 1 BBL short. Sting out fr/CICR. PUH & displace. TOH.
7. TIH 5-1/2" 10K CICR, 1 jt 2-3/8" tbg, SN & 2-3/8" tbg. Set CICR @ 9,070'. Sting out fr/CICR.
8. Sting into CICR. EIR into 9,085' – 9,203' perforations.
9. Pump Plug #2 w/50 sxs Type G neat cmt (mixed @ 15.8 ppg & 1.15 cu ft/sx yield, 40.25 cu ft). Flsh dwn tbg w/fresh water. Disp 1 BBL short. Sting out fr/CICR. PUH & displace. TOH.
10. TIH 5-1/2" 10K CICR, 1 jt 2-3/8" tbg, SN & 2-3/8" tbg. Set CICR @ 8,965'. Sting out fr/CICR.
11. Sting into CICR. EIR into 8,970' – 9,045' perforations.
12. Pump Plug #3 w/50 sxs Type G neat cmt (mixed @ 15.8 ppg & 1.15 cu ft/sx yield, 40.25 cu ft). Flsh dwn tbg w/fresh water. Disp 1 BBL short. Sting out fr/CICR. PUH & displace. TOH.
13. TIH 5-1/2" 10K CICR, 1 jt 2-3/8" tbg, SN & 2-3/8" tbg. Set CICR @ 8,750'. Sting out fr/CICR.

14. Sting into CICR. EIR into 8,770' – 8,858' perforations.

15. Pump Plug #4 w/50 sxs Type G neat cmt (mixed @ 15.8 ppg & 1.15 cu ft/sx yield, 40.25 cu ft). Flsh dwn tbg w/fresh water. Disp 1 BBL short. Sting out fr/CICR. PUH & displace. TOH.

16. TIH 5-1/2" 10K CICR, 1 jt 2-3/8" tbg, SN & 2-3/8" tbg. Set CICR @ 8,580'. Sting out fr/CICR.

17. Sting into CICR. EIR into 8,613' – 8,678' perforations.

18. Pump Plug #5 w/50 sxs Type G neat cmt (mixed @ 15.8 ppg & 1.15 cu ft/sx yield, 40.25 cu ft). Flsh dwn tbg w/fresh water. Disp 1 BBL short. Sting out fr/CICR. PUH & displace. TOH.

19. TIH 5-1/2" 10K CICR, 1 jt 2-3/8" tbg, SN & 2-3/8" tbg. Set CICR @ 8,410'. Sting out fr/CICR. Circ csg cln.

20. Sting into CICR. EIR into 8,438' – 8,510' perforations.

21. Pump Plug #6 w/50 sxs Type G neat cmt (mixed @ 15.8 ppg & 1.15 cu ft/sx yield, 40.25 cu ft). Flsh dwn tbg w/fresh water.

22. Sting out fr/CICR. Rev circ tbg cln w/fresh water. Circ cmt to pit. RDMO cmt equip.

23. TOH 2-3/8" tbg, SN, 1 jt 2-7/8" tbg & stinger. Ld csg w/fresh water. PT csg to 500 psig. SWI.

24. PU & TIH 4-3/4" bit, XO, 6 - 3-1/2" DCs, XO, 1 jt 2-3/8" tbg, SN & 2-3/8" tbg. Tag cmt. DO to PBTD.

25. TOH & LD BHA. Ld & PT csg @ 550 psi for 30" w/chart.

26. ND BOP. NU WH. RDMO PU. WO drilling operations.

DISTRICT I
1625 N. French Dr., Hobbs, N.M. 88240

DISTRICT II
1301 W. Grand Ave., Artesia, N.M. 88210

DISTRICT III
1000 Rio Brazos Rd., Aztec, N.M. 87410

DISTRICT IV
1220 South St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals & Natural Resources Department

OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-102
Revised June 10, 2003
Submit to Appropriate District Office
State Lease – 4 Copies
Fee Lease – 3 Copies

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

1 API Number	2 Pool Code	3 Pool Name
30-045-34154	86760	Ute Dome Paradox

4 Property Code	5 Property Name	6 Well Number
22645	UTE INDIANS A	63

7 OGRID No.	8 Operator Name	9 Elevation
167067 5380	XTO ENERGY INC.	6821

10 Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
E	25	32-N	14-W		1955	NORTH	730	WEST	SAN JUAN

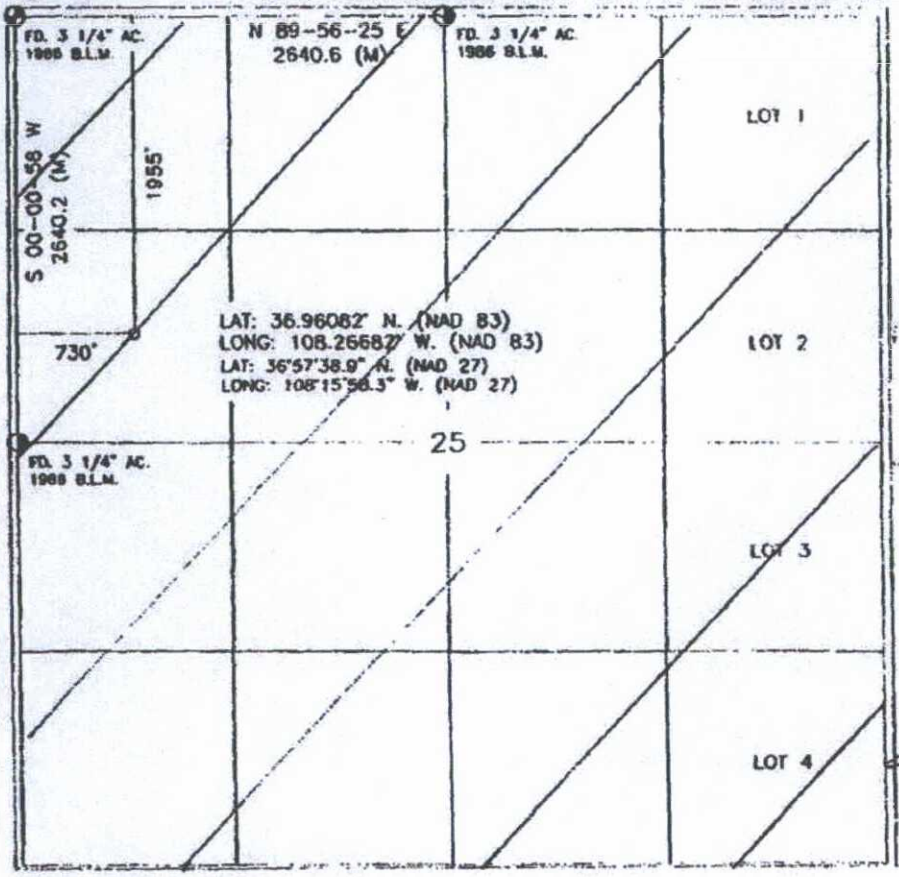
11 Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County

12 Dedicated Acres	13 Joint or Infill	14 Consolidation Code	15 Order No.
All 640			

NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION

16



17 OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief

Signature

K Small

Printed Name

Regulatory Compliance Tech

Title

5/9/06

Date

18 SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

Date of Survey: 2006

Signature and Seal of Professional Surveyor:

NEW MEXICO 14831 REGISTERED PROFESSIONAL SURVEYOR

Certificate Number

B

XTO ENERGY INC.
UTE A63
API: 30-045-34154-0000
APD Data
July 22, 2016

Surface Location: Sec 25, T32N, R14W **County:** San Juan **State:** New Mexico

Objective: Deepen well into the McCracken Formation

1. WELL INFORMATION

Ground level Elevation	6821'
KB Elevation	6833'
Current TD	9497'
Surface Casing	9-5/8" 36# J-55 casing set at 832'
Surface Casing Cement	280 sxs Premium lite & Type III, circulated 30 bbl to surface
Production Casing	5-1/2" 17# L-80, set at 9497'
Production Casing Cement	1332 sxs Premium lite & Type III
Current Open Perforations	8438'- 8510', 8613' -78', 8770' – 8858', 8970' – 9045', 9085' – 9203', 9220' -267' (Ismay, Desert Creek, Akah & Barker Creek)
TD	10266'

2. BACKGROUND INFORMATION

The Ute A63 well was drilled and completed in 2007. The well was landed in the lower section of the Paradox and completions targeted the Ismay, Desert Creek, Akah and Barker Creek intervals of the Paradox formation. Prior casing leaks were identified and squeezed (4304'). The plan is to deepen the existing wellbore approximately 750' into the McCracken formation; with the goal of testing the producticity of the newly drilled intervals.

3. PREPARATORY WORK

Prior to the drilling rig, a workover rig will be mobilized to pull tubing to assess casing integrity, retrieve junk and other deposits in the rat hole and squeeze existing perforations with cement. Afterwards, pick-up bit to drill cement in the wellbore and across the perforations, cleanout to the bottom of the rat-hole to insure hole is rid of impeding debris. Test the squeezed perforations to 11.2 ppg EMW prior to rigging down the workover rig.

4. WELLHEAD

Tubing Hanger: 7-1/16" X 2-3/8" EUE W/ 2-1/2" Type H BPVP
Adaptor : 7-1/16" 5K X 2-9/16" 5K with ½" NPT Test Port
Gate Valve: 2-1/16" 5K Model M, Handwheel Operated gate valve

5. ANTICIPATED OIL, GAS AND WATER ZONES

a.

Zone/Formation	Tops (ft,TVD)	Expected Fluid/Gas
Pinkerton Trail	9419	Possible Gas
Drill out from casing – currently set at 9,515'		
Molas	9579	
Leadville	9815	Possible Gas
Ouray	10002	Possible Gas
Elbert	10067	
McCracken	10116	Possible Gas / Oil
TD	10266	

b. No Appreciable Water Zones are anticipated
c. Appropriately weighted mud will be used to isolate gas, oil and water zones
d. No abnormally pressure zones or zones of lost circulation are anticipated

6. DRILLING PROCEDURE

a. MIRU drilling rig
b. Nipple up and test BOPE
c. P Pick up 4-3/4" PDC/Tri-cone OR ±5-1/4" OD Bi-Center bit, BHA and 2-7/8" DP and trip into the wellbore, drill-out float shoe.
d. Continue drilling activity and collect core samples at specified intervals. Drill to total depth of ±10,266'
e. Circulate bottoms-up to clean hole, make wiper trip as needed, trip out of hole for open hole logs. If necessary, spot cement across the McCracken zone after open hole logging
f. Rig up wireline unit, perform open hole log if hole conditions permit
g. Pick up retrievable bridge plug, RIH with setting tool, set plug inside the casing, above the 7" casing float collar
h. Pressure test plug to ensure isolation
i. Nipple Down drilling rig BOP, Nipple Up NACE wellhead, cap well with pressure gauge and side outlet valve
j. Rig Down, release and de-mobilize the drilling rig for completions activities

7. PRELIMINARY MUD PROGRAM

Interval	8530' – 9669'
Hole Size	4.75"
Mud Type	LSND
Weight (ppg)	10.6 -11.2
Viscosity (sec/qt)	35 - 45
Plastic Viscosity (cp)	6 -16
Yield Point (lbf/100_ft2)	6 – 10
Filtrate (cc/30 min)	<6
LGS (%)	<3
PH	8.5 - 9.5

Remarks: Use fibrous materials as needed to control seepage and loss circulation. Pump high viscosity sweeps as needed for hole cleaning.

8. SUPPLEMENTARY INFORMATION

A) Logging, DST and Coring Program

1. A mud log will be run throughout the deepened intervals. Mudlog to include: total gas chromatograph and sample cuttings - 10' sample intervals
2. Open hole logging (Resistivity, Porosity, GR/SP) will be conducted on this well
3. No DST's are planned at this time.

B) H2S

H2S may be present in the Hermosa group of Paradox formation, this down to ~100ft below the 5 ½" casing shoe. All H2S related safety equipment and trailer will be installed, tested and operational at the onset of drilling activity.

C) Maximum Anticipated Formation Pressure and Temp

1. Formation pressure gradient is expected (up to 0.52 psi/ft or 10 ppg) in the lower section of the Paradox formation (Alkali Gulch and Pinkerton Trail)
2. Formation pressure gradient is expected (up to 0.58 psi/ft or 11.2 ppg) in the Leadville and Ouray formation
3. The maximum anticipated BHST is 250 degrees F at TD

D) BOP Equipment Requirements

See attached diagram detailing BOPE specifications.

1. Inside BOP and TIW valves will be available to use on all sizes and threads of DP used on well.
2. BOP accumulator will have enough capacity to close HCR valve, close all rams plus annular preventer & retain minimum of 200 psi above pre-charge on the closing manifold without the use of closing pumps. The fluid reservoir capacity shall be at least double the usable fluid volume of the accumulator system capacity & the fluid level shall be maintained at

manufacturer's recommendation. There will be 2 additional sources of power for the closing pumps (electric and air). Sufficient N2 bottles will be available and will be recharged when pressure falls below manufacturer's minimum

3. BOP ram preventers will be tested to 5,000 psi for 30 minutes using a test plug when initially installed and at 30 day intervals. Function test rams and hydraulically operated remote choke line valve daily (preferably at every crew change).
4. Remote valve for BOP rams, HCR & choke shall be placed in a location that is readily available to the Driller. The remote BOP valve shall be capable of closing and opening the rams.
5. Hand wheels on BOP shall be equipped with locking devices. A locking device shall be placed on annular preventer line valve & must be locked in the open position. This lock shall only be removed when the closing unit is inoperative.

E) Drilling Fluid Related Equipment

1. Pumps shall be equipped with stroke counters with displays located in dog house. Slow pump speed shall be recorded on drilling report daily after mudding up.
2. A Pit Volume Totalizer will be installed and the readout will be displayed in the dog house.
3. Gas detecting equipment (for a chromatograph) will be installed at shaker. Readouts will be available in dog house and in geologist trailer.
4. In the event gas flow becomes an issue. A flare pit shall be constructed not less than 100' from wellhead & 50' from cuttings handling area. Lines to the flare pit will be straight runs (anchored) with targeted turns as needed. Flare pit will be located downwind as much as possible. An electronic ignitor will be used along with a propane line to provide for a continuous flare pilot.

A choke with a two pin recorder will be installed at the manifold to record amount of flared vented gas

9. DRILLING FLUID AND CUTTINGS MANAGEMENT

A closed loop system would be implemented for drilling fluid and cuttings management. This would include several 400 bbl pit tanks, catch tank for the solids, centrifuge and other solids control kit (generator, circuit control, pump, etc). Layout of the closed loop system is illustrated on the next page.

A) Drilling fluid volume estimate: 200 – 400 bbl, drill cuttings estimate 60 – 150 yd^3
B) The inside of the catch tank will be lined to prevent effluent fluid leaks from the solids
C) Drill cuttings will be transported and disposed at approved landfills. This approved disposal locations includes Industrial Ecostystem Inc. (Permit No. NM01-0010B) and Envirotech (Permit No. NM01-0011).
D) Once drilling is completed, the fluid will be re-used for deepening subsequent wells. Afterwards, drilling mud will be transported to the approved disposal locations, Envirotech and Industrial Ecostystem Inc. (IEI)

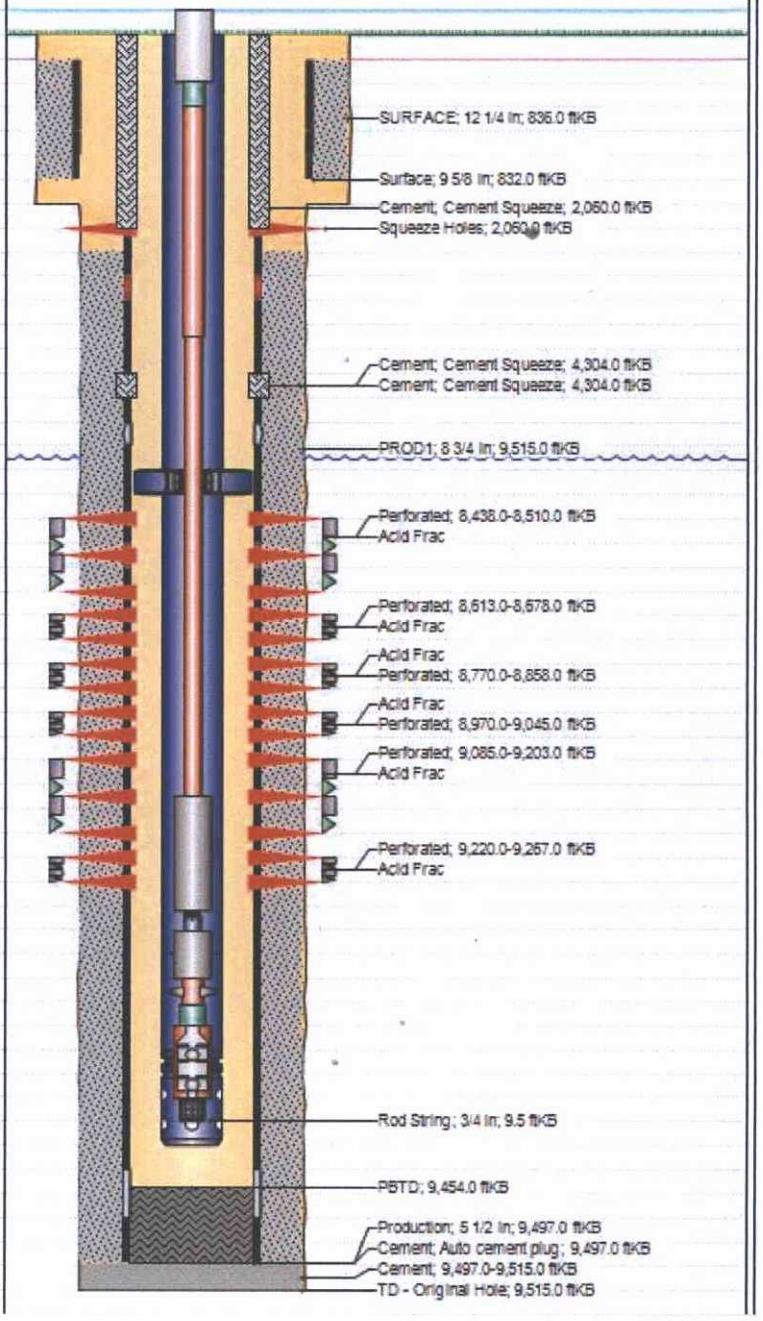
CURRENT WELL SCHEMATIC

ENERGY

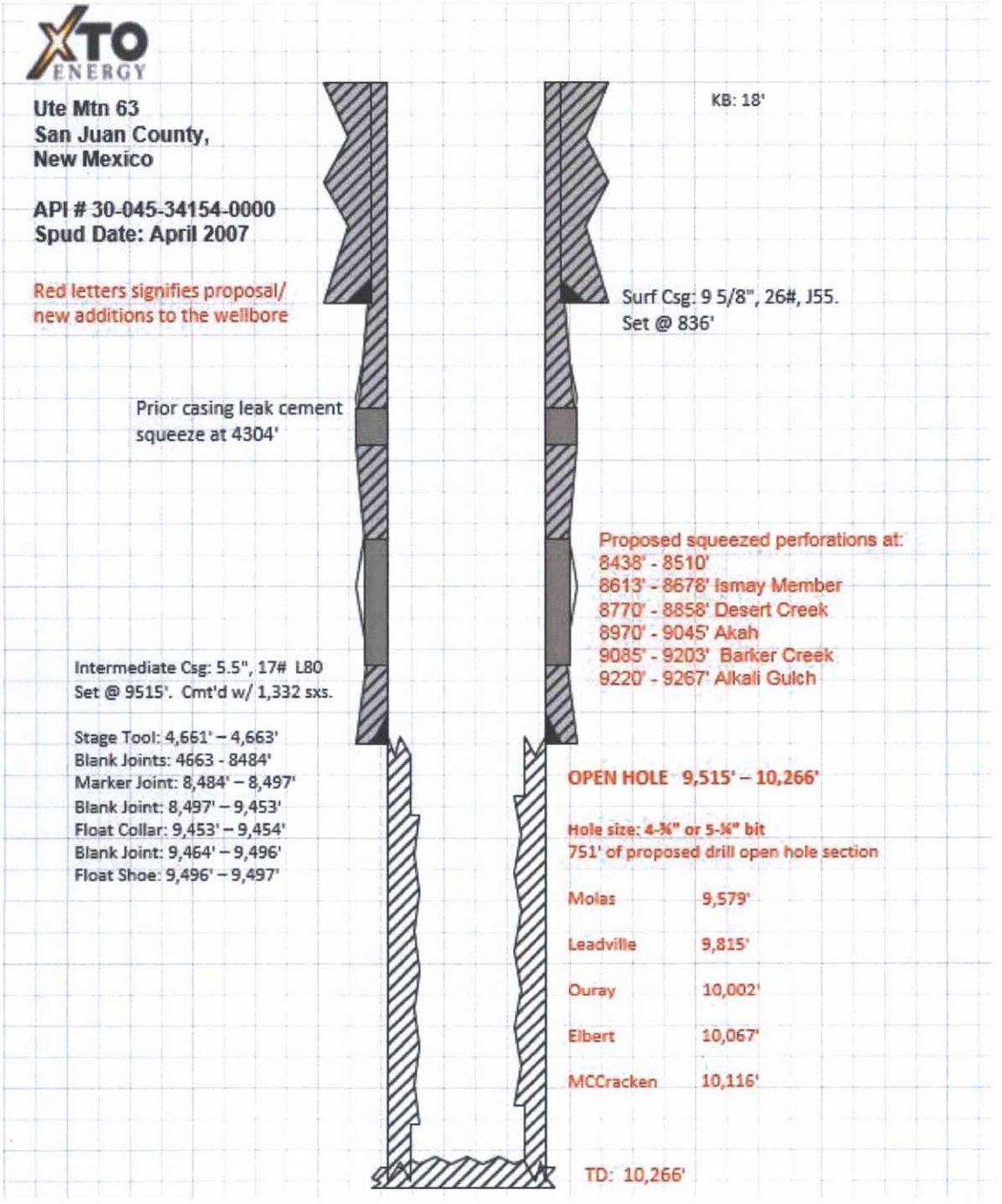
Well Name: Ute Indians A 63

API/UWI	XTO Accounting ID	Permit Number	State/Province	County
30045341540000	68358		New Mexico	San Juan
Location	**Spud Date**	**Original KB Elevation (ft)**	**Gr Elev (ft)**	**KB-Ground Distance (ft)**
T32N-R14W-S25	4/14/2007 00:30	6,839.00	6,821.00	18.00

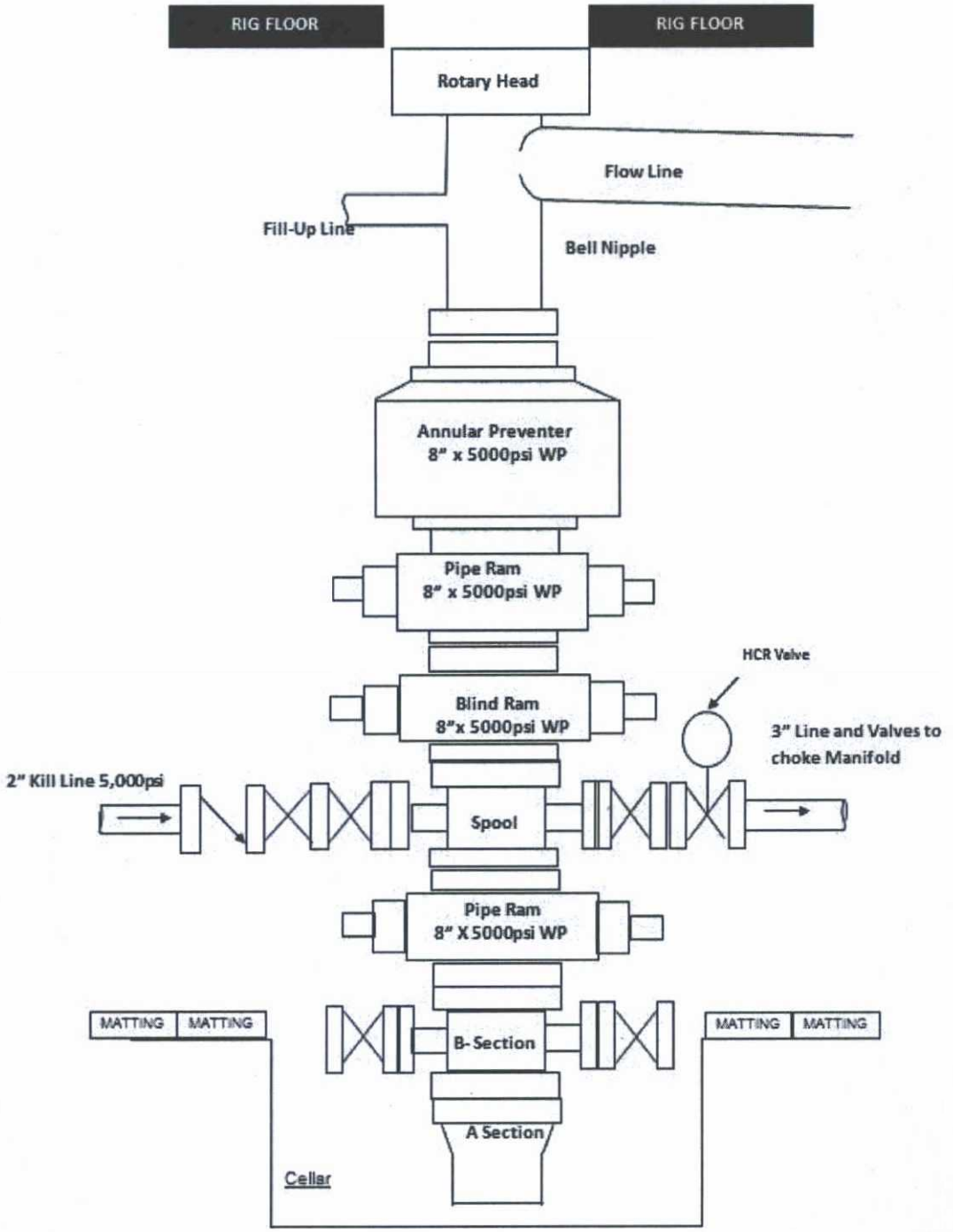
MD (ftKB)	TVD (ftKB)	Incl (°)	Vertical schematic (actual)
9.5			
19.0			
37.4			
831.0			
836.0			
2,106.0			
3,125.7			
3,562.7			
4,304.1			
4,663.4			
8,362.9			
8,483.6			
8,509.8			
8,678.1			
8,857.9			
9,044.9			
9,187.3			
9,203.1			
9,267.1			
9,313.0			
9,338.3			
9,342.8			
9,348.4			
9,361.9			
9,453.7			
9,454.4			
9,497.0			



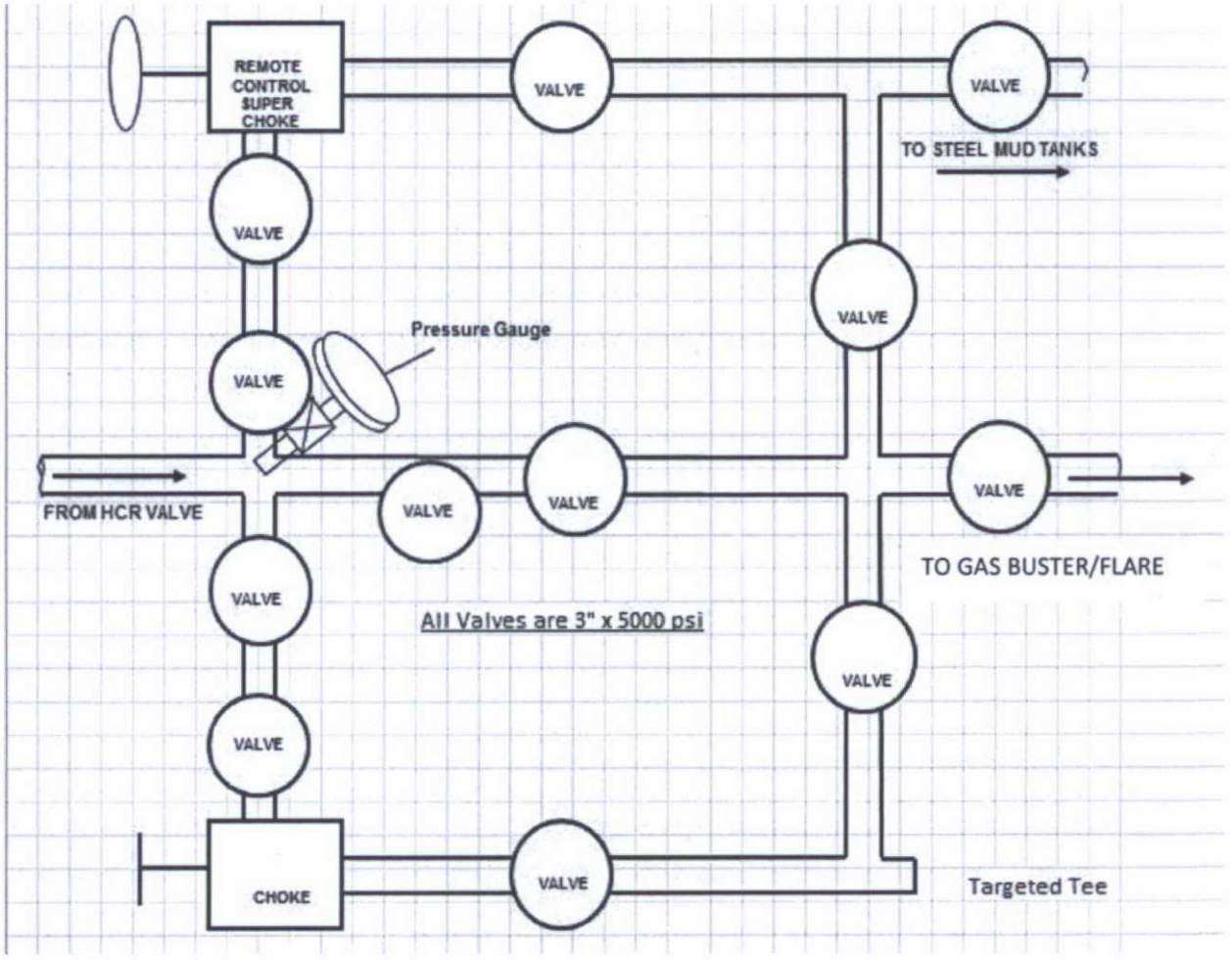
PROPOSED DRILLING SCHEMATIC



BOP DIAGRAM


RIG FLOOR
RIG FLOOR
Rotary Head
Flow Line
Fill-Up Line
Bell Nipple
Annular Preventer
8" x 5000psi WP
Pipe Ram
8" x 5000psi WP
HCR Valve
Blind Ram
8"x 5000psi WP
3" Line and Valves to
choke Manifold
2" Kill Line 5,000psi
Spool
Pipe Ram
8" X 5000psi WP
MATTING
MATTING
B- Section
MATTING
MATTING
A Section
Cellar

CHOKE MANIFOLD DIAGRAM



H_2S Contingency Plan

(Emergency Response and Public Protection Plan)

XTO Energy Inc.

Western Division

San Juan Basin

For Ute A63 Deepening Operation

Well Name:	**Ute A63 San Juan County, New Mexico**
Location:	**Sec 25 T32N R14W 1955'FNL 730'FWL**
	Latitude: 36.960820 N Longitude: 108.266820 W
API:	**30-045-34154**
Formation:	**Various Formation**
	Paradox, Molas, Leadville, Ouray, Elebert, McCracken
Geological Tops:	**This will be determined by data obtained during operations**

This document is designed to protect operating personnel, contractors and the public from exposure to Hydrogen Sulfide (H_2S) and Sulfur Dioxide (SO_2). This contingency plan conforms to all applicable local, state and federal laws and regulations regarding notifications, precautions, evacuations and other requirements.

Drilling Operations San Juan New Mexico Contact Personnel

XTO Energy Drilling Manager
Ross Lubbers
Office: (405) 659-8563

XTO Energy Drilling Superintendent
Bobby Jackson
Office: (303) 397-3720
Cell: (505) 486-4706

XTO Energy Drilling Engineers
Bola Adeyeye and Alec Bridge
Bola Cell: (720) 539-1660, Alec Cell: (720) 244-9083

XTO Energy Drilling Health & Safety Coordinator
Jerry Lacy
Office (505) 333-3100
Cell (505) 320-6543

XTO Energy Drilling OIMS Coordinator
Mark Neitzel
Office: (505) 333-3100
(Cell) 505/ 486-2609

XTO Energy OIMS/Contractor Management - EHS Coor.
Logan Hixon
Cell: (505) 386-8018 Off. (505) 333-3100

XTO Energy Senior EHS Manager/EHS District Supervisor
Martin Nee/James McDaniel
Martin Office: (303) 397-3600
Martin (Cell) 505/793-6694
James Office: (505) 333-3100
James Cell: (505) 787-0519

CONTRACT H2S / SITE SAFETY COMPANIES
McGuire Industries
Leroy Winters
Office: (505) 634-8629 Office: (505) 325- 6232

Drilling Rig
D&J Drilling Rig #3

CONTENTS

1.0 PURPOSE

This Emergency Response, and Public Protection Plan (Plan) is a specific plan that applies to the San Juan Basin Operations of New Mexico, operated by XTO Energy Inc. (XTO). This document is designed to for the safety and welfare of XTO and contract personnel, the community, the environment and property under H2S situations.
This plan establishes evacuation procedures, assigns response duties to specific individuals, provides for notification of outside agencies and provides details of actions to alert and protect the public. This plan will be activated immediately upon the detection of the release of a potentially hazardous volume of hydrogen sulfide (H2S).

2.00 GENERAL INFORMATION ON AND PHYSIOLOGICAL RESPONSES TO HYDROGEN SULFIDE (H2S) AND SULFUR DIOXIDE (SO2)

2.10 HYDROGEN SULFIDE (H2S)

Hydrogen sulfide is a flammable, highly toxic, colorless gas that is heavier than air with the odor of rotten eggs. It can be detected by smell at the concentration of only 0.002 parts per million (ppm). Above concentrations of 100 ppm, it will deaden the sense of smell in a few minutes, and at a concentration of 600 + ppm, a single breath can be fatal. If ignited, it burns with a blue flame. In still air, it tends to accumulate in low places in dangerous concentrations. However, if it is warmer than the surrounding air, it may tend to rise. The upper flammability in air is 4% (40,000 ppm).

Breathing low concentrations of H2S can cause headaches. Higher concentrations (0.01 percent by volume) cause irritation of the eyes, nose, throat, and lungs. Eyes become red and swollen, accompanied by sharp pain in more severe cases. Still higher concentrations (0.05 percent by volume) cause dizziness, unconsciousness, and failure of respiration.

The Threshold Limit Value (TLV) is 10 ppm (0.001%) in air. This is the limit for eight hours of continuous exposure as recommended by the American Conference of Governmental Industrial Hygienists. The health and safety reference values of various concentrations of H2S are listed in the toxicity chart below. A Manufacturers Safety Data Sheet (MSDS) for hydrogen sulfide is included in Appendix E.

2.20 SULFUR DIOXIDE (S02)

Sulfur dioxide is formed with the burning of hydrogen sulfide gas. Sulfur dioxide is a pungent, irritating, suffocating, colorless gas. This gas is normally heavier than air and concentrations above 400 ppm are considered dangerous for even brief exposures.

Under special circumstances, hydrogen sulfide gas may be ignited in order to dissipate a gas cloud and reduce impact on a local area. Often these burning temperatures are enough to raise and mix the SO2 with air in a ratio well below toxic levels. However, great care and proper monitoring should be used when this is attempted.

Due to the irritating effect of SO2 at low concentrations of less than 5 ppm, there is usually no doubt as to it's presence in an area, which provides better warning characteristics than H2S.

2.30 TOXICITY CHART

NAME	SPECIFIC GRAVITY	TLV (2) (ppm)	HAZARDOUS LIMIT (3)	LETHAL CONCENTRATION (4)
Hydrogen Sulfide	1.18	10	100 ppm/1 hr	600+ ppm
Sulfur Dioxide	2.21	2	50 ppm/1 hr	400 ppm

Notes:

(1) Specific gravity of air = 1.00
(2) TLV — Threshold Limit Value
(3) Hazardous Limit — concentration that may cause death with short term exposure.
(4) Lethal concentration — concentration that may cause death with only a few breaths.

3.00 TREATMENT PROCEDURES FOR H2S AND SO2 EXPOSURE

A. Remove the patient to fresh air. Personnel should always use fresh air breathing equipment when entering an area to retrieve a person who has been overcome with H2S.

B. Call a physician and get patient under his care as soon as possible.

C. If breathing has ceased, begin artificial respiration immediately. Give cardiopulmonary resuscitation (CPR) only if there is no pulse and no breathing. Continue revival efforts until physician arrives or, if patient is mobile and it is determined that he should go to the hospital, continue oxygen inhalation under the physician's direction.

D. Administer oxygen to help eliminate toxic substances from blood stream.

E. Keep the patient at rest and protect from chilling.

4.00 INDIVIDUAL RESPONSIBILITIES

It is the responsibility of all personnel on the location to familiarize themselves with the procedures outlined in this contingency plan.

A. All Personnel
   1. Responsible for their assigned safety equipment.
   2. Responsible for familiarizing themselves with the location of all safety equipment.
   3. Responsible for reporting any indications of H2S to those in the area and to a supervisor.

B. XTO Site Supervisor/ Company Man
   1. Responsible for thoroughly understanding and seeing that all aspects of this contingency plan are enforced.
   2. Responsible for implementing all phases of this contingency plan.
   3. Responsible for keeping a minimum of personnel on the location during expected hazardous operations.
   4. Responsible for coordinating all well site operations and communications in the event that

an emergency condition develops.

5. Responsible for ensuring that all visitors receive an H2S safety orientation. A visitors log will be maintained as well as a list of all personnel on location after drilling has progressed to the suspected H2S formation.

4.10 LOCATION LAYOUT

The location should have at least two pre-determined safe areas to assemble at in the event of an emergency.
These locations should be located 180 degrees to one another, and in the direction of the prevailing winds.

A. H2S rig monitor with at least three heads. One located at the bell nipple, one located at the shale shaker, and a third one on the rig floor.
The location and type of all air masks. Self-contained breathing apparatus for use by rig personnel for this well will be kept in the following location(s):

Type: 1-30 min. rescue unit	Location: Safety Contractor's Trailer
Type: 1-30 min. rescue unit	Location: All Trailers
Type: 2-30 min. rescue unit	Location: Briefing Area #1
Type: 2-30 min. rescue unit	Location: Briefing Area #2
Type: 5-Hoseline work unit	Location: Safety Trailer
Type: 3-5 min escape unit	Location: Rig Floor
Type: 1-5 min. escape unit	Location: Tubing board (derrick)

If a cascade system is utilized, indicate the location(s);

Type: 10 cylinder cascade Location: Safety Trailer located by rig base of catwalk.

The location of windsocks or streamers. The wind directions indicators for this well will be located at:

Type: Windsock	Location: Briefing Area #1
Type: Windsock	Location: Briefing Area #2
Type: Windsock	Location: On floor & pits

The location of any other safety equipment used, such as flare guns or bug blowers.

Type: Flare gun Location: Safety Trailer

The location of all telephones and/or means of communications are as follows:

Type: Cell phone Location: Drilling - Production Superintendent/ Tool Pusher

Warning Signs:
"No Smoking" signs should be strategically located around the rig and rig location. The following locations are appropriate:

Rig Floor
Dog house
Substructure
Lower landing of all stairs to rig floor
Mud Pits
Shale Shaker
"Poison Gas" signs should also be strategically located around the rig and rig location.

The following locations are appropriate:
All entrances leading to location
Lower landing of all stairs leading to rig floor
All areas around substructure, including mud pits and shale shaker
Various points along the perimeter of the radius of exposure

NOTE: *All warnings should be black and yellow in color and of readable size at a distance.*

4.20 OPERATING PROCEDURES

The following operating procedures will be utilized for drilling in areas with H2S.

A. Plan of operation for handling gas kicks and other problems. Any gas kick will be controlled by using approved well control techniques. Upon evidence that ambient H2S concentrations have reached 10 ppm, all non-essential personnel will be evacuated to pre-determined safe areas. Personnel remaining on the rig floor will continue to control the well until the situation indicates the area is safe to reenter.

Special Operations:
Drill Stem Tests: All drill stem tests must be closed chamber and conducted during daylight hours only – There will not be drill stem test for this operation.
Coring: After a core has been cut, circulate bottoms up and monitor for H2S. If hole conditions (and/or detectors) indicate potentially hazardous conditions, put breathing equipment on (10) ten stands before core barrel reaches surface. Breathing equipment will be worn by all personnel while core barrel is pulled, broken out and opened, and until a safe atmosphere is indicated.
All equipment with potential for H2S shall be suitable for H2S service, i.e. Drill String, Casing, Well Head, Blowout Preventor equipment and trim, Rotating Head, Kill Lines, Choke Manifold and Lines.
A remote controlled choke will be installed prior to all H2S drilling.
Mud system pH will be maintained at or above 10.0 with sufficient materials on location to maintain the required PH.

A flarepit will be located a minimum of 150' from the wellhead and 30' from the reserve pit. Should H2S be encountered during drilling operations an ignitable, flaring system will be used and burnable gas will then be vented to the atmosphere. Extreme caution will be noted for Sulfur Dioxide that is a by-product of Hydrogen Sulfide when burned.

4.30 OPERATING CONDITIONS

Operating conditions are defined in three categories. A description of each of these conditions and the required action to take are given below.

A. Condition I — Normal Operating Conditions, Potential Danger
Characterized by: Normal Drilling Operations in zones which contain or may contain H2S.
Warning Flag: Yellow
Alarm: None
Probable Occurrence: No detectable gas present at surface

General Action:
Know location of safety equipment.
Check safety equipment for proper function. Keep it available.
Be alert for a condition change.
Follow instructions of supervisor.

B. Condition II — Potential to Moderate Danger to Life
Characterized by: H2S gas present. Concentration less than 10 ppm.
Warning Flag: Orange
Alarm: Flashing light at 10 ppm H2S. Intermittent blasts on horn at 10 ppm H2S.
Probable Occurrence: As drill gas.
As trip gas when circulating bottoms up
When a core barrel is pulled
When a well kick is circulated out
Surface pressure, well flow or lost operations
Equipment failure during testing operations

General Action:
Follow instructions of supervisor.
Put on breathing equipment if directed, or is conditions warrant it.
Stay in "SAFE BRIEFING AREA" if instructed and not working to correct the problem.
The Drilling Superintendent will initiate action to reduce the H2S concentration to zero.

C. Condition III — Moderate to Extreme Danger to Life
Characterized by: H2S present in concentrations at or above 10 ppm. Critical well operations or well control problems. In the extreme, loss of well control.
Warning Flag: Red
Alarm: Flashing light and continuous blast on horn at 10 ppm H2S
Probable Occurrence: As drill gas
As trip gas when circulating bottoms up
When a core barrel is pulled
When a well kick is circulated out
Surface pressure, well flow or lost return problems
Equipment failure during testing operations

General Action:
Put on breathing equipment. Move to "SAFE BRIEFING AREA" and remain there is not working to correct or control problem.
Follow instructions of XTO site supervisor/Company man or other supervisor.

The Company man will initiate emergency action as provided in the contingency plan and as appropriate to the actual conditions. If testing operations are in progress, the well will be shut in. The Company man will conduct any necessary operations with an absolute minimum of personnel. All persons in the immediate area will wear a breathing apparatus. All other personnel will restrict their movements to those directed by the Superintendent.

If gas containing hydrogen sulfide (H2S) is ignited, the burning hydrogen sulfide will be converted to sulfur dioxide, which is poisonous.

5.00 HYDROGEN SULFIDE EMERGENCY PROCEDURES

The procedures listed below apply to drilling operations:

A. If at any time during Condition I, the mud logger, mud engineer or any other person detects H2S, he/she will notify XTO Site Supervisor/Company Man. All personnel should keep alert to the Company man's orders, this includes:

1. Immediately begin to ascertain the cause or the source of the H2S and take steps to reduce the H2S concentration to zero. This should include having the mud engineer run a sulfide and pH determination on the flowline mud if water-base mud is in use. If an oil-base mud is in use, the mud engineer should check the lime content of the mud.
2. Order non-essential personnel out of the potential danger area.
3. Order all personnel to check their safety equipment to see that it is working properly and in the proper location. Persons without breathing equipment will not be allowed to work in a hazard area.
4. Notify the Drilling Superintendent of condition and action taken.
5. Continue gas monitoring activities and continue with caution.
6. Display the orange warning flag.

B. If the H2S concentration exceeds 10 ppm, the following steps will be taken:

1. Put on breathing equipment
2. Display red flag
3. Driller — prepare to shut the well in
   a. Pick up pipe to get Kelly out of BOP's
   b. Close BOP's if necessary
4. If testing operations are in progress, the well will be shut-in
5. Help anyone who may be affected by the gas
6. Evacuate quickly to the "SAFE BRIEFING AREA" if instructed or conditions warrant

C. In the event a potentially hazardous volume of H2S is released into the atmosphere, the following steps must be taken to alert the public:

1. Remove all rig personnel from the danger area and assemble at a pre-determined safe area, preferable upwind from the well site.
2. Alert the drilling office, public safety personnel, regulatory agencies, and the general public of the existence and location of an H2S release. See List of Emergency Telephone Numbers.
3. Assign personnel to block any public road (and access road to location) at the boundary of the area of exposure. Any unauthorized people within the area should be informed that an emergency exists and be ordered to leave immediately.

4. Request assistance from public safety personnel to control traffic and/or evacuate people from the threatened area.

6.00 TRAINING PROGRAM

All personnel associated with the drilling operations will receive training to ensure efficient and correct action in all situations. This training will be in the general areas of:
(A) Personnel Safety (B) Rig Operations (C) Well Control Procedures

A. Personnel Safety Training — All Personnel shall have received H2S training in the following areas:
   1. Hazards and characteristics of H2S.
   2. Effect on mental components of the system.
   3. Safety precautions.
   4. Operation of safety equipment and life support systems.
   5. Corrective action and shutdown procedures.

B. Rig Operations — All rig personnel shall have received training in the following areas:
   1. Well control procedures.
   2. Layout and operations of the well control equipment.

NOTE: Proficiency will be developed through BOP drills which will be documented by the Drilling Superintendent.

7. Service Company Personnel — All service personnel shall be trained by their employers in the hazards and characteristics of H2S, and the operation of safety equipment, and life support systems.

Visitors — All first time visitors to the location will be required to attend a safety orientation. The Drilling Superintendent shall be responsible for this orientation and he shall see that every visitor is logged correctly.

Public - The public within the area of exposure shall be given an advance briefing by the Drilling Superintendent. This briefing must include the following elements:

1. Hazards and characteristics of hydrogen sulfide. It is an extremely dangerous gas. It is normally detectable by its "rotten egg" odor, but odor is not a reliable means of detections because the sense of smell may be dulled or lost due to intake of the gas at higher concentrations. It is colorless, transparent and flammable. It is heavier than air and may accumulate in low places.
2. The necessity of an emergency action plan. Due to the danger of persons exposed to hydrogen sulfide and the need for expeditious action should an emergency occur, this action plan will be put into effect if and when a leak occurs.
3. The location of hydrogen sulfide within the area of exposure at the drilling location.
4. The manner in which the public will be notified of an emergency.
5. Steps to be taken in case of an emergency.
6. Abandon danger area.
7. Notify necessary agencies and request assistance for controlling traffic and evacuating people.

7.00 PROTECTION OF THE GENERAL PUBLIC

7.10 NOTIFICATION OF POTENTIAL DANGER

- Warning signs will be prominently displayed at the well site and at all access points.

7.20 EMERGENCY EVACUATION AND ISOLATION OF DANGER AREA

In the event that toxic gases are released in such quantities as to be a possible hazard to the public, the following steps (in addition to the procedure outlines in Section 5.00) will be taken by the person in charge.

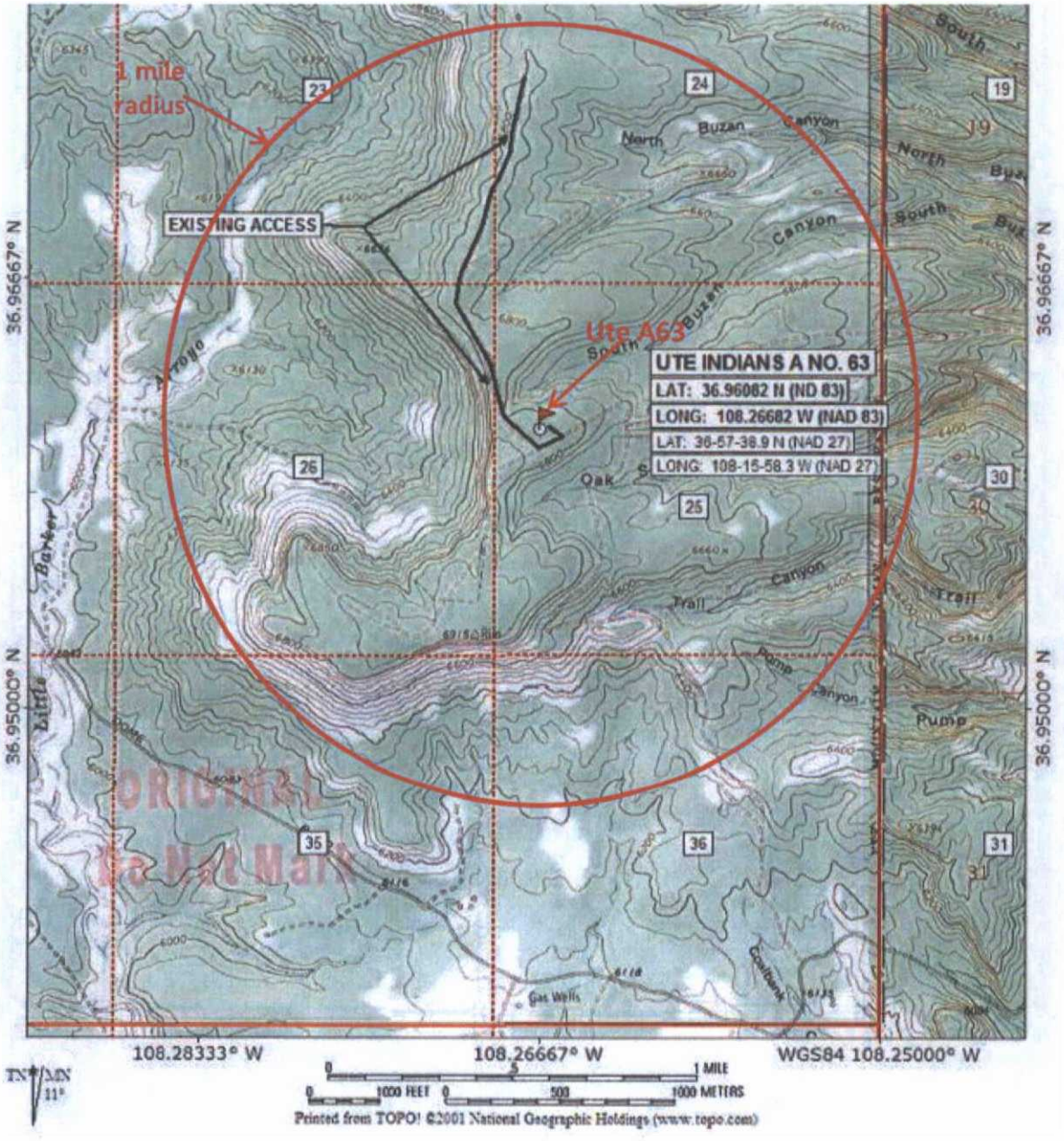
- Choose a command post site in a safe area
- Alert by telephone the Incident Commander or the Safety Manager and notify the person of the situation and your choice of command posts.
- Notify local Law Enforcement Officials of the need to restrict entry to the area and the location of your command post. Request their assistance in restricting entry into the danger area by placing roadblocks or barriers in safe areas.

NOTE: Alternate command posts and roadblocks may be required; the Incident Commander may make changes in the locations listed above. Care should be taken to notify all responders of the changes.

- If evacuation cannot be accomplished in a timely manner and the H2S release is posing an immediate threat to human life, the Incident Commander may choose to ignite the gas, because of the increased risks igniting the gas can pose for response personnel, only the Incident Commander can give this order.

APPENDIX A

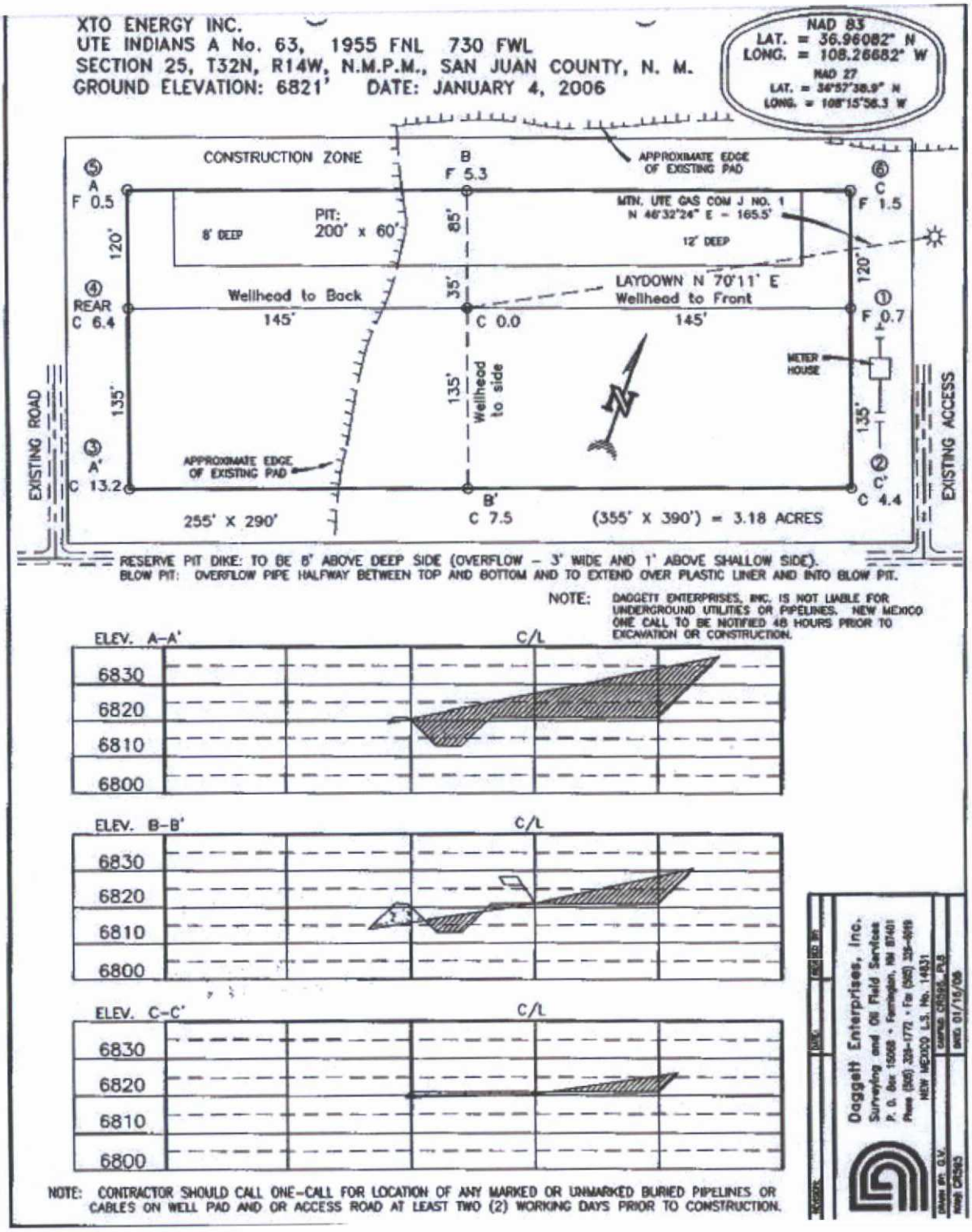
AREA MAP



There is no resident within one-mile radius of the Ute A63 well

APPENDIX B

LOCATION LAYOUT



APPENDIX C

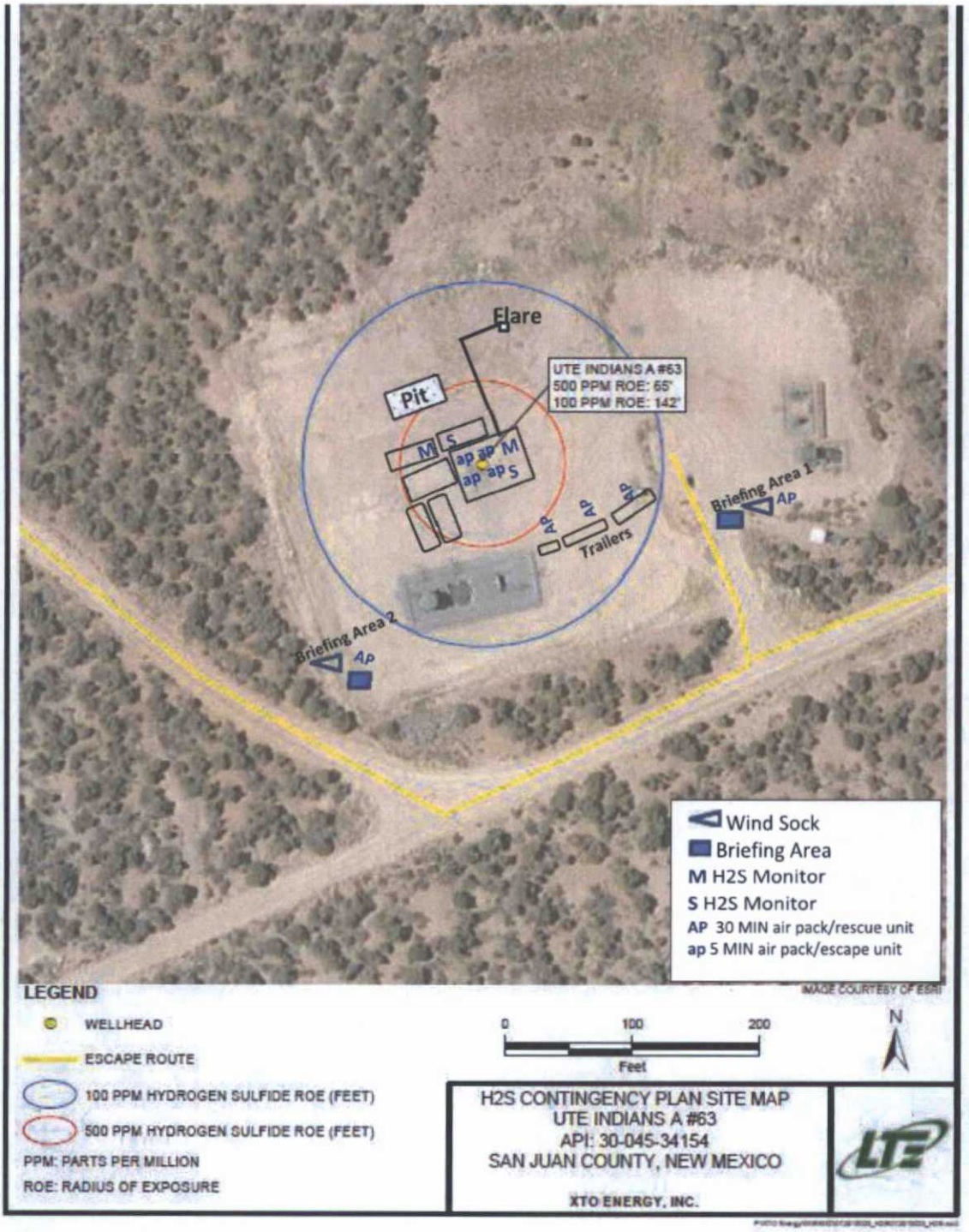
EMERGENCY CONTACT LIST

EPA 24-Hour Spill Notification Number	303-293-1788
Department of Transportation National Response Center	800-424-8802
Medical Personnel:	
Ambulance	911
Hospitals	
San Juan Regional Medical Center	505-325-5011
Lifeguard Air Emergency Services (life flight)(911)	800-345-7737
Firefighting & Public Safety Personnel:	
Fire Department	505-334-6622
Police Department	505-334-6622
County Sheriff	505-334-6622
State Patrol	505-325-7547
Government Agencies:	
County Health Department	505-334-9481
BLM Office (Farmington, NM)	505-599-8900
BLM Office (Durango, Colorado)	970-247-4874
NMOCD	505-334-6178
XTO Energy Drilling Personnel:	
Ross Lubers, Drilling Manager	303-397-3600
Bobby Jackson, Drilling Superintendent	505-333-3100
Bola Adeyeye, Drilling Engineer	720-539-1660
Alec Bridge, Drilling Engineer	720-244-9083
Mark Nietzel, OIMS Drilling Coordinator	505-486-2609
Service Companies:	
Pump Trucks: Halliburton Farmington, N.M.	505-324-3500
Dirt Contractor: TBD	
H2S Safety Company: McGuire Industries (Leroy Winters)	505-325-6232

Emergency calls should dial 911.
NOTE: If 911 are unavailable, call the applicable County Sheriff Dispatch number

APPENDIX D

H2S RADIUS OF EXPOSURE AND MAP



APPENDIX E
EMPLOYEE SIGNOFF SHEET

I have read the XTO Energy H2S Contingency Plan, and understand its contents. I understand my personal responsibilities under this policy and will make use of this information to contribute to the safety of the public and for my own personal safety while an employee of XTO Energy Inc.

Print	Sign	Date

Material Safety Data Sheet

Hydrogen Sulfide

Section 1. Chemical product and company identification

Product name : Hydrogen Sulfide

Supplier : AIRGAS INC., on behalf of its subsidiaries
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

Product use : Synthetic/Analytical chemistry.

Synonym : Dihydrogen monosulfide; Dihydrogen sulfide; Hydrosulfuric acid; Stink damp; Sulfur hydride; Sulfureted hydrogen; H2S; Sulfuretted hydrogen; Hydrogen-sulphide-; Hydrogen sulfide (H2S); Acide sulfhydrique; Hydrogene sulfure; Idrogeno solforato; Rcra waste number U135; Schwefelwasserstoff; Siarkowodor; UN 1053; Zwavelwaterstof; Hepatic gas; Hepatic acid; Hydrogen monosulfide; Sewer gas; Sour gas; Sulfur hydroxide

MSDS # : 001029

Date of Preparation/Revision : **4/26/2010.**

In case of emergency : 1-866-734-3438

Section 2. Hazards identification

Physical state : Gas. [COLORLESS LIQUEFIED COMPRESSED GAS WITH A ROTTEN EGG ODOR, BUT ODORLESS AT POISONOUS CONCENTRATIONS. [NOTE: SENSE OF SMELL BECOMES RAPIDLY FATIGUED AND CAN NOT BE RELIED UPON TO WARN OF THE CONTINUOUS PRESENCE OF H2S.]]

Emergency overview : DANGER!

FLAMMABLE GAS.
MAY CAUSE FLASH FIRE.
MAY BE FATAL IF INHALED.
MAY CAUSE EYE AND SKIN IRRITATION.
MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.
CONTENTS UNDER PRESSURE.

Keep away from heat, sparks and flame. Do not puncture or incinerate container. Do not breathe gas. Avoid contact with eyes, skin and clothing. May cause target organ damage, based on animal data. Use only with adequate ventilation. Wash thoroughly after handling. Keep container closed.

Contact with rapidly expanding gases can cause frostbite.

Target organs : May cause damage to the following organs: lungs, upper respiratory tract, eyes, central nervous system (CNS).

Routes of entry : Inhalation Dermal Eyes

Potential acute health effects

Eyes : Moderately irritating to eyes. Contact with rapidly expanding gas may cause burns or frostbite.

Skin : Moderately irritating to the skin. Contact with rapidly expanding gas may cause burns or frostbite.

Inhalation : Very toxic by inhalation.

Ingestion : Ingestion is not a normal route of exposure for gases

Potential chronic health effects : **CARCINOGENIC EFFECTS**: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.

Medical conditions aggravated by over-exposure : Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

See toxicological information (section 11)

Section 3. Composition, Information on Ingredients

Name	CAS number	% Volume	Exposure limits
Hydrogen Sulfide	7783-06-4	100	**ACGIH TLV (United States, 1/2009).** STEL: 21 mg/m³ 15 minute(s). STEL: 15 ppm 15 minute(s). TWA: 14 mg/m³ 8 hour(s). TWA: 10 ppm 8 hour(s). **NIOSH REL (United States, 6/2009).** CEIL: 15 mg/m³ 10 minute(s). CEIL: 10 ppm 10 minute(s). **OSHA PEL 1989 (United States, 3/1989).** STEL: 21 mg/m³ 15 minute(s). STEL: 15 ppm 15 minute(s). TWA: 14 mg/m³ 8 hour(s). TWA: 10 ppm 8 hour(s). **OSHA PEL Z2 (United States, 11/2006).** AMP: 50 ppm 10 minute(s). CEIL: 20 ppm

Section 4. First aid measures

No action shall be taken involving any personal risk or without suitable training.If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus.It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

Eye contact : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Inhalation : Call medical doctor or poison control center immediately. Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Ingestion : As this product is a gas, refer to the inhalation section.

Section 5. Fire-fighting measures

Flammability of the product : Flammable.

Auto-ignition temperature : 259.85°C (499.7°F)

Flammable limits : Lower: 4% Upper: 44%

Products of combustion : Decomposition products may include the following materials:
sulfur oxides

Fire-fighting media and instructions : In case of fire, use water spray (fog), foam or dry chemical.

In case of fire, allow gas to burn if flow cannot be shut off immediately. Apply water from a safe distance to cool container and protect surrounding area. If involved in fire, shut off flow immediately if it can be done without risk.

Contains gas under pressure. Flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions : Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment (section 8). Shut off gas supply if this can be done safely. Isolate area until gas has dispersed.

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Methods for cleaning up : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see section 1 for emergency contact information and section 13 for waste disposal.

Section 7. Handling and storage

Handling : Use only with adequate ventilation. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Wash thoroughly after handling. High pressure gas. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Keep container closed. Avoid contact with skin and clothing. Avoid contact with eyes. Keep away from heat, sparks and flame. To avoid fire, eliminate ignition sources. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Storage : Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Segregate from oxidizing materials. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

Engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Personal protection

Eyes : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Skin : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

The applicable standards are (US) 29 CFR 1910.134 and (Canada) Z94.4-93

Hands : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Personal protection in case of a large spill : Self-contained breathing apparatus (SCBA) should be used to avoid inhalation of the product. Full chemical-resistant suit and self-contained breathing apparatus should be worn only by trained and authorized persons.

Product name

hydrogen sulphide

ACGIH TLV (United States, 1/2009).
STEL: 21 mg/m³ 15 minute(s).
STEL: 15 ppm 15 minute(s).
TWA: 14 mg/m³ 8 hour(s).
TWA: 10 ppm 8 hour(s).
NIOSH REL (United States, 6/2009).
CEIL: 15 mg/m³ 10 minute(s).
CEIL: 10 ppm 10 minute(s).
OSHA PEL 1989 (United States, 3/1989).

STEL: 21 mg/m³ 15 minute(s).
STEL: 15 ppm 15 minute(s).
TWA: 14 mg/m³ 8 hour(s).
TWA: 10 ppm 8 hour(s).

OSHA PEL Z2 (United States, 11/2006).
AMP: 50 ppm 10 minute(s).
CEIL: 20 ppm

Consult local authorities for acceptable exposure limits.

Section 9. Physical and chemical properties

Molecular weight	: 34.08 g/mole
Molecular formula	: H2-S
Boiling/condensation point	: -60°C (-76°F)
Melting/freezing point	: -82.8°C (-117°F)
Critical temperature	: 100.5°C (212.9°F)
Vapor pressure	: 252 (psig)
Vapor density	: 1.19 (Air = 1)
Specific Volume (ft ³/lb)	: 11.236
Gas Density (lb/ft ³)	: 0.089

Section 10. Stability and reactivity

Stability and reactivity	: The product is stable.
Incompatibility with various substances	: Extremely reactive or incompatible with the following materials: oxidizing materials.
Hazardous decomposition products	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.
Hazardous polymerization	: Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Toxicity data

Product/ingredient name	Result	Species	Dose	Exposure
hydrogen sulphide	LC50 Inhalation Vapor	Rat	820 mg/m3	3 hours
	LC50 Inhalation Vapor	Rat	700 mg/m3	4 hours
	LC50 Inhalation Vapor	Rat	470 mg/m3	6 hours
	LC50 Inhalation Gas.	Mouse	634 ppm	1 hours
	LC50 Inhalation Gas.	Rat	712 ppm	1 hours

IDLH	: 100 ppm
Chronic effects on humans	: May cause damage to the following organs: lungs, upper respiratory tract, eyes, central nervous system (CNS).
Other toxic effects on humans	: No specific information is available in our database regarding the other toxic effects of this material to humans.

Specific effects

Carcinogenic effects	: No known significant effects or critical hazards.
Mutagenic effects	: No known significant effects or critical hazards.
Reproduction toxicity	: No known significant effects or critical hazards.

Section 12. Ecological information

Aquatic ecotoxicity

Product/ingredient name	Test	Result	Species	Exposure
hydrogen sulphide	-	Acute EC50 770 ug/L Fresh water	Crustaceans - Amphipod - Crangonyx richmondensis lauren - 10 mm	48 hours
	-	Acute EC50 540 ug/L Fresh water	Crustaceans - Amphipod - Crangonyx richmondensis lauren - 10 mm	48 hours
	-	Acute LC50 7 ug/L Fresh water	Fish - Fathead minnow - Pimephales promelas - FRY	96 hours
	-	Acute LC50 4 ug/L Fresh water	Fish - Lake whitefish - Coregonus clupeaformis - Yolk-sac fry	96 hours
	-	Acute LC50 3.2 ug/L Fresh water	Fish - Asian redtail catfish - Hemibagrus nemurus	96 hours
	-	Acute LC50 3 ug/L Fresh water	Fish - Lake whitefish - Coregonus clupeaformis - Yolk-sac fry	96 hours
	-	Acute LC50 <2 ug/L Fresh water	Fish - Yellow perch - Perca flavescens - Yolk-sac fry	96 hours
	-	Acute LC50 2 ug/L Fresh water	Fish - Lake whitefish - Coregonus clupeaformis - Yolk-sac fry	96 hours

Products of degradation : Products of degradation: sulfur oxides (SO_2, SO_3 etc.).

Environmental fate : Not available.

Environmental hazards : No known significant effects or critical hazards.

Toxicity to the environment : Not available.

Section 13. Disposal considerations

Product removed from the cylinder must be disposed of in accordance with appropriate Federal, State, local regulation.Return cylinders with residual product to Airgas, Inc.Do not dispose of locally.

Section 14. Transport information

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information

Hydrogen Sulfide						
DOT Classification	UN1053	HYDROGEN SULFIDE	2.3	Not applicable (gas).		**Reportable quantity** 100 lbs. (45.4 kg) **Limited quantity** Yes. **Packaging instruction** **Passenger aircraft** Quantity limitation: Forbidden. **Cargo aircraft** Quantity limitation: Forbidden. **Special provisions** 2, B9, B14
TDG Classification	UN1053	HYDROGEN SULFIDE; OR HYDROGEN SULPHIDE	2.3	Not applicable (gas).		**Explosive Limit and Limited Quantity Index** 0 **ERAP Index** 0 **Passenger Carrying Ship Index** Forbidden **Passenger Carrying Road or Rail Index** Forbidden
Mexico Classification	UN1053	HYDROGEN SULFIDE	2.3	Not applicable (gas).		-

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Section 15. Regulatory information

United States

U.S. Federal regulations : **United States inventory (TSCA 8b):** This material is listed or exempted.

SARA 302/304/311/312 extremely hazardous substances: hydrogen sulphide
SARA 302/304 emergency planning and notification: hydrogen sulphide
SARA 302/304/311/312 hazardous chemicals: hydrogen sulphide
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: hydrogen sulphide: Fire hazard, Sudden release of pressure, Immediate (acute) health hazard, Delayed (chronic) health hazard

Clean Water Act (CWA) 307: No products were found.

Clean Water Act (CWA) 311: No products were found.

Clean Air Act (CAA) 112 accidental release prevention: hydrogen sulphide

Clean Air Act (CAA) 112 regulated flammable substances: No products were found.

Clean Air Act (CAA) 112 regulated toxic substances: hydrogen sulphide

SARA 313

	Product name	CAS number	Concentration
Form R - Reporting requirements :	Hydrogen Sulfide	7783-06-4	100
Supplier notification :	Hydrogen Sulfide	7783-06-4	100

SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

State regulations : **Connecticut Carcinogen Reporting:** This material is not listed.
Connecticut Hazardous Material Survey: This material is not listed.
Florida substances: This material is not listed.
Illinois Chemical Safety Act: This material is not listed.
Illinois Toxic Substances Disclosure to Employee Act: This material is not listed.
Louisiana Reporting: This material is not listed.
Louisiana Spill: This material is not listed.
Massachusetts Spill: This material is not listed.
Massachusetts Substances: This material is listed.
Michigan Critical Material: This material is not listed.
Minnesota Hazardous Substances: This material is not listed.
New Jersey Hazardous Substances: This material is listed.
New Jersey Spill: This material is not listed.
New Jersey Toxic Catastrophe Prevention Act: This material is listed.
New York Acutely Hazardous Substances: This material is listed.
New York Toxic Chemical Release Reporting: This material is not listed.
Pennsylvania RTK Hazardous Substances: This material is listed.
Rhode Island Hazardous Substances: This material is not listed.

Canada

WHMIS (Canada) : Class A: Compressed gas.
Class B-1: Flammable gas.
Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).

CEPA Toxic substances: This material is not listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

Section 16. Other information

United States

Label requirements : FLAMMABLE GAS.
MAY CAUSE FLASH FIRE.
MAY BE FATAL IF INHALED.
MAY CAUSE EYE AND SKIN IRRITATION.
MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.
CONTENTS UNDER PRESSURE.

Canada

Label requirements : Class A: Compressed gas.
Class B-1: Flammable gas.
Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).

Hazardous Material Information System (U.S.A.) :

National Fire Protection Association (U.S.A.) :

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Material Safety Data Sheet

Sulfur Dioxide

Section 1. Chemical product and company identification

Product name : Sulfur Dioxide

Supplier : AIRGAS INC., on behalf of its subsidiaries
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

Product use : Synthetic/Analytical chemistry.

Synonym : Sulfurous acid anhydride; Fermenicide powder; Fermenticide liquid; Sulfur oxide (SO2); Sulfurous anhydride; Sulfurous oxide; SO2; Sulphur dioxide; Fermenicide liquid; Schwefeldioxyd; Siarki dwutlenek; Sulfur oxide; UN 1079; Oxosulfane oxide

MSDS # : 001047

Date of Preparation/Revision : **3/20/2012.**

In case of emergency : 1-866-734-3438

Section 2. Hazards identification

Physical state : Gas. [COLORLESS LIQUEFIED COMPRESSED GAS WITH A SHARP IRRITATING ODOR. [NOTE: A LIQUID BELOW 14 F. SHIPPED AS A LIQUEFIED COMPRESSED GAS.]

Emergency overview : DANGER!

CAUSES SEVERE RESPIRATORY TRACT, EYE AND SKIN BURNS.
MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.
CONTENTS UNDER PRESSURE.

Do not puncture or incinerate container. Do not breathe gas. Do not get on skin or clothing. Use only with adequate ventilation. Keep container closed. Wash thoroughly after handling.

Contact with rapidly expanding gases can cause frostbite.

Target organs : May cause damage to the following organs: lungs, upper respiratory tract, skin, eyes.

Routes of entry : Inhalation Dermal Eyes

Potential acute health effects

Eyes : Severely corrosive to the eyes. Causes severe burns. Contact with rapidly expanding gas may cause burns or frostbite.

Skin : Severely corrosive to the skin. Causes severe burns. Contact with rapidly expanding gas may cause burns or frostbite.

Inhalation : Severely corrosive to the respiratory system.

Ingestion : Ingestion is not a normal route of exposure for gases

Potential chronic health effects

Target organs : May cause damage to the following organs: lungs, upper respiratory tract, skin, eyes.

Medical conditions aggravated by over exposure : Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

See toxicological information (Section 11)

Section 3. Composition, Information on Ingredients

Name	CAS number	% Volume	Exposure limits
Sulfur Dioxide	7446-09-5	100	**ACGIH TLV (United States, 1/2009).** STEL: 0.25 ppm 15 minute(s). **OSHA PEL 1989 (United States, 3/1989).** TWA: 2 ppm 8 hour(s). TWA: 5 mg/m^3 8 hour(s). STEL: 5 ppm 15 minute(s). STEL: 10 mg/m^3 15 minute(s). **NIOSH REL (United States, 6/2009).** TWA: 2 ppm 10 hour(s). TWA: 5 mg/m^3 10 hour(s). STEL: 5 ppm 15 minute(s). STEL: 13 mg/m^3 15 minute(s). **OSHA PEL (United States, 11/2006).** TWA: 5 ppm 8 hour(s). TWA: 13 mg/m^3 8 hour(s).

Section 4. First aid measures

No action shall be taken involving any personal risk or without suitable training.If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus.It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

Eye contact : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Inhalation : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Ingestion : As this product is a gas, refer to the inhalation section.

Section 5. Fire-fighting measures

Flammability of the product : Non-flammable.

Products of combustion : Decomposition products may include the following materials: sulfur oxides

Fire-fighting media and instructions : Use an extinguishing agent suitable for the surrounding fire.

Apply water from a safe distance to cool container and protect surrounding area. If involved in fire, shut off flow immediately if it can be done without risk.

Contains gas under pressure. In a fire or if heated, a pressure increase will occur and the container may burst or explode.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions : Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment (section 8). Shut off gas supply if this can be done safely. Isolate area until gas has dispersed.

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Methods for cleaning up : Immediately contact emergency personnel. Stop leak if without risk. Note: see section 1 for emergency contact information and section 13 for waste disposal.

Section 7. Handling and storage

Handling : Use only with adequate ventilation. Wash thoroughly after handling. High pressure gas. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Keep container closed. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

Storage : Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

Engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Personal protection

Eyes : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Skin : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

The applicable standards are (US) 29 CFR 1910.134 and (Canada) Z94.4-93

Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Personal protection in case of a large spill : Self-contained breathing apparatus (SCBA) should be used to avoid inhalation of the product. Full chemical-resistant suit and self-contained breathing apparatus should be worn only by trained and authorized persons.

Product name

sulphur dioxide

ACGIH TLV (United States, 1/2009).
STEL: 0.25 ppm 15 minute(s).
OSHA PEL 1989 (United States, 3/1989).
TWA: 2 ppm 8 hour(s).
TWA: 5 mg/m^3 8 hour(s).
STEL: 5 ppm 15 minute(s).
STEL: 10 mg/m^3 15 minute(s).
NIOSH REL (United States, 6/2009).
TWA: 2 ppm 10 hour(s).
TWA: 5 mg/m^3 10 hour(s).
STEL: 5 ppm 15 minute(s).
STEL: 13 mg/m^3 15 minute(s).
OSHA PEL (United States, 11/2006).
TWA: 5 ppm 8 hour(s).
TWA: 13 mg/m^3 8 hour(s).

Consult local authorities for acceptable exposure limits.

Section 9. Physical and chemical properties

Molecular weight : 64.06 g/mole

Molecular formula : O2-S

Boiling/condensation point : -10°C (14°F)

Melting/freezing point : -75.6°C (-104.1°F)

Critical temperature : 156.9°C (314.4°F)

Vapor pressure : 34 (psig)

Vapor density : 2.2 (Air = 1)

Specific Volume (ft^3/lb) : 5.9172

Gas Density (lb/ft^3) : 0.169

Section 10. Stability and reactivity

Stability and reactivity : The product is stable.

Incompatibility with various substances : Extremely reactive or incompatible with the following materials: alkalis and moisture. Reactive or incompatible with the following materials: metals.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Toxicity data

Product/ingredient name	Result	Species	Dose	Exposure
sulphur dioxide	LC50 Inhalation Gas.	Mouse	3000 ppm	0.5 hours
	LC50 Inhalation Gas.	Rat	2520 ppm	1 hours
	LC50 Inhalation Gas.	Rat	2520 ppm	1 hours

Chronic effects on humans : **CARCINOGENIC EFFECTS**: A4 (Not classifiable for humans or animals.) by ACGIH, 3 (Not classifiable for humans.) by IARC.
May cause damage to the following organs: lungs, upper respiratory tract, skin, eyes.

Other toxic effects on humans : Hazardous by the following route of exposure: of skin contact (corrosive), of eye contact (corrosive), of inhalation (lung corrosive).

Specific effects

Carcinogenic effects : No known significant effects or critical hazards.

Mutagenic effects : No known significant effects or critical hazards.

Reproduction toxicity : No known significant effects or critical hazards.

Section 12. Ecological information

Aquatic ecotoxicity

Not available.

Products of degradation :

Environmental fate : Not available.

Environmental hazards : No known significant effects or critical hazards.

Toxicity to the environment : Not available.

Section 13. Disposal considerations

Product removed from the cylinder must be disposed of in accordance with appropriate Federal, State, local regulation.Return cylinders with residual product to Airgas, Inc.Do not dispose of locally.

Section 14. Transport information

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
DOT Classification	UN1079	SULFUR DIOXIDE	2.3	Not applicable (gas).		**Limited quantity** Yes. **Packaging instruction** **Passenger aircraft** Quantity limitation: Forbidden. **Cargo aircraft** Quantity limitation: Forbidden. **Special provisions** 3, B14, T50, TP19
TDG Classification	UN1079	SULFUR DIOXIDE; OR SULPHUR DIOXIDE	2.3	Not applicable (gas).		**Explosive Limit and Limited Quantity Index** 0 **ERAP Index** 500 **Passenger Carrying Ship Index** Forbidden **Passenger Carrying Road or Rail Index** Forbidden
Mexico Classification	UN1079	SULFUR DIOXIDE	2.3	Not applicable (gas).		-

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Section 15. Regulatory information

United States

U.S. Federal regulations : **United States inventory (TSCA 8b):** This material is listed or exempted.

SARA 302/304/311/312 extremely hazardous substances: sulphur dioxide
SARA 302/304 emergency planning and notification: sulphur dioxide
SARA 302/304/311/312 hazardous chemicals: sulphur dioxide
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: sulphur dioxide: Sudden release of pressure, Immediate (acute) health hazard, Delayed (chronic) health hazard

Clean Water Act (CWA) 307: No products were found.

Clean Water Act (CWA) 311: No products were found.

Clean Air Act (CAA) 112 regulated flammable substances: No products were found.

Clean Air Act (CAA) 112 regulated toxic substances: sulphur dioxide

State regulations : **Connecticut Carcinogen Reporting:** This material is not listed.
Connecticut Hazardous Material Survey: This material is not listed.
Florida substances: This material is not listed.
Illinois Chemical Safety Act: This material is not listed.
Illinois Toxic Substances Disclosure to Employee Act: This material is not listed.
Louisiana Reporting: This material is not listed.
Louisiana Spill: This material is not listed.
Massachusetts Spill: This material is not listed.
Massachusetts Substances: This material is listed.
Michigan Critical Material: This material is not listed.
Minnesota Hazardous Substances: This material is not listed.
New Jersey Hazardous Substances: This material is listed.
New Jersey Spill: This material is not listed.
New Jersey Toxic Catastrophe Prevention Act: This material is listed.
New York Acutely Hazardous Substances: This material is listed.
New York Toxic Chemical Release Reporting: This material is not listed.
Pennsylvania RTK Hazardous Substances: This material is listed.
Rhode Island Hazardous Substances: This material is not listed.

Canada

WHMIS (Canada) : Class A: Compressed gas.
Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
Class E: Corrosive material

CEPA Toxic substances: This material is listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

Section 16. Other information

United States

Label requirements : CAUSES SEVERE RESPIRATORY TRACT, EYE AND SKIN BURNS.
MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.
CONTENTS UNDER PRESSURE.

Canada

Label requirements : Class A: Compressed gas.
Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
Class E: Corrosive material

Sulfur Dioxide

Hazardous Material Information System (U.S.A.)	:	Health	* 3
		Flammability	0
		Physical hazards	0

National Fire Protection Association (U.S.A.) :

Notice to reader

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Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.