

30-015-39189

**Hydrogen Sulfide (H<sub>2</sub>S) Contingency Plan**

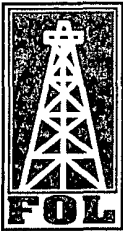
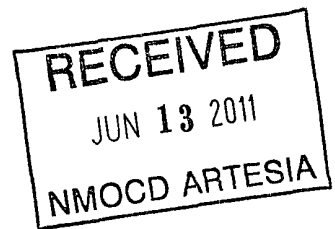
**Fair 18 Federal #1**

**2310' FNL & 840' FEL Section 18, T. 17 S., R. 31 E.**

**Eddy County, New Mexico**

**32.83543° North & 103.90318° West**

**Prepared for**



**FAIR OIL, LTD.**

P.O. Box 689 • Tyler, Texas, 75710 • 225 South College • Tyler, Texas 75702 • (903) 592-3811 • FAX (903) 597-3587

Prepared by

**PERMITS WEST, INC.**  
PROVIDING PERMITS for LAND USERS  
37 Verano Loop, Santa Fe, New Mexico 87505 (505) 466-8120

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BUREAU OF LAND MGMT  
CARLSBAD FIELD OFFICE

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### **Checklist for Drilling, Work Over, and Maintenance in H<sub>2</sub>S Environment**

1. All personnel will receive proper H<sub>2</sub>S training in accordance with Onshore Order 6, Section III.C.3.a.
2. Two safety-briefing areas will be established at least 100 yards from the wellhead. At least one briefing area will be upwind at all times. These sites should be located uphill whenever possible. (see Appendix 3.1)
3. Identify direction of prevailing winds (see Appendix 3.1)
4. At least two wind socks will be installed at all times
5. Primary and secondary emergency escape routes (flagged trail minimum)
6. Number, types, and storage location of H<sub>2</sub>S emergency respirators for personnel, and number of personnel to be present onsite at any one time.
7. H<sub>2</sub>S detector locations (3 minimum to include cellar or bell nipple and mud tanks at shale shaker). Type and location of visual and audible alarms to be used.
8. H<sub>2</sub>S evacuation and emergency training procedures and schedule (i.e. Contingency Plan)
9. List of area residents within a two-mile radius, evacuation plan, and contact list (including agencies and individuals)
10. Types and quantities of mud additives and scavengers to be available at location for H<sub>2</sub>S operations
11. Design features and operational procedures to be used to provide safe working environment (all equipment meets standards for H<sub>2</sub>S service)
12. Appropriate warning signs and flags on all access roads
13. Provisions for blocking and monitoring access to location during critical incident
14. Ventilation fan under rig floor
15. In event of uncontrolled blowout, designation of local official who has authority to ignite flow
16. Swabbing or drill stem fluids containing H<sub>2</sub>S should be put through a separator to permit flaring of gas. Flare should have a continuous pilot light to ensure ignition of all such gas.

## 1.0 General

### 1.1 Description of Hydrogen Sulfide Gas

Hydrogen Sulfide ( $H_2S$ ) is a colorless, transparent gas with a distinct and characteristic rotten-egg odor at low concentrations. It is not detectable by odor at high concentrations.  $H_2S$  at higher concentrations and/or over longer periods of exposure paralyzes the olfactory sense for that specific odor. The gas is extremely toxic to humans and can easily become dangerous and lethal. Extreme care and caution is needed to prevent injury and/or death.  $H_2S$  has a specific gravity of 1.192 that is heavier than air. It tends, therefore, to accumulate in low places. This collection of gas can lead to dangerous concentrations in areas such as arroyos and drainages.  $H_2S$  from "down hole" is often warmer than surface air and will therefore tend to rise and therefore affect workers above the escaping source. Hydrogen Sulfide is explosive and water soluble.

### 1.2 Toxicity

American National Standards Institute standard: Z37.2-1972 Acceptable Concentrations of Hydrogen Sulfide describes  $H_2S$  toxicity in this way: Hydrogen Sulfide is an extremely toxic and irritating gas. Free hydrogen sulfide in the blood reduces its oxygen-carrying capacity, thereby depressing the nervous system. Hydrogen sulfide is oxidized quite rapidly to sulfates in the body, therefore no permanent aftereffects occur in cases of recovery from acute exposures unless oxygen deprivation of the nervous system is prolonged. There is no evidence that repeated exposures to hydrogen sulfide result in accumulative or systemic poisoning. Effects such as eye irritation, respiratory tract irritation, slow pulse rate, lassitude, digestive disturbances, and cold sweats may occur but these symptoms disappear in a relatively short time after removal from the exposure. Odors become detectable in concentrations as low as .008 parts per million (ppm) (California studies), but the sense of smell is lost after 2-15 minutes at 100 ppm.

### 1.3 H<sub>2</sub>S First Aid and Treatment Procedures

- Victim should be removed to fresh air immediately\*\*
- If victim is not breathing, rescue breathing or artificial breathing should be started immediately
- Treat for shock; keep victim warm and comfortable
- Call ambulance and/or doctor, take victim immediately to emergency room or other healthcare facility

**\*\*The rescuer(s) should always wear personal protective equipment when attempting to rescue an H<sub>2</sub>S victim. It is important to never increase the number of victims unnecessarily during an H<sub>2</sub>S emergency.**

## 2.0 Hydrogen Sulfide (H<sub>2</sub>S) Contingency Plan

### 2.1 Introduction

This plan provides required procedures to be followed to provide for a safe H<sub>2</sub>S working environment. These required procedures include safety procedures, precautionary measures, and training for emergency and standard procedures. This document sets forth the responsibilities of the operator and all individuals and entities under employment or contract with the operator working in a sour oil or gas (H<sub>2</sub>S) area.

To make this contingency plan effective and in order to provide a safe working environment, cooperation from all individuals is a necessity. Each person on site must understand normal and emergency operating procedures for this site. Each individual on site must have adequate information, training, and practice with the specific procedures described in this Contingency Plan. It is the responsibility of both the operator to provide adequate equipment, training, and procedures, as well as the individual worker's responsibility to participate fully in all H<sub>2</sub>S procedures, to familiarize themselves with the location of all safety equipment and features, and to keep equipment and procedures in working order and up to date.

In order for Fair Oil, Ltd. to provide a safe working environment for all workers and individuals in the vicinity of the well the safeguards are put in place. **Initiative lies with each and every individual for the safety of all. To this end the drilling foreman is required to and will enforce all safety procedures, for the benefit of all involved.**

### 2.2 Purpose

Fair Oil, Ltd. will provide a safe working environment for all neighbors, employees, contractors, and others involved with the drilling of its well. There exists the possibility of encountering toxic H<sub>2</sub>S gas during the drilling, completion, maintenance, and production of the well. This H<sub>2</sub>S contingency plan will be put into effect after surface casing is drilled or when it is deemed necessary by the BLM in consultation with Fair Oil, Ltd.

Safety procedures are established for each person's safety connected with the operation and for the safety of the residents of the local area. No house is within 2 miles. However, Burnett Oil Co. (575 677-2313) has an office 1.95 miles west.

The Fair Oil, Ltd foreman will strictly enforce these procedures. Noncompliance may result in loss of pay or dismissal from the site, job, or employment.

## 2.3 Operating Procedures

**Before this H<sub>2</sub>S contingency plan is operational, all personnel that are to be involved with operation will be thoroughly trained\* in the proper use of breathing apparatus\*\* (i. e. Self Contained Breathing Apparatus and Escape Units), emergency procedures, and H<sub>2</sub>S first aid and rescue methods. Training will include means of communication when wearing breathing apparatus. An approved list of trained personnel will be supplied by the safety company and stored with the drilling foreman.**

\*Required training for operation personnel will include, but not be limited to, an H<sub>2</sub>S safety course from an approved training company, safety briefing at the drill site on all safety equipment use and locations before the start of work for each and every person onsite, safety related training in-place, on-site 1,000 feet before drilling the first H<sub>2</sub>S formation.

\*\*Throughout this contingency plan breathing apparatus shall be understood as

- a) A Self-Contained Breathing Apparatus (SCBA) manufactured such as Scott Industrial C100 or similar.
- b) Or an emergency Escape Unit such as the Scott SCRAM or Elsa (or similar) often referred to as hip packs, hoods, or pony bottles.

The two types of breathing apparatus will be differentiated as a SCBA or as an Escape Unit as required.

### 2.3.1 Safety Equipment

Personal H<sub>2</sub>S & SO<sub>4</sub> monitors - Every person on site will be required to wear a personal H<sub>2</sub>S & SO<sub>4</sub> monitor at all times while onsite. Monitors will not be worn on hard hats, but should be worn on the waist belt or preferably near the chest in-front.

Breathing Apparatus - All personnel on the drill site will be assigned an individual breathing apparatus unit. This may be either an escape unit or a SCBA unit. A minimum of two SCBA type units will be onsite. These units will be used by the team whose duty it is to serve as the onsite rescue team.

Monitoring and Recording Devices - An experienced safety company (such as Total Safety U. S., Inc., Artesia, NM) will responsible for the installation and monitoring of H<sub>2</sub>S detectors placed on site. These units will be tested and recalibrated as the safety company requires. If H<sub>2</sub>S is detected, the monitors will be tested and recalibrated at least every 12 hours. This monitoring system may or may not be integral to the required two stage alarm system on site. This two stage system (visual and audio) will have a

minimum of three H<sub>2</sub>S detector locations. Monitors will be located: 1) in the cellar or on the bell nipple, 2), at the mud tanks' shale shaker, and 3), to be determined by the safety company. Visual (light) and audio (siren) alarms will activate when H<sub>2</sub>S concentrations reach 10 ppm.

First-Aid and rescue equipment - Stored on-site, but ideally uphill and upwind from H<sub>2</sub>S sources a minimum of one "rescue pack" will contain at least:

- 1 backboard, straps, head blocks
- a set of cervical collars (s-xl)
- 1 bag valve mask
- 1 bottle of oxygen
- gauze and other standard first-aid items

suggested - 1 AED (automatic external defibrillator)

Gas Monitor - An appropriate monitor should be on-site that can measure for LLE, VOC, and other explosive or hazardous gasses.

### 2.3.2 Safety Procedures

Cascade System - Every person required to perform duties within "safety zones" (see list below) will be provided with breathing equipment attached to a cascade air system. These areas are as follows

- rig floor
- mud pit
- derrick
- shale shaker
- mud hopper and bulk hopper
- all hazardous locations will be accessible by hose and work pack (SCBA)

Escape Routes - Two escape routes will be at a minimum flagged and kept clear at all times.

Safety Briefing Areas - Two safety-briefing areas will be located at the end of escape routes (see above). The briefing areas will be clearly marked, at least one up-hill, and located so that one site is always up wind. Please see attached site map for safety briefing areas in Appendix 3.1.



Safety, first-aid, and rescue equipment - Will be stored on site using best practices. This will include proper maintenance and scheduled testing, inspection, and training/practice.

Service companies - All service companies will be briefed regarding potential hazards of the well site including the presence (or potential for) H<sub>2</sub>S. These companies will be required to provide breathing apparatus and training to their employees. No service company personnel will be allowed onsite without meeting these requirements. In addition a safety briefing under the direction of the drill foreman regarding site specific H<sub>2</sub>S procedures will be provided to each new personnel member reporting on-site.

Drills and practice - Drills reviewing all and any safety procedures including evacuation, rescue, and proper procedures to shut-in a well, and identify source of H<sub>2</sub>S in instance of a leak will be practiced under the supervision of the safety company representative and company foreman. Proper use of breathing apparatus will be instructed during such drills. Drill schedule will be designed to familiarize new personnel with all safety procedures. Each crew should also be familiar with all operations. Drills should include a short work period in safety equipment.

Warning Signs - Warning signs will be posted on all access roads. "No smoking" signs will be posted at access points as well. Signs will be posted at least 200 feet and no more than 500 feet from well pad. When H<sub>2</sub>S is present at 10 ppm or greater a red flag shall be displayed on the warning sign. Gates, road barricades, and/or gate guards will be used if necessary to prevent access during critical or hazardous situations.

Wind Socks - A minimum of two windsocks should be installed at locations easily observable from all work areas. If more than two windsocks are needed in order to allow "workers" at all times to easily identify the wind direction; more windsock will be installed.

Vehicle Parking - Vehicles should be parked 200 feet from the well site with their fronts pointing away from the well site. Preferably vehicles will be located up hill and up wind from the well along the escape route.

Testing Fluids - Swabbing and testing fluids containing H<sub>2</sub>S will be pass through a separator to permit flaring of the gas. There will be a pilot light in such instances.

Bug Blowers - Circulation will be provided by explosion proof electric fans at all critical locations when necessary.

Drills - Reviewing any and all safety procedures including evacuation, rescue, proper procedures to shut-in a well, and how to identify the source of H<sub>2</sub>S if a leak occurs

will be practiced under the supervision of the safety company representative and company foreman. Proper use of breathing apparatus will be taught during such drills. The drill schedule will be designed to familiarize new personnel with all safety procedures. Each crewmember will be familiar with all operations. Drills should include a short work period in safety equipment.

### 2.3.3 Working Conditions

Occupational Safety and Health Administration (OSHA) has set guidelines for Permissible Exposure Limits (PEL). The standard is to be considered the threshold **never to be exceeded** for the health and safety of all workers on this site. Ideally, exposure would never be this high.

#### 2.3.3.1 Exposure Limits

OSHA Permissible Exposure Limit (PEL) for General Industry: 29 CFR 1910.1000 Z-2 Table -- Exposures shall not exceed 20 ppm (ceiling) with the following exception: if no other measurable exposure occurs during the 8-hour work shift, exposures may exceed 20 ppm, but not more than 50 ppm (peak), for a single time period up to 10 minutes.

OSHA Permissible Exposure Limit (PEL) for Construction Industry: 29 CFR 1926.55 Appendix A -- 10 ppm, 15 mg/m<sup>3</sup> TWA (accessed via the internet at: [http://www.osha.gov/dts/chemicalsampling/data/CH\\_246800.html#exposure](http://www.osha.gov/dts/chemicalsampling/data/CH_246800.html#exposure) on 19 July 2007)

The maximum exposure limit for an 8 hour day is less than 10 ppm.

## 2.4 H<sub>2</sub>S Emergency Procedures

### 2.4.1 Incident

H<sub>2</sub>S alarm system activation. Light and siren warnings or personal H<sub>2</sub>S monitor activation for any one “worker.”

### 2.4.2 Primary Emergency Procedure

- i. All rig crew personnel and all auxiliary personnel must **DON BREATHING APPARATUS IMMEDIATELY.**
- ii. Rig crew should mask up with SCBA type work packs preferentially
- iii. All auxiliary crew should move to safety briefing area, uphill and upwind.
- iv. All non-essential personnel should continue to evacuate site.

### 2.4.3 Secondary Emergency Procedure

#### I. Supervisory Personnel

- i. Company Foreman
  - a. Proceed to cascade trailer and check for safe operation of the cascade system.
  - b. Proceed to active safety briefing areas and account for all personnel. If all personnel are not accounted, then initiate an appropriate search.
  - c. Return to the drilling floor and supervise operations.
- ii. Tool Pusher
  - a. Proceed to cascade trailer and check if Company Foreman is operating cascade system safely. If NOT ensure safe operations of the cascade system.
  - b. Proceed to drilling floor and supervise operations. Make sure all crewmembers are accounted for and institute buddy system. If all personnel are not accounted for, initiate appropriate search.

#### II. Rig Crew

- i. Driller
  - a. if drilling

1. after donning breathing apparatus proceed to console and raise kelly to slip set position

2. shut down mud pumps

3. monitor well flow, remain at console

4. use hand signals to verify all personnel are at stations, verify company man and toolpusher's position, initiate search if well is not flowing

b. If tripping

1. after donning breathing apparatus put pipe in the slip-set position

2. stab safety valve, close safety valve

3. monitor well flow-remain at console

4. watch derrick man descend from derrick, verify all personnel locations, verify company man and tool pusher's position, initiate search if well is not flowing

c. if well is flowing

1. after donning breathing apparatus, shut well in HARD

2. verify all personnel locations, verify company man and tool pusher's position, initiate search if necessary

3. obtain necessary pressures for well control

4. proceed to safety briefing area with crew, plan well control operations with all personnel

ii. Derrick Man

a. after donning breathing apparatus, go to pit side window on the floor whether drilling or tripping (descend derrick)

b. maintain visual contact with driller and monitor flow

c. if mud properties are needed, then proceed to the shaker with "buddy"

d. monitor other hands on pit side of rig visually

e. proceed to open manual well-head if necessary (with "buddy")

iii. Motorman

- a. after donning breathing apparatus, go to the cascade system and ensure safe operation
- b. maintain visual contact with chain hand on doghouse side of floor

iv. Chain Hand

- a. after donning breathing apparatus, stab safety valve if tripping
- b. go to doghouse/pipe-rack and maintain visual contact with driller and motorman

v. Floor man

- a. after donning breathing apparatus, stab safety valve if tripping
- b. aid driller while maintaining visual contact with driller, derrick man, and chain hand

III. Auxiliary Personnel

- i. Mud engineer and Company man or geologist are to act as wardens. Wardens must account for all other auxiliary crew.
- ii. All auxiliary crew are to remain in safety briefing area unless evacuated by wardens.
- iii. Wardens organize search with notification from company. All searches are to be done with “buddy”. Geologist warden should remain in safety briefing area.

2.4.4 Igniting the Well

I. Decision

- i. The Company Foreman is responsible for the decision to ignite a well. If he is incapacitated or absent, then authority passes to the tool pusher, and then the contract driller
- ii. the decision to ignite the well is only to be made as a last resort safety measure if:
  - a. there is threat human life and grave threat to public safety and equipment
  - b. there is no alternative way of containing the well given the emergency faced.
  - c. an attempt was made to contact area office (circumstances permitting)\*

**\*When human life is threatened, there can be no delay in making a decision.**

## I. Instructions for Igniting the Well

- i. Two individuals are required for ignition
- ii. Both individuals will wear SCBAs & have 200-foot retrieval ropes tied to their waists
- iii. One individual will measure the atmosphere for explosive gasses with appropriate meter.
- iv. The other individual will remain in the safety briefing area
- v. Others in the briefing area are to remain aware of both individuals and aid as able. If either tethered individual is overcome by gas, he should be pulled to safety.
- vi. The well should be lit with a 25 mm meteor type flare gun when well conditions allow. The safest method of igniting the well should always be used.
- vii. Burning  $\text{H}_2\text{S}$  will produce sulfur dioxide which is poisonous. The area therefore is not safe once the well has ignited. Continue to observe all emergency procedures and follow orders from supervisors and the area office. Notice of incident must be reported to all appropriate authorities.

### 3.0 Appendices

#### 3.1 Check List for Safety Equipment (designed for a maximum of 11 people)

- ☐ Safety Trailer housing cascade system at least ten 300 cu. ft. bottles of compressed air
- ☐ 7 SCBA type breathing apparatus with 45 cu. ft. bottles
- ☐ 5 breathing masks connected to the cascade system with 7 cu. ft. pony bottles
- ☐ 2 extra 300 cu. ft. bottles able to refill SCBA bottles will be placed at the safety briefing areas
- ☐ 2 Wind socks
- ☐ 1 Flare gun and flares
- ☐ 1 rescue pack (as described in section 2.3.1)
- ☐ Warning signs for access (flags for marking conditions)
- ☐ "Safety Briefing Area" signs, evacuation route flags
- ☐ H<sub>2</sub>S monitors (personnel and stationary)
- ☐ Alarm system (audio and visual—explosion proof)
- ☐ Gas Monitor

### 3.2 Emergency Phone Numbers

#### Fair Oil, Ltd. Personnel to be Notified

Rodney Thompson, Production Manager

Office: (903) 510-6527

or

Jay Bynum

Office: (903) 510-6525

#### Safety Company Personnel

(Name)	(Position)	(Number work)	(Number home)
(Name)	(Position)	(Number work)	(Number home)

#### Local & County Agencies

Loco Hills Fire Department 911 or (575) 677-2349

Maljamar Fire Department 911 or (575) 676-4100

Eddy County Sheriff (Artesia) 911 (575) 748-2323

Eddy County Emergency Management (Carlsbad) (575) 887-9511

Eddy County Emergency Management (Artesia) (575) 746-9540

Eddy County Health Services (Carlsbad) (575) 887-9511

Artesia Hospital (575) 748-3333  
702 North 13<sup>th</sup> Street, Artesia

#### State Agencies

NM State Police (Artesia) (575) 748-9718

NM Oil Conservation (Artesia) (575) 748-1283

NM Oil Conservation (Santa Fe) (505) 476-3440

NM Dept. of Transportation (Roswell) (575) 637-7201



#### Federal Agencies

BLM	Carlsbad Field Office	(575) 234-5972
National Response Center		(800) 424-8802
US EPA Region 6 (Dallas)		(800) 887-6063 or (214) 665-6444

#### Other Contacts

Veterinarian	Artesia Animal Clinic	(575) 748-2042
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#### Residents within 2 miles

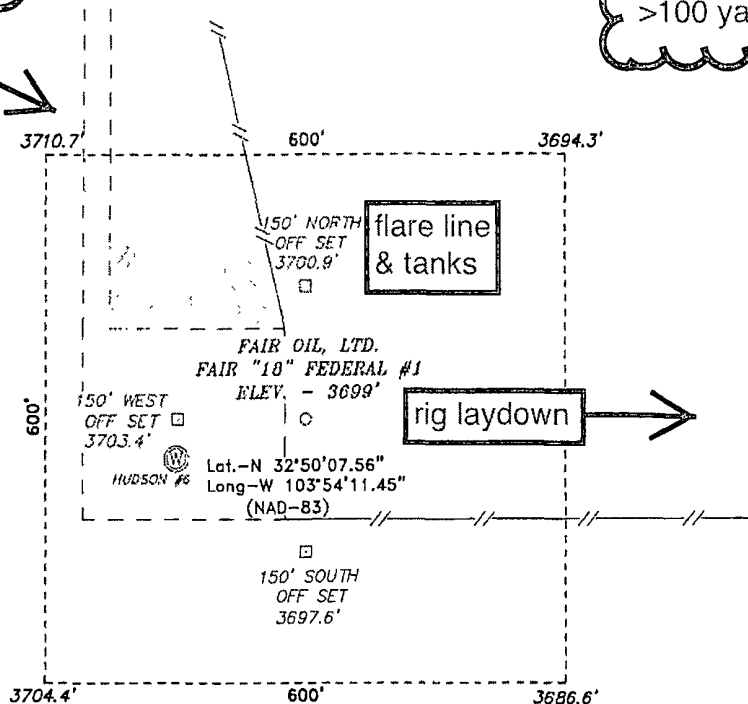
There are no homes within 2 miles. However, Burnett Oil Co. has an office 1.95 miles west. Their phone number is (575) 677-2313. The office is on County Road 220.

SECTION 18, TOWNSHIP 17 SOUTH, RANGE 31 EAST, N.M.P.M.,  
EDDY COUNTY, NEW MEXICO.

higher ground to  
west & north

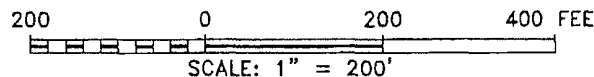
safety briefing area  
>100 yards from well head

warning  
signs &  
wind sock



safety briefing area  
>100 yards from well head

prevailing wind  
blows from SSE



Directions to Location:

FROM THE JUNCTION OF HWY 82 AND CO. RD. 220,  
GO NORTH 1.7 MILES TO CO. RD. 221 (SKELLY), GO  
EAST 1.3 MILES TO LEASE ROAD, ON LEASE ROAD  
GO EASTERLY 0.7 MILES THENCE SOUTH 0.1 MILES  
TO MERIT HUDSON #6 PAD AND PROPOSED  
LOCATION.

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

W.O. Number: 20666 Drawn By: J. SMALL

Date: 10-27-2008 Disk: JMS 20666

**FAIR OIL, LTD.**

REF: FAIR "18" FEDERAL #1 / WELL PAD TOPO

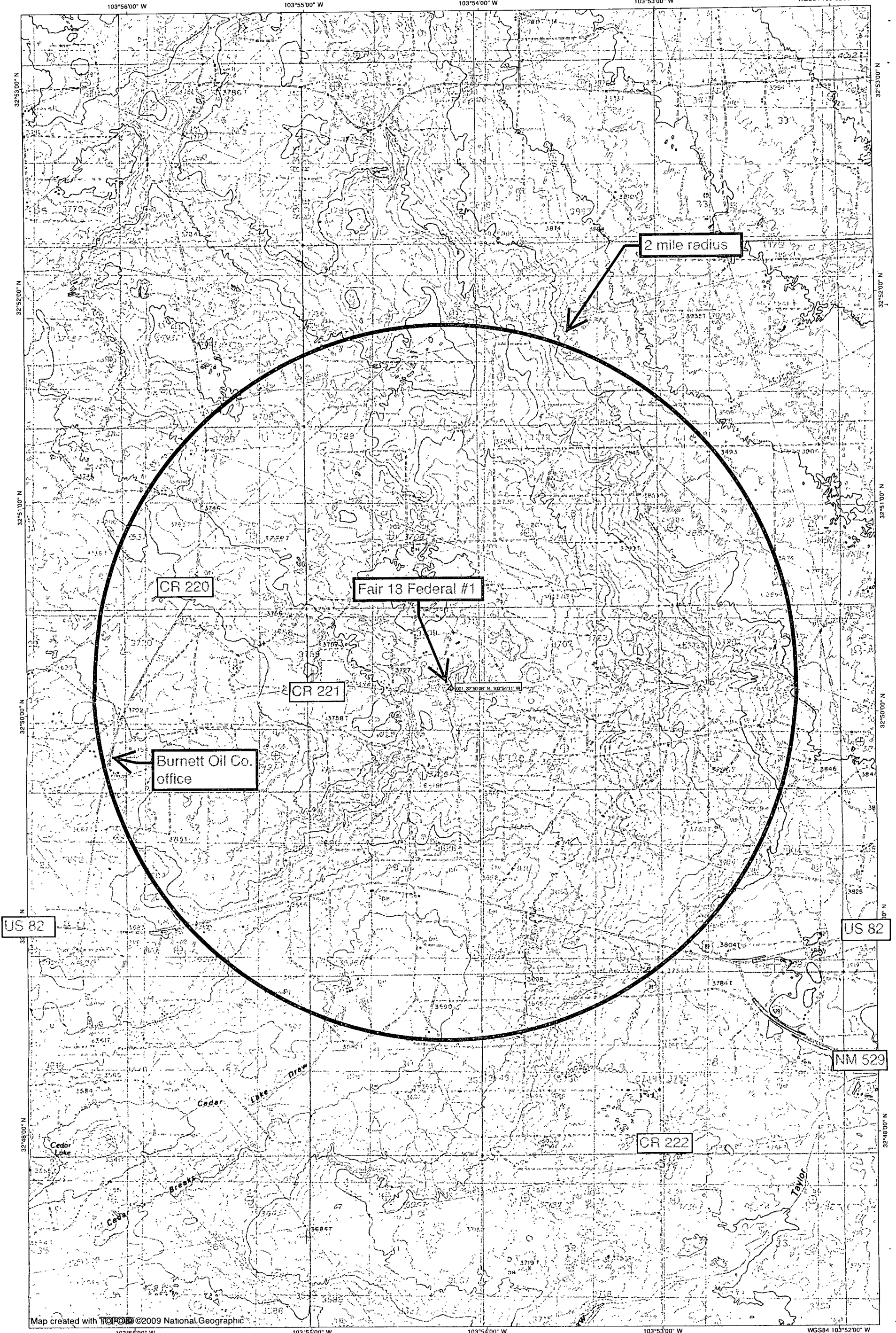
THE FAIR "18" FEDERAL #1 LOCATED 2310'

FROM THE NORTH LINE AND 840' FROM THE EAST LINE

SECTION 18, TOWNSHIP 17 SOUTH, RANGE 31 EAST,

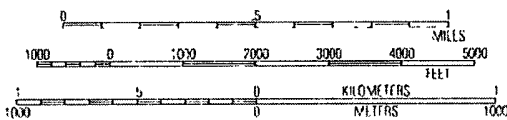
N.M.P.M., EDDY COUNTY, NEW MEXICO.

Survey Date: 10-23-2008 Sheet 1 of 1



Map created with TOPO! ©2009 National Geographic

NATIONAL  
GEOGRAPHIC



TN MN  
8°  
04/02/11