OPERATIONS PERMIT APPLICATION FOR DRILLING AND PRODUCTION AT THE NOBLES GRADE AND TAMIAMI PROSPECTS, BIG CYPRESS NATIONAL PRESERVE

APPENDIX H: H2S CONTINGENCY PLAN & SAFETY PROTOCOLS



HYDROGEN SULFIDE CONTINGENCY PLAN FOR DRILLING OPERATIONS

Nobles Grade and Tamiami Locations Collier County, Florida

Rig: To be determined

June 24, 2020

For



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I. INTRODUCTION

This H2S Contingency Plan will go into effect at approximately 10,500' which is over 1000' before the top of the expected or unknown hazardous H2S zone.

To be effective, the plan requires the cooperation and effort of each person participating in the drilling of an H_2S well. Each person must know his/her responsibilities and all emergency and safety procedures. He/she should thoroughly understand and be able to use with accuracy, all safety equipment while performing his/her normal duties, if the circumstance should arise. He/she should therefore familiarize himself/herself with the location of all safety equipment and check to see that it is properly stored, easily accessible at all times, and routinely maintained.

It is the intention of Burnett and the Drilling Contractor to make every effort to provide adequate safeguards against harm to persons on the rig and in the immediate vicinity from the effects of hydrogen sulfide, which may be released into the atmosphere under emergency conditions. However, the initiative rests with the individual in utilizing the safeguards provided. The ideas and suggestions of the individuals involved in the drilling of this well are highly welcomed and act as a fundamental tool for providing the safest working conditions possible.

The drilling representative is required to enforce these procedures. They are set up for your safety and the safety of all others.

II. PURPOSE

It is Burnett's intent to provide a safe working place, not only for its employees, but also for other contractors who are aiding in the drilling of this well. The safety of the general public is of utmost concern. All precautions will be taken to keep a safe working environment and protect the public.

There is a possibility of encountering toxic hydrogen sulfide gas. Safety procedures must be adhered to in order to protect all personnel connected with the operations as well as people living within the area.

The Burnett representative will enforce all aspects of the H2S Contingency Plan. This job will become easier by a careful study of the following pages and training and informing all personnel on location their duties and responsibilities.

A. OPERATING PROCEDURES

GENERAL:

Before this H_2S contingency plan becomes operational, the drilling contractor's personnel, necessary service personnel, and the operator's personnel shall be thoroughly trained in the use of breathing equipment, emergency procedures, and responsibilities. Total Safety shall keep a list of all personnel who have been through the on-site H_2S training program at the drill site.

All personnel shall be given H2S training and the steps to be taken during H2S conditions under which the well may be drilled. General information will be explained about toxic gases, as well as the physiological effects of H₂S and the various classified operating conditions. In addition, the reader will be informed his/her general responsibility concerning safety equipment and emergency procedures.

The Total Safety H₂S Safety Consultant shall make available the H2S Contingency Plan for all personnel to read and understand it thoroughly.

Without exception, all personnel on the drill site must proceed directly to the Total Safety H₂S Safety Consultant for location and/or assignment of breathing apparatus. An instruction and orientation briefing will also be held.

B. PROCEDURES TO BE INITIATED PRIOR TO REACHING 1000' ABOVE THE H₂S BEARING ZONE:

A list of emergency phone numbers and contacts will be on location and posted at the following locations:

- 1. Burnett Representative's Office
- 2. Drilling Contractor's, Toolpusher Office
- 3. Living Quarters Area

All safety equipment and H₂S related hardware must be set up as required by Burnett with regard to location of briefing areas, breathing equipment, etc. All safety equipment must be inspected periodically with particular attention to resuscitators and breathing equipment.

All personnel on the drill site will be assigned breathing apparatus. Operator and drilling contractor personnel required to work in the following areas will be provided with breathing equipment connected to a cascade bottled air supply:

- 1. Rig Floor
- 2. Mud Pits
- 3. Derrick
- 4. Shale Shaker
- 5. Cellar

The Total Safety H_2S Safety Consultant will be responsible for rigging up and monitoring all H_2S continuous monitoring-type detectors. These units must be tested and recalibrated by the Total Safety H_2S Safety Consultant during drilling conditions. In the event H_2S is detected, or when drilling in a zone containing H_2S , the units shall be bump tested at least once every 24 hours. A calibration log will be kept on location. All results will be reported to the Burnett Representative.

C. DRILLING BELOW CONTINGENCY PLAN DEPTH

Blowout drills will be held as often as necessary to acquaint the crews and service company personnel of their responsibilities and the proper procedures to shut-in a well. After the Burnett representative is satisfied with blowout drill procedures, a drill will be conducted weekly with each crew, as necessary. A Total Safety H₂S Safety Consultant will be on duty prior to reaching contingency plan depth or as otherwise deemed necessary. He/she will conduct safety talks and drills, maintain the safety equipment, consult and carry out the instructions of the drilling supervisor. All personnel allowed on the drill site during drilling or testing operations will be instructed in the use of breathing equipment until supervisory personnel are satisfied that they are capable of using it.

After familiarization, each person must perform a drill with breathing equipment. The drill should include getting the breathing equipment, donning the breathing apparatus, and working for a short period. A record shall be kept of all personnel drilled and the date of the drill.

Rig crews and service company personnel shall be made aware of the location of spare air bottles, resuscitation equipment, portable fire extinguishers, H₂S monitors and detectors. Knowledge of the location of the H₂S monitors and detectors are vital in determining as our gas location and the severity of the emergency conditions. In addition, key personnel shall be trained in the use of a resuscitator.

After H₂S has been initially detected by any device, all areas of poor ventilation shall be inspected periodically by means of a portable H₂S detector instrument.

D. PROCEDURES PROGRAM

- 1. Drill Site
 - a. The drilling rig will be located to allow prevailing winds to blow across the reserve pit.
 - b. Safe Briefing Areas will be provided with a safety equipment trailer at the Primary Area. A Breathing air cascade system will be available at the Secondary Area. Personnel will assemble at the most upwind station under alarm conditions, or when so ordered by the Burnett representative, the Contractor representative, or the Total Safety H₂S Safety Consultant. Windsocks or streamers will be anchored to various strategic places on a pole about 30 feet high, so it is in easy view from the rig floor at all times.
 - c. Warning signs will be posted on the perimeters. "No Smoking" signs will be posted as well.
 - d. One multi-channel automatic H₂S monitor will be provided by Total Safety and the detector heads will be at the shale shaker, bell nipple, mud pits and on the rig floor and monitored there, or in the logging unit. Should the alarm be shut off to silence the sirens, the blinker light must continue to warn of H₂S presence. The safety representative will continuously monitor the detectors and will reactivate the alarm if H₂S concentrations increase to a dangerous level. Additional sensor/s will be located outside the living quarter's area, as needed.
 - e. A method of escape will be open at all times.
 - f. Explosion-proof electric fans (bug blowers) will be positioned to insure adequate circulation at all critical locations. These fans are to be supplied by rig contractor.
 - g. If available, land line telephone service will be provided or cell phones provided. (Primary communications provided)
 - h. A rig communication system will be provided, as needed.
 - i. A gas trap, choke manifold, and degasser will be installed.
 - j. A kill line securely anchored and of ample strength, will be laid to the well-head from a safe location. This line is to be used only in an emergency.
- 2. General
 - a. The Burnett representative and/or the Contractor's Toolpusher will be available at all times. The drilling supervisor, while on duty, will have complete charge of the rig and location operations and will take whatever action is deemed necessary to ensure personnel safety, to protect the well, and to prevent damage.
 - b. A Mud Engineer will be on location at all times when drilling takes place at the depth H₂S may be expected. The mud engineer will be able to verify the presence or absence of H2S.

III. CONDITIONS AND EMERGENCY PROCEDURES

A. DEFINITION OF OPERATIONAL "CONDITIONS"

1. CONDITION I - "POSSIBLE DANGER"

Warning Flags: Green

Alarms:

Characterized By:	Drilling operations in zones that may contain hydrogen sulfide. This
	condition remains in effect unless H ₂ S is detected and it becomes
	necessary to go to Condition II.

- General Action: a. Be alert for a condition change
 - b. Check all safety equipment for availability and proper functioning.
 - c. Perform all drills for familiarization and proficiency.

2. CONDITION II - "MODERATE DANGER"

Warning Flags:	Yellow
Alarms:	Actuates at 10 ppm. Continuous flashing light.
Characterized By:	Drilling operations in zones containing hydrogen sulfide. This condition will remain in effect until hydrogen sulfide can be neutralized by adding chemicals to the mud system or if it becomes necessary to go to Condition III.
General Action:	IV. Be alert for a condition changeV. Check all safety equipment for availability and proper functioning.VI. Follow instructions.
	VII. All persons working in hazardous area will wear SCBA or work unit.

3. CONDITION III "EXTREME DANGER"

Warning Flags	Red			
Alarms	Actuate at 15 ppm. Continuous Sirens and Flashing Lights			
Characterized by:	Critical well operations which pose an immediate threat of H_2S exposure to on-site personnel and a potential threat to the public.			
General Action:				
	a.	Breathing Apparatus on.		
	b.	If not specifically designated to control the well, go to the appropriate safe briefing area.		
	c.	During any emergency, use the "buddy" system to prevent anyone from entering or being left in a gas area alone, even wearing breathing apparatus.		
	d.	Personnel shall ensure that their breathing apparatus is properly fitted and operational before entering an H_2S contaminated area to provide assistance to anyone who may be injured or overcome by toxic gases.		
	e.	e. Remain in safe briefing area and wait for instructions.		
	f.	If well is ignited do not assume area is safe. SO2 is hazardous and not all H2S will burn.		

B. H₂S EMERGENCY PROCEDURES

Day to Day Drilling Operations

- A. Upon discovering a release of H₂S gas in the ambient air by warning alarms or in any other way. <u>Do Not</u> <u>Panic.</u>
- B. Hold your breath and rapidly move up or across-wind away from the areas where H₂S sensing devices are in place, to the closest available breathing apparatus, don your mask, continue to use breathing apparatus until it has been determined that the exposure of H₂S gas in the ambient air no longer exists. <u>Do Not Panic!</u>
- C. Utilize the "Buddy System", i.e.; select and pair up each person participating in the drilling of an H₂S well prior to an emergency situation.
- 4. Help anyone who is overcome or affected by the H₂S gas by taking him/her up-wind out of the contaminated area.
- 5. Take necessary steps to confirm the release of the H₂S gas into the ambient air.
 - a. While wearing your self-contained breathing apparatus, determine by the read-out on the fixed monitor which sensing device has detected the release of the H₂S gas.
 - b. Utilize the hand-held sniffer type device at the particular sensing point disclosed on the fixed monitor to corroborate the fact that H₂S gas has actually been released. That is to rule out the possibility of a false alarm.
- 6. Refer to the Emergency Phone Numbers and call emergency personnel.
- 7. Take the necessary steps to suppress the release of H₂S gas into the ambient air. Comply with Burnett Representative to physically suppress the release of H₂S gas at the actual release point.
- 8. Check all Burnett monitoring devices and increase gas monitoring activities with the portable handoperated H₂S and gas detector units. **Do Not Panic!**
- The Burnett representative will assess the situation and with assistance of the Contractor's Representative and Total Safety's H₂S Safety Consultant, will assign duties to each person to bring the situation under control.
- 10. Emergency Procedures at the Drilling Rig:

When the H₂S monitors activate the siren and blinker light, toxic gas is present. Do Not Panic!

- a. Put on your gas mask
- b. Render Assistance
- c. Follow Instructions

C. RESPONSIBILITIES OF WELL-SITE PERSONNEL

In the event of a release of potentially hazardous amounts of H₂S, all personnel will immediately proceed upwind to the nearest designated safe briefing area and put on their protective breathing apparatus. Consideration will be given to evacuating non essential personnel, as situation warrants.

1. Burnett Well-site Representatives

- a. If Burnett well-site representative is incapacitated or not on location, this responsibility will fall to the Toolpusher/Driller.
- b. Immediately upon assessing the situation, set this plan into action by initiating the proper procedures to contain the gas and notify the appropriate people and agencies.
- c. Ensure that the alarm area indicated by the fixed H_2S Monitor is checked and verified with a portable H_2S detector.
- d. Consult Pusher/driller of remedial actions as needed.
- e. Ensure that non-essential personnel proceed to the safe briefing area.
- f. Ensure location entrance barricades are positioned. Keep the number of persons on location to a minimum during hazardous operations.
- g. Consult each contractor, service company, and all others allowed to enter the site, that H₂S gas may be encountered and the potential hazards that may exist.
- h. Authorize the evacuation of local residents if H₂S threatens their safety.
- i. Non-essential personnel should be evacuated from location situation warrants.

2. Toolpusher

- a. Toolpusher/Driller will assume responsibilities of Burnett well-site representative if that person is incapacitated or not on location.
- b. Ensure that the alarm area indicated by the fixed H_2S monitor is checked and verified with a portable H_2S gas detector.
- c. Confer with Burnett well-site representative or superintendent and direct remedial action to suppress the H_2S and control the well.
- d. Ensure that personnel at the safe briefing area are instructed on emergency actions required.
- e. Ensure that personnel at the drill floor area are instructed on emergency actions required.
- f. Ensure that the appropriate safety and emergency procedures are observed by all personnel.
- g. Ensure that all persons are accounted for and provided emergency assistance as necessary.

3. Mud Engineer

- a. Run a sulfide check on the flowline mud.
- b. Take steps to determine the source of the H_2S and suppress it. Caustic and H_2S scavenger shall be added to the mud as necessary.

4. H₂S Safety Consultant

- a. Check and verify with a portable H₂S detector the alarm area indicated by the fixed H₂S monitor. Advise the Tool pusher/Driller and Burnett well-site representative of findings.
- b. If H₂S is flared, check for sulfur dioxide (SO₂) near the flare as necessary. Take hourly readings at different perimeters, log readings and record on location.
- c. Ensure that personnel at the safe briefing area are instructed on emergency actions required.
- d. Ensure that explosion-proof bug blowers are positioned as necessary to disperse H₂S away from workers performing their job tasks. These will be provided by rig contractor.
- e. Ensure that the appropriate warning flags are displayed.

- f. Ensure that all personnel are in S.C.B.A. as necessary.
- g. Ensure that all persons are accounted for and provide emergency assistance as necessary.
- h. Be prepared to evacuate rig if order is issued.

5. General Personnel & Visitors

- a. If not specifically designated to control the well, go to the appropriate (upwind) safe briefing area.
- b. All non essential personnel should be evacuated, as situation warrants.
- c. During any emergency, use the "buddy" system to prevent anyone from entering or being left in a gas area alone, even wearing breathing apparatus.
- d. Provide assistance to anyone who may be injured or overcome by toxic gases. Personnel shall ensure that their breathing apparatus is properly fitted and operational before entering H₂S contaminated area.
- e. Remain in safe briefing area and wait for instructions.

D. INSTRUCTIONS FOR IGNITING THE WELL

- 1. The Toolpusher/Driller will confer with the **Burnett** well-site representative who will secure the approval of higher **Burnett** authority, prior to igniting the well, if at all possible.
- 2. The Toolpusher/Driller will be responsible for igniting the well in the event of severe well control problems. This decision should be made only as a last resort in situations where it is clear that:
 - a. Human life and property are endangered, or
 - b. There is no hope of controlling the well under current conditions.
- 3. Once the decision has been made, the following procedures should be followed:
 - a. Two people wearing self-contained breathing apparatus will be needed for the actual lighting of the well. They must first establish the flammable perimeter by using an explosimeter. This should be established at 30% to 40% of the lower flammable limits.
 - b. After the flammable perimeter has been established and everyone removed from the area, the ignition team should select a site upwind of the well from which to ignite the well. This site should offer the maximum protection and have a clear path for retreat from the area.
 - c. The ignition team should have safety belts and lanyards attached and manned before attempting ignition. If the leak is not ignited on the first attempt, move in 20 to 30 feet and fire again. Continue to monitor with the explosimeter and NEVER fire from an area with over 75% of the Lower Explosive Limit (LEL). If having trouble igniting the well, try firing 40 degrees to 90 degrees on either side of the well.
 - d. If ignition is not possible due to the makeup of the gas, the toxic perimeter must be established and evacuation continued until the well is contained.
 - e. All personnel must act only as directed by the person in charge of the operations.
 - NOTE: After the well is ignited, burning hydrogen sulfide (H₂S) will convert to sulfur dioxide (SO₂), which is also a highly toxic gas.

DO NOT ASSUME THE AREA IS SAFE AFTER THE WELL IS IGNITED

IV. NORMAL OPERATIONS

A. Responsibilities of well-site personnel

1. Well-site Representative

- a. Notify H₂S Safety Consultant of expected date to reach Contingency Plan implementation depth (1,000' above suspected H₂S bearing zone) or prior to starting well work.
- b. Ensure H₂S Safety Consultant completes rig-up procedures prior to reaching Contingency Plan effective depth.
- c. Restrict the number of personnel at the drilling rig or well-site to a minimum while drilling, starting well work, testing or coring.
- d. Ensure weekly H₂S drills/training are performed.

2. Toolpusher

- a. Ensure that necessary H₂S safety equipment is provided on the rig and that it is properly inspected and maintained.
- b. Ensure that all personnel are thoroughly trained in the use of H₂S safety equipment and periodic drills are held to maintain an adequate level of proficiency.

3. All Personnel (Including Visitors)

- a. Remain clean-shaven. Beards and long sideburns do not allow a proper facepiece seal.
- b. Receive H₂S safety training on location
- c. Familiarize yourself with the rig's Contingency Plan.
- d. Inspect and practice putting on your breathing apparatus.
- e. Know the location of the "safe briefing areas".
- f. Keep yourself "wind conscious". Be prepared to quickly move upwind and away in the event of any emergency involving release of H₂S.

4. Total Safety H₂S Safety Consultant

- a. Conduct training as necessary to ensure all personnel are familiar with the contingency procedures and the operation of emergency equipment.
- b. Check all H₂S safety equipment to ensure that it is ready for emergency use:
 - i. Check pressure daily for each shift on breathing apparatus (both 30-minute and hip-packs) to make sure they are charged to full volume.
 - ii. Check pressure on cascade air bottles to see that they are capable of recharging breathing apparatus.
 - iii. Check oxygen resuscitator to ensure that it is charged to full volume.
 - iv. Check H₂S detectors daily for each shift (fixed and portable), and explosimeter, to ensure they are working properly.
- c. Provide a weekly report to **Burnett** well-site representative documenting:

- i. Calibrations performed on H₂S detectors.
- ii. Proper location and working order of H₂S safety equipment.
- iii. Attendance of all personnel, trained or retrained, and their company.
- iv. Weekly drills including list of personnel participating and summary of actions.

V. SAFETY EQUIPMENT

All respirators will be designed, selected, used and maintained in conformance with ANSI Z88.2, American National Standard for respiratory protection.

Personal protective equipment must be provided and used. All personnel and contractors will be required to wear personal H₂S monitors at all times. Those who are expected to use respiratory equipment in case of an emergency will be carefully instructed in the proper use and told why the equipment is being used. Careful attention will be given to the minute details in order to avoid possible misuse of the equipment during periods of extreme stress.

Self-contained breathing apparatus provides complete respiratory and eye protection in any concentration of toxic gases and under any condition of oxygen deficiency. The wearer is independent of the surrounding atmosphere because he/she is breathing with a system admitting no outside air. It consists of a full face mask, breathing tube, pressure demand regulator, air supply cylinder, and harness. Pure breathing air from the supply cylinder flows to the mask automatically through the pressure demand regulator which reduces the pressure to a breathing level. Upon inhalation, air flows into the mask at a rate precisely regulated to the user's demand. Upon exhalation, the flow to the mask stops and the exhaled breath passes through a valve in the face piece to the surrounding atmosphere. The apparatus includes an alarm & gauge which warns the wearer to leave the contaminated area for a new cylinder of air or cylinder refill.

To enable men/women to work in a toxic atmosphere for prolonged periods of time, a hose line with a quick connect can be added to the unit, thereby connecting it to a cascade system breathing air. The installation of a hose bank series of manifolds on the rig floor connected to a series of cascade bottles at a remote location, allows all personnel to remain with masks on for an extended period.

The derrickman is provided with a full face piece unit attached to a 5 minute escape cylinder, connected to one or more 300 cubic-foot air cylinders through a quick disconnect "T". In case evacuation via trolley or ladder becomes necessary, he will also have a full bottle of air in his own self-contained breathing apparatus.

All respiratory protective equipment, when not in use, should be stored in a clean, cool, dry place, and out of direct sunlight to retard the deterioration of rubber parts. After each use, the mask assembly will be scrubbed with soap and water, rinsed thoroughly, and dried. Air cylinders can be recharged to a full condition from a cascade system.

Personnel in each crew will be trained in the proper techniques of bottle filling.

The primary piece of equipment to be utilized, should anyone be overcome by hydrogen sulfide, is the oxygen resuscitator.

When asphyxiation occurs, the victim must be moved to fresh air and immediately given artificial respiration. In order to assure readiness, the bottles of oxygen will be checked at regular intervals and an extra tank kept on hand.

Hand-operated pump-type detectors incorporating detector tubes will give more accurate readings of hydrogen sulfide. The pump-type draws air to be tested through the detector tube containing lead acetate-silica gel granules. Presence of hydrogen sulfide in the air sample is shown by the development of a dark brown stain on the granules, which is the scale reading of the concentration of hydrogen sulfide. By changing the type of detector tube used, this detector may also be used for sulfur dioxide (SO₂) detection when hydrogen sulfide (H₂S) is being burned in the flare area.

Provisions must be made for the storage of all safety equipment as is evident from the foregoing discussion. All equipment must be stored in an available location so that anyone engaged in normal work situations is no more than "one breath away' from a mask.

VI. TOXICITY OF VARIOUS GASES

Common Name	Chemical Formula	Specific Gravity ¹	Lethal ⁴ PEL (OSHA) ²	STEL ³	ppm
Hydrogen Cyanide	HCN	0.94	10	150	300
Hydrogen Sulfide	H ₂ S	1.18	10	15 ppm	600
Sulfur Dioxide SO ₂ 2.21		2	5 ppm		
Chlorine	CL ₂	2.45	1		
Carbon Monoxide	CO	0.97	35	200/1 Hour	1000
Carbon Dioxide	CO ₂	1.52	5000	5%	10%
Methane	CH4	0.55	90000 (9%)	Combustible	
			. ,	(Above 5% in air)	

Air = 1.0

² Permissible -	Concentration at which is believed that all workers may repeatedly be exposed, day after day, without adverse effect.
³ STEL - ⁴ Lethal -	Short Term Exposure Limit. Concentration that will cause death with short-term exposure.
Reference:	API RP-49, September 1974 - Reissued August 1978

VI. PROPERTIES OF GASES

Α. **CARBON DIOXIDE**

- 1. Carbon Dioxide (CO₂) is usually considered inert and is commonly used to extinguish fires. It is 1.52 times heavier than air and will concentrate in low areas of still air. Humans cannot breathe air containing more than 10% CO₂ without losing conscience or becoming disorientation in a few minutes. Continued exposure to CO₂ after being affected will cause convulsions, coma, and respiratory failure.
- 2. The threshold limit of CO₂ is 5000 ppm. Short-term exposure to 50,000 ppm (5%) is reasonable. This gas is colorless, odorless, and can be tolerated in relatively high concentrations.

Β. **HYDROGEN SULFIDE**

- 1. Hydrogen Sulfide (H_2S) is a colorless, transparent, flammable gas. It is heavier than air and, hence, may accumulate in low places.
- 2. Although the slightest presence of H₂S in the air is normally detectable by its characteristic "rotten egg" odor, it is dangerous to rely on the odor as a means of detecting excessive concentrations because the sense of smell is rapidly lost, allowing lethal concentrations to be accumulated without warning. The following table indicates the poisonous nature of H₂S.

DRAFT

CONCENTRATION			EFFECTS	
% H₂S	РРМ	GR/100 SCF ¹		
0.001	10	.65	Safe for 8 hours without respirator. Obvious and unpleasant odor.	
0.0015	15	0.975	Safe for 15 minutes of exposure without respirator.	
0.01	100	6.48	Kills smell in 3-15 minutes; may sting eyes and throat.	
0.02	200	12.96	Kills smell quickly; stings eyes and throat.	
0.05	500	32.96	Dizziness; breathing ceases in a few minutes; need prompt artificial respiration.	
0.07	700	45.92	Rapid Unconsciousness; death will result if not rescued promptly.	
0.1	1000	64.80	Instant unconsciousness, followed by death within minutes.	

¹ Grain Per 100 Cubic Feet

C. <u>SULPHUR DIOXIDE</u>

- 1. Sulfur Dioxide (SO₂) is a colorless, non-flammable, transparent gas.
- 2. SO₂ is produced during the burning of H₂S. Although SO₂ is heavier than air, it can be picked up by a breeze and carried downwind at elevated temperatures. Since SO₂ is extremely irritating to the eyes and mucous membranes of the upper respiratory tract, it has exceptionally good warning powers in this respect. The following table indicates the toxic nature of SO₂:

CONCENTRATION		EFFECTS
% SO2	РРМ	
0.005	3 to 5	Pungent odor, normally a person can detect SO_2 in this range.
0.012	12	Throat irritation, coughing, constriction of the chest, tearing and smarting of eyes.
0.15	150	So irritating that it can only be endured for a few minutes.
.05	500	Causes a sense of suffocation, event with the first breath.

VII. Treatment Procedures for Hydrogen Sulfide Poisoning

- A. Remove the victim to fresh air.
- B. If breathing has ceased or is labored, begin resuscitation immediately.

Note: This is the quickest and preferred method of clearing victim's lungs of contaminated air; however, under disaster conditions, it may not be practical to move the victim to fresh air. In such instances, where those rendering first aid must continue to wear masks, a resuscitator should be used.

- C. Apply resuscitator to help purge H_2S from the blood stream.
- D. Keep the victim at rest and prevent chilling.
- E. Get victim under physician's care as soon as possible.

VIII. BREATHING AIR EQUIPMENT DRILLS FOR ON & OFF DUTY PERSONNEL

An H_2S Drill and Training Session must be given once a week to ALL on-duty personnel with off duty personnel. On-duty and Off-duty personnel will reverse roles on alternate drills. An H2S drill and training session must be given once a week to all off-duty personnel in coincidence with on-duty personnel reversing roles on alternate drills.

The purpose of this drill is to instruct the crews in the operation and use of breathing air and H_2S related emergency equipment and to allow the personnel to become acquainted with using the equipment under working conditions. The crews should be trained to put on the breathing air equipment within one minute after an H_2S emergency has been alerted.

The following procedure should be used for weekly drills. The **Burnett Oil** supervisor must be satisfied that the crews are proficient with the equipment.

- A. All personnel should be informed that a drill will be held.
- B. The H₂S Safety Technician should initiate the drill by signaling as he would if he detected H₂S.
- C. Personnel should don their breathing apparatus.
- D. Once the breathing air equipment is on, the H2S Technician should check all personnel to insure proper operation.

A training and information session will be conducted after each drill to answer any H₂S related questions and to cover one or more of the following:

- 1. Condition II, and III alerts and steps to be taken by all personnel.
- 2. The importance of wind direction when dealing with H₂S.
- 3. Proper use and storage of all types of breathing equipment.
- 4. Proper use and storage of oxygen resuscitators.
- 5. Proper use and storage of H₂S detectors (Mini Checks or equivalent).
- 6. The "buddy system" and the procedure for rescuing a person overcome by H₂S.
- 7. Responsibilities and duties.
- 8. Location of H₂S safety equipment.

9. Other parts of the "H₂S Contingency Plan" that should be reviewed.

NOTE: A record of attendance must be kept for weekly drills and training sessions.

IX. HYDROGEN SULFIDE TRAINING CURRICULUM

(FOR EMPLOYERS, VISITORS, AND CONTRACTORS)

EACH PERSON WILL BE INFORMED ON THE RESTRICTIONS OF HAVING BEARDS AND CONTACT LENS. THEY WILL ALSO BE INFORMED OF THE AVAILABILITY OF SPECTACLE KITS.

AFTER THE H2S EQUIPMENT IS RIGGED UP, ALL PERSONNEL WILL BE H2S TRAINED AND PUT THROUGH A DRILL. ANY DEFICIENCIES WILL BE CORRECTED.

Training Completion cards are good for one year and will indicate date of completion or expiration. Personnel previously trained on another facility and visiting, must attend a "supplemental briefing" on H2S equipment and procedures before beginning duty. Visitors who remain on the location more than 24 hours must receive full H2S training given all crew members. A "supplemental briefing" will include but not be limited to: Location, use and donning of an assigned respirator, familiarization with safe briefing areas, alarms with instruction on responsibilities in the event of a release and hazards of H2S and (SO2, if applicable). A training and drill log will be kept.

Topics for full H2S training shall include, but not be limited to the following:

A. Brief Introduction on H2S

- 1. Slide or VCR presentation (If Available)
- 2. H2S material will be distributed
- 3. Re-emphasize the properties, toxicity, and hazards of H2S
- 4. Source of SO2 (if applicable)

B. H2S Detection

- 1. Description of H2S sensors
- 2. Description of warning system (how it works & it's location)
- 3. Actual location of H2S sensors
- 4. Instruction on use of pump type detector (Gastec)
- 5. Use of card detectors, ampoules, or dosemeters
- 6. Use of combustible gas detector
- 7. Other personnel detectors used
- 8. Alarm conditions I & II,
- 9. SO2 alarms (if applicable)

C. H2S Protection

- 1. Types of breathing apparatus provided (30-minute SCBA & SKA PAK with voice diaphragms for communication)
- 2. Principle of how breathing apparatus works
- 3. Demonstration on how to use breathing apparatus
- 4. Location of breathing apparatus

D. Cascade System

- 1. Description of cascade system
- 2. How system works
- 3. Cascade location of rig with reference to briefing areas
- 4. How to use cascade system (with SKA PAKS & refill)
- 5. Importance of wind direction and actual location of windsocks
- 6. Purpose of compressor/function (if one is on site)

E. H2S Rescue and First Aid

- 1. Importance of wind direction
- 2. Safe briefing area
- 3. Buddy system
- 4. H2S symptoms
- 5. Methods of rescue

F. Hands on Training

- 1. Donning/familiarization of SCBA
- 2. Donning/familiarization of SKA PAK
- 3. Familiarization of cascades
- 4. Use of O2 resuscitator
- 5. Alarm conditions upwind briefing areas, etc...
- 6. Duties and responsibilities of all personnel
- 7. Procedures for evacuation
- 8. Search and Rescue teams

G. Certification

H. Testing on material covered

X. EMPLOYEE INFORMATION

		TOTAL S	AFETY US INC	., FIT TEST	
Employee Name			Da	ite:	_
Date of Employe	e Medical Evaluation	:			
Medical Status (circle): Unrestricted	Limit	ations on Use	Use Not Authorized	
RESPIRATOR I	NFORMATIOIN				
Respirator Type	(Dustmask, SCBA, e	tc):			
Brand:					_
Size: (circle):	XS	S	М	L	XL
FIT TEST INFO	RMATION				
Type of Fit Test I	Performed:				
Quantita	<u>ative</u> Porta Count Fittester 3000			Fit Factor:	
<u>Qualitat</u>	ive Irritant Smoke Isoamyl Acetate (Bar Saccharin Bitrex	nana Oil)		Passed / Failed Passed / Failed Passed / Failed Passed / Failed	
l hereby certify th 1910.134.	nat this fittest was cor	nducted in ac	cordance with t	he OSHA Fit Testing Pr	otocols found in Appendix
Fit Tester Name	(Print):				

Siq	nature:	Date:	

XI. H₂S SAFETY SERVICES

HYDROGEN SULFIDE SAFETY PACKAGE

RESPIRATORY SAFETY SYSTEMS

QTY DESCRIPTION

- 1 20 Bottle Trailer
- 12 30-Minute Pressure Demand SCBA w/Pigtail
- 8 5-Minute Work Units
- 2 Regulators
- 4 100' Low Pressure Hose Lines
- 10 50' Low Pressure Hose Lines
- 16 3'-5' Pigtails
- 1 12 Man Manifold
- 1 6 Man Manifold
- 1 3 Man Manifold
- 1 8 Bottle Cascade

DETECTION AND ALARM SYSTEMS

- 1 4-Channel H2S Monitor
- 4 H2S Controllers
- 5 H2S Sensors
- 1 Explosion Proof Alarm
- 1 Portable Quad Meter
- 1 Sensidyne/Rae Manual Gas Detection Pump
- 4 Boxes H2S Tubes (Various Ranges)
- 4 Boxes S02 Tubes (Various Ranges)
- 1 Calibration Kit
- 1 Record Keeping paperwork (ie: Training, Calibration, Inspection, and Daily Reports)
- 1 Rig Up Box

QTY DESCRIPTION

- 1 Windsock with Pole and Bracket
- 1 Megaphone (Bullhorn) w/Spare Batteries
- 1 Well Condition Sign w/Green, Yellow, Red Flags
- 1 Primary and Secondary Safe Briefing Area Signs
- 1 Flare Pistol, w/Flares
- 1 White Marker Board with Erasers and Markers
- 1 Safety Harness w/50' Safety Line
- 1 O2 Resuscitator
- 1 Litter
- 1 24 Piece First Aid Kit

Steve Brown:251-379-6898srbrown@totalsafety.comMike Kirk:251-366-1628Jameskirk@totalsafety.comDanny Loper:251-635-7559dloper@totalsafety.com

1-800-833-2974- Office 1-251-666-4350 - fax

EMERGENCY PHONE NUMBERS

Burnett Oil Co. Inc.	Main Office	O: 817-332-5108
801 Cherry Street – Unit 9 Fort Worth, Texas 76102	Kevin Vermillion VP of Special Services	O: 817-332-5108
	Wesley Hanna Engineering Manager	O: 817-332-5108
	Leslie Garvis Regulatory & Government Affairs Manager	O: 817-332-5108
Rig Company	To be named	
Hydrogen Sulfide Safety Contractor	Steve Brown (Salesman)	O:800-833-2974 M:251-379-6898
Total Safety 5237 Halls Mill Road Building J Mobile, AL 36619	Mike Kirk (District Manager)	O:800-833-2974 M:251-591-5404
Fire Departments	Clewiston	863-983-1499
	LaBelle	863-675-1537
Sheriff Departments		
	Clewiston	863-805-5000
	LaBelle	863-674-5600
	LaBelle Annex	863-674-5600
Hendry County Emergency Management	Lupe Taylor	863-674-5400
Ambulance Services	Medical Services	863-612-0721
Hospitals	EMT To Be Determined	
Florida Highway Patrol	Troop F- Ft. Myers 10041 Daniels Pkwy. Ft. Meyers, FL 33913	239-344-1730
U.S. Environmental Protection Agency	Region #4 Sam Nunn Atlanta Federal Center 61 Forsyth St. SW Atlanta, GA 30303	O:404-562-9900 F:404-562-8174 Toll Free:800-241-1754

DRAFT

OSHA	Regional Office 61 Forsyth St. SW Atlanta, GA 30303	O: 404-562-2300 F: 404-562-2295
	Fort Lauderdale Area Office 8040 Peters Road Bldg. H-100 Fort Lauderdale, FL 33324	O: 954-424-0242 F: 954-424-3073
NATIONAL RESPONSE CENTER	Toxic Chemical and Oil Spills	800-424-8802
	Tallahassee Office Florida DEP/Bureau of Mine Reclamation Oil and Gas Program 2051 East Paul Dirac DR./M.S. 715 Tallahassee, FL 32310	O: 850-488-8217 V-Mail: 850-413-8192 F: 850-488-1254
Florida Department of		050 717 0140

Florida Department of	Program Administrator	850-717-9110
Environmental Protection	5	
Oil and Gas Program	P.E. Engineer	850-245-8406
2600 Blair Stone Road, MS 3588	3	
Tallahassee, FL 32399-2600	Enginering Specialist II	850-245-7536
	Environmental Consultant	850-245-8405

Florida Department of Environmental	Engineering Specialist II	239-344-5600
Protection- Oil & Gas Program		
Fort Myers Field Office		
2295 Victoria Avenue, Suite 364		
Ft. Myers, FL 33901		

XII. EVACUATION OF THE GENERAL PUBLIC

The procedure to be used in alerting nearby persons in the event of any occurrence that could pose a threat to life or property will be arranged and completed with public officials in detail, prior to drilling into the hydrogen sulfide formations.

In the event of an actual emergency, the following steps will be immediately taken:

- 1. The Burnett representative will dispatch sufficient personnel to immediately warn each resident and transient's down-wind within radius of exposure from the well site. Then warn all residence in the radius of exposure. Additional evacuation zones may be necessary as the situation warrants.
- 2. The Burnett representative will immediately notify proper authorities, including the Sheriff's Office, Highway Patrol, and any other public officials as described above and will enlist their assistance in warning residents and transients in the calculated radius of exposure.
- 3. The Burnett representative will dispatch sufficient personnel to divert traffic in the vicinity away from the potentially dangerous area. A guard to the entrance of the well site will be posted to monitor essential and non essential traffic.
- 4. General:
 - A. The area included within the radius of exposure is considered to be the zone of maximum potential hazard from a hydrogen sulfide gas escape. Immediate evacuation of public areas, in accordance with the provisions of this contingency plan, is imperative. When it is determined that conditions exist which create an additional area (beyond the initial zone of maximum potential hazard) vulnerable to possible hazard, public areas in the additional hazardous area will be evacuated in accordance with the contingency plan.
 - B. In the event of a disaster, after the public areas have been evacuated and traffic stopped, it is expected that local civil authorities will have arrived and within a few hours will have assumed direction of and control of the public, including all public areas. Burnett will cooperate with these authorities to the fullest extent and will exert every effort by careful advice to such authorities to prevent panic or rumors.
 - C. Burnett will attempt to have appropriate management personnel at the disaster site as soon as possible. The company's personnel will cooperate with and provide such information to civil authorities as they might require.
 - D. One of the products of the combustion of hydrogen sulfide is sulfur dioxide (SO₂). Under certain conditions this gas may be equally as dangerous as H₂S. A pump type detector device, which determines the percent of SO₂ in air through concentrations in ppm, will be available. Although normal air movement is sufficient to dissipate this material to safe levels, the SO₂ detector should be utilized to check concentrations in the proximity of the well once every hour, or as necessary and the situation warrants. Also, if any low areas are suspected of having high concentrations, personnel should be made aware of these areas, and steps should be taken to determine whether or not these low areas are hazardous.

ADDENDUM:

"In the event that conditions relating to drilling of the subject well require evacuation of personnel in the proximity of the drilling location due to a release of hydrogen Sulfide gas, in addition to the housing and reasonable per diem for the displaced people involved, the operator will provide appropriate reimbursement for reasonable and competitive evacuation and boarding costs for horses and/or cattle that must be included in the evacuation. Formal evacuation would be the result of a decision and declaration resulting from the safety evaluation of the operator, the professional safety company employed on location, and local public emergency officials."

OTHER: NOTES:

DIRECTIONS TO WELL SITE:

RESIDENTS LIST:

Ref #	Contact Name	Phone #	# of Household	Address	Special Needs	Transportation
1					1	



Hydrogen Sulfide Safety Protocol for Completion, Workover & Production Operations

Nobles Grade and Tamiami Locations



I. Introduction

Hydrogen Sulfide (H_2S) is a toxic, poisonous gas that could cause death or injury. This protocol outlines the protections to be put in place for alerting and protecting both personnel and the public from H_2S exposure in the event a potentially hazardous volume is accidentally released to the atmosphere.

It is the intention of **Burnett Oil Co., Inc.** to make every effort to provide adequate safeguards against harm to persons on the well pad and in the immediate vicinity from the effects of hydrogen sulfide, which may be released into the atmosphere under emergency conditions. However, the initiative rests with the individual in utilizing the safeguards provided. The ideas and suggestions of the individuals involved in the completion, workover, and production operations of this well are highly welcomed and act as a fundamental tool for providing the safest working conditions possible.

BOCI personnel and/or contract supervisory personnel will be responsible for enacting all emergency procedures should the need arise. These procedures are set up for their safety and the safety of all others.

It is **Burnett Oil Co., Inc.'s** intent to provide a safe working place, not only for its employees, but also for other contractors who are aiding in the completion and production of this well. The safety of the public and visitors is of utmost concern. All precautions will be taken to keep a safe working environment and protect the public.

High levels of H₂S are not expected during the completion and production of these wells; however, **Burnett Oil Co., Inc.** will have constant monitoring in place and will utilize outlined procedures in the event an H₂S alarm should alert personnel on location. It is understood that some other South Florida fields have encountered H₂S from formations at depths greater than 10,000 TVD. H2S Contingency Plan



II. Individual Responsibilities

- A. All personnel shall be:
 - 1. Responsible for their assigned safety equipment.
 - 2. Responsible for familiarizing themselves with the location of all safety equipment.
 - Responsible for reporting any indications of H₂S to those in the area and to a supervisor.
- B. During *daily production operations*, **BOCI field personnel** shall be:
 - Responsible for thoroughly understanding and seeing that all aspects of this protocol are enforced.
 - Responsible for keeping a minimum number of personnel on the location during expected hazardous operations.
 - 3. Responsible for coordinating all well site operations and communications in the event an emergency condition develops.
 - 4. Responsible for ensuring that all contractors possess the proper H2S certifications.
 - 5. Responsible for administering site specific safety orientation to all visitors and first-time contract personnel.
- C. During completion/workover operations, BOCI well-site supervisors shall be:
 - 1. Responsible for ensuring that all Burnett Oil Co., Inc. policies and procedures are followed by all personnel on location.
 - Responsible for thoroughly understanding and seeing that this protocol is enforced.
 - Responsible for keeping a minimum number of personnel on the location during expected hazardous operations.
 - 4. Responsible for coordinating all well site operations and communications in the event an emergency condition develops.

H2S Contingency Plan



- 5. Responsible for ensuring that all contractors possess the proper H2S certifications.
- 6. Responsible for administering site specific safety orientation to all visitors and first-time contract personnel.

III. Safety Equipment and Location

- A. Personal H₂S Monitors shall be provided by the employee's company, and the monitors shall be worn within the breathing zone while on location.
- B. A fixed H₂S alarm will be installed during the construction of the production facility that will have an audible and visual siren to alert personnel of levels greater than 10 ppm.
- C. Fixed signage will be placed at the facility and pad entrance notifying entrants of potential exposure to H₂S and other location specific hazards.
- D. BOCI personnel will be equipped with breathing equipment. Contractors will be responsible for providing breathing equipment to their personnel on location.
 This equipment shall be placed in close proximity to the work being done, to be utilized in the event of an evacuation or rescue.
- E. Windsocks and signage are to be strategically located around the rig (when present) and the facility (once constructed), to provide wind direction reference to all personnel.
- F. All equipment shall be inspected and calibrated regularly. The equipment shall also be inspected and recalibrated after use.
- G. All personnel on location shall be trained in how to properly don and/or use all equipment on location.





IV. **Operating Conditions and Notifications**

A.	Condition I – Normal Operating Conditions, Potential Danger, Ops Under Control		
	Alarms:	No Alarm. H ₂ S less than 10 ppm	
	Action:	Operations shall continue as normal. Visitors and non-	
		essential personnel are allowed on site.	
В.	5. Condition II -Potential to Moderate Danger to Life		
	Alarms:	Actuates at 10 ppm with audible siren & lights	
C.	. Condition III – Moderate to Extreme Danger to Life		
	Alarms:	Actuates at 15 ppm with continuous sirens & flashing	
		lights	

Condition II and Condition III require the immediate evacuation of the rig or surrounding area to the pre-determined upwind muster area, until the atmosphere has been tested and cleared by trained personnel.

V. **Training Requirements**

- A. <u>Personnel Safety Training</u> All personnel shall have received OSHA compliant H₂S certification.
- B. <u>Rig Operations</u> All personnel shall be adequately trained in well control & rig operations.
- C. <u>Service Company Personnel</u> All service personnel shall have been trained by their employers in the hazards and characteristics of H₂S and the operation of safety equipment.
- D. Visitors- All first-time visitors to the location will be required to attend an on-site orientation, that will include H₂S awareness training.
- E. <u>Emergency</u> In the event of an uncontrollable situation, **Burnett Oil Co., Inc.** will initiate its Emergency Response Plan (ERP).



VI. BOCI Contact List

Name:	Company:	Phone #:	Title:
Wes Hanna	Burnett Oil Co., Inc.	(817) 332-5108 Office	Engineering Mgr.
Kevin Vermillion	Burnett Oil Co., Inc.	(817) 332-5108 Office	VP Special Services