Arrow S Energy Operating, LLC H₂S Contingency Plan

Pad Description Pad Names: ASE SOUTH K2 Latitude: 28° 46' 42.37" Longitude: 98° 25' 22.99" RRC Permit # : 20948



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1. EMERGENCY ASSISTANCE TELEPHONE LIST

1.1 Public Safety

| Arrow S Energy Operating, LLC Emergency | 1000 Louisiana, Suite 7000 | | (713) 400-6648 |
|---|--------------------------------|---------------------|---------------------|
| Number | Houston, T | TX 77002 | (405) 219-1076 |
| | | | (888)279-9150 |
| Atascosa FMS | 915 Mair | n Street | 911 |
| | Jourdanton, | TX 78026 | (830) 769-2702 |
| Atascosa County Sheriff Office | 1108 Campbell Ave, Jo | ourdanton, TX 78026 | (830) 769-3434 |
| Atascosa County Sheriff Office | Sheriff Davi | d Soward | (830) 769-3434 ext. |
| | | | 2225 |
| Fire Marshal & Emergency Management | Devin W | /ilborn | (830) 769-2029 |
| Volunteer Fire Department | 108 2nd St, Pleasa | anton, TX 78064 | (830) 569-2813 |
| Methodist Hospital Atascosa | 1905 Hwy 97 East, Joi | urdanton, TX 78026 | (830) 769-3515 |
| ASEO Production Superintendent | Jamin R | ichard | (337) 552-4510 |
| ASEO Production Lead | Kyle Kre | emling | (361) 412-7589 |
| ASEO Production Lead | Geoffery | Penuel | (956) 285-8896 |
| ASEO Production Lead | Mario Fernandez | | (956) 602-6923 |
| ASEO HSE Manager/ Emergency Response | Antonio Lopez | | (832) 572-9180 |
| Coordinator | | | |
| Arrow S Ranch Manager | Rocky R | oberts | (830) 570-7361 |
| Texas Dept. of Transportation: | 2154 S. Second St. Ple | easanton, TX 78064 | (830) 281-5384 |
| NACG / SMEC | | | (830) 784-3411 |
| Control Room 24/7/365 | | | Ext 239 |
| NACG / SMEC | Casey Bird Safety Manager | | (830) 784-3411 |
| | | | Ext. 287 |
| H2S Services & Breathing Equipment | JSA Safety & Consulting , Inc. | | (830) 742-2580 |
| Environmental Compliance | Sunpro Ser | vices LLC | (210)951-9855 |
| Roustabouts/Spill Contractor Pegasus Construction & | | on & Services, LLC | (361) 394-2060 |
| Well Control | Well Control Wild Well Control | | (281) 784-4700 |
| Texas Commission on Environmental Quality – | Main Line | (210) 490-3096 | |
| TCEQ Region 13 (San Antonio) Office | 24 hr. Spill Reporting | (800) 832-8224 | |
| Texas Bailroad Commission – TX BCC Office | Main Line | (887) 228-5740 | (210) 227-1313 |
| Region 1 | 24hr. Accident | (512) 463-6788 | (210) 227-4822 |
| | Reporting | | |

2. H₂S CONTINGENCY PLAN

2.1 Scope:

This H₂S 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 (H₂S).

2.2 Objective:

- Prevent any and all accidents and prevent the uncontrolled release of H₂S 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 H2S Contingency Plan is to protect workers and the general public from the harmful effects of H_2S 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 H₂S 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 H2S operations. Although the release of a potentially hazardous quantity of H₂S 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 H₂S 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

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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 H2S. This plan shall be made available at 1000 Louisiana, Suite 7000 Houston, TX 77002, <u>https://hse.arrowsenergy.com/h2</u>s, 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_2S .

IDLH: Immediately Dangerous to Life and Health is the concentration that has been determined by the ACGIH to cause serious health problems or death if exposed to this level. The IDLH for H_2S is 100 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 | NONE | NONE | 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 502 ft and 500PPM is at 229ft. | | | |

| Occupied Location | Contact Name | Phone Number | Email Address | | |
|--|--------------|--------------|---------------|--|--|
| NONE | NONE | NONE | NONE | | |
| No Occupied location located in the Radius of Exposure (ROE) | | | | | |

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 H₂S can reasonably be expected.
- When sampling air in areas to determine if toxic concentrations of H₂S exist.



• When working in areas where 10 PPM or more of H₂S has been detected.

5.2 Toxic Effects of H2S 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

| Concentration (PPM) | Physiological Effect | |
|---------------------|---|--|
| 0.1 - 3 | Odor Threshold | |
| 3 - 10 | Offensive Odor | |
| | Headache | |
| 10 - 50 | Nausea | |
| | Throat and Eye Irritation | |
| 50 - 100 | Eye Injury | |
| | Conjunctivitis | |
| 100 - 300 | Respiratory Tract Infection | |
| | Olfactory Paralysis | |
| 200 500 | Pulmonary Edema | |
| 300 - 300 | Imminent Threat to Life | |
| 500 1 000 | Strong Nervous System Stimulation | |
| 300 - 1,000 | Apnea | |
| 1 000 - 2 000 | Immediate Collapse with Respiratory Paralysis | |
| 1,000 - 2,000 | Risk of Death | |

5.3 Toxicity table for H2S (Adapted from ACGIH and NIOSH sources)

5.4 Permissible Exposure Limits of H₂S 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 in a few minutes. |
| .07 | 700 | Unconscious quickly, death will result if not rescued promptly. |
| .10 | 1000 | Death will result unless rescued promptly. Artificial resuscitation may be necessary. |



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

5.5 Permissible Exposure Limits of Various Gases

5.6 Physical Properties of H₂S:

- **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, H₂S, even in low concentrations, is so toxic that it attacks and quickly impairs a victim's sense of smell, so it could be fatal to rely on your nose as a detection device.
- VAPOR DENSITY SPECIFIC GRAVITY OF 1.192: Hydrogen Sulfide is heavier than air, so it tends to settle in low-lying areas like pits, cellars or tanks. If you find yourself in a location where H₂S is known to exist, protect yourself. Whenever possible, work in an area upwind and keep to higher ground.
- EXPLOSIVE LIMITS 4.0% TO 44%: Mixed with the right proportion of air or oxygen, H₂S 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 (SO2), 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 H₂S is dependent on temperature and pressure, but if conditions are right, simply agitating a fluid containing H₂S 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 H₂S is cleared.
- Fans, or opening of doors is recommended to ensure that enclosed spaces are cleared as part of this process.

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 H₂S at the site by emergency shutdown/shutin, 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 H2S, 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 H₂S should always be examined by medical personnel. They should always be transported to a hospital or doctor.

| | | - |
|--------------------------------|-----------------|----------------|
| 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 |

7.1 Supervisor & Backup Supervisors:

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 H₂S emergency procedures etc.
- Clean up, recharge, restock, repair, and/ or replace H₂S 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 H₂S 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 selfcontained 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.

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10. TRAINING PROGRAM

When working in an area where Hydrogen Sulfide (H₂S) 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 (H₂S).
- Physicals effects of Hydrogen Sulfide on the human body.
- Toxicity of Hydrogen Sulfide and Sulfur Dioxide.
- H₂S 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
- H₂S POISONOUS GAS MAY BE PRESENT
- NO ADMITTANCE WITHOUT AUTHORIZATION

Sample H₂S 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 H₂S can reasonably be expected.
- When sampling air in areas where H₂S may be present.
- When working in areas where the concentration of H₂S exceeds the Threshold Limit Value for H₂S (10 ppm).
- At any time where there is a doubt as to the H₂S 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) H₂S monitors located at the following locations:

- Wellheads
- Scrubbers
- Storage Tanks



| | Alarm Level 1 | Alarm Level 2 |
|-----------------|--------------------------|--|
| Concorlocation | Flashing Strobe and Call | Flashing Strobe, Siren Alarm, Call Out |
| Sensor Location | Out to ASEO Personnel | 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 |

11.6 H₂S Monitoring System Set Points

11.7 Fire Extinguishers:

Fire extinguisher shall be located at the production equipment and in addition to areas required outside of this H2S 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) | Х |
|--|---|
| 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 ₂ 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



Version: 1.3 Uncontrolled copy if printed.

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APPENDIX B WELL PLAT(S)









APPENDIX C SITE EMERGENCY NUMBERS

EMERGENCY INFORMATION ARROWS ENERGY OPERATING

| ATASCOSA EMS | 911 |
|---|--|
| Atascosa County Sheriff EMS Dispatch | (830) 769-3434 |
| Air Life | (210) 233-5800 |
| San Antonio, TX | (800) 247-6428 |
| Poison Control | (800) 222-1222 |
| Nearest Hospital(Anti-Venom Hospital) | (830) 769-3515 |
| Methodist Hospital Atascosa | 1905 Hwy 97 East, Jourdanton, TX 78026 |
| 24 min (23.0 miles) via FM140 W and TX-16 N FM140 Pleasanton, TX 78064 ↑ Head west on FM140 W 12.4 ml ↑ Turn right onto TX-16 N Pleas by Subwey (on the left in 3.5 ml) 9.0 ml ↑ Turn right onto TX-07 E/Oak St Continue to follow TX-07 E 1.6 ml Methodist Hospital Atascosa 1905 Hery 97 East, Jourdanton, TX 78025 | |

LOCATION INFORMATION

| Location / Pad Name: | ASEO South K2 | |
|--|--------------------------------|-----|
| GPS Coordinates | 28°46'36.54"N 98°25'04.19"W | |
| Production Superintendent: | Jamin Richard (337) 552-4510 | |
| | Kyle Kremling (361) 412-7589 | |
| Production Leads: | Geoffrey Penuel (956) 285-8896 | |
| and the second | Mario Fernandez (956) 602-6923 | |
| Construction Supervisor: | Scott Quarles (361) 649-2329 | |
| Land Management: | Dan Pohl (979) 743-9670 | |
| Water Management: | Jerrod Harris (903) 253-2743 | - 3 |
| HES: | Autonio Lopez (832) 572-9180 | |

SAN MIGUEL

| 13 | SMEC Control Room 24/7/365 | (830) 784-3411 Ext 239 | |
|----|----------------------------------|--------------------------|--|
| 2 | Casey Bird Safety Manager – NACG | (\$30) 784-3411 Ext. 287 | |
| | | | |

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



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. K211NU First Stage Separator Spot Gas Sample @ 230 psig & 108 °F

Date Sampled: 02/21/2024

Job Number: 241454.001

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286

| MOL% | GPM |
|---------|--|
| 1.600 | |
| 0.484 | |
| 3.876 | |
| 68.268 | |
| 12.590 | 3.364 |
| 7.625 | 2.099 |
| 0.909 | 0.297 |
| 2.230 | 0.702 |
| 0.002 | 0.001 |
| 0.534 | 0.195 |
| 0.576 | 0.209 |
| 0.573 | 0.236 |
| 0.733 | 0.323 |
| 100.000 | 7.426 |
| | MOL% 1.600 0.484 3.876 68.268 12.590 7.625 0.909 2.230 0.002 0.534 0.576 0.573 0.733 100.000 |

Computed Real Characteristics Of Heptanes Plus:

| Specific Gravity | 3.615 | (Air=1) |
|---------------------|--------|---------|
| Molecular Weight | 104.22 | |
| Gross Heating Value | 5485 | BTU/CF |

Computed Real Characteristics Of Total Sample:

| Specific Gravity | 0.845 | (Air=1) |
|---------------------|--------|---------|
| Compressibility (Z) | 0.9953 | |
| Molecular Weight | 24.37 | |
| Gross Heating Value | | |
| Dry Basis | 1331 | BTU/CF |
| Saturated Basis | 1308 | BTU/CF |

*Hydrogen Sulfide tested on location by: Stain Tube Method (GPA 2377) 1006 Gr/100 CF, 16000 PPMV or 1.600 Mol %

Remark: None

Base Conditions: 14.650 PSI & 60 Deg F

Sampled By: (10) Hausmann Analyst: JS Processor: BC Cylinder ID: L-0546 Certified: FESCO, Ltd. - Alice, Texas

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Printed on: MARCH 8, 2023



FESCO, Ltd.

Job Number: 241454.001

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286 TOTAL REPORT

| COMPONENT | MOL % | GPM | WT % |
|------------------------|---------|-------|---------|
| Hydrogen Sulfide* | 1.600 | | 2.237 |
| Nitrogen | 0.484 | | 0.556 |
| Carbon Dioxide | 3.876 | | 6.999 |
| Methane | 68.268 | | 44,938 |
| Ethane | 12.590 | 3.364 | 15.534 |
| Propane | 7.625 | 2.099 | 13.796 |
| Isobutane | 0.909 | 0.297 | 2.168 |
| n-Butane | 2.230 | 0.702 | 5.318 |
| 2,2 Dimethylpropane | 0.002 | 0.001 | 0.006 |
| Isopentane | 0.534 | 0.195 | 1.581 |
| n-Pentane | 0.576 | 0.209 | 1.705 |
| 2,2 Dimethylbutane | 0.005 | 0.002 | 0.018 |
| Cyclopentane | 0.000 | 0.000 | 0.000 |
| 2,3 Dimethylbutane | 0.058 | 0.024 | 0.205 |
| 2 Methylpentane | 0.181 | 0.075 | 0.640 |
| 3 Methylpentane | 0.099 | 0.040 | 0.350 |
| n-Hexane | 0.230 | 0.094 | 0.813 |
| Methylcyclopentane | 0.074 | 0.026 | 0.256 |
| Benzene | 0.029 | 0.008 | 0.093 |
| Cyclohexane | 0.052 | 0.018 | 0.180 |
| 2-Methylhexane | 0.034 | 0.016 | 0.140 |
| 3-Methylhexane | 0.041 | 0.019 | 0.169 |
| 2,2,4 Trimethylpentane | 0.014 | 0.007 | 0.066 |
| Other C7's | 0.050 | 0.022 | 0.204 |
| n-Heptane | 0.085 | 0.039 | 0.349 |
| Methylcyclohexane | 0.047 | 0.019 | 0.189 |
| Toluene | 0.031 | 0.010 | 0.117 |
| Other C8's | 0.091 | 0.042 | 0.412 |
| n-Octane | 0.039 | 0.020 | 0.183 |
| Ethylbenzene | 0.008 | 0.003 | 0.035 |
| M & P Xylenes | 0.012 | 0.005 | 0.052 |
| O-Xylene | 0.004 | 0.002 | 0.017 |
| Other C9's | 0.057 | 0.029 | 0.295 |
| n-Nonane | 0.016 | 0.009 | 0.084 |
| Other C10's | 0.032 | 0.019 | 0.186 |
| n-Decane | 0.001 | 0.001 | 0.006 |
| Undecanes (11) | 0.016 | 0.011 | 0.103 |
| Totals | 100.000 | 7.426 | 100.000 |
| | | | |

Computed Real Characteristics Of Total Sample:

| Specific Gravity | 0.845 | (Air=1) |
|---------------------|--------|---------|
| Compressibility (Z) | 0.9953 | |
| Molecular Weight | 24.37 | |
| Gross Heating Value | | |
| Dry Basis | 1331 | BTU/CF |
| Saturated Basis | 1308 | BTU/CF |
| | | |

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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. K222NU First Stage Separator Spot Gas Sample @ 224 psig & 114 °F

Date Sampled: 02/21/2024

Job Number: 241451.001

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286

| COMPONENT | MOL% | GPM |
|---------------------|---------|-------|
| Hydrogen Sulfide* | 1.600 | |
| Nitrogen | 0.434 | |
| Carbon Dioxide | 4.418 | |
| Methane | 70.639 | |
| Ethane | 10.893 | 2.910 |
| Propane | 6.572 | 1.809 |
| Isobutane | 0.862 | 0.282 |
| n-Butane | 2.092 | 0.659 |
| 2-2 Dimethylpropane | 0.012 | 0.005 |
| Isopentane | 0.539 | 0.197 |
| n-Pentane | 0.611 | 0.221 |
| Hexanes | 0.451 | 0.186 |
| Heptanes Plus | 0.877 | 0.402 |
| Totals | 100.000 | 6.669 |

Computed Real Characteristics Of Heptanes Plus:

| Specific Gravity | 3.784 | (Air=1) |
|---------------------|--------|---------|
| Molecular Weight | 109.09 | |
| Gross Heating Value | 5729 | BTU/CF |

Computed Real Characteristics Of Total Sample:

| Specific Gravity | 0.833 | (Air=1) |
|---------------------|--------|---------|
| Compressibility (Z) | 0.9954 | |
| Molecular Weight | 24.02 | |
| Gross Heating Value | | |
| Dry Basis | 1298 | BTU/CF |
| Saturated Basis | 1276 | BTU/CF |

"Hydrogen Sulfide tested on location by: Stain Tube Method (GPA 2377) 1006 Gr/100 CF, 16000 PPMV or 1.600 Mol %

Remark: None

Base Conditions: 14.650 PSI & 60 Deg F

Sampled By: (10) Hausmann Analyst: JS Certified: FESCO, Ltd. - Alice, Texas

Analyst: JS Processor: BC Cylinder ID: T-4042

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Printed on: MARCH 8, 2023



FESCO, Ltd.

Job Number: 241451.001

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286 TOTAL REPORT

| COMPONENT | MOL % | GPM | WT 96 |
|------------------------|--------------|------------------|---------|
| Hydrogen Sulfide* | 1 600 | 0.1 | 2 270 |
| Nitrogen | 0 434 | | 0.506 |
| Carbon Dioxide | 4 4 1 8 | | 8 095 |
| Methane | 70.639 | | 47 184 |
| Ethane | 10,893 | 2,910 | 13.638 |
| Propane | 6.572 | 1.809 | 12,066 |
| Isobutane | 0.862 | 0.282 | 2.086 |
| n-Butane | 2.092 | 0.659 | 5.063 |
| 2.2 Dimethylpropane | 0.012 | 0.005 | 0.036 |
| Isopentane | 0.539 | 0.197 | 1.619 |
| n-Pentane | 0.611 | 0.221 | 1.835 |
| 2,2 Dimethylbutane | 0.005 | 0.002 | 0.018 |
| Cyclopentane | 0.000 | 0.000 | 0.000 |
| 2,3 Dimethylbutane | 0.044 | 0.018 | 0.158 |
| 2 Methylpentane | 0.140 | 0.058 | 0.502 |
| 3 Methylpentane | 0.077 | 0.031 | 0.276 |
| n-Hexane | 0.185 | 0.076 | 0.664 |
| Methylcyclopentane | 0.059 | 0.021 | 0.207 |
| Benzene | 0.027 | 0.008 | 0.088 |
| Cyclohexane | 0.045 | 0.015 | 0.158 |
| 2-Methylhexane | 0.031 | 0.014 | 0.129 |
| 3-Methylhexane | 0.038 | 0.017 | 0.159 |
| 2,2,4 Trimethylpentane | 0.012 | 0.006 | 0.057 |
| Other C7's | 0.044 | 0.019 | 0.182 |
| n-Heptane | 0.084 | 0.039 | 0.350 |
| Methylcyclohexane | 0.046 | 0.018 | 0.188 |
| Toluene | 0.038 | 0.013 | 0.146 |
| Other C8's | 0.107 | 0.050 | 0.491 |
| n-Octane | 0.045 | 0.023 | 0.214 |
| Ethylbenzene | 0.010 | 0.004 | 0.044 |
| M & P Xylenes | 0.025 | 0.010 | 0.111 |
| O-Xylene | 0.007 | 0.003 | 0.031 |
| Other C9's | 0.111 | 0.056 | 0.583 |
| n-Nonane | 0.055 | 0.031 | 0.294 |
| Other C10's | 0.076 | 0.044 | 0.447 |
| n-Decane | 0.009 | 0.006 | 0.053 |
| Undecanes (11) | 0.008 | 0.005 | 0.052 |
| Totals | 100.000 | 6.669 | 100.000 |
| | | | |
| Computed Real Chara | cteristics (| Of Total Sample: | |

| computed Real Characteristics Of Total Sample. | | | |
|--|--------|---------|--|
| Specific Gravity | 0.833 | (Air=1) | |
| Compressibility (Z) | 0.9954 | | |
| Molecular Weight | 24.02 | | |
| Gross Heating Value | | | |
| Dry Basis | 1298 | BTU/CF | |
| Saturated Basis | 1276 | BTU/CF | |
| | | | |

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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. K233NU First Stage Separator Spot Gas Sample @ 227 psig & 124 °F

Date Sampled: 02/21/2024

Job Number: 241455.001

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286

| COMPONENT | MOL% | GPM |
|---------------------|---------|-------|
| Hydrogen Sulfide* | 1.400 | |
| Nitrogen | 0.612 | |
| Carbon Dioxide | 4.052 | |
| Methane | 69.424 | |
| Ethane | 12.119 | 3.237 |
| Propane | 7.386 | 2.032 |
| Isobutane | 0.859 | 0.281 |
| n-Butane | 2.185 | 0.688 |
| 2-2 Dimethylpropane | 0.001 | 0.000 |
| Isopentane | 0.497 | 0.182 |
| n-Pentane | 0.550 | 0.199 |
| Hexanes | 0.456 | 0.188 |
| Heptanes Plus | 0.459 | 0.196 |
| Totals | 100.000 | 7.003 |

Computed Real Characteristics Of Heptanes Plus:

| Specific Gravity | 3.489 | (Air=1) |
|---------------------|--------|---------|
| Molecular Weight | 100.61 | |
| Gross Heating Value | 5295 | BTU/CF |

Computed Real Characteristics Of Total Sample:

| Specific Gravity | 0.827 | (Air=1) |
|---------------------|--------|---------|
| Compressibility (Z) | 0.9955 | |
| Molecular Weight | 23.85 | |
| Gross Heating Value | | |
| Dry Basis | 1299 | BTU/CF |
| Saturated Basis | 1278 | BTU/CF |

*Hydrogen Sulfide tested on location by: Stain Tube Method (GPA 2377) 880.5 Gr/100 CF, 14000 PPMV or 1.400 Mol %

Remark: None

Base Conditions: 14.650 PSI & 60 Deg F

Sampled By: (10) Hausmann

Certified: FESCO, Ltd. - Alice, Texas

Analyst: JS Processor: BC Cylinder ID: T-1026

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FESCO, Ltd.

Job Number: 241455.001

CHROMATOGRAPH EXTENDED ANALYSIS - GPA 2286 TOTAL REPORT

| COMPONENT | MOL % | GPM | WT 96 |
|------------------------|---------|-------|---------|
| Hydrogen Sulfide* | 1 400 | 0.1 | 2 001 |
| Nitrogen | 0.612 | | 0.719 |
| Carbon Dioxide | 4 052 | | 7 477 |
| Methane | 69 424 | | 46 695 |
| Ethane | 12 119 | 3 237 | 15 279 |
| Propane | 7.386 | 2.032 | 13.656 |
| Isobutane | 0.859 | 0.281 | 2.093 |
| n-Butane | 2.185 | 0.688 | 5 325 |
| 2.2 Dimethylpropane | 0.001 | 0.000 | 0.003 |
| Isopentane | 0.497 | 0.182 | 1.503 |
| n-Pentane | 0.550 | 0.199 | 1.664 |
| 2.2 Dimethylbutane | 0.004 | 0.002 | 0.014 |
| Cyclopentane | 0.000 | 0.000 | 0.000 |
| 2,3 Dimethylbutane | 0.047 | 0.019 | 0.170 |
| 2 Methylpentane | 0.146 | 0.061 | 0.528 |
| 3 Methylpentane | 0.078 | 0.032 | 0.282 |
| n-Hexane | 0.181 | 0.074 | 0.654 |
| Methylcyclopentane | 0.056 | 0.020 | 0.198 |
| Benzene | 0.023 | 0.006 | 0.075 |
| Cyclohexane | 0.039 | 0.013 | 0.138 |
| 2-Methylhexane | 0.024 | 0.011 | 0.101 |
| 3-Methylhexane | 0.029 | 0.013 | 0.122 |
| 2,2,4 Trimethylpentane | 0.009 | 0.005 | 0.043 |
| Other C7's | 0.035 | 0.015 | 0.146 |
| n-Heptane | 0.058 | 0.027 | 0.244 |
| Methylcyclohexane | 0.031 | 0.012 | 0.128 |
| Toluene | 0.021 | 0.007 | 0.081 |
| Other C8's | 0.060 | 0.028 | 0.277 |
| n-Octane | 0.020 | 0.010 | 0.096 |
| Ethylbenzene | 0.004 | 0.002 | 0.018 |
| M & P Xylenes | 0.007 | 0.003 | 0.031 |
| O-Xylene | 0.002 | 0.001 | 0.009 |
| Other C9's | 0.022 | 0.011 | 0.116 |
| n-Nonane | 0.009 | 0.005 | 0.048 |
| Other C10's | 0.000 | 0.000 | 0.000 |
| n-Decane | 0.005 | 0.003 | 0.030 |
| Undecanes (11) | 0.005 | 0.004 | 0.036 |
| Totals | 100.000 | 7.003 | 100.000 |
| | | | |

Computed Real Characteristics Of Total Sample:

| Specific Gravity | 0.827 | (Air=1) |
|---------------------|--------|---------|
| Compressibility (Z) | 0.9955 | |
| Molecular Weight | 23.85 | |
| Gross Heating Value | | |
| Dry Basis | 1299 | BTU/CF |
| Saturated Basis | 1278 | BTU/CF |
| | | |

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