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OCD-ARTESIA

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Form 3160-3
(August 2007)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
APPLICATION FOR PERMIT TO DRILL OR REENTER



FORM APPROVED
OMB No 1004-0137
Expires July 31, 2010

| | | | |
|--|--|--|--|
| 1a. Type of work: <input checked="" type="checkbox"/> DRILL <input type="checkbox"/> REENTER | | 5. Lease Serial No. SL State of NM BHL NMLC 103876 | |
| 1b. Type of Well: <input checked="" type="checkbox"/> Oil Well <input type="checkbox"/> Gas Well <input type="checkbox"/> Other <input checked="" type="checkbox"/> Single Zone <input type="checkbox"/> Multiple Zone | | 6. If Indian, Allottee or Tribe Name N/A | |
| 2. Name of Operator COG Operating, LLC | | 7. If Unit or CA Agreement, Name and No. N/A | |
| 3a. Address 550 West Texas, Suite 1300 Midland, TX 79701 | | 8. Lease Name and Well No. Blitzen "35" Federal #2H | |
| 3b. Phone No. (include area code) (432)-685-9158 Andersen | | 9. API Well No. 30-015-36058 | |
| 4. Location of Well (Report location clearly and in accordance with any State requirements *) At surface 1800' FNL & 330' FEL, Unit H At proposed prod. zone 1800' FNL & 330' FWL, Unit E Split Estate | | 10. Field and Pool, or Exploratory Wolfcamp, NGL | |
| 11. Sec., T. R. M. or Blk. and Survey or Area Section 35, T16S, R28E | | 12. County or Parish Eddy Co. | |
| 13. State NM | | 14. Distance in miles and direction from nearest town or post office* Approx 10 miles Northwest of Loco Hills | |
| 15. Distance from proposed* 330' location to nearest property or lease line, ft. (Also to nearest drig. unit line, if any) | | 16. No. of acres in lease 160 | |
| 17. Spacing Unit dedicated to this well 160 | | 18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft N/A | |
| 19. Proposed Depth 11350' MD 6785' TVD | | 20. BLM/BIA Bond No. on file NMB 000215 | |
| 21. Elevations (Show whether DF, KDB, RT, GL, etc.) 3585' GL | | 22. Approximate date work will start* 12/15/2007 | |
| 23. Estimated duration 45 Days | | 24. Attachments | |

The following, completed in accordance with the requirements of Onshore Oil and Gas Order No.1, must be attached to this form:

- Well plat certified by a registered surveyor.
- A Drilling Plan.
- A Surface Use Plan (if the location is on National Forest System Lands, the SUPO must be filed with the appropriate Forest Service Office).
- Bond to cover the operations unless covered by an existing bond on file (see Item 20 above).
- Operator certification
- Such other site specific information and/or plans as may be required by the BLM.

| | | |
|---|--|---------------------|
| 25. Signature | Name (Printed/Typed) Dwaine Moore | Date 09/05/2007 |
| Title Agent for COG Operating LLC | | |
| Approved by (Signature) /s/ Don Peterson | Name (Printed/Typed) /s/ Don Peterson | Date JAN 15 2008 |
| Title FIELD MANAGER | | |
| Office CARLSBAD FIELD OFFICE | | |

Application approval 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.
Conditions of approval, if any, are attached.

APPROVAL FOR TWO YEARS

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.

(Continued on page 2)

*(Instructions on page 2)

Roswell Controlled Water Basin
**SEE ATTACHED FOR
CONDITIONS OF APPROVAL**

**APPROVAL SUBJECT TO
GENERAL REQUIREMENTS
AND SPECIAL STIPULATIONS
ATTACHED**

STATEMENT ACCEPTING RESPONSIBILITY FOR OPERATIONS

C.O.G. Operating, LLC (229137)
550 W. Texas Avenue, Ste. 1300
Midland, TX 79701

The undersigned accepts all applicable terms, conditions, stipulations and restrictions covering operations conducted on the leased land or portion thereof, as described below:

| | |
|-------------------------------|--|
| Lease No: | SL: State of New Mexico BHL: NMLC #103876 NM |
| Well Name: | Blitzen "35 Federal #2H |
| Legal Description of Land: | SL: 1800' FNL & 330' FEL, Unit H BHL: 1800' FNL & 330' FWL, Unit E Section 35, T16S, R28E Eddy County, NM |
| Formation(s) (if applicable): | Wolfcamp |
| Bond Coverage: | \$25,000 statewide bond of C.O.G. Operating, LLC |
| BLM Bond File No: | NMB 000215 |

9/6/07
Date

John Coffman
John Coffman
C.O.G. Operating, LLC

DISTRICT I
1826 N. French Dr., Hobbs, NM 88240

DISTRICT II
1301 W. Grand Avenue, Artesia, NM 88210

DISTRICT III
1000 Rio Brazos Rd., Aztec, NM 87410

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

State of New Mexico
Energy, Minerals and Natural Resources Department

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

Form C-102
Revised October 12, 2005

Submit to Appropriate District Office
State Lease - 4 Copies
Fee Lease - 3 Copies

☐ AMENDED REPORT

Anderson
WELL LOCATION AND ACREAGE DEDICATION PLAT

| | | |
|------------------------|--|-----------------------------|
| API Number | Pool Code 97183 | Pool Name Wolfcamp North |
| Property Code 36953 | Property Name BLITZEN "35" FEDERAL | Well Number 2 H |
| OGRID No. 229137 | Operator Name C.O.G. OPERATING L.L.C. | Elevation 3585' |

Surface Location

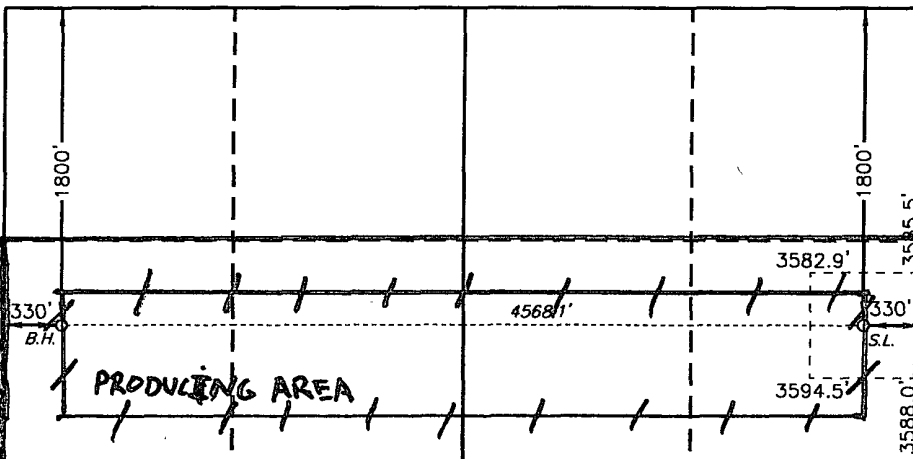
| UL or lot No. | Section | Township | Range | Lot Idn | Feet from the | North/South line | Feet from the | East/West line | County |
|---------------|---------|----------|-------|---------|---------------|------------------|---------------|----------------|--------|
| H | 35 | 16 S | 28 E | | 1800' | NORTH | 330 | EAST | EDDY |

Bottom Hole Location If Different From Surface

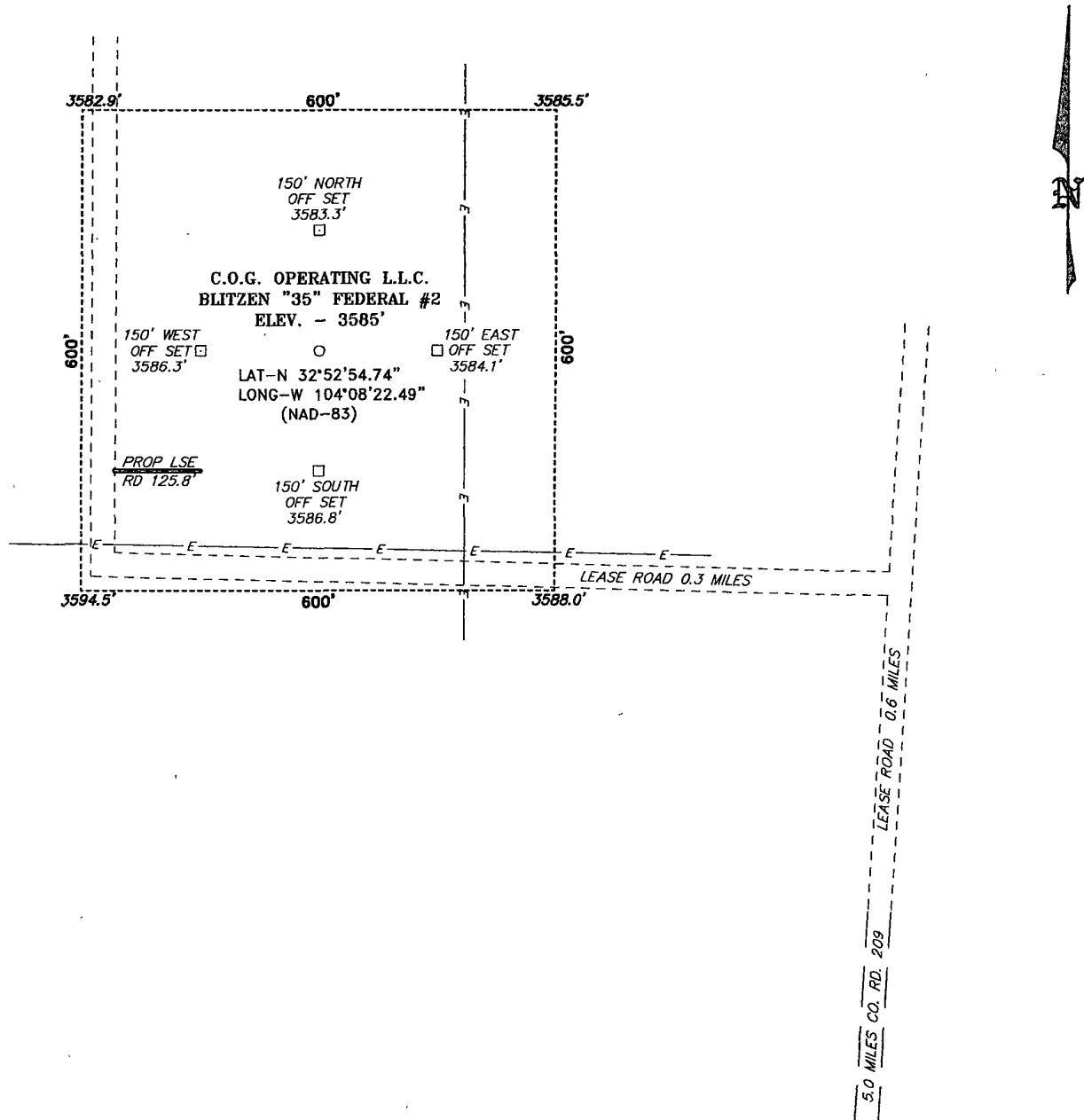
| UL or lot No. | Section | Township | Range | Lot Idn | Feet from the | North/South line | Feet from the | East/West line | County |
|---------------|---------|----------|-------|---------|---------------|------------------|---------------|----------------|--------|
| E | 35 | 16 S | 28 E | | 1800' | NORTH | 330 | WEST | EDDY |

| | | | |
|------------------------|-----------------|--------------------|-----------|
| Dedicated Acres 160 | Joint or Infill | Consolidation Code | Order No. |
|------------------------|-----------------|--------------------|-----------|

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

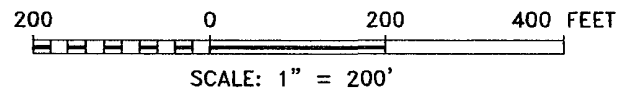
| | | |
|---|--|---|
|  | | <p>OPERATOR CERTIFICATION</p> <p>I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.</p> <p>Signature: <i>[Signature]</i> Date: 9/6/07</p> <p>Printed Name: DWAIN MOORE AGENT FOR COG</p> |
| <p>BOTTOM HOLE LOCATION</p> <p>LAT.: N 32°52'54.92" LONG.: W104°09'16.04" N.: 684623.461 SPC- E.: 596257.240 (NAD-83)</p> | <p>SURFACE LOCATION</p> <p>LAT.: N 32°52'54.74" LONG.: W104°08'22.47" N.: 684613.274 SPC- E.: 600825.369 (NAD-83)</p> | |
| <p>SURVEYOR CERTIFICATION</p> <p>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.</p> <p>AUGUST 24 2007</p> <p>Date Surveyed: <i>[Signature]</i> Signature: <i>[Signature]</i> Professional Surveyor</p> <p>W. B. JONES Certificate No. Gary L. Jones 7977</p> <p>BASIN SURVEYS</p> | | |

SECTION 35, TOWNSHIP 16 SOUTH, RANGE 28 EAST, N.M.P.M.,
EDDY COUNTY, NEW MEXICO.



DIRECTIONS TO LOCATION:

FROM THE JUNCTION OF U.S. HWY 82 AND CO. RD. 209 (TURKEY TRACK), GO NORTH ON CO. RD. 209 FOR APPROX. 5.0 MILES TO LEASE ROAD, CONTINUE NORTH APPROX. 0.6 MILES TO LEASE ROAD, ON LEASE ROAD GO WEST 0.3 MILES TO PROPOSED LOCATION AND LEASE ROAD.



C.O.G. OPERATING L.L.C.

REF: BLITZEN "35" FEDERAL #2 / Well Pad Topo

THE BLITZEN "35" FEDERAL #2 LOCATED 1880' FROM
THE NORTH LINE AND 330' FROM THE EAST LINE OF
SECTION 35, TOWNSHIP 16 SOUTH, RANGE 28 EAST,
N.M.P.M., EDDY COUNTY, NEW MEXICO.

BASIN SURVEYS P.O. BOX 1786-HOBBS, NEW MEXICO

W.O. Number: 17934

Drawn By: J. M. SMALL

Date: 08-27-2007

Disk: JMS 17934W

Survey Date: 08-24-2007

Sheet 1 of 1 Sheets

ATTACHMENT TO FORM 3160-3
COG Operating LLC
Blitzen "35" Federal # 2H
SL: 1800' FNL & 330' FEL, Unit H
BHL: 1800' FNL & 330' FWL, Unit E
Sec 35, T16S, R28E
Eddy County, NM

1. Proration Unit Spacing: 160 Acres

2. Ground Elevation: 3585'

3. Proposed Depths: Pilot hole TD = 7005', Horizontal TVD = 6785', Horizontal MD = 11350'

4. Estimated tops of geological markers:

| | |
|--------------------|---------|
| Quaternary | Surface |
| Yates/Seven Rivers | 570' |
| Queens | 1340' |
| San Andres | 2110' |
| Glorietta | 3650' |
| Abo | 5600' |
| Wolfcamp | 6755' |

5. Possible mineral bearing formations:

| | | |
|------------|-------------|-------|
| Water Sand | Fresh Water | 150' |
| Queens | Oil / Gas | 1350' |
| San Andres | Oil / Gas | 2120' |
| Glorietta | Oil / Gas | 3650' |
| Abo | Oil / Gas | 5600' |
| Wolfcamp | Oil / Gas | 6755' |

6. Casing Program

| | <u>Hole size</u> | <u>Interval</u> | <u>OD of Casing</u> | <u>Weight</u> | <u>Cond.</u> | <u>Collar</u> | <u>Grade</u> |
|--------------|---|------------------|---------------------|---------------|--------------|---------------|--------------|
| see COA → | 17-1/2" | 0' - +/-500' | 13-3/8" | 48# | New | STC | H40 |
| | Collapse sf - 2.98, Burst sf - 2.33, Tension sf - 13.42 | | | | | | |
| see COA → | 12 1/4" | 0' - 1800' | 9-5/8" | 40# | New | STC | J-55 |
| | Collapse sf - 2.86, Burst sf - 1.42, Tension sf - 7.22 | | | | | | |
| | 8-3/4" | 0' - 6400'MD | 5-1/2" | 17# | New | LTC | L-80 |
| | Collapse sf - 2.01, Burst sf - 2.35, Tension sf - 2.73 | | | | | | |
| | 7-7/8" | 6400' - 11350'MD | 5-1/2" | 17# | New | BTC | L-80 |
| | Collapse sf - 1.75, Burst sf - 2.28, Tension sf - 28.77 | | | | | | |

ATTACHMENT TO FORM 3160-3
COG Operating LLC
Blitzen "35" Federal # 2H
Page 2 of 3

7. Cement Program

see
COA
see
COA

→ 13 3/8" Surface Casing set at +/- 500', Circ to Surf with +/- 500 sx Class "C" w/ 2% CaCl₂, 1.35 yd.

→ 9 5/8" Intermediate Casing set at +/- 1800', Circ. to Surf with +/- 600 sx 35/65 Poz "C", 2.05 yd. & 200 sx Class "C" w/ 2% CaCl₂, 1.35 yd.

5 1/2" Production Casing set at +/- 11350' MD, 6785' TVD, Cement with +/- 200 sx. 50/50/2 "C", 1.37 yd & +/- 700 sx Class "H", 1.18 yd. Est. TOC @ 6000'. ← see COA

8. Pressure Control Equipment:

After setting 13 3/8" casing and installing 3000 psi casing head, NU 13 5/8" 3000 psi annular BOP. Test annular BOP, casing and manifold with clear fluid to 1000 psi w/ rig pump.

After setting 9 5/8" casing and installing 3000 psi casing spool, NU 3000 psi double ram BOP and 3000 psi annular BOP. Test double ram BOP and manifold to 3000# with clear fluid and annular to 1500 psi using an independent tester, this equipment will be used continuously until TD is reached. Blind rams will be operationally checked on each trip out of hole. Pipe rams will be operationally checked each 24 hour period. These checks will be noted on daily tour sheets. Other accessories to the BOP equipment include a Kelly cock and floor safety valves, choke lines and choke manifold with 3000 psi WP rating.

9. Proposed Mud Circulating System

| | Interval | Mud Wt. | Visc. | FL | Type Mud System |
|------------|----------------|---------|-------|----|---|
| see COA | → 0' - 500' | 8.5 | 28 | NC | Fresh water native mud w/ paper for seepage and sweeps. Lime for PH. |
| see COA | → 500' - 1800' | 9.1 | 30 | NC | Cut brine mud, lime for PH and paper for seepage and sweeps. |
| | 1800' - 5300' | 9.1 | 29 | NC | Drill section with fresh water/cut brine circulating the reserve utilizing periodic sweeps of paper as needed for seepage control and solids removal. |
| | 5300' - 11350' | 9.5 | 36 | 10 | Drill horizontal section with XCD polymer / cut brine / starch. |

Sufficient mud materials to maintain mud properties and meet minimum lost circulation and weight increase requirements will be kept at the well site at all times.

10. Production Hole Drilling Summary:

Drill 8-3/4" hole thru Wolfcamp, run open hole logs. Spot 150 sx. "H" Kick off plug from +/- 6700' to +/- 6300'. Time drill and kick off 7-7/8" hole at +/- 6300', building curve over +/- 475' to horizontal at 6785' TVD. Drill horizontal section in a westerly direction for +/-4500' lateral. Run production casing and cement.

**ATTACHMENT TO FORM 3160-3
COG Operating LLC
Blitzen "35" Federal # 2H
Page 3 of 3**

11. Auxiliary Well Control and Monitoring Equipment

- A. Kelly cock will be kept in the drill string at all times.
- B. A full opening drill pipe-stabbing valve with proper drill pipe connections will be on the rig floor at all times.

12. Logging, Testing and Coring Program:

- A. The electric logging program will consist of GR-Dual Laterolog, Spectral Density, Dual Spaced Neutron, CSNG Log and will be ran from T.D. in Pilot hole to 9 5/8" casing shoe.
- B. The mud logging program will consist of lagged 10' samples from intermediate casing point to T.D. in vertical pilot hole and from Kick off point to TD in Horizontal hole.
- C. Drill Stem test is not anticipated.
- D. No conventional coring is anticipated.
- E. Further testing procedures will be determined after the 5 1/2" production casing has been cemented at TD based on drill shows and log evaluation.

13. Abnormal Conditions, Pressures, Temperatures and Potential Hazards:

No abnormal pressures or temperatures are anticipated. The estimated bottom hole at TD is 110 degrees and estimated maximum bottom hole pressure is 2939 psig. Low levels of Hydrogen sulfide have been monitored in producing wells in the area, so H2S may be present while drilling of the well. An H2S plan is attached to the Drilling Program. No major loss of circulation zones has been reported in offsetting wells.

14. Anticipated Starting Date

Drilling operations will commence approximately on December 15, 2007 with drilling and completion operations lasting approximately 45 days.

Pathfinder Energy Planning Report

| | | | | | | | | | | |
|---|--------------------|---|------------------|---|--------------------|-------------------------|---------------------------|---------------------------|--------------------------|---------------------|
| Company: COG Operating Company LLC Field: Blitzen Site: Blitzen 35 Federal #2H Well: Blitzen 35 Federal #2H Wellpath: OH | | | | Date: 09/06/2007 Co-ordinate(NE) Reference: Blitzen 35 Federal #2H, Grid North Vertical (TVD) Reference: SITE 3606.0 Section (VS) Reference: Well (0.00N,0.00E,270.13Azi) Plan: Plan #1 9-6-07 | | | | Page: 1 | | |
| Field: Blitzen | | | | | | | | | | |
| Map System: US State Plane Coordinate System 1983 Geo Datum: GRS 1980 Sys Datum: Mean Sea Level | | | | Map Zone: New Mexico, Eastern Zone Coordinate System: Site Centre Geomagnetic Model: igrf2005 | | | | | | |
| Site: Blitzen 35 Federal #2H | | | | | | | | | | |
| Site Position: From: Map Position Uncertainty: 0.00 ft Ground Level: 3585.00 ft | | Northing: 684613.27 ft Easting: 600825.37 ft | | Latitude: 32 52 54.724 N Longitude: 104 8 22.402 W North Reference: Grid Grid Convergence: 0.11 deg | | | | | | |
| Well: Blitzen 35 Federal #2H | | | | Slot Name: | | | | | | |
| Well Position: +N/-S 0.00 ft +E/-W 0.00 ft Position Uncertainty: 0.00 ft | | Northing: 684613.27 ft Easting: 600825.37 ft | | Latitude: 32 52 54.724 N Longitude: 104 8 22.402 W | | | | | | |
| Wellpath: OH | | | | Drilled From: Surface Tie-on Depth: 0.00 ft Above System Datum: Mean Sea Level Declination: 8.34 deg Mag Dip Angle: 60.80 deg +E/-W Direction deg | | | | | | |
| Current Datum: SITE Magnetic Data: 09/06/2007 Field Strength: 49374 nT Vertical Section: Depth From (TVD) ft | | Height: 3606.00 ft +N/-S ft | | 0.00 | | 0.00 | | 270.13 | | |
| Plan: Plan #1 9-6-07 | | | | Date Composed: 09/06/2007 Version: 1 Tied-to: From Surface | | | | | | |
| Principal: Yes | | | | | | | | | | |
| Plan Section Information | | | | | | | | | | |
| MD ft | Incl deg | Azim deg | TVD ft | +N/-S ft | +E/-W ft | DLS deg/100ft | Build deg/100ft | Turn deg/100ft | TFO deg | Target |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 6300.00 | 0.00 | 0.00 | 6300.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 7070.85 | 91.05 | 270.13 | 6785.00 | 1.12 | -493.97 | 11.81 | 11.81 | 0.00 | 270.13 | |
| 11087.56 | 91.05 | 270.13 | 6711.39 | 10.23 | -4509.99 | 0.00 | 0.00 | 0.00 | 0.00 | |
| Survey | | | | | | | | | | |
| MD ft | Incl deg | Azim deg | TVD ft | +N/-S ft | +E/-W ft | VS ft | DLS deg/100ft | Build deg/100ft | Turn deg/100ft | Tool/Comment |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 100.00 | 0.00 | 0.00 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 200.00 | 0.00 | 0.00 | 200.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 300.00 | 0.00 | 0.00 | 300.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 400.00 | 0.00 | 0.00 | 400.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 500.00 | 0.00 | 0.00 | 500.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 600.00 | 0.00 | 0.00 | 600.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 700.00 | 0.00 | 0.00 | 700.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 800.00 | 0.00 | 0.00 | 800.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 900.00 | 0.00 | 0.00 | 900.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 1000.00 | 0.00 | 0.00 | 1000.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 1100.00 | 0.00 | 0.00 | 1100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 1200.00 | 0.00 | 0.00 | 1200.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 1300.00 | 0.00 | 0.00 | 1300.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 1400.00 | 0.00 | 0.00 | 1400.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 1500.00 | 0.00 | 0.00 | 1500.00 | | | | | | | |

Pathfinder Energy

Planning Report

Company: COG Operating Company LLC.
 Field: Blitzen
 Site: Blitzen 35 Federal #2H
 Well: Blitzen 35 Federal #2H
 Wellpath: OH

Date: 09/06/2007 Time: 14:57:25 Page: 2
 Co-ordinate(N/E) Reference: Blitzen 35 Federal #2H, Grid North
 Vertical (TVD) Reference: SITE 3606.0
 Section (VS) Reference: Well (0.00N,0.00E,270.13Azi)
 Plan: Plan #1 9-6-07

Survey

| MD ft | Incl deg | Azim deg | TVD ft | +N/-S ft | +E/-W ft | VS ft | DLS deg/100ft | Build deg/100ft | Turn deg/100ft | Tool/Comment |
|----------|-------------|-------------|-----------|-------------|-------------|----------|------------------|--------------------|-------------------|--------------------|
| 1700.00 | 0.00 | 0.00 | 1700.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 1800.00 | 0.00 | 0.00 | 1800.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 1900.00 | 0.00 | 0.00 | 1900.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2000.00 | 0.00 | 0.00 | 2000.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2100.00 | 0.00 | 0.00 | 2100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2200.00 | 0.00 | 0.00 | 2200.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2300.00 | 0.00 | 0.00 | 2300.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2400.00 | 0.00 | 0.00 | 2400.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2500.00 | 0.00 | 0.00 | 2500.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2600.00 | 0.00 | 0.00 | 2600.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2700.00 | 0.00 | 0.00 | 2700.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2800.00 | 0.00 | 0.00 | 2800.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 2900.00 | 0.00 | 0.00 | 2900.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 3000.00 | 0.00 | 0.00 | 3000.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 3100.00 | 0.00 | 0.00 | 3100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 3200.00 | 0.00 | 0.00 | 3200.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 3300.00 | 0.00 | 0.00 | 3300.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 3400.00 | 0.00 | 0.00 | 3400.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 3500.00 | 0.00 | 0.00 | 3500.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 3600.00 | 0.00 | 0.00 | 3600.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 3700.00 | 0.00 | 0.00 | 3700.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 3800.00 | 0.00 | 0.00 | 3800.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 3900.00 | 0.00 | 0.00 | 3900.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 4000.00 | 0.00 | 0.00 | 4000.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 4100.00 | 0.00 | 0.00 | 4100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 4200.00 | 0.00 | 0.00 | 4200.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 4300.00 | 0.00 | 0.00 | 4300.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 4400.00 | 0.00 | 0.00 | 4400.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 4500.00 | 0.00 | 0.00 | 4500.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 4600.00 | 0.00 | 0.00 | 4600.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 4700.00 | 0.00 | 0.00 | 4700.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 4800.00 | 0.00 | 0.00 | 4800.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 4900.00 | 0.00 | 0.00 | 4900.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 5000.00 | 0.00 | 0.00 | 5000.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 5100.00 | 0.00 | 0.00 | 5100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 5200.00 | 0.00 | 0.00 | 5200.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 5300.00 | 0.00 | 0.00 | 5300.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 5400.00 | 0.00 | 0.00 | 5400.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 5500.00 | 0.00 | 0.00 | 5500.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 5600.00 | 0.00 | 0.00 | 5600.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 5700.00 | 0.00 | 0.00 | 5700.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 5800.00 | 0.00 | 0.00 | 5800.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 5900.00 | 0.00 | 0.00 | 5900.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 6000.00 | 0.00 | 0.00 | 6000.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 6100.00 | 0.00 | 0.00 | 6100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 6200.00 | 0.00 | 0.00 | 6200.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 6300.00 | 0.00 | 0.00 | 6300.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| 6400.00 | 11.81 | 270.13 | 6399.29 | 0.02 | -10.27 | 10.27 | 11.81 | 11.81 | 0.00 | KOP @ 6300' MD/TVD |
| 6500.00 | 23.62 | 270.13 | 6494.38 | 0.09 | -40.65 | 40.65 | 11.81 | 11.81 | 0.00 | |
| 6600.00 | 35.43 | 270.13 | 6581.24 | 0.20 | -89.85 | 89.85 | 11.81 | 11.81 | 0.00 | |
| 6700.00 | 47.25 | 270.13 | 6656.19 | 0.35 | -155.78 | 155.78 | 11.81 | 11.81 | 0.00 | |
| 6788.46 | 57.70 | 270.13 | 6710.00 | 0.51 | -225.84 | 225.84 | 11.81 | 11.81 | 0.00 | PBHL |
| 6800.00 | 59.06 | 270.13 | 6716.05 | 0.53 | -235.67 | 235.67 | 11.81 | 11.81 | 0.00 | |

Pathfinder Energy

Planning Report

Company: COG Operating Company LLC
 Field: Blitzen
 Site: Blitzen 35 Federal #2H
 Well: Blitzen 35 Federal #2H
 Wellpath: OH

Date: 09/06/2007 Time: 14:57:25 Page: 3
 Co-ordinate(NE) Reference: Blitzen 35 Federal #2H, Grid North
 Vertical (TVD) Reference: SITE 3606.0
 Section (VS) Reference: Well (0.00N,0.00E,270.13Azi)
 Plan: Plan #1 9-6-07

Survey

| MD ft | Incl deg | Azim deg | TVD ft | +N/-S ft | +E/-W ft | VS ft | DLS deg/100ft | Build deg/100ft | Turn deg/100ft | Tool/Comment |
|----------|-------------|-------------|-----------|-------------|-------------|----------|------------------|--------------------|-------------------|---------------------------|
| 6900.00 | 70.87 | 270.13 | 6758.29 | 0.74 | -326.11 | 326.11 | 11.81 | 11.81 | 0.00 | |
| 7000.00 | 82.68 | 270.13 | 6781.13 | 0.96 | -423.28 | 423.29 | 11.81 | 11.81 | 0.00 | |
| 7070.85 | 91.05 | 270.13 | 6785.00 | 1.12 | -493.97 | 493.97 | 11.81 | 11.81 | 0.00 | EOC @ 7071' MD, 6785' TVD |
| 7100.00 | 91.05 | 270.13 | 6784.47 | 1.19 | -523.11 | 523.11 | 0.00 | 0.00 | 0.00 | |
| 7200.00 | 91.05 | 270.13 | 6782.63 | 1.41 | -623.09 | 623.10 | 0.00 | 0.00 | 0.00 | |
| 7300.00 | 91.05 | 270.13 | 6780.80 | 1.64 | -723.08 | 723.08 | 0.00 | 0.00 | 0.00 | |
| 7400.00 | 91.05 | 270.13 | 6778.97 | 1.87 | -823.06 | 823.06 | 0.00 | 0.00 | 0.00 | |
| 7500.00 | 91.05 | 270.13 | 6777.14 | 2.09 | -923.04 | 923.04 | 0.00 | 0.00 | 0.00 | |
| 7600.00 | 91.05 | 270.13 | 6775.30 | 2.32 | -1023.03 | 1023.03 | 0.00 | 0.00 | 0.00 | |
| 7700.00 | 91.05 | 270.13 | 6773.47 | 2.55 | -1123.01 | 1123.01 | 0.00 | 0.00 | 0.00 | |
| 7800.00 | 91.05 | 270.13 | 6771.64 | 2.77 | -1222.99 | 1222.99 | 0.00 | 0.00 | 0.00 | |
| 7900.00 | 91.05 | 270.13 | 6769.81 | 3.00 | -1322.97 | 1322.98 | 0.00 | 0.00 | 0.00 | |
| 8000.00 | 91.05 | 270.13 | 6767.97 | 3.23 | -1422.96 | 1422.96 | 0.00 | 0.00 | 0.00 | |
| 8100.00 | 91.05 | 270.13 | 6766.14 | 3.46 | -1522.94 | 1522.94 | 0.00 | 0.00 | 0.00 | |
| 8200.00 | 91.05 | 270.13 | 6764.31 | 3.68 | -1622.92 | 1622.93 | 0.00 | 0.00 | 0.00 | |
| 8300.00 | 91.05 | 270.13 | 6762.48 | 3.91 | -1722.91 | 1722.91 | 0.00 | 0.00 | 0.00 | |
| 8400.00 | 91.05 | 270.13 | 6760.64 | 4.14 | -1822.89 | 1822.89 | 0.00 | 0.00 | 0.00 | |
| 8500.00 | 91.05 | 270.13 | 6758.81 | 4.36 | -1922.87 | 1922.88 | 0.00 | 0.00 | 0.00 | |
| 8600.00 | 91.05 | 270.13 | 6756.98 | 4.59 | -2022.85 | 2022.86 | 0.00 | 0.00 | 0.00 | |
| 8700.00 | 91.05 | 270.13 | 6755.15 | 4.82 | -2122.84 | 2122.84 | 0.00 | 0.00 | 0.00 | |
| 8800.00 | 91.05 | 270.13 | 6753.31 | 5.04 | -2222.82 | 2222.83 | 0.00 | 0.00 | 0.00 | |
| 8900.00 | 91.05 | 270.13 | 6751.48 | 5.27 | -2322.80 | 2322.81 | 0.00 | 0.00 | 0.00 | |
| 9000.00 | 91.05 | 270.13 | 6749.65 | 5.50 | -2422.79 | 2422.79 | 0.00 | 0.00 | 0.00 | |
| 9100.00 | 91.05 | 270.13 | 6747.82 | 5.72 | -2522.77 | 2522.78 | 0.00 | 0.00 | 0.00 | |
| 9200.00 | 91.05 | 270.13 | 6745.98 | 5.95 | -2622.75 | 2622.76 | 0.00 | 0.00 | 0.00 | |
| 9300.00 | 91.05 | 270.13 | 6744.15 | 6.18 | -2722.74 | 2722.74 | 0.00 | 0.00 | 0.00 | |
| 9400.00 | 91.05 | 270.13 | 6742.32 | 6.40 | -2822.72 | 2822.73 | 0.00 | 0.00 | 0.00 | |
| 9500.00 | 91.05 | 270.13 | 6740.49 | 6.63 | -2922.70 | 2922.71 | 0.00 | 0.00 | 0.00 | |
| 9600.00 | 91.05 | 270.13 | 6738.65 | 6.86 | -3022.68 | 3022.69 | 0.00 | 0.00 | 0.00 | |
| 9700.00 | 91.05 | 270.13 | 6736.82 | 7.08 | -3122.67 | 3122.68 | 0.00 | 0.00 | 0.00 | |
| 9800.00 | 91.05 | 270.13 | 6734.99 | 7.31 | -3222.65 | 3222.66 | 0.00 | 0.00 | 0.00 | |
| 9900.00 | 91.05 | 270.13 | 6733.16 | 7.54 | -3322.63 | 3322.64 | 0.00 | 0.00 | 0.00 | |
| 10000.00 | 91.05 | 270.13 | 6731.32 | 7.77 | -3422.62 | 3422.62 | 0.00 | 0.00 | 0.00 | |
| 10100.00 | 91.05 | 270.13 | 6729.49 | 7.99 | -3522.60 | 3522.61 | 0.00 | 0.00 | 0.00 | |
| 10200.00 | 91.05 | 270.13 | 6727.66 | 8.22 | -3622.58 | 3622.59 | 0.00 | 0.00 | 0.00 | |
| 10300.00 | 91.05 | 270.13 | 6725.83 | 8.45 | -3722.56 | 3722.57 | 0.00 | 0.00 | 0.00 | |
| 10400.00 | 91.05 | 270.13 | 6723.99 | 8.67 | -3822.55 | 3822.56 | 0.00 | 0.00 | 0.00 | |
| 10500.00 | 91.05 | 270.13 | 6722.16 | 8.90 | -3922.53 | 3922.54 | 0.00 | 0.00 | 0.00 | |
| 10600.00 | 91.05 | 270.13 | 6720.33 | 9.13 | -4022.51 | 4022.52 | 0.00 | 0.00 | 0.00 | |
| 10700.00 | 91.05 | 270.13 | 6718.50 | 9.35 | -4122.50 | 4122.51 | 0.00 | 0.00 | 0.00 | |
| 10800.00 | 91.05 | 270.13 | 6716.66 | 9.58 | -4222.48 | 4222.49 | 0.00 | 0.00 | 0.00 | |
| 10900.00 | 91.05 | 270.13 | 6714.83 | 9.81 | -4322.46 | 4322.47 | 0.00 | 0.00 | 0.00 | |
| 11000.00 | 91.05 | 270.13 | 6713.00 | 10.03 | -4422.45 | 4422.46 | 0.00 | 0.00 | 0.00 | |
| 11087.56 | 91.05 | 270.13 | 6711.39 | 10.23 | -4509.99 | 4510.00 | 0.00 | 0.00 | 0.00 | TD @ 11088' MD |

Targets

| Name | Description Dip. Dir. | TVD ft | +N/-S ft | +E/-W ft | Map Northing ft | Map Easting ft | <--- Latitude ---><--- Longitude ---> | | | | | |
|------|--------------------------|-----------|-------------|-------------|-----------------------|----------------------|---------------------------------------|-----|--------|-----|-----|------------|
| | | | | | | | Deg | Min | Sec | Deg | Min | Sec |
| PBHL | | 6710.00 | 10.19 | -4568.13 | 684623.46 | 596257.24 | 32 | 52 | 54.904 | N | 104 | 9 15.971 W |

Pathfinder Energy

Planning Report

| | | | |
|---|--|-----------------------|----------------|
| Company: COG Operating Company LLC | Date: 09/06/2007 | Time: 14:57:25 | Page: 4 |
| Field: Blitzen | Co-ordinate(NE) Reference: Blitzen 35 Federal #2H, Grid North | | |
| Site: Blitzen 35 Federal #2H | Vertical (TVD) Reference: SITE 3606.0 | | |
| Well: Blitzen 35 Federal #2H | Section (VS) Reference: Well (0.00N,0.00E,270.13Azi) | | |
| Wellpath: OH | Plan: | Plan #1 9-6-07 | |

Annotation

| MD ft | TVD ft | |
|----------|-----------|---------------------------|
| 6300.00 | 6300.00 | KOP @ 6300' MD/TVD |
| 7070.85 | 6785.00 | EOC @ 7071' MD, 6785' TVD |
| 11087.55 | 6711.39 | TD @ 11088' MD |

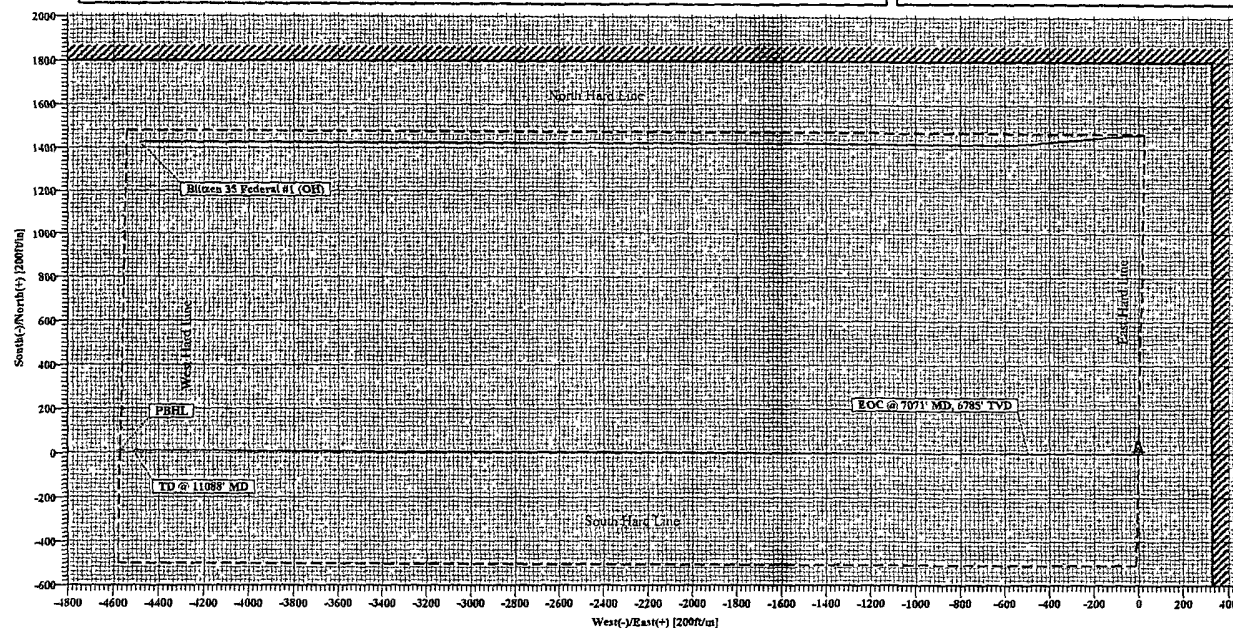
COG Operating Company LLC.

PATHFINDER

| SECTION DETAILS | | | | | | | | | |
|-----------------|----------|-------|--------|---------|-------|----------|-------|--------|-------------|
| Sec | MD | Inc | Azi | TVD | +N/-S | +E/-W | DLeg | TFace | VSec Target |
| 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 6300.00 | 0.00 | 0.00 | 6300.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 7070.85 | 91.05 | 270.13 | 6785.00 | 1.12 | -493.97 | 11.81 | 270.13 | 493.97 |
| 4 | 11087.56 | 91.05 | 270.13 | 6711.39 | 10.23 | -4509.99 | 0.00 | 0.00 | 4510.00 |

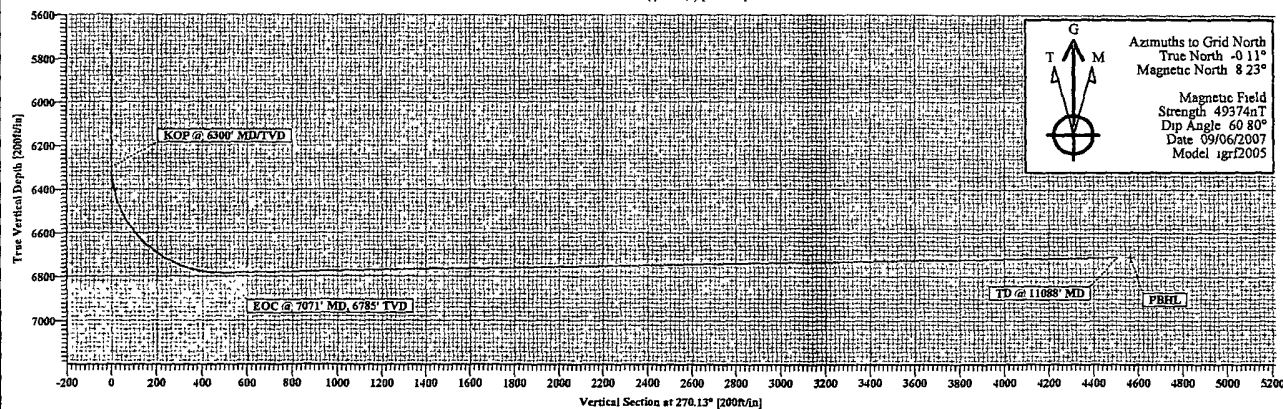
FORMATION TOP DETAILS
No TVDPath MDPATH Formation
No formation top details fall on the wellpath

Field: **Blitzen**
Site: **Blitzen 35 Federal #2H**
Well: **Blitzen 35 Federal #2H**
Wellpath: **OH**
Plan: **Plan #1 9-6-07**



| SITE DETAILS | |
|------------------------|-----------|
| Blitzen 35 Federal #2H | |
| Site Centre Northing | 684613.27 |
| Easting | 600825.37 |
| Ground Level | 3585.00 |
| Positional Uncertainty | 0.00 |
| Convergence | 0.11 |

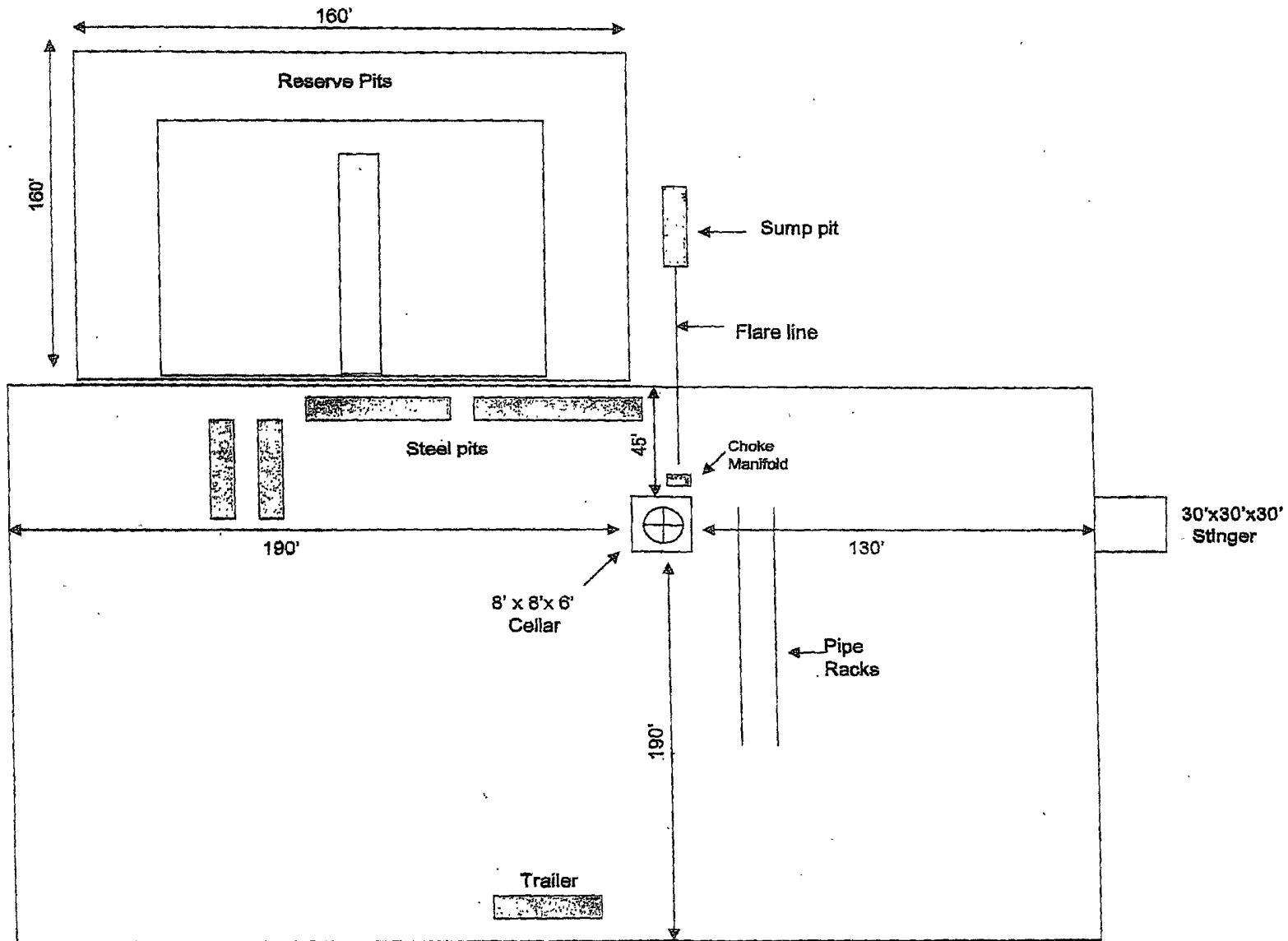
| TARGET DETAILS | | | | |
|----------------|---------|-------|----------|-------|
| Name | TVD | +N/-S | +E/-W | Shape |
| PBHL | 6710.00 | 10.19 | -4568.13 | Point |



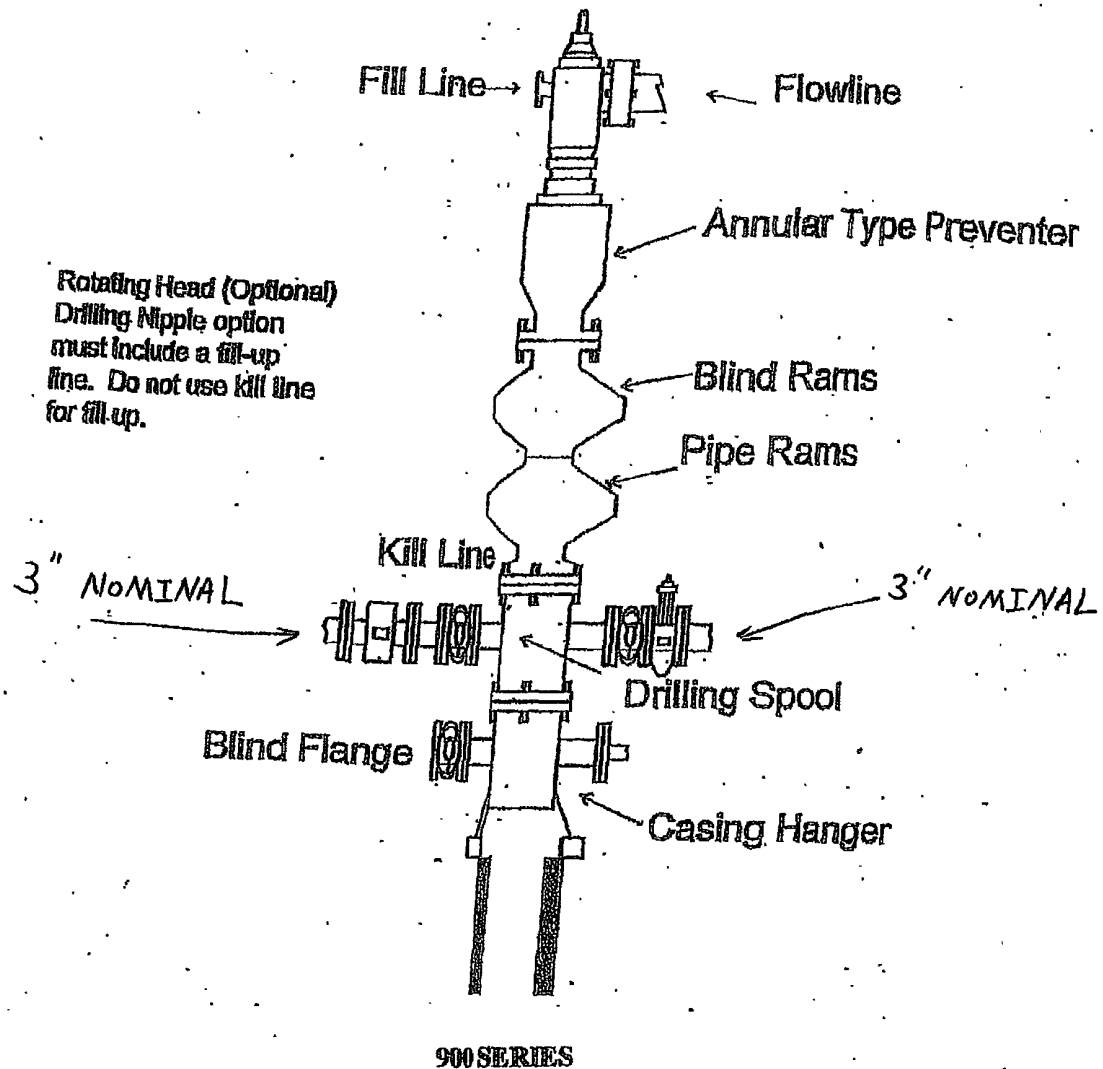
| WELLPATH DETAILS | | | | |
|------------------|--------------|--------------|-------------------|--|
| OH | | | | |
| Rig Ref Datum | SITE | 3606.00R | | |
| V Section Angle | Origin +N/-S | Origin +E/-W | Starting From TVD | |
| 270.13° | 0.00 | 0.00 | 0.00 | |

| ANNOTATIONS | | | | |
|-------------|---------|----------|---------------------------|--|
| No | TVD | MD | Annotation | |
| 1 | 6300.00 | 6300.00 | KOP @ 6300' MD/TVD | |
| 2 | 6785.00 | 7070.85 | EOC @ 7071' MD, 6785' TVD | |
| 3 | 6711.39 | 11087.55 | TD @ 11088' MD | |

See COAH

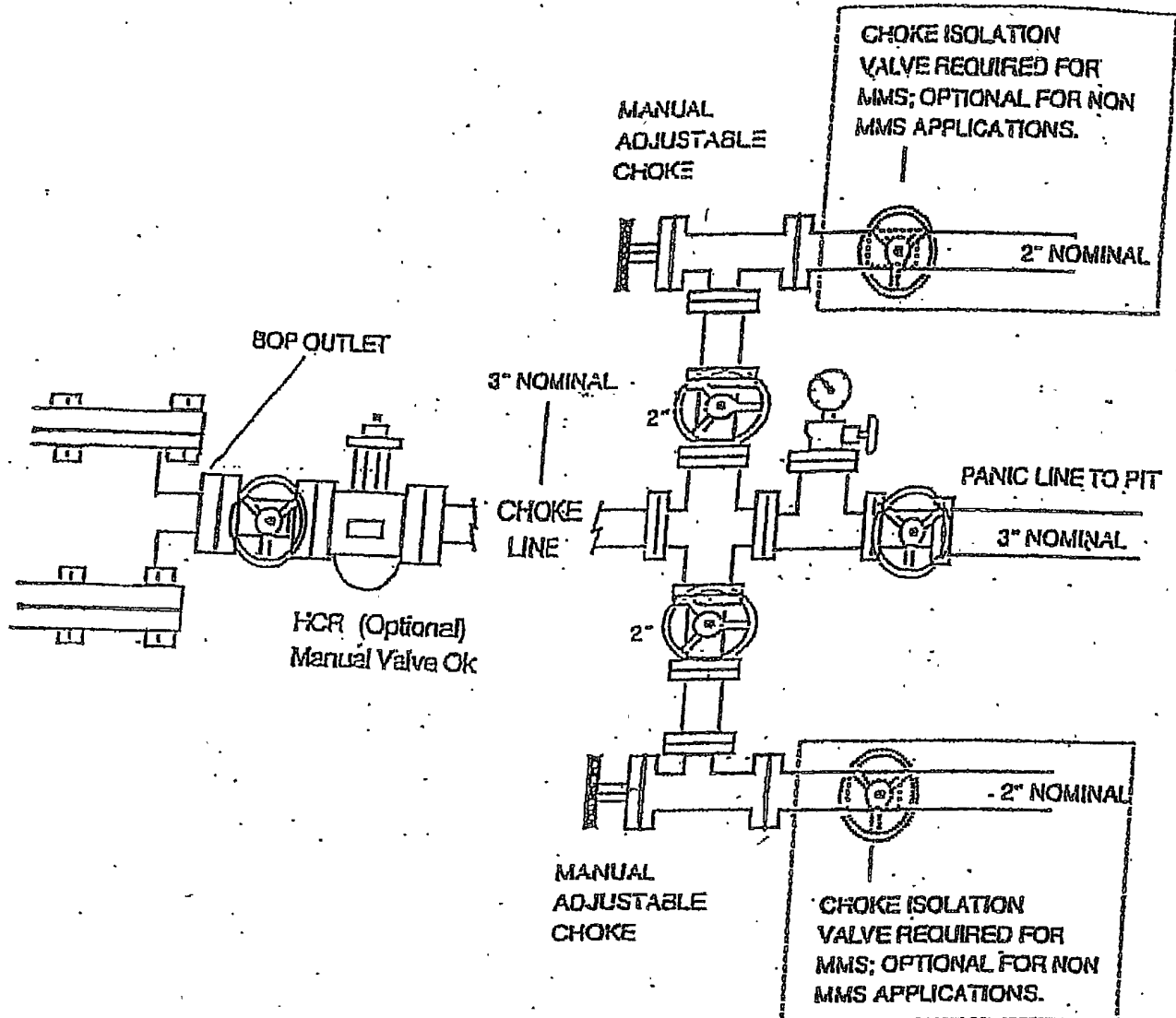


BOPE SCHEMATIC



CHOKE MANIFOLD

3M SERVICE



COG OPERATING, LLC

HYDROGEN SULFIDE (H₂S) CONTINGENCY PLAN FOR DRILLING / COMPLETING / WORKOVER / FACILITY WITH THE EXPECTATION OF H₂S IN EXCESS OF 100 PPM

**Blitzen "35" Federal 2H
NEW DRILL WELL
SL: 1800' FNL & 330' FEL, UNIT H
BHL: 1800' FNL & 330' FWL, UNIT E
SECTION 35, T16S, R28E
EDDY COUNTY, NEW MEXICO**

This well / facility is not expected to have H₂S, but the following is submitted as requested.

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| | | |
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| III. | Emergency Numbers for Notification | Page 4 |
| IV. | Protection of the General (ROE) Radius of Exposure | Page 5 |
| V. | Public Evacuation Plan | Page 6 |
| VI. | Procedure for Igniting an Uncontrollable Condition | Page 7 |
| VII. | Required Emergency Equipment | Page 8 |
| VIII. | Using Self-Contained Breathing Air Equipment (SCBA) | Page 9 |
| IX. | Rescue & First Aid for Victims of H ₂ S Poisoning | Page 10 |
| X. | H ₂ S Toxic Effects | Pages 11-12 |
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| XII. | Location Map | Page 15 |
| XIII. | Vicinity Map | Page 16 |

GENERAL H2S EMERGENCY ACTIONS

In the event of any evidence of H2S emergency, the following plan will be initiated:

1. All personnel will immediately evacuate to an up-wind and if possible up-hill "safe area".
2. If for any reason a person must enter the hazardous area, they must wear a SCBA (self-contained breathing apparatus).
3. Always use the "buddy system".
4. Isolate the well / problem if possible.
5. Account for all personnel.
6. Display the proper colors warning all unsuspecting personnel of the danger at hand.
7. Contact the company representative as soon as possible if not at the location (use the enclosed call list as instructed).

At this point the company representative will evaluate the situation and coordinate the necessary duties to bring the situation under control, and if necessary, the notification of emergency response agencies and residents.

EMERGENCY PROCEDURES FOR AN UNCONTROLLABLE RELEASE OF H2S

1. All personnel will don the self-contained breathing apparatus.
2. Remove all personnel to the "safe area: (always use the "buddy system").
3. Contact company representative if not on location.
4. Set in motion the steps to protect and / or remove the general public to any upwind "safe are". Maintain strict security and safety procedures while dealing with the source.
5. No entry to any unauthorized personnel.
6. Notify the appropriate agencies:
City Police - City streets
State Police - State Roads
County Sheriff - County Roads
7. Call the NMOCD.

If at this time the supervising person determines the release of H2S cannot be contained to the site location and the general public is in harms way, he will immediately notify public safety personnel.

EMERGENCY CALL LIST

| | <u>Office</u> | <u>Cell</u> | <u>Home</u> |
|--------------|---------------|--------------|--------------|
| John Coffman | 432-683-7443 | 432-631-9762 | 432-699-5552 |
| Erick Nelson | 432-683-7443 | 432-238-7591 | |
| Matt Corser | 432-683-7443 | 432-413-0071 | |

EMERGENCY RESPONSE NUMBERS
Eddy County, New Mexico

| | |
|---|----------------------------|
| State Police | 505-748-9718 |
| Eddy County Sheriff | 505-746-2701 |
| Emergency Medical Services (Ambulance) | 911 or 505-746-2701 |
| Eddy County Emergency Management (Harry Burgess) | 505-887-9511 |
| State Emergency Response Center (SERC) | 505-476-9620 |
| Carlsbad Police Department | 505-885-2111 |
| Carlsbad Fire Department | 505-885-3125 |
| New Mexico Oil Conservation Division | 505-748-1283 |
| Callaway Safety Equipment, Inc. | 505-392-2973 |

PROTECTION OF THE GENERAL (ROE) RADIUS OF EXPOSURE

In the event greater than 100 ppg H₂S is present, the ROE calculations will be done to determine if the following is warranted:

- * 100 ppm at any public area (any place not associated with this site)
- * 500 ppm at any public road (any road which the general public may travel).
- * 100 ppm radius of 3000' will be assumed if there is insufficient data to do the calculations, and there is a reasonable expectation that H₂S could be present in concentrations greater than 100 ppm in the gas mixture.

Calculation for the 100 ppm ROE: (H₂S concentrations in decimal form)

$$X = [(1.589)(\text{concentration})(Q)] (0.6258)$$

$$10,000 \text{ ppm} = .01$$

$$1,000 \text{ ppm} = .001$$

Calculation for the 500 ppm ROE:

$$100 \text{ ppm} = .0001$$

$$10 \text{ ppm} = .00001$$

$$X = [(0.4546)(\text{concentration})(Q)] (.06258)$$

EXAMPLE: If a well / facility has been determined to have 150 ppm H₂S in the gas mixture and the well / facility is producing at a gas rate of 200 MCFD then:

$$\text{ROE for 100 ppm} \quad X = [(1.589)(.00010)(200,000)] (0.6258)$$

$$X = 8.8'$$

$$\text{ROE for 500 ppm} \quad X = [(0.4546)(.00050)(200,000)] (0.6258)$$

$$X = 10.9'$$

These calculations will be forwarded to the appropriate NMOCD district office when applicable.

PUBLIC EVACUATION PLAN

When the supervisor has determined that the general public will be involved, the following plan will be implemented.

1. Notification of the emergency response agencies of the hazardous condition and implement evacuation procedures.
2. A trained person in H₂S safety shall monitor with detection equipment the H₂S concentration, wind and area of exposure. This person will determine the outer perimeter of the hazardous area. The extent of the evacuation area will be determined from the data being collected. Monitoring shall continue until the situation has been resolved. All monitoring equipment shall be UL approved for use in Class I Groups A, B, C & D, Division I hazardous locations. All monitors will have a minimum capability of measuring H₂S, oxygen, and flammable values.
3. Law enforcement shall be notified to set up necessary barriers and maintain such for the duration of the situation as well as aid in the evacuation procedure.
4. The company representative shall stay in communication with all agencies throughout the duration of the situation and inform such agencies when the situation has been contained and the effected area is safe to enter.

PROCEDURE FOR IGNITING AN UNCONTROLLABLE CONDITION

The decision to ignite a well should be a last resort and one, if not both, of the following pertain:

1. Human life and / or property are endangered.
2. There is no hope of bringing the situation under control with the prevailing conditions at the site.

Instructions for Igniting the Well:

1. Two people are required. They must be equipped with positive pressure, self-contained breathing apparatus and "D"-ring style, full body, OSHA approved safety harness. Non-flammable rope will be attached.
2. One of the people will be a qualified safety person who will test the atmosphere for H₂S, oxygen and LFL. The other person will be the company representative.
3. Ignite upwind from a distance no closer than necessary. Make sure that where you ignite from has the maximum escape avenue available. A 25mm flare gun with a range of approximately +/- 500 feet shall be used to ignite the gas.
4. Before igniting, check for the presence of combustible gases.
5. After igniting, continue emergency actions and procedures as before.

REQUIRED EMERGENCY EQUIPMENT

1. Breathing Apparatus

- * Rescue Packs (SCBA) – 1 unit shall be placed at each breathing area, 2 shall be stored in the safety trailer.
- * Work / Escape Packs – 4 packs shall be stored on the rig floor with sufficient air hose not to restrict work activity.
- * Emergency Escape Packs – 4 packs shall be stored in the doghouse for emergency evacuation.

2. Signage and Flagging

- * One Color Code Condition Sign will be placed at the entrance to the site reflecting the possible conditions at the site.
- * A Colored Condition flag will be on display reflecting the condition at the site at that time.

3. Briefing Area

- * Two perpendicular areas will be designated by signs and readily accessible.

4. Windsocks

- * Two windsocks will be placed in strategic locations, visible from all angles.

5. H2S Detectors and Alarms

* The stationary detector with three (3) sensors will be placed in the upper dog house if equipped, set to visually alarm @ 10 ppm and audible alarm @ 15 ppm. Calibrate a minimum of every 30 days or as needed. The three sensors will be placed in the following places: (Gas sample tubes will be stored in the safety trailer):

- * Rig Floor
- * Bell Nipple
- * End of flow line or where well bore fluid is being discharged

6. Auxiliary Rescue Equipment

- * Stretcher
- * Two OSHA full body harnesses

- * 100' of 5/8" OSHA approved rope
- * One 20 lb. Class ABC fire extinguisher
- * Communication via cell phones on location and vehicles on location

USING SELF-CONTAINED BREATHING AIR EQUIPMENT (SCBA)

1. SCBA should be worn when any of the following are performed:
 - * Working near the top or on top of a tank
 - * Disconnecting any line where H₂S can reasonably be expected.
 - * Sampling air in the area to determine if toxic concentrations of H₂S exist.
 - * Working in areas where over 10 ppm of H₂S has been detected.
 - * At any time there is a doubt of the level of H₂S in the area.
2. All personnel shall be trained in the use of SCBA prior to working in a potentially hazardous location.
3. Facial hair and standard eyeglasses are not allowed with SCBA.
4. Contact lenses are never allowed with SCBA.
5. When breaking out any line where H₂S can reasonably be expected.
6. After each use, the SCBA unit shall be cleaned, disinfected, serviced and inspected.
7. All SCBA shall be inspected monthly.

RESCUE & FIRST AID FOR VICTIMS OF H₂S POISONING

- * Do not panic.
- * Remain calm and think.
- * Get on the breathing apparatus.
- * Remove the victim to the safe breathing area as quickly as possible, upwind and uphill from source or crosswind to achieve upwind.
- * Notify emergency response personnel.
- * Provide artificial respiration and / or CPR as necessary.
- * Remove all contaminated clothing to avoid further exposure.
- * A minimum of two (2) personnel on location shall be trained in CPR and First Aid.

Toxic Effects of H2S Poisoning

Hydrogen Sulfide is extremely toxic. The acceptable ceiling concentration for eight-hour exposure is 10 PPM, which is .001% by volume. Hydrogen Sulfide is heavier than air (specific gravity-1.192) and is colorless and transparent. Hydrogen Sulfide is almost as toxic as Hydrogen Cyanide and is 5-6 times more toxic than Carbon Monoxide. Occupational exposure limits for Hydrogen sulfide and other gasses are compared below in Table 1. toxicity table for H2S and physical effects are shown in Table II.

Table 1
Permissible Exposure Limits of Various Gasses

| Common Name | Symbol | Sp. Gravity | TLV | STEL | IDLH |
|------------------|--------|-------------|----------|------------|---------|
| Hydrogen Cyanide | HCN | .94 | 4.7 ppm | C | |
| Hydrogen Sulfide | H2S | 1.192 | 10 ppm | 15 ppm | 100 ppm |
| Sulfide Dioxide | SO2 | 2.21 | 2 ppm | 5 ppm | |
| Chlorine | CL | 2.45 | .5 ppm | 1 ppm | |
| Carbon Monoxide | CO | .97 | 25 ppm | 200 ppm | |
| Carbon Dioxide | CO2 | 1.52 | 5000 ppm | 30,000 ppm | |
| Methane | CH4 | .55 | 4.7% LEL | 14% UEL | |

Definitions

- A. TLV – Threshold Limit Value is the concentration employees may be exposed to based on a TWA (time weighted average) for eight (8) hours in one day for 40 hours in one (1) week. This is set by ACGIH (American Conference of Governmental Hygienists and regulated by OSHA.
- B. STEL – Short Term Exposure Limit is the 15 minute average concentration an employee may be exposed to providing that the highest exposure never exceeds the OEL (Occupational Exposure Limit). The OEL for H2S is 19 PPM.
- C. IDLH – Immediately Dangerous to Life and Health is the concentration that has been determined by the ACGIH to cause serious health problems or death if exposed to this level. The IDLH for H2S is 100 PPM.
- D. TWA – Time Weighted Average is the average concentration of any chemical or gas for an eight (8) hour period. This is the concentration that any employee may be exposed to based on an TWA.

TABLE II
Toxicity Table of H₂S

| Percent % | PPM | Physical Effects |
|-----------|------|---|
| .0001 | 1 | Can smell less than 1 ppm. |
| .001 | 10 | TLV for 8 hours of exposure |
| .0015 | 15 | STEL for 15 minutes of exposure |
| .01 | 100 | Immediately Dangerous to Life & Health. Kills sense of smell in 3 to 5 minutes. |
| .02 | 200 | Kills sense of smell quickly, may burn eyes and throat. |
| .05 | 500 | Dizziness, cessation of breathing begins in a few minutes. |
| .07 | 700 | Unconscious quickly, death will result if not rescued promptly. |
| .10 | 1000 | Death will result unless rescued promptly. Artificial resuscitation may be necessary. |

PHYSICAL PROPERTIES OF H₂S

The properties of all gasses are usually described in the context of seven major categories:

COLOR
ODOR
VAPOR DENSITY
EXPLOSIVE LIMITS
FLAMMABILITY
SOLUBILITY (IN WATER)
BOILING POINT

Hydrogen Sulfide is no exception. Information from these categories should be considered in order to provide a fairly complete picture of the properties of the gas.

COLOR – TRANSPARENT

Hydrogen Sulfide is colorless so it is invisible. This fact simply means that you can't rely on your eyes to detect its presence, a fact that makes the gas extremely dangerous to be around.

ODOR – ROTTEN EGGS

Hydrogen Sulfide has a distinctive offensive smell, similar to "rotten eggs". For this reason it earned its common name "sour gas". However, H₂S, even in low concentrations, is so toxic that it attacks and quickly impairs a victim's sense of smell, so it could be fatal to rely on your nose as a detection device.

VAPOR DENSITY – SPECIFIC GRAVITY OF 1.192

Hydrogen Sulfide is heavier than air so it tends to settle in low-lying areas like pits, cellars or tanks. If you find yourself in a location where H₂S is known to exist, protect yourself. Whenever possible, work in an area upwind and keep to higher ground.

EXPLOSIVE LIMITS – 4.3% TO 46%

Mixed with the right proportion of air or oxygen, H₂S will ignite and burn or explode, producing another alarming element of danger besides poisoning.

FLAMMABILITY

Hydrogen Sulfide will burn readily with a distinctive clear blue flame, producing Sulfur Dioxide (SO₂), another hazardous gas that irritates the eyes and lungs.

SOLUBILITY – 4 TO 1 RATIO WITH WATER

Hydrogen Sulfide can be dissolved in liquids, which means that it can be present in any container or vessel used to carry or hold well fluids including oil, water, emulsion and sludge. The solubility of H₂S is dependent on temperature and pressure, but if conditions are right, simply agitating a fluid containing H₂S may release the gas into the air.

BOILING POINT – (-76 degrees Fahrenheit)

Liquefied Hydrogen Sulfide boils at a very low temperature, so it is usually found as a gas.