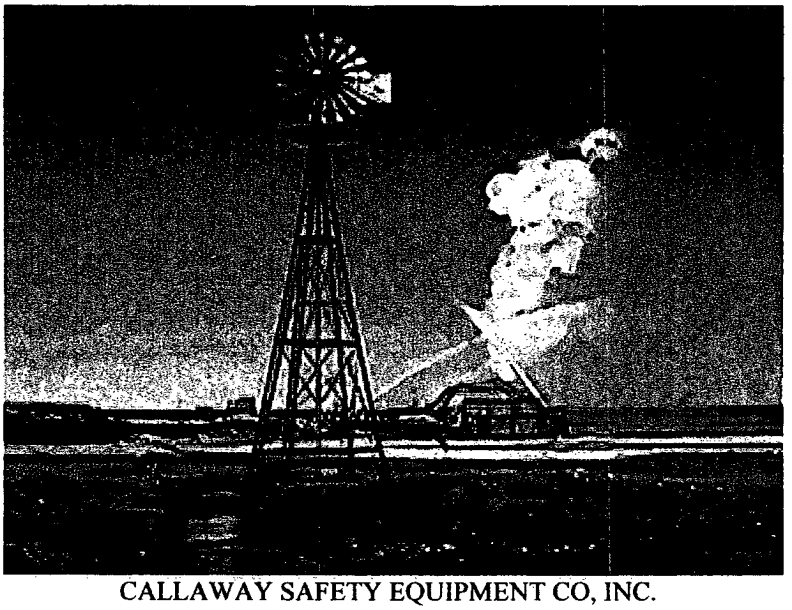
David H. Arrington Oil & Gas, Inc.

Legals:
Colorado Brown Hackle State "16"
747' FSL & 1354' FWL
Section 16, Township 20 South, Range 23 East
Topographic Land Surveyors
N.M.P.M., Eddy County, New Mexico

30-015-33441

"CONTINGENCY PLAN"



CALLAWAY SAFETY EQUIPMENT CO, INC.
11020 W. Hwy. 80 East
Odessa, Texas 79765
(432) 561-5049

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I. H_2S CONTINGENCY PLAN SECTION

Scope

This contingency plan establishes guidelines for all company employees and contract employees whose work activities may involve exposure to Hydrogen Sulfide gas (H_2S).

Objective

1. Prevent any and all accidents, and prevent the uncontrolled release of H_2S into the atmosphere.
2. Provide proper evacuation procedures to cope with emergencies.
3. Provide immediate and adequate medical attention should an injury occur.

Discussion of Plan

Suspected Problem Zones: ___ San Andres & Cisco Reef

Implementation: This plan, with all details, is to be fully implemented before drilling to the _San Andres & Cisco Reef _

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 prior to drilling into the San Andres & Cisco Reef Formations.

Emergency Call Lists: Included are the telephone numbers of all persons that would need to be contacted should an emergency exists.

Briefing: This section deals with the briefing of all people involved in the drilling operation.

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

CheckLists: Status Check Lists and Procedural Check Lists have been included to insure adherence to the plan.

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

II. EMERGENCY PROCEDURES SECTION

Emergency Procedures

I. In the event of any evidence of H_2S level above 10 ppm, 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 H_2S 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 and the Texas Railroad Commission 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 procedures.

III. Responsibility
   - A. The Company Approved Supervisor shall be responsible for the total implementation of the plan.
   - B. The Company Approved Supervisor shall be in complete command during any emergency.
   - C. The Company Approved Supervisor 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
      1. When alarm sounds, don escape unit and report to upwind Safe Briefing Area.
      2. Check status of other personnel (buddy system).
      3. Secure breathing apparatus.
      4. Await orders from Supervisor.
   B. Drilling Foreman
      1. Report to the upwind Safe Briefing Area.
      2. Don Breathing Apparatus and return to the point of release with the Tool Pusher or Driller (buddy system).
      3. Determine the concentration of H2S.
      4. Assess the situation and take appropriate control measures.
   C. Tool Pusher
      1. Report to the upwind Safe Briefing Area.
      2. Don Breathing Apparatus and return to the point of release with the Drilling Foreman or Driller (buddy system).
      3. Determine the concentration of H2S.
      4. Assess the situation and take appropriate control measures.
   D. Driller
      1. Don escape unit.
      2. Check monitor for point of release.
      3. Report to the Safe Briefing Area.
      4. Check the status of other personnel (in a rescue attempt, always use the buddy system).
      5. Assign the least essential person to notify the Drilling Foreman and Tool Pusher, in the event of their absence.
      6. Assume the responsibility of the Drilling Foreman and Tool Pusher until they arrive, in the event of their absence.
   E. Derrick Man
      1. Remain in the Safe Briefing Area until otherwise instructed by Supervisor.
   F. Mud Engineer
      1. Report to Safe Briefing Area.
      2. When instructed, begin check of mud for pH level and H2S level.
   G. Safety Personnel
      1. Don appropriate breathing apparatus.
      2. Check status of all personnel
      3. Await instructions from Drilling Foreman or Tool Pusher.

II. Taking A Kick
   A. All personnel report to 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 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
   1. Sound the alarm immediately.
   2. Stop the rotary and hoist kelly joint above the rotary table.
   3. Stop the circulatory pump.
   4. Close drill pipe rams.
   5. Record casing and drill pipe shut-in pressures and pit volume increases.

B. Drill No. 2--Tripping Drill Pipe
   1. Sound the alarm immediately.
   2. Position the upper tool joint just above the rotary table and set slips.
   3. Install a full opening valve or inside blowout preventor tool in order to close the drill pipe.
   4. Close the drill pipe rams.
   5. Record the shut-in annular pressure.

II. Crew Assignments

A. Drill No. 1--Bottom Drilling

1. Driller
   a. Stop the rotary and hoist kelly joint above the rotary table.
   b. Stop the circulatory pump.
   c. Check flow.
   d. If flowing, sound the alarm immediately.
   e. Record the shut-in drill pipe pressure.
   f. Record all data reported by the crew.
   g. Determine the mud weight increase needed or other courses of action.
2. Derrickman
   a. Open choke line valve at BOP.
   b. Signal Floor Man #1 at accumulator that choke line is open.
   c. Close choke and upstream valve after pipe tams have been closed.
   d. Read the shut-in annular pressure and report readings to Driller.
3. Floor Man #1
   a. Close the pipe trams after receiving the signal from the Derrickman.
   b. Report to Driller for further instructions.
4. Floor Man #2
   a. Notify the Tool Pusher and Operator Representative of the H_2S alarms.
   b. Check for open fires and, if safe to do so, extinguish them.
   c. Stop all welding operations.
   d. Turn-off all non-explosion proof lights and instruments.
   e. Report to Driller for further instructions.
5. Tool Pusher
   a. Report to the rig floor.
   b. Have a meeting with all crews.
   c. Compile and summarize all information.
   d. Calculate the proper kill weight.
   e. Ensure that proper well procedures are put into action.
6. Operator Representative
   a. Notify the Drilling Superintendent.
   b. Determine if an emergency exists and if so, activate the contingency plan.

B. Drill No.2--Tripping Pipe

1. Driller
   a. Sound the alarm immediately when mud volume increase has been detected.
   b. Position the upper tool joint just above the rotary table and set slips.
   c. Install a full opening valve or inside blowout preventor tool to close the drill pipe.
   d. Check flow.
   e. Record all data reported by the crew.
   f. Determine the course of action.
2. Derrickman
   a. Come down out of derrick.
   b. Notify Tool Pusher and Operator Representative
   c. Check for open fires and, if safe to do so, extinguish them.
   d. Stop all welding operations.
   e. Report to Driller for further instructions.
3. Floor Man #1
   a. Pick up full opening valve or inside blowout preventors and stab into tool joint above rotary table (with Floor Man #2).
   b. Tighten valve with back-up tongs.
   c. Close pipe rams after signal from Floor Man #2.
   d. Read accumulator pressure and check for possible high pressure fluid leaks in valves or piping.
   e. Report to Driller for further instructions.
4. Floor Man #2
   a. Pick-up full opening valve or inside blowout preventors and stab into tool joint above rotary table (with Floor Man #1).
   b. Position back-up tongs on drill pipe.
   c. Open choke line valve at BOP.
   d. Signal Floor Man #1 at accumulator that choke line is open.
   e. Close choke and upstream valve after pipe rams have been closed.
   f. Check for leaks on BOP stack and choke manifold.
   g. Read annular pressure.
   h. Report readings to the Driller.

5. Tool Pusher
   a. Report to rig floor.
   b. Have a meeting with all crews.
   c. Compile and summarize all information.
   d. Calculate proper kill weight.
   e. See that proper well kill procedures are put into action.
6. Operator Representative
   a. Notify Drilling Superintendent.
   b. Determine if an emergency exists, and if so, activate the contingency plans.

III. IGNITION PROCEDURES SECTION

Responsibility

The decision to ignite the well is the responsibility of the DRILLING FOREMAN in concurrence with the STATE POLICE. In the event the Drilling Foreman is incapacitated, it becomes the responsibility of the RIG TOOL PUSHER. This decision should be made only as a last resort and in a situation where it is clear that:

1. Human life and property are endangered.
2. There is no hope of controlling the blowout under the prevailing conditions.

If time permits, notify the main office, but do not delay if human life is in danger. Initiate the first phase of the evacuation plan.

Instructions for Igniting the Well

1. Two people are required for the actual igniting operation. Both men must wear self-contained breathing apparatus and attach a safety rope. One man must monitor the atmosphere for explosive gases with the Explosimeter, while the Drilling Foreman is responsible for igniting the well.
2. The primary method to ignite is a 25mm flare gun with a range of approximately 500 feet.
3. Ignite from upwind and do not approach any closer than is warranted.
4. Select the ignition site best suited for protection and which offers an easy escape route.
5. Before igniting, check for the presence of combustible gases.
6. After igniting, continue emergency actions and procedures as before.
7. All unassigned personnel will limit their actions to those directed by the Drilling Foreman.

NOTE: After the well is ignited, burning Hydrogen Sulfide will convert to Sulfur Dioxide, which is also highly toxic. Do not assume the area is safe after the well is ignited.

IV. TRAINING PROGRAM SECTION

Training Requirements

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

1. Hazards and characteristics of H_2S.
2. Physical effects of Hydrogen Sulfide on the human body.
3. Toxicity of Hydrogen Sulfide and Sulfur Dioxide.
4. H_2S detection.
5. Emergency rescue.
6. Resuscitators.
7. First aid and artificial resuscitation.
8. The effects of H_2S on metals.
9. Location safety.

Service company personnel and visiting personnel must be notified if the zone contains H2S, and each service company must provide adequate training and equipment for their employees before they arrive at the well site.

V. EMERGENCY EQUIPMENT SECTION

Emergency Equipment Requirements

I. Signs
   A. Located at the location entrance with the following information:
   (Lease)
   CAUTION-POTENTIAL POISON GAS
   HYDROGEN SULFIDE
   NO ADMITTANCE WITHOUT AUTHORIZATION

II. * Fresh air breathing equipment
   A. Air line units for all rig personnel on location.
   B. Cascade system with hose lines to rig floor and one to the derrick man and other operation areas. Spare cascade (trailer) on location

III. Wind socks or wind streamers
   A. Two 10" windsocks located at strategic locations at a height visible from the rig floor.
   B. Wind streamers (if preferred) to be placed at various locations on the well site to ensure wind consciousness at all times. (Corners of location).

IV. Hydrogen Sulfide detector and alarms.
   A. 1-four channel H_2S monitor with alarms.
   B. 4 sensors located at floor, bell nipple, shale shaker, and pits
   * C. Hand operated detectors with tubes.
   * D. H_2S monitor tester.

V. Condition sign and flags
   A. One each of green, yellow, and red condition flags to be displayed to denote conditions:
      GREEN--Normal Conditions
      YELLOW--Potential Danger
      RED--Danger, H2S Present
   B. The condition flag shall be posted at the location entrance.

VI. * Auxiliary rescue equipment
   A. Stretcher
   B. Two 100' lengths of 5/8" nylon rope.

VII. * Mud inspection devices
   A. Garrett Gas Train or Hach Tester for inspection of Hydrogen Sulfide concentration in the mud system.

VIII. Fire extinguishers
   A. Adequate fire extinguishers shall be located at strategic locations.

IX. Blowout prevention equipment
  A. The well shall have hydraulic BOP equipment for the anticipated BHP.
  B. Equipment must be tested upon installation.

X. * Combustible gas detectors
  A. There shall be one combustible gas detector on location at all times.

XI. BOP testing
  A. BOP, Choke Line and Kill Line will be tested as specified by operator.

XII. Audio system
  A. Radio communication shall be available at the rig.
  B. Radio communication shall be available at the rig floor or trailer.
  C. Radio communication shall be available on vehicles.

XIII. Special control equipment
  A. Hydraulic BOP equipment with remote control on ground.
  B. Rotating head at surface casing point.

XIV. Evacuation Plan
  A. Evacuation routes should be established prior to spudding each well.
  B. Should be discussed with all rig personnel.

XV. Designated Areas
  A. Parking and visitor area.
    1. All vehicles are to be parked at a pre-determined safe distance from the wellhead.
    2. Designated smoking area.
  B. Safe Briefing Area
    1. 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.
    2. Personal protective equipment should be stored in both protection centers or if a moveable trailer is used, it should be kept upwind of existing winds. When wind is from the prevailing direction, both protection centers should be accessible.

- *Additional equipment will be available at Callaway Safety Midland, Texas.
- Additional personnel hydrogen sulfide monitors on location for all hands.
- Automatic Flare ignitor installed on rig

VI. CHECK LIST SECTION

Status Check List

Note: Date each item as they are implemented.

1. Sign at location entrance. _____
2. Two (2) wind socks (in required locations). _____
3. Wind streamers (if required). _____
4. 30 minute pressure demand air packs on location for all rig personnel and mud loggers. _____
5. Air packs, inspected and ready for use. _____
6. Spare bottles for each air pack (if required). _____
7. Cascade system and hose line hook up. _____
8. Cascade system for refilling air bottles. _____
9. Choke manifold hooked-up and tested. (Before drilling out surface casing.) _____
10. Remote Hydraulic BOP control (hooked-up and tested before drilling out surface casing.) _____
11. BOP Preventor tested (before drilling out surface casing.) _____
12. Mud engineer on location with equipment to test mud for Hydrogen Sulfide. _____
13. Safe Briefing Areas set-up. _____
14. Condition sign and flags on location and ready. _____
15. Hydrogen Sulfide detection system hooked-up. _____
16. Hydrogen Sulfide alarm system hooked-up. _____

17. Stretcher on location at Safe Briefing Area. _____

18. 1-100' length of 5/8" nylon rope on location. _____

19. 1-20 # or 30# ABC fire extinguisher in safety trailer in addition to those on rig. _____

20. Combustible gas detector on location and tested. _____

21. All rig crews and supervisors trained (as required). _____

22. Access restricted for unauthorized personnel. _____

23. Drills on H_2S and well control procedures. _____

24. All outside service contractors advised of potential Hydrogen Sulfide on the well. _____

25. NO SMOKING sign posted. _____

26. Hand operated H_2S detector with tubes on location. _____

27. 25mm flare gun with flares. _____

28. Automatic Flare ignitor installed on rig _____

Procedural Check List

Perform the following on each tour:

1. Check fire extinguishers to see that they have the proper charge.
2. Check breathing equipment to insure that it has not been tampered with.
3. Check pressure on supply air bottles to see that they are capable of recharging.
4. Make sure all of the Hydrogen Sulfide detection systems are operative.

Perform the following each week:

1. Check each piece of breathing equipment to make sure that the demand regulator is working. This requires that the bottle be opened and the mask assembly be put on tight enough so that when you inhale, you get air.
2. Blowout preventor skills.
3. Check supply pressure on BOP accumulator stand-by source.
4. Check all work/escape units for operation: demand regulator, escape bottle air volumes, supply bottle of air volume.
5. Check breathing equipment mask assembly to see that straps are loosened and turned back, ready to put on.
6. Check pressure on breathing equipment air bottles to make sure they are charged to full volume.
7. Check breathing equipment air bottles to make sure all demand regulators are working. This requires that the bottles be opened and the mask assembly be put on tight enough so that when you inhale, you get air
8. Confirm pressure on all supply air bottles.
9. Perform breathing equipment drills with on-site personnel.
10. Check the following supplies for availability:
    a. Stretcher
    b. Safety belts and ropes
    c. Emergency telephone lists
    d. Spare air bottles
    e. Spare oxygen bottles (if resuscitator required)
    f. Hand operated H2S detectors and tubes
11. Test the Explosimeter to verify batteries are good.

VII. BRIEFING PROCEDURES SECTION

Briefing Procedures

The following scheduled briefings will be held to ensure the effective drilling and operation of this project:

Pre-Spud Meeting

Date: Prior to spudding the well.
Attendance: Drilling Supervisor
Drilling Engineer
Drilling Foreman
Rig Pushers
Rig Driller
Mud Engineer
All Safety Personnel
Service Companies
Purpose: Review and discuss the well program, step-by-step, to insure complete understanding of assignments and responsibilities.

VIII. EVACUATION PLAN SECTION

General Plan

The direct lines of action prepared by CALLAWAY SAFETY EQUIPMENT CO., INC. to protect the public form hazardous gas situations are as follows:

1. When the company approved supervisor (Drilling Foreman, Tool Pusher, Driller) determine 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 need to be implemented.
3. Company approved safety personnel that have been trained in the use of Hydrogen Sulfide detection equipment and self-contained breathing 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 Reaction Plan

Emergency Assistance Telephone List

PUBLIC SAFETY	
Eddy County Sheriff Department	(505) 887-7551
New Mexico State Police	(505) 888-3137
Fire Department	(505) 885-2111
Hospitals	(505) 887-4100
Carlsbad City Police	(505) 885-2111
New Mexico D.O.T.	(505) 827-5100
Bureau of Land Management	(505) 393-3612
U.S. Department of Labor	(505) 248-5302

David H. Arrington Oil & Gas, Inc.

Midland Office		(432) 682-6685
	Fax	(432) 682-4139
Operations Engineer		
David Burgen	Cell	(432) 208-3170
	Home	(432) 524-4603
Senior Engineer		
Tony Beilman	Cell	(214) 762-0830
	Home	(972) 771-6148

Patterson UTI Rig # 624

Midland Office		(432) 561-9386
Drilling Superintendent		
Jim Stein	Cell	(432) 631-3361
Tool Pushers		
Lee Rowell	Cell	(432) 634-0218
Charlie Cooper	Cell	(432) 557-2722

Safety Contractor

Callaway Safety Equipment	Hobbs	(505) 392-2973
	Odessa	(505) 561-5049

Affected Public 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

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.

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

IX. MAPS AND PLATS SECTION

DISTRICT I
1625 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 August 15, 2000
Submit to Appropriate District Office
State Lease - 4 copies
Fee Lease - 3 copies

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

[1] API Number	[2] Pool Code	[3] Pool Name	
[4] Property Code	[5] Property Name: COLORADO BROWN HACKLE STATE "16"		[6] Well Number: 1
[7] OGRID No.	[8] Operator Name: DAVID H. ARRINGTON OIL & GAS, INC.		[9] Elevation: 4193'

[10] Surface Location

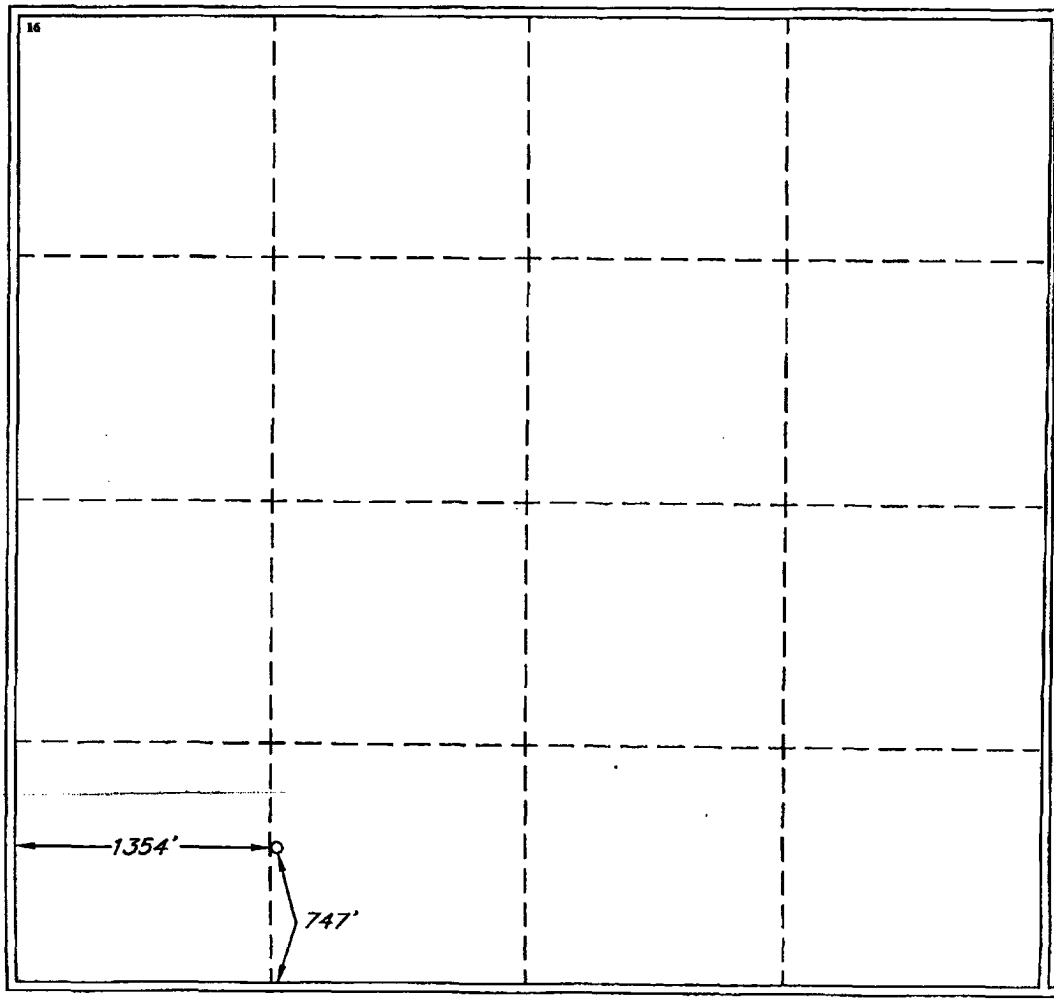
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
N	16	20 SOUTH	23 EAST, N.M.P.M.		747'	SOUTH	1354'	WEST	EDDY

[11] Bottom Hole Location If Different From Surface

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

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.

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



[17] OPERATOR CERTIFICATION

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

Signature

Printed Name

Title

Date

[18] SURVEYOR CERTIFICATION

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

MARCH 31, 2004

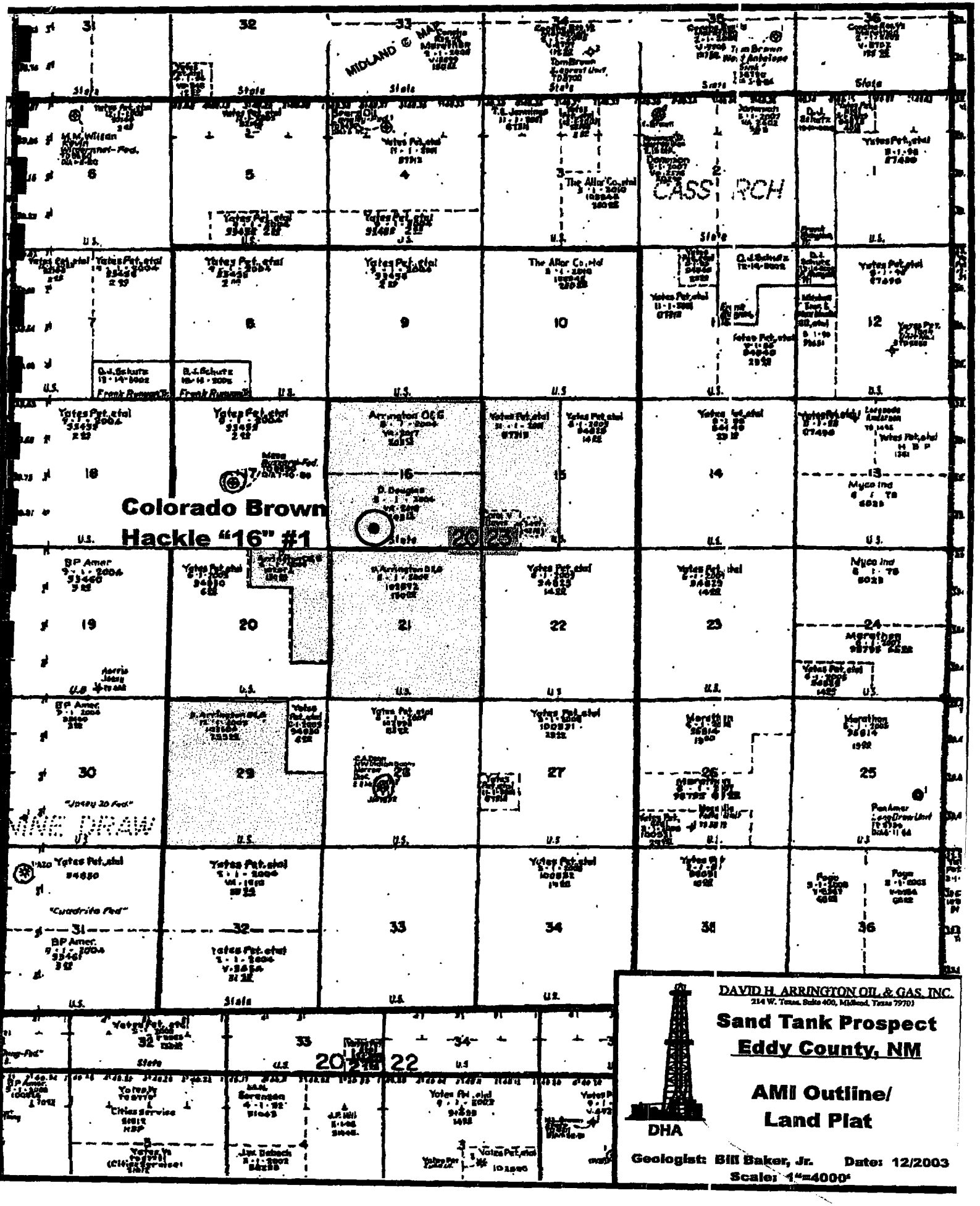
Date of Survey

Signature and Seal of Professional Surveyor

4-5-04

Certificate Number V. L. BEZNER R.P.S. #7920

JOB #93963-A / 76SW / J.C.P.


Colorado Brown
Hackle "16" #1
DAVID H. ARRINGTON OIL & GAS, INC.
214 W. Texas, Suite 400, Midland, Texas 79701
Sand Tank Prospect
Eddy County, NM
AMI Outline/
Land Plat
DHA
Geologist: Bill Baker, Jr. Date: 12/2003
Scale: 1"=4000'

X. GENERAL INFORMATION SECTION

HORIZON MUD COMPANY

PROPOSED MUD PROGRAM

CASING DESIGN

13 3/8"	Surface Casing	at	650'
9 5/8"	Intermediate Casing	at	1,250'
8 3/4"	Open Hole	to	8,950'

RECOMMENDED MUD PROPERTIES

DEPTH	MUD WEIGHT	VISCOSITY	FLUID LOSS
Spud	8.6- 8.7	32-34	No Control
650'	8.9- 9.2	32-34	No Control
Set 13 3/8" Surface Casing at 650'. Drill out with Fresh Water.			
700'	8.3- 8.4	28-29	No Control
1,000'	8.3- 8.4	28-29	No Control
1,250'	8.3- 8.4	28-29	No Control
Set 9 5/8" Intermediate Casing at 1,250'. Drill out with Fresh Water.			
1,300'	8.3- 8.4	28-29	No Control
2,000'	8.3- 8.4	28-29	No Control
3,000'	8.3- 8.4	28-29	No Control
4,800'	9.0- 9.2	28-29	No Control
6,100'	9.1- 9.2	30-32	<10
7,000'	9.2- 9.4	30-32	<10
7,600'	9.3- 9.5	32-36	<10
8,100'	9.4-10.0	32-36	<8
8,950'	9.4-10.0	34-40	<8

HORIZON MUD COMPANY

RECOMMENDED MUD PROGRAM BY CASING INTERVAL

Surface Hole 0 – 650'

Spud with a Horizon Gel/Lime slurry, mixing one **Lime** per ten **Gel** for a 32-34 viscosity. Lost circulation is common in this area. Should lost circulation occur and cannot be re-gained with one LCM pill, dry drill to total depth. Viscous sweeps will be necessary to avoid stuck pipe.

Intermediate Hole 650'-1,250'

Drill out from under the surface casing with fresh water, circulating through the reserve pit to allow maximum time for settling drilled-solids. Severe lost circulation is also common while drilling this interval. Seepage can be controlled with additions of **Paper**. Should complete loss of returns occur while drilling, we recommend pulling up above the loss zone to avoid differential sticking and spotting a 100-200 barrel pill containing 15-25 lb/bbl lost circulation material. Spot the pill from above at a reduced pump rate before returning to bottom to commence drilling operations. If circulation cannot be regained after one or two attempts, we recommend blind drilling to total depth.

Attention should be paid to the possibility of crooked hole problems in this general area.

Allow hole conditions to dictate the need for any additional viscosity or hole sweeps at total depth to clean the hole and insure smooth casing operations.

Open Hole– 1,250'-8,950'

Drill out from under the intermediate casing with fresh water, circulating through the outer reserve pit to, once again, allow maximum time for settling drilled-solids. A flocculent (**MF-1**) can be used to aid in dropping solids, providing a clear fluid and maximum penetration rates.

We recommend that the surface pit system include the following:

⇒ **Flo-line Cleaner** – This will allow removal of a wider range of solids and will assist in optimizing the efficiency of the de-sander and de-silter (or scale shaker).

⇒ **Stirrers or Rollers in the Suction Pit** – This will condition mud before being pumped.

⇒ **Shale and settling pit by-pass Canal** – To reduce volumes when conditioning mud for DST's or added hole cleaning at total depth.

We recommend maintaining a 9.0 – 9.5 pH with **Caustic.**

As drilling progresses post **3,000'**, some loss of fluid should occur. Minor seepage can be controlled with additions of **Paper**. Complete lost circulation is also possible during this interval. Should complete loss of returns occur while drilling, we recommend following the same procedure described in the previous section.

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We do not anticipate severe crooked hole problems, but this can be a problem in this area.

Utilize **Horizon Poly-Vis II** and Prehydrated **Gel** for periodic sweeps while drilling, prior to mud-up.

By a depth of **4,800' or the top of the Wolfcamp,** we recommend returning to the working pits and increasing the mud weight with brine to **9.0- 9.2 ppg.**

Close attention should be paid to the possibility of tight connections and sloughing shale past **4,800'**. Increasing the mud weight, hole sweeps and/or early mud-up may be necessary to control hole conditions.

By 6,100' or the top of the Cisco, we recommend mudding-up with a **Starch/MF-55** system to achieve the following properties:

Mud Weight	**9.1-9.2**
Viscosity	**30-32**
Fluid Loss	**<10**

While using **Starch** for fluid loss control, it is important that the Ph of the fluid remain below 11.0 to avoid burning the **Starch.**

We use **DCS** surfactant as a mud additive to provide the following benefits:

⇒ minimize the usage of Mud Products

⇒ help drop solids providing a cleaner mud, lower mud weight and a thinner filter cake

⇒ improve clean-up of the pay zone should whole mud losses be encountered

We recommend adding **MF-55** to the system in this particular area to minimize potential sloughing shale. **MF-55** is a non-ionic emulsion polymer that will chemically tie up water. This "taking on of water" effect has proven to significantly minimize fluid invasion. **MF-55** also has the ability to inhibit through encapsulation, or coating of the wellbore.

Lost circulation could occur after mud-up. We recommend using fibrous-type **LCM** to control seepage. Should complete loss of returns occur, we recommend following the same procedure as described in the previous section. Utilize **acid-soluble LCM** for any losses in the pay zone.

Hole conditions may make it necessary to drill with a higher viscosity. Utilize **Salt Gel** or **XCD Polymer** to raise the viscosity depending on the amount of footage to be drilled prior to total depth.

This fluid, adjusted as shown in the **"RECOMMENDED MUD PROPERTIES"** section, or as hole conditions dictate, should provide good hole conditions for any testing, logging and casing operations.

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ESTIMATED COST

Surface Hole 650'	Gel	30	
(1 days)	Lime	3	206.50
	Possible LCM		500.00
Intermediate Hole 650'-1,250'	Paper	30	163.10
(3 days)	Possible LCM		1,000.00
Open Hole 1,250'-6,100'	Paper	40	
(10 days)	Caustic	30	
	Poly-Vis II	3	1,402.50
Mud-up at 6,100'	Starch	70	
(1,100 barrels)	MF-55	12	
	DCS	6	
	XC-102	2	
	Soda Ash	20	3,475.50
Open Hole 6,100'-8,950'	Starch	150	
(15 days)	MF-55	20	
	Aquapac	20	
	DCS	15	
	XC-102	8	
	Caustic	45	
	Soda Ash	20	13,027.50
	Possible Higher Vis		3,000.00
	Possible LCM		2,000.00
29 days			
	Total Estimated Material		$ 26,775.10
	Tax		1,589.50
	Drayage		3,500.00
	Total Estimated Cost		**$ 31,864.60**

VARIABLES EFFECTING ESTIMATED COST

1. $3,500.00 added for lost circulation
2. $3,000.00 added for possible higher viscosity
3. 1,100 barrels volume at mud-up
4. 15 days on mud, 29 total days
5. 15% discount on Gel, Salt Gel and 25% on all other products.
6. Barite will be priced by load.

Toxic Effects of Hydrogen Sulfide Poisoning

Hydrogen Sulfide is extremely toxic. The acceptable ceiling concentration for eight-hour exposure is 20 ppm, which is .002% by volume. Hydrogen Sulfide is heavier than air (specific gravity-1.192) and colorless. It forms an explosive mixture with air between 4.3 and 46.0 percent by volume. Hydrogen Sulfide is almost as toxic as Hydrogen Cyanide and is between five and six times more toxic than Carbon Monoxide. Toxicity data for Hydrogen Sulfide and various other gases are compared below in Table I. Physical effects at various Hydrogen Sulfide levels are shown in Table II.

Table I
Toxicity of Various Gases

Common Name	Chemical Formula	Specific Gravity	Threshold Limit (A)	Hazardous Limit (B)	Lethal Concentration C)
Hydrogen Cyanide	HCN	0.94	10 ppm	150 ppm/hr	300 ppm
Hydrogen Sulfide	H2S	1.18	10 ppm (D) 20 ppm (E)	250 ppm/hr	600 ppm
Sulfur Dioxide	SO2	2.21	5 ppm		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 ppm	(9%)	Combustible above 5% in air

A. Threshold Limit--Concentration at which it is believed that all workers may be repeatedly exposed day after day without adverse effects.
B. Hazardous Limit--Concentration that may cause death.
C. Lethal Concentration--Concentration that will cause death with short-term exposure.
D. Threshold Limit--10 ppm, 1972 ACGIH (American Conference of Governmental industrial Hygienists)
E. Threshold Limit--20 ppm, 1966 ANSI acceptable ceiling concentration for eight-hour exposure (based on 40-hour week) is 20 ppm. OSHA Rules and Regulations (Federal Register, Volume 37, No. 202, Part II, dated 10/18/72).

Table II
Physical Effects of Hydrogen Sulfide

Percent %	ppm	Physical Effects
0.001	10	Obvious and unpleasant odor.
0.002	20	Safe for 8 hrs. exposure
0.01	100	Kills smell in 3 to 5 minutes; may sting eyes and throat.
0.02	200	Kills smell shortly; stings eyes and throat.
0.03	300	IDLH (Immediately Dangerous to Life & Health) Level
0.05	500	Dizziness; breathing ceases in a few minutes
0.07	700	Unconscious quickly; death will result if not rescued.
0.10	1000	Unconscious at once; followed by death within minutes.

*Caution: Hydrogen Sulfide is a colorless and transparent gas and is highly flammable. It is heavier than air and may accumulate in low places.

Use of Self-Contained Breathing Apparatus

I. Written procedures shall be prepared covering safe use of respirators in dangerous atmospheric situations which might be encountered in normal operations or in emergencies. Personnel shall be familiar with these procedures and the available respirators.

II. Respirators shall be inspected frequently, at random, to insure that they are properly used, cleaned, and maintained.

III. Anyone who may use respirators shall be trained in how to properly seal the face piece. They shall wear respirators in normal air and then in a test atmosphere.(Note: Such items as facial hair (beard or sideburns) and eyeglass temple pieces will not allow a proper seal.) Anyone that may be expected to wear respirators should have these items removed before entering a toxic atmosphere. A special mask must be obtained for anyone who must wear eyeglasses. Contact lenses should not be allowed.

IV. Maintenance and care of respirators

- A. A program of maintenance and care of respirators shall include the following:
  1. Inspection for defects, including leak checks.
  2. Cleaning and disinfecting.
  3. Repair.
  4. Storage.
- B. Inspection: Self-Contained Breathing Apparatus for emergency use shall be inspected monthly, and records maintained, for the following:
  1. Fully charged cylinders.
  2. Regulator and warning device operation.
  3. Condition of face piece and connection.
  4. Elastomer or rubber parts shall be stretched or massaged to keep them pliable and prevent deterioration.
- C. Routinely used respirators shall be collected, cleaned, and disinfected as frequently as necessary to insure proper protection is provided.

V. Persons assigned tasks that require the use of Self-Contained Breathing Equipment shall be certified physically fit for breathing equipment usage by the local company physician at least annually.

VI. Respirators should be worn during the following conditions:

- A. Any employee who works near the top or on the top of any tank unless tests reveal less than 20 ppm of H2S.
- B. When breaking out any line where H2S can reasonably be expected.
- C. When sampling air in areas to determine if toxic concentrations of H2S exist.
- D. When working in areas where over 20 ppm H2S has been detected.
- E. At any time where there is a doubt as to the H2S level in the area to be entered.

Rescue-First Aid for Hydrogen Sulfide Poisoning

Do Not Panic!!!

Remain Calm--THINK

1. Hold your breath (Do not inhale; stop breathing.) and go to Briefing area.

2. Put on breathing apparatus.

3. Remove victim(s) to fresh air as quickly as possible. (Go upwind from the source or at right angles to the wind; NOT downwind.)

4. Briefly apply chest pressure--arm lift method of artificial respiration to clear the victim's lungs and to avoid inhaling any toxic gas directly from the victim's lungs

5. Provide for prompt transportation to the hospital, and continue giving artificial respiration if needed.

6. Hospital(s) or medical facilities need to be informed, beforehand, of the possibility of H2S gas poisoning, no matter how remote the possibility.

7. Notify emergency room personnel that the victim(s) have been exposed to H2S gas.

Besides basic first aid, everyone on location should have a good working knowledge of artificial respiration, as well as first aid for eyes and skin contact with liquid H2S. Everyone needs to master these necessary skills.