



READ & STEVENS, INC.  
HYDROGEN SULFIDE (H<sub>2</sub>S) CONTINGENCY PLAN  
FOR DRILLING/COMPLETING/WORKOVER/FACILITY  
WITH THE EXPECTATION OF H<sub>2</sub>S IN EXCESS OF 100 PPM

30-015-37434  
BANDIT STATE #8  
SECTION 10 T23S-26E  
EDDY COUNTY, N.M.

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### GENERAL H2S EMERGENCY ACTIONS:

In the event of an 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 personnel 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 co-ordinate 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 personnel if not on location.
- 4) Set in motion the steps to protect and or remove the general public to an upwind "safe area". Maintain strict security & safety procedures while dealing with the source.
- 5) No entry to any unauthorized personnel.
- 6) Notify the appropriate agencies: City Police-City street(s)  
State Police-State Rd,  
County Sheriff-County Rd.  
(will assist in general public evacuation/safety while maintaining roadblocks)
- 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 take necessary steps to contact the following:

EMERGENCY CALL LIST: (Start and continue until ONE of these people have been reached)

	<u>OFFICE</u>	<u>MOBILE</u>	<u>HOME</u>
Read & Stevens, Inc.	575-622-3770		
David Luna	575-622-3770 x 213	575-626-9395	575-625-0666
Bud Thorp	575-390-4676	575-691-8520	575-396-7282
John Maxey	575-622-3770 x224	575-626-7602	575-625-1354
Will Palmer	575-396-5391	575-390-2424	575-396-7560

EMERGENCY RESPONSE NUMBERS: Eddy County, New Mexico

State Police	575-748-9718
Eddy County Sheriff	575-887-7551
Emergency Medical Service (Ambulance)	911 or 575-746-2701
Eddy County Emergency Management (Joel Arnwine )	575-887-9511
State Emergency Response Center (SERC)	575-476-9620
Artesia Police Department	575-746-5000
Artesia Fire Department	575-746-5000
Carlsbad Police Department	575-885-2111
Carlsbad Fire Department	575-885-3125
Loco Hills Fire Department	575-677-2349
(NMOCD) New Mexico Oil Conservation Division, District I (Lea, Roosevelt, Chaves, Curry)	575-393-6161
District II (Eddy, Chaves)	575-748-1283
American Safety	575-746-1096
Indian Fire & Safety	575-746-4660 or 800-530-8693
Callaway Safety	575-746-2847
BJ Services	575-746-3569

## PROTECTION OF THE GENERAL PUBLIC/ROE:

In the event greater than 100 ppm H<sub>2</sub>S is present, the ROE (Radius Of Exposure) 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 H<sub>2</sub>S could be present in concentrations greater than 100 ppm in the gas mixture.

### **Calculation for the 100 ppm ROE:**

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

### **Calculation for the 500 ppm ROE:**

$$X = [(0.4546) (\text{concentration}) (Q)]^{(0.6258)}$$

EXAMPLE: If a well/facility has been determined to have 150 ppm H<sub>2</sub>S in the gas mixture and the well/facility is producing at a gas rate of 100 MCFPD then:

$$\begin{aligned} 100 \text{ PPM} \quad X &= [(1.589)(150/1,000,000)(100,000)]^{0.6258} \\ X &= 7' \end{aligned}$$

$$\begin{aligned} 500 \text{ PPM} \quad X &= [(0.4546)(150/1,000,000)(100,000)]^{0.6258} \\ X &= 3' \end{aligned}$$

(These calculations will be forwarded to the appropriate District NMOCD 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 H<sub>2</sub>S safety, shall monitor with detection equipment the H<sub>2</sub>S concentration, wind and area of exposure (ROE). 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 H<sub>2</sub>S 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 supervising personnel shall stay in communications with all agencies through out the duration of the situation and inform such agencies when the situation has been contained and the effected area(s) is safe to enter.

PROCEDURE FOR IGNITING AN UNCONTROLABLE 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 in danger.
- 2) There is no hope of bringing the situation under control with the prevailing conditions at the site.

INSTRUCTIONS FOR IGNITION:

- 1) Two people are required. They must be equipped with positive pressure; self contained breathing apparatus and a "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 H<sub>2</sub>S, Oxygen, & LFL. The other person will be the company supervisor; he is responsible for igniting the well.
- 3) Ignite up-wind from a distance no closer than necessary. Make sure that where you ignite from has the maximum escape avenue available. A 25mm flare gun shall be used, with a  $\pm 500'$  range to ignite the gas.
- 4) Prior to ignition, make a final check for combustible gases.
- 5) Following ignition, continue with the emergency actions & 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/Escapes 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 & 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) Wind Socks: Two windsocks will be placed in strategic locations, visible from all angles.
- 5) H2S Detectors and Alarm: 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 @ 15 ppm. Calibrate a minimum of every 30 days or as needed. The 3 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 are being discharged.
- 6) Auxiliary Rescue Equipment:
  - Stretcher
  - Two OSHA full body harness
  - 100' of 5/8" OSHA approved rope
  - 1 – 20# Class ABC fire extinguisher
  - Communication via cell phones on location and vehicles on location.

#### USING SELF-CONTAINED BREATHING AIR EQUIPMENT (SCBA):

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 on H2S has been detected.
- At any time there is a doubt as the level of H2S in the area.

All personnel shall be trained in the use of SCBA prior to working in a potentially hazardous location.

Facial hair and standard eyeglasses are not allowed with SCBA.

Contact lenses are never allowed with SCBA.

Air quality shall continuously be checked during the entire operation.

After each use, the SCBA unit shall be cleaned, disinfected, serviced and inspected.

All SCBA shall be inspected monthly.

## RESCUE & FIRST AID FOR VICTIMS OF HYDROGEN SULFIDE (H<sub>2</sub>S) POISONING

Do not panic.

Remain calm & think.

Get on the breathing apparatus.

Remove the victim to the safe breathing area as quickly as possible. Upwind an uphill from source of cross wind 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.



## H2S TOXIC EFFECTS:

H2S is extremely toxic. The acceptable ceiling for eight hours of exposure is 10 ppm, which is .001% by volume. H2S is approximately 20% heavier than air (Sp.Gr=1.19 / Air=1 ) and colorless. It forms an explosive mixture with air between 4.3% and 46.0%. By volume hydrogen sulfide (H2S) is almost as toxic as hydrogen cyanide and is 5-6 times more toxic than carbon monoxide.

### Various Gases

Common Name	Chemical Abbrev.	Sp. Gr.	Threshold Limits	Hazardous Limits	Lethal Concentration
Hydrogen Sulfide	H2S	1.19	10 ppm 15 ppm	100 ppm/hr	600 ppm
Hydrogen Cyanide	HCN	0.94	10 ppm	150 ppm/hr	300 ppm
Sulfur Dioxide	SO2	2.21	2 ppm	N/A	1000 ppm
Chlorine	CL2	2.45	1 ppm	4 ppm/hr	1000 ppm
Carbon Monoxide	CO	0.97	50 ppm	400 ppm/hr	1000 ppm
Carbon Dioxide	CO2	1.52	5000 ppm	5%	10%
Methane	CH4	0.55	90,000	Combustible @ 5%	N/A

- 1 Threshold limit – Concentrations at which it is believed that all workers may be repeatedly exposed, day after day without adverse effects
- 2 Hazardous limit – Concentration that may cause death.
- 3 Lethal concentration – Concentration that will cause death with short-term exposure
- 4 Threshold limit – 10 ppm – NIOSH guide to chemical hazards
- 5 Short-term threshold limit

## PHYSICAL EFFECTS OF HYDROGEN SULFIDE:

CONCENTRATIONS		PHYSICAL EFFECTS
.001%	10 ppm	Obvious and unpleasant odor. Safe for 8 hr. exposure
.005%	50 ppm	Can cause some flu-like symptoms and can cause pneumonia.
.01%	100 ppm	Kills the sense of smell in 3-15 minutes. May irritate eyes and throat.
.02%	200 ppm	Kills the sense of smell rapidly. Severely irritates eyes and throat. Severe flu-like symptoms after 4 or more hours. May cause lung damage and/or death.
.06%	600 ppm	Loss of consciousness quickly, death will result if not rescued promptly.

**Read & Stevens, Inc.  
Drilling Procedure Summary  
Bandit State #8  
Eddy County, New Mexico**

**ESTIMATED FORMATION TOPS:**

Delaware	1850'
Cherry Canyon	2700'

**CASING/HOLE PROGRAM:**

<u>Hole Size</u>	<u>Casing</u>	<u>Depth</u>	<u>Cement</u>	<u>TOC</u>
12 1/4"	8 5/8" 24# J55	650'	As per procedure/ hole conditions	Surface
7 7/8"	5 1/2" 15.5# J55	3,200'	As deemed necessary	Tie Back

**MUD PROGRAM: (SUBJECT TO CHANGE PENDING HOLE CONDITIONS)**

<u>Depth</u>	<u>Mud Type</u>	<u>Weight</u>	<u>Vis</u>	<u>Filtrate</u>
0-650'	Fresh Water/Native Mud	8.6	34	NC
650'-TD	Brine	10.1	29	NC

**MUD LOGGING:** Mud logging will commence with a two-man unit at a depth of 650'.

**OPEN HOLE LOGS:**

TD to csg shoe. (GR-CAL-CNL-LDT)(GR-CAL-DLL-MICRO)(GR-CNL) to surface.

<b>CORING:</b>	Rotary Sidewall: as dictated by logs.
<b>POSSIBLE DST'S:</b>	As deemed necessary