# Sandridge Energy

Legals:

Coogan Federal #2

Lariat 17

Lea County, NM
Section 1

T-21-S, R-37-E Lat: N 32.510602

Long: W 103.121560

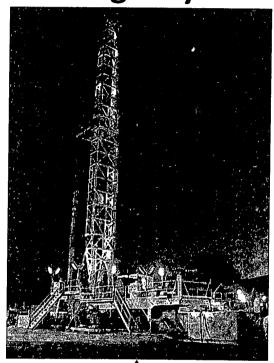
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H<sub>2</sub>S

# "Contingency Plan"





Safety Solutions, LLC 7907 Industrial

(432) 563-0400 Midland, TX 79706

Bureau of Land Management RECEIVED

AUG - 4 2011

Carlsbad Field Office Carlsbad, NM

## **Emergency Assistance Telephone List**

| PUBLIC SAFETY:                  | 911 or                |  |  |
|---------------------------------|-----------------------|--|--|
| State Police                    | (575)392-5588         |  |  |
| Lea County Sheriff's Department | (575) 396-3611        |  |  |
| Fire Department:                |                       |  |  |
| Eunice                          | (575) 394-3258        |  |  |
| Ambulance: Hobbs<br>Hospitals:  | (575) 397-9262        |  |  |
| Lea Regional                    | (575) 492-5000        |  |  |
| Andrews Memorial                | (432) 758-5811        |  |  |
| Odessa Medical Center Hospital  | (432) 640-4000        |  |  |
| U.S. Dept. of Labor             | (806) 743-7681        |  |  |
| Air Med/ Care Star              | (432) 687-2992        |  |  |
| Highway Dept                    | (575) 637-7200        |  |  |
| SERC                            | (505) 476-9628        |  |  |
| LEPC                            | (575) 526-0795        |  |  |
| NRC                             | (800) 424-8802        |  |  |
| Sandridge                       |                       |  |  |
| Sandridge                       | Office (405)-429-5500 |  |  |
| Company Drilling Manager:       |                       |  |  |
| Nick Newland                    | Cell (405) 761-5655   |  |  |
| Drilling Engineer:              |                       |  |  |
| Preston Wray                    | Cell (405) 761-2541   |  |  |
| Drilling Superintendent:        |                       |  |  |
| Brian Ehrennberg                | Cell (432) 290-8454   |  |  |
| Johnny Greene                   | Cell (432) 464-4438   |  |  |
| Lariat Drilling:                |                       |  |  |
| Lariat Office                   | (432) 333-5252        |  |  |
| Lariat 17: Rig Phone            | (832) 200-7549        |  |  |
| Safety Consultants:             |                       |  |  |
| Safety Solutions, LLC           | Office (432) 563-0400 |  |  |
| Cliff Strasner                  | Cell (432) 894-9789   |  |  |
| Craig Strasner                  | Cell (432) 894-0341   |  |  |
| <b>U</b>                        | (432) 0341            |  |  |

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## H<sub>2</sub>S CONTINGENCY PLAN SECTION

#### Scope:

This contingency plan provides an organized plan of action for alerting and protecting the public within an area of exposure prior to an intentional release, or following the accidental release of a potentially hazardous volume of hydrogen sulfide. The plan establishes guidelines for all personnel whose work activity may involve exposure to Hydrogen Sulfide Gas (H<sub>2</sub>S).

## **Objective:**

Prevent any and all accidents, and prevent the uncontrolled release of H<sub>2</sub>S into the atmosphere.

Provide proper evacuation procedures to cope with emergencies.

Provide immediate and adequate medical attention should an injury occur.

*Implementation:* This plan, with all details, is to be fully implemented 1000' before drilling into the first sour zone.

**Emergency Response Procedure:** This section outlines the conditions and denotes steps to be taken in the event of an emergency.

**Emergency Equipment and Procedure:** This section outlines the safety and emergency equipment that will be required for the drilling of this well.

**Training Provisions:** This section outlines the training provisions that must be adhered to 1000' before drilling into the first sour zone.

**Emergency call list:** Included are the telephone numbers of all persons that would need to be contacted, should an H<sub>2</sub>S emergency occur.

Briefing: This section deals with the briefing of all persons involved with the drilling of this well.

Public Safety: Public Safety Personnel will be made aware of the drilling of this well.

**Check Lists:** Status check lists and procedural check lists have been included to ensure adherence to the plan.

General Information: A general information section has been included to supply support information.

## **EMERGENCY PROCEDURES SECTION**

- I. In the event of any evidence of  $H_2S$  level above 10ppm, take the following steps immediately:
  - a. Secure breathing apparatus.
  - b. Order non-essential personnel out of the danger zone.
  - c. Take steps to determine if the H₂S level can be corrected or suppressed, and if so, proceed with normal operations.
- II. If uncontrollable conditions occur, proceed with the following:
  - a. Take steps to protect and/or remove any public downwind of the rig, including partial evacuation or isolation. Notify necessary public safety personnel, the State Emergency Response Commission (SERC), the Local Emergency Planning Commission (LEPC), the National Response Center (NRC) and the New Mexico Oil Conservation Division of the situation.
  - b. Remove all personnel to the Safe Briefing Area.
  - c. Notify public safety personnel for help with maintaining roadblocks and implementing evacuation.
  - d. Determine and proceed with the best possible plan to regain control of the well. Maintain tight security and safety measures.

## III. Responsibility:

- a. The company approved foreman shall be responsible for the total implementation of the plan.
- b. The company approved foreman shall be in complete command during any emergency.
- c. The company approved foreman shall designate a back up Supervisor in the event that he/she is not available.

## **EMERGENCY PROCEDURE IMPLEMENTATION**

## I. Drilling or Tripping

## a. All Personnel

- i. When alarm sounds, don escape unit and report to upwind Safe Briefing Area.
- ii. Check status of other personnel (buddy system).
- iii. Secure breathing apparatus.
- iv. Wait for orders from supervisor.

## **b.** Drilling Foreman

- i. Report to the upwind Safe Briefing Area.
- ii. Don Breathing Apparatus and return to the point of release with the Tool Pusher or Driller (buddy system).
- iii. Determine the concentration of H<sub>2</sub>S.
- iv. Assess the situation and take appropriate control measures.

## c. Tool Pusher

- i. Report to the upwind Safe Briefing Area.
- ii. Don Breathing Apparatus and return to the point of release with the Drilling Foreman or the Driller (buddy system).
- iii. Determine the concentration of H<sub>2</sub>S.
- iv. Assess the situation and take appropriate control measures.

## d. Driller

- Check the status of other personnel (in a rescue attempt, always use the buddy system).
- ii. Will notify rig manager or tool pusher of situation on location at present time.
- iii. Assume the responsibility of the Drilling Foreman and the Tool Pusher until they arrive, in the event of their absence.

## e. Derrick Man and Floor Hands

i. Remain in the upwind Safe Briefing Area until otherwise instructed by a supervisor.

## f. Mud Engineer

- i. Report to the upwind Safe Briefing Area.
- ii. When instructed, begin check of mud for pH level and H<sub>2</sub>S level.

## g. Safety Personnel

- i. Don Breathing Apparatus.
- ii. Check status of personnel.
- iii. Wait for instructions from Drilling Foreman or Tool Pusher.

## II. Taking a Kick

- a. All Personnel report to the upwind Safe Briefing Area.
- **b.** Follow standard BOP procedures.

## III. Open Hole Logging

- **a.** All unnecessary personnel should leave the rig floor.
- **b.** Drilling Foreman and Safety Personnel should monitor the conditions and make necessary safety equipment recommendations.

## IV. Running Casing or Plugging

- a. Follow "Drilling or Tripping" procedures.
- b. Assure that all personnel have access to protective equipment.

#### SIMULATED BLOWOUT CONTROL DRILLS

All drills will be initiated by activating alarm devices (air horn). One long blast, on the air horn for ACTUAL and SIMULATED, Blowout Control Drills. This operation will be performed by the Drilling Foreman or Tool Pusher at least one time per week for each of the following conditions, with each crew:

Drill #1 Bottom Drilling

Drill #2 Tripping Drill Pipe

In each of these drills, the initial reaction time to shutting in the well shall be timed as well as the total time for the crew to complete its entire pit drill assignment. The times must be recorded on the IADC Driller's Log as "Blowout Control Drill".

Drill No .:

Reaction Time to Shut-In:

minutes,

seconds.

Total Time to Complete Assignment:

minutes,

seconds.

## I. Drill Overviews

- a. Drill No. 1 Bottom Drilling
  - i. Sound the alarm immediately.
  - ii. Stop the rotary and hoist Kelly joint above the rotary table.
  - iii. Stop the circulatory pump.
  - iv. Close the drill pipe rams.
  - v. Record casing and drill pipe shut-in pressures and pit volume increases.
- b. Drill No. 2 Tripping Drill Pipe
  - i. Sound the alarm immediately.
  - ii. Position the upper tool joint just above the rotary table and set the slips.
  - iii. Install a full opening valve or inside blowout preventer tool in order to close the drill pipe.
  - iv. Close the drill pipe rams.
  - v. Record the shut-in annular pressure.

## **II. Crew Assignments**

## a. Drill No. 1 - Bottom Drilling

## i. Driller

- 1. Stop the rotary and hoist Kelly joint above the rotary table.
- 2. Stop the circulatory pump.
- 3. Check Flow.
- 4. If flowing, sound the alarm immediately
- 5. Record the shit-in drill pipe pressure
- 6. Determine the mud weight increase needed or other courses of action.

## ii. Derrickman

- 1. Open choke line valve at BOP.
- 2. Signal Floor Man #1 at accumulator that choke line is open.
- 3. Close choke and upstream valve after pipe tam have been closed.
- 4. Read the shut-in annular pressure and report readings to Driller.

#### iii. Floor Man #1

- 1. Close the pipe rams after receiving the signal from the Derrickman.
- 2. Report to Driller for further instructions.

## iv. Floor Man #2

- 1. Notify the Tool Pusher and Operator representative of the H<sub>2</sub>S alarms.
- 2. Check for open fires and, if safe to do so, extinguish them.
- 3. Stop all welding operations.
- 4. Turn-off all non-explosions proof lights and instruments.
- 5. Report to Driller for further instructions.

## v. Tool Pusher

- 1. Report to the rig floor.
- 2. Have a meeting with all crews.

- 3. Compile and summarize all information.
- 4. Calculate the proper kill weight.
- 5. Ensure that proper well procedures are put into action.

## vi. Operator Representative

- 1. Notify the Drilling Superintendent.
- 2. Determine if an emergency exists and if so, activate the contingency plan.

## b. Drill No. 2 - Tripping Pipe

## i. Driller

- 1. Sound the alarm immediately when mud volume increase has been detected.
- 2. Position the upper tool joint just above the rotary table and set slips.
- 3. Install a full opening valve or inside blowout preventer tool to close the drill pipe.
- 4. Check flow.
- 5. Record all data reported by the crew.
- 6. Determine the course of action.

## ii. Derrickman

- 1. Come down out of derrick.
- 2. Notify Tool Pusher and Operator Representative.
- 3. Check for open fires and, if safe to do so, extinguish them.
- 4. Stop all welding operations.
- 5. Report to Driller for further instructions.

#### iii. Floor Man #1

- 1. Pick up full opening valve or inside blowout preventer tool and stab into tool joint above rotary table (with Floor Man #2).
- 2. Tighten valve with back-up tongs.

- 3. Close pipe rams after signal from Floor Man #2.
- 4. Read accumulator pressure and check for possible high pressure fluid leaks in valves or piping.
- 5. Report to Driller for further instructions.

## iv. Floor Man #2

- 1. Pick-up full opening valve or inside blowout preventer tool and stab into tool joint above rotary table (with Floor Man #1).
- 2. Position back-up tongs on drill pipe.
- 3. Open choke line valve at BOP.
- 4. Signal Floor Man #1 at accumulator that choke line is open.
- 5. Close choke and upstream valve after pipe rams have been closed.
- 6. Check for leaks on BOP stack and choke manifold.
- 7. Read annular pressure.
- 8. Report readings to the Driller.

#### v. Tool Pusher

- 1. Report to the rig floor.
- 2. Have a meeting with all of the crews.
- 3. Compile and summarize all information.
- 4. See that proper well kill procedures are put into action.

## vi. Operator Representative

- 1. Notify Drilling Superintendent
- 2. Determine if an emergency exists, and if so, activate the contingency plan.

## TRAINING PROGRAM

When working in an area where Hydrogen Sulfide ( $H_2S$ ) might be encountered, definite training requirements must be carried out. The Company Supervisor will ensure that all personnel, at the well site, have had adequate training in the following:

- 1. Hazards and characteristics of Hydrogen Sulfide.
- 2. Physicals effects of Hydrogen Sulfide on the human body.
- 3. Toxicity of Hydrogen Sulfide and Sulfur Dioxide.
- 4. H<sub>2</sub>S detection, Emergency alarm and sensor location.
- 5. Emergency rescue.
- 6. Resuscitators.
- 7. First aid and artificial resuscitation.
- 8. The effects of Hydrogen Sulfide on metals.
- 9. Location safety.

Service company personnel and visiting personnel must be notified if the zone contains  $H_2S$ , and each service company must provide adequate training and equipment for their employees before they arrive at the well site. All training and drill attendance will be documented on a sign-in sheet listing the day, date, time, instructor, training or drill and name and signature of all those in attendance.

## **EMERGENCY EQUIPMENT REQUIREMENTS**

## Lease Entrance Sign:

Should be located at the lease entrance with the following information:

# CAUTION – POTENTIAL POISON GAS HYDROGEN SULFIDE NO ADMITTANCE WITHOUT AUTHORIZATION

## **Respiratory Equipment:**

- Fresh air breathing equipment should be placed at the safe briefing areas and should include the following:
- Two SCBA's at each briefing area.
- Enough air line units to operate safely, anytime the H₂S concentration reaches the IDLH level (100 ppm).
- Cascade system with enough breathing air hose and manifolds to reach the rig floor, the derrickman and the other operation areas.

## Windsocks or Wind Streamers:

- A minimum of two 10" windsocks located at strategic locations so that they may be seen from any point on location.
- Wind streamers (if preferred) should be placed at various locations on the well site to ensure wind consciousness at all times. (Corners of location).

## **Hydrogen Sulfide Detector and Alarms:**

- 1 Four channel H<sub>2</sub>S monitor with alarms.
- Four (4) sensors located as follows: #1 Rig Floor, #2 Bell Nipple, #3 Shale Shaker, #4 Mud Pits.
- Gastec or Draeger pump with tubes.
- Sensor test gas.

## Well Condition Sign and Flags:

The Well Condition Sign w/flags should be placed a minimum of 150' before you enter the location. It should have three (3) color coded flags (green, yellow and red) that will be used to denote the following location conditions:

GREEN – Normal Operating Conditions YELLOW – Potential Danger RED – Danger, H₂S Gas Present

## **Auxiliary Rescue Equipment:**

- Stretcher
- 2 100' Rescue lines.
- First Aid Kit properly stocked.

## **Mud Inspection Equipment:**

Garret Gas Train or Hach Tester for inspection of Hydrogen Sulfide in the drilling mud system.

## Fire Extinguishers:

Adequate fire extinguishers shall be located at strategic locations.

## **Blowout Preventer:**

- The well shall have hydraulic BOP equipment for the anticipated BHP.
- The BOP should be tested upon installation.
- BOP, Choke Line and Kill Line will be tested as specified by Operator.

## **Confined Space Monitor:**

There should be a portable multi-gas monitor with at least 3 sensors ( $O_2$ , LEL  $H_2S$ ). This instrument should be used to test the atmosphere of any confined space before entering. It should also be used for atmospheric testing for LEL gas before beginning any type of Hot Work. Proper calibration documentation will need to be provided.

## **Communication Equipment:**

- Proper communication equipment such as cell phones or 2-way radios should be available at the rig.
- Radio communication shall be available for communication between the company man's trailer, rig floor and the tool pusher's trailer.

• Communication equipment shall be available on the vehicles.

## **Special Control Equipment:**

- Hydraulic BOP equipment with remote control on the ground.
- Rotating head at the surface casing point.

## **Evacuation Plan:**

- Evacuation routes should be established prior to spudding the well.
- Should be discussed with all rig personnel.

## **Designated Areas:**

## Parking and Visitor area:

- All vehicles are to be parked at a pre-determined safe distance from the wellhead.
- Designated smoking area.

## Safe Briefing Areas:

- Two Safe Briefing Areas shall be designated on either side of the location at the maximum allowable distance from the well bore so they offset prevailing winds or they are at a 180 degree angle if wind directions tend to shift in the area.
- Personal protective equipment should be stored at both briefing areas or if a moveable cascade trailer is used, it should be kept upwind of existing winds. When wind is from the prevailing direction, both briefing areas should be accessible.

## **EVACUATION PLAN**

#### **General Plan**

The direct lines of action prepared by SAFETY SOLUTIONS, LLC to protect the public from hazardous gas situations are as follows:

- 1. When the company approved supervisor (Drilling Foreman, Tool Pusher or Driller) determine that Hydrogen Sulfide gas cannot be limited to the well location, and the public will be involved, he will activate the evacuation plan. Escape routes are noted on the area map.
- 2. Company safety personnel or designee will notify the appropriate local government agency that a hazardous condition exists and evacuation needs to be implemented.
- 3. Company approved safety personnel that have been trained in the use of the proper emergency equipment will be utilized.
- 4. Law enforcement personnel (State Police, Local Police Department, Fire Department, and the Sheriff's Department) will be called to aid in setting up and maintaining road blocks. Also, they will aid in evacuation of the public if necessary.

NOTE: Law enforcement personnel will not be asked to come into a contaminated area. Their assistance will be limited to uncontaminated areas. Constant radio contact will be maintained with them.

5. After the discharge of gas has been controlled, "Company" safety personnel will determine when the area is safe for re-entry.

**See Emergency Action Plan** 

# MAPS AND PLATS (Maps & Plats Attached)

## **Affected Notification List**

(Within a 65' radius of exposure @100ppm)

The geologic zones that will be encountered during drilling are known to contain hazardous quantities of  $H_2S$ . The accompanying map illustrates the affected areas of the community. The residents within this radius will be notified via a hand delivered written notice describing the activities, potential hazards, conditions of evacuation, evacuation drill siren alarms and other precautionary measures.

**Evacuee Description:** 

Residents: THERE ARE NO RESIDENTS WITHIN 3000' ROE.

**Notification Process:** 

A continuous siren audible to all residence will be activated, signaling evacuation of previously notified and informed residents.

**Evacuation Plan:** 

All evacuees will migrate lateral to the wind direction.

Sandridge will identify all home bound or highly susceptible individuals and make special evacuation preparations, interfacing with the local and emergency medical service as necessary.

**GENERAL INFORMATION** 

## Toxic Effects of H<sub>2</sub>S 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 gases are compared below in Table 1. Toxicity table for  $H_2S$  and physical effects are shown in Table 2.

Table 1
Permissible Exposure Limits of Various Gases

| Common Name      | Symbol          | Sp. Gravity | TLV      | STEL       | IDLH    |
|------------------|-----------------|-------------|----------|------------|---------|
| Hydrogen Cyanide | HCN             | .94         | 4.7 ppm  | С          |         |
| Hydrogen Sulfide | H₂S             | 1.192       | 10 ppm   | 15 ppm     | 100 ppm |
| Sulfide Dioxide  | SO <sub>2</sub> | 2.21        | 2 ppm    | 5 ppm      |         |
| Chlorine         | CL              | 2.45        | .5 ppm   | 1 ppm      |         |
| Carbon Monoxide  | СО              | .97         | 25 ppm   | 200 ppm    |         |
| Carbon Dioxide   | CO <sub>2</sub> | 1.52        | 5000 ppm | 30,000 ppm |         |
| Methane          | CH <sub>4</sub> | .55         | 4.7% LEL | 14% UEL    |         |

## **Definitions**

- A. TLV Threshold Limit Value is the concentration employees may be exposed 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 H<sub>2</sub>S 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  $H_2S$  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 based on an TWA.

## TABLE 2

|           |      | 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 H<sub>2</sub>S

The properties of all gases 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. In fact that makes this 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, H<sub>2</sub>S, 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, H<sub>2</sub>S 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 (SO<sub>2</sub>), 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  $H_2S$  is dependent on temperature and pressure, but if conditions are right, simply agitating a fluid containing  $H_2S$  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.

## PHYSICAL PROPERTIES OF Sulfur Dioxide (SO<sub>2</sub>)

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

COLOR

ODOR

**VAPOR DENSITY** 

**EXPLOSIVE LIMITS** 

**FLAMMABILITY** 

**SOLUBILITY (IN WATER)** 

**BOILING POINT** 

Sulfur Dioxide 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**

Sulfur Dioxide is colorless so it is invisible. This fact simply means that you can't rely on your eyes to detect its presence. In fact that makes this gas extremely dangerous to be around.

## ODOR - Burnt match, choking

Sulfur Dioxide has a distinctive offensive smell, similar to "burnt match".

## **VAPOR DENSITY - SPECIFIC GRAVITY OF 2.26**

Sulfur Dioxide 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  $SO_2$  is known to exist, protect yourself. Whenever possible, work in an area upwind and keep to higher ground.

## **EXPLOSIVE LIMITS -- Not applicable**

Sulfur dioxide is the result of burning hydrogen sulfide. LEL or UEL is not applicable.

## **FLAMMABILITY**

LEL or UEL is not applicable.

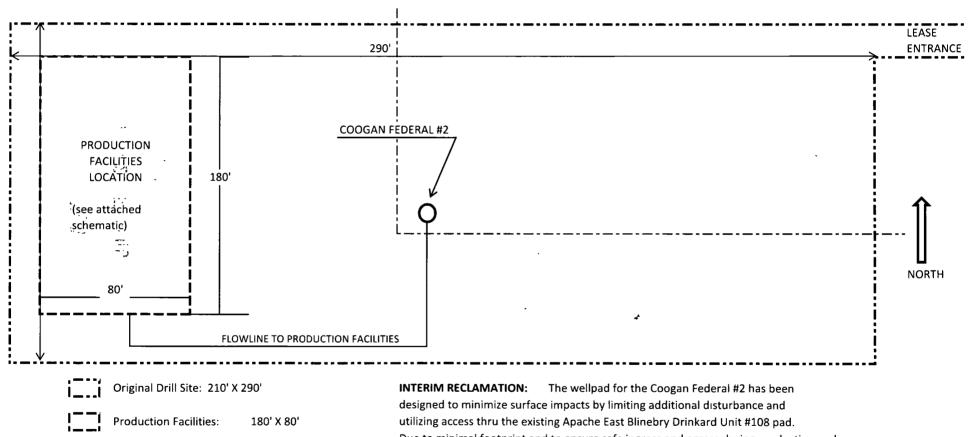
#### **SOLUBILITY**

Highly soluble - forms Sulfuric Acid with water.

## BOILING POINT $-14^{\circ}F$ (-10°C)

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

## SANDRIDGE ENERGY COMPANY COOGAN FEDERAL #2 [LAT=32.510602 N, LONG=103.121560 W] SECTION 1 - T21S - R37E, LEA COUNTY, NEW MEXICO PRODUCTION FACILITY LAYOUT



Apache's East Blinebry Drinkard Unit #108 Pad

Due to minimal footprint and to ensure safe ingress and egress during production and maintenance operations located between two active wells, interim reclamation is not anticipated.