

# **Arrow S Energy Operating, LLC H<sub>2</sub>S Contingency Plan**

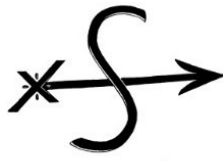
## **Pad Description**

**Pad Names: ASE SOUTH L2**

**Latitude: 28° 75' 33.73"**

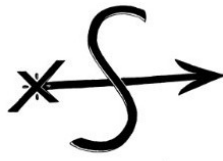
**Longitude: 98° 35' 12.40"**

**RRC Permit # : 20948**



## TABLE OF CONTENTS

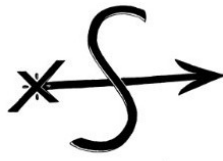
1. EMERGENCY ASSISTANCE TELEPHONE LIST .....	3
2. H <sub>2</sub> S CONTINGENCY PLAN.....	4
3. DEFINITIONS.....	5
4. AFFECTED PUBLIC.....	5
5. OPERATING CONDITIONS.....	5
6. EVACUATION PLAN.....	8
7. EMERGENCY PROCEDURES .....	9
8. POST EMERGENCY ACTIONS.....	10
9. WELL IGNITION PROCEDURES .....	10
10. TRAINING PROGRAM .....	11
11. EMERGENCY EQUIPMENT .....	12
12. MAPS, PLATS & APPENDICES.....	14
13. GAS ANALYSIS.....	17



## 1. EMERGENCY ASSISTANCE TELEPHONE LIST

### 1.1 Public Safety

Arrow S Energy Operating, LLC Emergency Number	1000 Louisiana, Suite 7000 Houston, TX 77002	(713) 400-6648 (405) 219-1076 (888) 279-9150
Atascosa EMS	915 Main Street Jourdanton, TX 78026	911 (830) 769-2702
Atascosa County Sheriff Office	1108 Campbell Ave, Jourdanton, TX 78026	(830) 769-3434
Atascosa County Sheriff Office	Sheriff David Soward	(830) 769-3434 Ext 2225
Fire Marshal & Emergency Management	Devin Wilborn	(830) 769-2029
Volunteer Fire Department	108 2nd St, Pleasanton, TX 78064	(830) 569-2813
Methodist Hospital Atascosa	1905 Hwy 97 East, Jourdanton, TX 78026	(830) 769-3515
ASEO Production Superintendent	Jamin Richard	(337) 552-4510
ASEO Production Lead	Kyle Kremling	(361) 412-7589
ASEO Production Lead	Geoffery Penuel	(956) 285-8896
ASEO Production Lead	Mario Fernandez	(956) 602-6923
ASEO HSE Manager/ Emergency Response Coordinator	Antonio Lopez	(832) 572-9180
Arrow S Ranch Manager	Rocky Roberts	(830) 570-7361
Texas Dept. of Transportation:	2154 S. Second St. Pleasanton, TX 78064	(830) 281-5384
NACG / SMEC Control Room 24/7/365		(830) 784-3411 Ext 239
NACG / SMEC	Casey Bird EHS & Engineering Manager	830-784-3411 Ext 287
H2S Services & Breathing Equipment	JSA Safety & Consulting , Inc.	(830) 742-2580
Environmental Compliance	Sunpro Services LLC	(210) 951-9855
Roustabouts/Spill Contractor	Pegasus Construction & Services, LLC	(361) 394-2060
Well Control	Wild Well Control	(281) 784-4700
Texas Commission on Environmental Quality – TCEQ Region 13 (San Antonio) Office	Main Line	(210) 490-3096
	24 hr. Spill Reporting	(800) 832-8224
Texas Railroad Commission – TX RCC Office Region 1	Main Line	(887) 228-5740
	24hr. Accident Reporting	(512) 463-6788



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

### 2.1 Scope:

This H<sub>2</sub>S Contingency Plan (the Plan) provides an organized plan of action for alerting and protecting workers and the public within an area of exposure prior to an intentional release or following the accidental release of a potentially hazardous volume of hydrogen sulfide. The plan establishes guidelines for affected residents and personnel whose dwelling(s) or work activity may be at risk of exposure to Hydrogen Sulfide Gas (H<sub>2</sub>S).

### 2.2 Objective:

- Prevent any and all accidents and prevent the uncontrolled release of H<sub>2</sub>S into the atmosphere.
- Provide proper evacuation procedures to cope with emergencies.
- Provide immediate and adequate medical attention should an injury occur.

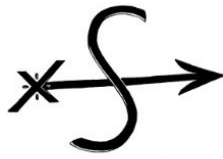
### 2.3 Purpose, Distribution and Updating of This Plan:

The Purpose of this H<sub>2</sub>S Contingency Plan is to protect workers and the general public from the harmful effects of H<sub>2</sub>S accidentally escaping from the subject producing well. This plan is designed to accomplish its purpose by assuring the preparedness necessary to:

1. Minimize the possibility of releasing H<sub>2</sub>S into the atmosphere during related operations.
2. Provide for the logical, efficient, and safe emergency actions required to protect the general public and public safety personnel.

Supplemental information is included with this plan and is intended as reference material for anyone needing a more detailed understanding of the many factors pertinent to safe H<sub>2</sub>S operations. Although the release of a potentially hazardous quantity of H<sub>2</sub>S is highly unlikely, if such a release should occur however, obviously the exact time, rate, duration, and other pertinent facts will be known in advance thus, this plan must necessarily be somewhat general. The plan does review in detail, as is reasonably possible, the type of accidental release that could possibly endanger the general public, the probable extent of such danger, and the emergency actions generally appropriate. In the event of such an accidental release, the specific actions to be taken will have to be determined at the time of release by the responsible personnel at the well site. Complete familiarity with this plan will help such personnel make the proper decisions rapidly. Familiarity with this plan is also required of all operators, operator representatives, and supervisory personnel who could possibly be on duty at the production location at the time of an H<sub>2</sub>S emergency.

This plan must be kept current if it is to effectively serve its purpose. The Arrow S Energy Operating Safety Manager will be responsible for seeing that all copies are updated. Updating the plan is required when any changes to the personnel Call List (Section) including telephone numbers occur or



when any pertinent data or plans for the well are altered. The plan must also be updated when any changes in the general public are likely to be within the exposure area in the event of an accidental release from the well bore of a potentially hazardous quantity of H<sub>2</sub>S. This plan shall be made available at 1000 Louisiana, Suite 7000 Houston, TX 77002, <https://hse.arrowsenergy.com/h2s>, and one printed copy shall be retained at the Main field office.

### 3. DEFINITIONS

**TLV:** Threshold Limit Value is the concentration employees may be exposed based on a TWA (time weighted average) for eight (8) hours in one day for 40 hours in one (1) week. This is set by ACGIH (American Conference of Governmental Hygienists) and regulated by OSHA.

**STEL:** Short Term Exposure Limit is the 15-minute average concentration an employee may be exposed H<sub>2</sub>S.

**IDLH:** Immediately Dangerous to Life and Health is the concentration that has been determined by the ACGIH to cause serious health problems or death if exposed to this level. The IDLH for H<sub>2</sub>S is 100 parts per million (PPM).

**TWA:** Time Weighted Average is the average concentration of any chemical or gas for an eight (8) hour period. This is the concentration that any employee may be exposed based on a TWA.

**PPM:** Parts Per Million is the ratio of one gas to another .

### 4. AFFECTED PUBLIC

#### 4.1 Area Residences/ Occupied Locations/ Public Roads

Resident Location	Resident Name	Phone Number	Email Address
NONE			
No residents located in the Radius of Exposure (ROE)			

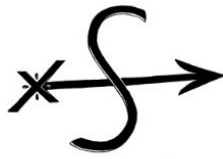
Public Roadway			
FM 140			
FM 140 is within the Radius of Exposure (ROE) 100PPM is at 697 ft and 500PPM is at 319ft.			

Occupied Location	Contact Name	Phone Number	Email Address
Hunting Camp	Rocky Roberts	(830) 570-7361	
Hunting Camp is within the Radius of Exposure (ROE) 100PPM is at 697 ft and 500PPM is at 319 ft.			

### 5. OPERATING CONDITIONS

#### 5.1 Conditions Requiring Air Masks

- Whenever air masks are used, the person should be appropriately shaven to allow for a tight fit and seal of the breathing equipment.
- When breaking out any line where H<sub>2</sub>S can reasonably be expected.
- When sampling air in areas to determine if toxic concentrations of H<sub>2</sub>S exist.



- When working in areas where 10 PPM or more of H<sub>2</sub>S has been detected.

## 5.2 Toxic Effects of H<sub>2</sub>S Poisoning

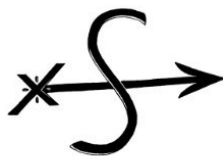
Hydrogen Sulfide is extremely toxic. The acceptable ceiling concentration for eight-hour exposure is 10 PPM, which is .001% by volume. Hydrogen Sulfide is heavier than air (specific gravity – 1.192) and is colorless and transparent. Hydrogen Sulfide is almost as toxic as Hydrogen Cyanide and is 5-6 times more toxic than Carbon Monoxide. Occupational exposure limits for Hydrogen Sulfide and other gases are compared below in

## 5.3 Toxicity table for H<sub>2</sub>S *(Adapted from ACGIH and NIOSH sources)*

Concentration (PPM)	Physiological Effect
0.1 - 3	Odor Threshold
3 - 10	Offensive Odor
10 - 50	Headache Nausea Throat and Eye Irritation
50 - 100	Eye Injury
100 - 300	Conjunctivitis Respiratory Tract Infection Olfactory Paralysis
300 - 500	Pulmonary Edema Imminent Threat to Life
500 - 1,000	Strong Nervous System Stimulation Apnea
1,000 – 2,000	Immediate Collapse with Respiratory Paralysis Risk of Death

## 5.4 Permissible Exposure Limits of H<sub>2</sub>S Gases

Percent %	PPM	Physical Effects
.0001	1	Can smell less than 1 ppm.
.001	10	TLV for 8 hours of exposure.
.0015	15	STEL for 15 minutes of exposure.
.01	100	Immediately Dangerous to Life & Health. Kills sense of smell in 3 to 5 minutes.
.02	200	Kills sense of smell quickly, may burn eyes and throat.
.05	500	Dizziness, cessation of breathing begins <b>in a few minutes</b> .
.07	700	Unconscious quickly, death will result if not rescued promptly.
.10	1000	Death will result unless rescued promptly. Artificial resuscitation may be necessary.

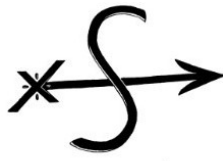


### 5.5 Permissible Exposure Limits of Various Gases

Common Name	Symbol	Sp. Gravity	TLV	STEL	IDLH
Hydrogen Cyanide	HCN	.94	4.7 ppm	4.7 ppm	50 ppm
Sulfide Dioxide	SO <sub>2</sub>	2.21	2 ppm	5 ppm	100 ppm
Chlorine	CL	2.45	.5 ppm	1 ppm	10 ppm
Carbon Monoxide	CO	.97	25 ppm	200 ppm	1200 ppm
Carbon Dioxide	CO <sub>2</sub>	1.52	5000 ppm	30,000 ppm	40,000 ppm
Methane	CH <sub>4</sub>	.55	5% LEL	15% UEL	

### 5.6 Physical Properties of H<sub>2</sub>S:

- **COLOR – TRANSPARENT:** Hydrogen Sulfide is colorless, so it is invisible. This fact simply means that you can't rely on your eyes to detect its presence. In fact, that makes this gas extremely dangerous to be around.
- **ODOR – ROTTEN EGGS:** Hydrogen Sulfide has a distinctive offensive smell, like "rotten eggs". For this reason, it earned its common name "sour gas". However, H<sub>2</sub>S, even in low concentrations, is so toxic that it attacks and quickly impairs a victim's sense of smell, so it could be fatal to rely on your nose as a detection device.
- **VAPOR DENSITY – SPECIFIC GRAVITY OF 1.192:** Hydrogen Sulfide is heavier than air, so it tends to settle in low-lying areas like pits, cellars or tanks. If you find yourself in a location where H<sub>2</sub>S is known to exist, protect yourself. Whenever possible, work in an area upwind and keep to higher ground.
- **EXPLOSIVE LIMITS – 4.0% TO 44%:** Mixed with the right proportion of air or oxygen, H<sub>2</sub>S will ignite and burn or explode, producing another alarming element of danger besides poisoning.
- **FLAMMABILITY** – Hydrogen Sulfide will burn readily with a distinctive clear blue flame, producing Sulfur Dioxide (SO<sub>2</sub>), another hazardous gas that irritates the eyes and lungs.
- **SOLUBILITY – 4 TO 1 RATIO WITH WATER:** Hydrogen Sulfide can be dissolved in liquids, which means that it can be present in any container or vessel used to carry or hold well fluids including oil, water, emulsion and sludge. The solubility of H<sub>2</sub>S is dependent on temperature and pressure, but if conditions are right, simply agitating a fluid containing H<sub>2</sub>S may release the gas into the air.
- **BOILING POINT – (-77° Fahrenheit):** Liquefied Hydrogen Sulfide boils at a very low temperature, so it is usually found as a gas.



## 6. EVACUATION PLAN

### 6.1 General Evacuation Plan:

The direct lines of action prepared by Arrow S Energy Operating to protect the public from hazardous gas situations are as follows:

- When the company approved supervisor (Production Superintendent) determines that Hydrogen Sulfide gas at 100 PPM or greater cannot be limited to the well location, and the public will be involved, he will activate the evacuation plan. Well site escape routes are noted on the well site area map.
- Appropriate local government agencies and the Arrow S Ranch Manager will be notified that a hazardous condition exists, and an evacuation alarm has been initiated.
- Company approved safety personnel that have been trained in the use of the proper emergency equipment will be utilized.
- 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 roadblocks. Also, they will aid in evacuation of the public if necessary.
- After the discharge of gas has been controlled, the authorized company supervisor will determine when the area is safe for re-entry.
- If a major release is secured, all exposed housing, vehicles, and low-lying areas and other structures downwind must be tested and cleared to ensure that all residual H<sub>2</sub>S is cleared.
- Fans, or opening of doors is recommended to ensure that enclosed spaces are cleared as part of this process.

#### 6.1.1 Evacuation Plan for Hunting Camp

In the event of a release of Hydrogen Sulfide gas at 100 PPM or greater cannot be limited to the well location these actions shall be followed:

- Contact Arrow S Ranch Manager – Rocky Roberts at (830) 570-7361 to verify if any people are at Hunting Camp. If people are present the next steps are to be followed.
- If a contact number can be obtained every attempt so be made to reach person(s) for their current location. If contact cannot be made an emergency search should begin for any missing and/or unaccounted individual(s). All search missions shall be conducted under fresh air masks in teams of two.
- Inform them of the emergency.
- Directed to nearest safe muster point.
- Once area has been deemed safe for re-entry.
- All exposed housing, vehicles, and low-lying areas downwind must be tested and cleared to ensure that all residual H<sub>2</sub>S is cleared.

**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 emergency personnel.





**6.2 If uncontrollable condition above 15 ppm occurs, the following will occur:**

- Prepare to take steps to protect and/or remove workers and the public downwind of the location, including partial evacuation or isolation as necessary.
- Prepare to notify necessary public safety personnel for help with maintaining roadblocks, thus limiting traffic and implementing evacuation.
- Determine and proceed with the best possible plan to regain control of the well. Maintain tight security and safety measures.

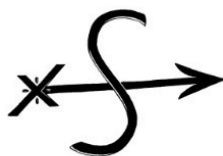
**6.3 Responsibility:**

- The (Richard Heerwald (817) 964-5652 Jamin Richard (337) 552-4510) shall be responsible for the total implementation of the plan.
- The Company Approved Supervisor shall be in complete command during any emergency.
- The Company Approved Supervisor has designated backup Supervisors if he/she is not available.

**6.4 Immediate Action Plan**

Upon notification of an actual or potential release, the company representative receiving the notification shall:

- Obtain and document the following information notification log (for third party notification of emergencies)
  - a) Caller's Name
  - b) Caller's Telephone Number
  - c) Caller's Location
  - d) Location Emergency
  - e) Type of Emergency, presence of gas, extent, medical help needed
- Identify the emergency (leak, loss of well control, fire, equipment malfunction or failure causing release, etc.)
- Access the emergency scene and assure your safety and the safety of others nearby. (Consider the scene: isolated, public, etc. and identify type of terrain, weather, and wind conditions).
- Call Production Superintendent/Lead from a safe location as soon as possible and relay situation information:
  - a) Type of emergency, severity, and precise location
  - b) Means of further communication with company personnel
- Secure the area; take care of people's safety first.
- Ascertain the radius of exposure, utilizing the site's maps and make all further notification from the Emergency assistance telephone list, including public emergency services, if needed.
- Dispatch the necessary personnel, equipment, tools, and materials to the location.



- Until the arrival of Supervisor, the Production Lead/ Emergency Response Coordinator at the site of the emergency will be responsible for assuring the deployment and coordination of support contactors and emergency personnel to ascertain the safety of all persons in the area.
- Minimize the volume of H<sub>2</sub>S at the site by emergency shutdown/shut-in, use of flare or other means as applicable.

## **7. EMERGENCY PROCEDURES (100 PPM)**

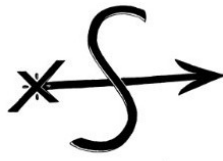
- Before attempting any rescue, personnel must first get out of the hazardous area. Go to a safe briefing area and headcount of all personnel will be done by either Production Superintendent/Lead or Emergency Response Coordinator .
- The alarm will be sounded, and calls will be made to local EMS, Sheriff office, and Fire Dept., with gate guard ensuring unauthorized personnel cannot access the location.
- If rescue is necessary, a breathing apparatus will be worn, with at least two trained rescuers performing this function. Rescue the victim(s) and return them to a safe briefing area.
- Perform an initial assessment and begin proper First Aid/CPR procedures.
- Keep victim lying down with a blanket or coat, etc., under the shoulders to keep airway open. Conserve body heat and do not leave unattended.
- If the eyes are affected by H<sub>2</sub>S, wash them thoroughly with potable water. Forslight irritation, cold compresses are helpful.
- In case a person has only minor exposure and does not lose consciousness totally, it's best if he doesn't return to work until the following day.
- Any personnel overcome by H<sub>2</sub>S should always be examined by medical personnel. They should always be transported to a hospital or doctor.

### **7.1 Supervisor & Backup Supervisors:**

Production Superintendent	Jamin Richard	(337) 552-4510
Production Lead	Kyle Kremling	(361) 412-7589
Production Lead	Geoffrey Penuel	(956) 285-8896
Production Lead	Mario Fernandez	(956) 602-6923
Emergency Response Coordinator	Antonio Lopez	(832) 572-9180

### **7.2 Evacuation Direction:**

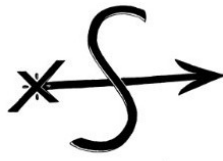
Always evacuate cross and up-wind from the point of gas release. Workers should muster at the most up-wind designated muster points.



## **8. POST EMERGENCY ACTIONS**

In the event this plan is activated, the following post emergency actions shall be taken to reduce the possibility of a reoccurrence of the type of problem that required its activation, and/or assure that any future activation of a similar plan will be as effective as possible.

- Review the factors that caused or permitted the emergency to occur, and if the need is indicated to modify operating, maintenance and/or surveillance procedures.
- If the need is indicated, retrain employees in H<sub>2</sub>S emergency procedures etc.
- Clean up, recharge, restock, repair, and/ or replace H<sub>2</sub>S emergency equipment as necessary, and return it to its proper place. (For whatever rental equipment is used, this will be the responsibility of Rental Company).
- See that future H<sub>2</sub>S Contingency plan is modified as necessary, if the need is.



## 9. WELL IGNITION PROCEDURES

### 9.1 Responsibilities:

The decision to ignite the well is the responsibility of the authorized company representative in concurrence with the STATE POLICE. In the event the authorized company representative is incapacitated, it becomes the responsibility of the Production Superintendent. The well should only be ignited only as a last resort and in a situation where it is clear that:

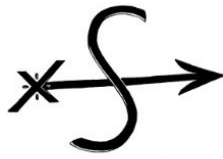
- Human life and property are endangered.
- There is no hope of controlling the blowout under the prevailing

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.

### 9.2 Instructions for Igniting the Well:

- Two people are required for the actual igniting operation. Both men must wear self-contained breathing apparatus and must use a full body harness and attach a retrievable safety line to the D-Ring in the back. One man must monitor the atmosphere for explosive gases with the LEL monitor, while the Production Superintendent is responsible for igniting the well.
- The primary method to ignite is a 25mm flare gun with a range of approximately 500 feet.
- Ignite from upwind and do not approach any closer than is warranted.
- Select the ignition site best suited for protection and which offers an easy escape route.
- Before igniting, check for the presence of combustible gases.
- After igniting, continue emergency actions and procedures as before.
- All unassigned personnel will limit their actions to those directed by the authorized company represented.

**Note:** After the well is ignited, burning Hydrogen Sulfide will convert to Sulfur Dioxide, which is also highly toxic. Also, both are heavier than air. Do not assume the area is safe even after the well is ignited.



## 10. TRAINING PROGRAM

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

- Hazards and characteristics of Hydrogen Sulfide ( $H_2S$ ).
- Physical effects of Hydrogen Sulfide on the human body.
- Toxicity of Hydrogen Sulfide and Sulfur Dioxide.
- $H_2S$  detection, Emergency alarm and sensor location.
- Don and Doff of SCBA and be appropriately shaven.
- Emergency rescue.
- Resuscitators.
- First aid and artificial resuscitation.
- The effects of Hydrogen Sulfide on metals.

Service company personnel and visiting personnel must be notified if the zone contains  $H_2S$ , and each service company must provide adequate training and equipment for their employees before they arrive at the well site.

## 11. EMERGENCY EQUIPMENT

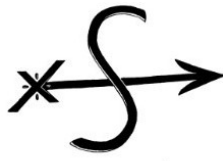
### 11.1 Lease Entrance Sign:

The lease  $H_2S$  entrance warning sign should be placed at the entrance of location and at a minimum provide the following information:

- CAUTION
- $H_2S$  POISONOUS GAS MAY BE PRESENT
- NO ADMITTANCE WITHOUT AUTHORIZATION

Sample  $H_2S$  Entrance Sign:





### **11.2 Respiratory Equipment:**

Emergency escape self-contained breathing apparatus shall be available on location and be displayed in an easily accessible position.

### **11.3 Respiratory Equipment:**

The Occupational Safety and Health Administration (OSHA) regulate the use of respiratory protection to protect the health of employees. OSHA's requirements are written in the Code of Federal Regulations, Title 29, Part 1910, Section 134, Respiratory Protection. This regulation requires that all employees who might be required to wear respirators, shall complete an OSHA mandated medical evaluation questionnaire. The employee then should be fit tested prior to wearing any respirator while being exposed to hazardous gases.

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.

Respirators shall be inspected prior to and after each use to make sure that the respirator has been properly cleaned, disinfected and that the respirator works properly. The unit should be fully charged prior to being used.

Anyone who may use respirators shall be properly 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 who 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.

Respirators shall be worn during the following conditions:

- When breaking out any line where  $H_2S$  can reasonably be expected.
- When sampling air in areas where  $H_2S$  may be present.
- When working in areas where the concentration of  $H_2S$  exceeds the Threshold Limit Value for  $H_2S$  (10 ppm).
- At any time where there is a doubt as to the  $H_2S$  level in the area to be entered.

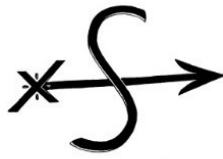
### **11.4 Windsocks or Wind Streamers:**

- Two (2) windsocks. A windsock must be visible from all areas of location.

### **11.5 Hydrogen Sulfide Monitors and Alarms:**

There are three (3)  $H_2S$  monitors located at the following locations:

- Wellheads
- Scrubbers
- Storage Tanks



## 11.6 H<sub>2</sub>S Monitoring System Set Points

	Alarm Level 1	Alarm Level 2
Sensor Location	Flashing Strobe and Call Out to ASEO Personnel	Flashing Strobe, Siren Alarm, Call Out to ASEO Personnel
Wellheads	10 PPM - 99 PPM	100 PPM
Scrubbers	10 PPM - 99 PPM	100 PPM
Storage Tanks	10 PPM - 99 PPM	100 PPM

## 11.7 Fire Extinguishers:

Fire extinguisher shall be located at the production equipment and in addition to areas required outside of this H<sub>2</sub>S Contingency Plan.

## 11.8 Designated Areas:

- Smoking is not allowed anywhere on the affected location.

## 11.9 Safe Briefing Areas:

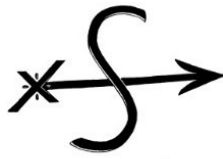
- The designated safe briefing area should be the muster point furthest and most upwind from the point of release. In the event none of the muster locations are safe, a safe briefing area will be appointed by the company authorized supervisor.
- Personal protective equipment should be stored on location upwind of prevailing winds.

## 11.10 Checklist:

Equipment Status Check List (all may not apply)	X
Sign at location entrance	
Two (2) windsocks (in required locations)	
Safe Briefing Areas identified as muster points	
Hydrogen Sulfide detection/ alarm system hooked-up & tested	
All support crews and supervisor trained (as required)	
All support crews and supervision medically qualified and fit tested for proper respirators	
Access restricted for unauthorized personnel.	
All outside service contractors advised of potential H <sub>2</sub> S and concentration values	
25mm Flare Gun on location w/flare cartridges	
Two (2) Self Contained Breathing Apparatus.	

## 11.11 Procedural Check List (all may not apply)

- Inspect fire extinguisher.
- Inspect breathing equipment.
- Make sure all Hydrogen Sulfide detection systems are tested and calibrated on a monthly basis.



## 12. MAPS, PLATS & APPENDICES

### APPENDIX A ROE MAP

#### ROE OF THE AFFECTED LOCATION ( ASE SOUTH – PAD L2)

Radius of Exposure (ROE) determined by Production Data

Wells : ASE South L211,L222,L233

22,000 PPM H<sub>2</sub>S, 1000 mcf/ day maximum escape velocity

100 PPM Radius of Exposure (ROE) 697 ft

500 PPM Radius of Exposure (ROE) 319 ft

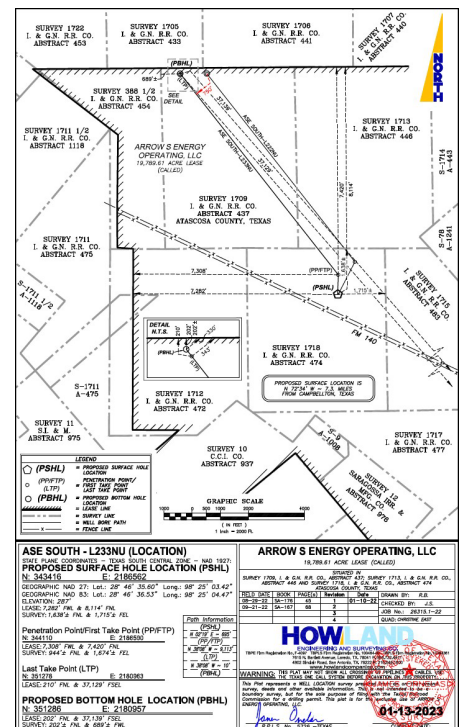


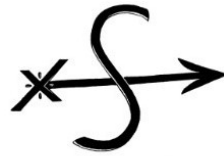
100 PPM Radius of Exposure (ROE) 697 ft



500 PPM Radius of Exposure (ROE) 319 ft







## APPENDIX C SITE EMERGENCY NUMBERS

### EMERGENCY INFORMATION ARROW S ENERGY OPERATING

<b>ATASCOSA EMS</b>	<b>911</b>
<b>Atascosa County Sheriff EMS Dispatch</b>	<b>(830) 769-3434</b>
<b>Air Life</b>	<b>(210) 233-5800</b>
<b>San Antonio, TX</b>	<b>(800) 247-6428</b>
<b>Poison Control</b>	<b>(800) 222-1222</b>
<b>Nearest Hospital(Anti-Venom Hospital)</b>	<b>(830) 769-3515</b>
<b>Methodist Hospital Atascosa</b>	<b>1905 Hwy 97 East, Jourdanton, TX 78026</b>
<p>24 min (23.0 miles) via FM140 W and TX-16 N <b>FM140</b> Messantou, TX 78064</p> <p>↑ Head west on FM140 W 12.4 mi</p> <p>↩ Turn right onto TX-16 N Pass by Subway (on the left in 8.5 mi) 9.0 mi</p> <p>↩ Turn right onto TX-97 E/Dak St Continue to follow TX-97 E 1.6 mi</p> <p><b>Methodist Hospital Atascosa</b> 1905 Hwy 97 East, Jourdanton, TX 78026</p>	

### LOCATION INFORMATION

<b>Location / Pad Name:</b>	<b>ASEO South L2</b>	
<b>GPS Coordinates:</b>	<b>28°46'36.54"N 98°25'04.19"W</b>	
<b>Production Superintendent:</b>	<b>Jamin Richard</b>	<b>(337) 552-4510</b>
<b>Production Leads:</b>	<b>Kyle Kremling</b>	<b>(361) 412-7589</b>
	<b>Geoffrey Pennel</b>	<b>(956) 285-8896</b>
	<b>Mario Fernandez</b>	<b>(956) 602-6923</b>
<b>Construction Supervisor:</b>	<b>Scott Quarles</b>	<b>(361) 649-2329</b>
<b>Land Management:</b>	<b>Dan Pohl</b>	<b>(979) 743-9670</b>
<b>Water Management:</b>	<b>Jerrod Harris</b>	<b>(903) 253-2743</b>
<b>HES:</b>	<b>Antonio Lopez</b>	<b>(832) 572-9180</b>

### SAN MIGUEL

<b>SMEC Control Room 24/7/365</b>	<b>(830) 784-3411 Ext 239</b>
<b>Casey Bird Safety Manager – NACC</b>	<b>(830) 784-3411 Ext. 287</b>

### DIRECTIONS TO LOCATION

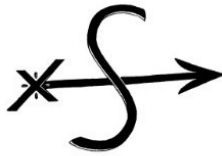
**GPS: 28°46'36.54"N 98°25'04.19"W**

**From: Exit 92(Campbellton Exit) & FM 140 W**

Turn Southwest onto FM 140 from US 281 ALT S  
Keep left to continue toward US-281 ALT S  
0.1 mi  
Continue onto US-281 ALT S  
1.4 mi  
Turn right onto FM140 W  
Destination will be on the right  
6.6 mi



*People First, Safety Always*



## APPENDIX D Gas Analysis

February 27, 2024

FESCO, Ltd.  
1100 Fesco Ave. - Alice, Texas 78332

For: Arrow S Energy Operating LLC  
1000 Louisiana, Suite 7000  
Houston, Texas 77002

Sample: ASE South No. L211NU  
First Stage Separator  
Spot Gas Sample @ 184 psig & 106 °F

Date Sampled: 02/21/2024

Job Number: 241453.001

### CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286

COMPONENT	MOL%	GPM
Hydrogen Sulfide*	1.300	
Nitrogen	0.416	
Carbon Dioxide	3.781	
Methane	67.920	
Ethane	12.126	3.241
Propane	7.850	2.161
Isobutane	1.021	0.334
n-Butane	2.609	0.822
2-2 Dimethylpropane	0.005	0.002
Isopentane	0.640	0.234
n-Pentane	0.716	0.259
Hexanes	0.684	0.282
Heptanes Plus	<u>0.932</u>	<u>0.405</u>
Totals	100.000	7.739

#### Computed Real Characteristics Of Heptanes Plus:

Specific Gravity ----- 3.569 (Air=1)  
Molecular Weight ----- 102.84  
Gross Heating Value ----- 5392 BTU/CF

#### Computed Real Characteristics Of Total Sample:

Specific Gravity ----- 0.863 (Air=1)  
Compressibility (Z) ----- 0.9950  
Molecular Weight ----- 24.87  
Gross Heating Value  
Dry Basis ----- 1365 BTU/CF  
Saturated Basis ----- 1342 BTU/CF

\*Hydrogen Sulfide tested on location by: Stain Tube Method (GPA 2377)  
817.6 Gr/100 CF, 13000 PPMV or 1.300 Mol %

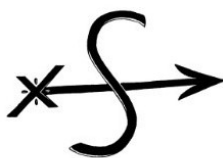
Remark: None

Base Conditions: 14.650 PSI & 60 Deg F

Sampled By: (10) Hausmann  
Analyst: JS  
Processor: BC  
Cylinder ID: T-3764

Certified: FESCO, Ltd. - Alice, Texas

Conan Pierce 361-661-7015



## APPENDIX D Gas Analysis

FESCO, Ltd.

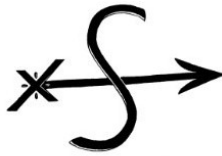
Job Number: 241453.001

### CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286 TOTAL REPORT

COMPONENT	MOL %	GPM	WT %
Hydrogen Sulfide*	1.300		1.782
Nitrogen	0.416		0.469
Carbon Dioxide	3.781		6.692
Methane	67.920		43.817
Ethane	12.126	3.241	14.663
Propane	7.850	2.161	13.920
Isobutane	1.021	0.334	2.386
n-Butane	2.609	0.822	6.098
2,2 Dimethylpropane	0.005	0.002	0.015
Isopentane	0.640	0.234	1.857
n-Pentane	0.716	0.259	2.077
2,2 Dimethylbutane	0.007	0.003	0.024
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.063	0.026	0.218
2 Methylpentane	0.213	0.088	0.738
3 Methylpentane	0.118	0.048	0.409
n-Hexane	0.283	0.116	0.981
Methylcyclopentane	0.082	0.029	0.278
Benzene	0.038	0.011	0.119
Cyclohexane	0.063	0.021	0.213
2-Methylhexane	0.045	0.021	0.181
3-Methylhexane	0.053	0.024	0.214
2,2,4 Trimethylpentane	0.015	0.008	0.069
Other C7's	0.060	0.026	0.239
n-Heptane	0.118	0.054	0.475
Methylcyclohexane	0.062	0.025	0.245
Toluene	0.049	0.016	0.182
Other C8's	0.137	0.064	0.607
n-Octane	0.049	0.025	0.225
Ethylbenzene	0.011	0.004	0.047
M & P Xylenes	0.019	0.007	0.081
O-Xylene	0.007	0.003	0.030
Other C9's	0.079	0.040	0.401
n-Nonane	0.016	0.009	0.083
Other C10's	0.024	0.014	0.136
n-Decane	0.004	0.002	0.023
Undecanes (11)	<u>0.001</u>	<u>0.001</u>	<u>0.006</u>
Totals	100.000	7.739	100.000

#### Computed Real Characteristics Of Total Sample:

Specific Gravity	0.863	(Air=1)
Compressibility (Z)	0.9950	
Molecular Weight	24.87	
Gross Heating Value		
Dry Basis	1365	BTU/CF
Saturated Basis	1342	BTU/CF



## APPENDIX D Gas Analysis

February 27, 2024

FESCO, Ltd.  
1100 Fesco Ave. - Alice, Texas 78332

For: Arrow S Energy Operating LLC  
1000 Louisiana, Suite 7000  
Houston, Texas 77002

Sample: ASE South No. L233NU  
First Stage Separator  
Spot Gas Sample @ 180 psig & 117 °F

Date Sampled: 02/21/2024

Job Number: 241452.001

### CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286

COMPONENT	MOL%	GPM
Hydrogen Sulfide*	1.650	
Nitrogen	0.426	
Carbon Dioxide	4.234	
Methane	68.089	
Ethane	11.116	2.971
Propane	7.256	1.998
Isobutane	0.994	0.325
n-Butane	2.588	0.815
2-2 Dimethylpropane	0.005	0.002
Isopentane	0.717	0.262
n-Pentane	0.814	0.295
Hexanes	0.899	0.370
Heptanes Plus	1.212	0.525
Totals	100.000	7.564

#### Computed Real Characteristics Of Heptanes Plus:

Specific Gravity ----- 3.538 (Air=1)  
Molecular Weight ----- 101.96  
Gross Heating Value ----- 5364 BTU/CF

#### Computed Real Characteristics Of Total Sample:

Specific Gravity ----- 0.875 (Air=1)  
Compressibility (Z) ----- 0.9949  
Molecular Weight ----- 25.21  
Gross Heating Value  
Dry Basis ----- 1366 BTU/CF  
Saturated Basis ----- 1343 BTU/CF

\*Hydrogen Sulfide tested on location by: Stain Tube Method (GPA 2377)  
1038 Gr/100 CF, 16500 PPMV or 1.650 Mol %

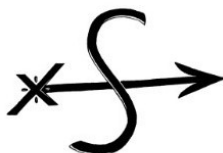
Remark: None

Base Conditions: 14.650 PSI & 60 Deg F

Sampled By: (10) Hausmann  
Analyst: JS  
Processor: BC  
Cylinder ID: L-0874

Certified: FESCO, Ltd. - Alice, Texas

Conan Pierce 361-661-7015



## APPENDIX D Gas Analysis

FESCO, Ltd.

Job Number: 241452.001

### CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286 TOTAL REPORT

COMPONENT	MOL %	GPM	WT %
Hydrogen Sulfide*	1.650		2.231
Nitrogen	0.426		0.473
Carbon Dioxide	4.234		7.391
Methane	68.089		43.327
Ethane	11.116	2.971	13.258
Propane	7.256	1.998	12.691
Isobutane	0.994	0.325	2.292
n-Butane	2.588	0.815	5.966
2,2 Dimethylpropane	0.005	0.002	0.014
Isopentane	0.717	0.262	2.052
n-Pentane	0.814	0.295	2.330
2,2 Dimethylbutane	0.008	0.003	0.027
Cyclopentane	0.000	0.000	0.000
2,3 Dimethylbutane	0.083	0.034	0.284
2 Methylpentane	0.277	0.115	0.947
3 Methylpentane	0.154	0.063	0.526
n-Hexane	0.377	0.155	1.289
Methylcyclopentane	0.116	0.041	0.387
Benzene	0.049	0.014	0.152
Cyclohexane	0.088	0.030	0.294
2-Methylhexane	0.064	0.030	0.254
3-Methylhexane	0.077	0.035	0.306
2,2,4 Trimethylpentane	0.023	0.012	0.104
Other C7's	0.087	0.038	0.342
n-Heptane	0.166	0.077	0.660
Methylcyclohexane	0.084	0.034	0.327
Toluene	0.060	0.020	0.219
Other C8's	0.163	0.076	0.713
n-Octane	0.067	0.034	0.304
Ethylbenzene	0.012	0.005	0.051
M & P Xylenes	0.018	0.007	0.076
O-Xylene	0.006	0.002	0.025
Other C9's	0.083	0.042	0.416
n-Nonane	0.016	0.009	0.081
Other C10's	0.022	0.013	0.123
n-Decane	0.002	0.001	0.011
Undecanes (11)	<u>0.009</u>	<u>0.006</u>	<u>0.057</u>
Totals	100.000	7.564	100.000

#### Computed Real Characteristics Of Total Sample:

Specific Gravity -----	0.875	(Air=1)
Compressibility (Z) -----	0.9949	
Molecular Weight -----	25.21	
Gross Heating Value -----		
Dry Basis -----	1366	BTU/CF
Saturated Basis -----	1343	BTU/CF