Trinity Consultants
9737 Great Hills Trl, Ste 340, Austin, TX 78759 / P 512.349.5800 / **trinityconsultants.com**

May 6, 2026

Permit Programs Manager
NMED Air Quality Bureau
525 Camino de los Marquez Suite 1
Santa Fe, NM 87505-1816

*RE: Application for Minor Source NSR*
*Frontier Field Services, LLC; BKU Compressor Station*
*Agency ID 29329*

To Whom It May Concern:

On behalf of Frontier Field Services, LLC, Trinity Consultants is submitting an application for the BKU Compressor Station, currently authorized to operate under GCP-O&G Permit No. 4208M5. With this application, Frontier seeks to authorize several changes at the site, detailed in Section 3 of the attached application. These changes will require the site to be authorized under a minor source new source review (NSR) construction permit under 20.2.72 NMAC (Part 72 Permit) per 20.2.72.200.A NMAC.

The format and content of this application are consistent with the Bureau's current policy regarding NSR significant modification applications. Enclosed are two hard copies of the application, including the original certification. Electronic files will be provided upon request via secure electronic file transfer, as described in the application.

Please feel free to contact me by email at dawna.allen@trinityconsultants.com if you have any questions regarding this application. You may also contact Molly Greer with Frontier Field Services, LLC at mgreer@kinetik.com.

Sincerely,

TRINITY CONSULTANTS

Dawna Allen
Managing Consultant

Cc: Molly Greer (Frontier Field Services, LLC)

Trinity Project File: 254404.0698

# NMED AIR QUALITY
# NSR PERMIT
# INITIAL NSR PERMIT APPLICATION

## FRONTIER FIELD SERVICES, LLC
## BKU COMPRESSOR STATION

**Prepared By:**

**TRINITY CONSULTANTS**
9327 Great Hills Trl, Ste 340
Austin, TX 78759
(512) 238-2336
**trinityconsultants.com**

Dawna L. Allen, Managing Consultant

May 2026

Project 254404.0698

Trinity Consultants

**Air Permit Application**
**Compliance History Disclosure Form**

Pursuant to Subsection 74-2-7(S) of the New Mexico Air Quality Control Act ("AQCA"), NMSA §§ 74-2-1 to -17, the New Mexico Environment Department ("Department") may deny any permit application or revoke any permit issued pursuant to the AQCA if, within ten years immediately preceding the date of submission of the permit application, the applicant met any one of the criteria outlined below. In order for the Department to deem an air permit application administratively complete, or issue an air permit for those permits without an administrative completeness determination process, the applicant must complete this Compliance History Disclosure Form as specified in Subsection 74-2-7(P). An existing permit holder (permit issued prior to June 18, 2021) shall provide this Compliance History Disclosure Form to the Department upon request.

| **Permittee/Applicant Company Name** | | **Expected Application Submittal Date** |
|---|---|---|
| Frontier Field Services, LLC | | May 6, 2026 |
| **Permittee/Company Contact** | **Phone** | **Email** |
| Molly Greer | 432-236-0033 | mgreer@kinetik.com |

| | **Within the 10 years preceding the expected date of submittal of the application, has the permittee or applicant:** | |
|---|---|---|
| 1 | Knowingly misrepresented a material fact in an application for a permit? | ☐ Yes ☒ No |
| 2 | Refused to disclose information required by the provisions of the New Mexico Air Quality Control Act? | ☐ Yes ☒ No |
| 3 | Been convicted of a felony related to environmental crime in any court of any state or the United States? | ☐ Yes ☒ No |
| 4 | Been convicted of a crime defined by state or federal statute as involving or being in restraint of trade, price fixing, bribery, or fraud in any court of any state or the United States? | ☐ Yes ☒ No |
| 5a | Constructed or operated any facility for which a permit was sought, including the current facility, without the required air quality permit(s) under 20.2.70 NMAC, 20.2.72 NMAC, 20.2.74 NMAC, 20.2.79 NMAC, or 20.2.84 NMAC? | ☐ Yes ☒ No |
| 5b | If "No" to question 5a, go to question 6.<br>If "Yes" to question 5a, state whether each facility that was constructed or operated without the required air quality permit met at least one of the following exceptions:<br><br>a. The unpermitted facility was discovered after acquisition during a timely environmental audit that was authorized by the Department; or<br><br>b. The operator of the facility estimated that the facility's emissions would not require an air permit, **and** the operator applied for an air permit within 30 calendar days of discovering that an air permit was required for the facility. | ☐ Yes ☐ No |
| 6 | Had any permit revoked or permanently suspended for cause under the environmental laws of any state or the United States? | ☐ Yes ☒ No |
| 7 | For each "yes" answer, please provide an explanation and documentation. | |

Kinetik Holdings LP
2700 Post Oak Blvd
Houston, TX 77056

Company Number: 42

CHECK NUMBER: 42001904

| PAY DATE | SUPPLIER NO. | SUPPLIER NAME | CHECK TOTAL |
|---|---|---|---|
| Mar 12, 2026 | 11231 | NEW MEXICO ENVIRONMENT DEPT - AQB | $500.00 |

| Invoice Date | Invoice No. | Invoice / Credit Memo Invoice Description | Gross | Discount | Net |
|---|---|---|---|---|---|
| 03/10/2026 | 2026.03.102 BKU | | $500.00 | $0.00 | $500.00 |
| | | Totals | $500.00 | $0.00 | $500.00 |

THE FACE OF THIS CHECK IS PRINTED BLUE-THE BACK CONTAINS A SIMULATED WATERMARK

Kinetik Holdings LP
2700 Post Oak Blvd
Houston, TX 77056

Bank of America 32-1

Check Number: 0042001904

Check Date : Mar 12, 2026

Five Hundred Dollars And Zero Cents Only**********

| PAY (USD) | $500.00 |
|---|---|

Pay To The Order Of
NEW MEXICO ENVIRONMENT DEPT - AQB
525 CAMINO DE LOS MARQUEZ
SUITE 1
SANTA FE NM 87505-1816

Authorized Signature

⑈004200190⑈ ⑆111000012⑆ 445168097⑧⑈

| **Mail Application To:** | | **For Department use only:** |
|---|---|---|
| New Mexico Environment Department<br>Air Quality Bureau<br>Permits Section<br>525 Camino de los Marquez, Suite 1<br>Santa Fe, New Mexico, 87505<br><br>Phone: (505) 476-4300<br>Fax: (505) 476-4375<br>www.env.nm.gov/aqb | | |

# Universal Air Quality Permit Application

### Use this application for NOI, NSR, or Title V sources.

Use this application for: the initial application, modifications, technical revisions, and renewals. For technical revisions, complete Sections, 1-A, 1-B, 2-E, 3, 9 and any other sections that are relevant to the requested action; coordination with the Air Quality Bureau permit staff prior to submittal is encouraged to clarify submittal requirements and to determine if more or less than these sections of the application are needed. Use this application for streamline permits as well.

**This application is submitted as** (check all that apply): ☐ Request for a No Permit Required Determination (no fee)
☐ **Updating** an application currently under NMED review. Include this page and all pages that are being updated (no fee required).
**Construction Status:** ☐ Not Constructed ☒ Existing Permitted (or NOI) Facility ☐ Existing Non-permitted (or NOI) Facility
**Minor Source:** ☐ NOI 20.2.73 NMAC ☒ 20.2.72 NMAC application or revision ☐ 20.2.72.300 NMAC Streamline application
**Title V Source:** ☐ Title V (new) ☐ Title V renewal ☐ TV minor mod. ☐ TV significant mod. ☐ TV Acid Rain: ☐ New ☐ Renewal
**PSD Major Source:** ☐ PSD major source (new) ☐ Minor Modification to a PSD source ☐ a PSD major modification

**Acknowledgements:**

☒ I acknowledge that a pre-application meeting is available to me upon request. ☐ Title V Operating, Title IV Acid Rain, and NPR applications have no fees.

☒ $500 NSR application Filing Fee enclosed OR ☐ The full permit fee associated with 10 fee points (required w/ streamline applications).

☒ Check No.: 42001904 in the amount of $500

☒ I acknowledge the required submittal format for the hard copy application is printed double sided 'head-to-toe', 2-hole punched (except the Sect. 2 landscape tables is printed 'head-to-head'), numbered tab separators. Incl. a copy of the check on a separate page.

☒ I acknowledge there is an annual fee for permits in addition to the permit review fee: www.env.nm.gov/air-quality/permit-fees-2/.

☐ This facility qualifies for the small business fee reduction per 20.2.75.11.C. NMAC. The full $500.00 filing fee is included with this application and I understand the fee reduction will be calculated in the balance due invoice. The Small Business Certification Form has been previously submitted or is included with this application. (Small Business Environmental Assistance Program Information: www.env.nm.gov/air-quality/small-biz-eap-2/.)

**Citation:** Please provide the **low level citation** under which this application is being submitted: **20.2.72.200.A NMAC**
(e.g. application for a new minor source would be 20.2.72.200.A NMAC, one example for a Technical Permit Revision is 20.2.72.219.B.1.b NMAC, a Title V acid rain application would be: 20.2.70.200.C NMAC)

## Section 1 – Facility Information

### Section 1-A: Company Information

| | | | |
|---|---|---|---|
| | | AI # if known: 29329 | Updating<br>Permit/NOI #: 4208M5 |
| 1 | Facility Name:<br>BKU Compressor Station | Plant primary SIC Code (4 digits): 1311 | |
| | | Plant NAIC code (6 digits): 21113 | |
| a | Facility Street Address (If no facility street address, provide directions from a prominent landmark):<br>From Artesia, drive 21 miles east on Hwy 82. Turn right and drive 0.5 miles to the facility. | | |
| 2 | Plant Operator Company Name: Frontier Field Services, LLC | Phone/Fax: 432-789-1333 | |
| a | Plant Operator Address: 303 Veterans Airpark Lane #2000, Midland, TX 79705 | | |

| | | |
|---|---|---|
| b | Plant Operator's New Mexico Corporate ID or Tax ID: 2343077 | |
| 3 | Plant Owner(s) name(s): Frontier Field Services, LLC | Phone/Fax: 432-789-1333 |
| a | Plant Owner(s) Mailing Address(s): 303 Veterans Airpark Lane #2000, Midland, TX 79705 | |
| 4 | Bill To (Company): Frontier Field Services, LLC | Phone/Fax: 432-789-1333 |
| a | Mailing Address: 303 Veterans Airpark Lane #2000, Midland, TX 79705 | E-mail: |
| 5 | ☒ Preparer: Dawna L. Allen<br>☒ Consultant: Trinity Consultants - Austin | Phone/Fax: 512-484-4478 |
| a | Mailing Address: 9737 Great Hills Trl #340, Austin, TX 78759 | E-mail: Dawna.Allen@trinityconsultants.com |
| 6 | Plant Operator Contact: Wayne Spicer | Phone/Fax: 575-361-8265 |
| a | Address: 132766 Lovington Highway, Loco Hills, NM 88255 | E-mail: wspicer@kinetik.com |
| 7 | Air Permit Contact: Molly Greer | Title: Environmental Project Manager |
| a | E-mail: mgreer@kinetik.com | Phone/Fax: 432-236-0033 |
| b | Mailing Address: 303 Veterans Airpark Lane #2000, Midland, TX 79705 | |
| c | The designated Air permit Contact will receive all official correspondence (i.e. letters, permits) from the Air Quality Bureau. | |

## Section 1-B: Current Facility Status

| | | |
|---|---|---|
| 1.a | Has this facility already been constructed? ☒ Yes ☐ No | 1.b If yes to question 1.a, is it currently operating in New Mexico? ☒ Yes ☐ No |
| 2 | If yes to question 1.a, was the existing facility subject to a Notice of Intent (NOI) (20.2.73 NMAC) before submittal of this application? ☐ Yes ☒ No | If yes to question 1.a, was the existing facility subject to a construction permit (20.2.72 NMAC) before submittal of this application? ☒ Yes ☐ No |
| 3 | Is the facility currently shut down? ☐ Yes ☒ No | If yes, give month and year of shut down (MM/YY): N/A |
| 4 | Was this facility constructed before 8/31/1972 and continuously operated since 1972? ☐ Yes ☒ No | |
| 5 | If Yes to question 3, has this facility been modified (see 20.2.72.7.P NMAC) or the capacity increased since 8/31/1972? ☐ Yes ☐ No ☒ N/A | |
| 6 | Does this facility have a Title V operating permit (20.2.70 NMAC)? ☐ Yes ☒ No | If yes, the permit No. is: N/A |
| 7 | Has this facility been issued a No Permit Required (NPR)? ☐ Yes ☒ No | If yes, the NPR No. is: N/A |
| 8 | Has this facility been issued a Notice of Intent (NOI)? ☐ Yes ☒ No | If yes, the NOI No. is: N/A |
| 9 | Does this facility have a construction permit (20.2.72/20.2.74 NMAC)? ☒ Yes ☐ No | If yes, the permit No. is: GCP-O&G #4208M5 |
| 10 | Is this facility registered under a General permit (GCP-1, GCP-2, etc.)? ☒ Yes ☐ No | If yes, the register No. is: GCP-O&G #4208M5 |

## Section 1-C: Facility Input Capacity & Production Rate

| | | | | |
|---|---|---|---|---|
| 1 | What is the facility's maximum input capacity, specify units (reference here and list capacities in Section 20, if more room is required) | | | |
| a | Current | Hourly:<br>Oil: 2.22 bbl/h<br>Gas: 1.67 MMscf/h<br>Water: 2.22 bbl/h | Daily:<br>Oil: 53.33 bbl/d<br>Gas: 40 MMscf/d<br>Water: 53.33 bbl/d | Annually:<br>Oil: 19,465.45 bbl/y<br>Gas: 14,600 MMscf/y<br>Water: 19,465.45 bbl/y |
| b | Proposed | Hourly:<br>Oil: 3.42 bbl/h<br>Gas: 1.67 MMscf/h<br>Water: 2.22 bbl/h | Daily:<br>Oil: 82.19 bbl/d<br>Gas: 40 MMscf/d<br>Water: 53.33 bbl/d | Annually:<br>Oil: 30,000 bbl/y<br>Gas: 14,600 MMscf/y<br>Water: 19,465.45 bbl/y |
| 2 | What is the facility's maximum production rate, specify units (reference here and list capacities in Section 20, if more room is required) | | | |
| a | Current | Hourly:<br>Oil: 2.22 bbl/h<br>Gas: 1.67 MMscf/h<br>Water: 2.22 bbl/h | Daily:<br>Oil: 53.33 bbl/d<br>Gas: 40 MMscf/d<br>Water: 53.33 bbl/d | Annually:<br>Oil: 19,465.45 bbl/y<br>Gas: 14,600 MMscf/y<br>Water: 19,465.45 bbl/y |

| | | | | |
|---|---|---|---|---|
| b | Proposed | Hourly:<br>Oil: 3.42 bbl/h<br>Gas: 1.67 MMscf/h<br>Water: 2.22 bbl/h | Daily:<br>Oil: 82.19 bbl/d<br>Gas: 40 MMscf/d<br>Water: 53.33 bbl/d | Annually:<br>Oil: 30,000 bbl/y<br>Gas: 14,600 MMscf/y<br>Water: 19,465.45 bbl/y |

## Section 1-D: Facility Location Information

| | | | | |
|---|---|---|---|---|
| 1 | Latitude (decimal degrees): 32.812183 | Longitude (decimal degrees): -104.044811 | County: Eddy | Elevation (ft): 3583 |
| 2 | UTM Zone: ☐ 12 or ☒ 13 | Datum: ☒ NAD 83 ☐ WGS 84 | | |
| a | UTM E (in meters, to nearest 10 meters): 589,420 m E | UTM N (in meters, to nearest 10 meters): 3,630,870 m N | | |
| 3 | Name and zip code of nearest New Mexico town: Artesia, 88210 | | | |
| 4 | Detailed Driving Instructions from nearest NM town (attach a road map if necessary): From Artesia, NM , go 21 miles E on Hwy 82. Turn right and drive 0.5 miles to the facility. | | | |
| 5 | The facility is 21 (distance) miles E (direction) of Artesia(nearest town). | | | |
| 6 | Land Status of facility (check one): ☐ Private ☐ Indian/Pueblo ☐ Government ☒ BLM ☐ Forest Service ☐ Military | | | |
| 7 | List all municipalities, Indian tribes, and counties within a ten (10) mile radius (20.2.72.203.B.2 NMAC) of the property on which the facility is proposed to be constructed or operated:<br>Municipalities: Artesia, NM<br>Counties: Eddy County<br>Indian tribes: None | | | |
| 8 | **20.2.72** NMAC applications **only**: Will the property on which the facility is proposed to be constructed or operated be closer than 50 km (31 miles) to other states, Bernalillo County, or a Class I area (see www.env.nm.gov/air-quality/modeling-publications/ )? ☐ Yes ☒ No (20.2.72.206.A.7 NMAC) If yes, list all with corresponding distances in kilometers: N/A | | | |
| 9 | Name nearest Class I area: Carlsbad Caverns National Park | | | |
| 10 | Shortest distance (in km) from facility boundary to the boundary of the nearest Class I area (to the nearest 10 meters): 75.50 | | | |
| 11 | Distance (meters) from the perimeter of the Area of Operations (AO is defined as the plant site inclusive of all disturbed lands, including mining overburden removal areas) to nearest residence, school or occupied structure: 5,177m | | | |
| 12 | Method(s) used to delineate the Restricted Area: Continuous Fencing<br><br>"**Restricted Area**" is an area to which public entry is effectively precluded. Effective barriers include continuous fencing, continuous walls, or other continuous barriers approved by the Department, such as rugged physical terrain with steep grade that would require special equipment to traverse. If a large property is completely enclosed by fencing, a restricted area within the property may be identified with signage only. Public roads cannot be part of a Restricted Area. | | | |
| 13 | Does the owner/operator intend to operate this source as a portable stationary source as defined in 20.2.72.7.X NMAC?<br>☐ Yes ☒ No<br>A portable stationary source is not a mobile source, such as an automobile, but a source that can be installed permanently at one location or that can be re-installed at various locations, such as a hot mix asphalt plant that is moved to different job sites. | | | |
| 14 | Will this facility operate in conjunction with other air regulated parties on the same property? ☒ No ☐ Yes<br>If yes, what is the name and permit number (if known) of the other facility? | | | |

## Section 1-E: Proposed Operating Schedule (The 1-E.1 & 1-E.2 operating schedules may become conditions in the permit.)

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | Facility **maximum** operating ($\frac{\text{hours}}{\text{day}}$): 24 | ($\frac{\text{days}}{\text{week}}$): 7 | ($\frac{\text{weeks}}{\text{year}}$): 52 | ($\frac{\text{hours}}{\text{year}}$): 8760 | | |
| 2 | Facility's maximum daily operating schedule (if less than 24 $\frac{\text{hours}}{\text{day}}$)? Start: N/A | | ☐AM ☐PM | End: N/A | ☐AM ☐PM | |
| 3 | Month and year of anticipated start of construction: Sept 2026 or upon permit issuance | | | | | |
| 4 | Month and year of anticipated construction completion: Sept 2026 or upon permit issuance | | | | | |
| 5 | Month and year of anticipated startup of new or modified facility: Sept 2026 or upon permit issuance | | | | | |

| | |
|---|---|
| 6 | Will this facility operate at this site for more than one year? ☒ Yes ☐ No |

## Section 1-F: Other Facility Information

| | | | |
|---|---|---|---|
| 1 | Are there any current Notice of Violations (NOV), compliance orders, or any other compliance or enforcement issues related to this facility? ☒ Yes ☐ No If yes, specify: NOV | | |
| a | If yes, NOV date or description of issue: 1/14/2025 | | NOV Tracking No: FRO-29329-2401 |
| b | Is this application in response to any issue listed in 1-F, 1 or 1a above? ☐ Yes ☒ No<br>If Yes, provide the 1c & 1d info below: | | |
| c | Document Title: N/A | Date: N/A | Requirement # (or page # and paragraph #): N/A |
| d | Provide the required text to be inserted in this permit: N/A | | |
| 2 | Is air quality dispersion modeling or modeling waiver being submitted with this application? ☒ Yes ☐ No | | |
| 3 | Does this facility require an "Air Toxics" permit under 20.2.72.400 NMAC & 20.2.72.502, Tables A and/or B? ☐ Yes ☒ No | | |
| 4 | Will this facility be a source of federal Hazardous Air Pollutants (HAP)? ☒ Yes ☐ No | | |
| a | If Yes, what type of source? ☐ **Major** (☐ ≥10 tpy of any single HAP **OR** ☐ ≥25 tpy of any combination of HAPS) **OR** ☒ **Minor** (☒ <10 tpy of any single HAP **AND** ☒ <25 tpy of any combination of HAPS) | | |
| 5 | Is any unit exempt under 20.2.72.202.B.3 NMAC? ☐ Yes **X** No | | |
| a | If yes, include the name of company providing commercial electric power to the facility: _____N/A_____<br><br>Commercial power is purchased from a commercial utility company, which specifically does not include power generated on site for the sole purpose of the user. | | |

## Section 1-G: Streamline Application (This section applies to 20.2.72.300 NMAC Streamline applications only)

| | |
|---|---|
| 1 | ☐ I have filled out Section 18, "Addendum for Streamline Applications." ☒ N/A (This is not a Streamline application.) |

## Section 1-H: Current Title V Information - Required for all applications from TV Sources

**(Title V-source required information for all applications submitted pursuant to 20.2.72 NMAC (Minor Construction Permits), or 20.2.74/20.2.79 NMAC (Major PSD/NNSR applications), and/or 20.2.70 NMAC (Title V))**

| | | |
|---|---|---|
| 1 | Responsible Official (R.O.) (20.2.70.300.D.2 NMAC): Bryan Graham | Phone: (832) 444-7239 |
| a | R.O. Title: Vice President of Operations | R.O. e-mail: bgraham@kinetik.com |
| b | R. O. Address: 303 Veterans Airpark Ln, Suite 2000, Midland, Texas 79705 | |
| 2 | Alternate Responsible Official (20.2.70.300.D.2 NMAC): N/A | Phone: N/A |
| a | A. R.O. Title: N/A | A. R.O. e-mail: N/A |
| b | A. R. O. Address: N/A | |
| 3 | Company's Corporate or Partnership Relationship to any other Air Quality Permittee (List the names of any companies that have operating (20.2.70 NMAC) permits and with whom the applicant for this permit has a corporate or partnership relationship): N/A | |
| 4 | Name of Parent Company ("Parent Company" means the primary name of the organization that owns the company to be permitted wholly or in part.): Kinetik Holdings, LLC | |
| a | Address of Parent Company: 2700 Post Oak Blvd, Suite 300, Houston, Texas 77056 | |
| 5 | Names of Subsidiary Companies ("Subsidiary Companies" means organizations, branches, divisions or subsidiaries, which are owned, wholly or in part, by the company to be permitted.): N/A | |

| | |
|---|---|
| 6 | Telephone numbers & names of the owners' agents and site contacts familiar with plant operations:<br>Rebecca Moore – (713) 540-2081<br>Wayne Spicer – (575) 361-8265 |
| 7 | Affected Programs to include Other States, local air pollution control programs (i.e. Bernalillo) and Indian tribes:<br>Will the property on which the facility is proposed to be constructed or operated be closer than 80 km (50 miles) from other states, local pollution control programs, and Indian tribes and pueblos (20.2.70.402.A.2 and 20.2.70.7.B)? If yes, state which ones and provide the distances in kilometers: N/A |

# Section 1-I – Submittal Requirements

Each 20.2.73 NMAC (**NOI**), a 20.2.70 NMAC (**Title V**), a 20.2.72 NMAC (**NSR** minor source), or 20.2.74 NMAC (**PSD**) application package shall consist of the following:

## Hard Copy Submittal Requirements:

1) One hard copy **original signed and notarized application package** **printed double sided** **'head-to-toe'** **2-hole punched** as we bind the document on top, not on the side; except Section 2 (landscape tables), which should be head-to-head. Please use **numbered tab separators** in the hard copy submittal(s) as this facilitates the review process. For NOI submittals only, hard copies of UA1, Tables 2A, 2D & 2F, Section 3 and the signed Certification Page are required. Please include a copy of the check on a separate page.

2) If the application is for a minor NSR, PSD, NNSR, or Title V application, include one working hard **copy** for Department use. This copy should be printed in book form, 3-hole punched, and **must be double sided**. Note that this is in addition to the head-to-to 2-hole punched copy required in 1) above. Minor NSR Technical Permit revisions (20.2.72.219.B NMAC) only need to fill out Sections 1-A, 1-B, 3, and should fill out those portions of other Section(s) relevant to the technical permit revision. TV Minor Modifications need only fill out Sections 1-A, 1-B, 1-H, 3, and those portions of other Section(s) relevant to the minor modification. NMED may require additional portions of the application to be submitted, as needed.

3) The entire NOI or Permit application package, including the full modeling study, should be submitted electronically. Electronic files for applications for NOIs, any type of General Construction Permit (GCP), or technical revisions to NSRs must be submitted with compact disk (CD) or digital versatile disc (DVD). For these permit application submittals, **two** CD copies are required (in sleeves, not crystal cases, please), with additional CD copies as specified below. NOI applications require only a single CD submittal. Electronic files for other New Source Review (construction) permits/permit modifications or Title V permits/permit modifications can be submitted on CD/DVD or sent through AQB's secure file transfer service.

**Electronic files sent by (check one):**

☐ CD/DVD attached to paper application

☒ Secure electronic transfer. Air Permit Contact Name Dawna Allen; Email: dawna.allen@trinityconsultants.com, Phone number: 512-484-4478.

a. If the file transfer service is chosen by the applicant, after receipt of the application, the Bureau will email the applicant with instructions for submitting the electronic files through a secure file transfer service. Submission of the electronic files through the file transfer service needs to be completed within 3 business days after the invitation is received, so the applicant should ensure that the files are ready when sending the hard copy of the application. The applicant will not need a password to complete the transfer. **Do not use the file transfer service for NOIs, any type of GCP, or technical revisions to NSR permits.**

4) Optionally, the applicant may submit the files with the application on compact disk (CD) or digital versatile disc (DVD) following the instructions above and the instructions in 5 for applications subject to PSD review.

5) If **air dispersion modeling** is required by the application type, include the **NMED Modeling Waiver** and/or electronic air dispersion modeling report, input, and output files. The dispersion modeling ***summary report only*** should be submitted as hard copy(ies) unless otherwise indicated by the Bureau.

6) If the applicant submits the electronic files on CD and the application is subject to PSD review under 20.2.74 NMAC (PSD) or NNSR under 20.2.79 NMC include,
   a. one additional CD copy for US EPA,
   b. one additional CD copy for each federal land manager affected (NPS, USFS, FWS, USDI) and,
   c. one additional CD copy for each affected regulatory agency other than the Air Quality Bureau.

If the application is submitted electronically through the secure file transfer service, these extra CDs do not need to be submitted.

**Electronic Submittal Requirements** [in addition to the required hard copy(ies)]:

1) All required electronic documents shall be submitted as 2 separate CDs or submitted through the AQB secure file transfer service. Submit a single PDF document of the entire application as submitted and the individual documents comprising the application.

2) The documents should also be submitted in Microsoft Office compatible file format (Word, Excel, etc.) allowing us to access the text and formulas in the documents (copy & paste). Any documents that cannot be submitted in a Microsoft Office compatible format shall be saved as a PDF file from within the electronic document that created the file. If you are unable to provide Microsoft office compatible electronic files or internally generated PDF files of files (items that were not created electronically: i.e. brochures, maps, graphics, etc,), submit these items in hard copy format. We must be able to review the formulas and inputs that calculated the emissions.

3) It is preferred that this application form be submitted as 4 electronic files (3 MSWord docs: Universal Application section 1 [UA1], Universal Application section 3-19 [UA3], and Universal Application 4, the modeling report [UA4]) and 1 Excel file of the tables (Universal Application section 2 [UA2]). Please include as many of the 3-19 Sections as practical in a single MS Word electronic document. Create separate electronic file(s) if a single file becomes too large or if portions must be saved in a file format other than MS Word.

4) The electronic file names shall be a maximum of 25 characters long (including spaces, if any). The format of the electronic Universal Application shall be in the format: "A-3423-FacilityName". The "A" distinguishes the file as an application submittal, as opposed to other documents the Department itself puts into the database. Thus, all electronic application submittals should begin with "A-". Modifications to existing facilities should use the core permit number (i.e. '3423') the Department assigned to the facility as the next 4 digits. Use 'XXXX' for new facility applications. The format of any separate electronic submittals (additional submittals such as non-Word attachments, re-submittals, application updates) and Section document shall be in the format: "A-3423-9-description", where "9" stands for the section # (in this case Section 9-Public Notice). Please refrain, as much as possible, from submitting any scanned documents as this file format is extremely large, which uses up too much storage capacity in our database. Please take the time to fill out the header information throughout all submittals as this will identify any loose pages, including the Application Date (date submitted) & Revision number (0 for original, 1, 2, etc.; which will help keep track of subsequent partial update(s) to the original submittal. Do not use special symbols (#, @, etc.) in file names. The footer information should not be modified by the applicant.

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# Table 2-A: Regulated Emission Sources

Unit and stack numbering must correspond throughout the application package. If applying for a NOI under 20.2.73 NMAC, equipment exemptions under 2.72.202 NMAC do not apply.

| Unit Number[1] | Source Description | Make | Model # | Serial # | Manufacturer's Rated Capacity[3] (Specify Units) | Requested Permitted Capacity[3] (Specify Units) | Date of Manufacture[2] / Date of Construction/ Reconstruction[2] | Controlled by Unit # / Emissions vented to Stack # | Source Classification Code (SCC) | For Each Piece of Equipment, Check One | RICE Ignition Type (CI, SI, 4SLB, 4SRB, 2SLB)[4] | Replacing Unit No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C-311 | Internal Combustion Engine | Caterpillar | Caterpillar G3516LE | WPW02071 | 1340 hp | 1340 hp | 9/26/2008<br>9/6/2010 | Catalyst-1<br>Catalyst-1 | 20200254 | ☐ Existing (unchanged) ☐ To be Removed<br>☐ New/Additional ☐ Replacement Unit<br>☑ To Be Modified ☐ To be Replaced | 4SLB | NA |
| C-312 | Internal Combustion Engine | Caterpillar | Caterpillar G3516LE | WPW8JZ00187 | 1340 hp | 1340 hp | 4/30/2018<br>8/2/2018 | Catalyst-2<br>Catalyst-2 | 20200254 | ☐ Existing (unchanged) ☐ To be Removed<br>☐ New/Additional ☐ Replacement Unit<br>☑ To Be Modified ☐ To be Replaced | 4SLB | NA |
| C-313 | Internal Combustion Engine | Caterpillar | Caterpillar G3516LE | WPW02449 | 1340 hp | 1340 hp | 9/26/2008<br>9/6/2010 | Catalyst-3<br>Catalyst-3 | 20200254 | ☐ Existing (unchanged) ☐ To be Removed<br>☐ New/Additional ☐ Replacement Unit<br>☑ To Be Modified ☐ To be Replaced | 4SLB | NA |
| C-314 | Internal Combustion Engine | Caterpillar | Caterpillar G3516LE | WPW02379 | 1340 hp | 1340 hp | 8/29/2008<br>12/19/2011 | Catalyst-4<br>Catalyst-4 | 20200254 | ☐ Existing (unchanged) ☐ To be Removed<br>☐ New/Additional ☐ Replacement Unit<br>☑ To Be Modified ☐ To be Replaced | 4SLB | NA |
| C-315 | Internal Combustion Engine | Caterpillar | Caterpillar G3516B | JEF01921 | 1380 hp | 1380 hp | 9/17/2012<br>5/30/2013 | Catalyst-5<br>Catalyst-5 | 20200254 | ☐ Existing (unchanged) ☐ To be Removed<br>☐ New/Additional ☐ Replacement Unit<br>☑ To Be Modified ☐ To be Replaced | 4SLB | NA |
| C-316 | Internal Combustion Engine | Caterpillar | Caterpillar G3516B | JEF01914 | 1380 hp | 1380 hp | 9/1/2012<br>11/1/2021 | Catalyst-6<br>Catalyst-6 | 20200254 | ☐ Existing (unchanged) ☐ To be Removed<br>☐ New/Additional ☐ Replacement Unit<br>☑ To Be Modified ☐ To be Replaced | 4SLB | NA |
| FUG | Fugitive Emissions | N/A | N/A | N/A | N/A | N/A | 11/14/2012<br>11/14/2012 | NA<br>NA | 31088811 | ☐ Existing (unchanged) ☐ To be Removed<br>☐ New/Additional ☐ Replacement Unit<br>☑ To Be Modified ☐ To be Replaced | NA | NA |
| H-1 | Heater | Hanover Company | None | 1006038 | 1 MMBtu/hr | 1 MMBtu/hr | 1/1/2010<br>10/2/2010 | NA<br>H1 | 31000228 | ☐ Existing (unchanged) ☑ To be Removed<br>☐ New/Additional ☐ Replacement Unit<br>☐ To Be Modified ☐ To be Replaced | NA | NA |
| V1/F1 | Glycol Dehy Still Vent/Flash Tank | Exterran | Jatco Venturi System | CL 10-596 | 40 MMscfd | 40 MMscfd | 1/1/2010<br>10/2/2010 | V1/F1<br>V1/F1 | 31000304 | ☐ Existing (unchanged) ☑ To be Removed<br>☐ New/Additional ☐ Replacement Unit<br>☐ To Be Modified ☐ To be Replaced | NA | NA |
| H-2 | Dehy Reboiler | Exterran | SB28-16 | 1301-85D | 1 MMBtu/hr | 1 MMBtu/hr | 1/1/2012<br>1/1/2013 | NA<br>H2 | 31000228 | ☑ Existing (unchanged) ☐ To be Removed<br>☐ New/Additional ☐ Replacement Unit<br>☐ To Be Modified ☐ To be Replaced | NA | NA |
| V2/F2 | Glycol Dehy Still Vent/Flash Tank | Exterran | None[5] | 11173 | 40 MMscfd | 40 MMscfd | 1/1/2012<br>1/1/2013 | Facility Inlet<br>Facility Inlet | 31000304 | ☐ Existing (unchanged) ☐ To be Removed<br>☐ New/Additional ☐ Replacement Unit<br>☑ To Be Modified ☐ To be Replaced | NA | NA |
| H-3 | Heater | Exterran | None[5] | 12035 | 0.8 MMBtu/hr | 0.8 MMBtu/hr | 1/1/2012<br>1/1/2013 | NA<br>H3 | 31000404 | ☑ Existing (unchanged) ☐ To be Removed<br>☐ New/Additional ☐ Replacement Unit<br>☐ To Be Modified ☐ To be Replaced | NA | NA |
| L1 | Condensate Truck Loading | N/A | N/A | N/A | 30,000 bbl/yr | 30,000 bbl/yr | 2013<br>2013 | VCU-1<br>VCU-1 | 40600142 | ☐ Existing (unchanged) ☐ To be Removed<br>☐ New/Additional ☐ Replacement Unit<br>☑ To Be Modified ☐ To be Replaced | NA | NA |
| L2 | Produced WaterTruck Loading | N/A | N/A | N/A | 19,465 bbl/yr | 19,465 bbl/yr | 2013<br>2013 | NA<br>L2 | 40600142 | ☐ Existing (unchanged) ☐ To be Removed<br>☐ New/Additional ☐ Replacement Unit<br>☑ To Be Modified ☐ To be Replaced | NA | NA |

| Unit Number[1] | Source Description | Make | Model # | Serial # | Manufacturer's Rated Capacity[3] (Specify Units) | Requested Permitted Capacity[3] (Specify Units) | Date of Manufacture[2] / Date of Construction/ Reconstruction[2] | Controlled by Unit # / Emissions vented to Stack # | Source Classification Code (SCC) | For Each Piece of Equipment, Check One | RICE Ignition Type (CI, SI, 4SLB, 4SRB, 2SLB)[4] | Replacing Unit No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TK-104 | Condensate Storage Tank | Palmer | 16 oz | 29085 | 300 BBL | 300 BBL | 2013<br>2013 | VCU-1<br>VCU-1 | 31000212 | ☐ Existing (unchanged) ☐ To be Removed<br>☐ New/Additional ☐ Replacement Unit<br>☑ To Be Modified ☐ To be Replaced | NA | NA |
| TK-105 | Condensate Storage Tank | Palmer | 16 oz | 29089 | 300 BBL | 300 BBL | 2013<br>2013 | VCU-1<br>VCU-1 | 31000212 | ☐ Existing (unchanged) ☐ To be Removed<br>☐ New/Additional ☐ Replacement Unit<br>☑ To Be Modified ☐ To be Replaced | NA | NA |
| TK-106 | Condensate Storage Tank | Palmer | 16 oz | 29088 | 300 BBL | 300 BBL | 2013<br>2013 | VCU-1<br>VCU-1 | 31000212 | ☐ Existing (unchanged) ☐ To be Removed<br>☐ New/Additional ☐ Replacement Unit<br>☑ To Be Modified ☐ To be Replaced | NA | NA |
| PWT-1 | Produced Water Storage Tank | Azteca | 16 oz | EC389 | 300 BBL | 300 BBL | 2019<br>2019 | N/A<br>N/A | 31000213 | ☐ Existing (unchanged) ☐ To be Removed<br>☐ New/Additional ☐ Replacement Unit<br>☑ To Be Modified ☐ To be Replaced | NA | NA |
| PWT-2 | Produced Water Storage Tank | Palmer | 16 oz | None[5] | 300 BBL | 300 BBL | 2013<br>2013 | N/A<br>N/A | 31000213 | ☐ Existing (unchanged) ☐ To be Removed<br>☐ New/Additional ☐ Replacement Unit<br>☑ To Be Modified ☐ To be Replaced | NA | NA |
| SSM | Startup/Shutdown/ Maintenance | N/A | N/A | N/A | N/A | N/A | TBD<br>TBD | FL-1<br>FL-1 | 31088811 | ☐ Existing (unchanged) ☐ To be Removed<br>☐ New/Additional ☐ Replacement Unit<br>☑ To Be Modified ☐ To be Replaced | NA | NA |
| FL-1 | Pilot / SSM | Hero | 60x12 | None[5] | 25 MMscfd | 25 MMscfd | 2013<br>2013 | NA<br>FL-1 | 31000205 | ☐ Existing (unchanged) ☐ To be Removed<br>☐ New/Additional ☐ Replacement Unit<br>☑ To Be Modified ☐ To be Replaced | NA | NA |
| VCU-1 | Vapor Combustor | Abutec 20 | None[5] | 1207 26789 | 2.39 MMBtu/hr | 1.38 MMBtu/hr | 2013<br>2013 | NA<br>VCU-1 | 31000205 | ☐ Existing (unchanged) ☐ To be Removed<br>☐ New/Additional ☐ Replacement Unit<br>☑ To Be Modified ☐ To be Replaced | NA | NA |
| COMP-311 | Inlet Compressor | Ariel | JGT/4 | F-33746 | 1340 hp | 1340 hp | 6/11/2010<br>9/6/2010 | N/A<br>N/A | 31000313 | ☑ Existing (unchanged) ☐ To be Removed<br>☐ New/Additional ☐ Replacement Unit<br>☐ To Be Modified ☐ To be Replaced | NA | NA |
| COMP-312 | Inlet Compressor | Ariel | JGT/4 | F-33820 | 1340 hp | 1340 hp | 6/25/2010<br>8/2/2018 | N/A<br>N/A | 31000313 | ☑ Existing (unchanged) ☐ To be Removed<br>☐ New/Additional ☐ Replacement Unit<br>☐ To Be Modified ☐ To be Replaced | NA | NA |
| COMP-313 | Inlet Compressor | Ariel | JGT/4 | F-33851 | 1340 hp | 1340 hp | 7/2/2010<br>9/6/2010 | N/A<br>N/A | 31000313 | ☑ Existing (unchanged) ☐ To be Removed<br>☐ New/Additional ☐ Replacement Unit<br>☐ To Be Modified ☐ To be Replaced | NA | NA |
| COMP-314 | Inlet Compressor | Ariel | JGT/4 | F-32448 | 1340 hp | 1340 hp | 3/20/2009<br>12/19/2011 | N/A<br>N/A | 31000313 | ☑ Existing (unchanged) ☐ To be Removed<br>☐ New/Additional ☐ Replacement Unit<br>☐ To Be Modified ☐ To be Replaced | NA | NA |
| COMP-315 | Inlet Compressor | Ariel | JGT/4 | F-40130 | 1340 hp | 1340 hp | 2/28/2012<br>5/30/2013 | N/A<br>N/A | 31000313 | ☑ Existing (unchanged) ☐ To be Removed<br>☐ New/Additional ☐ Replacement Unit<br>☐ To Be Modified ☐ To be Replaced | NA | NA |
| COMP-316 | Inlet Compressor | Ariel | JGT/4 | F-39903 | 1340 hp | 1340 hp | 9/1/2012<br>11/1/2021 | N/A<br>N/A | 31000313 | ☑ Existing (unchanged) ☐ To be Removed<br>☐ New/Additional ☐ Replacement Unit<br>☐ To Be Modified ☐ To be Replaced | NA | NA |

[1] Unit numbers must correspond to unit numbers in the previous permit unless a complete cross reference table of all units in both permits is provided.

[2] Specify dates required to determine regulatory applicability.

[3] To properly account for power conversion efficiencies, generator set rated capacity shall be reported as the rated capacity of the engine in horsepower, not the kilowatt capacity of the generator set.

[4] "4SLB" means four stroke lean burn engine, "4SRB" means four stroke rich burn engine, "2SLB" means two stroke lean burn engine, "CI" means compression ignition, and "SI" means spark ignition

[5] This is not a unit model or serial number for these, as noted on the specific items. The dehy and flare are field fabricated units.

# Table 2-B: Insignificant Activities[1] (20.2.70 NMAC) OR Exempted Equipment (20.2.72 NMAC)

All 20.2.70 NMAC (Title V) applications must list all Insignificant Activities in this table. All 20.2.72 NMAC applications must list Exempted Equipment in this table. If equipment listed on this table is exempt under 20.2.72.202.B.2, include emissions calculations and emissions totals for 202.B.2 "similar functions" units, operations, and activities in Section 6, Calculations. Equipment and activities exempted under 20.2.72.202 NMAC may not necessarily be Insignificant under 20.2.70 NMAC (and vice versa). Unit & stack numbering must be consistent throughout the application package. Per Exemptions Policy 02-012.00 (see http://www.env.nm.gov/aqb/permit/aqb_pol.html ), 20.2.72.202.B NMAC Exemptions do not apply, but 20.2.72.202.A NMAC exemptions do apply to NOI facilities under 20.2.73 NMAC. List 20.2.72.301.D.4 NMAC Auxiliary Equipment for Streamline applications in Table 2-A. The List of Insignificant Activities (for TV) can be found online at https://www.env.nm.gov/wp-content/uploads/sites/2/2017/10/InsignificantListTitleV.pdf. TV sources may elect to enter both TV Insignificant Activities and Part 72 Exemptions on this form.

| Unit Number | Source Description | Manufacturer | Model No. / Serial No. | Max Capacity / Capacity Units | List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.2) / Insignificant Activity citation (e.g. IA List Item #1.a) | Date of Manufacture /Reconstruction[2] / Date of Installation /Construction[2] | For Each Piece of Equipment, Check Onc |
|---|---|---|---|---|---|---|---|
| TK-15 | Engine Oil Tank | Unknown[3] | NA | 2000 | 20.2.72.202.B.2 | N/A | ☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced |
| | | | NA | gallons | | N/A | |
| TK-16 | Engine Oil Tank | Uknown[3] | NA | 330 | 20.2.72.202.B.2 | N/A | ☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced |
| | | | NA | gallons | | N/A | |
| TK-17 | Compressor Lube Oil Tank | Uknown[3] | NA | 330 | 20.2.72.202.B.2 | N/A | ☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced |
| | | | NA | gallons | | N/A | |
| TK-18 | Antifreeze Tank | Uknown[3] | NA | 330 | 20.2.72.202.B.5 | N/A | ☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced |
| | | | NA | gallons | | N/A | |
| TK-19 | Antifreeze Tank | Uknown[3] | NA | 330 | 20.2.72.202.B.5 | N/A | ☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced |
| | | | NA | gallons | | N/A | |
| TK-20 | Antifreeze Tank | Uknown[3] | NA | 330 | 20.2.72.202.B.5 | N/A | ☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced |
| | | | NA | gallons | | N/A | |
| TK-21 | Antifreeze Tank | Uknown[3] | NA | 330 | 20.2.72.202.B.5 | N/A | ☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced |
| | | | NA | gallons | | N/A | |
| TK-24 | Corrosion Inhibitor Tank | Uknown[3] | NA | 330 | 20.2.72.202.B.2 | N/A | ☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced |
| | | | NA | gallons | | N/A | |
| TK-25 | Iron Sulfide Treatment Tank | Uknown[3] | NA | 330 | 20.2.72.202.B.2 | N/A | ☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced |
| | | | NA | gallons | | N/A | |
| T-26 | TEG Glyocol Storage Tank | Uknown[3] | NA | 330 | 20.2.72.202.B.2 | N/A | ☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced |
| | | | NA | gallons | | N/A | |
| T-28 | Skid Drain / Waste Oil Storage Tank | Uknown[3] | NA | 210 | 20.2.72.202.B.2 | N/A | ☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced |
| | | | NA | bbl | | N/A | |

| Unit Number | Source Description | Manufacturer | Model No. / Serial No. | Max Capacity / Capacity Units | List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.2) / Insignificant Activity citation (e.g. IA List Item #1.a) | Date of Manufacture /Reconstruction[2] / Date of Installation /Construction[2] | For Each Piece of Equipment, Check Onc |
|---|---|---|---|---|---|---|---|
| Tote-1 | Used Antifreeze Tote | Uknown[3] | NA | 275 | 20.2.72.202.B.5 | N/A | ☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced |
| | | | NA | gallons | | N/A | |
| Tote-2 | Used Antifreeze Tote | Uknown[3] | NA | 275 | 20.2.72.202.B.5 | N/A | ☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced |
| | | | NA | gallons | | N/A | |
| Tote-3 | Used Antifreeze Tote | Uknown[3] | NA | 275 | 20.2.72.202.B.5 | N/A | ☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced |
| | | | NA | gallons | | N/A | |
| Tote-4 | Used Antifreeze Tote | Uknown[3] | NA | 275 | 20.2.72.202.B.5 | N/A | ☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced |
| | | | NA | gallons | | N/A | |
| HAUL | Haul Road Emissions | Uknown[3] | NA | NA | 20.2.72.202.B.5 | N/A | ☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced |
| | | | NA | bbl | | N/A | |

[1] Insignificant activities exempted due to size or production rate are defined in 20.2.70.300.D.6, 20.2.70.7.Q NMAC, and the NMED/AQB List of Insignificant Activities, dated September 12, 2008. Emissions from these insignificant activities do not need to be reported, unless specifically requested.

[2] Specify date(s) required to determine regulatory applicability.

[3] These units are white tanks with no identifiable make/model.

# Table 2-C: Emissions Control Equipment

Unit and stack numbering must correspond throughout the application package. Only list control equipment for TAPs if the TAP's maximum uncontrolled emissions rate is over its respective threshold as listed in 20.2.72 NMAC, Subpart V, Tables A and B. In accordance with 20.2.72.203.A(3) and (8) NMAC, 20.2.70.300.D(2)(b) and (e) NMAC, and 20.2.73.200.B(7) NMAC, the permittee shall report all control devices and list each pollutant controlled by the control device regardless if the applicant takes credit for the reduction in emissions.

| Control Equipment Unit No. | Control Equipment Description | Date Installed | Controlled Pollutant(s) | Controlling Emissions for Unit Number(s)[1] | Efficiency (% Control by Weight) | Method used to Estimate Efficiency |
|---|---|---|---|---|---|---|
| Catalyst-1 | Catalytic Oxidation | 9/6/2010 | CO | C-101 | 70% | Vendor data |
| | | | VOC | | 50% | |
| | | | HCHO | | 70% | |
| Catalyst-2 | Catalytic Oxidation | 8/2/2018 | CO | C-102 | 70% | Vendor data |
| | | | VOC | | 50% | |
| | | | HCHO | | 70% | |
| Catalyst-3 | Catalytic Oxidation | 9/6/2010 | CO | C-103 | 70% | Vendor data |
| | | | VOC | | 50% | |
| | | | HCHO | | 70% | |
| Catalyst-4 | Catalytic Oxidation | 12/19/2011 | CO | C-104 | 70% | Vendor data |
| | | | VOC | | 50% | |
| | | | HCHO | | 70% | |
| Catalyst-5 | Catalytic Oxidation | 5/30/2013 | CO | C-105 | 75% | Vendor data |
| | | | VOC | | 64% | |
| | | | HCHO | | 75% | |
| Catalyst-6 | Catalytic Oxidation | 11/1/2021 | CO | C-106 | 75% | Vendor data |
| | | | VOC | | 64% | |
| | | | HCHO | | 75% | |
| VCU-1 | Vapor Combustor | 2013 | VOC, HAP, H2S | TK-104, TK-105, TK-106, L-1 | 98% | Design Specification |
| FL-1 | Flare | 2013 | VOC, HAP, H2S | SSM / Inlet Gas Combustion | 98% | Design Specification |
| Facility | Return to Facility Inlet | 1/1/2013 | VOC, HAP | V2/F2 | 100% | Design Specification |
| | | | | | | |

[1] List each control device on a separate line. For each control device, list all emission units controlled by the control device.

# Table 2-D: Maximum Emissions (under normal operating conditions)

☐ **This Table was intentionally left blank because it would be identical to Table 2-E.**

Maximum Emissions are the emissions at maximum capacity and prior to (in the absence of) pollution control, emission-reducing process equipment, or any other emission reduction. Calculate the hourly emissions using the worst case hourly emissions for each pollutant. For each pollutant, calculate the annual emissions as if the facility were operating at maximum plant capacity without pollution controls for 8760 hours per year, unless otherwise approved by the Department. List Hazardous Air Pollutants (HAP) & Toxic Air Pollutants (TAPs) in Table 2-I. Unit & stack numbering must be consistent throughout the application package. Fill all cells in this table with the emission numbers or a "-" symbol. A "-" symbol indicates that emissions of this pollutant are not expected. Numbers shall be expressed to at least 2 decimal points (e.g. 0.41, 1.41, or 1.41E-4).

| Unit No. | NOx | | CO | | VOC | | SOx | | PM[1] | | PM10[1] | | PM2.5[1] | | $H_2S$ | | Lead | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr |
| C-311 | 5.91 | 25.88 | 5.41 | 23.68 | 1.53 | 6.71 | 0.006 | 0.026 | 0.10 | 0.44 | 0.10 | 0.44 | 0.10 | 0.10 | - | - | - | - |
| C-312 | 5.91 | 25.88 | 5.41 | 23.68 | 1.53 | 6.71 | 0.006 | 0.026 | 0.10 | 0.44 | 0.10 | 0.44 | 0.10 | 0.10 | - | - | - | - |
| C-313 | 5.91 | 25.88 | 5.41 | 23.68 | 1.53 | 6.71 | 0.006 | 0.026 | 0.10 | 0.44 | 0.10 | 0.44 | 0.10 | 0.10 | - | - | - | - |
| C-314 | 5.91 | 25.88 | 5.41 | 23.68 | 1.53 | 6.71 | 0.006 | 0.026 | 0.10 | 0.44 | 0.10 | 0.44 | 0.10 | 0.10 | - | - | - | - |
| C-315 | 1.52 | 6.66 | 7.30 | 31.98 | 2.18 | 9.56 | 0.006 | 0.026 | 0.10 | 0.44 | 0.10 | 0.44 | 0.10 | 0.44 | - | - | - | - |
| C-316 | 1.52 | 6.66 | 7.30 | 31.98 | 2.18 | 9.56 | 0.006 | 0.026 | 0.10 | 0.44 | 0.10 | 0.44 | 0.10 | 0.44 | - | - | - | - |
| H-2 | 0.098 | 0.43 | 0.08 | 0.36 | 0.0054 | 0.024 | 0.001 | 0.003 | 0.01 | 0.03 | 0.01 | 0.03 | 0.01 | 0.03 | - | - | - | - |
| H-3 | 0.078 | 0.34 | 0.066 | 0.29 | 0.0043 | 0.019 | 0.000 | 0.002 | 0.01 | 0.03 | 0.01 | 0.03 | 0.01 | 0.03 | - | - | - | - |
| TK-104 | - | - | - | - | 2.99 | 13.08 | - | - | - | - | - | - | - | - | 0.06 | 0.26 | - | - |
| TK-105 | - | - | - | - | 2.99 | 13.08 | - | - | - | - | - | - | - | - | 0.06 | 0.26 | - | - |
| TK-106 | - | - | - | - | 2.99 | 13.08 | - | - | - | - | - | - | - | - | 0.06 | 0.26 | - | - |
| PWT-1 | - | - | - | - | 0.51 | 2.25 | - | - | - | - | - | - | - | - | 0.04 | 0.15 | - | - |
| PWT-2 | - | - | - | - | 0.51 | 2.25 | - | - | - | - | - | - | - | - | 0.04 | 0.15 | - | - |
| V2/F2 | - | - | - | - | 366.4 | 1488.7 | - | - | - | - | - | - | - | - | 27.38 | 119.92 | - | - |
| FL-1 (pilot) | 0.027 | 0.12 | 0.054 | 0.24 | 0.007 | 0.031 | - | - | - | - | - | - | - | - | - | - | - | - |
| VCU-1 (pilot) | 0.027 | 0.12 | 0.054 | 0.24 | 0.00014 | 0.00062 | - | - | 0.0015 | 0.0067 | 0.0015 | 0.0067 | 0.0015 | 0.0067 | - | - | - | - |
| FUG | - | - | - | - | 1.32 | 5.78 | - | - | - | - | - | - | - | - | 0.05 | 0.21 | - | - |
| L1 | - | - | - | - | 63.88 | 5.63 | - | - | - | - | - | - | - | - | - | - | - | - |
| L2 | - | - | - | - | 4.73 | 0.27 | - | - | - | - | - | - | - | - | - | - | - | - |
| HAUL | - | - | - | - | - | - | - | - | 0.49 | 0.041 | 0.49 | 0.041 | 0.049 | 4.08E-03 | - | - | - | - |
| SSM | - | - | - | - | - | 0.24 | - | - | - | - | - | - | - | - | - | 0.01 | - | - |
| **Totals** | **26.91** | **117.85** | **36.48** | **159.80** | **447.35** | **1548.92** | **0.04** | **0.16** | **1.11** | **2.76** | **1.11** | **2.76** | **0.67** | **1.35** | **27.46** | **120.29** | **-** | **-** |

**1Condensable Particulate Matter:** Include condensable particulate matter emissions for PM10 and PM2.2 if the source is a combustion source. Do not include condensable particulate matter for PM unless PM is set equal to PM10 and PM2.2. Particulate matter (PM) is not subject to an ambient air quality standard, but PM is a regulated air pollutant under PSD (20.2.74 NMAC) and Title V (20.2.70 NMAC).

# Table 2-E: Requested Allowable Emissions

Unit & stack numbering must be consistent throughout the application package. Fill all cells in this table with the emission numbers or a "-" symbol. A "-" symbol indicates that emissions of this pollutant are not expected. Numbers shall be expressed to at least 2 decimal points (e.g. 0.41, 1.41, or $1.41E^{-4}$).

| Unit No. | NOx | | CO | | VOC | | SOx | | PM[1] | | PM10[1] | | PM2.5[1] | | $H_2S$ | | Lead | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr |
| C-311 | 5.91 | 25.88 | 1.62 | 7.12 | 0.70 | 3.05 | 0.006 | 0.026 | 0.10 | 0.44 | 0.10 | 0.44 | 0.10 | 0.44 | - | - | - | - |
| C-312 | 5.91 | 25.88 | 1.62 | 7.12 | 0.70 | 3.05 | 0.006 | 0.026 | 0.10 | 0.44 | 0.10 | 0.44 | 0.10 | 0.44 | - | - | - | - |
| C-313 | 5.91 | 25.88 | 1.62 | 7.12 | 0.70 | 3.05 | 0.006 | 0.026 | 0.10 | 0.44 | 0.10 | 0.44 | 0.10 | 0.44 | - | - | - | - |
| C-314 | 5.91 | 25.88 | 1.62 | 7.12 | 0.70 | 3.05 | 0.006 | 0.026 | 0.10 | 0.44 | 0.10 | 0.44 | 0.10 | 0.44 | - | - | - | - |
| C-315 | 1.52 | 6.66 | 1.83 | 8.00 | 0.78 | 3.41 | 0.006 | 0.026 | 0.10 | 0.44 | 0.10 | 0.44 | 0.10 | 0.44 | - | - | - | - |
| C-316 | 1.52 | 6.66 | 1.83 | 8.00 | 0.78 | 3.41 | 0.006 | 0.026 | 0.10 | 0.44 | 0.10 | 0.44 | 0.10 | 0.44 | - | - | - | - |
| H-2 | 0.10 | 0.43 | 0.082 | 0.36 | 0.0054 | 0.024 | 0.001 | 0.0026 | 0.0075 | 0.033 | 0.0075 | 0.033 | 0.0075 | 0.033 | - | - | | |
| H-3 | 0.08 | 0.34 | 0.066 | 0.29 | 0.0043 | 0.019 | 0.00047 | 0.0021 | 0.0060 | 0.026 | 0.0060 | 0.026 | 0.0060 | 0.026 | - | - | - | - |
| TK-104 | The Condensate Tanks are controlled by VCU-1 and emissions are represented at VCU-1 | | | | | | | | | | | | | | | | - | - |
| TK-105 | The Condensate Tanks are controlled by VCU-1 and emissions are represented at VCU-1 | | | | | | | | | | | | | | | | - | - |
| TK-106 | The Condensate Tanks are controlled by VCU-1 and emissions are represented at VCU-1 | | | | | | | | | | | | | | | | - | - |
| PWT-1 | - | - | - | - | 0.51 | 2.25 | - | - | - | - | - | - | - | - | 3.54E-02 | 1.55E-01 | - | - |
| PWT-2 | - | - | - | - | 0.51 | 2.25 | - | - | - | - | - | - | - | - | 3.54E-02 | 1.55E-01 | - | - |
| V2/F2 | The Dehy Flash Tank and Regen Vent is fully collected and routed back to facility inlet. | | | | | | | | | | | | | | | | - | - |
| FL-1 (pilot) | 0.027 | 0.12 | 0.054 | 0.24 | 0.00014 | 0.00062 | - | - | - | - | - | - | - | - | - | - | - | - |
| VCU-1 | 0.19 | 0.27 | 0.38 | 0.53 | 1.07 | 0.86 | 2.07 | 1.62 | 0.0050 | 0.010 | 0.0050 | 0.010 | 0.0050 | 0.010 | 2.20E-02 | 1.73E-02 | - | - |
| FUG | - | - | - | - | 1.32 | 5.78 | - | - | - | - | - | - | - | - | 4.72E-02 | 2.07E-01 | - | - |
| L1 | - | - | - | - | 19.16 | 1.69 | - | - | - | - | - | - | - | - | 3.96E-01 | 3.49E-02 | - | - |
| L2 | - | - | - | - | 4.73 | 0.27 | - | - | - | - | - | - | - | - | 3.29E-01 | 1.88E-02 | - | - |
| **Totals** | **27.07** | **118.00** | **10.73** | **45.88** | **31.67** | **32.15** | **2.11** | **1.78** | **0.62** | **2.72** | **0.62** | **2.72** | **0.62** | **2.72** | **0.86** | **0.59** | - | - |

[1] Condensable Particulate Matter: Include condensable particulate matter emissions for PM10 and PM2.2 if the source is a combustion source. Do not include condensable particulate matter for PM unless PM is set equal to PM10 and PM2.2. Particulate matter (PM) is not subject to an ambient air quality standard, but it is a regulated air pollutant under PSD (20.2.74 NMAC) and Title V (20.2.70 NMAC).

"*" denotes that an hourly emission rate is not requested.

# Table 2-F: Additional Emissions during Startup, Shutdown, and Routine Maintenance (SSM)

☐ This table is intentionally left blank since all emissions at this facility due to routine or predictable startup, shutdown, or scehduled maintenance are no higher than those listed in Table 2-E and a malfunction emission limit is not already permitted or requested. If you are required to report GHG emissions as described in Section 6a, include any GHG emissions during Startup, Shutdown, and/or Scheduled Maintenance (SSM) in Table 2-P. Provide an explanations of SSM emissions in Section 6 and 6a.

All applications for facilities that have emissions during routine our predictable startup, shutdown or scheduled maintenance (SSM)[1], including NOI applications, must include in this table the Maximum Emissions during routine or predictable startup, shutdown and scheduled maintenance (20.2.7 NMAC, 20.2.72.203.A.3 NMAC, 20.2.73.200.D.2 NMAC). In Section 6 and 6a, provide emissions calculations for all SSM emissions reported in this table. Refer to "Guidance for Submittal of Startup, Shutdown, Maintenance Emissions in Permit Applications (https://www.env.nm.gov/aqb/permit/aqb_pol.html) for more detailed instructions. Numbers shall be expressed to at least 2 decimal points (e.g. 0.41, 1.41, or 1.41E-4).

| Unit No. | NOx | | CO | | VOC | | SOx | | PM[2] | | PM10[2] | | PM2.5[2] | | $H_2S$ | | Lead | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr |
| FL-1 SSM | 184.05 | 25.49 | 367.43 | 50.89 | 298.53 | 41.35 | 1749.55 | 242.31 | - | - | - | - | - | - | 18.62 | 2.58 | - | - |
| SSM | - | - | - | - | - | 0.24 | - | - | - | - | - | - | - | - | 0.090 | 0.012 | - | - |
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| **Totals** | 184.05 | 25.49 | 367.43 | 50.89 | 298.53 | 41.58 | 1,749.55 | 242.31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 18.71 | 2.59 | 0.00 | 0.00 |

[1] For instance, if the short term steady-state Table 2-E emissions are 2 lb/hr and the SSM rate is 12 lb/hr, enter 7 lb/hr in this table. If the annual steady-state Table 2-E emissions are 21.9 TPY, and the number of scheduled SSM events result in annual emissions of 31.9 TPY, enter 10.0 TPY in the table below.

[2] Condensable Particulate Matter: Include condensable particulate matter emissions for PM10 and PM2.2 if the source is a combustion source. Do not include condensable particulate matter for PM unless PM is set equal to PM10 and PM2.2. Particulate matter (PM) is not subject to an ambient air quality standard, but it is a regulated air pollutant under PSD (20.2.74 NMAC) and Title V (20.2.70 NMAC).

# Table 2-G: Stack Exit and Fugitive Emission Rates for Special Stacks

☑ I have elected to leave this table blank because this facility does not have any stacks/vents that split emissions from a single source or combine emissions from more than one source listed in table 2-A. Additionally, the emission rates of all stacks match the Requested allowable emission rates stated in Table 2-E.

Use this table to list stack emissions (requested allowable) from split and combined stacks. List Toxic Air Pollutants (TAPs) and Hazardous Air Pollutants (HAPs) in Table 2-I. List all fugitives that are associated with the normal, routine, and non-emergency operation of the facility. Unit and stack numbering must correspond throughout the application package. Refer to Table 2-E for instructions on use of the "-" symbol and on significant figures.

| Stack No. | Serving Unit Number(s) from Table 2-A | NOx | | CO | | VOC | | SOx | | PM | | PM10 | | PM2.2 | | ☑ $H_2S$ or ☐ Lead | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr |
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| **Totals**: | | | | | | | | | | | | | | | | | |

# Table 2-H: Stack Exit Conditions

Unit and stack numbering must correspond throughout the application package. Include the stack exit conditions for each unit that emits from a stack, including blowdown venting parameters and tank emissions. If the facility has multiple operating scenarios, complete a separate Table 2-H for each scenario and, for each, type scenario name here:

| Stack Number | Serving Unit Number(s) from Table 2-A | Orientation (H-Horizontal V=Vertical) | Rain Caps (Yes or No) | Height Above Ground (ft) | Temp. (F) | Flow Rate | | Moisture by Volume (%) | Velocity (ft/sec) | Inside Diameter (ft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | (acfs) | (dscfs) | | | |
| C-311 | C-311 | Vertical | No | 35.00 | 851 | 127.52 | 46.9 | 10 | 200.44 | 0.90 |
| C-312 | C-312 | Vertical | No | 35.00 | 851 | 127.52 | 46.9 | 10 | 200.44 | 0.90 |
| C-313 | C-313 | Vertical | No | 35.00 | 851 | 127.52 | 46.9 | 10 | 200.44 | 0.90 |
| C-314 | C-314 | Vertical | No | 35.00 | 851 | 127.52 | 46.9 | 10 | 200.44 | 0.90 |
| C-315 | C-315 | Vertical | No | 35.00 | 870 | 122.38 | 46.7 | 10 | 128.78 | 1.10 |
| C-316 | C-316 | Vertical | No | 35.00 | 870 | 122.38 | 46.7 | 10 | 128.78 | 1.10 |
| H-2 | H-2 | Vertical | No | 16.00 | 620 | 12.03 | 4.6 | 10 | 31.26 | 0.70 |
| H-3 | H-3 | Vertical | No | 23.00 | 620 | 9.63 | 3.7 | 10 | 25.01 | 0.70 |
| VCU-1 | VCU-1 | Vertical | No | 20.00 | 1,500 | 30.18 | 6.4 | 10 | 15.33 | 1.58 |
| FL-1 | FL-1 | Vertical | No | 60.00 | 1,832 | 0.056 | 0.06 | 10 | 0.07 | 1.00 |

# Table 2-I: Stack Exit and Fugitive Emission Rates for HAPs and TAPs

In the table below, report the Potential to Emit for each HAP from each regulated emission unit listed in Table 2-A, only if the entire facility emits the HAP at a rate greater than or equal to one (1) ton per year For each such emission unit, HAPs shall be reported to the nearest 0.1 tpy. Each facility-wide Individual HAP total and the facility-wide Total HAPs shall be the sum of all HAP sources calculated to the nearest 0.1 ton per year. Per 20.2.72.403.A.1 NMAC, facilities not exempt [see 20.2.72.402.C NMAC] from TAP permitting shall report each TAP that has an uncontrolled emission rate in excess of its pounds per hour screening level specified in 20.2.72.202 NMAC. TAPs shall be reported using one more significant figure than the number of significant figures shown in the pound per hour threshold corresponding to the substance. Use the HAP nomenclature as it appears in Section 112 (b) of the 1990 CAAA and the TAP nomenclature as it listed in 20.2.72.202 NMAC. Include tank-flashing emissions estimates of HAPs in this table. For each HAP or TAP listed, fill all cells in this table with the emission numbers or a "-" symbol. A "-" symbol indicates that emissions of this pollutant are not expected or the pollutant is emitted in a quantity less than the threshold amounts described above.

| Stack No. | Unit No.(s) | Total HAPs | | Formaldehyde ☑ HAP or ☐ TAP | | Benzene ☑ HAP or ☐ TAP | | Acetaldehyde ☑ HAP or ☐ TAP | | Acrolein ☑ HAP or ☐ TAP | | Ethylbenzene ☑ HAP or ☐ TAP | | n-Hexane ☑ HAP or ☐ TAP | | Toluene ☑ HAP or ☐ TAP | | Xylene ☑ HAP or ☐ TAP | | 2,2,4-Trimethylpentane ☑ HAP or ☐ TAP | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr | lb/hr | ton/yr |
| C-311 | C-311 | 0.32 | 1.38 | 0.17 | 0.74 | 0.0045 | 0.019 | 0.085 | 0.37 | 0.052 | 0.23 | 0.00040 | 0.0018 | - | - | 0.0041 | 0.018 | 0.0019 | 0.008 | - | - |
| C-312 | C-312 | 0.32 | 1.38 | 0.17 | 0.74 | 0.0045 | 0.019 | 0.085 | 0.37 | 0.052 | 0.23 | 0.00040 | 0.0018 | - | - | 0.0041 | 0.018 | 0.0019 | 0.008 | - | - |
| C-313 | C-313 | 0.32 | 1.38 | 0.17 | 0.74 | 0.0045 | 0.019 | 0.085 | 0.37 | 0.052 | 0.23 | 0.00040 | 0.0018 | - | - | 0.0041 | 0.018 | 0.0019 | 0.008 | - | - |
| C-314 | C-314 | 0.32 | 1.38 | 0.17 | 0.74 | 0.0045 | 0.019 | 0.085 | 0.37 | 0.052 | 0.23 | 0.00040 | 0.0018 | - | - | 0.0041 | 0.018 | 0.0019 | 0.008 | - | - |
| C-315 | C-315 | 0.29 | 1.28 | 0.15 | 0.64 | 0.0044 | 0.019 | 0.084 | 0.37 | 0.052 | 0.23 | 0.00040 | 0.0018 | - | - | 0.0041 | 0.018 | 0.0019 | 0.008 | - | - |
| C-316 | C-316 | 0.29 | 1.28 | 0.15 | 0.64 | 0.0044 | 0.019 | 0.084 | 0.37 | 0.052 | 0.23 | 0.00040 | 0.0018 | - | - | 0.0041 | 0.018 | 0.0019 | 0.008 | - | - |
| H-2 | H-2 | 7.89E-05 | 3.46E-04 | 7.35E-05 | 3.22E-04 | 2.06E-06 | 9.02E-06 | - | - | - | - | - | - | - | - | 3.33E-06 | 1.46E-05 | - | - | - | - |
| H-3 | H-3 | 6.31E-05 | 2.77E-04 | 5.88E-05 | 2.58E-04 | 1.65E-06 | 7.21E-06 | - | - | - | - | - | - | - | - | 0.0000 | 0.0000 | - | - | - | - |
| TK-104 | TK-104 | The Condensate Tanks are controlled by VCU-1 and emissions are represented at VCU-1 | | | | | | | | | | | | | | | | | | | |
| TK-105 | TK-105 | The Condensate Tanks are controlled by VCU-1 and emissions are represented at VCU-1 | | | | | | | | | | | | | | | | | | | |
| TK-106 | TK-106 | The Condensate Tanks are controlled by VCU-1 and emissions are represented at VCU-1 | | | | | | | | | | | | | | | | | | | |
| PWT-1 | PWT-1 | 0.077 | 0.34 | - | - | 0.018 | 0.08 | - | - | - | - | 0.0015 | 0.007 | 0.036 | 0.16 | 0.014 | 0.06 | 0.0016 | 0.01 | 0.0049 | 0.022 |
| PWT-2 | PWT-2 | 0.077 | 0.34 | - | - | 0.018 | 0.08 | - | - | - | - | 0.0015 | 0.007 | 0.036 | 0.16 | 0.014 | 0.06 | 0.0016 | 0.01 | 0.0049 | 0.022 |
| V2/F2 | V2/F2 | The Dehy Flash Tank and Regen Vent is fully collected and routed back to facility inlet. | | | | | | | | | | | | | | | | | | | |
| FL-1 (pilot) | FL-1 (pilot) | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| FL-1 (SSM) | FL-1 (SSM) | 5.81 | 0.80 | - | - | 3.64 | 0.50 | - | - | - | - | 0.020 | 0.0028 | 0.11 | 0.015 | 1.87 | 0.26 | 0.17 | 0.023 | - | - |
| VCU-1 | VCU-1 | 0.088 | 0.86 | - | - | 0.028 | 0.023 | - | - | - | - | 0.0016 | 0.0013 | 0.037 | 0.030 | 0.02 | 0.01 | 0.002 | 0.0014 | 0.01 | 0.004 |
| FUG | FUG | 0.20 | 0.86 | - | - | 0.029 | 0.13 | - | - | - | - | 0.012 | 0.050 | 0.093 | 0.41 | 0.04 | 0.18 | 0.01 | 0.060 | 0.010 | 0.043 |
| L1 | L1 | 1.57 | 0.14 | - | - | 0.49 | 0.043 | - | - | - | - | 0.028 | 0.0025 | 0.66 | 0.058 | 0.27 | 0.02 | 0.03 | 0.003 | 0.089 | 0.008 |
| L2 | L2 | 0.71 | 0.041 | - | - | 0.17 | 0.010 | - | - | - | - | 0.014 | 0.0008 | 0.34 | 0.019 | 0.13 | 0.01 | 0.02 | 0.0009 | 0.046 | 0.003 |
| SSM | SSM | - | 0.0062 | - | - | - | 0.0032 | - | - | - | - | - | 0.0001 | - | 0.001 | - | 0.002 | - | 0.0002 | - | 0.0001 |
| **Totals:** | | 10.38 | 11.49 | 0.97 | 4.23 | 4.42 | 0.99 | 0.51 | 2.22 | 0.31 | 1.36 | 0.08 | 0.08 | 1.31 | 0.85 | 2.38 | 0.71 | 0.24 | 0.15 | 0.16 | 0.10 |

# Table 2-J: Fuel

Specify fuel characteristics and usage. Unit and stack numbering must correspond throughout the application package.

| Unit No. | Fuel Type (low sulfur Diesel, ultra low sulfur diesel, Natural Gas, Coal, …) | Fuel Source: purchased commercial, pipeline quality natural gas, residue gas, raw/field natural gas, process gas (e.g. SRU tail gas) or other | Specify Units | | | | |
|---|---|---|---|---|---|---|---|
| | | | Lower Heating Value BTU/scf [2] | Hourly Usage scf/hr | Annual Usage MMscf/yr | Sulfur gr/dscf | % Ash |
| C-311 | Natural Gas | Pipeline Quality Natural Gas | 1020 | 9916.00 | 86.86 | 0.002 | - [1] |
| C-312 | Natural Gas | Pipeline Quality Natural Gas | 1020 | 9916.00 | 86.86 | 0.002 | - [1] |
| C-313 | Natural Gas | Pipeline Quality Natural Gas | 1020 | 9916.00 | 86.86 | 0.002 | - [1] |
| C-314 | Natural Gas | Pipeline Quality Natural Gas | 1020 | 9916.00 | 86.86 | 0.002 | - [1] |
| C-315 | Natural Gas | Pipeline Quality Natural Gas | 1020 | 9877.82 | 86.53 | 0.002 | - [1] |
| C-316 | Natural Gas | Pipeline Quality Natural Gas | 1020 | 9877.82 | 86.53 | 0.002 | - [1] |
| H-2 | Natural Gas | Pipeline Quality Natural Gas | 1020 | 10169.78 | 89.09 | 0.002 | - [1] |
| H-3 | Natural Gas | Pipeline Quality Natural Gas | 1020 | 8135.82 | 71.27 | 0.002 | - [1] |
| FL-1 | Natural Gas | Pipeline Quality Natural Gas | 981 | 200.00 | 1.75 | 0.0000 | - [1] |
| VCU-1 | Natural Gas | Pipeline Quality Natural Gas | 981 | 200.00 | 1.75 | 0.0000 | - [1] |
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[1] Pipeline natural gas is ash free.

[2] Due to possible variability in the fuel gas, the standard natural gas heating value is used for the Engine and Heater emissions basis, consistent with AP-42 basis.

# Table 2-K: Liquid Data for Tanks Listed in Table 2-L

For each tank, list the liquid(s) to be stored in each tank. If it is expected that a tank may store a variety of hydrocarbon liquids, enter "mixed hydrocarbons" in the Composition column for that tank and enter the corresponding data of the most volatile liquid to be stored in the tank. If tank is to be used for storage of different materials, list all the materials in the "All Calculations" attachment, run the newest version of TANKS on each, and use the material with the highest emission rate to determine maximum uncontrolled and requested allowable emissions rate. The permit will specify the most volatile category of liquids that may be stored in each tank. Include appropriate tank-flashing modeling input data. Use additional sheets if necessary. Unit and stack numbering must correspond throughout the application package.

| Tank No. | SCC Code | Material Name | Composition | Liquid Density (lb/gal) | Vapor Molecular Weight (lb/lb*mol) | Average Storage Conditions | | Max Storage Conditions | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Temperature (°F) | True Vapor Pressure (psia) | Temperature (°F) | True Vapor Pressure (psia) |
| TK-104 | 31000212 | Condensate | Condensate | 5.88 | 51.61 | 92.08 | 8.28 | 95.00 | 8.28 |
| TK-105 | 31000212 | Condensate | Condensate | 5.88 | 51.61 | 92.08 | 8.28 | 95.00 | 8.28 |
| TK-106 | 31000212 | Condensate | Condensate | 5.88 | 51.61 | 92.08 | 8.28 | 95.00 | 8.28 |
| PWT-1 | 31000213 | Produced Water | Produced Water | 8.28 | 60.43 | 92.08 | 8.28 | 95.00 | 8.28 |
| PWT-2 | 31000213 | Produced Water | Produced Water | 8.28 | 60.43 | 92.08 | 8.28 | 95.00 | 8.28 |
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# Table 2-L: Tank Data

Include appropriate tank-flashing modeling input data. Use an addendum to this table for unlisted data categories. Unit and stack numbering must correspond throughout the application package. Use additional sheets if necessary. See reference Table 2-L2. Note: 1.00 bbl = 10.159 M3 = 42.0 gal

| Tank No. | Date Installed | Materials Stored | Seal Type (refer to Table 2-LR below) | Roof Type (refer to Table 2-LR below) | Capacity | | Diameter (M) | Vapor Space (M) | Color (from Table VI-C) | | Paint Condition (from Table VI-C) | Annual Throughput (gal/yr) | Turn-overs (per year) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | (bbl) | ($M^3$) | | | Roof | Shell | | | |
| TK-104 | 2013 | Condensate | N/A | Vertical - Fixed Roof | 300 | 47.7 | 3.66 | 4.57 | MG | MG | Good | 420,000 | 33.33 |
| TK-105 | 2013 | Condensate | N/A | Vertical - Fixed Roof | 300 | 47.7 | 3.66 | 4.57 | MG | MG | Good | 420,000 | 33.33 |
| TK-106 | 2013 | Condensate | N/A | Vertical - Fixed Roof | 300 | 47.7 | 3.66 | 4.57 | MG | MG | Good | 420,000 | 33.33 |
| PWT-1 | 2019 | Produced Water | N/A | Vertical - Fixed Roof | 300 | 47.7 | 3.66 | 4.57 | MG | MG | Good | 408,774 | 32.44 |
| PWT-2 | 2013 | Produced Water | N/A | Vertical - Fixed Roof | 300 | 47.7 | 3.66 | 4.57 | MG | MG | Good | 408,774 | 32.44 |
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# Table 2-L2: Liquid Storage Tank Data Codes Reference Table

| Roof Type | Seal Type, Welded Tank Seal Type | | Seal Type, Riveted Tank Seal Type | | Roof, Shell Color | Paint Condition |
|---|---|---|---|---|---|---|
| **FX**: Fixed Roof | **Mechanical Shoe Seal** | **Liquid-mounted resilient seal** | **Vapor-mounted resilient seal** | **Seal Type** | **WH**: White | Good |
| **IF**: Internal Floating Roof | **A**: Primary only | **A**: Primary only | **A**: Primary only | **A**: Mechanical shoe, primary only | **AS**: Aluminum (specular) | Poor |
| **EF**: External Floating Roof | **B**: Shoe-mounted secondary | **B**: Weather shield | **B**: Weather shield | **B**: Shoe-mounted secondary | **AD**: Aluminum (diffuse) | |
| **P**: Pressure | **C**: Rim-mounted secondary | **C**: Rim-mounted secondary | **C**: Rim-mounted secondary | **C**: Rim-mounted secondary | **LG**: Light Gray | |
| | | | | | **MG**: Medium Gray | |
| | | | | | **BL**: Black | |
| | | | | | **OT**: Other (specify) | |

Note: 1.00 bbl = 0.159 $M^3$ = 42.0 gal

# Table 2-M: Materials Processed and Produced (Use additional sheets as necessary.)

| Material Processed | | | | Material Produced | | | |
|---|---|---|---|---|---|---|---|
| **Description** | **Chemical Composition** | **Phase (Gas, Liquid, or Solid)** | **Quantity (specify units)** | **Description** | **Chemical Composition** | **Phase** | **Quantity (specify units)** |
| Natural Gas | Mixed Hydrocarbons | Gas | 40 MMSCFD | Dehydrated Natural Gas | Natural Gas | Gas | 40 MMSCFD |
| | | | | Condensate | Condensate | Liquid | 30000 bbl/yr |
| | | | | Produced Water | Produced Water | Liquid | 19465 bbl/yr |
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# Table 2-N: CEM Equipment

Enter Continuous Emissions Measurement (CEM) Data in this table. If CEM data will be used as part of a federally enforceable permit condition, or used to satisfy the requirements of a state or federal regulation, include a copy of the CEM's manufacturer specification sheet in the Information Used to Determine Emissions attachment. Unit and stack numbering must correspond throughout the application package. Use additional sheets if necessary.

| Stack No. | Pollutant(s) | Manufacturer | Model No. | Serial No. | Sample Frequency | Averaging Time | Range | Sensitivity | Accuracy |
|---|---|---|---|---|---|---|---|---|---|
| N/A - No Continuous Emissions Measurement equipment at this facility. | | | | | | | | | |
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# Table 2-O: Parametric Emissions Measurement Equipment

Unit and stack numbering must correspond throughout the application package. Use additional sheets if necessary.

| Unit No. | Parameter/Pollutant Measured | Location of Measurement | Unit of Measure | Acceptable Range | Frequency of Maintenance | Nature of Maintenance | Method of Recording | Averaging Time |
|---|---|---|---|---|---|---|---|---|
| N/A - No Parametric Emissions Measurement equipment at this facility. | | | | | | | | |
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# Table 2-P: Greenhouse Gas Emissions

Applications submitted under 20.2.70, 20.2.72, & 20.2.74 NMAC are required to complete this Table. Power plants, Title V major sources, and PSD major sources must report and calculate all GHG emissions for each unit. Applicants must report potential emission rates in short tons per year (see Section 6.a for assistance). Include GHG emissions during Startup, Shutdown, and Scheduled Maintenance in this table. For minor source facilities that are not power plants, are not Title V, or are not PSD, there are three options for reporting GHGs 1) report GHGs for each individual piece of equipment; 2) report all GHGs from a group of unit types, for example report all combustion source GHGs as a single unit and all venting GHG as a second separate unit; OR 3) check the following box ☐ By checking this box, the applicant acknowledges the total CO2e emissions are less than 75,000 tons per year.

| | | $CO_2$ ton/yr | $N_2O$ ton/yr | $CH_4$ ton/yr | $SF_6$ ton/yr | PFC/HFC ton/yr[2] | | | | | | | | | Total GHG Mass Basis ton/yr[4] | Total $CO_2e$ ton/yr[5] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Unit No.** | **GWPs [1]** | **1** | **265** | **28** | | | | | | | | | | | | |
| **C-311** | **mass GHG** | 5,182.12 | 0.010 | 0.10 | | | | | | | | | | | 5,182 | |
| | **$CO_2e$** | 5,182.12 | 2.59 | 2.73 | | | | | | | | | | | | 5,187 |
| **C-312** | **mass GHG** | 5,182.12 | 0.010 | 0.10 | | | | | | | | | | | 5,182 | |
| | **$CO_2e$** | 5,182.12 | 2.59 | 2.73 | | | | | | | | | | | | 5,187 |
| **C-313** | **mass GHG** | 5,182.12 | 0.010 | 0.10 | | | | | | | | | | | 5,182 | |
| | **$CO_2e$** | 5,182.12 | 2.59 | 2.73 | | | | | | | | | | | | 5,187 |
| **C-314** | **mass GHG** | 5,182.12 | 0.010 | 0.10 | | | | | | | | | | | 5,182 | |
| | **$CO_2e$** | 5,182.12 | 2.59 | 2.73 | | | | | | | | | | | | 5,187 |
| **C-315** | **mass GHG** | 5,162.17 | 0.010 | 0.10 | | | | | | | | | | | 5,162 | |
| | **$CO_2e$** | 5,162.17 | 2.58 | 2.72 | | | | | | | | | | | | 5,167 |
| **C-316** | **mass GHG** | 5,162.17 | 0.010 | 0.10 | | | | | | | | | | | 5,162 | |
| | **$CO_2e$** | 5,162.17 | 2.58 | 2.72 | | | | | | | | | | | | 5,167 |
| **H-2** | **mass GHG** | 512.36 | 9.66E-04 | 0.010 | | | | | | | | | | | 512 | |
| | **$CO_2e$** | 512.36 | 0.256 | 0.270 | | | | | | | | | | | | 513 |
| **H-3** | **mass GHG** | 409.88 | 7.72E-04 | 0.008 | | | | | | | | | | | 410 | |
| | **$CO_2e$** | 409.88 | 0.205 | 0.216 | | | | | | | | | | | | 410 |
| **PWT-1** | **mass GHG** | - | - | 0.008 | | | | | | | | | | | 0.01 | |
| | **$CO_2e$** | - | - | 0.222 | | | | | | | | | | | | 0.22 |
| **PWT-2** | **mass GHG** | - | - | 0.008 | | | | | | | | | | | 0.01 | |
| | **$CO_2e$** | - | - | 0.222 | | | | | | | | | | | | 0.22 |
| **FL-1** | **mass GHG** | 21,707.78 | 4.09E-02 | 89.294 | | | | | | | | | | | 21,797 | |
| | **$CO_2e$** | 21,707.78 | 10.842 | 2,500.232 | | | | | | | | | | | | 24,219 |
| **VCU-1** | **mass GHG** | 226.99 | 4.28E-04 | 0.567 | | | | | | | | | | | 228 | |
| | **$CO_2e$** | 226.99 | 0.113 | 15.887 | | | | | | | | | | | | 243 |
| **FUG** | **mass GHG** | 0.25 | - | 7.046 | | | | | | | | | | | 7.3 | |
| | **$CO_2e$** | 0.25 | - | 197.301 | | | | | | | | | | | | 197.6 |
| **L1** | **mass GHG** | 0.01 | - | 0.031 | | | | | | | | | | | 0.040 | |
| | **$CO_2e$** | 0.01 | - | 0.872 | | | | | | | | | | | | 0.881 |
| **L2** | **mass GHG** | 0.0001 | - | 0.000 | | | | | | | | | | | 0.000 | |
| | **$CO_2e$** | 0.0001 | - | 0.009 | | | | | | | | | | | | 0.010 |
| **SSM** | **mass GHG** | - | - | 0.426 | | | | | | | | | | | 0.43 | |
| | **$CO_2e$** | - | - | 11.934 | | | | | | | | | | | | 12 |
| **Total** | **mass GHG** | 53,910.12 | 0.10 | 97.984 | | | | | | | | | | | 54,008 | |
| | **$CO_2e$** | 53,910.12 | 26.924 | 2,743.551 | | | | | | | | | | | | 56,681 |

[1] **GWP** (Global Warming Potential): Applicants must use the most current GWPs codified in Table A-1 of 40 CFR part 98. GWPs are subject to change, therefore, applicants need to check 40 CFR 98 to confirm GWP values.

[2] For **HFCs** or **PFCs** describe the specific HFC or PFC compound and use a separate column for each individual compound.

[3] For each new compound, enter the appropriate GWP for each HFC or PFC compound from Table A-1 in 40 CFR 98.

[4] Green house gas emissions on a **mass basis** is the ton per year green house gas emission before adjustment with its GWP.

[5] **$CO_2e$** means Carbon Dioxide Equivalent and is calculated by multiplying the TPY mass emissions of the green house gas by its GWP.

# Section 3

# Application Summary

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The **Application Summary** shall include a brief description of the facility and its process, the type of permit application, the applicable regulation (i.e. 20.2.72.200.A.X, or 20.2.73 NMAC) under which the application is being submitted, and any air quality permit numbers associated with this site. If this facility is to be collocated with another facility, provide details of the other facility including permit number(s). In case of a revision or modification to a facility, provide the lowest level regulatory citation (i.e. 20.2.72.219.B.1.d NMAC) under which the revision or modification is being requested. Also describe the proposed changes from the original permit, how the proposed modification will affect the facility's operations and emissions, de-bottlenecking impacts, and changes to the facility's major/minor status (both PSD & Title V).

The **Process Summary** shall include a brief description of the facility and its processes.

**Startup, Shutdown, and Maintenance (SSM) routine or predictable emissions:** Provide an overview of how SSM emissions are accounted for in this application. Refer to "Guidance for Submittal of Startup, Shutdown, Maintenance Emissions in Permit Applications (http://www.env.nm.gov/aqb/permit/app_form.html) for more detailed instructions on SSM emissions.

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Application Summary:

Frontier Field Services, LLC (Frontier) is submitting this NSR application for the BKU Compressor Station (BKU). Gas compression at this site is and will remain at 40 MMSCFD. BKU is located approximately 21 miles East of Artesia, in Eddy County New Mexico. BKU is currently operating under GCP-O&G permit number 4208-M5. Frontier is now submitting this NSR permit application for the site to transition to an NSR permit, pursuant to 20.2.72.200.A NMAC.

The following describes the changes to the site, which will require the site to be authorized under an NSR permit:

- Update the (6) compressor engines (Unit Nos. C-311 through C-316) emission factors based on updated engine catalyst guarantee data.
- Removal of the V1/F1 glycol dehydrator system and associated H-1 dehy reboiler, which have been removed from the process. In the previous permit revision, dehy V2/F2 and reboiler H-2 were removed but instead, dehy V1/F1 and reboiler H-1 should have been removed. Add back dehy V2/F2 and reboiler H-2 to the permit.
- Change the dehy (V2/F2) BTEX condenser vapors control from FL-1 to instead return to suction/inlet for control. The flash tank vapors still return to inlet for control as previously represented.
- Update the inlet gas representation for an increased amount of $H_2S$ and $CO_2$ and a site-specific sample, resulting in updates in emissions for the following:
    - Updated representations for the emissions for the dehy (V2/F2).
    - Update in SSM emissions for FL-1 SSM due to the updated gas composition and updates to the hourly and annual volumes.
- Update the emissions from tanks and loading using a site-specific sample and an increase in condensate throughput. This includes:
    - Increase the condensate throughput for the three (3) condensate tanks (TK-104, TK-105, TK-106) and associated condensate loading (L1).
    - Update emissions from the three (3) condensate (TK-104, TK-105, TK-106) and two (2) produced water tanks (PWT-1, PWT-2) based on the sample and process modeling via BR&E ProMax.
    - Update emissions from the condensate loading (L1) and produced water loading (L2) using the updated composition, condensate volume, and process modeling data.
    - Add the produced water tanks (PWT-1 and PWT-2) and produced water loading (L2) sources to the Table 2-A. These were previously exempt sources.
- Update fugitive emissions (FUG) to reflect the updated compositions at the site.

- Addition of site-specific SSM venting emission calculations (SSM) for equipment depressurizing and venting during SSM activities.
- Addition of compressors to Table 2-A (COMP-311 through COMP-316), which are only being added for regulatory applicability purposes.
- Updates to the exempted sources listed in the Table 2-B to reflect the small tanks currently at the site.
- Update unit numbers for the engines consistent with how Frontier personnel refer to the equipment. Update the vapor combustor unit number from TO-1 to VCU-1, since the unit is an enclosed vapor combustor. Unit number updates are shown in the below cross reference table.

| Current Unit Number | Updated Unit Number |
|---|---|
| C-101 | C-311 |
| C-102 | C-312 |
| C-104 | C-313 |
| C-105 | C-314 |
| C-106 | C-315 |
| TO-1 | VCU-1 |

Process Summary:
Facility throughputs are as follows:

- 40 MMSCFD natural gas
- 82.19 bbl/day condensate
- 53.33 bbl/day produced water

The station accepts field gas which is compressed by compressor engines (C-311 through C-316) to facilitate transfer to upstream facilities. Following compression, the gas is sent to a TEG dehydration unit (V2/F2). Flash tank overheads are recycled to the facility inlet. Regenerator emissions are controlled by a condenser and are routed back to station suction/inlet. After being processed by the dehydrator, the gas then exits the facility. Liquids that drop out at the inlet separator are sent to a heater treater (H-3), then the condensate to condensate tanks (TK-104, TK-105, TK-106) and water to produced water tanks (PWT-1 and PWT-2). Condensate and produced water are transported off-site via truck L1, L2). Emissions from the storage tanks and condensate loading are controlled by a vapor combustor (VCU-1).

The station also has units that are exempt equipment pursuant to 20.2.72.202.B(2) or 20.2.72.202.B(5): Unpaved Haul Road Emissions (Unit No. Haul) and miscellaneous small tanks as listed in Table 2-B.

The facility is not a new major stationary source under the new source review requirements of the FCAA, Part C (PSD). The facility is located in Eddy County, New Mexico, an area that is classified as attainment or unclassified with the National Ambient Air Quality Standards (NAAQS) for all pollutants. Oil and gas production operations are not a listed source category under 40 CFR §52.21(b)(1); therefore, the facility would be considered a major source if criteria pollutant emissions are greater than or equal to the major source threshold of 250 tpy for each pollutant. The maximum annual emission rates for each criteria pollutant are less than 250 tpy. Therefore, the facility will remain a minor source as defined in the rules, and PSD review is not triggered.

Startup, Shutdown, and Maintenance (SSM) Summary:
The following SSM may occur at the site:

- In the event of an upset condition and the plant needs to flare inlet gas to the Flare (FL-1 SSM).
- Various equipment blowdowns to the atmosphere may occur during SSM events, primarily due to the need to conduct maintenance (SSM).

# Section 4

## Process Flow Sheet

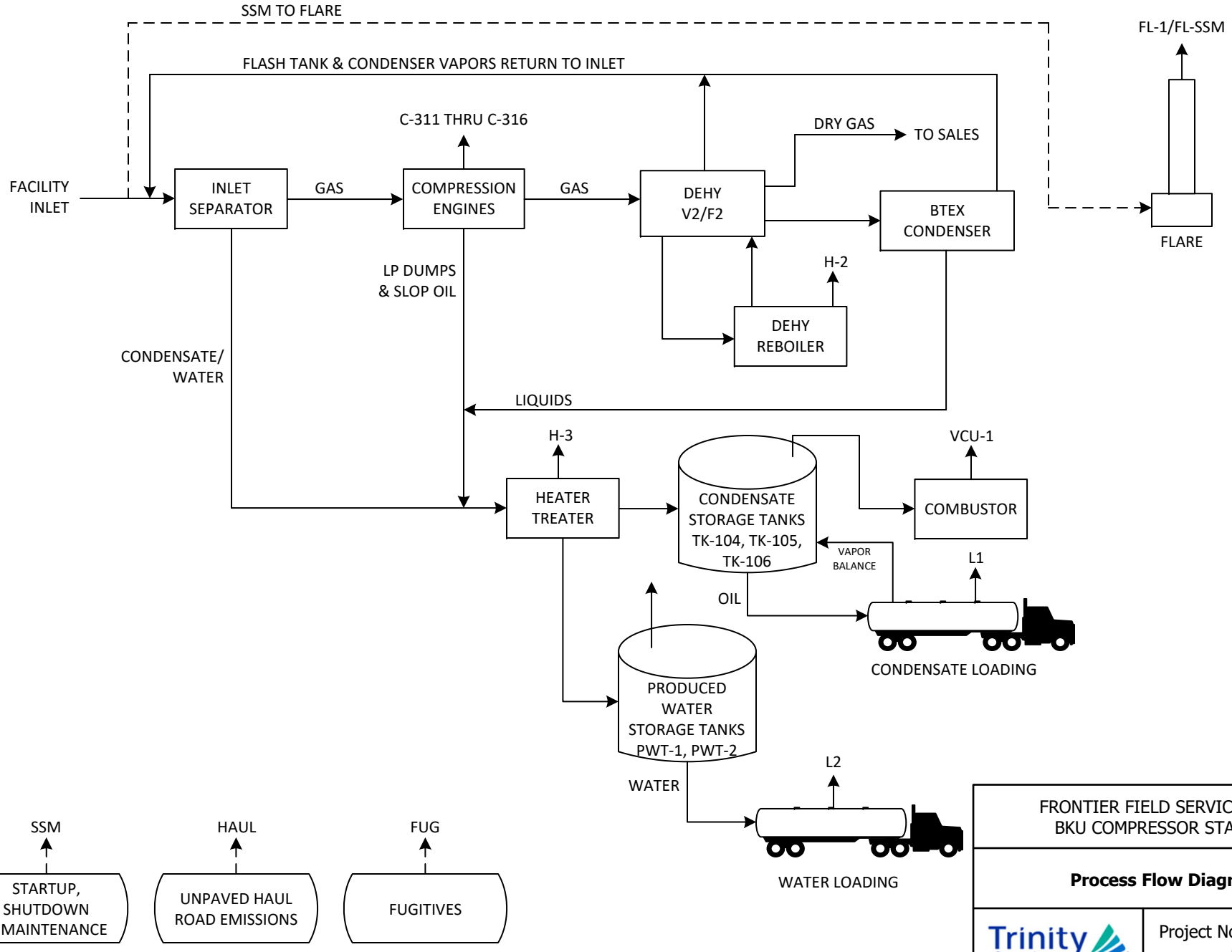
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A **process flow sheet** and/or block diagram indicating the individual equipment, all emission points and types of control applied to those points. The unit numbering system should be consistent throughout this application.

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A process flow diagram is attached.

# BKU COMPRESSOR STATION
# PROCESS FLOW DIAGRAM




FRONTIER FIELD SERVICES, LLC
BKU COMPRESSOR STATION

**Process Flow Diagram**

Trinity Consultants

Project No. 254404.0698
04/26

# Section 5

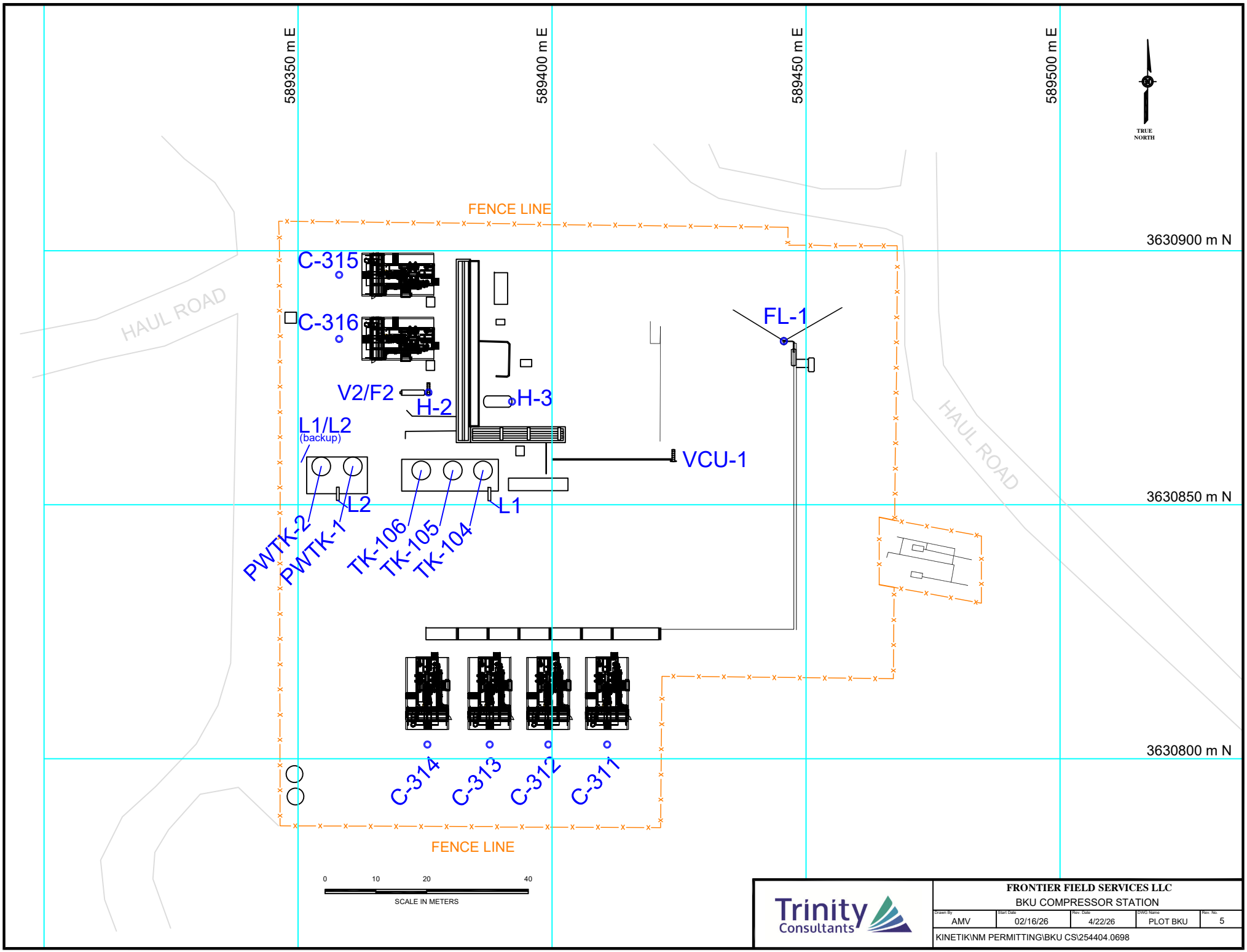
## Plot Plan Drawn to Scale

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A **plot plan drawn to scale** showing emissions points, roads, structures, tanks, and fences of property owned, leased, or under direct control of the applicant. This plot plan must clearly designate the restricted area as defined in UA1, Section 1-D.12. The unit numbering system should be consistent throughout this application.

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A plot plan is attached.




Trinity Consultants

**FRONTIER FIELD SERVICES LLC**

BKU COMPRESSOR STATION

| Drawn By | Start Date | Rev. Date | DWG Name | Rev. No. |
|---|---|---|---|---|
| AMV | 02/16/26 | 4/22/26 | PLOT BKU | 5 |

KINETIK\NM PERMITTING\BKU CS\254404.0698

# Section 6

## All Calculations

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**Show all calculations** used to determine both the hourly and annual controlled and uncontrolled emission rates. All calculations shall be performed keeping a minimum of three significant figures. Document the source of each emission factor used (if an emission rate is carried forward and not revised, then a statement to that effect is required). If identical units are being permitted and will be subject to the same operating conditions, submit calculations for only one unit and a note specifying what other units to which the calculations apply. All formulas and calculations used to calculate emissions must be submitted. The "Calculations" tab in the UA2 has been provided to allow calculations to be linked to the emissions tables. Add additional "Calc" tabs as needed. If the UA2 or other spread sheets are used, all calculation spread sheet(s) shall be submitted electronically in Microsoft Excel compatible format so that formulas and input values can be checked. Format all spread sheets and calculations such that the reviewer can follow the logic and verify the input values. Define all variables. If calculation spread sheets are not used, provide the original formulas with defined variables. Additionally, provide subsequent formulas showing the input values for each variable in the formula. All calculations, including those calculations are imbedded in the Calc tab of the UA2 portion of the application, the printed Calc tab(s), should be submitted under this section.

**Tank Flashing Calculations**: The information provided to the AQB shall include a discussion of the method used to estimate tank-flashing emissions, relative thresholds (i.e., NOI, permit, or major source (NSPS, PSD or Title V)), accuracy of the model, the input and output from simulation models and software, all calculations, documentation of any assumptions used, descriptions of sampling methods and conditions, copies of any lab sample analysis. If Hysis is used, all relevant input parameters shall be reported, including separator pressure, gas throughput, and all other relevant parameters necessary for flashing calculation.

**SSM Calculations**: It is the applicant's responsibility to provide an estimate of SSM emissions or to provide justification for not doing so. In this Section, provide emissions calculations for Startup, Shutdown, and Routine Maintenance (SSM) emissions listed in the Section 2 SSM and/or Section 22 GHG Tables and the rational for why the others are reported as zero (or left blank in the SSM/GHG Tables). Refer to "Guidance for Submittal of Startup, Shutdown, Maintenance Emissions in Permit Applications (http://www.env.nm.gov/aqb/permit/app_form.html) for more detailed instructions on calculating SSM emissions. If SSM emissions are greater than those reported in the Section 2, Requested Allowables Table, modeling may be required to ensure compliance with the standards whether the application is NSR or Title V. Refer to the Modeling Section of this application for more guidance on modeling requirements.

**Glycol Dehydrator Calculations**: The information provided to the AQB shall include the manufacturer's maximum design recirculation rate for the glycol pump. If GRI-Glycalc is used, the full input summary report shall be included as well as a copy of the gas analysis that was used.

**Road Calculations:** Calculate fugitive particulate emissions and enter haul road fugitives in Tables 2-A, 2-D and 2-E for:

1. If you transport raw material, process material and/or product into or out of or within the facility and have PER emissions greater than 0.5 tpy.
2. If you transport raw material, process material and/or product into or out of the facility more frequently than one round trip per day.

**Significant Figures:**

**A.** All emissions standards are deemed to have at least two significant figures, but not more than three significant figures.

**B.** At least 5 significant figures shall be retained in all intermediate calculations.

**C.** In calculating emissions to determine compliance with an emission standard, the following rounding off procedures shall be used:

**(1)** If the first digit to be discarded is less than the number 5, the last digit retained shall not be changed;

**(2)** If the first digit discarded is greater than the number 5, or if it is the number 5 followed by at least one digit other than the number zero, the last figure retained shall be increased by one unit; **and**

**(3)** If the first digit discarded is exactly the number 5, followed only by zeros, the last digit retained shall be rounded upward if it is an odd number, but no adjustment shall be made if it is an even number.

**(4)** The final result of the calculation shall be expressed in the units of the standard.

**Control Devices:** In accordance with 20.2.72.203.A(3) and (8) NMAC, 20.2.70.300.D(5)(b) and (e) NMAC, and 20.2.73.200.B(7) NMAC, the permittee shall report all control devices and list each pollutant controlled by the control device regardless if the applicant takes credit for the reduction in emissions. The applicant can indicate in this section of the application if they chose to not take credit for the reduction in emission rates. For notices of intent submitted under 20.2.73 NMAC, only uncontrolled emission rates can be considered to determine applicability unless the state or federal Acts require the control. This information is necessary to determine if federally enforceable conditions are necessary for the control device, and/or if the control device produces its own regulated pollutants or increases emission rates of other pollutants.

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**Storage Tanks (Units TK-104 thru TK-106)**

A recently collected condensate liquids analysis from the oil leg of the heater treater and the condensate throughput (82.19 bbl/day) was used to quantify tank emissions using BR&E ProMax. Flash, working and breathing emissions were quantified with BR&E ProMax. All overhead emissions from these units are captured 100% and sent to a vapor combustor with 98% destruction efficiency. Emissions are represented at the vapor combustor Unit VCU-1.

**Produced Water Storage Tanks (PWT-1, PWT-2)**

Produced water is water that has separated from the condensate liquids. The condensate liquids analysis, water, and a produced water throughput of 53.33 bbl/day was used to quantify tank emissions using BR&E ProMax. Working and breathing emissions were quantified with BR&E ProMax. Emissions from these tanks are uncontrolled.

**Condensate and Produced Water Loading (Units L1, L2)**

Condensate and produced water loading emissions are calculated using EPA's AP-42, 5th Edition, Section 5.2 and the maximum hourly and annual loading volumes. The physical properties of the loading vapors and speciation are from BR&E ProMax. Vapors generated during condensate loading are vapor balanced to the condensate tanks and in turn controlled by the vapor combustor VCU-1. These captured emissions are represented under VCU-1 and VCU-1 operates with a destruction efficiency of 98%. The small percentage of fugitive emissions from condensate loading that are uncaptured are represented under Unit L1. Produced water loading emissions are uncontrolled.

**Tanks and Loading Vapor Combustor (Unit VCU-1)**

Unit VCU-1 combusts the vapors collected from the condensate tank and loading emissions. The VCU is conservatively represented as having a VOC, HAP and $H_2S$ destruction efficiency of 98%. Emissions are also calculated for the VCU pilot. Emissions of NOx and CO are based on TCEQ guidance for waste streams with >1,000 BTU/scf heating value, based on the heating value of the streams being combusted. Emissions of $SO_2$ are calculated with material balance approach for conversion of $H_2S$ to $SO_2$. Emissions of PM/PM10/PM2.5 are calculated from EPA's AP-42 Section 1.4. GHG emissions are calculated using factors from 40 CFR 98 Subpart C Table C-1 and Table C-2.

**Facility-Wide Fugitive Emissions (Unit FUG)**

Facility-wide fugitive emissions are calculated using the most recent count of fugitive components at the facility and with gas and liquid compositions used to quantify emissions at the facility. The emissions from fugitive components associated with this site are calculated using emission factors from Table 2-4 of the EPA Protocol for Equipment Leak Emission Estimates, November 1995. The emissions speciation has been updated using the updated analyses.

**Flare (Unit FL-1, FL-1 SSM)**

The FL-1 Flare will combust inlet gas during periods of upset / SSM and compressor blowdowns. The emissions are calculated using the volume of gas for max hourly and annual basis. Emissions of NOx and CO are based on TCEQ guidance for waste streams with >1,000 BTU/scf heating value. Emissions of $SO_2$ are calculated with material balance approach for conversion of $H_2S$ to $SO_2$. GHG emissions are calculated using factors from 40 CFR 98 Subpart C Table C-1 and Table C-2. The flare is designed to be smokeless so there are no particulate matter emissions from the flare.

**Compressor Engines (Units C-311 to C-316)**

The engines operating at the facility include Caterpillar 3516LE and 3516B engines. These engines will compress inlet gas and send the gas to the TEG dehydration unit. The fuel burned in the engines is pipeline quality natural gas. Engine emissions of NOx, CO, VOC, and formaldehyde are calculated using catalyst control guarantees from engine catalyst vendors. AP-42 emission factors are used to quantify the remaining HAP, SO2, and PM emissions (AP-42, Chapter 3, Table 3.2-2). The AP-42 emission factor for SO2 for natural gas is based on 0.002 grains sulfur per dry standard cubic foot of gas. GHG emissions are calculated using factors from 40 CFR 98 Subpart C Table C-1 and Table C-2.

**TEG Dehydrator (Unit V2/F2)**

TEG dehydrator emissions are calculated using a BR&E ProMax simulation designed to incorporate the operating parameters that will be used at the facility. Flash tank overhead emissions are routed to the inlet. Regenerator emissions are controlled by a condenser and are routed back to the inlet. No emissions are expected from this source.

**Heaters (Units H-2 and H-3)**

The heaters burn pipeline quality natural gas. Emissions from heaters installed at the facility are calculated using emission factors from AP-42 Section 1.4, Natural Gas Combustion. The AP-42 emission factor for SO2 for natural gas is based on 0.002 grains sulfur per dry standard cubic foot of gas. Greenhouse gas (GHG) emissions from all heaters and boilers are calculated using factors from 40 CFR 98 Subpart C Table C-1 and Table C-2.

**Haul Road Emissions (Exempt per 20.2.72.202.B(5) NMAC)**

Haul trucks will be utilized at this facility to transport condensate and produced water off-site. The emission calculations provided in this section demonstrate that these activities will generate less than 0.5 tpy of PM/PM10/PM2.5 emissions. This activity is therefore considered exempt and is not a regulated source of emissions.

**Vented SSM (SSM)**

Equipment blowdowns to atmosphere will occur for compressors, scrubbers, reboilers, pigging, small filter/strainer/small vessel openings, and tank maintenance. Compressors will first depressure back to suction header or to FL-1, after which a small remaining volume will be released to atmosphere. Pigging volumes are estimating using pigging records. Released gas remaining is speciated using the inlet gas and condensate vapor characterizations. On an hourly basis, only one SSM event type will occur in one single hour; therefore, the hourly H2S emission rate is the maximum of the event types.

**Fugitive Emissions Clarification**

Fugitive emissions sources of H2S include both routine fugitive emission sources and event-based fugitive emission sources.

- Routine fugitive emission sources are: Produced Water Tank emissions (PWT-1, PWT-2) and fugitives (FUG)
- Event-based fugitive emission sources: SSM (vented SSM), produced water loading (L2), and the uncaptured fugitives from condensate loading (L2)

The event-based fugitive emissions sources will not occur within the same hour and this has been taken into account in the air dispersion modeling for the facility. Truck loading of condensate and produced water will not occur within the same hour and while truck loading is occurring, the site will not be performing SSM venting activities.

# Section 6.a

## Green House Gas Emissions

(Submitting under 20.2.70, 20.2.72 20.2.74 NMAC)

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**Title V (20.2.70 NMAC), Minor NSR (20.2.72 NMAC), and PSD (20.2.74 NMAC)** applicants must estimate and report greenhouse gas (GHG) emissions to verify the emission rates reported in the public notice, determine applicability to 40 CFR 60 Subparts, and to evaluate Prevention of Significant Deterioration (PSD) applicability. GHG emissions that are subject to air permit regulations consist of the sum of an aggregate group of these six greenhouse gases: carbon dioxide ($CO_2$), nitrous oxide ($N_2O$), methane ($CH_4$), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride ($SF_6$).

### Calculating GHG Emissions:

**1.** Calculate the ton per year (tpy) GHG mass emissions and GHG $CO_2e$ emissions from your facility.
**2.** GHG mass emissions are the sum of the total annual tons of greenhouse gases without adjusting with the global warming potentials (GWPs). GHG $CO_2e$ emissions are the sum of the mass emissions of each individual GHG multiplied by its GWP found in Table A-1 in 40 CFR 98 Mandatory Greenhouse Gas Reporting.
**3.** Emissions from routine or predictable start up, shut down, and maintenance must be included.
**4.** Report GHG mass and GHG $CO_2e$ emissions in Table 2-P of this application. Emissions are reported in **short** tons per year and represent each emission unit's Potential to Emit (PTE).
**5.** All Title V major sources, PSD major sources, and all power plants, whether major or not, must calculate and report GHG mass and CO2e emissions for each unit in Table 2-P.
**6.** For minor source facilities that are not power plants, are not Title V, and are not PSD there are three options for reporting GHGs in Table 2-P: 1) report GHGs for each individual piece of equipment; 2) report all GHGs from a group of unit types, for example report all combustion source GHGs as a single unit and all venting GHGs as a second separate unit; 3) or check the following ☐ By checking this box, the applicant acknowledges the total CO2e emissions are less than 75,000 tons per year.

**Sources for Calculating GHG Emissions:**

- Manufacturer's Data
- AP-42 Compilation of Air Pollutant Emission Factors at http://www.epa.gov/ttn/chief/ap42/index.html
- EPA's Internet emission factor database WebFIRE at http://cfpub.epa.gov/webfire/
- 40 CFR 98 Mandatory Green House Gas Reporting except that tons should be reported in short tons rather than in metric tons for the purpose of PSD applicability.
- API Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Natural Gas Industry. August 2009 or most recent version.
- Sources listed on EPA's NSR Resources for Estimating GHG Emissions at http://www.epa.gov/nsr/clean-air-act-permitting-greenhouse-gases:

**Global Warming Potentials (GWP):**
Applicants must use the Global Warming Potentials codified in Table A-1 of the most recent version of 40 CFR 98 Mandatory Greenhouse Gas Reporting. The GWP for a particular GHG is the ratio of heat trapped by one unit mass of the GHG to that of one unit mass of $CO_2$ over a specified time period.

**"Greenhouse gas"** for the purpose of air permit regulations is defined as the aggregate group of the following six gases: carbon dioxide, nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. **(20.2.70.7 NMAC, 20.2.74.7 NMAC).** You may also find GHGs defined in 40 CFR 86.1818-12(a).

**Metric to Short Ton Conversion:**
Short tons for GHGs and other regulated pollutants are the standard unit of measure for PSD and title V permitting programs. 40 CFR 98 Mandatory Greenhouse Reporting requires metric tons.
1 metric ton = 1.10231 short tons (per Table A-2 to Subpart A of Part 98 – Units of Measure Conversions)

**Frontier Field Services LLC**
**BKU Compressor Station**

## Emission Summary

**Uncontrolled Emissions**

| Unit | $NO_x$ | | CO | | VOC | | $SO_x$ | | PM | | $PM_{10}$ | | $PM_{2.5}$ | | $H_2S$ | | Total HAP | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy |
| C-311 | 5.91 | 25.88 | 5.41 | 23.68 | 1.53 | 6.71 | 0.0059 | 0.026 | 0.10 | 0.44 | 0.10 | 0.44 | 0.10 | 0.10 | - | - | 0.71 | 3.10 |
| C-312 | 5.91 | 25.88 | 5.41 | 23.68 | 1.53 | 6.71 | 0.0059 | 0.026 | 0.10 | 0.44 | 0.10 | 0.44 | 0.10 | 0.10 | - | - | 0.71 | 3.10 |
| C-313 | 5.91 | 25.88 | 5.41 | 23.68 | 1.53 | 6.71 | 0.0059 | 0.026 | 0.10 | 0.44 | 0.10 | 0.44 | 0.10 | 0.10 | - | - | 0.71 | 3.10 |
| C-314 | 5.91 | 25.88 | 5.41 | 23.68 | 1.53 | 6.71 | 0.0059 | 0.026 | 0.10 | 0.44 | 0.10 | 0.44 | 0.10 | 0.10 | - | - | 0.71 | 3.10 |
| C-315 | 1.52 | 6.66 | 7.30 | 31.98 | 2.18 | 9.56 | 0.0059 | 0.026 | 0.10 | 0.44 | 0.10 | 0.44 | 0.10 | 0.44 | - | - | 0.72 | 3.17 |
| C-316 | 1.52 | 6.66 | 7.30 | 31.98 | 2.18 | 9.56 | 0.0059 | 0.026 | 0.10 | 0.44 | 0.10 | 0.44 | 0.10 | 0.44 | - | - | 0.72 | 3.17 |
| H-2 | 0.10 | 0.43 | 0.082 | 0.36 | 0.0054 | 0.024 | 5.9E-04 | 2.6E-03 | 0.0075 | 0.033 | 0.0075 | 0.033 | 0.0075 | 0.033 | - | - | 7.4E-05 | 3.2E-04 |
| H-3 | 0.078 | 0.34 | 0.066 | 0.29 | 4.31E-03 | 0.019 | 4.7E-04 | 2.1E-03 | 0.0060 | 0.026 | 0.0060 | 0.026 | 0.0060 | 0.026 | - | - | 5.9E-05 | 2.6E-04 |
| TK-104 | - | - | - | - | 2.99 | 13.08 | - | - | - | - | - | - | - | - | 0.059 | 0.26 | 0.25 | 1.11 |
| TK-105 | - | - | - | - | 2.99 | 13.08 | - | - | - | - | - | - | - | - | 0.059 | 0.26 | 0.25 | 1.11 |
| TK-106 | - | - | - | - | 2.99 | 13.08 | - | - | - | - | - | - | - | - | 0.059 | 0.26 | 0.25 | 1.11 |
| PWT-1 | - | - | - | - | 0.51 | 2.25 | - | - | - | - | - | - | - | - | 0.035 | 0.15 | 0.08 | 0.34 |
| PWT-2 | - | - | - | - | 0.51 | 2.25 | - | - | - | - | - | - | - | - | 0.035 | 0.15 | 0.08 | 0.34 |
| V2/F2 | - | - | - | - | 366.39 | 1,488.72 | - | - | - | - | - | - | - | - | 27.38 | 119.92 | 163.13 | 25.65 |
| FL-1 (pilot) | 0.027 | 0.12 | 0.054 | 0.24 | 0.0071 | 0.031 | - | - | - | - | - | - | - | - | - | - | - | - |
| VCU-1 (pilot) | 0.027 | 0.12 | 0.054 | 0.24 | 1.4E-04 | 0.001 | - | - | 1.5E-03 | 0.0067 | 1.5E-03 | 0.0067 | 1.5E-03 | 0.0067 | - | - | - | - |
| FUG | - | - | - | - | 1.32 | 5.78 | - | - | - | - | - | - | - | - | 0.047 | 0.21 | 0.20 | 0.86 |
| L1 | - | - | - | - | 63.88 | 5.63 | - | - | - | - | - | - | - | - | - | - | 5.22 | 0.69 |
| L2 | | | | | 4.73 | 0.27 | - | - | - | - | - | - | - | - | - | - | 0.71 | 0.04 |
| HAUL | - | - | - | - | - | - | - | - | 1.92 | 0.16 | 0.49 | 0.041 | 0.049 | 4.1E-03 | - | - | - | - |
| SSM | - | - | - | - | - | 0.24 | - | - | - | - | - | - | - | - | - | 0.012 | - | 0.0062 |
| Total | 26.91 | 118 | 36.48 | 159.80 | 456.82 | 1,590.42 | 0.04 | 0.16 | 2.54 | 2.88 | 1.11 | 2.76 | 0.67 | 1.35 | 27.67 | 121.23 | 174.46 | 50.014 |

**Controlled Emissions**

| Unit | $NO_x$ | | CO | | VOC | | $SO_x$ | | PM | | $PM_{10}$ | | $PM_{2.5}$ | | $H_2S$ | | Total HAP | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy |
| C-311 | 5.91 | 25.88 | 1.62 | 7.12 | 0.70 | 3.05 | 0.0059 | 0.026 | 0.10 | 0.44 | 0.10 | 0.44 | 0.10 | 0.44 | - | - | 0.32 | 1.38 |
| C-312 | 5.91 | 25.88 | 1.62 | 7.12 | 0.70 | 3.05 | 0.0059 | 0.026 | 0.10 | 0.44 | 0.10 | 0.44 | 0.10 | 0.44 | - | - | 0.32 | 1.38 |
| C-313 | 5.91 | 25.88 | 1.62 | 7.12 | 0.70 | 3.05 | 0.0059 | 0.026 | 0.10 | 0.44 | 0.10 | 0.44 | 0.10 | 0.44 | - | - | 0.32 | 1.38 |
| C-314 | 5.91 | 25.88 | 1.62 | 7.12 | 0.70 | 3.05 | 0.0059 | 0.026 | 0.10 | 0.44 | 0.10 | 0.44 | 0.10 | 0.44 | - | - | 0.32 | 1.38 |
| C-315 | 1.52 | 6.66 | 1.83 | 8.00 | 0.78 | 3.41 | 0.0059 | 0.026 | 0.10 | 0.44 | 0.10 | 0.44 | 0.10 | 0.44 | - | - | 0.29 | 1.28 |
| C-316 | 1.52 | 6.66 | 1.83 | 8.00 | 0.78 | 3.41 | 0.0059 | 0.026 | 0.10 | 0.44 | 0.10 | 0.44 | 0.10 | 0.44 | - | - | 0.29 | 1.28 |
| H-2 | 0.10 | 0.43 | 0.082 | 0.36 | 0.0054 | 0.024 | 5.9E-04 | 2.6E-03 | 0.0075 | 0.033 | 0.0075 | 0.033 | 0.0075 | 0.033 | - | - | 7.9E-05 | 3.5E-04 |
| H-3 | 0.078 | 0.34 | 0.066 | 0.29 | 0.0043 | 0.019 | 4.7E-04 | 2.1E-03 | 0.0060 | 0.026 | 0.0060 | 0.026 | 0.0060 | 0.026 | - | - | 6.3E-05 | 2.8E-04 |
| TK-104 | The Condensate Tanks are controlled by VCU-1 and emissions are represented at VCU-1 | | | | | | | | | | | | | | | | | |
| TK-105 | The Condensate Tanks are controlled by VCU-1 and emissions are represented at VCU-1 | | | | | | | | | | | | | | | | | |
| TK-106 | The Condensate Tanks are controlled by VCU-1 and emissions are represented at VCU-1 | | | | | | | | | | | | | | | | | |
| PWT-1 | - | - | - | - | 0.51 | 2.25 | - | - | - | - | - | - | - | - | 0.035 | 0.15 | 0.077 | 0.34 |
| PWT-2 | - | - | - | - | 0.51 | 2.25 | - | - | - | - | - | - | - | - | 0.035 | 0.15 | 0.077 | 0.34 |
| V2/F2 | The Dehy Flash Tank and Regen Vent is fully collected and routed back to facility inlet. | | | | | | | | | | | | | | | | | |
| FL-1 (pilot) | 0.027 | 0.12 | 0.054 | 0.24 | 1.4E-04 | 6.2E-04 | - | - | - | - | - | - | - | - | - | - | - | - |
| FL-1 (SSM) | 184.05 | 25.49 | 367.43 | 50.89 | 298.53 | 41.35 | 1,749.55 | 242.31 | - | - | - | - | - | - | 18.62 | 2.58 | 5.81 | 0.80 |
| VCU-1 | 0.19 | 0.27 | 0.38 | 0.53 | 1.07 | 0.86 | 2.07 | 1.62 | 0.0050 | 0.010 | 5.0E-03 | 0.010 | 5.0E-03 | 0.010 | 0.022 | 0.017 | 0.088 | 0.86 |
| FUG | - | - | - | - | 1.32 | 5.78 | - | - | - | - | - | - | - | - | 0.047 | 0.21 | 0.20 | 0.86 |
| L1 | - | - | - | - | 19.16 | 1.69 | - | - | - | - | - | - | - | - | 0.40 | 0.035 | 1.57 | 0.14 |
| L2 | | | | | 4.73 | 0.27 | - | - | - | - | - | - | - | - | 0.33 | 0.019 | 0.71 | 0.04 |
| SSM | - | - | - | - | | 0.24 | - | - | - | - | - | - | - | - | 0.090 | 0.012 | | 0.01 |
| **Total** | **211.12** | **143.49** | **378.16** | **96.77** | **330.19** | **73.74** | **1,751.66** | **244.10** | **0.62** | **2.72** | **0.62** | **2.72** | **0.62** | **2.72** | **19.57** | **3.18** | **10.38** | **11.49** |
| Totals w/o Fugitives | 211.12 | 143.49 | 378.16 | 96.77 | 328.87 | 67.96 | 1,751.66 | 244.10 | 0.62 | 2.72 | 0.62 | 2.72 | 0.62 | 2.72 | 19.52 | 2.97 | 10.18 | 10.63 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Title V Major Source Thresholds | | 100 | | 100 | | 100 | | 100 | | 100 | | 100 | | 100 | | 100 | | 25 |
| Less than Threshold? | | No | | Yes | | Yes | | No | | | | | | | | Yes | | Yes |
| PSD Major Source Thresholds | | 250 | | 250 | | 250 | | 250 | | 250 | | 250 | | 250 | | 250 | | |
| Less than Threshold? | | Yes | | Yes | | Yes | | Yes | | Yes | | Yes | | Yes | | Yes | | |

Note: For modeling purposes, L1, L2, and SSM will not occur within the same hour.
Note: Formaldehyde and Acetaldehyde are added into the VOC totals for the Engines.

**Frontier Field Services LLC**
**BKU Compressor Station**

## Emission Summary

**Uncontrolled Emissions**

| Unit | Formaldehyde | | Acetaldehyde | | Acrolein | |
|---|---|---|---|---|---|---|
| | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy |
| C-311 | 0.56 | 2.46 | 0.08 | 0.37 | 0.05 | 0.23 |
| C-312 | 0.56 | 2.46 | 0.08 | 0.37 | 0.05 | 0.23 |
| C-313 | 0.56 | 2.46 | 0.08 | 0.37 | 0.05 | 0.23 |
| C-314 | 0.56 | 2.46 | 0.08 | 0.37 | 0.05 | 0.23 |
| C-315 | 0.58 | 2.53 | 0.08 | 0.37 | 0.05 | 0.23 |
| C-316 | 0.58 | 2.53 | 0.08 | 0.37 | 0.05 | 0.23 |
| H-2 | 7.4E-05 | 3.2E-04 | - | - | - | - |
| H-3 | 5.9E-05 | 2.6E-04 | - | - | - | - |
| TK-104 | - | - | - | - | - | - |
| TK-105 | - | - | - | - | - | - |
| TK-106 | - | - | - | - | - | - |
| PWT-1 | - | - | - | - | - | - |
| PWT-2 | - | - | - | - | - | - |
| V2/F2 | - | - | - | - | - | - |
| FL-1 (pilot) | - | - | - | - | - | - |
| VCU-1 (pilot) | - | - | - | - | - | - |
| FUG | - | - | - | - | - | - |
| L1 | - | - | - | - | - | - |
| L2 | | | | | | |
| HAUL | - | - | - | - | - | - |
| SSM | - | - | - | - | - | - |
| Total | 3.40 | 14.90 | 0.51 | 2.22 | 0.31 | 1.36 |

**Controlled Emissions**

| Unit | Formaldehyde | | Acetaldehyde | | Acrolein | | Benzene | | Toluene | | Ethylbenzene | | Xylenes | | n-Hexane | | 2,2,4-TMP | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy |
| C-311 | 0.17 | 0.74 | 0.08 | 0.37 | 0.05 | 0.23 | 4.5E-03 | 0.02 | 4.1E-03 | 0.02 | 4.0E-04 | 1.8E-03 | 1.9E-03 | 0.01 | - | - | - | - |
| C-312 | 0.17 | 0.74 | 0.08 | 0.37 | 0.05 | 0.23 | 4.5E-03 | 0.02 | 4.1E-03 | 0.02 | 4.0E-04 | 1.8E-03 | 1.9E-03 | 0.01 | - | - | - | - |
| C-313 | 0.17 | 0.74 | 0.08 | 0.37 | 0.05 | 0.23 | 4.5E-03 | 0.02 | 4.1E-03 | 0.02 | 4.0E-04 | 1.8E-03 | 1.9E-03 | 0.01 | - | - | - | - |
| C-314 | 0.17 | 0.74 | 0.08 | 0.37 | 0.05 | 0.23 | 4.5E-03 | 0.02 | 4.1E-03 | 0.02 | 4.0E-04 | 1.8E-03 | 1.9E-03 | 0.01 | - | - | - | - |
| C-315 | 0.15 | 0.64 | 0.08 | 0.37 | 0.05 | 0.23 | 4.4E-03 | 0.02 | 4.1E-03 | 0.02 | 4.0E-04 | 1.8E-03 | 1.9E-03 | 0.01 | - | - | - | - |
| C-316 | 0.15 | 0.64 | 0.08 | 0.37 | 0.05 | 0.23 | 4.4E-03 | 0.02 | 4.1E-03 | 0.02 | 4.0E-04 | 1.8E-03 | 1.9E-03 | 0.01 | - | - | - | - |
| H-2 | 7.4E-05 | 3.2E-04 | - | - | - | - | 2.1E-06 | 9.0E-06 | 3.3E-06 | 1.5E-05 | - | - | - | - | - | - | - | - |
| H-3 | 5.9E-05 | 2.6E-04 | - | - | - | - | 1.6E-06 | 7.2E-06 | 2.7E-06 | 1.2E-05 | - | - | - | - | - | - | - | - |
| TK-104 | The Condensate Tanks are controlled by VCU-1 and emissions are represented at VCU-1 | | | | | | | | | | | | | | | | | |
| TK-105 | The Condensate Tanks are controlled by VCU-1 and emissions are represented at VCU-1 | | | | | | | | | | | | | | | | | |
| TK-106 | The Condensate Tanks are controlled by VCU-1 and emissions are represented at VCU-1 | | | | | | | | | | | | | | | | | |
| PWT-1 | - | - | - | - | - | - | 0.018 | 0.081 | 0.014 | 0.060 | 0.0015 | 0.0067 | 0.0016 | 0.007 | 0.036 | 0.16 | 0.005 | 0.022 |
| PWT-2 | - | - | - | - | - | - | 0.018 | 0.081 | 0.014 | 0.060 | 0.0015 | 0.0067 | 0.0016 | 0.007 | 0.036 | 0.16 | 0.005 | 0.022 |
| V2/F2 | The Dehy Flash Tank and Regen Vent is fully collected and routed back to facility inlet. | | | | | | | | | | | | | | | | | |
| FL-1 (pilot) | - | - | - | - | - | - | 0.0E+00 | 0.0E+00 | 0.0E+00 | 0.0E+00 | 0.0E+00 | 0.0E+00 | 0.0E+00 | 0.0E+00 | 0.0E+00 | 0.0E+00 | 0.0E+00 | 0.0E+00 |
| FL-1 (SSM) | - | - | - | - | - | - | 3.64 | 0.50 | 1.87 | 0.26 | 0.020 | 0.0028 | 0.17 | 0.023 | 0.11 | 0.015 | 0.0E+00 | 0.0E+00 |
| VCU-1 | - | - | - | - | - | - | 0.028 | 0.023 | 0.015 | 0.01 | 1.6E-03 | 1.3E-03 | 1.7E-03 | 1.4E-03 | 0.037 | 0.03 | 0.0050 | 4.2E-03 |
| FUG | - | - | - | - | - | - | 0.03 | 0.13 | 0.04 | 0.18 | 0.012 | 0.050 | 0.014 | 0.060 | 0.09 | 0.41 | 0.01 | 0.04 |
| L1 | - | - | - | - | - | - | 0.49 | 0.04 | 0.27 | 0.02 | 0.03 | 2.5E-03 | 0.03 | 2.6E-03 | 0.66 | 0.06 | 0.09 | 0.01 |
| L2 | - | - | - | - | - | - | 0.17 | 0.01 | 0.13 | 0.01 | 0.01 | 8.2E-04 | 0.02 | 8.6E-04 | 0.34 | 0.02 | 0.05 | 2.6E-03 |
| SSM | - | - | - | - | - | - | - | 3.2E-03 | - | 1.7E-03 | - | 5.7E-05 | - | 1.6E-04 | - | 1.1E-03 | - | 1.4E-04 |
| **Total** | **0.97** | **4.23** | **0.51** | **2.22** | **0.31** | **1.36** | **4.42** | **0.99** | **2.38** | **0.71** | **0.08** | **0.08** | **0.24** | **0.15** | **1.31** | **0.85** | **0.16** | **0.10** |
| Totals w/o Fugitives | 0.97 | 4.23 | 0.51 | 2.22 | 0.31 | 1.36 | 4.40 | 0.86 | 2.34 | 0.53 | 0.07 | 0.03 | 0.23 | 0.09 | 1.21 | 0.44 | 0.15 | 0.06 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Title V Major Source Thresholds | | 10 | | 10 | | 10 | | 10 | | 10 | | 10 | | 10 | | 10 | | 10 |
| Less than Threshold? | | Yes | | Yes | | Yes | | Yes | | Yes | | Yes | | Yes | | Yes | | Yes |
| PSD Major Source Thresholds | | | | | | | | | | | | | | | | | | |
| Less than Threshold? | | | | | | | | | | | | | | | | | | |

**Frontier Field Services LLC**
**BKU Compressor Station**
**Heaters/Boilers**

Emission Unit: **H-2**
Description: 1.0 MMBTU Reboiler

| | |
|---|---|
| Heater/Boiler rating (MMBtu/hr): | 1 |
| Flow Rate (dscfm): | 169.50 |
| Operating hours/year: | 8,760 |
| Fuel Heat Value, LHV (Btu/SCF): | 1020.0 |

| Pollutant [1] | emission factor (lb/MMCF) | lb/hr | tpy |
|---|---|---|---|
| VOC | 5.5 | 0.0054 | 0.024 |
| NOx | 100 | 0.10 | 0.43 |
| CO | 84 | 0.082 | 0.36 |
| PM | 7.6 | 0.0075 | 0.033 |
| Benzene | 2.10E-03 | 2.1E-06 | 9.0E-06 |
| Toluene | 3.40E-03 | 3.3E-06 | 1.5E-05 |
| Formaldehyde | 7.50E-02 | 7.4E-05 | 3.2E-04 |
| $SO_2$ | 0.6 | 5.9E-04 | 2.6E-03 |

1 External combustion emissions are calculated in accordance with AP-42 Section 1.4 (July 1998).
2 Factor per 40 CFR 40 Appx A Method 19 Table 19-2.

| Stack Parameters: | | |
|---|---|---|
| Height: | 16 | feet |
| Diameter: | 0.70 | feet |
| Temperature: | 620 | °F |
| Flow: | 722 | $ft^3$/min |
| Velocity: | 31.3 | ft/sec |

| GHG Emissions | emission factor (kg/MMBtu) | lb/hr | tpy |
|---|---|---|---|
| CO2 | 53.06 | 116.98 | 512.36 |
| N2O | 0.0001 | 2.2E-04 | 9.7E-04 |
| Methane | 0.001 | 2.2E-03 | 0.010 |

GHG Emissions Factors from 40 CFR Part 98, Subpart C

assumptions:

| | | |
|---|---|---|
| NO2 MW | 46 | lb/lb-mole |
| CO MW | 28 | lb/lb-mole |
| Ideal Gas Law | 385.22 | SCF/lb-mole |
| Stack O2 | 3 | % |
| $F_d$ [2] | 8710 | dscf/MMBtu |

Emission Unit: **H-3**
Description: Condensate Stabilizer

| | |
|---|---|
| Heater/Boiler rating (MMBtu/hr): | 0.8 |
| Flow Rate (dscfm): | 135.60 |
| Operating hours/year: | 8,760 |
| Fuel Heat Value, LHV (Btu/SCF): | 1020.0 |

| Pollutant [1] | emission factor (lb/MMCF) | lb/hr | tpy |
|---|---|---|---|
| VOC | 5.5 | 4.3E-03 | 0.019 |
| NOx | 100 | 0.078 | 0.34 |
| CO | 84 | 0.066 | 0.29 |
| PM | 7.6 | 0.0060 | 0.026 |
| Benzene | 2.10E-03 | 1.6E-06 | 7.2E-06 |
| Toluene | 3.40E-03 | 2.7E-06 | 1.2E-05 |
| Formaldehyde | 7.50E-02 | 5.9E-05 | 2.6E-04 |
| $SO_2$ | 0.6 | 4.7E-04 | 2.1E-03 |

1 External combustion emissions are calculated in accordance with AP-42 Section 1.4 (July 1998).
2 Factor per 40 CFR 40 Appx A Method 19 Table 19-2.

| Stack Parameters: | | |
|---|---|---|
| Height: | 23 | feet |
| Diameter: | 0.70 | feet |
| Temperature: | 620 | °F |
| Flow: | 578 | $ft^3$/min |
| Velocity: | 25.0 | ft/sec |

| GHG Emissions | emission factor (kg/MMBtu) | lb/hr | tpy |
|---|---|---|---|
| CO2 | 53.06 | 93.58 | 409.88 |
| N2O | 0.0001 | 1.8E-04 | 7.72E-04 |
| Methane | 0.001 | 1.8E-03 | 0.0077 |

GHG Emissions Factors from 40 CFR Part 98, Subpart C

assumptions:

| | | |
|---|---|---|
| NO2 MW | 46 | lb/lb-mole |
| CO MW | 28 | lb/lb-mole |
| Ideal Gas Law | 385.22 | SCF/lb-mole |
| Stack O2 | 3 | % |
| $F_d$ [2] | 8710 | dscf/MMBtu |

**Frontier Field Services LLC**
**BKU Compressor Station**
**Compressor Engines**

| | | |
|---|---|---|
| Emission unit number(s): | C-311, C-312, C-313, C-314 | |
| Source description: | Caterpillar G3516LE | |
| Manufacturer: | Caterpillar | |
| Model: | G3516LE | |
| Type: | 4SLB | |
| Emission Control: | oxidation | |
| Number of Engines: | 4 | |
| Horsepower (HP): | 1340 | Engine HP Rating / Spec Sheet |
| Max Engine RPM: | 1400 | Vendor Catalyst Spec Sheet |
| Fuel Consumption (Btu/hp-hr): | 7548 | Engine Spec Sheet |
| Annual Operating Hours: | 8760 | |

| Stack Parameters: | C-311 | C-312 | C-313 | C-314 | |
|---|---|---|---|---|---|
| Height (ft): | 35.0 | 35.0 | 35.0 | 35.0 | Stack Parameter |
| Diameter (ft): | 0.90 | 0.90 | 0.90 | 0.90 | Stack Parameter |
| Temperature (°F): | 851 | 851 | 851 | 851 | Vendor Catalyst Spec Sheet |
| Flow (ACFM): | 7,651 | 7,651 | 7,651 | 7,651 | Vendor Catalyst Spec Sheet |
| Velocity (ft/s): | 200.44 | 200.44 | 200.44 | 200.44 | Calculated |

| Fuel Parameters | All Engines | |
|---|---|---|
| Fuel Type: | Natural Gas | |
| Fuel LHV: | 1020 | Btu/scf |
| Fuel Sulfur Content: | 0.002 | grains/dscf |
| Hourly Fuel Flow Rate: | 0.010 | MMSCF/hr |
| Annual Fuel Flow Rate: | 86.86 | MMSCF/yr |

| Emissions | NOx | | CO | | VOC | | TSP/PM10/PM2.5 | | SO2 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Uncontrolled Emission Factor: | 2 | g/hp-hr | 1.83 | g/hp-hr | 0.3 | g/hp-hr | 0.0099871 | lb/MMBtu | 0.000588 | lb/MMBtu |
| Uncontrolled Emissions: | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy |
| | 5.91 | 25.88 | 5.41 | 23.68 | 0.89 | 3.88 | 0.10 | 0.44 | 0.0059 | 0.026 |
| Control Efficiency: | 0% | | 70% | | 50% | | 0% | | 0% | |
| Controlled Emission Factor: | 2 | g/hp-hr | 0.55 | g/hp-hr | 0.15 | g/hp-hr | 0.0099871 | lb/MMBtu | 0.000588 | lb/MMBtu |
| Controlled Emissions: | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy |
| | 5.91 | 25.88 | 1.62 | 7.12 | 0.44 | 1.94 | 0.10 | 0.44 | 0.0059 | 0.026 |

Emissions basis:
NOx, CO, VOC, formaldehyde - manufacturer specifications

PM, SO2, and remaining HAPs - AP-42, Chapter 3, Table 3.2-2

| | Hazardous Air Pollutants | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Emissions | Formaldehyde | | Benzene | | Acetaldehyde | | Acrolein | | Ethylbenzene | | Toluene | | Xylene | | Total HAPs | |
| Uncontrolled Emission Factor: | 0.19 | g/hp-hr | 0.00044 | lb/MMBtu | 0.00836 | lb/MMBtu | 0.00514 | lb/MMBtu | 0.0000397 | lb/MMBtu | 0.000408 | lb/MMBtu | 0.000184 | lb/MMBtu | Uncontrolled | |
| Uncontrolled Emissions: | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy |
| | 0.56 | 2.46 | 4.5E-03 | 0.019 | 0.085 | 0.37 | 0.052 | 0.23 | 4.0E-04 | 1.8E-03 | 4.1E-03 | 0.018 | 1.9E-03 | 0.0082 | 0.71 | 3.10 |
| Control Efficiency: | 70% | | 0% | | 0% | | 0% | | 0% | | 0% | | 0% | | | |
| Controlled Emission Factor: | 0.057 | g/hp-hr | 0.00044 | lb/MMBtu | 0.00836 | lb/MMBtu | 0.00514 | lb/MMBtu | 0.0000397 | lb/MMBtu | 0.000408 | lb/MMBtu | 0.000184 | lb/MMBtu | Controlled | |
| Controlled Emissions: | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy |
| | 0.17 | 0.74 | 4.5E-03 | 0.019 | 0.085 | 0.37 | 0.052 | 0.23 | 4.0E-04 | 1.8E-03 | 4.1E-03 | 0.018 | 1.9E-03 | 0.0082 | 0.32 | 1.38 |

| GHG Emissions Calculations | CO2 | | N2O | | Methane | |
|---|---|---|---|---|---|---|
| Emission Factor: | 53.06 | kg/MMBtu | 0.0001 | kg/MMBtu | 0.001 | kg/MMBtu |
| Calculated Emissions: | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy |
| | 1183.13 | 5182.12 | 2.2E-03 | 0.010 | 0.022 | 0.10 |

GHG Emissions Factors from 40 CFR Part 98, Subpart C

Note: Formaldehyde and Acetaldehyde are added into the total VOC emissions in the Emissions Summary Table and Table 2s.

**Frontier Field Services LLC**
**BKU Compressor Station**
**Compressor Engines**

| | | |
|---|---|---|
| Emission unit number(s): | C-315, C-316 | |
| Source description: | Caterpillar G3516B | |
| Manufacturer: | Caterpillar | |
| Model: | G3516B | |
| Type: | 4SLB | |
| Emission Control: | oxidation | |
| Number of Engines: | 2 | |
| Horsepower (HP): | 1380 | Engine HP Rating / Spec Sheet |
| Max Engine RPM: | 1400 | Vendor Catalyst Spec Sheet |
| Fuel Consumption (Btu/hp-hr): | 7301 | Engine Spec Sheet |
| Annual Operating Hours: | 8760 | |

| Stack Parameters: | C-315 | C-316 | |
|---|---|---|---|
| Height (ft): | 35.0 | 35.0 | Stack Parameter |
| Diameter (ft): | 1.10 | 1.10 | Stack Parameter |
| Temperature (°F): | 870 | 870 | Vendor Catalyst Spec Sheet |
| Flow (ACFM): | 7,343 | 7,343 | Vendor Catalyst Spec Sheet |
| Velocity (ft/s): | 128.78 | 128.78 | Calculated |

| Fuel Parameters | All Engines | |
|---|---|---|
| Fuel Type: | Natural Gas | |
| Fuel LHV: | 1020 | Btu/scf |
| Fuel Sulfur Content: | 0.002 | grains/dscf |
| Hourly Fuel Flow Rate: | 0.010 | MMSCF/hr |
| Annual Fuel Flow Rate: | 86.53 | MMSCF/yr |

| Emissions | NOx | | CO | | VOC | | TSP/PM10/PM2.5 | | SO2 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Uncontrolled Emission Factor: | 0.5 | g/hp-hr | 2.4 | g/hp-hr | 0.5 | g/hp-hr | 0.0099871 | lb/MMBtu | 0.000588 | lb/MMBtu |
| Uncontrolled Emissions: | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy |
| | 1.52 | 6.66 | 7.30 | 31.98 | 1.52 | 6.66 | 0.10 | 0.44 | 0.0059 | 0.026 |
| Control Efficiency: | 0% | | 75% | | 64% | | 0% | | 0% | |
| Controlled Emission Factor: | 0.5 | g/hp-hr | 0.6 | g/hp-hr | 0.18 | g/hp-hr | 0.0099871 | lb/MMBtu | 0.000588 | lb/MMBtu |
| Controlled Emissions: | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy |
| | 1.52 | 6.66 | 1.83 | 8.00 | 0.55 | 2.40 | 0.10 | 0.44 | 0.0059 | 0.026 |

Emissions basis:
NOx, CO, VOC, formaldehyde - manufacturer specifications

PM, SO2, and remaining HAPs - AP-42, Chapter 3, Table 3.2-2

| | Hazardous Air Pollutants | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Emissions | Formaldehyde | | Benzene | | Acetaldehyde | | Acrolein | | Ethylbenzene | | Toluene | | Xylene | | Total HAPs | |
| Uncontrolled Emission Factor: | 0.19 | g/hp-hr | 0.00044 | lb/MMBtu | 0.00836 | lb/MMBtu | 0.00514 | lb/MMBtu | 0.0000397 | lb/MMBtu | 0.000408 | lb/MMBtu | 0.000184 | lb/MMBtu | Uncontrolled | |
| Uncontrolled Emissions: | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy |
| | 0.58 | 2.53 | 4.4E-03 | 0.019 | 0.084 | 0.37 | 0.052 | 0.23 | 4.0E-04 | 1.8E-03 | 4.1E-03 | 0.018 | 1.9E-03 | 0.0081 | 0.72 | 3.17 |
| Control Efficiency: | 75% | | 0% | | 0% | | 0% | | 0% | | 0% | | 0% | | | |
| Controlled Emission Factor: | 0.048 | g/hp-hr | 0.00044 | lb/MMBtu | 0.00836 | lb/MMBtu | 0.00514 | lb/MMBtu | 0.0000397 | lb/MMBtu | 0.000408 | lb/MMBtu | 0.000184 | lb/MMBtu | Controlled | |
| Controlled Emissions: | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy |
| | 0.15 | 0.64 | 4.4E-03 | 0.019 | 0.084 | 0.37 | 0.052 | 0.23 | 4.0E-04 | 1.8E-03 | 4.1E-03 | 0.018 | 1.9E-03 | 0.0081 | 0.29 | 1.28 |

| GHG Emissions Calculations | CO2 | | N2O | | Methane | |
|---|---|---|---|---|---|---|
| Emission Factor: | 53.06 | kg/MMBtu | 0.0001 | kg/MMBtu | 0.001 | kg/MMBtu |
| Calculated Emissions: | lb/hr | tpy | lb/hr | tpy | lb/hr | tpy |
| | 1178.58 | 5162.17 | 2.2E-03 | 0.010 | 0.022 | 0.10 |

GHG Emissions Factors from 40 CFR Part 98, Subpart C

Note: Formaldehyde and Acetaldehyde are added into the total VOC emissions in the Emissions Summary Table and Table 2s.

**Frontier Field Services LLC**
**BKU Compressor Station**

# Uncontrolled Condensate Tank Emissions

Unit(s): TK-104, TK-105, TK106

| Total Condensate Throughput (bbl/d) | Number of Tanks | Operation Hours | Emissions Controlled (Yes/No) | Control Type (Flare, VRU, etc) |
|---|---|---|---|---|
| 82.19 | 3 | 8,760 | Yes | Vapor Combustor |

| Component | Total Hourly Emissions | | Total Annual Emissions | |
|---|---|---|---|---|
| | Uncontrolled Condensate Tanks (lb/hr) | | Uncontrolled Condensate Tanks (tpy) | |
| | Flash | W&B | Flash | W&B |
| Nitrogen | 0.15 | 0.010 | 0.64 | 0.044 |
| Methane | 0.23 | 0.058 | 1.00 | 0.25 |
| Ethane | 0.49 | 0.28 | 2.13 | 1.22 |
| Propane | 1.83 | 1.02 | 8.04 | 4.48 |
| i-Butane | 0.43 | 0.24 | 1.90 | 1.04 |
| n-Butane | 1.17 | 0.64 | 5.15 | 2.78 |
| i-Pentane | 0.52 | 0.27 | 2.26 | 1.20 |
| n-Pentane | 0.58 | 0.30 | 2.53 | 1.33 |
| Other hexanes | 0.35 | 0.18 | 1.52 | 0.79 |
| n-Hexane | 0.21 | 0.11 | 0.92 | 0.47 |
| Hydrogen Sulfide | 0.11 | 0.065 | 0.50 | 0.28 |
| Carbon Dioxide | 0.028 | 0.016 | 0.12 | 0.07 |
| Heptane | 0.32 | 0.16 | 1.41 | 0.70 |
| Octane | 0.11 | 0.053 | 0.48 | 0.23 |
| n-Nonane | 0.012 | 0.0056 | 0.052 | 0.024 |
| n-Decane | 1.9E-04 | 8.1E-05 | 8.3E-04 | 3.5E-04 |
| m-Xylene | 0.010 | 4.8E-03 | 0.043 | 0.021 |
| Ethylbenzene | 0.0094 | 4.6E-03 | 0.041 | 0.020 |
| Toluene | 0.089 | 0.044 | 0.39 | 0.19 |
| 2,2,4-Trimethylpentane | 0.029 | 0.014 | 0.13 | 0.063 |
| Benzene | 0.16 | 0.080 | 0.69 | 0.35 |
| **Total** | **6.83** | **3.56** | **29.93** | **15.58** |
| **Total VOC** | **5.83** | **3.13** | **25.54** | **13.70** |
| **Total HAP** | **0.50** | **0.26** | **2.20** | **1.12** |

**Footnotes:**

[a] Uncontrolled stream properties determined via ProMax.

**Frontier Field Services LLC**
**BKU Compressor Station**

# Uncontrolled Water Tank Emissions

Unit(s): PWT-1, PWT-2

| Total Condensate Throughput (bbl/d) | Number of Tanks | Operation Hours | Emissions Controlled (Yes/No) | Control Type (Flare, VRU, etc) |
|---|---|---|---|---|
| 53.33 | 2 | 8,760 | No | None |

| Component | Total Hourly Emissions | | Total Annual Emissions | |
|---|---|---|---|---|
| | Uncontrolled Water Tanks (lb/hr) | | Uncontrolled Water Tanks (tpy) | |
| | Flash | W&B | Flash | W&B |
| Nitrogen | 4.9E-04 | 5.0E-04 | 2.2E-03 | 2.2E-03 |
| Methane | 5.5E-04 | 1.3E-03 | 2.4E-03 | 5.5E-03 |
| Ethane | 1.2E-03 | 0.0065 | 5.4E-03 | 0.028 |
| Propane | 5.8E-03 | 0.062 | 0.025 | 0.27 |
| i-Butane | 1.5E-03 | 0.04 | 6.4E-03 | 0.16 |
| n-Butane | 3.9E-03 | 0.14 | 0.017 | 0.60 |
| i-Pentane | 1.8E-03 | 0.14 | 7.7E-03 | 0.63 |
| n-Pentane | 2.0E-03 | 0.21 | 8.7E-03 | 0.90 |
| Other hexanes | 1.2E-03 | 0.12 | 5.2E-03 | 0.53 |
| n-Hexane | 7.2E-04 | 0.072 | 3.1E-03 | 0.32 |
| Water | 4.8E-04 | 0.046 | 2.1E-03 | 0.20 |
| Hydrogen Sulfide | 6.6E-04 | 0.070 | 2.9E-03 | 0.31 |
| Carbon Dioxide | 8.5E-06 | 2.9E-04 | 3.7E-05 | 1.3E-03 |
| Heptane | 1.1E-03 | 0.11 | 4.8E-03 | 0.48 |
| Octane | 3.8E-04 | 0.036 | 1.7E-03 | 0.16 |
| n-Nonane | 4.0E-05 | 3.7E-03 | 1.8E-04 | 0.016 |
| n-Decane | 6.4E-07 | 5.4E-05 | 2.8E-06 | 2.4E-04 |
| m-Xylene | 3.4E-05 | 3.2E-03 | 1.5E-04 | 0.014 |
| Ethylbenzene | 3.2E-05 | 3.0E-03 | 1.4E-04 | 0.013 |
| Toluene | 2.8E-04 | 0.027 | 1.2E-03 | 0.12 |
| 2,2,4-Trimethylpentane | 9.9E-05 | 0.010 | 4.3E-04 | 0.043 |
| Benzene | 3.6E-04 | 0.037 | 1.6E-03 | 0.16 |
| **Total** | **0.023** | **1.13** | **0.10** | **4.96** |
| **Total VOC** | **0.019** | **1.01** | **0.084** | **4.42** |
| **Total HAP** | **0.0015** | **0.15** | **0.0066** | **0.67** |

**Footnotes:**

[a] Uncontrolled stream properties determined via ProMax.

**Frontier Field Services LLC**
**BKU Compressor Station**

Emission unit number: L1
Source description: Condensate Loading

Condensate Production: 82.19 bbl/day
Condensate Production: 30,000 bbl/yr
Max Loading Rate: 7560 gallons/hr
*Note that condensate loading will not occur while water loading is happening.

**Equation[1]:**

$$L_L = \frac{12.46 * SPM}{T}$$

**Variables[1]:**
$L_L$ - Loading Loss (lbs/1000 gal loaded)
S - Saturation Factor (From Table 5.2-1 of AP-42, Section 5.2)
P - True Vapor Pressure of Loaded Liquid (psia)
M - Molecular Weight of Vapor (lb/lb mol)
T- Temperature of Bulk Liquid ( °R = [°F + 460] )

1. Emissions calculated using the loading loss equation and variables from AP-42 Chapter 5.2, Transportation and Marketing of Petroleum Liquids

**Maximum Hourly Emission Estimate**

| Condensate Loading | Saturation Factor S [2] | True Vapor Pressure psia[3] | Mole Weight lb/lb-mol | Maximum Temperature | | Loading Loss lb/1000 gallon | Hourly Loading Rate gallons/hr | Total Emissions lb/hr | Capture Efficiency[1] % | Emissions To Atmosphere lbs/hr |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Deg F | Deg R | | | | | |
| Submerged loading: dedicated vapor balance | 1.0 | 8.284 | 51.61 | 95.00 | 554.57 | 9.61 | 7,560 | 72.62 | 70.0% | 21.79 |

**Average Annual Emission Estimate**

| Condensate Loading | Saturation Factor S [2] | True Vapor Pressure psia[3] | Mole Weight lb/lb-mol | Average Temperature | | Loading Loss lb/1000 gallon | Annual Loading Rate gallons/year | Total Emissions tons/year | Capture Efficiency[1] % | Emissions To Atmosphere tons/year |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Deg F | Deg R | | | | | |
| Submerged loading: dedicated vapor balance | 1.0 | 8.284 | 51.61 | 65.00 | 524.57 | 10.16 | 1,260,000 | 6.40 | 70.0% | 1.92 |

[1] From TCEQ guidance document "Air Permit Technical Guidance for New Source Review Loading Operations", APD-ID 3v1, February 2021" for loading to trucks with no leak test certification
[2] Submerged loading: dedicated vapor balance service
[3] True Vapor Pressure calculated in ProMax

| Component | Oil W&B | Total Speciated Vapors Captured During Loading | | Total Speciated Vapors Uncaptured During Loading | |
|---|---|---|---|---|---|
| | Wt% | lb/hour | tons/year | lb/hour | tons/year |
| Hydrogen Sulfide | 1.82 | 0.92 | 0.081 | 0.40 | 0.035 |
| Nitrogen | 0.28 | 0.14 | 0.013 | 0.06 | 0.0054 |
| Methane | 1.62 | 0.83 | 0.073 | 0.35 | 0.031 |
| Carbon Dioxide | 0.46 | 0.24 | 0.021 | 0.10 | 0.0089 |
| Ethane | 7.85 | 3.99 | 0.35 | 1.71 | 0.15 |
| Propane | 28.78 | 14.63 | 1.29 | 6.27 | 0.55 |
| Isobutane | 6.67 | 3.39 | 0.30 | 1.45 | 0.13 |
| Butane | 17.87 | 9.09 | 0.80 | 3.89 | 0.34 |
| Isopentane | 7.68 | 3.90 | 0.34 | 1.67 | 0.15 |
| Pentane | 8.53 | 4.34 | 0.38 | 1.86 | 0.16 |
| i-Hexane | 5.06 | 2.57 | 0.23 | 1.10 | 0.10 |
| Hexane | 3.01 | 1.53 | 0.13 | 0.66 | 0.058 |
| Benzene | 2.26 | 1.15 | 0.10 | 0.49 | 0.043 |
| Cyclohexane | | | | | |
| i-Heptane | 4.51 | 2.29 | 0.20 | 0.98 | 0.09 |
| n-Heptane | | | | | |
| Toluene | 1.25 | 0.64 | 0.06 | 0.27 | 0.024 |
| i-Octane | 1.50 | 0.76 | 0.07 | 0.33 | 0.029 |
| n-Octane | | | | | |
| Ethylbenzene | 0.13 | 0.065 | 0.0057 | 0.028 | 2.5E-03 |
| m-Xylene | 0.13 | 0.068 | 0.0060 | 0.029 | 2.6E-03 |
| o-Xylene | | | | | |
| 2,2,4-Trimethylpentane | 0.41 | 0.21 | 0.018 | 0.089 | 0.0078 |
| Nonane | 0.16 | 0.080 | 0.0070 | 0.034 | 3.0E-03 |
| Decane | 2.3E-03 | 1.2E-03 | 1.0E-04 | 4.9E-04 | 4.3E-05 |
| Cyclopentene | | | | | |
| Water | | | | | |
| **TOTAL** | 100.00 | 50.84 | 4.48 | 21.79 | 1.92 |
| **Total VOC** | 87.96 | 44.71 | 3.94 | 19.16 | 1.69 |
| **Total HAPs** | 7.19 | 3.65 | 0.55 | 1.57 | 0.14 |

Emissions from condensate loading are controlled by the vapor combustor (VCU) with a 98% DRE.

**Frontier Field Services LLC**
**BKU Compressor Station**

Emission unit number: L2
Source description: Water Loading

Condensate Production: 53.33 bbl/day
Condensate Production: 19,465 bbl/yr
Max Loading Rate: 7560 gallons/hr
*Note that water loading will not occur while condensate loading is happening.

**Equation[1]:**

$$L_L = \frac{12.46 * SPM}{T}$$

**Variables[1]:**
$L_L$ - Loading Loss (lbs/1000 gal loaded)
S - Saturation Factor (From Table 5.2-1 of AP-42, Section 5.2)
P - True Vapor Pressure of Loaded Liquid (psia)
M - Molecular Weight of Vapor (lb/lb mol)
T- Temperature of Bulk Liquid ( °R = [°F + 460] )

1. Emissions calculated using the loading loss equation and variables from AP-42 Chapter 5.2, Transportation and Marketing of Petroleum Liquids

**Maximum Hourly Emission Estimate**

| Condensate Loading | Saturation Factor [2] S | True Vapor Pressure psia[3] | Mole Weight lb/lb-mol | Maximum Temperature Deg F | Maximum Temperature Deg R | Loading Loss lb/1000 gallon | Hourly Loading Rate gallons/hr | Water Content Reduction[4] % | Total Emissions lb/hr | Capture Efficiency[1] % | Emissions To Atmosphere lbs/hr |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Submerged loading: dedicated normal service | 0.6 | 8.284 | 60.43 | 95.00 | 554.57 | 6.75 | 7,560 | 90.00% | 5.10 | 0.0% | 5.10 |

**Average Annual Emission Estimate**

| Condensate Loading | Saturation Factor [2] S | True Vapor Pressure psia[3] | Mole Weight lb/lb-mol | Average Temperature Deg F | Average Temperature Deg R | Loading Loss lb/1000 gallon | Annual Loading Rate gallons/year | Water Content Reduction[4] % | Total Emissions tons/year | Capture Efficiency[1] % | Emissions To Atmosphere tons/year |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Submerged loading: dedicated normal service | 0.6 | 8.284 | 60.43 | 65.00 | 524.57 | 7.13 | 817,549 | 90.00% | 0.29 | 0.0% | 0.29 |

[1] Produced Water Loading is not controlled.
[2] Submerged loading, dedicated normal service.
[3] True Vapor Pressure calculated in ProMax for condensate
[4] If the volume of liquids loaded includes a percentage of water, the percentage of water is removed from the overall emissions. Water Content of loaded stream is over 90%, but conservatively use only 90% water content of the load vapors

| Component | Water W&B[5] Wt% | Total Speciated Vapors Captured During Loading lb/hour | Total Speciated Vapors Captured During Loading tons/year | Total Speciated Vapors Uncaptured During Loading lb/hour | Total Speciated Vapors Uncaptured During Loading tons/year |
|---|---|---|---|---|---|
| Hydrogen Sulfide | 6.45 | | | 0.33 | 0.019 |
| Nitrogen | 0.046 | | | 2.3E-03 | 1.3E-04 |
| Methane | 0.12 | | | 0.0059 | 3.4E-04 |
| Carbon Dioxide | 0.03 | | | 1.4E-03 | 7.9E-05 |
| Ethane | 0.59 | | | 0.030 | 1.7E-03 |
| Propane | 5.72 | | | 0.29 | 0.017 |
| Isobutane | 3.28 | | | 0.17 | 0.010 |
| Butane | 12.70 | | | 0.65 | 0.037 |
| Isopentane | 13.33 | | | 0.68 | 0.039 |
| Pentane | 18.90 | | | 0.96 | 0.055 |
| i-Hexane | 11.19 | | | 0.57 | 0.033 |
| Hexane | 6.65 | | | 0.34 | 0.019 |
| Benzene | 3.37 | | | 0.17 | 0.010 |
| Cyclohexane | | | | | |
| i-Heptane | 9.98 | | | 0.51 | 0.029 |
| n-Heptane | | | | | |
| Toluene | 2.51 | | | 0.13 | 0.007 |
| i-Octane | 3.32 | | | 0.17 | 0.010 |
| n-Octane | | | | | |
| Ethylbenzene | 0.28 | | | 0.014 | 8.2E-04 |
| m-Xylene | 0.30 | | | 0.015 | 8.6E-04 |
| o-Xylene | | | | | |
| 2,2,4-Trimethylpentane | 0.90 | | | 0.046 | 2.6E-03 |
| Nonane | 0.34 | | | 0.018 | 1.0E-03 |
| Decane | 5.0E-03 | | | 2.5E-04 | 1.5E-05 |
| Cyclopentene | | | | | |
| Water | | | | | |
| Piperazine | | | | | |
| TEG | | | | | |
| Oxygen | | | | | |
| **TOTAL** | 100.00 | 0.00 | 0.00 | 5.10 | 0.29 |
| **Total VOC** | 92.77 | 0.00 | 0.00 | 4.73 | 0.27 |
| **Total HAPs** | 21.82 | 0.00 | 0.00 | 0.71 | 0.041 |

[5] Vapor Speciation from ProMax Water W&B stream, removing the water and renormalizing the stream to 100% speciation.

**Frontier Field Services LLC**
**BKU Compressor Station**

## Vapor Combustor (VCU-1) - Hourly Emissions

Emission Unit: VCU-1
Source Description: Vapor Combustor

| Maximum Hourly Emission Rates and Composition to Vapor Combustor | | | | | | |
|---|---|---|---|---|---|---|
| Component | Pilot[b] | Captured Condensate Loading Vapors | Condensate Tanks | Total | Destruction Efficiency | Vapor Combustor Exhaust (controlled) |
| | (lb/hr) | (lb/hr) | (lb/hr) | (lb/hr) | (%) | (lb/hr) |
| Nitrogen | 0.39 | 0.14 | 0.16 | 0.69 | 0% | **0.69** |
| Methane | 6.13 | 0.83 | 0.28 | 7.24 | 98% | **0.14** |
| Ethane | 0.12 | 3.99 | 0.77 | 4.88 | 98% | **0.10** |
| Propane | 0.0066 | 14.63 | 2.86 | 17.50 | 98% | **0.35** |
| i-Butane | 2.3E-04 | 3.39 | 0.67 | 4.06 | 98% | **0.08** |
| n-Butane | 2.3E-04 | 9.09 | 1.81 | 10.90 | 98% | **0.22** |
| i-Pentane | 0.0E+00 | 3.90 | 0.79 | 4.69 | 98% | **0.09** |
| n-Pentane | 0.0E+00 | 4.34 | 0.88 | 5.22 | 98% | **0.10** |
| Other hexanes | 0.0E+00 | 2.57 | 0.53 | 3.10 | 98% | **0.06** |
| n-Hexane | 0.0E+00 | 1.53 | 0.32 | 1.85 | 98% | **0.037** |
| Water | 0.0E+00 | 0.0E+00 | 0.0E+00 | 0.0E+00 | 0% | **0.0E+00** |
| Hydrogen Sulfide | 0.0E+00 | 0.92 | 0.18 | 1.10 | 98% | **0.02** |
| Carbon Dioxide | 0.0E+00 | 0.24 | 0.045 | 0.28 | 0% | **0.28** |
| Heptane | 0.0E+00 | 2.29 | 0.48 | 2.78 | 98% | **0.06** |
| Octane | 0.0E+00 | 0.76 | 0.16 | 0.93 | 98% | **0.02** |
| n-Nonane | 0.0E+00 | 0.080 | 0.017 | 0.10 | 98% | **1.9E-03** |
| n-Decane | 0.0E+00 | 1.2E-03 | 2.7E-04 | 1.4E-03 | 98% | **2.8E-05** |
| m-Xylene | 0.0E+00 | 0.068 | 0.015 | 0.083 | 98% | **1.7E-03** |
| Ethylbenzene | 0.0E+00 | 0.065 | 0.014 | 0.079 | 98% | **1.6E-03** |
| Toluene | 0.0E+00 | 0.64 | 0.13 | 0.77 | 98% | **0.015** |
| 2,2,4-Trimethylpentane | 0.0E+00 | 0.21 | 0.04 | 0.25 | 98% | **5.0E-03** |
| Methylcyclohexane | 0.0E+00 | 0.0E+00 | 0.0E+00 | 0.0E+00 | 98% | **0.0E+00** |
| Cyclohexane | 0.0E+00 | 0.0E+00 | 0.0E+00 | 0.0E+00 | 98% | **0.0E+00** |
| Benzene | 0.0E+00 | 1.15 | 0.24 | 1.39 | 98% | **0.028** |
| **Total** | **6.64** | **50.84** | **10.39** | **67.86** | -- | **2.31** |
| **Total VOC** | **0.01** | **44.71** | **8.96** | **53.68** | -- | **1.07** |
| **Total HAP** | **0.00** | **3.65** | **0.76** | **4.41** | -- | **0.088** |
| **Heating Value (Btu/scf)** | 981 | 2,622 | 2,622 | **2,119** | | |
| **Molecular Weight** | 17.04 | 51.61 | 51.61 | **46.70** | | |
| **Operating Hours** | 8,760 | 365 | 8,760 | -- | | |
| **Mass Flow** | 6.64 | 50.84 | 10.39 | -- | | |
| **Volumetric Flow (scf/hr)** | 200.00 | 373.78 | 78.57 | **652.36** | | |
| **Heat Release (MMBtu/hr)** | 0.20 | 0.98 | 0.21 | **1.38** | | |

| Criteria Pollutant Emissions from Vapor Combustor | | | |
|---|---|---|---|
| Component | Emission Rate | Emission Factor | Emission Factor Units |
| | (lb/hr) | | |
| **$NO_x$** | 0.19 | 0.138 | lb/MMBtu |
| **CO** | 0.38 | 0.2755 | lb/MMBtu |
| **$SO_2$** | 2.07 | -- | -- |
| **$PM_{10}$** | 5.0E-03 | 7.60 | lb/MMscf |
| **$PM_{2.5}$** | 5.0E-03 | 7.60 | lb/MMscf |
| **$H_2S$** | 0.022 | -- | -- |

| Vapor Combustor Parameters | |
|---|---|
| VCU Destruction Efficiency | 98% |
| H2S molecular weight | 34.08 |
| SO2 molecular weight | 64.06 |

| | Emission Factor | Emissions | |
|---|---|---|---|
| GHG Emissions | kg/MMBtu | lb/hr | TPY |
| CO2 | 53.06 | 161.68 | 226.99 |
| N2O | 0.0001 | 3.0E-04 | 4.3E-04 |
| Methane | 0.001 | 3.0E-03 | 0.57 |

GHG Emissions Factors from 40 CFR Part 98, Subpart C

Includes the addition of methane from VCU Annual emissions table

| Combustion Emissions from Vapor Combustor | | | | Totals |
|---|---|---|---|---|
| | (lb/hr) | (lb/hr) | (lb/hr) | (lb/hr) |
| **Total $NO_x$** | **0.03** | **0.14** | **0.028** | **0.19** |
| **Total CO** | **0.05** | **0.27** | **0.057** | **0.38** |
| **Total $SO_2$** | **0.0E+00** | **1.74** | **0.34** | **2.07** |
| **Total $PM_{10}$** | **1.5E-03** | **2.8E-03** | **6.0E-04** | **5.0E-03** |
| **Total $PM_{2.5}$** | **1.5E-03** | **2.8E-03** | **6.0E-04** | **5.0E-03** |

**Footnotes:**

[a] Pilot fuel gas emissions are conservatively calculated based on a 200 scfh flow rate.

b NOx and CO emission factors from TCEQ Air Permit Technical Guidance for Flares and Vapor Oxidizers, high btu. PM and PM2.5 emission factors from AP-42, Table 1.4-1 and 1.4-2, July 1998. SO2 emissions assume 100% conversion of H2S to SO2.

**Frontier Field Services LLC**
**BKU Compressor Station**

## Vapor Combustor (VCU-1) - Annual Emissions

Emission Unit: VCU-1
Source Description: Vapor Combustor

| Annual Emission Rates and Composition to Vapor Combustora,b | | | | | | |
|---|---|---|---|---|---|---|
| Component | Pilot[b] | Captured Condensate Loading Vapors | Condensate Tanks | Total | Destruction Efficiency | Exhaust Stream (controlled) |
| | (ton/yr) | (ton/yr) | (ton/yr) | (ton/yr) | (%) | (ton/yr) |
| Nitrogen | 1.70 | 0.013 | 0.68 | 2.39 | 0% | **2.39** |
| Methane | 26.83 | 0.073 | 1.25 | 28.16 | 98% | **0.56** |
| Ethane | 0.51 | 0.35 | 3.36 | 4.22 | 98% | **0.084** |
| Propane | 0.03 | 1.29 | 12.52 | 13.84 | 98% | **0.28** |
| i-Butane | 1.0E-03 | 0.30 | 2.94 | 3.24 | 98% | **0.065** |
| n-Butane | 1.0E-03 | 0.80 | 7.93 | 8.73 | 98% | **0.17** |
| i-Pentane | 0.0E+00 | 0.34 | 3.45 | 3.80 | 98% | **0.076** |
| n-Pentane | 0.0E+00 | 0.38 | 3.86 | 4.24 | 98% | **0.085** |
| Other hexanes | 0.0E+00 | 0.23 | 2.31 | 2.54 | 98% | **0.051** |
| n-Hexane | 0.0E+00 | 0.13 | 1.39 | 1.52 | 98% | **0.030** |
| Water | 0.0E+00 | 0.0E+00 | 0.0E+00 | 0.0E+00 | 0% | **0.0E+00** |
| Hydrogen Sulfide | 0.0E+00 | 0.081 | 0.78 | 0.86 | 98% | **0.017** |
| Carbon Dioxide | 0.0E+00 | 0.021 | 0.20 | 0.22 | 0% | **0.22** |
| Heptane | 0.0E+00 | 0.20 | 2.11 | 2.32 | 98% | **0.046** |
| Octane | 0.0E+00 | 0.067 | 0.72 | 0.78 | 98% | **0.016** |
| n-Nonane | 0.0E+00 | 0.0070 | 0.076 | 0.083 | 98% | **1.66E-03** |
| n-Decane | 0.0E+00 | 1.0E-04 | 1.2E-03 | 1.3E-03 | 98% | **2.57E-05** |
| m-Xylene | 0.0E+00 | 6.0E-03 | 0.064 | 0.070 | 98% | **1.41E-03** |
| Ethylbenzene | 0.0E+00 | 5.7E-03 | 0.061 | 0.067 | 98% | **1.34E-03** |
| Toluene | 0.0E+00 | 0.056 | 0.59 | 0.64 | 98% | **0.013** |
| 2,2,4-Trimethylpentane | 0.0E+00 | 1.82E-02 | 1.90E-01 | 2.08E-01 | 98% | **4.16E-03** |
| Methylcyclohexane | 0.0E+00 | 0.0E+00 | 0.0E+00 | 0.0E+00 | 98% | **0.0E+00** |
| Cyclohexane | 0.0E+00 | 0.0E+00 | 0.0E+00 | 0.0E+00 | 98% | **0.0E+00** |
| Benzene | 0.0E+00 | 0.10 | 1.04 | 1.14 | 98% | **0.023** |
| **Total** | **29.07** | **4.48** | **45.51** | **79.06** | -- | **4.14** |
| **Total VOC** | **0.031** | **3.94** | **39.24** | **43.22** | -- | **0.86** |
| **Total HAP** | **0.0E+00** | **0.32** | **3.32** | **3.65** | -- | **0.073** |
| **Heating Value (Btu/scf)** | 981 | 2,622 | 2,622 | **1,506** | | |
| **Molecular Weight** | 17.04 | 51.61 | 51.61 | **28.11** | | |
| **Operating Hours** | 8,760 | 365 | 8,760 | -- | | |
| **Mass Flow (ton/yr)** | 29.07 | 4.48 | 45.51 | **79.06** | | |
| **Volumetric Flow (scf/hr)** | 200.00 | 373.78 | 78.57 | -- | | |
| **Volumetric Flow (MMscf/yr)** | 1.75 | 0.14 | 0.69 | **2.58** | | |
| **Heat Release (MMBtu/yr)** | 1,719 | 358 | 1,804.58 | **3,881** | | |

| Annual Combustion Emissions from Vapor Combustor | | | | Totals |
|---|---|---|---|---|
| | (TPY) | (TPY) | (TPY) | (TPY) |
| **Total $NO_x$** | **0.12** | **0.025** | **0.12** | **0.27** |
| **Total CO** | **0.24** | **0.049** | **0.25** | **0.53** |
| **Total $SO_2$** | **0.0E+00** | **0.15** | **1.47** | **1.62** |
| **Total $PM_{10}$** | **0.0067** | **5.2E-04** | **2.6E-03** | **0.010** |
| **Total $PM_{2.5}$** | **0.0067** | **5.2E-04** | **2.6E-03** | **0.010** |

| Criteria Pollutant Emissions from Vapor Combustorc | | | |
|---|---|---|---|
| Component | Emission Rate | Emission Factor | Emission Factor Units |
| | (ton/yr) | | |
| **$NO_x$** | 0.27 | 0.138 | lb/MMBtu |
| **CO** | 0.53 | 0.2755 | lb/MMBtu |
| **$SO_2$** | 1.62 | -- | -- |
| **$PM_{10}$** | 0.010 | 7.60 | lb/MMscf |
| **$PM_{2.5}$** | 0.010 | 7.60 | lb/MMscf |
| **$H_2S$** | 0.017 | -- | -- |

| Vapor Combustor Parameters | |
|---|---|
| VCU Destruction Efficiency | 98% |
| H2S molecular weight | 34.08 |
| SO2 molecular weight | 64.06 |

**Footnotes:**

[a] Uncontrolled stream properties determined via ProMax.

[b] Pilot fuel gas emissions are conservatively calculated based on a 200 scfh flow rate.

[c] CO and Nox emission factors from AP-42, Table 13.5-1 and 13.5-2, February 2018. PM and PM2.5 emission factors from AP-42, Table 1.4-1 and 1.4-2, July 1998. SO2 emissions assume 100% conversion of H2S to SO2.

**Frontier Field Services LLC**
**BKU Compressor Station**

## Flare (FL-1) - Hourly Emissions

Emission Unit: FL-1
Source Description: FLARE

| Maximum Hourly Emission Rates and Composition to Flare[a] | | | | | |
|---|---|---|---|---|---|
| Component | Pilot[b] | Inlet Gas SSM | Total | Destruction Efficiency | Flare Exhaust (controlled) |
| | (lb/hr) | (lb/hr) | (lb/hr) | (%) | (lb/hr) |
| Nitrogen | 0.39 | 1,370 | 1,370 | 0% | **1,370** |
| Methane | 6.13 | 31,895 | 31,901 | 98% | **638.02** |
| Ethane | 0.12 | 10,505 | 10,506 | 98% | **210.11** |
| Propane | 0.0066 | 7,690 | 7,690 | 98% | **153.80** |
| i-Butane | 2.3E-04 | 1,235 | 1,235 | 98% | **24.70** |
| n-Butane | 2.3E-04 | 2,964 | 2,964 | 98% | **59.27** |
| i-Pentane | 0.0E+00 | 881 | 880.81 | 98% | **17.62** |
| n-Pentane | 0.0E+00 | 871 | 870.96 | 98% | **17.42** |
| Other hexanes | 0.0E+00 | 199.7 | 199.65 | 98% | **3.99** |
| n-Hexane | 0.0E+00 | 5.49 | 5.49 | 98% | **0.11** |
| Water | 0.0E+00 | 0.0E+00 | 0.0E+00 | 0% | **0.0E+00** |
| Hydrogen Sulfide | 0.0E+00 | 930.76 | 930.76 | 98% | **18.62** |
| Carbon Dioxide | 6.3E-03 | 1,133.45 | 1,133.46 | 0% | **1,133** |
| Heptane | 0.0E+00 | 288.64 | 288.64 | 98% | **5.77** |
| Octane | 0.0E+00 | 104.77 | 104.77 | 98% | **2.10** |
| n-Nonane | 0.0E+00 | 24.94 | 24.94 | 98% | **0.50** |
| n-Decane | 0.0E+00 | 12.73 | 12.73 | 98% | **0.25** |
| m-Xylene | 0.0E+00 | 8.46 | 8.46 | 98% | **0.17** |
| Ethylbenzene | 0.0E+00 | 1.02 | 1.02 | 98% | **0.020** |
| Toluene | 0.0E+00 | 93.38 | 93.38 | 98% | **1.87** |
| 2,2,4-Trimethylpentane | 0.0E+00 | 0.0E+00 | 0.0E+00 | 98% | **0.0E+00** |
| Methylcyclohexane | 0.0E+00 | 164.48 | 164.48 | 98% | **3.29** |
| Cyclohexane | 0.0E+00 | 200.25 | 200.25 | 98% | **4.00** |
| Benzene | 0.0E+00 | 182.00 | 182.00 | 98% | **3.64** |
| Cyclopentene | 0.0E+00 | 0.0E+00 | 0.0E+00 | 98% | **0.0E+00** |
| TEG | 0.0E+00 | 0.0E+00 | 0.0E+00 | 0% | **0.0E+00** |
| **Total** | **6.64** | **60,761** | **60,767** | -- | **3,669** |
| **Total VOC** | **0.01** | **14,926** | **14,926** | -- | **298.53** |
| **Total HAP** | **0.00** | **290** | **290** | -- | **5.81** |
| **Heating Value (Btu/scf)** | 981 | 1,287 | **1,287** | | |
| **Molecular Weight** | 17.04 | 22.45 | **22.45** | | |
| **Operating Hours** | 8,760 | 277 | -- | | |
| **Mass Flow** | 6.64 | 60,761 | -- | | |
| **Volumetric Flow (scf/hr)** | 200.00 | 1,036,458 | **1,036,658** | | |
| **Heat Release (MMBtu/hr)** | 0.20 | 1,334 | **1,334** | | |

| Combustion Emissions from Flare | | | Totals |
|---|---|---|---|
| | Routine Emissions | Inlet Gas SSM | |
| | (lb/hr) | (lb/hr) | (lb/hr) |
| **Total $NO_x$** | **0.03** | **184.05** | **184.08** |
| **Total CO** | **0.05** | **367.43** | **367.48** |
| **Total $SO_2$** | **0.0E+00** | **1,749.55** | **1,749.55** |

| Criteria Pollutant Emissions from Flare[c] | | | |
|---|---|---|---|
| Component | Emission Rate | Emission Factor | Emission Factor Units |
| | (lb/hr) | | |
| **$NO_x$** | 184.08 | 0.138 | lb/MMBtu |
| **CO** | 367.48 | 0.2755 | lb/MMBtu |
| **$SO_2$** | 1,749.55 | -- | -- |
| **$H_2S$** | 18.62 | -- | -- |

| Flare Parameters | |
|---|---|
| Flare Destruction Efficiency C3+ | 98% |
| H2S molecular weight | 34.08 |
| SO2 molecular weight | 64.06 |

| GHG Emissions | Emission Factor | Emissions | |
|---|---|---|---|
| | kg/MMBtu | lb/hr | TPY |
| CO2 | 53.06 | 156,032.03 | 21,707.78 |
| N2O | 0.0001 | 0.29 | 0.04 |
| Methane | 0.001 | 2.94 | 89.29 |

GHG Emissions Factors from 40 CFR Part 98, Subpart C

Includes the addition of residual methane from FL-1 Annual Emissions table

**Footnotes:**

[a] Stream properties determined via gas and fuel gas analyses.

[b] Pilot fuel gas emissions are conservatively calculated based on a 200 scfh flow rate.

[c] NOx and CO emission factors from TCEQ Air Permit Technical Guidance for Flares and Vapor Oxidizers, high btu. SO2 emissions assume 100% conversion of H2S to SO2.

**Frontier Field Services LLC**
**BKU Compressor Station**

## Flare (FL-1) - Annual Emissions

Emission Unit: FL-1
Source Description: FLARE

| Annual Emission Rates and Composition to Flare[a] | | | | | |
|---|---|---|---|---|---|
| Component | Pilot[b] | Inlet Gas SSM | Total | Destruction Efficiency | Exhaust Stream (controlled) |
| | (ton/yr) | (ton/yr) | (ton/yr) | (%) | (ton/yr) |
| Nitrogen | 1.70 | 189.76 | 191.46 | 0% | **191.46** |
| Methane | 26.83 | 4,417 | 4,444 | 98% | **88.88** |
| Ethane | 0.51 | 1455.00 | 1455.50 | 98% | **29.11** |
| Propane | 0.029 | 1065.10 | 1065.13 | 98% | **21.30** |
| i-Butane | 1.0E-03 | 171.04 | 171.04 | 98% | **3.42** |
| n-Butane | 1.0E-03 | 410.45 | 410.45 | 98% | **8.21** |
| i-Pentane | 0.0E+00 | 121.99 | 121.99 | 98% | **2.44** |
| n-Pentane | 0.0E+00 | 120.63 | 120.63 | 98% | **2.41** |
| Other hexanes | 0.0E+00 | 27.65 | 27.65 | 98% | **0.55** |
| n-Hexane | 0.0E+00 | 0.76 | 0.76 | 98% | **0.015** |
| Water | 0.0E+00 | 0.0E+00 | 0.0E+00 | 0% | **0.0E+00** |
| Hydrogen Sulfide | 0.0E+00 | 128.91 | 128.91 | 98% | **2.58** |
| Carbon Dioxide | 0.03 | 156.98 | 157.01 | 0% | **157.01** |
| Heptane | 0.0E+00 | 39.98 | 39.98 | 98% | **0.80** |
| Octane | 0.0E+00 | 14.51 | 14.51 | 98% | **0.29** |
| n-Nonane | 0.0E+00 | 3.45 | 3.45 | 98% | **0.069** |
| n-Decane | 0.0E+00 | 1.76 | 1.76 | 98% | **0.035** |
| m-Xylene | 0.0E+00 | 1.17 | 1.17 | 98% | **0.023** |
| Ethylbenzene | 0.0E+00 | 0.14 | 0.14 | 98% | **2.8E-03** |
| Toluene | 0.0E+00 | 12.93 | 12.93 | 98% | **0.26** |
| 2,2,4-Trimethylpentane | 0.0E+00 | 0.0E+00 | 0.0E+00 | 98% | **0.0E+00** |
| Methylcyclohexane | 0.0E+00 | 22.78 | 22.78 | 98% | **0.46** |
| Cyclohexane | 0.0E+00 | 27.73 | 27.73 | 98% | **0.55** |
| Benzene | 0.0E+00 | 25.21 | 25.21 | 98% | **0.50** |
| Cyclopentene | 0.0E+00 | 0.0E+00 | 0.0E+00 | 98% | **0.0E+00** |
| TEG | 0.0E+00 | 0.0E+00 | 0.0E+00 | 0% | **0.0E+00** |
| **Total** | **29.10** | **8,415** | **8,444** | -- | **510.39** |
| **Total VOC** | **0.03** | **2,067.30** | **2,067.33** | -- | **41.35** |
| **Total HAP** | **0.00** | **40.21** | **40.21** | -- | **0.80** |
| **Heating Value (Btu/scf)** | 981 | 1,287 | **1,285** | | |
| **Molecular Weight** | 17.04 | 22.45 | -- | | |
| **Operating Hours** | 8,760 | 277 | -- | | |
| **Mass Flow (ton/yr)** | 29.10 | 8,415 | **8,444** | | |
| **Volumetric Flow (scf/hr)** | 200.00 | 1,036,458 | -- | | |
| **Volumetric Flow (MMscf/yr)** | 1.75 | 287.10 | **288.85** | | |
| **Heat Release (MMBtu/yr)** | 1,719 | 369,430 | **371,149** | | |

| Criteria Pollutant Emissions from Flare[c] | | | |
|---|---|---|---|
| Component | Emission Rate | Emission Factor | Emission Factor Units |
| | (ton/yr) | | |
| **$NO_x$** | 25.61 | 0.138 | lb/MMBtu |
| **CO** | 51.13 | 0.2755 | lb/MMBtu |
| **$SO_2$** | 242.31 | -- | -- |
| **$H_2S$** | 2.58 | -- | -- |
| **N2O** | 0.04 | 0.0001 | kg/MMBtu |

| Flare Parameters | |
|---|---|
| Flare Destruction Efficiency C3+ | 98% |
| H2S molecular weight | 34.08 |
| SO2 molecular weight | 64.06 |

| Annual Combustion Emissions from Flare | | | Totals |
|---|---|---|---|
| | Routine Emissior | Inlet Gas SSM | |
| | (TPY) | (TPY) | (TPY) |
| **Total $NO_x$** | **0.12** | **25.49** | **25.61** |
| **Total CO** | **0.24** | **50.89** | **51.13** |
| **Total $SO_2$** | **0.0E+00** | **242.31** | **242.31** |

**Footnotes:**

[a] Stream properties determined via gas and fuel gas analyses.

[b] Pilot fuel gas emissions are conservatively calculated based on a 200 scfh flow rate.

[c] NOx and CO emission factors from TCEQ Air Permit Technical Guidance for Flares and Vapor Oxidizers, high btu. SO2 emissions assume 100% conversion of H2S to SO2.

**Frontier Field Services LLC**
**BKU Compressor Station**

## Dehydrator Still Column & Flash Tank (V2/F2) - Uncontrolled Hourly Emissions

Emission Unit: V2/F2
Source Description: Dehydrator Still Column & Flash Tank
The Dehy Flash Tank and Regen Vent is fully collected and routed back to facility inlet

| Maximum Hourly Emission Rates and Composition to Dehy[a] | | |
|---|---|---|
| **Promax Stream:** | **Overheads** | **Flash Gas** |
| **Component** | **Dehy Still Vent** | **Dehy Flash Tank** |
| | **(lb/hr)** | **(lb/hr)** |
| Hydrogen Sulfide | 20.51 | 6.87 |
| Carbon Dioxide | 2.99 | 4.94 |
| Nitrogen | 3.9E-03 | 0.32 |
| Methane | 1.29 | 24.05 |
| Ethane | 3.91 | 18.57 |
| Propane | 7.70 | 17.76 |
| i-Butane | 1.74 | 2.84 |
| n-Butane | 7.67 | 8.22 |
| i-Pentane | 3.49 | 2.27 |
| n-Pentane | 4.55 | 2.42 |
| Cyclopentane | 0.0E+00 | 0.0E+00 |
| C6Alkanes(iso) | 8.25 | 2.07 |
| Cyclohexane | 7.32 | 0.61 |
| n-Heptane | 4.64 | 0.61 |
| Methylcyclohexane | 6.21 | 0.40 |
| Octane | 2.16 | 0.16 |
| Nonane | 0.81 | 0.031 |
| Decanes+ | 3.55 | 0.0055 |
| Benzene | 43.37 | 0.61 |
| Toluene | 33.33 | 0.24 |
| Ethylbenzene | 0.55 | 2.3E-03 |
| o-Xylene | 4.84 | 0.014 |
| n-Hexane | 0.053 | 0.014 |
| 2,2,4-Trimethylpentane | 0.0E+00 | 0.0E+00 |
| Triethylene Glycol | 0.027 | 3.7E-04 |
| Ethylene Glycol | 0.0E+00 | 0.0E+00 |
| Water | 157.21 | 0.13 |
| Methanol | 0.0E+00 | 0.0E+00 |
| O2 | 0.0E+00 | 0.0E+00 |
| SO2 | 0.0E+00 | 0.0E+00 |
| **Total** | 326.16 | 93.15 |
| **Total VOC** | 289.86 | 76.53 |
| **Total HAP** | 160.73 | 2.40 |

**Footnotes:**

[a] Uncontrolled stream properties determined via ProMax.

**Frontier Field Services LLC**
**BKU Compressor Station**

## Dehydrator Still Column & Flash Tank (V2/F2) - Uncontrolled Annual Emissions

Emission Unit: V2/F2
Source Description: Dehydrator Still Column & Flash Tank
The Dehy Flash Tank and Regen Vent is fully collected and routed back to facility inlet

| Maximum Annual Emission Rates and Composition to Dehy[a] | | |
|---|---|---|
| **Promax Stream:** | **Overheads** | **Flash Gas** |
| **Component** | **Dehy Still Vent** | **Dehy Flash Tank** |
| | **(ton/yr)** | **(ton/yr)** |
| Hydrogen Sulfide | 89.83 | 30.08 |
| Carbon Dioxide | 13.09 | 21.65 |
| Nitrogen | 0.017 | 1.39 |
| Methane | 5.64 | 105.32 |
| Ethane | 17.14 | 81.32 |
| Propane | 33.71 | 77.79 |
| i-Butane | 7.63 | 12.45 |
| n-Butane | 33.59 | 35.99 |
| i-Pentane | 15.30 | 9.94 |
| n-Pentane | 19.92 | 10.60 |
| Cyclopentane | 0.0E+00 | 0.0E+00 |
| C6Alkanes(iso) | 36.13 | 9.08 |
| Cyclohexane | 32.05 | 2.65 |
| n-Heptane | 20.32 | 2.69 |
| Methylcyclohexane | 27.22 | 1.75 |
| Octane | 9.45 | 0.69 |
| Nonane | 3.56 | 0.14 |
| Decanes+ | 15.54 | 0.024 |
| Benzene | 189.98 | 2.69 |
| Toluene | 145.96 | 1.05 |
| Ethylbenzene | 2.41 | 0.010 |
| o-Xylene | 21.18 | 0.063 |
| n-Hexane | 0.23 | 0.062 |
| 2,2,4-Trimethylpentane | 0.0E+00 | 0.0E+00 |
| Triethylene Glycol | 0.12 | 1.6E-03 |
| Ethylene Glycol | 0.0E+00 | 0.0E+00 |
| Water | 688.57 | 0.58 |
| Methanol | 0.0E+00 | 0.0E+00 |
| O2 | 0.0E+00 | 0.0E+00 |
| SO2 | 0.0E+00 | 0.0E+00 |
| **Total** | 1,429 | 408.00 |
| **Total VOC** | 1161.45 | 327.27 |
| **Total HAP** | 15.64 | 10.01 |

**Footnotes:**

[a] Uncontrolled stream properties determined via ProMax.

**Frontier Field Services LLC**
**BKU Compressor Station**

## Fugitive Emissions

Emission Unit: FUG
Source Description: Fugitive Emissions

| | | | Un-Controlled | | | | | |
|---|---|---|---|---|---|---|---|---|
| Component | Service | Count | E-Factor | Un-Controlled | Un-Controlled | Control | Controlled | Controlled |
| | | | lb/hr-source | lb/hr | tpy | Factor | lb/hr | tpy |
| Valves | Gas | 228 | 0.00992 | 2.26 | 9.91 | 0.00% | 2.26 | 9.91 |
| | Light Liquid | 58 | 0.0055 | 0.32 | 1.40 | 0.00% | 0.32 | 1.40 |
| | Heavy Liquid | 0 | 0.0000185 | 0.0E+00 | 0.0E+00 | 0.00% | 0.0E+00 | 0.0E+00 |
| Flanges | Gas | 228 | 0.00086 | 0.20 | 0.86 | 0.00% | 0.20 | 0.86 |
| | Light Liquid | 58 | 0.000243 | 0.014 | 0.062 | 0.00% | 0.014 | 0.062 |
| | Heavy Liquid | 0 | 0.00000086 | 0.0E+00 | 0.0E+00 | 0.00% | 0.0E+00 | 0.0E+00 |
| Connectors | Gas | 684 | 0.00044 | 0.30 | 1.32 | 0.00% | 0.30 | 1.32 |
| | Light Liquid | 174 | 0.000463 | 0.081 | 0.35 | 0.00% | 0.081 | 0.35 |
| | Heavy Liquid | 0 | 0.0000165 | 0.0E+00 | 0.0E+00 | 0.00% | 0.0E+00 | 0.0E+00 |
| Open Ended Lines | Gas | 23 | 0.00441 | 0.10 | 0.44 | 0.00% | 0.10 | 0.44 |
| | Light Liquid | 6 | 0.00309 | 0.019 | 0.081 | 0.00% | 0.019 | 0.081 |
| | Heavy Liquid | 0 | 0.000309 | 0.0E+00 | 0.0E+00 | 0.00% | 0.0E+00 | 0.0E+00 |
| Pumps | Light Liquid | 2 | 0.02866 | 0.057 | 0.25 | 0.00% | 0.06 | 0.25 |
| | Heavy Liquid | 0 | 0.00113 | 0.0E+00 | 0.0E+00 | 0.00% | 0.0E+00 | 0.0E+00 |
| Other | Gas | 12 | 0.0194 | 0.23 | 1.02 | 0.00% | 0.23 | 1.02 |
| | Light Liquid | 3 | 0.0165 | 0.050 | 0.22 | 0.00% | 0.050 | 0.22 |
| | Heavy Liquid | 0 | 0.0000683 | 0.0E+00 | 0.0E+00 | 0.00% | 0.0E+00 | 0.0E+00 |
| **Totals** | | **1,476** | | **3.63** | **15.91** | | **3.63** | **15.91** |

Factors from Table 2-4 of the EPA Protocol for Equipment Leak Emission Estimates, November 1995

| Gas Service Speciation | | | |
|---|---|---|---|
| 3.09 | lb/hr | Emission Rate | |
| Component | Weight % | | |
| | | lbs\hr | tpy |
| Nitrogen | 2.234% | 0.07 | 0.30 |
| Methane | 52.007% | 1.61 | 7.05 |
| Ethane | 17.130% | 0.53 | 2.32 |
| Propane | 12.540% | 0.39 | 1.70 |
| i-Butane | 2.014% | 0.062 | 0.27 |
| n-Butane | 4.832% | 0.15 | 0.65 |
| i-Pentane | 1.436% | 0.044 | 0.19 |
| n-Pentane | 1.420% | 0.044 | 0.19 |
| n-Hexane | 1.258% | 0.039 | 0.17 |
| Water | 0.000% | 0.0E+00 | 0.0E+00 |
| Hydrogen Sulfide | 1.518% | 0.047 | 0.21 |
| Carbon Dioxide | 1.848% | 0.057 | 0.25 |
| Heptane | 0.471% | 0.015 | 0.064 |
| Octane | 0.171% | 5.28E-03 | 0.02 |
| n-Nonane | 0.041% | 1.26E-03 | 0.01 |
| n-Decane | 0.021% | 6.4E-04 | 2.8E-03 |
| m-Xylene | 0.014% | 4.3E-04 | 1.9E-03 |
| Ethylbenzene | 0.002% | 5.1E-05 | 2.3E-04 |
| Toluene | 0.152% | 4.7E-03 | 0.02 |
| 2,2,4-Trimethylpentane | 0.000% | 0.0E+00 | 0.0E+00 |
| Methylcyclohexane | 0.268% | 0.0083 | 0.036 |
| Cyclohexane | 0.327% | 0.010 | 0.044 |
| Benzene | 0.297% | 0.0092 | 0.040 |
| | **100.00%** | **3.09** | **13.55** |
| **Totals** | **Total HAPs** | **0.05** | **0.23** |
| | **Total VOCs** | **0.78** | **3.42** |

| Light Liquid Service Speciation | | | |
|---|---|---|---|
| 0.54 | lb/hr | Emission Rate | |
| Component | Weight % | | |
| | | lbs\hr | tpy |
| Nitrogen | 0.02% | 9.7E-05 | 4.2E-04 |
| Methane | 0.03% | 1.8E-04 | 7.7E-04 |
| Ethane | 0.14% | 7.5E-04 | 3.3E-03 |
| Propane | 1.23% | 6.6E-03 | 0.029 |
| i-Butane | 0.67% | 3.6E-03 | 0.016 |
| n-Butane | 2.58% | 0.014 | 0.061 |
| i-Pentane | 2.66% | 0.014 | 0.063 |
| n-Pentane | 3.89% | 0.021 | 0.092 |
| n-Hexane | 9.96% | 0.054 | 0.24 |
| Water | 0.00% | 0.0E+00 | 0.0E+00 |
| Hydrogen Sulfide | 0.04% | 2.2E-04 | 9.5E-04 |
| Carbon Dioxide | 0.01% | 3.0E-05 | 1.3E-04 |
| Heptane | 21.56% | 0.12 | 0.51 |
| Octane | 25.32% | 0.14 | 0.60 |
| n-Nonane | 7.17% | 0.039 | 0.17 |
| n-Decane | 7.99% | 0.043 | 0.19 |
| m-Xylene | 2.44% | 0.013 | 0.058 |
| Ethylbenzene | 2.13% | 0.011 | 0.050 |
| Toluene | 6.68% | 0.036 | 0.16 |
| 2,2,4-Trimethylpentane | 1.81% | 9.7E-03 | 0.043 |
| Methylcyclohexane | 0.00% | 0.0E+00 | 0.0E+00 |
| Cyclohexane | 0.00% | 0.0E+00 | 0.0E+00 |
| Benzene | 3.67% | 0.020 | 0.087 |
| | **100.00%** | **0.54** | **2.36** |
| **Totals** | **Total HAPs** | **0.14** | **0.63** |
| | **Total VOCs** | **0.54** | **2.36** |

| | | Controlled | | Uncontrolled | |
|---|---|---|---|---|---|
| Grand Totals | | lbs\hr | tpy | lbs\hr | tpy |
| | **Total HAPs** | **0.20** | **0.86** | **0.20** | **0.86** |
| | **Total VOCs** | **1.32** | **5.78** | **1.32** | **5.78** |
| | **Total H2S** | **0.047** | **0.21** | **0.047** | **0.21** |

**Frontier Field Services LLC**
**BKU Compressor Station**
**SSM to Atmosphere**

Emission unit number: SSM
Source description: SSM
Gas Constant (scf/lb-mole): 379.5

| | Volume Released | | | | Mass Released | H2S | | | | VOC | H2S | Methane | | | | | | | Benzene | Toluene | Ethylbenzene | Xylene | n-Hexane | 2,2,4-TMP | Total HAPs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SSM Activity** | **scf/event** | **Events/yr** | **Vapor Service** | **MW** | **lb/yr** | **lb/hr** | **VOC Wt %** | **H2S Wt %** | **Methane Wt %** | **tpy** | **tpy** | **tpy** | **Benzene Wt %** | **Toluene Wt %** | **E-Benzene Wt %** | **Xylene Wt %** | **n-Hexane Wt %** | **2,2,4-TMP wt%** | **tpy** | **tpy** | **tpy** | **tpy** | **tpy** | **tpy** | **tpy** |
| Compressor Blowdowns/Openings | 100 | 144 | Inlet | 22.45 | 852.01 | 0.090 | 25.26% | 1.52% | 52.01% | 0.11 | 6.5E-03 | 0.22 | 0.30% | 0.15% | 0.002% | 0.014% | 0.009% | 0.000% | 1.3E-03 | 6.5E-04 | 7.1E-06 | 5.9E-05 | 3.8E-05 | 0.0E+00 | 2.0E-03 |
| Scrubber Blowdowns | 100 | 48 | Inlet | 22.45 | 284.00 | 0.090 | 25.26% | 1.52% | 52.01% | 0.036 | 2.2E-03 | 0.074 | 0.30% | 0.15% | 0.002% | 0.014% | 0.009% | 0.000% | 4.2E-04 | 2.2E-04 | 2.4E-06 | 2.0E-05 | 1.3E-05 | 0.0E+00 | 6.7E-04 |
| Reboiler Blowdowns | 65 | 1 | Inlet | 22.45 | 3.85 | 0.058 | 25.26% | 1.52% | 52.01% | 4.9E-04 | 2.9E-05 | 1.0E-03 | 0.30% | 0.15% | 0.002% | 0.014% | 0.009% | 0.000% | 5.7E-06 | 2.9E-06 | 3.2E-08 | 2.7E-07 | 1.7E-07 | 0.0E+00 | 9.1E-06 |
| Pigging | 100 | 60 | Inlet | 22.45 | 355.01 | 0.090 | 25.26% | 1.52% | 52.01% | 0.045 | 2.7E-03 | 0.092 | 0.30% | 0.15% | 0.002% | 0.014% | 0.009% | 0.000% | 5.3E-04 | 2.7E-04 | 3.0E-06 | 2.4E-05 | 1.6E-05 | 0.0E+00 | 8.4E-04 |
| Filters/Strainers/Small Vessels | 100 | 24 | Inlet | 22.45 | 142.00 | 0.090 | 25.26% | 1.52% | 52.01% | 0.018 | 1.1E-03 | 0.037 | 0.30% | 0.15% | 0.00% | 0.01% | 0.01% | 0.00% | 2.1E-04 | 1.1E-04 | 1.2E-06 | 9.8E-06 | 6.4E-06 | 0.0E+00 | 3.4E-04 |
| Tank Maintenance | 500 | 1 | Condensate | 51.61 | 68.00 | 0.027 | 87.96% | 0.04% | 1.62% | 0.030 | 1.4E-05 | 5.5E-04 | 2.26% | 1.25% | 0.128% | 0.135% | 3.008% | 0.407% | 7.7E-04 | 4.3E-04 | 4.4E-05 | 4.6E-05 | 1.0E-03 | 1.4E-04 | 2.3E-03 |
| | | | | **TOTALS** | **1704.87** | | | | | **0.24** | **0.012** | **0.43** | | | | | | | **3.2E-03** | **1.7E-03** | **5.7E-05** | **1.6E-04** | **1.1E-03** | **1.4E-04** | **6.2E-03** |
| | | | | **Max** | **852.01** | **0.090** | | | | | | | | | | | | | | | | | | | |

Equations used:

A. Mass Released, lb = (Total Volume Released, scf) x (Molecular Weight, lb/lb-mole) / (Gas Constant at STP, scf/lb-mole)
B. Annual Pollutant Emissions, tpy = (Pollutant Content, Wt%) x (Mass Released per Year, lb/yr) / (2,000 lb/ton)

Notes:
On an hourly basis, only one event type will occur in one single hour; therefore, the hourly H2S emission rate is the maximum of the event types.
Volumes released and numbers of events are estimates only and are not intended as enforceable limits, so long as overall emissions remain below total emissions.
Compressor blowdowns are initially depressured to FL-1 or recycled to header, so only minimal residual volume is released to atmosphere. Note that the depressure to flare is included in the SSM gas to flare scenario.
Pigging occurs on average once per week during the year. The volume released per pigging event is <100 scf based on the volume and residual pressure in the line.

**Frontier Field Services LLC**
**BKU Compressor Station**

# Unpaved Haul Road (Exempt Per 20.2.72.202.b(5) NMAC)

| Haul Input Information | |
|---|---|
| Unit(s): | HAUL |
| Description: | Unpaved haul road emissions |

| Input Data | | |
|---|---|---|
| Empty vehicle weight[1] | 16 | tons |
| Load weight[2] | 26.6 | tons |
| Loaded vehicle[3] | 42.6 | tons |
| Mean vehicle weight[4] | 29.32 | tons |
| Oil & Water Throughput | 136 | bbl/day |
| Loadout volume | 49465 | bbl/yr |
| Vehicle size | 180 | bbl |
| Vehicle frequency[5] | 1 | vehicles/day |
| Round-trip distance | 0.2 | mile/trip |
| Truck Size: | 7560 | gal |
| Filling Time: | 0.75 | Nominal |
| Oil Loadout Spots | 1 | Per Load |
| Trip frequency[6] | 1.3 | trips/hour |
| Trip frequency[7] | 275 | trips/yr |
| Surface silt content[8] | 4.8 | % |
| Annual wet days[9] | 70 | days/yr |
| Vehicle miles traveled[10] | 0.27 | mile/hr |
| Vehicle miles traveled | 55.0 | miles/yr |

| Emission Factors and Constants | | | |
|---|---|---|---|
| **Parameter** | **$PM_{30}$** | **$PM_{10}$** | **$PM_{2.5}$** |
| k, lb/VMT[11] | 4.90 | 1.50 | 0.15 |
| a, lb/VMT[11] | 0.70 | 0.90 | 0.90 |
| b, lb/VMT[11] | 0.45 | 0.45 | 0.45 |
| Hourly EF, lb/VMT[12] | 7.20 | 1.83 | 0.18 |
| Annual EF, lb/VMT[13] | 5.82 | 1.48 | 0.15 |

| Emission Calculations for Particulate Matter | | | |
|---|---|---|---|
| **$PM_{30}$** | **$PM_{10}$** | **$PM_{2.5}$** | |
| 1.92 | 0.49 | 0.05 | lb/hr[14] |
| 0.16 | 0.041 | 4.1E-03 | ton/yr[15] |

[1] Empty vehicle weight includes driver and occupants and full fuel load.
[2] Cargo, transported materials, etc. (Density (lb/gal) *7560 gal truck/ 2000lb/ton)
[3] Loaded vehicle weight = Empty + Load Size
[4] Mean Vehicle weight = (Loaded Weight + Empty Weight) / 2
[5] Vehicles per day = Loadout volume / Truck size
[6] Trips per hour = Total loadout spots / Loading time
[7] Trips per year = Total throughput (bbl/yr) / Truck size (bbl)
[8] AP-42 Table 13.2.2-1
[9] Per NMED Guidance
[10] VMT/hr = Vehicle Miles Traveled per hour= Trips per hour * Segment Length
[11] Table 13.2.2-2, Industrial Roads
[12] AP-42 13.2.2, Equation 1a
[13] AP-42 13.2.2, Equation 2
[14] lb/hr = Hourly EF (lb/VMT) * VMT (mile/hr)
[15] ton/yr = Annual EF (lb/VMT) * VMT (mile/hr) * Hours of operation (hr/yr)

**Frontier Field Services LLC**

**BKU Compressor Station**

## Laboratory Analyses

All emission calculations in this application are based upon site-specific laboratory analyses of the gas and liquids handled at this site.

### Produced Gas Sample

| Sample Information | |
|---|---|
| Site | BKU Compressor Station |
| Sample Type | Site-Specific Sample |
| Date Sampled | 5/1/2024 |
| Point in Process | Inlet |
| Temperature (°F) | 69 |
| Pressure (psig) | 48 |
| Used for | dehy inlet and SSM flaring |
| Notes | Inlet H2S mol% was revised to represent maximum anticipated scenario, and the sample composition was normalized to 100% with the Nitrogen. |

Composition:

| Component | Molecular Weight (lb/lb-mole) | Mole % | Weight % |
|---|---|---|---|
| Hydrogen Sulfide | 34.08 | 1.0000 | 1.5177 |
| Carbon Dioxide | 44.01 | 0.9430 | 1.8482 |
| Nitrogen | 28.01 | 1.7910 | 2.2341 |
| Methane (C1) | 16.04 | 72.8070 | 52.0073 |
| Ethane (C2) | 30.07 | 12.7920 | 17.1301 |
| Propane (C3) | 44.10 | 6.3850 | 12.5397 |
| Isobutane (i-C4) | 58.12 | 0.7780 | 2.0137 |
| n-Butane (n-C4) | 58.12 | 1.8670 | 4.8323 |
| Isopentane (i-C5) | 72.15 | 0.4470 | 1.4363 |
| n-Pentane (n-C5) | 72.15 | 0.4420 | 1.4202 |
| Cyclopentane | 70.10 | 0.00E+00 | 0.00E+00 |
| Other Hexanes (C6) | 86.18 | 0.3256 | 1.2494 |
| Cyclohexane | 84.16 | 0.0871 | 0.3265 |
| Heptanes (C7) | 100.20 | 0.1055 | 0.4707 |
| Methylcyclohexane | 98.19 | 0.0613 | 0.2682 |
| Octanes (C8+ | 127.48 | 0.0301 | 0.1708 |
| Nonanes (C9) | 128.26 | 0.0071 | 0.0407 |
| Decanes Plus (C10+) | 142.29 | 0.0033 | 0.0208 |
| Benzene | 78.11 | 0.0853 | 0.2968 |
| Toluene | 92.14 | 0.0371 | 0.1523 |
| Ethylbenzene | 106.17 | 0.0004 | 0.0017 |
| Xylenes | 106.17 | 0.0029 | 0.0138 |
| n-Hexane | 86.18 | 0.0023 | 0.0090 |
| 2,2,4 - Trimethylpentane | 114.23 | 0.00E+00 | 0.00E+00 |
| Totals: | | 100.0000 | 100.0000 |

Equations used:

A. *(Component Weight %) = (Component Mole %) x (Component Molecular Weight, lb/lb-mole) / (Total Molecular Weight, lb/lb-mole)*

Other sample properties are shown in the table below:

| Property | Value |
|---|---|
| Molecular Weight (lb/lb-mole) | 22.45 |
| VOC (Wt%) | 25.26 |
| HHV (Btu/scf) | 1,287 |

**Frontier Field Services LLC**

**BKU Compressor Station**

## Laboratory Analyses

### Fuel Gas Sample

| Sample Information | |
|---|---|
| Site | BKU Compressor Station |
| Sample Type | Site-Specific Sample |
| Date Sampled | 1/12/2026 |
| Point in Process | Pipeline |
| Temperature (°F) | 59 |
| Pressure (psig) | 124 |
| Used for | Flare pilot and Engine fuel gas |
| Notes | |

Composition:

| Component | Molecular Weight (lb/lb-mole) | Mole % | Weight % |
|---|---|---|---|
| Hydrogen Sulfide | 34.08 | 0.0E+00 | 0.0E+00 |
| Carbon Dioxide | 44.01 | 0.04 | 0.07 |
| Nitrogen | 28.01 | 3.46 | 4.32 |
| Methane (C1) | 16.04 | 95.50 | 68.22 |
| Ethane (C2) | 30.07 | 0.96 | 1.29 |
| Propane (C3) | 44.10 | 0.04 | 0.07 |
| Isobutane (i-C4) | 58.12 | 1.0E-03 | 2.6E-03 |
| n-Butane (n-C4) | 58.12 | 1.0E-03 | 2.6E-03 |
| Isopentane (i-C5) | 72.15 | 0.0E+00 | 0.0E+00 |
| n-Pentane (n-C5) | 72.15 | 0.0E+00 | 0.0E+00 |
| Cyclopentane | 70.10 | 0.0E+00 | 0.0E+00 |
| Other Hexanes (C6) | 86.18 | 0.0E+00 | 0.0E+00 |
| Cyclohexane | 84.16 | 0.0E+00 | 0.0E+00 |
| Heptanes (C7) | 100.20 | 0.0E+00 | 0.0E+00 |
| Methylcyclohexane | 98.19 | 0.0E+00 | 0.0E+00 |
| Octanes (C8) | 127.48 | 0.0E+00 | 0.0E+00 |
| Nonanes (C9) | 128.26 | 0.0E+00 | 0.0E+00 |
| Decanes Plus (C10+) | 142.29 | 0.0E+00 | 0.0E+00 |
| Benzene | 78.11 | 0.0E+00 | 0.0E+00 |
| Toluene | 92.14 | 0.0E+00 | 0.0E+00 |
| Ethylbenzene | 106.17 | 0.0E+00 | 0.0E+00 |
| Xylenes | 106.17 | 0.0E+00 | 0.0E+00 |
| n-Hexane | 86.18 | 0.0E+00 | 0.0E+00 |
| 2,2,4 - Trimethylpentane | 114.23 | 0.0E+00 | 0.0E+00 |
| Totals: | | 100.0000 | 73.9736 |

Equations used:

A. *(Component Weight %) = (Component Mole %) x (Component Molecular Weight, lb/lb-mole) / (Total Molecular Weight, lb/lb-mole)*

Other sample properties are shown in the table below:

| Property | Value |
|---|---|
| Molecular Weight (lb/lb-mole) | 17.04 |
| VOC (Wt%) | 0.08 |
| HHV (Btu/scf) | 981 |

**Frontier Field Services LLC**

**BKU Compressor Station**

## Laboratory Analyses

All emission calculations in this application are based upon site-specific laboratory analyses of the gas and liquids handled at this site.

### Condensate Sample

| Sample Information | |
|---|---|
| Site | BKU Compressor Station |
| Sample Type | Site-Specific Sample |
| Date Sampled | 3/6/2025 |
| Point in Process | Oil Leg of Heater Treater |
| Temperature (°F) | 60 |
| Pressure (psig) | 5 |
| Used for | Condensate Tanks |
| Notes | The raw analysis was edited to include H2S using ProMax and the sample was renormalized with ProMax. |

Composition:

| Component | Molecular Weight (lb/lb-mole) | Mole % (Raw Analysis) | Mole % | Weight % |
|---|---|---|---|---|
| Hydrogen Sulfide[1] | 34.08 | 0.00 | 0.12 | 0.04 |
| Carbon Dioxide | 44.01 | 0.01 | 0.01 | 0.01 |
| Nitrogen | 28.01 | 0.06 | 0.06 | 0.02 |
| Methane (C1) | 16.04 | 0.20 | 0.20 | 0.03 |
| Ethane (C2) | 30.07 | 0.46 | 0.46 | 0.14 |
| Propane (C3) | 44.10 | 2.79 | 2.79 | 1.23 |
| Isobutane (i-C4) | 58.12 | 1.16 | 1.16 | 0.67 |
| n-Butane (n-C4) | 58.12 | 4.43 | 4.42 | 2.58 |
| Isopentane (i-C5) | 72.15 | 3.68 | 3.68 | 2.66 |
| n-Pentane (n-C5) | 72.15 | 5.38 | 5.37 | 3.89 |
| Cyclopentane | 70.10 | 0.0E+00 | 0.0E+00 | 0.0E+00 |
| Other Hexanes (C6) | 86.18 | 6.29 | 6.29 | 5.43 |
| Cyclohexane | 84.16 | 0.00 | 0.00 | 0.0E+00 |
| Heptanes (C7) | 100.20 | 21.47 | 21.45 | 21.56 |
| Methylcyclohexane | 98.19 | 0.0E+00 | 0.0E+00 | 0.0E+00 |
| Octanes Plus (C8+) | 127.48 | 19.83 | 19.80 | 25.32 |
| Nonanes (C9) | 128.26 | 5.58 | 5.57 | 7.17 |
| Decanes Plus (C10+) | 142.29 | 5.60 | 5.60 | 7.99 |
| Benzene | 78.11 | 4.69 | 4.69 | 3.67 |
| Toluene | 92.14 | 7.24 | 7.23 | 6.68 |
| Ethylbenzene | 106.17 | 2.00 | 2.00 | 2.13 |
| Xylenes | 106.17 | 2.30 | 2.29 | 2.44 |
| n-Hexane | 86.18 | 5.24 | 5.23 | 4.53 |
| 2,2,4 - Trimethylpentane | 114.23 | 1.58 | 1.58 | 1.81 |
| Totals: | | 100.0000 | 100.0000 | 100.0000 |

Equations used:

A. *(Component Weight %) = (Component Mole %) x (Component Molecular Weight, lb/lb-mole) / (Total Molecular Weight, lb/lb-mole)*

[1]H2S composition was modeled using a ProMax flash analysis since H2S content was not included in the liquid lab sample.

Other sample properties are shown in the table below:

| Property | Value |
|---|---|
| Molecular Weight (lb/lb-mole) | 95.20 |
| VOC (Wt%) | 99.76 |

| Property (C10+) | Value |
|---|---|
| Molecular Weight (lb/lb-mole) | 189.60 |
| API Gravity | 43.47 |

# Section 7

## Information Used to Determine Emissions

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**Information Used to Determine Emissions shall include the following**:

- ☒ If manufacturer data are used, include specifications for emissions units and control equipment, including control efficiencies specifications and sufficient engineering data for verification of control equipment operation, including design drawings, test reports, and design parameters that affect normal operation.
- ☐ If test data are used, include a copy of the complete test report. If the test data are for an emissions unit other than the one being permitted, the emission units must be identical. Test data may not be used if any difference in operating conditions of the unit being permitted and the unit represented in the test report significantly effect emission rates.
- ☒ If the most current copy of AP-42 is used, reference the section and date located at the bottom of the page. Include a copy of the page containing the emissions factors, and clearly mark the factors used in the calculations.
- ☐ If an older version of AP-42 is used, include a complete copy of the section.
- ☒ If an EPA document or other material is referenced, include a complete copy.
- ☐ Fuel specifications sheet.
- ☒ If computer models are used to estimate emissions, include an input summary (if available) and a detailed report, and a disk containing the input file(s) used to run the model. For tank-flashing emissions, include a discussion of the method used to estimate tank-flashing emissions, relative thresholds (i.e., permit or major source (NSPS, PSD or Title V)), accuracy of the model, the input and output from simulation models and software, all calculations, documentation of any assumptions used, descriptions of sampling methods and conditions, copies of any lab sample analysis.

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**Storage Tanks (Units TK-104 thru TK-106, PWT-1, PWT-2)**

- Liquids analysis for condensate
- BR&E ProMax simulation

**Vapor Combustor (Unit VCU-1)**

- Manufacturer specifications
- BR&E ProMax Simulation
- AP-42 Section 1.4
- TCEQ – (APD-ID 6v1, Revised 03/21) NSR Emission Calculations
- 40 CFR 98 Subpart A Table A-1, 40 CFR 98 Subpart C Tables C-1 & C-2

**Condensate and Produced Water Loading (Units L1, L2)**

- Liquids analysis for condensate
- BR&E ProMax Simulation
- EPA's AP-42, 5th Edition, Section 5.2

**Facility-Wide Fugitive Emissions (Unit FUG)**

- Gas analysis and condensate analysis
- Table 2-4 of the EPA Protocol for Equipment Leak Emission Estimates, November 1995

**Compressor Engines (Units C-311 to C-316)**

- Engine manufacturer data
- AP-42 Section 3.2
- Catalyst vendor data
- 40 CFR 98 Subpart A Table A-1, 40 CFR 98 Subpart C Tables C-1 & C-2

**Flare (Unit FL-1)**

- Gas analysis

- Flare spec sheet
- TCEQ – (APD-ID 6v1, Revised 03/21) NSR Emission Calculations
- 40 CFR 98 Subpart A Table A-1, 40 CFR 98 Subpart C Tables C-1 & C-2

**TEG Dehydrator (Units V2/F2)**

- Inlet gas analysis
- BR&E ProMax simulation

**Heaters (Unit H2 and H3)**

- AP-42 Section 1.4
- 40 CFR 98 Subpart A Table A-1, 40 CFR 98 Subpart C Tables C-1 & C-2

**Fugitives (FUG)**

- Gas analysis and liquids analysis
- Table 2-4 of the EPA Protocol for Equipment Leak Emission Estimates, November 1995

**Haul Road Emissions (HAUL)**

- Haul road emissions are calculated using constants from AP-42, Table 13.2.2-2 and methodology outlined in AP-42 Chapter 13.2.2, Unp*aved Roads*.

# MANLEY GAS TESTING, INC.

P.O. DRAWER 193
ODESSA, TEXAS 79760
OFFICE(432)367-3024 FAX(432)367-1166 E-MAIL: MANLEYGAST@AOL.COM

CHARGE..... 150 - 0
REC. NO. .... 1
TEST NUMBER.. 28749

DATE SAMPLED..... 04-30-24
DATE RUN..... 05-03-24
EFFEC. DATE..... 05-01-24

STATION NO. ... 06512004

PRODUCER ..... DMS

SAMPLE NAME.... BKU INLET TYPE: SPOT

RECEIVED FROM.. FRONTIER FIELD SERVICES LLC - MALJAMAR

FLOWING PRESSURE ..... 48.0 PSIA FLOWING TEMPERATURE ..... 69 F

SAMPLED BY: DD CYLINDER NO. ...

## FRACTIONAL ANALYSIS
CALCULATED @ 14.650 PSIA AND 60F

| | MOL% | GPM (REAL) |
|---|---|---|
| HYDROGEN SULFIDE... | 0.400 | |
| NITROGEN..... | 2.391 | |
| CARBON DIOXIDE..... | 0.943 | |
| METHANE..... | 72.807 | |
| ETHANE..... | 12.792 | 3.416 |
| PROPANE..... | 6.385 | 1.756 |
| ISO-BUTANE..... | 0.778 | 0.254 |
| NOR-BUTANE..... | 1.867 | 0.587 |
| ISO-PENTANE..... | 0.447 | 0.164 |
| NOR-PENTANE..... | 0.442 | 0.160 |
| HEXANES +..... | 0.748 | 0.327 |
| TOTALS ..... | 100.000 | 6.664 |

H2S PPMV = 4000

'Z' FACTOR (DRY) = 0.9960
'Z' FACTOR (WET) = 0.9956

CALC. MOL. WT. = 22.44

..CALCULATED SPECIFIC GRAVITIES..

REAL, DRY ..... 0.7776

REAL, WET ..... 0.7752

..CALCULATED GROSS HEATING VALUES..

BTU/CF - REAL, DRY .... 1284

BTU/CF - REAL, WET .... 1263

DISTRIBUTION AND REMARKS:

N

ANALYZED BY: JT
** R **
~ HE ~

APPROVED:

MANLEY GAS TESTING INC.
120 DOCK ROAD - ODESSA, TEXAS-432-367-3024

A SAMPLE OF 06512004 DMS - BKU INLET

CAPILLARY EXTENDED
C-6+ ANALYSIS
(NORMALIZED TO 100%)



| COMPONENT | MOL% | WT% |
|---|---|---|
| NEOHEXANE | 0.312 | 0.301 |
| 2,3DMC4+CYC5 | 4.759 | 3.996 |
| 2MPENTANE | 11.231 | 10.836 |
| 3MPENTANE | 6.289 | 6.068 |
| N-HEXANE | 12.644 | 12.198 |
| 2,2 DMPENTANE | 0.117 | 0.132 |
| MCYCLOPENTANE | 8.600 | 8.103 |
| 2,4 DMPENTANE | 0.000 | 0.000 |
| 2,2,3 TMBUTANE | 0.051 | 0.058 |
| BENZENE | 11.406 | 9.975 |
| 3,3 DMPENTANE | 0.000 | 0.000 |
| CYCLOHEXANE | 11.647 | 10.974 |
| 2MHEXANE | 1.863 | 2.090 |
| 2,3 DMPENTANE | 1.559 | 1.749 |
| 3MHEXANE | 2.379 | 2.669 |
| DIMCYCPENTANES(GROUPED) | 3.923 | 4.314 |
| N-HEPTANE | 4.209 | 4.722 |
| MCYCLOHEXANE | 8.200 | 9.014 |
| 2,2DMHEXANE | 0.485 | 0.620 |
| 2,3,3TMPENTANE | 0.000 | 0.000 |
| TOLUENE | 4.961 | 5.117 |
| 2,3DMHEXANE | 0.256 | 0.328 |
| 2M3EPENTANE | 0.000 | 0.000 |
| 2MHEPTANE | 1.077 | 1.378 |
| 4MHEPTANE | 0.000 | 0.000 |
| 3,4DMHEXANE | 0.091 | 0.116 |
| 3MHEPTANE | 0.463 | 0.592 |
| TRIMCYCPENTANES(GROUPED) | 0.065 | 0.081 |
| DIMCYCHEXANES(GROUPED) | 0.777 | 0.976 |
| N-OCTANE | 0.620 | 0.793 |
| 2,3,5TRIMHEXANE | 0.015 | 0.022 |
| 2,2,4TRIMHEXANE | 0.038 | 0.055 |
| 2,2DIMHEPTANE | 0.006 | 0.008 |
| 2,2,3TRIMHEXANE | 0.010 | 0.015 |
| 2,5DIMHEPTANE | 0.010 | 0.014 |
| I-NONANE | 0.000 | 0.000 |
| 2,4DIMHEPTANE | 0.000 | 0.000 |
| E-CYCHEXANE | 0.174 | 0.218 |
| 3,3DIMHEPTANE | 0.090 | 0.129 |
| 2,6DIMHEPTANE | 0.000 | 0.000 |
| E-BENZENE | 0.047 | 0.055 |
| 2,3DIMHEPTANE | 0.000 | 0.000 |
| M-XYLENE | 0.350 | 0.416 |
| P-XYLENE | 0.000 | 0.000 |
| 3,4DIMHEPTANE | 0.055 | 0.079 |
| 3EHEPTANE | 0.000 | 0.000 |

MANLEY GAS TESTING INC.
120 DOCK ROAD - ODESSA, TEXAS-432-367-3024

A SAMPLE OF 06512004 DMS - BKU INLET

CAPILLARY EXTENDED
C-6+ ANALYSIS
(NORMALIZED TO 100%)



| COMPONENT | MOL% | WT% |
|---|---|---|
| 4MOCTANE | 0.097 | 0.139 |
| 3MOCTANE | 0.000 | 0.000 |
| O-XYLENE | 0.040 | 0.048 |
| IC4CYCPENTANE | 0.014 | 0.019 |
| N-NONANE | 0.122 | 0.175 |
| I-DECANE | 0.010 | 0.016 |
| 1E1MCYC6 | 0.010 | 0.015 |
| IC3BENZENE | 0.034 | 0.046 |
| 2,3DMOCTANE | 0.071 | 0.113 |
| 3EOCTANE | 0.161 | 0.257 |
| NC4CYCC6 | 0.022 | 0.035 |
| NC3BENZENE | 0.039 | 0.053 |
| M+P E-TOLUENE | 0.069 | 0.093 |
| O-E-TOLUENE | 0.042 | 0.056 |
| 2,2DMOCTANE | 0.065 | 0.103 |
| TERTBUTYLBENZENE | 0.014 | 0.020 |
| 1,3,5TMBENZENE | 0.004 | 0.006 |
| 3,6DMOCTANE | 0.007 | 0.011 |
| IC4BENZENE | 0.042 | 0.063 |
| N-DECANE | 0.038 | 0.060 |
| UNKNOWN C-6'S | 0.000 | 0.000 |
| UNKNOWN C-7'S | 0.000 | 0.000 |
| UNKNOWN C-8'S | 0.015 | 0.019 |
| UNKNOWN C-9'S | 0.297 | 0.427 |
| UNK C10'S THRU C14'S | 0.008 | 0.015 |
| UNK C15'S THRU C16'S | 0.000 | 0.000 |
| UNK C17'S THRU C20'S | 0.000 | 0.000 |
| TOTAL | 100.000 | 100.000 |

COMPONENT GROUPINGS (PARAFFINS-NAPTHENES-AROMATICS)

| | MOL% | WT% |
|---|---|---|
| TOTAL C-6'S | 66.888 | 62.451 |
| TOTAL C-7'S | 27.262 | 29.865 |
| TOTAL C-8'S | 4.460 | 5.640 |
| TOTAL C-9'S | 0.952 | 1.351 |
| TOTAL C-10'S | 0.430 | 0.678 |
| TOTAL C-11 THRU C-14 | 0.008 | 0.015 |
| TOTAL C-15 THRU C-16 | 0.000 | 0.000 |
| TOTAL C-17 THRU C-20 | 0.000 | 0.000 |
| TOTAL | 100.000 | 100.000 |

* C6+ CHARACTERIZATION

MOL.WEIGHT = 89.320
SP.GRAVITY = 3.0840
BTU/FT3(DRY) = 4746.789
BTU/FT3(WET) = 4665.072
CU.FT./GAL = 26.214
GAL/CU.FT. = 0.038147
MOL% C6+ AROMATICS = 17.048

PANTECHS LABORATORIES

# ANALYSIScertificate

| | | | |
|---|---|---|---|
| OPERATOR | Kinetik | PRESS/TEMP | 5 psig/60 F |
| LOCATION | BKU Compressor Station | ATM TEMP | 60 F |
| SITE | Heater Treater | DATE/TIME | 03/06/2025 11:39 AM |
| SAMPLE POINT | Oil Leg of Heater Treater | COLLECTION BY | Cody Carson |
| METER ID | | SPOT/COMP | Spot |
| CONTAINER(S) | PLP17779 | BASE | 14.650 psi/60 F |

## FRACTIONAL:ASTM D8003; GPA 2103

| COMPOUND | FORMULA | MOL% | VOL% | WT% |
|---|---|---|---|---|
| NITROGEN | N2 | 0.0639 | 0.0170 | 0.0188 |
| CARBON DIOXIDE | CO2 | 0.0125 | 0.0052 | 0.0058 |
| HYDROGEN SULFIDE | H2S | 0.0000 | 0.0000 | 0.0000 |
| METHANE | C1 | 0.2041 | 0.0836 | 0.0344 |
| ETHANE | C2 | 0.4635 | 0.2995 | 0.1464 |
| PROPANE | C3 | 2.7915 | 1.8581 | 1.2930 |
| I-BUTANE | iC4 | 1.1572 | 0.9149 | 0.7065 |
| N-BUTANE | nC4 | 4.4261 | 3.3714 | 2.7023 |
| I-PENTANE | iC5 | 3.6839 | 3.2552 | 2.7920 |
| N-PENTANE | nC5 | 5.3581 | 4.6928 | 4.0608 |
| NEO PENTANE (2,2 dimethylpropane) | C5H12 | 0.0177 | 0.0164 | 0.0134 |
| **HEXANES** | | **16.2278** | **14.6151** | **14.2922** |
| BENZENE | C6H6 | 4.6945 | 3.1743 | 3.8520 |
| N-HEXANE | C6H14 | 5.2407 | 5.2069 | 4.7440 |
| OTHER HEXANES | C6Hx | 6.2926 | 6.2339 | 5.6962 |
| **HEPTANES** | | **30.2910** | **28.2585** | **29.4693** |
| 2,2,4-TRIMETHYLPENTANE | C7H14 | 1.5798 | 1.5707 | 1.6294 |
| TOLUENE | C7H8 | 7.2410 | 5.8589 | 7.0083 |
| OTHER HEPTANES | C7Hx | 21.4702 | 20.8289 | 20.8316 |
| **OCTANES** | | **24.1212** | **26.1281** | **27.1395** |
| ETHYLBENZENE | C8H10 | 1.9992 | 1.8643 | 2.2296 |
| M+P XYLENE | C8H10 | 1.7356 | 1.6237 | 1.9356 |
| O-XYLENE | C8H10 | 0.5604 | 0.5148 | 0.6250 |
| OTHER OCTANES | C8Hx | 19.8260 | 22.1253 | 22.3493 |
| NONANES | C9Hx | 5.5794 | 6.9576 | 7.1663 |
| DECANES PLUS | C10+ | 5.6021 | 9.5266 | 10.1593 |
| **TOTALS:** | | **100.0000** | **100.0000** | **100.0000** |

*Value of "0.0000" interpreted as below detectable limit.*

## CALCULATED PROPERTIES

| FRACTION | MOLECULAR WT | VP 100F, PSI | RVPE, PSI | REL DEN (60/60) | API GRAVITY, 60F |
|---|---|---|---|---|---|
| **TOTAL SAMPLE** | 95.1979 | 13.5283 | 12.4105 | 0.7337 | 61.4 |
| **C6+ ONLY** | 102.6501 | 2.2230 | | 0.7562 | 55.61 |
| **C10+ ONLY** | 189.6037 | 0.0259 | | 0.8087 | 43.47 |

## DECANES+detail

| C10 - C30+ | GROUP | MOL% | VOL% | WT% |
|---|---|---|---|---|
| **DECANES** | C10 | 2.6593 | 3.4528 | 3.7126 |
| **UNDECANES** | C11 | 0.9530 | 1.2438 | 1.3991 |
| **DODECANES** | C12 | 0.4180 | 0.6465 | 0.7002 |
| **TRIDECANES** | C13 | 0.2564 | 0.4759 | 0.4965 |
| **TETRADECANES** | C14 | 0.1847 | 0.3657 | 0.3849 |
| **PENTADECANES** | C15 | 0.1727 | 0.3638 | 0.3854 |
| **HEXADECANES** | C16 | 0.1207 | 0.2692 | 0.2871 |
| **HEPTADECANES** | C17 | 0.1185 | 0.2755 | 0.2951 |
| **OCTADECANES** | C18 | 0.1072 | 0.2626 | 0.2828 |
| **NONADECANES** | C19 | 0.0891 | 0.2277 | 0.2462 |
| **EICOSANES** | C20 | 0.0707 | 0.1881 | 0.2041 |
| **HENEICOSANES** | C21 | 0.0587 | 0.1646 | 0.1794 |
| **DOCOSANES** | C22 | 0.0453 | 0.1327 | 0.1451 |
| **TRICOSANES** | C23 | 0.0360 | 0.1095 | 0.1201 |
| **TETRACOSANES** | C24 | 0.0290 | 0.0915 | 0.1007 |
| **PENTACOSANES** | C25 | 0.0201 | 0.0659 | 0.0744 |
| **HEXACOSANES** | C26 | 0.0189 | 0.0640 | 0.0726 |
| **HEPTACOSANES** | C27 | 0.0034 | 0.0120 | 0.0137 |
| **OCTACOSANES** | C28 | 0.0028 | 0.0100 | 0.0115 |
| **NONACOSANES** | C29 | 0.0037 | 0.0137 | 0.0157 |
| **TRIACONTANE PLUS** | C30+ | 0.2340 | 1.0911 | 1.0324 |
| **DECANES PLUS:** | **C10+** | **5.6021** | **9.5266** | **10.1593** |

## SIMULATEDdistillation

| LIGHT ENDS | TEMP | VOL% | TOTAL VOL % |
|---|---|---|---|
| C1-C4,N2,CO2,H2S | <97 F | 6.5497 | 6.5497 |

| BOILING POINT GROUP | TEMP | VOL% | TOTAL VOL % |
|---|---|---|---|
| C5 | 97 F | 7.9480 | 7.9480 |
| C6 | 156 F | 14.6151 | 22.5631 |
| C7 | 208 F | 28.2585 | 50.8216 |
| C8 | 259 F | 26.1281 | 76.9497 |
| C9 | 304 F | 6.9576 | 83.9073 |
| C10 | 345 F | 3.4528 | 87.3601 |
| C11 | 385 F | 1.2438 | 88.6039 |
| C12 | 421 F | 0.6465 | 89.2504 |
| C13 | 455 F | 0.4759 | 89.7263 |
| C14 | 489 F | 0.3657 | 90.0920 |
| C15 | 520 F | 0.3638 | 90.4558 |
| C16 | 549 F | 0.2692 | 90.7250 |
| C17 | 576 F | 0.2755 | 91.0005 |
| C18 | 601 F | 0.2626 | 91.2631 |
| C19 | 626 F | 0.2277 | 91.4908 |
| C20 | 651 F | 0.1881 | 91.6789 |
| C21 | 674 F | 0.1646 | 91.8435 |
| C22 | 694 F | 0.1327 | 91.9762 |
| C23 | 716 F | 0.1095 | 92.0857 |
| C24 | 736 F | 0.0915 | 92.1772 |
| C25 | 756 F | 0.0659 | 92.2431 |
| C26 | 774 F | 0.0640 | 92.3071 |
| C27 | 792 F | 0.0120 | 92.3191 |
| C28 | 808 F | 0.0100 | 92.3291 |
| C29 | 825 F | 0.0137 | 92.3428 |
| C30+ | 840 F | 1.0911 | 93.4339 |

# MANLEY GAS TESTING, INC.

P.O. DRAWER 193 ODESSA, TEXAS 79760
OFFICE(432)367-3024 FAX(432)367-1166 E-MAIL: MANLEYGAST@AOL.COM

CHARGE..... 160
REC. NO. .... 12
TEST NUMBER.. 32754

DATE SAMPLED..... 01-12-26 14:18
DATE RUN..... 01-14-26 15:05
EFFEC. DATE..... 01-01-26
CALIBRATION DATE... 01-14-26
INSTRUMENT ID ..... GC-INFICON 3000A

SAMPLE TYPE ..... SPOT
HEAT TRACE USED.. NO
SAMPLE POINT .... RECEIPT PT.
SAMPLING METHOD.. FILL&PURGE
STATION NO. ..... 18G006334
PROPERTY ID ..... N/A
PRODUCER ..... KINETIK
SAMPLE NAME..... BKU COMPRESSOR PURCHASE FUEL
FLOW RATE(MSCFD) 1217
RECEIVED FROM ... KINETIK - HOUSTON TX

FLOWING PRESS. 124 PSIG FLOWING TEMP. 59 F AMBIENT TEMP. 54 F
SAMPLED BY: 258 CYLINDER NO.. JT

## FRACTIONAL ANALYSIS
## CALCULATED @ 14.650 PSIA AND 60F

| | UN-NORM MOL% | NORM MOL% | GPM (REAL) | |
|---|---|---|---|---|
| HYDROGEN SULFIDE. | 0.0000 | 0.0000 | | |
| NITROGEN..... | 3.3980 | 3.4614 | | |
| CARBON DIOXIDE... | 0.0350 | 0.0357 | | |
| METHANE..... | 93.7510 | 95.5006 | | |
| ETHANE..... | 0.9450 | 0.9626 | 0.256 | |
| PROPANE..... | 0.0370 | 0.0377 | 0.010 | |
| ISO-BUTANE..... | 0.0010 | 0.0010 | 0.000 | |
| NOR-BUTANE..... | 0.0010 | 0.0010 | 0.000 | |
| ISO-PENTANE..... | 0.0000 | 0.0000 | 0.000 | 'Z' FACTOR(DRY) = 0.9981 |
| NOR-PENTANE..... | 0.0000 | 0.0000 | 0.000 | 'Z' FACTOR(WET) = 0.9978 |
| HEXANES +..... | 0.0000 | 0.0000 | 0.000 | |
| TOTALS ..... | 98.1680 | 100.0000 | 0.266 | |

..CALCULATED SPECIFIC GRAVITIES..

IDEAL, DRY..... 0.5736
IDEAL, WET ..... 0.5744
REAL, DRY ..... 0.5745
REAL, WET ..... 0.5755

..CALCULATED GROSS HEATING VALUES..

BTU/CF - IDEAL, DRY .... 979.5
BTU/CF - IDEAL, WET .... 962.4
BTU/CF - REAL, DRY .... 981.4
BTU/CF - REAL, WET .... 964.5

DISTRIBUTION AND REMARKS:

E.MCCASLAND/J.TORREZ/J.AUCOIN/C.DYER/L.HAMILTON

ANALYZED BY: DD
** R **

APPROVED:

# Emission Control Application Data Sheet

**AEG**
2690 S COUNTY RD WEST
Odessa, TX 79766
Phone: 432 363-7889
Email: catalyst@alliedcomp.net

Customer: **Kinetik** Project: **BKU 311** Date: **12/16/2025**

Sales Person: **R.Haley** Site Elevation: **500** ft Contact: **Joel Collier** Order/Quote #:

**Engine Data:**

Engine Model: **G3516 tale** Speed: **1400** RPM

Fuel & Operating Type: **Natural Gas Lean Burn** Engine Power: **1339** Hp

Exhaust Flow Rate: **7651** **acfm** Exhaust Temperature: **851** °F
**12999** **$m^3$/hr** **455** °C
**13673** **lbs/hr**

**Emission:**

Min. Temp. at Core Face: **800** °F **427** °C Catalyst Type: **CO Oxidation**

Max. Temp. at Core Face: **1215** °F **657** °C Catalyst Part # T1-2415RH353 (24L x 15W x 3.5D)

No. Elements 3
Blanks 0

| | Pollutant | | | | |
|---|---|---|---|---|---|
| | NOx | CO | NMHC/VOC | H2CO | |
| Engine Out / Pre Catalyst: | **2** | **1.83** | **0.3** | **.19** | g/bhp-hr |
| Post Catalyst: | 2.00 | 0.55 | 0.15 | 0.057 | g/bhp-hr |
| | 0.00% | 70.00% | 50.00% | 70.00% | |
| | 5.904 | 1.621 | 0.443 | .0154 | lb/hr |
| | 25.86 | 7.10 | 1.94 | 0.68 | tons/year operation |
| | 267.46 | 120.60 | 20.93 | 11.31 | ppmv |
| | 75.84 | 34.20 | 5.93 | 3.21 | ppmvd @ 15% O2 |

**8760** hr/year

**Warranty & Notes:**

- **If Pre-Emission levels are not as noted above, contact AEG for a re-quote.**
- To achieve Post Emissions levels detailed above, exhaust temperature and Pre-Emission data must be as specified.
- Maximum allowable exhaust temperature at core face is 1250°F.
- If applicable, the engine will require an air/fuel ratio controller to meet above emission levels. For Rich Burn engines λ must be 0.96 - 0.99.
- Catalyst cleaning/regeneration required, if initial backpressure increases by 2" of WC.
- Engine operation to be stable and reproducible.
- Maximum lubrication oil consumption rate to be less than 0.0015 lb/bhp/hr.
- Lube oil sulfate ash contents should not exceed 0.5%.
- Phosphorus and/or Zinc should not exceed 5 ppmv in the exhaust stream.
- A high temperature alarm/shutdown to be maintained at downstream of catalyst at 1300°F.
- Fuel not to contain heavy or transition metals such as Pb, Ar, Zn, Cu, Sn, Fe, Ba, Ni, Cr etc.
- Chlorinated or Silicone containing compounds in the exhaust not to exceed 1 ppmv.
- Sulfur compounds in the exhaust gas stream not to exceed 25 ppmv.
- Performance guarantee is voided should the catalyst become masked or de-activated by any contaminant in the exhaust stream.
- Engine to be maintained and operated in accordance within manufacturer's recommended practice.
- Under no condition will AEG assume any contingent liabilities.
- Operating manual is available from a AEG sales representative.
- AEG's standard one year warranty applies to the housing.

# Emission Control Application Data Sheet

**AEG**
2690 S COUNTY RD WEST
Odessa, TX 79766
Phone: 432 363-7889
Email: catalyst@alliedcomp.net

Customer: **Kinetik** Project: **BKU 312** Date: **12/16/2025**

Sales Person: **R.Haley** Site Elevation: **500** ft Contact: **Joel Collier** Order/Quote #:

**Engine Data:**

Engine Model: **G3516 tale** Speed: **1400** RPM

Fuel & Operating Type: **Natural Gas Lean Burn** Engine Power: **1339** Hp

Exhaust Flow Rate: **7651** **acfm** Exhaust Temperature: **851** °F
**12999** **$m^3$/hr** **455** °C
**13673** **lbs/hr**

**Emission:**

Min. Temp. at Core Face: **800** °F **427** °C Catalyst Type: **CO Oxidation**

Max. Temp. at Core Face: **1215** °F **657** °C Catalyst Part # T1-2415RH353 (24L x 15W x 3.5D)

No. Elements 3
Blanks 0

| | Pollutant | | | | |
|---|---|---|---|---|---|
| | NOx | CO | NMHC/VOC | H2CO | |
| Engine Out / Pre Catalyst: | **2** | **1.83** | **0.3** | **.19** | g/bhp-hr |
| Post Catalyst: | 2.00 | 0.55 | 0.15 | 0.057 | g/bhp-hr |
| | 0.00% | 70.00% | 50.00% | 70.00% | |
| | 5.904 | 1.621 | 0.443 | .0154 | lb/hr |
| | 25.86 | 7.10 | 1.94 | 0.68 | tons/year operation |
| | 267.46 | 120.60 | 20.93 | 11.31 | ppmv |
| | 75.84 | 34.20 | 5.93 | 3.21 | ppmvd @ 15% O2 |

**8760** hr/year

**Warranty & Notes:**

- **If Pre-Emission levels are not as noted above, contact AEG for a re-quote.**
- To achieve Post Emissions levels detailed above, exhaust temperature and Pre-Emission data must be as specified.
- Maximum allowable exhaust temperature at core face is 1250°F.
- If applicable, the engine will require an air/fuel ratio controller to meet above emission levels. For Rich Burn engines λ must be 0.96 - 0.99.
- Catalyst cleaning/regeneration required, if initial backpressure increases by 2" of WC.
- Engine operation to be stable and reproducible.
- Maximum lubrication oil consumption rate to be less than 0.0015 lb/bhp/hr.
- Lube oil sulfate ash contents should not exceed 0.5%.
- Phosphorus and/or Zinc should not exceed 5 ppmv in the exhaust stream.
- A high temperature alarm/shutdown to be maintained at downstream of catalyst at 1300°F.
- Fuel not to contain heavy or transition metals such as Pb, Ar, Zn, Cu, Sn, Fe, Ba, Ni, Cr etc.
- Chlorinated or Silicone containing compounds in the exhaust not to exceed 1 ppmv.
- Sulfur compounds in the exhaust gas stream not to exceed 25 ppmv.
- Performance guarantee is voided should the catalyst become masked or de-activated by any contaminant in the exhaust stream.
- Engine to be maintained and operated in accordance within manufacturer's recommended practice.
- Under no condition will AEG assume any contingent liabilities.
- Operating manual is available from a AEG sales representative.
- AEG's standard one year warranty applies to the housing.

# Emission Control Application Data Sheet

**AEG**
2690 S COUNTY RD WEST
Odessa, TX 79766
Phone: 432 363-7889
Email: catalyst@alliedcomp.net

Customer: **Kinetik** Project: **BKU 313** Date: **12/16/2025**

Sales Person: **R.Haley** Site Elevation: **500** ft Contact: **Joel Collier** Order/Quote #:

**Engine Data:**

Engine Model: **G3516 tale** Speed: **1400** RPM

Fuel & Operating Type: **Natural Gas Lean Burn** Engine Power: **1339** Hp

Exhaust Flow Rate: **7651** **acfm** Exhaust Temperature: **851** °F
**12999** **$m^3$/hr** **455** °C
**13673** **lbs/hr**

**Emission:**

Min. Temp. at Core Face: **800** °F **427** °C Catalyst Type: **CO Oxidation**

Max. Temp. at Core Face: **1215** °F **657** °C Catalyst Part # T1-2415RH353 (24L x 15W x 3.5D)

No. Elements 3
Blanks 0

| | Pollutant | | | | |
|---|---|---|---|---|---|
| | NOx | CO | NMHC/VOC | H2CO | |
| Engine Out / Pre Catalyst: | **2** | **1.83** | **0.3** | **.19** | g/bhp-hr |
| Post Catalyst: | 2.00 | 0.55 | 0.15 | 0.057 | g/bhp-hr |
| | 0.00% | 70.00% | 50.00% | 70.00% | |
| | 5.904 | 1.621 | 0.443 | .0154 | lb/hr |
| | 25.86 | 7.10 | 1.94 | 0.68 | tons/year operation **8760** hr/year |
| | 267.46 | 120.60 | 20.93 | 11.31 | ppmv |
| | 75.84 | 34.20 | 5.93 | 3.21 | ppmvd @ 15% O2 |

**Warranty & Notes:**

- **If Pre-Emission levels are not as noted above, contact AEG for a re-quote.**
- To achieve Post Emissions levels detailed above, exhaust temperature and Pre-Emission data must be as specified.
- Maximum allowable exhaust temperature at core face is 1250°F.
- If applicable, the engine will require an air/fuel ratio controller to meet above emission levels. For Rich Burn engines λ must be 0.96 - 0.99.
- Catalyst cleaning/regeneration required, if initial backpressure increases by 2" of WC.
- Engine operation to be stable and reproducible.
- Maximum lubrication oil consumption rate to be less than 0.0015 lb/bhp/hr.
- Lube oil sulfate ash contents should not exceed 0.5%.
- Phosphorus and/or Zinc should not exceed 5 ppmv in the exhaust stream.
- A high temperature alarm/shutdown to be maintained at downstream of catalyst at 1300°F.
- Fuel not to contain heavy or transition metals such as Pb, Ar, Zn, Cu, Sn, Fe, Ba, Ni, Cr etc.
- Chlorinated or Silicone containing compounds in the exhaust not to exceed 1 ppmv.
- Sulfur compounds in the exhaust gas stream not to exceed 25 ppmv.
- Performance guarantee is voided should the catalyst become masked or de-activated by any contaminant in the exhaust stream.
- Engine to be maintained and operated in accordance within manufacturer's recommended practice.
- Under no condition will AEG assume any contingent liabilities.
- Operating manual is available from a AEG sales representative.
- AEG's standard one year warranty applies to the housing.

# Emission Control Application Data Sheet

**AEG**
2690 S COUNTY RD WEST
Odessa, TX 79766
Phone: 432 363-7889
Email: catalyst@alliedcomp.net

Customer: **Kinetik** Project: **BKU 314** Date: **12/16/2025**

Sales Person: **R.Haley** Site Elevation: **500** ft Contact: **Joel Collier** Order/Quote #:

**Engine Data:**

Engine Model: **G3516 tale** Speed: **1400** RPM

Fuel & Operating Type: **Natural Gas Lean Burn** Engine Power: **1339** Hp

Exhaust Flow Rate: **7651** **acfm** Exhaust Temperature: **851** °F
**12999** **$m^3$/hr** **455** °C
**13673** **lbs/hr**

**Emission:**

Min. Temp. at Core Face: **800** °F **427** °C Catalyst Type: **CO Oxidation**

Max. Temp. at Core Face: **1215** °F **657** °C Catalyst Part # T1-2415RH353 (24L x 15W x 3.5D)

No. Elements 3
Blanks 0

| | Pollutant | | | | |
|---|---|---|---|---|---|
| | NOx | CO | NMHC/VOC | H2CO | |
| Engine Out / Pre Catalyst: | **2** | **1.83** | **0.3** | **.19** | g/bhp-hr |
| Post Catalyst: | 2.00 | 0.55 | 0.15 | 0.057 | g/bhp-hr |
| | 0.00% | 70.00% | 50.00% | 70.00% | |
| | 5.904 | 1.621 | 0.443 | .0154 | lb/hr |
| | 25.86 | 7.10 | 1.94 | 0.68 | tons/year operation |
| | 267.46 | 120.60 | 20.93 | 11.31 | ppmv |
| | 75.84 | 34.20 | 5.93 | 3.21 | ppmvd @ 15% O2 |

**8760** hr/year

**Warranty & Notes:**

- **If Pre-Emission levels are not as noted above, contact AEG for a re-quote.**
- To achieve Post Emissions levels detailed above, exhaust temperature and Pre-Emission data must be as specified.
- Maximum allowable exhaust temperature at core face is 1250°F.
- If applicable, the engine will require an air/fuel ratio controller to meet above emission levels. For Rich Burn engines λ must be 0.96 - 0.99.
- Catalyst cleaning/regeneration required, if initial backpressure increases by 2" of WC.
- Engine operation to be stable and reproducible.
- Maximum lubrication oil consumption rate to be less than 0.0015 lb/bhp/hr.
- Lube oil sulfate ash contents should not exceed 0.5%.
- Phosphorus and/or Zinc should not exceed 5 ppmv in the exhaust stream.
- A high temperature alarm/shutdown to be maintained at downstream of catalyst at 1300°F.
- Fuel not to contain heavy or transition metals such as Pb, Ar, Zn, Cu, Sn, Fe, Ba, Ni, Cr etc.
- Chlorinated or Silicone containing compounds in the exhaust not to exceed 1 ppmv.
- Sulfur compounds in the exhaust gas stream not to exceed 25 ppmv.
- Performance guarantee is voided should the catalyst become masked or de-activated by any contaminant in the exhaust stream.
- Engine to be maintained and operated in accordance within manufacturer's recommended practice.
- Under no condition will AEG assume any contingent liabilities.
- Operating manual is available from a AEG sales representative.
- AEG's standard one year warranty applies to the housing.

# Emission Control Application Data Sheet

**AEG**
2690 S COUNTY RD WEST
Odessa, TX 79766
Phone: 432 363-7889
Email: catalyst@alliedcomp.net

| | | | | | |
|---|---|---|---|---|---|
| Customer: | **Kinetik** | Project: | **BKU 315** | Date: | **12/16/2025** |
| Sales Person: | **R.Haley** | Site Elevation: | 3652 | **Joel Collier** | Order/Quote #: |

**Engine Data:**

| | | | | | |
|---|---|---|---|---|---|
| Engine Model: | **G3516 ULB** | | Speed: | **1400** | RPM |
| Fuel & Operating Type: | **Natural Gas Lean Burn** | | Engine Power: | **1227** | Hp |
| Exhaust Flow Rate: | **7343** | **acfm** | Exhaust Temperature: | **870** | °F |
| | **12476** | **$m^3$/hr** | | **466** | °C |
| | **12935** | **lbs/hr** | | | |

**Emission:**

Min. Temp. at Core Face: **800** °F **427** °C
Max. Temp. at Core Face: **1215** °F **657** °C
Catalyst Type: **CO Oxidation**
Catalyst Part # T1-2415RH353 (24L x 15W x 3.5D)

| | |
|---|---|
| No. Elements | 3 |
| Blanks | 0 |

| | Pollutant | | | | | |
|---|---|---|---|---|---|---|
| | NOx | CO | NMHC/VOC | H2CO | | |
| Engine Out / Pre Catalyst: | **0.5** | **2.4** | **0.5** | **0.19** | g/bhp-hr | |
| Post Catalyst: | 0.50 | 0.60 | 0.18 | 0.048 | g/bhp-hr | |
| | 0.00% | 75.00% | 65.00% | 75.00% | | |
| | 1.353 | 1.623 | 0.473 | 0.128 | lb/hr | |
| | 5.92 | 7.11 | 2.07 | 0.56 | tons/year operation | **8760** hr/year |
| | 64.77 | 127.67 | 23.65 | 9.43 | ppmv | |
| | 18.37 | 36.20 | 6.71 | 2.68 | ppmvd @ 15% O2 | |

**Warranty & Notes:**

- **If Pre-Emission levels are not as noted above, contact AEG for a re-quote.**
- To achieve Post Emissions levels detailed above, exhaust temperature and Pre-Emission data must be as specified.
- Maximum allowable exhaust temperature at core face is 1250°F.
- If applicable, the engine will require an air/fuel ratio controller to meet above emission levels. For Rich Burn engines λ must be 0.96 - 0.99.
- Catalyst cleaning/regeneration required, if initial backpressure increases by 2" of WC.
- Engine operation to be stable and reproducible.
- Maximum lubrication oil consumption rate to be less than 0.0015 lb/bhp/hr.
- Lube oil sulfate ash contents should not exceed 0.5%.
- Phosphorus and/or Zinc should not exceed 5 ppmv in the exhaust stream.
- A high temperature alarm/shutdown to be maintained at downstream of catalyst at 1300°F.
- Fuel not to contain heavy or transition metals such as Pb, Ar, Zn, Cu, Sn, Fe, Ba, Ni, Cr etc.
- Chlorinated or Silicone containing compounds in the exhaust not to exceed 1 ppmv.
- Sulfur compounds in the exhaust gas stream not to exceed 25 ppmv.
- Performance guarantee is voided should the catalyst become masked or de-activated by any contaminant in the exhaust stream.
- Engine to be maintained and operated in accordance within manufacturer's recommended practice.
- Under no condition will AEG assume any contingent liabilities.
- Operating manual is available from a AEG sales representative.
- AEG's standard one year warranty applies to the housing.

# Emission Control Application Data Sheet

**AEG**
2690 S COUNTY RD WEST
Odessa, TX 79766
Phone: 432 363-7889
Email: catalyst@alliedcomp.net

| | | | | | |
|---|---|---|---|---|---|
| Customer: | **Kinetik** | Project: | **BKU 316** | Date: | **12/16/2025** |
| Sales Person: | **R.Haley** | Site Elevation: | 3652 | **Joel Collier** | Order/Quote #: |

**Engine Data:**

| | | | | | |
|---|---|---|---|---|---|
| Engine Model: | **G3516 ULB** | | Speed: | **1400** | RPM |
| Fuel & Operating Type: | **Natural Gas Lean Burn** | | Engine Power: | **1227** | Hp |
| Exhaust Flow Rate: | **7343** | **acfm** | Exhaust Temperature: | **870** | °F |
| | **12476** | **$m^3$/hr** | | **466** | °C |
| | **12935** | **lbs/hr** | | | |

**Emission:**

Min. Temp. at Core Face: **800** °F **427** °C
Max. Temp. at Core Face: **1215** °F **657** °C
Catalyst Type: **CO Oxidation**
Catalyst Part # T1-2415RH353 (24L x 15W x 3.5D)

| | |
|---|---|
| No. Elements | 3 |
| Blanks | 0 |

| | Pollutant | | | | | |
|---|---|---|---|---|---|---|
| | NOx | CO | NMHC/VOC | H2CO | | |
| Engine Out / Pre Catalyst: | **0.5** | **2.4** | **0.5** | **0.19** | g/bhp-hr | |
| Post Catalyst: | 0.50 | 0.60 | 0.18 | 0.048 | g/bhp-hr | |
| | 0.00% | 75.00% | 65.00% | 75.00% | | |
| | 1.353 | 1.623 | 0.473 | 0.128 | lb/hr | |
| | 5.92 | 7.11 | 2.07 | 0.56 | tons/year operation | **8760** hr/year |
| | 64.77 | 127.67 | 23.65 | 9.43 | ppmv | |
| | 18.37 | 36.20 | 6.71 | 2.68 | ppmvd @ 15% O2 | |

**Warranty & Notes:**

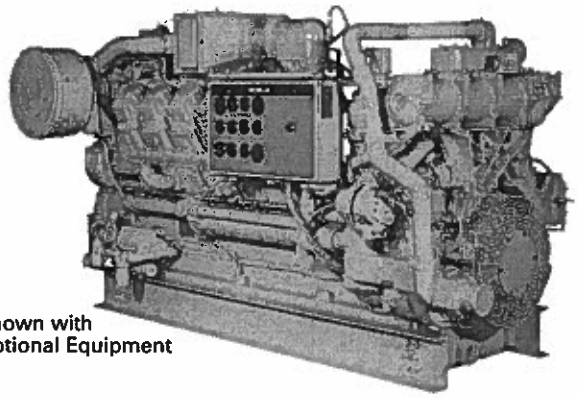
- **If Pre-Emission levels are not as noted above, contact AEG for a re-quote.**
- To achieve Post Emissions levels detailed above, exhaust temperature and Pre-Emission data must be as specified.
- Maximum allowable exhaust temperature at core face is 1250°F.
- If applicable, the engine will require an air/fuel ratio controller to meet above emission levels. For Rich Burn engines λ must be 0.96 - 0.99.
- Catalyst cleaning/regeneration required, if initial backpressure increases by 2" of WC.
- Engine operation to be stable and reproducible.
- Maximum lubrication oil consumption rate to be less than 0.0015 lb/bhp/hr.
- Lube oil sulfate ash contents should not exceed 0.5%.
- Phosphorus and/or Zinc should not exceed 5 ppmv in the exhaust stream.
- A high temperature alarm/shutdown to be maintained at downstream of catalyst at 1300°F.
- Fuel not to contain heavy or transition metals such as Pb, Ar, Zn, Cu, Sn, Fe, Ba, Ni, Cr etc.
- Chlorinated or Silicone containing compounds in the exhaust not to exceed 1 ppmv.
- Sulfur compounds in the exhaust gas stream not to exceed 25 ppmv.
- Performance guarantee is voided should the catalyst become masked or de-activated by any contaminant in the exhaust stream.
- Engine to be maintained and operated in accordance within manufacturer's recommended practice.
- Under no condition will AEG assume any contingent liabilities.
- Operating manual is available from a AEG sales representative.
- AEG's standard one year warranty applies to the housing.

CATERPILLAR®

# Gas Petroleum Engine

# G3516

1085-1340 bhp
809-1000 bkW
1200-1400 rpm



Shown with Optional Equipment

## CATERPILLAR® ENGINE SPECIFICATIONS

V-16, 4-Stroke-Cycle
Bore — in (mm) ..... 6.7 (170)
Stroke — in (mm)..... 7.5 (190)
Displacement — cu in (L)..... 4,210 (69)
Aspiration ..... Turbocharged-Aftercooled
Capacity for Liquids — U.S. gal (L)
Cooling System[1]..... 54 (205)
Lube Oil System (refill) ..... 112 (423)
Package Shipping Weight
(Dry) — lb (kg) ..... 17,670 (8015)

[1]Engine only.

## FEATURES

### ■ FULL RANGE OF ATTACHMENTS

- Wide range of bolt-on system expansion attachments, factory designed and tested

### ■ UNMATCHED PRODUCT SUPPORT OFFERED THROUGH WORLDWIDE CATERPILLAR DEALER NETWORK

- More than 1,500 dealer outlets
- Caterpillar factory-trained dealer technicians service every aspect of your petroleum engine
- 99.7% of parts orders filled within 24 hours — worldwide
- Caterpillar parts and labor warranty
- Preventive maintenance agreements available for "repair before failure" options
- Scheduled Oil Sampling (S•O•S℠) program matches your oil sample against Caterpillar set standards to determine:
  - internal engine component condition
  - presence of unwanted fluids
  - presence of combustion by-products

### ■ SINGLE-SOURCE SUPPLIER

- Caterpillar:
  - casts engine blocks, heads, cylinder liners, and flywheel housings
  - machines critical components
  - assembles complete engine

  Ownership of these manufacturing processes enables Caterpillar to produce high quality, dependable product.
- Factory-designed systems built at Caterpillar ISO certified facilities

### ■ G3516

- Standard and low emission ratings available
- Broad operating speed range and ability to burn a wide spectrum of gaseous fuels
- Cat® Electronic Ignition System (EIS)
- Robust diesel strength design provides prolonged life and lower owning and operating costs.

### ■ TESTING

- Prototype testing on every model:
  - proves computer design
  - verifies system torsional stability
  - functionality tests every model
- Every Caterpillar engine is dynamometer tested under full load to ensure proper engine performance.

### ■ WEB SITE

- For additional information on all your petroleum power requirements, visit www.cat-oilandgas.com.

CATERPILLAR FACILITIES ISO 9001 CERTIFIED

CE

## FACTORY INSTALLED STANDARD & OPTIONAL EQUIPMENT

| SYSTEM | STANDARD | OPTIONAL |
|---|---|---|
| **Air Inlet** | Air cleaner — intermediate-duty with service indicator | Remote air inlet adapters<br>Precleaner |
| **Charging System** | | Battery chargers<br>Charging alternators |
| **Control System** | Governor — 3161 mechanical, RH with positive lock (PA5319 & PA4871 only)<br>Air-fuel ratio control (LA2031 & LA2030 only | 2301A speed control governor<br>CSA 700 speed control governor<br>3161 mechanical governor<br>Vernier and positive locking control (PA5319 & PA4871 only) |
| **Cooling System** | Thermostats and housing<br>Jacket water pump<br>Aftercooler water pump<br>Aftercooler core for sea-air atmosphere<br>Aftercooler thermostats and housing | Aftercooler core<br>Thermostatic valve<br>Temperature switch<br>Connections<br>Expansion and overflow tank<br>Water level switch gauge |
| **Exhaust System** | Watercooled exhaust manifolds | Flexible fittings<br>Elbows<br>Flange<br>Flange and exhaust expanders<br>Rain cap<br>Mufflers |
| **Flywheel/ Flywheel Housing** | SAE No. 00 flywheel<br>SAE No. 00 flywheel housing<br>SAE standard rotation | |
| **Fuel System** | Gas pressure regulator<br>Natural gas carburetor | Low pressure gas conversions (PA5319 & PA4871 only)<br>Propane gas valve and jet kits (PA5319 & PA4871 only)<br>Air/fuel ratio interconnect wiring harness (LA2031 & LA2030)<br>Fuel filter |
| **Ignition System** | Caterpillar Electronic Ignition System (E.I.S.) | CSA ignition (PA5319 & PA4871)<br>CSA ignition with AFRC (LA2030, LA2031) |
| **Instrumentation** | Instrument panel, RH, 12 hole service meter | Alarm module<br>Customer communications modules<br>Instrument panel gauges (PA5319 & PA4871)<br>Instrument panel gauges f/u/w CSA electronic ignition system (LA2031 & LA2030) |
| **Lube System** | Crankcase breathers (top mounted)<br>Oil cooler<br>Oil filter, RH<br>Oil bypass filter<br>Shallow oil pan<br>Oil sampling valve | Oil bypass filter removal and oil pan accessories<br>Sump pump<br>Air prelube pump<br>Manual prelube pump<br>Turbo oil accumulator<br>Lubricating oil |
| **Mounting System** | Rails, engine mounting — 10 in. (254 mm) | Rails<br>Vibration isolators |
| **Power Take-Offs** | Front housing, two-sided | Front accessory drives<br>Auxiliary drive shafts and pulleys<br>Front stub shaft<br>Pulleys |
| **Protection** | Electronic shutoff system | PA5319 & PA4871: gas valve, explosion relief valves, status control box interconnect wiring harness |
| **Starting System** | | Air starting motor<br>Air pressure regulator<br>Air silencer<br>Electric air start controls<br>Electric starting motors — dual 24-volt<br>Starting aids<br>Battery sets (24-volt dry), cables, and rack |
| **General** | Paint, Caterpillar yellow<br>Vibration damper and guard (dual 23-inch) | Flywheel inertia weight<br>Guard removal<br>Engine barring group<br>Premium 8:1 pistons<br>Premium cylinder heads |

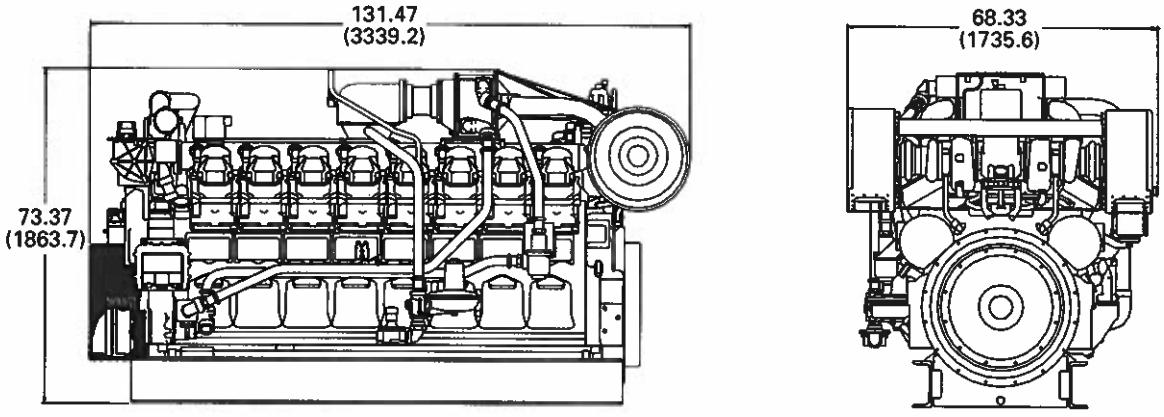
## TECHNICAL DATA

### G3516 Gas Petroleum Engine — 1200-1400 rpm

| | | DM0107-04 | DM5154-01 | DM5168-01 | DM5155-01 |
|---|---|---|---|---|---|
| **Arrangement Number** | | PA4871 w/o AFRC | LA2030 with AFRC | PA5319 w/o AFRC | PA2031 with AFRC |
| **Engine Power** | | | | | |
| @ 100% Load | bhp (bkW) | 1085 (809) | 1151 (859) | 1265 (944) | 1340 (1000) |
| @ 75% Load | bhp (bkW) | 814 (607) | 863 (644) | 949 (708) | 1005 (750) |
| **Engine Speed** | rpm | **1200** | **1200** | **1400** | **1400** |
| **SCAC Temperature** | °F (°C) | 129 (54) | 129 (54) | 129 (54) | 129 (54) |
| **Compression Ratio** | | 8.0:1 | 8.0:1 | 8.0:1 | 8.0:1 |
| **Emissions*** | | | | | |
| $NO_x$ | g/bhp-hr | 2.0 | 1.5 | 2.0 | 1.5 |
| CO | g/bhp-hr | 1.8 | 1.8 | 1.9 | 1.9 |
| Total Hydrocarbons | g/bhp-hr | 3.2 | 3.3 | 2.9 | 3.1 |
| **Fuel Consumption** | | | | | |
| @ 100% Load | Btu/bhp-hr (MJ/bkW-hr) | 7,450 (10.66) | 7,414 (10.49) | 7,548 (10.68) | 7,541 (10.67) |
| @ 75% Load | Btu/bhp-hr (MJ/bkW-hr) | 7,534 (10.93) | 7,591 (10.74) | 7,711 (10.91) | 7,803 (11.04) |
| **Heat Balance** | | | | | |
| Heat Rejection to Jacket Water | | | | | |
| @ 100% Load | Btu/mn (bkW) | 40,605 (687) | 41,174 (724) | 46,747 (822) | 47,828 (841) |
| @ 75% Load | Btu/mn (bkW) | 32,928 (546) | 33,838 (595) | 39,752 (699) | 39,980 (703) |
| Heat Rejection to Aftercooler | | | | | |
| @ 100% Load | Btu/mn (bkW) | 6,142 (109) | 7,564 (133) | 8,246 (145) | 10,350 (182) |
| @ 75% Load | Btu/mn (bkW) | 3,981 (62) | 5,118 (90) | 5,118 (90) | 6,995 (123) |
| Heat Rejection to Exhaust | | | | | |
| @ 100% Load | Btu/mn (bkW) | 37,307 (942) | 39,980 (703) | 45,155 (794) | 48,055 (845) |
| @ 75% Load | Btu/mn (bkW) | 26,956 (700) | 29,857 (525) | 32,359 (569) | 36,624 (644) |
| **Exhaust System** | | | | | |
| Exhaust Gas Flow Rate | | | | | |
| @ 100% Load | cfm ($m^3$/min) | 5,975 (180.0) | 6,413 (181.6) | 7,179 (203.3) | 7,684 (217.6) |
| @ 75% Load | cfm ($m^3$/min) | 4,368 (129.1) | 4,828 (136.7) | 5,177 (146.6) | 5,880 (166.5) |
| Exhaust Stack Temperature | | | | | |
| @ 100% Load | °F (°C) | 842 (462) | 840 (449) | 869 (465) | 855 (457) |
| @ 75% Load | °F (°C) | 820 (462) | 817 (436) | 862 (461) | 840 (449) |
| **Intake System** | | | | | |
| Air Inlet Flow Rate | | | | | |
| @ 100% Load | cfm ($m^3$/min) | 2,264 (72.8) | 2,433 (68.9) | 2,666 (75.5) | 2,885 (81.7) |
| @ 75% Load | cfm ($m^3$/min) | 1,681 (52.1) | 1,865 (52.8) | 1,928 (54.6) | 2,232 (63.2) |
| **Gas Pressure** | | High | High | High | High |

*at 100% load and speed

## GAS PETROLEUM ENGINE




| DIMENSIONS | | |
|---|---|---|
| Length | in (mm) | 131.47 (3339.2) |
| Width | in (mm) | 68.33 (1735.6) |
| Height | in (mm) | 73.37 (1863.7) |
| Shipping Weight | lb (kg) | 17,670 (8015) |

Note: General configuration not to be used for installation. See general dimension drawings for detail.

## RATING DEFINITIONS AND CONDITIONS

Engine performance is obtained in accordance with SAE J1995, ISO3046/1, BS5514/1, and DIN6271/1 standards.

Transient response data is acquired from an engine/generator combination at normal operating temperature and in accordance with ISO3046/1 standard ambient conditions. Also in accordance with SAE J1995, BS5514/1, and DIN6271/1 standard reference conditions.

**Conditions:** Power for gas engines is based on fuel having an LHV of 905 Btu/cu ft (33.74 kJ/L) at 29.91 in. Hg (101 kPa) and 59° F (15° C). Fuel rate is based on a cubic meter at 29.61 in. Hg (100 kPa) and 60.1° F (15.6° C). Air flow is based on a cubic foot at 29.61 in. Hg (100 kPa) and 77° F (25° C). Exhaust flow is based on a cubic foot at 29.61 in. Hg (100 kPa) and stack temperature.

TMI Reference No.: DM0107-04, DM5154-01, DM5168-01, DM5155-01
Materials and specifications are subject to change without notice.

The International System of Units (SI) is used in this publication.

LEHW0749-01 (4-01)

Printed in U.S.A.

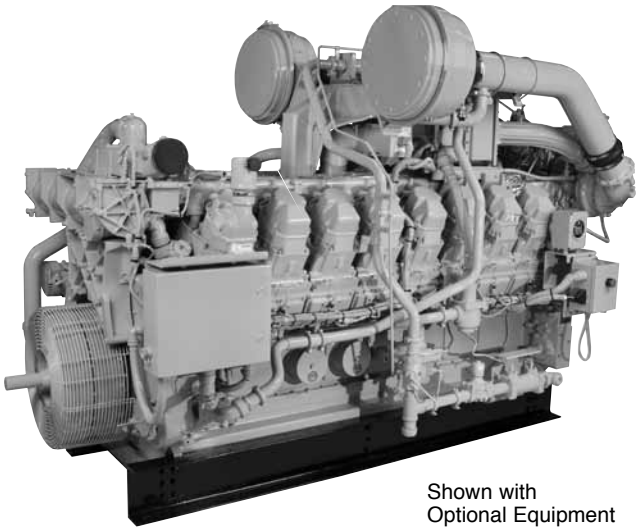
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CATERPILLAR®

# G3516B LE Gas Petroleum Engine

G3516B Engines
**1029 bkW (1380 bhp)**
**1400 rpm**

## 0.5 g/bhp-hr NOx or 1.0 g/bhp-hr NOx (NTE)



Shown with Optional Equipment

## CAT® ENGINE SPECIFICATIONS

**V-16, 4-Stroke-Cycle**

| | |
|---|---|
| Bore | 170 mm (6.7 in.) |
| Stroke | 190 mm (7.5 in.) |
| Displacement | 69.3 L (4230 cu. in.) |
| Aspiration | Turbocharged-2 Stage Aftercooled |
| Digital Engine Management | |
| Governor and Protection | Electronic (ADEM™ A3) |
| Combustion | Low Emission (Lean Burn) |
| Engine Weight, net dry (approx) | 8401 kg (18,520 lb) |
| Power Density | 8.2 kg/kW (13.4 lb/hp) |
| Power per Displacement | 19.9 bhp/L |
| Total Cooling System Capacity | 221.5 L (58.5 gal) |
| Jacket Water | 204.4 L (54 gal) |
| SCAC | 17 L (4.5 gal) |
| Lube Oil System (refill) | 424 L (112 gal) |
| Oil Change Interval | 1000 hour |
| Rotation (from flywheel end) | Counterclockwise |
| Flywheel and Flywheel Housing | SAE No. 00 |
| Flywheel Teeth | 183 |

## FEATURES

**Engine Design**
- Built on G3500 LE proven reliability and durability
- Ability to burn a wide spectrum of gaseous fuels
- Robust diesel strength design prolongs life and lowers owning and operating costs
- Broad operating speed range at lower site air densities (high altitude/hot ambient temperatures)
- Higher power density improves fleet management
- Quality engine diagnostics
- Detonation-sensitive timing control for individual cylinders

**Ultra Lean Burn Technology (ULB)**
ULB technology uses an advanced control system, a better turbo match, improved air and fuel mixing, and a more sophisticated combustion recipe to provide:
- Lowest engine-out emissions
- Highest fuel efficiency
- Improved altitude and speed turndown
- Stable load acceptance and load rejection

**Emissions**
- Meets U.S. EPA Spark Ignited Stationary NSPS emissions for 2010
- Lean air/fuel mixture provides best available emissions and fuel efficiency for engines of this bore size

**Advanced Digital Engine Management**
ADEM A3 engine management system integrates speed control, air/fuel ratio control, and ignition/detonation controls into a complete engine management system. ADEM A3 has improved: user interface, display system, shutdown controls, and system diagnostics.

**Full Range of Attachments**
Large variety of factory-installed engine attachments reduces packaging time.

**Testing**
Every engine is full-load tested to ensure proper engine performance.

**Gas Engine Rating Pro**
GERP is a PC-based program designed to provide site performance capabilities for Cat® natural gas engines for the gas compression industry. GERP provides engine data for your site's altitude, ambient temperature, fuel, engine coolant heat rejection, performance data, installation drawings, spec sheets, and pump curves.

**Product Support Offered Through Global Cat Dealer Network**
More than 2,200 dealer outlets

Cat factory-trained dealer technicians service every aspect of your petroleum engine

Cat parts and labor warranty

Preventive maintenance agreements available for repair-before-failure options

S•O•S℠ program matches your oil and coolant samples against Caterpillar set standards to determine:
- Internal engine component condition
- Presence of unwanted fluids
- Presence of combustion by-products
- Site-specific oil change interval

**Over 80 Years of Engine Manufacturing Experience**
Over 60 years of natural gas engine production

Ownership of these manufacturing processes enables Caterpillar to produce high quality, dependable products
- Cast engine blocks, heads, cylinder liners, and flywheel housings
- Machine critical components
- Assemble complete engine

**Web Site**
For all your petroleum power requirements, visit www.catoilandgas.cat.com.

## STANDARD EQUIPMENT

**Air Inlet System**
Axial flow air cleaners
Service indicator
Cleanable

**Cooling System**
Two-stage charge air cooling:
First stage — JW + OC + 1st stage AC
Second stage — 2nd stage AC
Engine cooling and charge air cooling thermostats

**Exhaust System**
Dry exhaust manifolds and turbocharger housings

**Flywheels and Housings**
SAE 00 flywheel
SAE 00 flywheel housing
SAE standard rotation

**Fuel System**
Electronic fuel metering valve
Requires 7-50 psig gas supply
Gas pressure regulator
Gas shutoff valve

**Instrumentation**
Remote-mounted Advisor control panel
Interconnect harness

**Lube System**
Top-mounted crankcase breathers
Oil cooler
Oil filter and oil sampling valve
Drain valve
Turbo oil accumulator
API B16.3 approved gas/air-driven pre-lube system

**Torsional Vibration Analysis**
Caterpillar provided
Required through first quarter 2010

**Mounting**
Rails

**Control Panels**
4" LCD Advisor display panel
Shipped loose

**Starting System**
90 psi TDI starter
150 psi TDI starter

**Power Take-Offs**
Front housing, two sided
Front lower LH accessory drive

**Protection System — Display/Alarm/Shutdown**
Low oil pressure
Oil filter differential pressure
High fuel or oil temperature
Engine oil to engine coolant
Differential temperature
High coolant temperature
Engine speed
Engine load
Battery voltage
Detonation
Manifold air temperature
Coolant JW inlet/outlet pressure
Left turbo inlet temperature
Right turbo inlet temperature
Cylinder port temperature

**Protection System — Display Only**
Service hours
Oxygen level

**General**
Paint — Cat yellow
Dual 23" vibration damper with guard
CSA Certification, Class 1 Division 2 Groups C and D

## OPTIONAL EQUIPMENT

**Air Inlet System**
Rectangular air inlet adapter
Circular air inlet adapter

**Charging System**
Battery Charger 20 amp

**Connections**
Mechanical joint assembly
Inlet connection

**Exhaust System**
Flexible fittings available at first production build
Elbows and mufflers

**Instrumentation**
Optional interconnect harness

**Lube System**
Shipped with lube oil

**Mounting System**
Rails

**Power Take-Offs**
Front stub shaft

**Literature**
Options available

**Packing**

## TECHNICAL DATA

### G3516B LE Gas Petroleum Engine — 1400 rpm***

| Fuel System | | 0.5 g NOx NTE Rating DM8800-03 | 1.0 g NOx NTE Rating DM8850-02 |
|---|---|---|---|
| **Engine Power** | | | |
| @ 100% Load | bkW (bhp) | 1029 (1380) | 1029 (1380) |
| **Engine Speed** | rpm | **1400** | **1400** |
| Max Altitude @ Rated Torque and 38°C (100°F) | m (ft) | 1219.2 (4000) | 1828.8 (6000) |
| Speed Turndown @ Max Altitude, Rated Torque, and 38°C (100°F) | % | 25 | 25 |
| **Aftercooler Temperature** | | | |
| Stage 1 (JW) | °C (°F) | 98.9 (210) | 98.9 (210) |
| Stage 2 (SCAC) | °C (°F) | 54 (130) | 54 (130) |
| **Emissions*** | | | |
| NOx | g/bkW-hr (g/bhp-hr) | 0.67 (0.50) | 1.34 (1.00) |
| CO | g/bkW-hr (g/bhp-hr) | 3.26 (2.43) | 3.75 (2.80) |
| $CO_2$ | g/bkW-hr (g/bhp-hr) | 635 (474) | 603 (449) |
| VOC** | g/bkW-hr (g/bhp-hr) | 0.64 (0.48) | 0.51 (0.38) |
| **Fuel Consumption*** ** | | | |
| @ 100% Load | MJ/bkW-hr (Btu/bhp-hr) | 10.33 (7301) | 9.97 (7050) |
| **Heat Balance** | | | |
| Heat Rejection to Jacket Water @ 100% Load | | | |
| JW | bkW (Btu/mn) | 412.37 (23,451) | 418.9 (23,820) |
| OC | bkW (Btu/mn) | 78.2 (4449) | 78.2 (4449) |
| Heat Rejection to Aftercooler @ 100% Load | | | |
| 1st Stage AC | bkW (Btu/mn) | 94.23 (5359) | 78.55 (4467) |
| 2nd Stage AC | bkW (Btu/mn) | 176.7 (10,047) | 157.9 (8984) |
| Heat Rejection to Exhaust @ 100% Load LHV to 25° C (77° F) | bkW (Btu/mn) | 1098 (62,428) | 1021.9 (58,113) |
| Heat Rejection to Atmosphere @ 100% Load | bkW (Btu/mn) | 107.34 (6110) | 107.34 (6110) |
| **Exhaust System** | | | |
| Exhaust Gas Flow Rate @ 100% Load | $m^3$/min (cfm) | 258.4 (9126) | 246.8 (8716) |
| Exhaust Stack Temperature @ 100% Load | °C (°F) | 533.33 (992) | 532.22 (990) |
| **Intake System** | | | |
| Air Inlet Flow Rate @ 100% Load | $m^3$/min (scfm) | 88.52 (3126) | 84.70 (2991) |
| **Gas Pressure** | kPag (psig) | 48-345 (7-50) | 48-345 (7-50) |

*at 100% load and speed, all values are listed as not to exceed

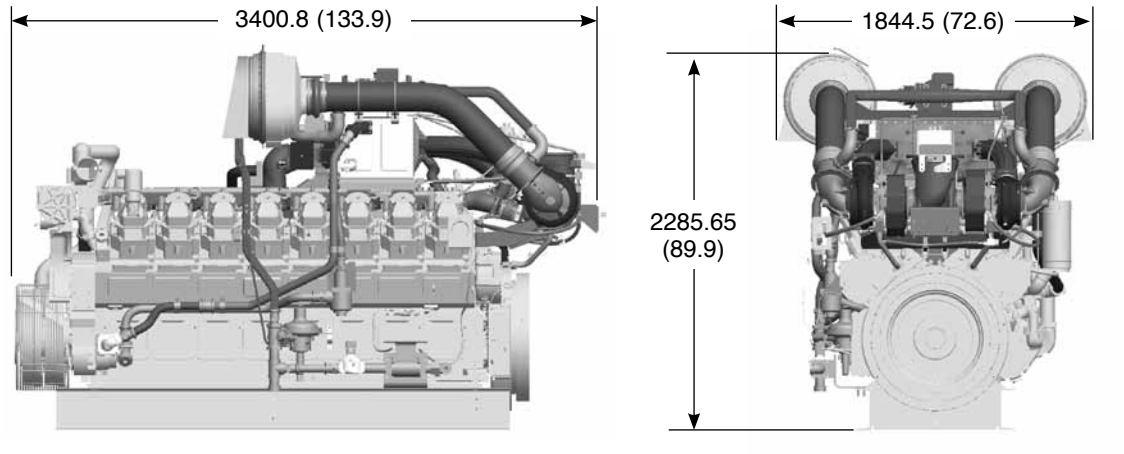
**Volatile organic compounds as defined in U.S. EPA 40 CFR 60, subpart JJJJ

***ISO 3046/1

# G3516B LE GAS PETROLEUM ENGINE

**1029 bkW (1380 bhp)**

## DIMENSIONS




| DIMENSIONS | | |
|---|---|---|
| Length | mm (in.) | 3400.8 (133.9) |
| Width | mm (in.) | 1844.55 (72.6) |
| Height | mm (in.) | 2285.65 (89.9) |
| Shipping Weight | kg (lb) | 8401 (18,520) |

Note: General configuration not to be used for installation.

Dimensions are in mm (inches).

## RATING DEFINITIONS AND CONDITIONS

Engine performance is obtained in accordance with SAE J1995, ISO3046/1, BS5514/1, and DIN6271/1 standards.

Transient response data is acquired from an engine/generator combination at normal operating temperature and in accordance with ISO3046/1 standard ambient conditions. Also in accordance with SAE J1995, BS5514/1, and DIN6271/1 standard reference conditions.

**Conditions:** Power for gas engines is based on fuel having an LHV of 33.74 kJ/L (905 Btu/cu ft) at 101 kPa (29.91 in. Hg) and 15° C (59° F). Fuel rate is based on a cubic meter at 100 kPa (29.61 in. Hg) and 15.6° C (60.1° F). Air flow is based on a cubic foot at 100 kPa (29.61 in. Hg) and 25° C (77° F). Exhaust flow is based on a cubic foot at 100 kPa (29.61 in. Hg) and stack temperature.

Materials and specifications are subject to change without notice. The International System of Units (SI) is used in this publication.
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Performance Numbers: DM8800-03, DM8850-02
LEHW0037-00 (11-09)
Supersedes LEHW0002-02

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# AKA Energy

May 6, 2016

Enclosed Combustor

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**ABUTEC Industries, Inc.**
Advanced Burner Technologies
2959 Cherokee Street, Suite 101
Kennesaw, GA 30144
Phone: (770) 846-0155
www.abutec.com

# III. Design Specifications

## Flare Gas Stream

| | |
|---|---|
| Type: | Enclosed Tank Battery Flare |
| Composition: | 2,100 BTU/ft3 |
| Temperature: | < 130°F |
| Flow Rate: | up to 26 MSCFD 18.0 scfm |
| Burner Size | 2.39 million BTU/hr (0.7 MW) |
| Customer Supplied Pressure | 4 oz/in$^2$ (7"w.c.) Minimum start pressure |

## Mechanical

| | |
|---|---|
| Design Wind Speed | 120 mph |
| Ambient Temperature | -20 to 120 Deg F |
| Electrical Area Classification | General Area Classification (Non-Hazardous) |
| Elevation | TBD |

## Process

| | |
|---|---|
| Smokeless Capacity | 100% |
| Operating Temperature | 1400 deg F to 2100 deg F (1500 deg F Normal) |
| Retention Time | Minimum of 0.3 sec |

## Utilities

| | |
|---|---|
| Pilot Gas | Wellgas/Propane @ 8 psig |
| Electricity | 24 VDC |
| Instrument Air/Gas | 20 psig Minimum; 30 psig Maximum |

## Emissions (Guaranteed by ABUTEC Industries, Inc.)

| | |
|---|---|
| Destruction Rate Efficiency: | Greater than 98% DRE |

## IV. Narrative Solutions (MTF – Medium Temperature Flare)

The flare will have an On/Off setting on the control panel. In "On" mode, the continuous pilot will ignite and the flame sensed by the ignition flame rod will confirm pilot flame presence. The flare will be in standby awaiting sufficient waste gas pressure from the tank battery, as sensed by the pressure switch. Once the "Flare Start" pressure is reached, the main solenoid will open and the gas will be ignited at the main burners. Once the unit reaches temperature and flame is confirmed. Once a low pressure level has been reached, the main solenoid will close. Several safety shutdowns are built into the system that will maintain safe operation of the flare system.

**Technical Description of COMBUSTION UNIT (MTF):**

| **Preliminary Design Parameters*** | | **Materials of Construction** | |
|---|---|---|---|
| Number of Burners* | 1 Internal Multi-Nozzle Burner Assembly | Flare Stack Enclosure | Stainless Steel 304 Stack |
| Inlet Line Size* | **ABUTEC 20: 1.5" NPT** | Base Frame / Stand | Stainless Steel 304 Stack |
| Total Height Excluding Foundation* | **ABUTEC 20: 12ft** | Burner | Stainless Steel 316 or equivalent |
| Base Dimensions* Weight (lbs) | **ABUTEC 20: 22" Diameter ~367 lbs** | Piping | Stainless Steel 304 |
| Combustion Chamber Diameter* | **ABUTEC 20: ~19in** | Gas Fittings | In accordance with NFPA, UL, and/or CSA |

***Actual values determined in Design Phase and sent to customer for Review & Approval**

**Scope of Supply:**

1 Flare unit consisting of Burner(s) (greater than 98% Combustion Efficiency and **0.3s** retention time) and a stainless steel stack.

- 1 Thermocouple for Temperature Indication
- 1 Pilot Ignition Systems consisting of:
    - Ignition Transformer and flame rod (pilot flame safety)
    - Pilot Burner
    - Complete Pilot gas train consisting of:
        - Isolation Ball Valve
        - Solenoid Valve
- 1 Flare inlet line consisting of:
    - Pressure Transmitter
    - Pneumatic Valve
    - Flame Arrestor
- Automatic control system to monitor flare operation, consisting of:
    - Fully integrated control panel/cabinet (NEMA 4x)
    - Profire PF2100 Burner Management System

1 Set of Documentation consisting of:
Operating and Maintenance Instructions, P&ID, General Arrangement Drawing (GAD), Profire Manual, and Spare Part List.

## GENERAL ARRANGEMENT DRAWING

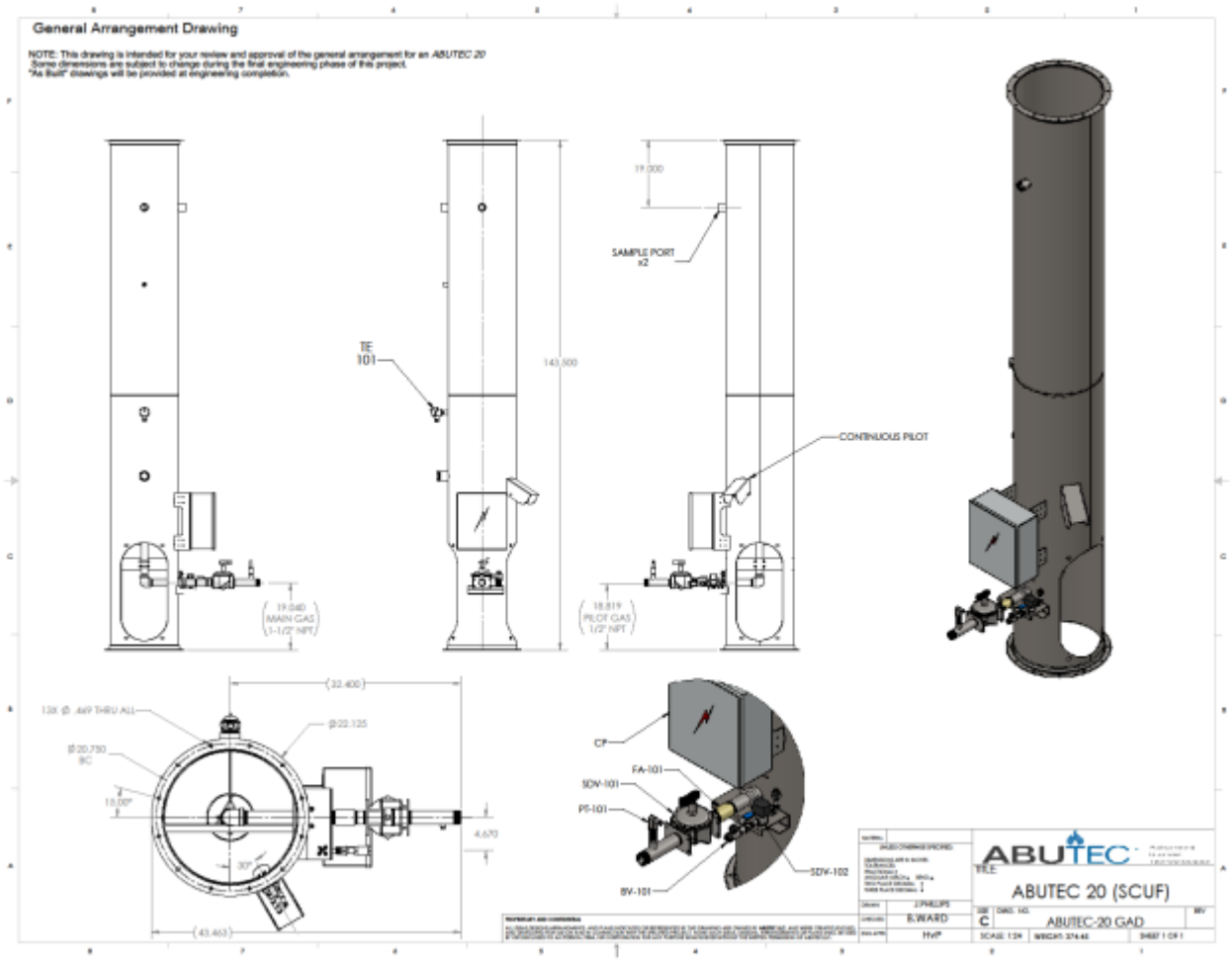



**Figure 1 – ABUTEC 20 General Arrangement Drawing**

# DOC-2

# Design and Fabrication Summary

# AKA Energy /

# Frontier Field Services

# Maljamar, NM

# Guyed Flare Stack

Hero Job H12120

Rev 1 1/22/13

# Design Summary

# &

# Fabrication Notes

- **Mechanical Design Basis**
- **Design Codes**
- **Material Specifications**
- **Fabrication Notes**
- **Fabrication Tolerances**
- **Inspection & Testing**
- **Client Specifications Summary**

## Design Codes

| | |
|---|---|
| Stack Design Code | ASME STS-1-2011 |
| Weld Inspection | ASME STS-1-2011 |
| Fabrication and Erection | ASME STS-1-2011 |
| Wind Loads | ASCE 7-05 |
| Seismic Loads | ASCE 7-05 (seismic not considered) |
| Structural Damping Criteria | ASME STS-1-2011 |
| Aerodynamic Damping Criteria | ASME STS-1-2011 |
| Allowable Stress Code | ASME STS-1-2011 |
| Fatigue Cycles | ASME STS-1-2011 |
| Stack Base Plate Detail | “Process Equipment Design” by Brownell & Young |
| Stack Lifting Analysis | ASME STS-1-2011 |
| Local Buckling Allowables | ASME STS-1-2011 Section 4.4 |
| Lifting Trunnion Design | Finite Element Analysis using FE/Pipe program. |
| Tailing Lug Analysis | Roark’s Formulas for Stress and Strain. 7$^{th}$ edition. |

The stack is analyzed for loads due to vortex shedding.

## Material Specifications

| | Flare Gas Riser | Pilot Gas | Conduit |
|---|---|---|---|
| Qty | 1 | 2 | 2 |
| Size | 12” | 3/8” | 3/4” |
| Wall Thk | 3/8” | --- | --- |
| **Materials** | | | |
| Rolled Plate / Head / Transition | --- | --- | --- |
| Pipe | **A106B seamless** | Stainless tubing, flexhose | Stainless braided, flexible |
| Flange / Fittings | A-105 | N/A | Galv Steel |
| Gaskets | 1/8” non-asb. | N/A | N/A |
| Stud Bolts | A-193 B7 | N/A | NA |
| Hex Nuts | A194 2H | N/A | NA |
| **Fabrication** | | | |
| End Connections | 150# RF | Swagelock Union | Plain |
| Joints | Buttweld | Swagelok Union | NPT |
| Welding Code | ASME IX / AWS | --- | N/A |
| MTR’s Rqd | SS only | No | No |
| Radiography / NDT | None<br>Dye Penetrant on Lift Lugs | None | No |
| Hydrostatic Test | None | None | --- |
| Shop/Field Install | ------ | Field (retractable pilot) | Field (retractable pilot) |
| Client Specification | None | None | None |
| | | | |

## Notes:

1. Wall thickness as shown are minimum and may be increased.

## General Material Specifications

| Material Specifications (unless otherwise noted) | | | |
|---|---|---|---|
| Flare Tip | 316 SS Upper / CS lower | Flange – 150# | A105N |
| Pilots | Stainless Steel | Flange – Plate | A-36 |
| Gas Riser | Pipe: **A106B seamless** | Pipe Fittings | A234-WPB |
| Nozzle Necks | A-234 Tee / RFWN flange | Stud Bolts / Nuts | A193-B7 / A194-2H hvy hex |
| Air Riser | A-36 rolled / A53B ERW / API 5L | | |
| Base Plate | A-36 | Struc Bolt / Nut | A-325 |
| Floor Plate | A-36 | Gasket | 1/8" non-asbestos |
| Structural | A-36 | Anchor Bolts | A-307 |
| Conduit | Stainless braided flexible | Thermocouple Wire | Type K, 20ga, PVC insulation |
| Tubing | 316 SS, Swagelok or equal fittings | Ignition Wire | 14ga, 3 conductor (red, green, black) |

## Fabrication Notes

1. All welding per AWS D1.1 or ASME Sec. IX.
2. All nozzle projections to be 6" unless noted otherwise.
3. Flange bolt holes to straddle centerlines unless noted otherwise.
4. Base ring (and other structural) bolt holes to be smooth cut.
5. Butt welds to be full penetration unless noted otherwise.
6. Stack and piping to be cleaned inside and outside, free of dirt, grease, loose mill scale, weld splatter, etc.
7. Install wood, plastic or steel covers on all openings before shipment.
8. Center punch major center lines on outside of shell. Stack sections to be match marked at $0^{o}$ for field alignment.
9. All ship loose items to have identification tag. All equipment tags to include Hero job number.

## Fabrication Tolerances

1. General dimensional tolerances are limited to:

   Longitudinal : 3/16” per 10 ft
   Shell Diameter: Under 8’-0”: +/- 1/8”, Over 8’-0” cylinders: +/- 3/16”
   Base Ring Bolt Circle: +/- 3/16” on opposite holes & chord
   Nozzle Elevation: +/- ¼” Nozzle Orientation: +/- 3/16” at the shell

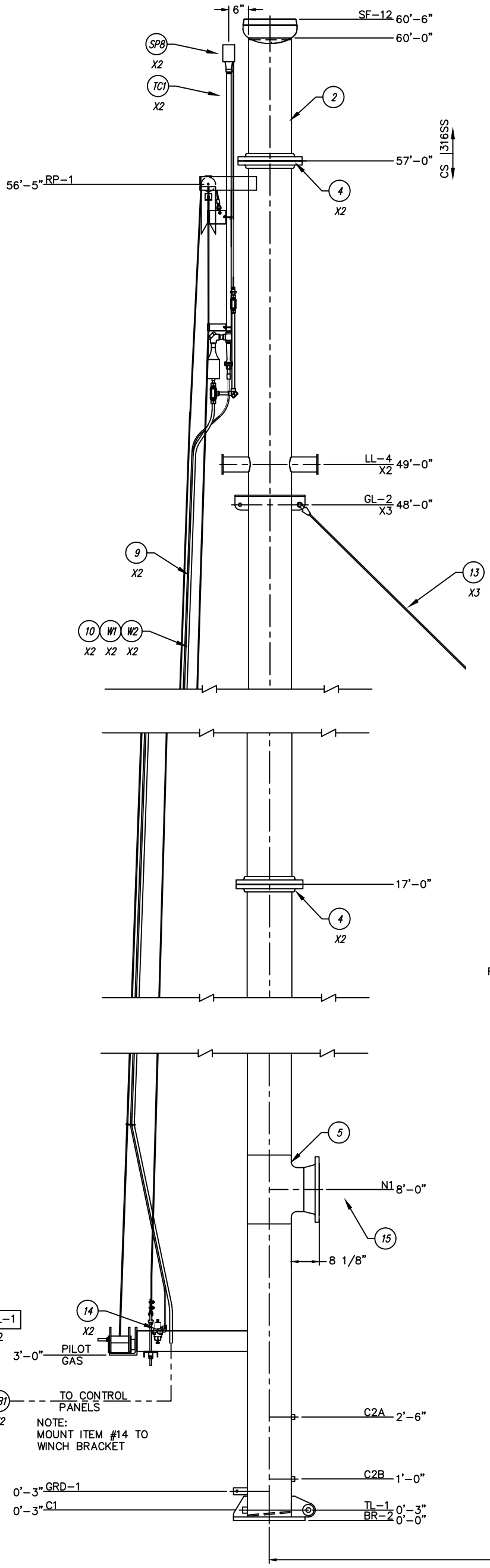
2. Maximum deviation from straight edge applied axially to stack shell shall not exceed 1/8” in 10 ft.

## Inspection & Testing

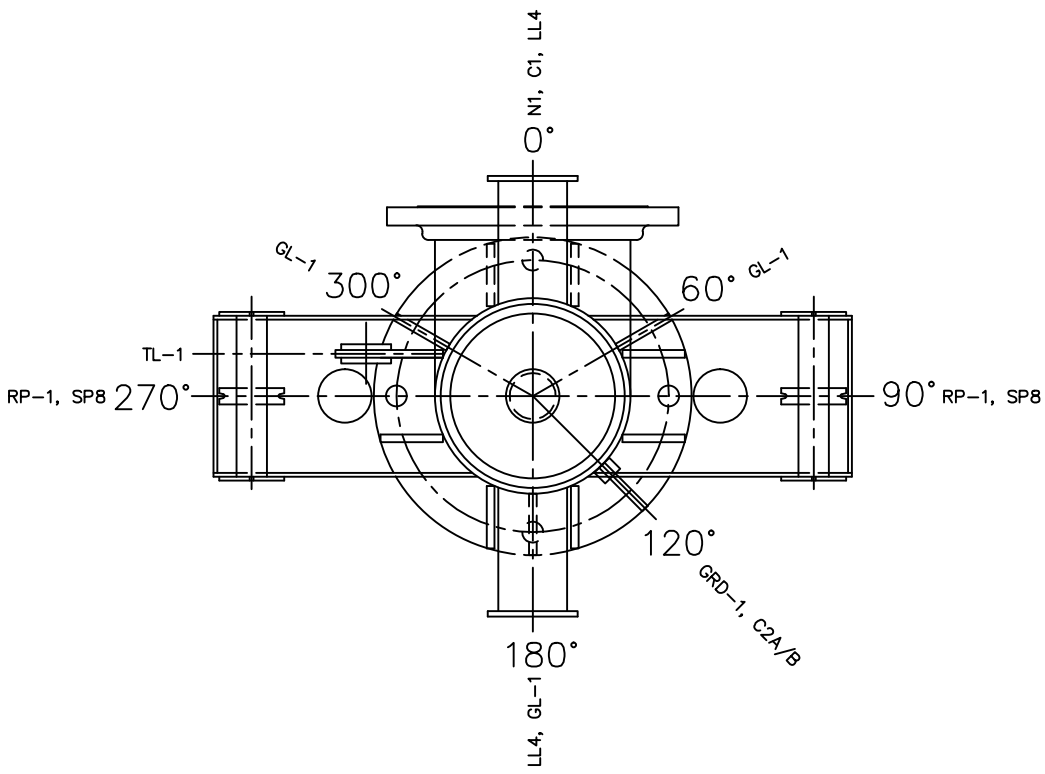
1. See table for MTR’s required. Certificates are acceptable for flanges and fittings.
2. WPS and PQR not required for approval.
3. Visual Inspection required on all shop and field welds.
4. See table for radiography required.

## Client Specifications

1. None




| ITEM# | QTY | DESCRIPTION (PER FLARE) |
|---|---|---|
| N1 | 1 | INLET, 12", 150# RFWN, S40, CS |
| C1 | 1 | DRAIN, 1" HALF COUPLING, WITH PLUG, 3000#, CS |
| C2A/B | 1/1 | LEVEL GAUGE, 3/4" HALF COUPLING, 3000#, CS |
| SF-12 | 1 | SONIC FLARE TIP, 12", 316SS |
| 2 | 1 | STACK, 12", .375 WALL, A-106 SEAMLESS |
| 4 | 4 | FLANGE, 12", 150#, RFSO, CS W/STUDS, NUTS, AND GASKET |
| 5 | 1 | TEE, 12", S40, A-234 WPB |
| GL-2 | 3 | GUY LUGS, WITH STIFFENER RING, CS |
| BR-2 | 1 | BASE PLATE, CS |
| TL-1 | 1 | TAILING LUG, CS |
| LL-4 | 2 | LIFTING LUG, CS |
| FP-1 | 1 | FLOOR PLATE, CS |
| GRD-1 | 1 | GROUND LUG, CS |
| RP-1 | 2 | RETRACTABLE PILOT SYSTEM: SS CABLE, MANUAL WINCH |
| 9 | AR | FUEL GAS TUBING, 3/8", 316SS, FLEXHOSE |
| 10 | AR | CONDUIT, 3/4", SS, FLEXHOSE |
| W1 | AR | WIRE, IGNITION, 3 CONDUCTOR |
| W2 | AR | WIRE, THERMOCOUPLE, TYPE K, 20 GA, PVC INSULATION |
| SP-8 | 2 | PILOT, SPARK IGNITED, 304SS |
| TC1 | 2 | THERMOCOUPLE, TYPE K |
| JB-1 | 2 | J-BOX TERMINATION (1 PER PILOT, 3/4") |
| | | |
| | | THE FOLLOWING ITEMS SHIP LOOSE FOR FIELD INSTALLATION |
| 13 | 3 | GUY WIRE, 3/8" X 70', WITH CLIPS, THIMBLES, & TURNBUCKLES |
| 14 | 1 | PILOT GAS REGULATOR WITH PRESSURE GAUGE |
| SOL-1 | 2 | IGNITION PANEL, SOLAR POWERED, PILOT MONITOR, NEMA 4X, FRP |
| 15 | 1 | FLAME ARRESTOR, 12", CS BODY, 304SS CELL, 150#RF FLANGE |
| | 100' | SPARE THERMOCOUPLE WIRE |
| | | |
| | | |




ITEM #4 AND SF-12
NOT SHOWN FOR CLARITY

ORIENTATION

NOTES:
1. FABRICATION PER AISC
2. PIPE WELDS PER B31.3
3. WELDING PER AWS D1.1
4. SMOOTH CUT ALL HOLES5
5. MATERIALS A-36 U.N.O.
6. WEIGHT: 6000 LB

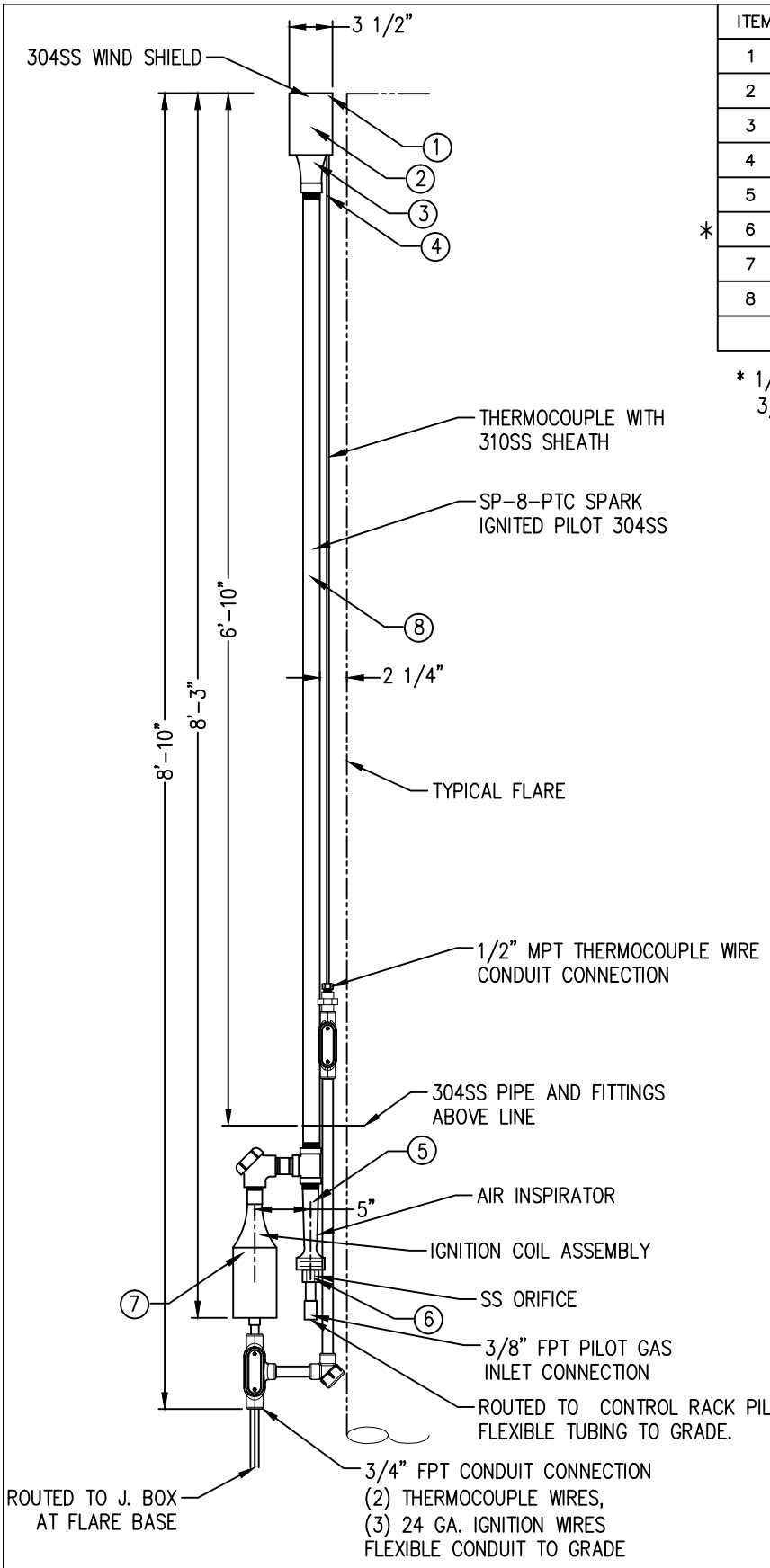

Hero Flare
445 FM20, Bastrop, TX 78602
Tel: (512) 772-5744 www.heroflare.com


| | |
|---|---|
| USER | AKA ENERGY |
| | Frontier Field Serv. |
| JOB SITE | Maljamar, NM |
| JOB | |

60x12 EMERGENCY FLARE
(5 TOTAL)


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| | | | | | |
|---|---|---|---|---|---|
| DRAWN: NJ | APPR. | JOB NO: H12120 | DWG. NO: GS60X12 | REV. 2 |
| DATE: 1/22/13 | DATE: | | | |




| ITEM# | QTY | DESCRIPTION | PART NUMBER |
|---|---|---|---|
| 1 | 1 | PILOT SHIELD | |
| 2 | 1 | PILOT NOZZLE | SP8-PNA |
| 3 | 1 | SPARK PLUG | P8-J99 |
| 4 | 1 | THERMOCOUPLE | 4K30-U-72-SB |
| 5 | 4 | AIR INSPIRATOR | 2-09119 |
| * 6 | 1 | ORIFICE | |
| 7 | 1 | IGNITION COIL | SP8-MSD8202 |
| 8 | AR | PIPE, 1", 304SS | |
| | | | |

* 1/16" DIA FOR NATURAL GAS
3/64" DIA FOR PROPANE

NOTES:
PILOT LENGTH = 8'-0"
PILOT WEIGHT = 32 LBS.
FUEL GAS RQD = NATURAL GAS 78 SCFH @ 5 PSI

Hero Flare
704 Hwy 71 West St D400 Bastrop, TX 78602
Tel: (512) 772-5744 www.heroflare.com

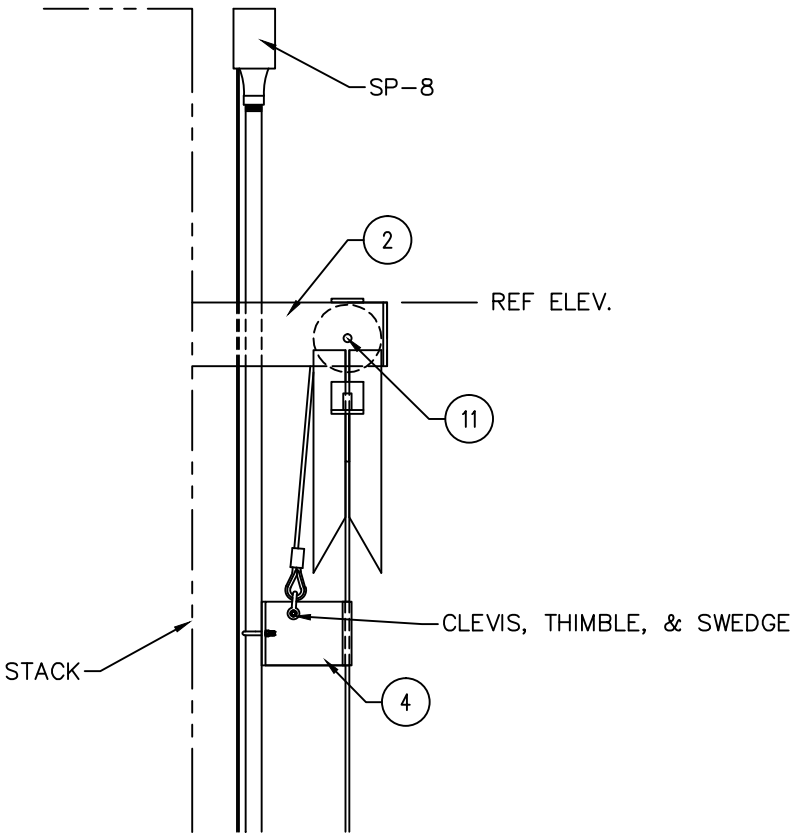
| | |
|---|---|
| USER | AKA ENERGY |
| | Frontier Field Serv. |
| JOB SITE | Maljamar, NM |
| JOB | |

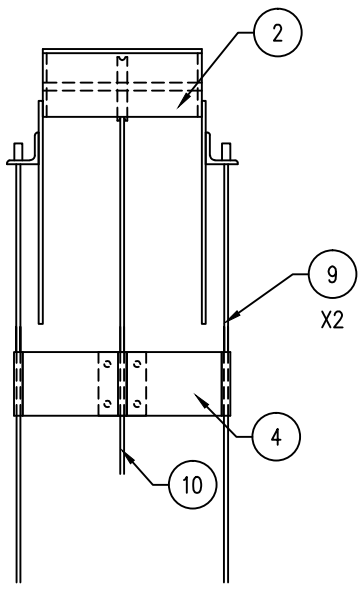
SP-8 PILOT

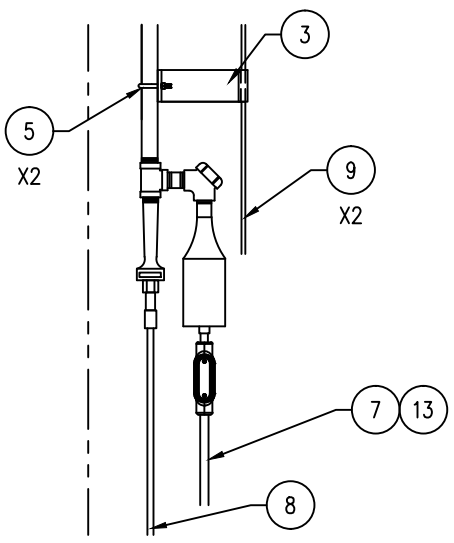
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| DRAWN: NJ | APPR. | JOB NO: | DWG. NO: | REV. |
|---|---|---|---|---|
| DATE: 1/22/13 | DATE: | H12120 | SP-8 | 0 |

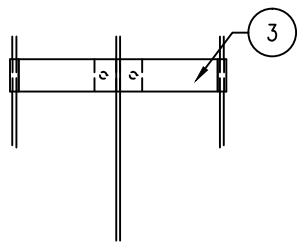
| ITEM# | QTY | DESCRIPTION (PER PILOT) |
|---|---|---|
| 1 | 1 | WINCH PLATE |
| 2 | 1 | GUIDE PLATE |
| 3 | 1 | BOTTOM PILOT CARRIAGE |
| 4 | 1 | TOP PILOT CARRIAGE |
| 5 | 3 | U-BOLT, 1"ø x 3/8" |
| | | |
| 7 | FT | FLEXIBLE CONDUIT, 3/4" |
| 8 | FT | FUELGAS, 3/8" SS FLEXHOSE |
| 9 | FT | GUIDE CABLE, SS |
| 10 | FT | SUPPORT CABLE, SS |
| 11 | 1 | PULLEY |
| 12 | 1 | MANUAL WINCH |
| 13 | AR | CLIPS FOR TUBING & CONDUIT |

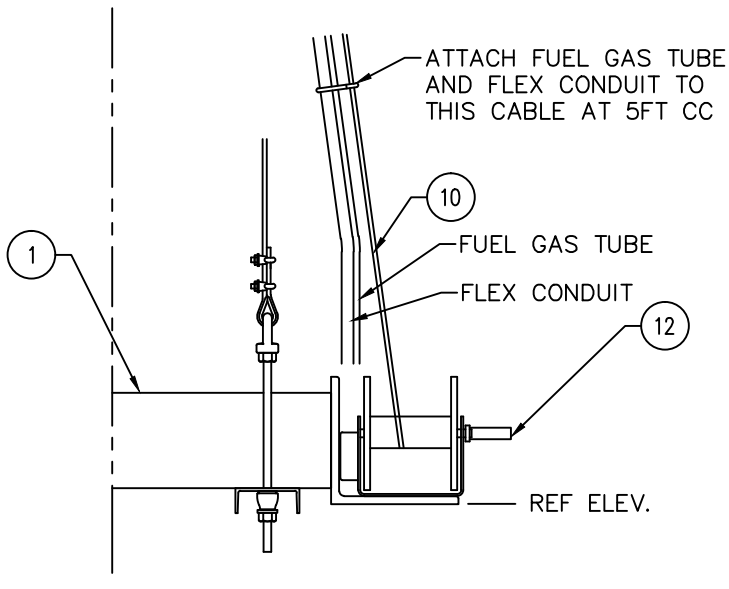


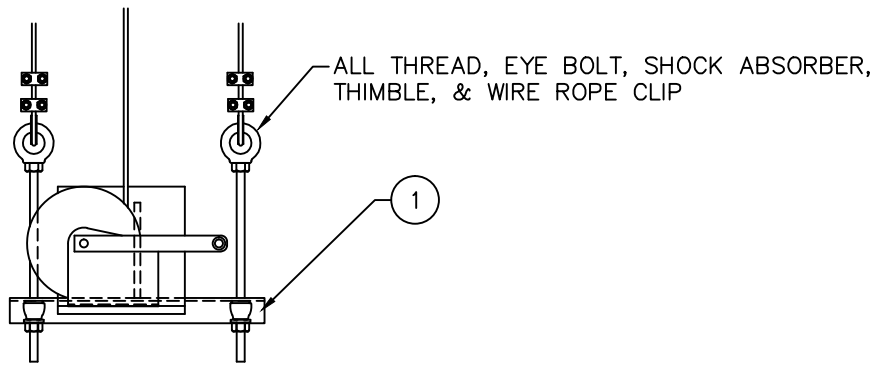




PILOT NOT SHOWN IN THIS VIEW FOR CLARITY




FRONT VIEW


Hero Flare
445 FM20, Bastrop, TX 78602
Tel: (512) 772-5744 www.heroflare.com


| | |
|---|---|
| USER | AKA ENERGY |
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| JOB | |

RP-1
RETRACTABLE PILOT SYSTEM


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| | | | | | |
|---|---|---|---|---|---|
| DRAWN: NJ | APPR. | JOB NO: H12120 | DWG. NO: RP-1 | REV. 0 |
| DATE: 1/16/12 | DATE: | | | |

# Table A-1 to Subpart A of Part 98—Global Warming Potentials, 100-Year Time Horizon

| Name | CAS No. | Chemical formula | Global warming potential (100 yr.) |
|---|---|---|---|
| **Chemical-Specific GWPs** | | | |
| Carbon dioxide | 124-38-9 | $CO_2$ | 1 |
| Methane | 74-82-8 | $CH_4$ | [a] [d] 28 |
| Nitrous oxide | 10024-97-2 | $N_2O$ | [a] [d] 265 |
| **Fully Fluorinated GHGs** | | | |
| Sulfur hexafluoride | 2551-62-4 | $SF_6$ | [a] [d] 23,500 |
| Trifluoromethyl sulphur pentafluoride | 373-80-8 | $SF_5CF_3$ | [d] 17,400 |
| Nitrogen trifluoride | 7783-54-2 | $NF_3$ | [d] 16,100 |
| PFC-14 (Perfluoromethane) | 75-73-0 | $CF_4$ | [a] [d] 6,630 |
| PFC-116 (Perfluoroethane) | 76-16-4 | $C_2F_6$ | [a] [d] 11,100 |
| PFC-218 (Perfluoropropane) | 76-19-7 | $C_3F_8$ | [a] [d] 8,900 |
| Perfluorocyclopropane | 931-91-9 | c-$C_3F_6$ | [d] 9,200 |
| PFC-3-1-10 (Perfluorobutane) | 355-25-9 | $C_4F_{10}$ | [a] [d] 9,200 |
| PFC-318 (Perfluorocyclobutane) | 115-25-3 | c-$C_4F_8$ | [a] [d] 9,540 |
| Perfluorotetrahydrofuran | 773-14-8 | c-$C_4F_8O$ | [e] 13,900 |
| PFC-4-1-12 (Perfluoropentane) | 678-26-2 | $C_5F_{12}$ | [a] [d] 8,550 |
| PFC-5-1-14 (Perfluorohexane, FC-72) | 355-42-0 | $C_6F_{14}$ | [a] [d] 7,910 |
| PFC-6-1-12 | 335-57-9 | $C_7F_{16}$; $CF_3(CF_2)_5CF_3$ | [b] 7,820 |
| PFC-7-1-18 | 307-34-6 | $C_8F_{18}$; $CF_3(CF_2)_6CF_3$ | [b] 7,620 |
| PFC-9-1-18 | 306-94-5 | $C_{10}F_{18}$ | [d] 7,190 |
| PFPMIE (HT-70) | NA | $CF_3OCF(CF_3)CF_2OCF_2OCF_3$ | [d] 9,710 |

This content is from the eCFR and is authoritative but unofficial.

# Title 40 —Protection of Environment
## Chapter I —Environmental Protection Agency
## Subchapter C —Air Programs
## Part 98 —Mandatory Greenhouse Gas Reporting
## Subpart C —General Stationary Fuel Combustion Sources

**Authority:** 42 U.S.C. 7401-7671q.
**Source:** 74 FR 56374, Oct. 30, 2009, unless otherwise noted.

**Editorial Note:** At 90 FR 21227, May 19, 2025, as required by the Congressional Review Act and Public Law 119-2, the Environmental Protection Agency removed the amendments to §§ 98.3 and 98.4 made effective on Jan. 17, 2025, at 89 FR 91163, Nov. 18, 2024. As of May 19, 2025, §§ 98.3 and 98.4 reverted to the Jan. 16, 2025 version.

## Table C-1 to Subpart C of Part 98—Default $CO_2$ Emission Factors and High Heat Values for Various Types of Fuel

### Default $CO_2$ Emission Factors and High Heat Values for Various Types of Fuel

| Fuel type | Default high heat value | Default $CO_2$ emission factor |
|---|---|---|
| Coal and coke | mmBtu/short ton | kg $CO_2$/mmBtu |
| Anthracite | 25.09 | 103.69 |

*[1] The HHV for components of LPG determined at 60 °F and saturation pressure with the exception of ethylene.*

*[2] Ethylene HHV determined at 41 °F (5 °C) and saturation pressure.*

*[3] Use of this default HHV is allowed only for: (a) Units that combust MSW, do not generate steam, and are allowed to use Tier 1; (b) units that derive no more than 10 percent of their annual heat input from MSW and/or tires; and (c) small batch incinerators that combust no more than 1,000 tons of MSW per year.*

*[4] Reporters subject to subpart X of this part that are complying with § 98.243(d) or subpart Y of this part may only use the default HHV and the default $CO_2$ emission factor for fuel gas combustion under the conditions prescribed in § 98.243(d)(2)(i) and (d)(2)(ii) and § 98.252(a)(1) and (a)(2), respectively. Otherwise, reporters subject to subpart X or subpart Y shall use either Tier 3 (Equation C-5) or Tier 4.*

*[5] Use the following formula to calculate a wet basis HHV for use in Equation C-1: $HHV_w = ((100 - M)/100)*HHV_d$ where $HHV_w$ = wet basis HHV, M = moisture content (percent) and $HHV_d$ = dry basis HHV from Table C-1.*

| Fuel type | Default high heat value | Default $CO_2$ emission factor |
|---|---|---|
| Bituminous | 24.93 | 93.28 |
| Subbituminous | 17.25 | 97.17 |
| Lignite | 14.21 | 97.72 |
| Coal Coke | 24.80 | 113.67 |
| Mixed (Commercial sector) | 21.39 | 94.27 |
| Mixed (Industrial coking) | 26.28 | 93.90 |
| Mixed (Industrial sector) | 22.35 | 94.67 |
| Mixed (Electric Power sector) | 19.73 | 95.52 |
| Natural gas | mmBtu/scf | kg $CO_2$/mmBtu |
| (Weighted U.S. Average) | $1.026 \times 10^{-3}$ | 53.06 |
| Petroleum products—liquid | mmBtu/gallon | kg $CO_2$/mmBtu |
| Distillate Fuel Oil No. 1 | 0.139 | 73.25 |
| Distillate Fuel Oil No. 2 | 0.138 | 73.96 |
| Distillate Fuel Oil No. 4 | 0.146 | 75.04 |
| Residual Fuel Oil No. 5 | 0.140 | 72.93 |
| Residual Fuel Oil No. 6 | 0.150 | 75.10 |
| Used Oil | 0.138 | 74.00 |
| Kerosene | 0.135 | 75.20 |
| Liquefied petroleum gases (LPG) [1] | 0.092 | 61.71 |
| Propane [1] | 0.091 | 62.87 |
| Propylene [2] | 0.091 | 67.77 |
| Ethane [1] | 0.068 | 59.60 |
| Ethanol | 0.084 | 68.44 |
| Ethylene [2] | 0.058 | 65.96 |

*[1] The HHV for components of LPG determined at 60 °F and saturation pressure with the exception of ethylene.*

*[2] Ethylene HHV determined at 41 °F (5 °C) and saturation pressure.*

*[3] Use of this default HHV is allowed only for: (a) Units that combust MSW, do not generate steam, and are allowed to use Tier 1; (b) units that derive no more than 10 percent of their annual heat input from MSW and/or tires; and (c) small batch incinerators that combust no more than 1,000 tons of MSW per year.*

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*[5] Use the following formula to calculate a wet basis HHV for use in Equation C-1: $HHV_w = ((100 - M)/100)*HHV_d$ where $HHV_w$ = wet basis HHV, M = moisture content (percent) and $HHV_d$ = dry basis HHV from Table C-1.*

| Fuel type | Default high heat value | Default $CO_2$ emission factor |
|---|---|---|
| Isobutane [1] | 0.099 | 64.94 |
| Isobutylene [1] | 0.103 | 68.86 |
| Butane [1] | 0.103 | 64.77 |
| Butylene [1] | 0.105 | 68.72 |
| Naphtha (<401 deg F) | 0.125 | 68.02 |
| Natural Gasoline | 0.110 | 66.88 |
| Other Oil (>401 deg F) | 0.139 | 76.22 |
| Pentanes Plus | 0.110 | 70.02 |
| Petrochemical Feedstocks | 0.125 | 71.02 |
| Special Naphtha | 0.125 | 72.34 |
| Unfinished Oils | 0.139 | 74.54 |
| Heavy Gas Oils | 0.148 | 74.92 |
| Lubricants | 0.144 | 74.27 |
| Motor Gasoline | 0.125 | 70.22 |
| Aviation Gasoline | 0.120 | 69.25 |
| Kerosene-Type Jet Fuel | 0.135 | 72.22 |
| Asphalt and Road Oil | 0.158 | 75.36 |
| Crude Oil | 0.138 | 74.54 |
| Petroleum products—solid | mmBtu/short ton | kg $CO_2$/mmBtu. |
| Petroleum Coke | 30.00 | 102.41. |
| Petroleum products—gaseous | mmBtu/scf | kg $CO_2$/mmBtu. |
| Propane Gas | $2.516 \times 10^{-3}$ | 61.46. |
| Other fuels—solid | mmBtu/short ton | kg $CO_2$/mmBtu |
| Municipal Solid Waste | 9.95 [3] | 90.7 |
| Tires | 28.00 | 85.97 |

*[1] The HHV for components of LPG determined at 60 °F and saturation pressure with the exception of ethylene.*

*[2] Ethylene HHV determined at 41 °F (5 °C) and saturation pressure.*

*[3] Use of this default HHV is allowed only for: (a) Units that combust MSW, do not generate steam, and are allowed to use Tier 1; (b) units that derive no more than 10 percent of their annual heat input from MSW and/or tires; and (c) small batch incinerators that combust no more than 1,000 tons of MSW per year.*

*[4] Reporters subject to subpart X of this part that are complying with § 98.243(d) or subpart Y of this part may only use the default HHV and the default $CO_2$ emission factor for fuel gas combustion under the conditions prescribed in § 98.243(d)(2)(i) and (d)(2)(ii) and § 98.252(a)(1) and (a)(2), respectively. Otherwise, reporters subject to subpart X or subpart Y shall use either Tier 3 (Equation C-5) or Tier 4.*

*[5] Use the following formula to calculate a wet basis HHV for use in Equation C-1: $HHV_w = ((100 - M)/100)*HHV_d$ where $HHV_w$ = wet basis HHV, M = moisture content (percent) and $HHV_d$ = dry basis HHV from Table C-1.*

| Fuel type | Default high heat value | Default $CO_2$ emission factor |
|---|---|---|
| Plastics | 38.00 | 75.00 |
| Other fuels—gaseous | mmBtu/scf | kg $CO_2$/mmBtu |
| Blast Furnace Gas | $0.092 \times 10^{-3}$ | 274.32 |
| Coke Oven Gas | $0.599 \times 10^{-3}$ | 46.85 |
| Fuel Gas [4] | $1.388 \times 10^{-3}$ | 59.00 |
| Biomass fuels—solid | mmBtu/short ton | kg $CO_2$/mmBtu |
| Wood and Wood Residuals (dry basis) [5] | 17.48 | 93.80 |
| Agricultural Byproducts | 8.25 | 118.17 |
| Peat | 8.00 | 111.84 |
| Solid Byproducts | 10.39 | 105.51 |
| Biomass fuels—gaseous | mmBtu/scf | kg $CO_2$/mmBtu |
| Landfill Gas | $0.485 \times 10^{-3}$ | 52.07 |
| Other Biomass Gases | $0.655 \times 10^{-3}$ | 52.07 |
| Biomass Fuels—Liquid | mmBtu/gallon | kg $CO_2$/mmBtu |
| Ethanol | 0.084 | 68.44 |
| Biodiesel (100%) | 0.128 | 73.84 |
| Rendered Animal Fat | 0.125 | 71.06 |
| Vegetable Oil | 0.120 | 81.55 |

*[1] The HHV for components of LPG determined at 60 °F and saturation pressure with the exception of ethylene.*

*[2] Ethylene HHV determined at 41 °F (5 °C) and saturation pressure.*

*[3] Use of this default HHV is allowed only for: (a) Units that combust MSW, do not generate steam, and are allowed to use Tier 1; (b) units that derive no more than 10 percent of their annual heat input from MSW and/or tires; and (c) small batch incinerators that combust no more than 1,000 tons of MSW per year.*

*[4] Reporters subject to subpart X of this part that are complying with § 98.243(d) or subpart Y of this part may only use the default HHV and the default $CO_2$ emission factor for fuel gas combustion under the conditions prescribed in § 98.243(d)(2)(i) and (d)(2)(ii) and § 98.252(a)(1) and (a)(2), respectively. Otherwise, reporters subject to subpart X or subpart Y shall use either Tier 3 (Equation C-5) or Tier 4.*

*[5] Use the following formula to calculate a wet basis HHV for use in Equation C-1: $HHV_w = ((100 - M)/100)*HHV_d$ where $HHV_w$ = wet basis HHV, M = moisture content (percent) and $HHV_d$ = dry basis HHV from Table C-1.*

*[78 FR 71950, Nov. 29, 2013, as amended at 81 FR 89252, Dec. 9, 2016]*

This content is from the eCFR and is authoritative but unofficial.

# Title 40 —Protection of Environment
## Chapter I —Environmental Protection Agency
## Subchapter C —Air Programs
## Part 98 —Mandatory Greenhouse Gas Reporting
## Subpart C —General Stationary Fuel Combustion Sources

**Authority:** 42 U.S.C. 7401-7671q.
**Source:** 74 FR 56374, Oct. 30, 2009, unless otherwise noted.

**Editorial Note:** At 90 FR 21227, May 19, 2025, as required by the Congressional Review Act and Public Law 119-2, the Environmental Protection Agency removed the amendments to §§ 98.3 and 98.4 made effective on Jan. 17, 2025, at 89 FR 91163, Nov. 18, 2024. As of May 19, 2025, §§ 98.3 and 98.4 reverted to the Jan. 16, 2025 version.

## Table C-2 to Subpart C of Part 98—Default $CH_4$ and $N_2O$ Emission Factors for Various Types of Fuel

| Fuel type | Default $CH_4$ emission factor (kg $CH_4$/mmBtu) | Default $N_2$ O emission factor (kg $N_2$ O/mmBtu) |
|---|---|---|
| Coal and Coke (All fuel types in Table C-1) | $1.1 \times 10^{-02}$ | $1.6 \times 10^{-03}$ |
| Natural Gas[1] | $1.0 \times 10^{-03}$ | $1.0 \times 10^{-04}$ |
| Petroleum Products (All fuel types in Table C-1) | $3.0 \times 10^{-03}$ | $6.0 \times 10^{-04}$ |
| Fuel Gas | $3.0 \times 10^{-03}$ | $6.0 \times 10^{-04}$ |
| Other Fuels—Solid | $3.2 \times 10^{-02}$ | $4.2 \times 10^{-03}$ |
| Blast Furnace Gas | $2.2 \times 10^{-05}$ | $1.0 \times 10^{-04}$ |
| Coke Oven Gas | $4.8 \times 10^{-04}$ | $1.0 \times 10^{-04}$ |
| Biomass Fuels—Solid (All fuel types in Table C-1, except wood and wood residuals) | $3.2 \times 10^{-02}$ | $4.2 \times 10^{-03}$ |
| Wood and wood residuals | $7.2 \times 10^{-03}$ | $3.6 \times 10^{-03}$ |
| Biomass Fuels—Gaseous (All fuel types in | $3.2 \times 10^{-03}$ | $6.3 \times 10^{-04}$ |

*Note: Those employing this table are assumed to fall under the IPCC definitions of the "Energy Industry" or "Manufacturing Industries and Construction". In all fuels except for coal the values for these two categories are identical. For coal combustion, those who fall within the IPCC "Energy Industry" category may employ a value of 1g of $CH_4$/mmBtu.*

*[1] Reporters subject to subpart W of this part may only use the default $CH_4$ emission factor for natural gas-fired combustion units that are not reciprocating internal combustion engines or gas turbines. For natural gas-fired reciprocating internal combustion engines or gas turbines, at facilities subject to subpart W of this part, reporters must use a $CH_4$ emission factor determined in accordance with § 98.233(z)(4).*

| Fuel type | Default $CH_4$ emission factor (kg $CH_4$/mmBtu) | Default $N_2O$ emission factor (kg $N_2O$/mmBtu) |
|---|---|---|
| Table C-1)<br>Biomass Fuels—Liquid (All fuel types in Table C-1) | $1.1 \times 10^{-03}$ | $1.1 \times 10^{-04}$ |

*Note: Those employing this table are assumed to fall under the IPCC definitions of the "Energy Industry" or "Manufacturing Industries and Construction". In all fuels except for coal the values for these two categories are identical. For coal combustion, those who fall within the IPCC "Energy Industry" category may employ a value of 1g of $CH_4$/mmBtu.*

*[1] Reporters subject to subpart W of this part may only use the default $CH_4$ emission factor for natural gas-fired combustion units that are not reciprocating internal combustion engines or gas turbines. For natural gas-fired reciprocating internal combustion engines or gas turbines, at facilities subject to subpart W of this part, reporters must use a $CH_4$ emission factor determined in accordance with § 98.233(z)(4).*

*[78 FR 71952, Nov. 29, 2013, as amended at 81 FR 89252, Dec. 9, 2016; 89 FR 42220, May 14, 2024]*

## 1.4 Natural Gas Combustion

### 1.4.1 General[1-2]

Natural gas is one of the major combustion fuels used throughout the country. It is mainly used to generate industrial and utility electric power, produce industrial process steam and heat, and heat residential and commercial space. Natural gas consists of a high percentage of methane (generally above 85 percent) and varying amounts of ethane, propane, butane, and inerts (typically nitrogen, carbon dioxide, and helium). The average gross heating value of natural gas is approximately 1,020 British thermal units per standard cubic foot (Btu/scf), usually varying from 950 to 1,050 Btu/scf.

### 1.4.2 Firing Practices[3-5]

There are three major types of boilers used for natural gas combustion in commercial, industrial, and utility applications: watertube, firetube, and cast iron. Watertube boilers are designed to pass water through the inside of heat transfer tubes while the outside of the tubes is heated by direct contact with the hot combustion gases and through radiant heat transfer. The watertube design is the most common in utility and large industrial boilers. Watertube boilers are used for a variety of applications, ranging from providing large amounts of process steam, to providing hot water or steam for space heating, to generating high-temperature, high-pressure steam for producing electricity. Furthermore, watertube boilers can be distinguished either as field erected units or packaged units.

Field erected boilers are boilers that are constructed on site and comprise the larger sized watertube boilers. Generally, boilers with heat input levels greater than 100 MMBtu/hr, are field erected. Field erected units usually have multiple burners and, given the customized nature of their construction, also have greater operational flexibility and $NO_x$ control options. Field erected units can also be further categorized as wall-fired or tangential-fired. Wall-fired units are characterized by multiple individual burners located on a single wall or on opposing walls of the furnace while tangential units have several rows of air and fuel nozzles located in each of the four corners of the boiler.

Package units are constructed off-site and shipped to the location where they are needed. While the heat input levels of packaged units may range up to 250 MMBtu/hr, the physical size of these units are constrained by shipping considerations and generally have heat input levels less than 100 MMBtu/hr. Packaged units are always wall-fired units with one or more individual burners. Given the size limitations imposed on packaged boilers, they have limited operational flexibility and cannot feasibly incorporate some $NO_x$ control options.

Firetube boilers are designed such that the hot combustion gases flow through tubes, which heat the water circulating outside of the tubes. These boilers are used primarily for space heating systems, industrial process steam, and portable power boilers. Firetube boilers are almost exclusively packaged units. The two major types of firetube units are Scotch Marine boilers and the older firebox boilers. In cast iron boilers, as in firetube boilers, the hot gases are contained inside the tubes and the water being heated circulates outside the tubes. However, the units are constructed of cast iron rather than steel. Virtually all cast iron boilers are constructed as package boilers. These boilers are used to produce either low-pressure steam or hot water, and are most commonly used in small commercial applications.

Natural gas is also combusted in residential boilers and furnaces. Residential boilers and furnaces generally resemble firetube boilers with flue gas traveling through several channels or tubes with water or air circulated outside the channels or tubes.

### 1.4.3 Emissions[3-4]

The emissions from natural gas-fired boilers and furnaces include nitrogen oxides ($NO_x$), carbon monoxide (CO), and carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($N_2O$), volatile organic compounds (VOCs), trace amounts of sulfur dioxide ($SO_2$), and particulate matter (PM).

Nitrogen Oxides -

Nitrogen oxides formation occurs by three fundamentally different mechanisms. The principal mechanism of $NO_x$ formation in natural gas combustion is thermal $NO_x$. The thermal $NO_x$ mechanism occurs through the thermal dissociation and subsequent reaction of nitrogen ($N_2$) and oxygen ($O_2$) molecules in the combustion air. Most $NO_x$ formed through the thermal $NO_x$ mechanism occurs in the high temperature flame zone near the burners. The formation of thermal $NO_x$ is affected by three furnace-zone factors: (1) oxygen concentration, (2) peak temperature, and (3) time of exposure at peak temperature. As these three factors increase, $NO_x$ emission levels increase. The emission trends due to changes in these factors are fairly consistent for all types of natural gas-fired boilers and furnaces. Emission levels vary considerably with the type and size of combustor and with operating conditions (e.g., combustion air temperature, volumetric heat release rate, load, and excess oxygen level).

The second mechanism of $NO_x$ formation, called prompt $NO_x$, occurs through early reactions of nitrogen molecules in the combustion air and hydrocarbon radicals from the fuel. Prompt $NO_x$ reactions occur within the flame and are usually negligible when compared to the amount of $NO_x$ formed through the thermal $NO_x$ mechanism. However, prompt $NO_x$ levels may become significant with ultra-low-$NO_x$ burners.

The third mechanism of $NO_x$ formation, called fuel $NO_x$, stems from the evolution and reaction of fuel-bound nitrogen compounds with oxygen. Due to the characteristically low fuel nitrogen content of natural gas, $NO_x$ formation through the fuel $NO_x$ mechanism is insignificant.

Carbon Monoxide -

The rate of CO emissions from boilers depends on the efficiency of natural gas combustion. Improperly tuned boilers and boilers operating at off-design levels decrease combustion efficiency resulting in increased CO emissions. In some cases, the addition of $NO_x$ control systems such as low $NO_x$ burners and flue gas recirculation (FGR) may also reduce combustion efficiency, resulting in higher CO emissions relative to uncontrolled boilers.

Volatile Organic Compounds -

The rate of VOC emissions from boilers and furnaces also depends on combustion efficiency. VOC emissions are minimized by combustion practices that promote high combustion temperatures, long residence times at those temperatures, and turbulent mixing of fuel and combustion air. Trace amounts of VOC species in the natural gas fuel (e.g., formaldehyde and benzene) may also contribute to VOC emissions if they are not completely combusted in the boiler.

Sulfur Oxides -

Emissions of $SO_2$ from natural gas-fired boilers are low because pipeline quality natural gas typically has sulfur levels of 2,000 grains per million cubic feet. However, sulfur-containing odorants are added to natural gas for detecting leaks, leading to small amounts of $SO_2$ emissions. Boilers combusting unprocessed natural gas may have higher $SO_2$ emissions due to higher levels of sulfur in the natural gas. For these units, a sulfur mass balance should be used to determine $SO_2$ emissions.

Particulate Matter -

Because natural gas is a gaseous fuel, filterable PM emissions are typically low. Particulate matter from natural gas combustion has been estimated to be less than 1 micrometer in size and has filterable and condensable fractions. Particulate matter in natural gas combustion are usually larger molecular weight hydrocarbons that are not fully combusted. Increased PM emissions may result from poor air/fuel mixing or maintenance problems.

Greenhouse Gases -[6-9]

$CO_2$, $CH_4$, and $N_2O$ emissions are all produced during natural gas combustion. In properly tuned boilers, nearly all of the fuel carbon (99.9 percent) in natural gas is converted to $CO_2$ during the combustion process. This conversion is relatively independent of boiler or combustor type. Fuel carbon not converted to $CO_2$ results in $CH_4$, CO, and/or VOC emissions and is due to incomplete combustion. Even in boilers operating with poor combustion efficiency, the amount of $CH_4$, CO, and VOC produced is insignificant compared to $CO_2$ levels.

Formation of $N_2O$ during the combustion process is affected by two furnace-zone factors. $N_2O$ emissions are minimized when combustion temperatures are kept high (above 1475°F) and excess oxygen is kept to a minimum (less than 1 percent).

Methane emissions are highest during low-temperature combustion or incomplete combustion, such as the start-up or shut-down cycle for boilers. Typically, conditions that favor formation of $N_2O$ also favor emissions of methane.

1.4.4 Controls[4,10]

$NO_x$ Controls -

Currently, the two most prevalent combustion control techniques used to reduce $NO_x$ emissions from natural gas-fired boilers are flue gas recirculation (FGR) and low $NO_x$ burners. In an FGR system, a portion of the flue gas is recycled from the stack to the burner windbox. Upon entering the windbox, the recirculated gas is mixed with combustion air prior to being fed to the burner. The recycled flue gas consists of combustion products which act as inerts during combustion of the fuel/air mixture. The FGR system reduces $NO_x$ emissions by two mechanisms. Primarily, the recirculated gas acts as a dilutent to reduce combustion temperatures, thus suppressing the thermal $NO_x$ mechanism. To a lesser extent, FGR also reduces $NO_x$ formation by lowering the oxygen concentration in the primary flame zone. The amount of recirculated flue gas is a key operating parameter influencing $NO_x$ emission rates for these systems. An FGR system is normally used in combination with specially designed low $NO_x$ burners capable of sustaining a stable flame with the increased inert gas flow resulting from the use of FGR. When low $NO_x$ burners and FGR are used in combination, these techniques are capable of reducing $NO_x$ emissions by 60 to 90 percent.

Low $NO_x$ burners reduce $NO_x$ by accomplishing the combustion process in stages. Staging partially delays the combustion process, resulting in a cooler flame which suppresses thermal $NO_x$ formation. The two most common types of low $NO_x$ burners being applied to natural gas-fired boilers are staged air burners and staged fuel burners. $NO_x$ emission reductions of 40 to 85 percent (relative to uncontrolled emission levels) have been observed with low $NO_x$ burners.

Other combustion control techniques used to reduce $NO_x$ emissions include staged combustion and gas reburning. In staged combustion (e.g., burners-out-of-service and overfire air), the degree of staging is a key operating parameter influencing $NO_x$ emission rates. Gas reburning is similar to the use of overfire in the use of combustion staging. However, gas reburning injects additional amounts of natural gas in the upper furnace, just before the overfire air ports, to provide increased reduction of $NO_x$ to $NO_2$.

Two postcombustion technologies that may be applied to natural gas-fired boilers to reduce $NO_x$ emissions are selective noncatalytic reduction (SNCR) and selective catalytic reduction (SCR). The SNCR system injects ammonia ($NH_3$) or urea into combustion flue gases (in a specific temperature zone) to reduce $NO_x$ emission. The Alternative Control Techniques (ACT) document for $NO_x$ emissions from utility boilers, maximum SNCR performance was estimated to range from 25 to 40 percent for natural gas-fired boilers.[12] Performance data available from several natural gas fired utility boilers with SNCR show a 24 percent reduction in $NO_x$ for applications on wall-fired boilers and a 13 percent reduction in $NO_x$ for applications on tangential-fired boilers.[11] In many situations, a boiler may have an SNCR system installed to trim $NO_x$ emissions to meet permitted levels. In these cases, the SNCR system may not be operated to achieve maximum $NO_x$ reduction. The SCR system involves injecting $NH_3$ into the flue gas in the presence of a catalyst to reduce $NO_x$ emissions. No data were available on SCR performance on natural gas fired boilers at the time of this publication. However, the ACT Document for utility boilers estimates $NO_x$ reduction efficiencies for SCR control ranging from 80 to 90 percent.[12]

Emission factors for natural gas combustion in boilers and furnaces are presented in Tables 1.4-1, 1.4-2, 1.4-3, and 1.4-4.[11] Tables in this section present emission factors on a volume basis ($lb/10^6$ scf). To convert to an energy basis (lb/MMBtu), divide by a heating value of 1,020 MMBtu/$10^6$ scf. For the purposes of developing emission factors, natural gas combustors have been organized into three general categories: large wall-fired boilers with greater than 100 MMBtu/hr of heat input, boilers and residential furnaces with less than 100 MMBtu/hr of heat input, and tangential-fired boilers. Boilers within these categories share the same general design and operating characteristics and hence have similar emission characteristics when combusting natural gas.

Emission factors are rated from A to E to provide the user with an indication of how "good" the factor is, with "A" being excellent and "E" being poor. The criteria that are used to determine a rating for an emission factor can be found in the Emission Factor Documentation for AP-42 Section 1.4 and in the introduction to the AP-42 document.

### 1.4.5 Updates Since the Fifth Edition

The Fifth Edition was released in January 1995. Revisions to this section are summarized below. For further detail, consult the Emission Factor Documentation for this section. These and other documents can be found on the Emission Factor and Inventory Group (EFIG) home page (http://www.epa.gov/ttn/chief).

Supplement D, March 1998

- Text was revised concerning Firing Practices, Emissions, and Controls.
- All emission factors were updated based on 482 data points taken from 151 source tests. Many new emission factors have been added for speciated organic compounds, including hazardous air pollutants.

July 1998 - minor changes

- Footnote D was added to table 1.4-3 to explain why the sum of individual HAP may exceed VOC or TOC, the web address was updated, and the references were reordered.

Table 1.4-1. EMISSION FACTORS FOR NITROGEN OXIDES ($NO_x$) AND CARBON MONOXIDE (CO) FROM NATURAL GAS COMBUSTION[a]

| Combustor Type (MMBtu/hr Heat Input) [SCC] | $NO_x$[b] | | CO | |
|---|---|---|---|---|
| | Emission Factor ($lb/10^6$ scf) | Emission Factor Rating | Emission Factor ($lb/10^6$ scf) | Emission Factor Rating |
| Large Wall-Fired Boilers (>100) [1-01-006-01, 1-02-006-01, 1-03-006-01] | | | | |
| Uncontrolled (Pre-NSPS)[c] | 280 | A | 84 | B |
| Uncontrolled (Post-NSPS)[c] | 190 | A | 84 | B |
| Controlled - Low $NO_x$ burners | 140 | A | 84 | B |
| Controlled - Flue gas recirculation | 100 | D | 84 | B |
| Small Boilers (<100) [1-01-006-02, 1-02-006-02, 1-03-006-02, 1-03-006-03] | | | | |
| Uncontrolled | 100 | B | 84 | B |
| Controlled - Low $NO_x$ burners | 50 | D | 84 | B |
| Controlled - Low $NO_x$ burners/Flue gas recirculation | 32 | C | 84 | B |
| Tangential-Fired Boilers (All Sizes) [1-01-006-04] | | | | |
| Uncontrolled | 170 | A | 24 | C |
| Controlled - Flue gas recirculation | 76 | D | 98 | D |
| Residential Furnaces (<0.3) [No SCC] | | | | |
| Uncontrolled | 94 | B | 40 | B |

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. To convert from $lb/10^6$ scf to $kg/10^6$ $m^3$, multiply by 16. Emission factors are based on an average natural gas higher heating value of 1,020 Btu/scf. To convert from $lb/10^6$ scf to lb/MMBtu, divide by 1,020. The emission factors in this table may be converted to other natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to this average heating value. SCC = Source Classification Code. ND = no data. NA = not applicable.

[b] Expressed as $NO_2$. For large and small wall fired boilers with SNCR control, apply a 24 percent reduction to the appropriate $NO_X$ emission factor. For tangential-fired boilers with SNCR control, apply a 13 percent reduction to the appropriate $NO_X$ emission factor.

[c] NSPS=New Source Performance Standard as defined in 40 CFR 60 Subparts D and Db. Post-NSPS units are boilers with greater than 250 MMBtu/hr of heat input that commenced construction modification, or reconstruction after August 17, 1971, and units with heat input capacities between 100 and 250 MMBtu/hr that commenced construction modification, or reconstruction after June 19, 1984.

TABLE 1.4-2. EMISSION FACTORS FOR CRITERIA POLLUTANTS AND GREENHOUSE GASES FROM NATURAL GAS COMBUSTION[a]

| Pollutant | Emission Factor ($lb/10^6$ scf) | Emission Factor Rating |
|---|---|---|
| $CO_2$[b] | 120,000 | A |
| Lead | 0.0005 | D |
| $N_2O$ (Uncontrolled) | 2.2 | E |
| $N_2O$ (Controlled-low-$NO_X$ burner) | 0.64 | E |
| PM (Total)[c] | 7.6 | D |
| PM (Condensable)[c] | 5.7 | D |
| PM (Filterable)[c] | 1.9 | B |
| $SO_2$[d] | 0.6 | A |
| TOC | 11 | B |
| Methane | 2.3 | B |
| VOC | 5.5 | C |

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. To convert from $lb/10^6$ scf to $kg/10^6$ $m^3$, multiply by 16. To convert from $lb/10^6$ scf to 1b/MMBtu, divide by 1,020. The emission factors in this table may be converted to other natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to this average heating value. TOC = Total Organic Compounds. VOC = Volatile Organic Compounds.

[b] Based on approximately 100% conversion of fuel carbon to $CO_2$. $CO_2[lb/10^6 scf] = (3.67)(CON)(C)(D)$, where CON = fractional conversion of fuel carbon to $CO_2$, C = carbon content of fuel by weight (0.76), and D = density of fuel, $4.2x10^4$ $lb/10^6$ scf.

[c] All PM (total, condensible, and filterable) is assumed to be less than 1.0 micrometer in diameter. Therefore, the PM emission factors presented here may be used to estimate $PM_{10}$, $PM_{2.5}$ or $PM_1$ emissions. Total PM is the sum of the filterable PM and condensible PM. Condensible PM is the particulate matter collected using EPA Method 202 (or equivalent). Filterable PM is the particulate matter collected on, or prior to, the filter of an EPA Method 5 (or equivalent) sampling train.

[d] Based on 100% conversion of fuel sulfur to $SO_2$. Assumes sulfur content is natural gas of 2,000 grains/$10^6$ scf. The $SO_2$ emission factor in this table can be converted to other natural gas sulfur contents by multiplying the $SO_2$ emission factor by the ratio of the site-specific sulfur content (grains/$10^6$ scf) to 2,000 grains/$10^6$ scf.

TABLE 1.4-3. EMISSION FACTORS FOR SPECIATED ORGANIC COMPOUNDS FROM NATURAL GAS COMBUSTION[a]

| CAS No. | Pollutant | Emission Factor ($lb/10^6$ scf) | Emission Factor Rating |
|---|---|---|---|
| 91-57-6 | 2-Methylnaphthalene[b, c] | 2.4E-05 | D |
| 56-49-5 | 3-Methylcholanthrene[b, c] | <1.8E-06 | E |
| | 7,12-Dimethylbenz(a)anthracene[b,c] | <1.6E-05 | E |
| 83-32-9 | Acenaphthene[b,c] | <1.8E-06 | E |
| 203-96-8 | Acenaphthylene[b,c] | <1.8E-06 | E |
| 120-12-7 | Anthracene[b,c] | <2.4E-06 | E |
| 56-55-3 | Benz(a)anthracene[b,c] | <1.8E-06 | E |
| 71-43-2 | Benzene[b] | 2.1E-03 | B |
| 50-32-8 | Benzo(a)pyrene[b,c] | <1.2E-06 | E |
| 205-99-2 | Benzo(b)fluoranthene[b,c] | <1.8E-06 | E |
| 191-24-2 | Benzo(g,h,i)perylene[b,c] | <1.2E-06 | E |
| 207-08-9 | Benzo(k)fluoranthene[b,c] | <1.8E-06 | E |
| 106-97-8 | Butane | 2.1E+00 | E |
| 218-01-9 | Chrysene[b,c] | <1.8E-06 | E |
| 53-70-3 | Dibenzo(a,h)anthracene[b,c] | <1.2E-06 | E |
| 25321-22-6 | Dichlorobenzene[b] | 1.2E-03 | E |
| 74-84-0 | Ethane | 3.1E+00 | E |
| 206-44-0 | Fluoranthene[b,c] | 3.0E-06 | E |
| 86-73-7 | Fluorene[b,c] | 2.8E-06 | E |
| 50-00-0 | Formaldehyde[b] | 7.5E-02 | B |
| 110-54-3 | Hexane[b] | 1.8E+00 | E |
| 193-39-5 | Indeno(1,2,3-cd)pyrene[b,c] | <1.8E-06 | E |
| 91-20-3 | Naphthalene[b] | 6.1E-04 | E |
| 109-66-0 | Pentane | 2.6E+00 | E |
| 85-01-8 | Phenanathrene[b,c] | 1.7E-05 | D |
| 74-98-6 | Propane | 1.6E+00 | E |

TABLE 1.4-3. EMISSION FACTORS FOR SPECIATED ORGANIC COMPOUNDS FROM NATURAL GAS COMBUSTION (Continued)

| CAS No. | Pollutant | Emission Factor ($lb/10^6$ scf) | Emission Factor Rating |
|---|---|---|---|
| 129-00-0 | Pyrene[b, c] | 5.0E-06 | E |
| 108-88-3 | Toluene[b] | 3.4E-03 | C |

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. To convert from $lb/10^6$ scf to $kg/10^6$ $m^3$, multiply by 16. To convert from $1b/10^6$ scf to lb/MMBtu, divide by 1,020. Emission Factors preceeded with a less-than symbol are based on method detection limits.

[b] Hazardous Air Pollutant (HAP) as defined by Section 112(b) of the Clean Air Act.

[c] HAP because it is Polycyclic Organic Matter (POM). POM is a HAP as defined by Section 112(b) of the Clean Air Act.

[d] The sum of individual organic compounds may exceed the VOC and TOC emission factors due to differences in test methods and the availability of test data for each pollutant.

TABLE 1.4-4. EMISSION FACTORS FOR METALS FROM NATURAL GAS COMBUSTION[a]

| CAS No. | Pollutant | Emission Factor ($lb/10^6$ scf) | Emission Factor Rating |
|---|---|---|---|
| 7440-38-2 | Arsenic[b] | 2.0E-04 | E |
| 7440-39-3 | Barium | 4.4E-03 | D |
| 7440-41-7 | Beryllium[b] | <1.2E-05 | E |
| 7440-43-9 | Cadmium[b] | 1.1E-03 | D |
| 7440-47-3 | Chromium[b] | 1.4E-03 | D |
| 7440-48-4 | Cobalt[b] | 8.4E-05 | D |
| 7440-50-8 | Copper | 8.5E-04 | C |
| 7439-96-5 | Manganese[b] | 3.8E-04 | D |
| 7439-97-6 | Mercury[b] | 2.6E-04 | D |
| 7439-98-7 | Molybdenum | 1.1E-03 | D |
| 7440-02-0 | Nickel[b] | 2.1E-03 | C |
| 7782-49-2 | Selenium[b] | <2.4E-05 | E |
| 7440-62-2 | Vanadium | 2.3E-03 | D |
| 7440-66-6 | Zinc | 2.9E-02 | E |

[a] Reference 11. Units are in pounds of pollutant per million standard cubic feet of natural gas fired. Data are for all natural gas combustion sources. Emission factors preceeded by a less-than symbol are based on method detection limits. To convert from $lb/10^6$ scf to $kg/10^6$ $m^3$, multiply by l6. To convert from $lb/10^6$ scf to 1b/MMBtu, divide by 1,020.

[b] Hazardous Air Pollutant as defined by Section 112(b) of the Clean Air Act.

References For Section 1.4


1. *Exhaust Gases From Combustion And Industrial Processes*, EPA Contract No. EHSD 71-36, Engineering Science, Inc., Washington, DC, October 1971.

2. *Chemical Engineers' Handbook, Fourth Edition*, J. H. Perry, Editor, McGraw-Hill Book Company, New York, NY, 1963.

3. *Background Information Document For Industrial Boilers*, EPA-450/3-82-006a, U. S. Environmental Protection Agency, Research Triangle Park, NC, March 1982.

4. *Background Information Document For Small Steam Generating Units*, EPA-450/3-87-000, U. S . Environmental Protection Agency, Research Triangle Park, NC, 1987.

5. J. L. Muhlbaier, "Particulate and Gaseous Emissions From Natural Gas Furnaces and Water Heaters", *Journal Of The Air Pollution Control Association*, December 1981.

6. L. P. Nelson, *et al.*, *Global Combustion Sources Of Nitrous Oxide Emissions*, Research Project 2333-4 Interim Report, Sacramento: Radian Corporation, 1991.

7. R. L. Peer, *et al.*, *Characterization Of Nitrous Oxide Emission Sources*, Prepared for the U. S. EPA Contract 68-D1-0031, Research Triangle Park, NC: Radian Corporation, 1995.

8. S. D. Piccot, *et al.*, *Emissions and Cost Estimates For Globally Significant Anthropogenic Combustion Sources Of $NO_x$, $N_2O$, $CH_4$, CO, and $CO_2$,* EPA Contract No. 68-02-4288, Research Triangle Park, NC: Radian Corporation, 1990.

9. *Sector-Specific Issues and Reporting Methodologies Supporting the General Guidelines for the Voluntary Reporting of Greenhouse Gases under Section 1605(b) of the Energy Policy Act of 1992* (1994) DOE/PO-0028, Volume 2 of 3, U.S. Department of Energy.

10. J. P. Kesselring and W. V. Krill, "A Low-$NO_x$ Burner For Gas-Fired Firetube Boilers", *Proceedings: 1985 Symposium On Stationary Combustion $NO_x$ Control, Volume 2*, EPRI CS-4360, Electric Power Research Institute, Palo Alto, CA, January 1986.

11. *Emission Factor Documentation for AP-42 Section 1.4—Natural Gas Combustion*, Technical Support Division, Office of Air Quality Planning and Standards, U. S. Environmental Protection Agency, Research Triangle Park, NC, 1997.

12. *Alternate Control Techniques Document - $NO_x$ Emissions from Utility Boilers*, EPA-453/R-94-023, U. S. Environmental Protection Agency, Research Triangle Park, NC, March 1994.

## 5.2 Transportation And Marketing Of Petroleum Liquids[1-3]

### 5.2.1 General

The transportation and marketing of petroleum liquids involve many distinct operations, each of which represents a potential source of evaporation loss. Crude oil is transported from production operations to a refinery by tankers, barges, rail tank cars, tank trucks, and pipelines. Refined petroleum products are conveyed to fuel marketing terminals and petrochemical industries by these same modes. From the fuel marketing terminals, the fuels are delivered by tank trucks to service stations, commercial accounts, and local bulk storage plants. The final destination for gasoline is usually a motor vehicle gasoline tank. Similar distribution paths exist for fuel oils and other petroleum products. A general depiction of these activities is shown in Figure 5.2-1.

### 5.2.2 Emissions And Controls

Evaporative emissions from the transportation and marketing of petroleum liquids may be considered, by storage equipment and mode of transportation used, in four categories:

1. Rail tank cars, tank trucks, and marine vessels: loading, transit, and ballasting losses.
2. Service stations: bulk fuel drop losses and underground tank breathing losses.
3. Motor vehicle tanks: refueling losses.
4. Large storage tanks: breathing, working, and standing storage losses. (See Chapter 7, "Liquid Storage Tanks".)

Evaporative and exhaust emissions are also associated with motor vehicle operation, and these topics are discussed in AP-42 *Volume II: Mobile Sources*.

#### 5.2.2.1 Rail Tank Cars, Tank Trucks, And Marine Vessels -

Emissions from these sources are from loading losses, ballasting losses, and transit losses.

##### 5.2.2.1.1 Loading Losses -

Loading losses are the primary source of evaporative emissions from rail tank car, tank truck, and marine vessel operations. Loading losses occur as organic vapors in "empty" cargo tanks are displaced to the atmosphere by the liquid being loaded into the tanks. These vapors are a composite of (1) vapors formed in the empty tank by evaporation of residual product from previous loads, (2) vapors transferred to the tank in vapor balance systems as product is being unloaded, and (3) vapors generated in the tank as the new product is being loaded. The quantity of evaporative losses from loading operations is, therefore, a function of the following parameters:

- Physical and chemical characteristics of the previous cargo;
- Method of unloading the previous cargo;
- Operations to transport the empty carrier to a loading terminal;
- Method of loading the new cargo; and
- Physical and chemical characteristics of the new cargo.

The principal methods of cargo carrier loading are illustrated in Figure 5.2-2, Figure 5.2-3, and Figure 5.2-4. In the splash loading method, the fill pipe dispensing the cargo is lowered only part way into the cargo tank. Significant turbulence and vapor/liquid contact occur during the splash

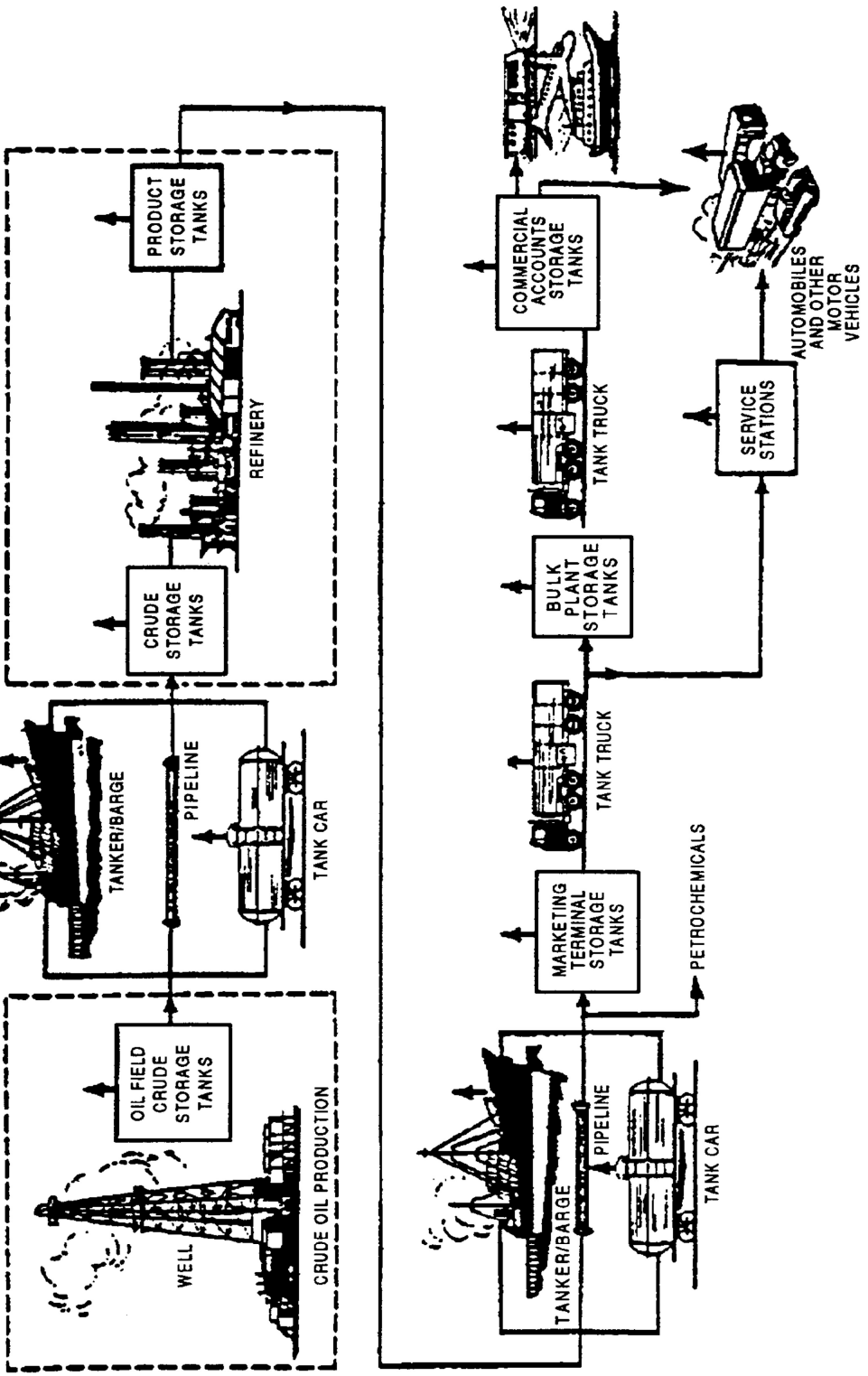



Figure 5.2-1. Flow sheet of petroleum production, refining, and distribution systems. (Points of organic emissions are indicated by vertical arrows.)

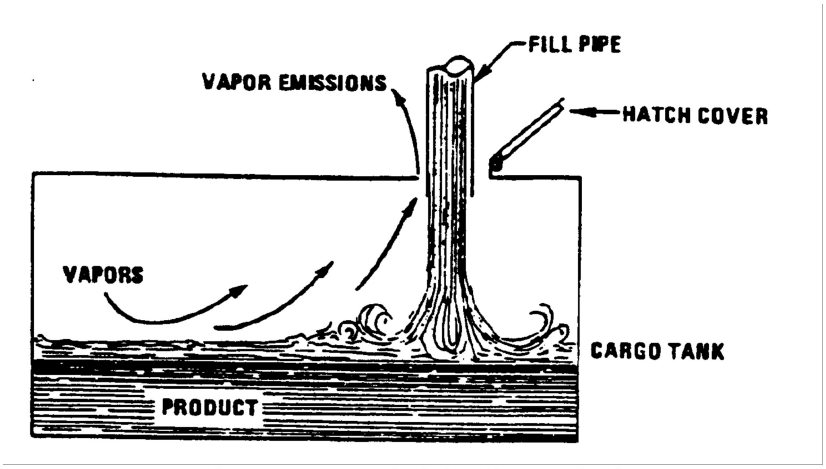



Figure 5.2-2. Splash loading method.

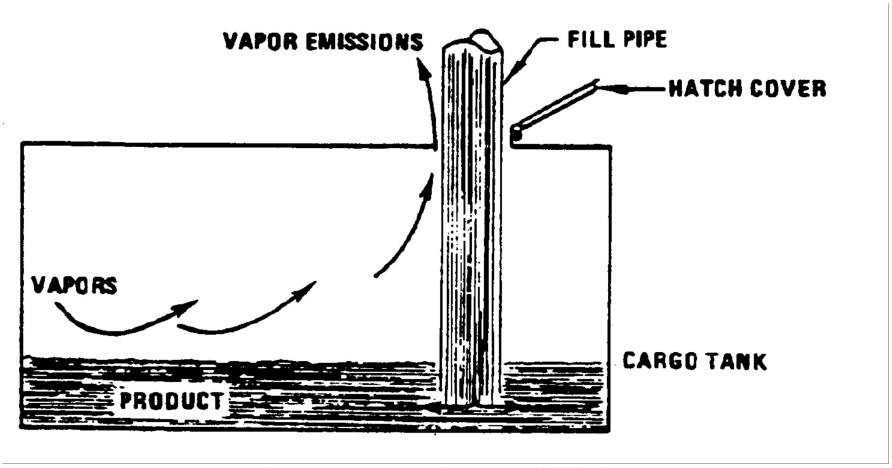



Figure 5.2-3. Submerged fill pipe.

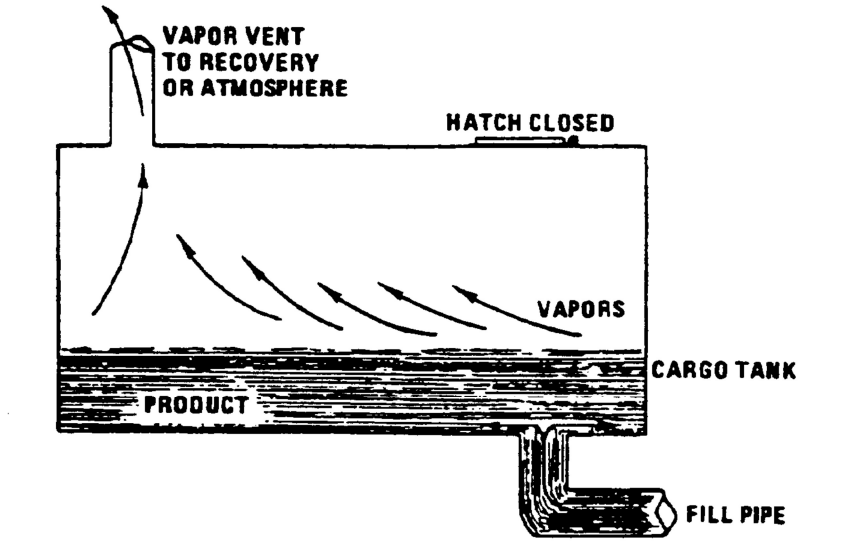



Figure 5.2-4. Bottom loading.

loading operation, resulting in high levels of vapor generation and loss. If the turbulence is great enough, liquid droplets will be entrained in the vented vapors.

A second method of loading is submerged loading. Two types are the submerged fill pipe method and the bottom loading method. In the submerged fill pipe method, the fill pipe extends almost to the bottom of the cargo tank. In the bottom loading method, a permanent fill pipe is attached to the cargo tank bottom. During most of submerged loading by both methods, the fill pipe opening is below the liquid surface level. Liquid turbulence is controlled significantly during submerged loading, resulting in much lower vapor generation than encountered during splash loading.

The recent loading history of a cargo carrier is just as important a factor in loading losses as the method of loading. If the carrier has carried a nonvolatile liquid such as fuel oil, or has just been cleaned, it will contain vapor-free air. If it has just carried gasoline and has not been vented, the air in the carrier tank will contain volatile organic vapors, which will be expelled during the loading operation along with newly generated vapors.

Cargo carriers are sometimes designated to transport only one product, and in such cases are practicing "dedicated service". Dedicated gasoline cargo tanks return to a loading terminal containing air fully or partially saturated with vapor from the previous load. Cargo tanks may also be "switch loaded" with various products, so that a nonvolatile product being loaded may expel the vapors remaining from a previous load of a volatile product such as gasoline. These circumstances vary with the type of cargo tank and with the ownership of the carrier, the petroleum liquids being transported, geographic location, and season of the year.

One control measure for vapors displaced during liquid loading is called "vapor balance service", in which the cargo tank retrieves the vapors displaced during product unloading at bulk plants or service stations and transports the vapors back to the loading terminal. Figure 5.2-5 shows a tank truck in vapor balance service filling a service station underground tank and taking on displaced gasoline vapors for return to the terminal. A cargo tank returning to a bulk terminal in vapor balance service normally is saturated with organic vapors, and the presence of these vapors at the start of submerged loading of the tanker truck results in greater loading losses than encountered during nonvapor balance, or "normal", service. Vapor balance service is usually not practiced with marine vessels, although some vessels practice emission control by means of vapor transfer within their own cargo tanks during ballasting operations, discussed below.

Emissions from loading petroleum liquid can be estimated (with a probable error of ±30 percent)[4] using the following expression:

$$L_L = 12.46 \frac{SPM}{T} \quad (1)$$

where:

$L_L$ = loading loss, pounds per 1000 gallons ($lb/10^3$ gal) of liquid loaded

S = a saturation factor (see Table 5.2-1)
P = true vapor pressure of liquid loaded, pounds per square inch absolute (psia) (see Section 7.1, "Organic Liquid Storage Tanks")
M = molecular weight of vapors, pounds per pound-mole (lb/lb-mole) (see Section 7.1, "Organic Liquid Storage Tanks")
T = temperature of bulk liquid loaded, °R (°F + 460)

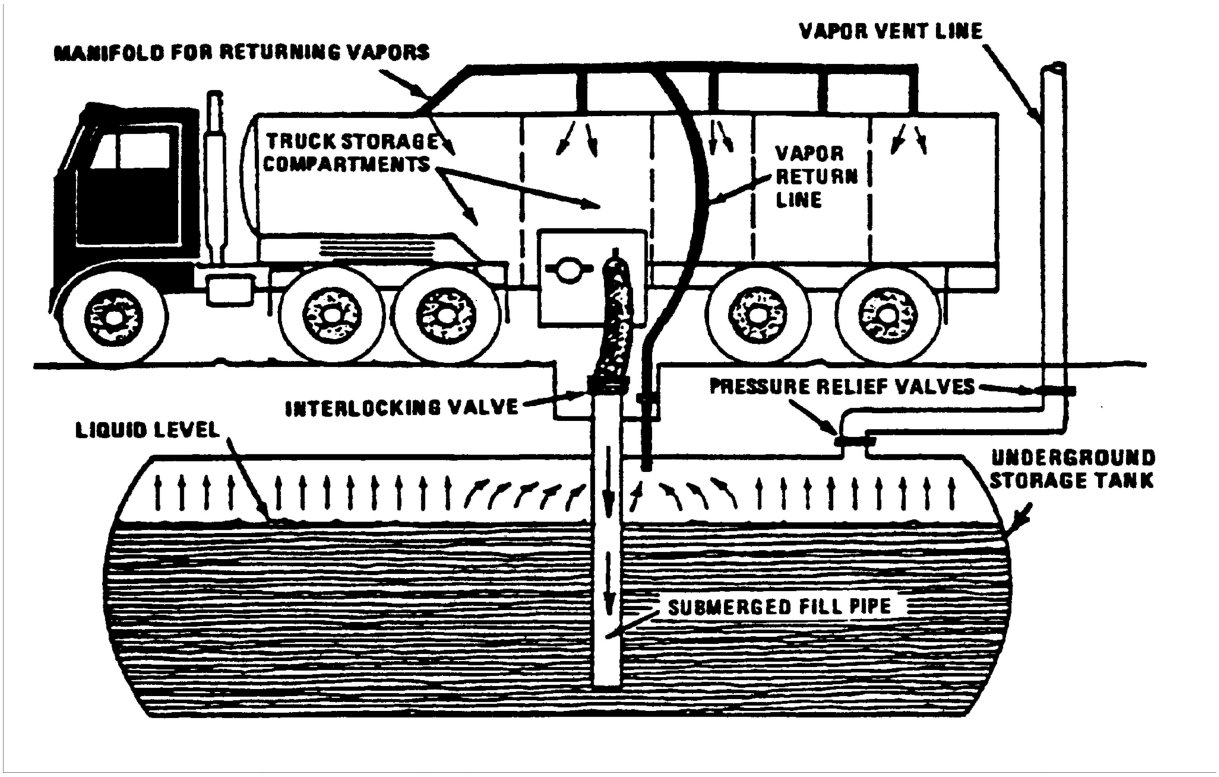



Figure 5.2-5. Tank truck unloading into a service station underground storage tank and practicing "vapor balance" form of emission control.

Table 5.2-1. SATURATION (S) FACTORS FOR CALCULATING PETROLEUM LIQUID LOADING LOSSES

| Cargo Carrier | Mode Of Operation | S Factor |
|---|---|---|
| Tank trucks and rail tank cars | Submerged loading of a clean cargo tank | 0.50 |
| | Submerged loading: dedicated normal service | 0.60 |
| | Submerged loading: dedicated vapor balance service | 1.00 |
| | Splash loading of a clean cargo tank | 1.45 |
| | Splash loading: dedicated normal service | 1.45 |
| | Splash loading: dedicated vapor balance service | 1.00 |
| Marine vessels[a] | Submerged loading: ships | 0.2 |
| | Submerged loading: barges | 0.5 |

[a] For products other than gasoline and crude oil. For marine loading of gasoline, use factors from Table 5.2-2. For marine loading of crude oil, use Equations 2 and 3 and Table 5.2-3.

The saturation factor, S, represents the expelled vapor's fractional approach to saturation, and it accounts for the variations observed in emission rates from the different unloading and loading methods. Table 5.2-1 lists suggested saturation factors.

Emissions from controlled loading operations can be calculated by multiplying the uncontrolled emission rate calculated in Equation 1 by an overall reduction efficiency term:

$$\left(1 - \frac{\text{eff}}{100}\right)$$

The overall reduction efficiency should account for the capture efficiency of the collection system as well as both the control efficiency and any downtime of the control device. Measures to reduce loading emissions include selection of alternate loading methods and application of vapor recovery equipment. The latter captures organic vapors displaced during loading operations and recovers the vapors by the use of refrigeration, absorption, adsorption, and/or compression. The recovered product is piped back to storage. Vapors can also be controlled through combustion in a thermal oxidation unit, with no product recovery. Figure 5.2-6 demonstrates the recovery of gasoline vapors from tank trucks during loading operations at bulk terminals. Control efficiencies for the recovery units range from 90 to over 99 percent, depending on both the nature of the vapors and the type of control equipment used.[5-6] However, not all of the displaced vapors reach the control device, because of leakage from both the tank truck and collection system. The collection efficiency should be assumed to be 99.2 percent for tanker trucks passing the MACT-level annual leak test (not more than 1 inch water column pressure change in 5 minutes after pressurizing to 18 inches water followed by pulling a vacuum of 6 inches water).[7] A collection efficiency of 98.7 percent (a 1.3 percent leakage rate) should be assumed for trucks passing the NSPS-level annual test (3 inches pressure change) A collection efficiency of 70 percent should be assumed for trucks not passing one of these annual leak tests[6].

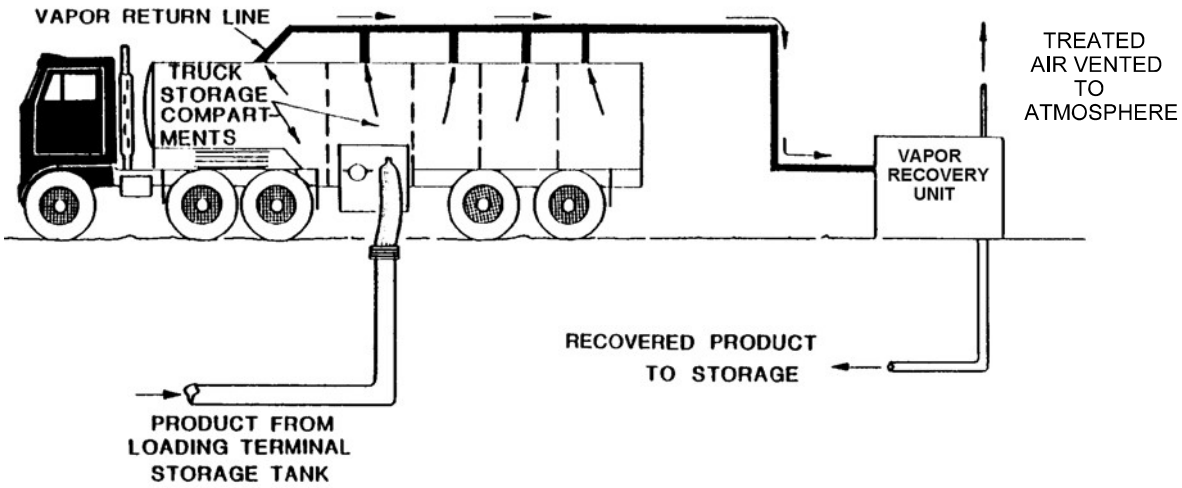



Figure 5.2-6. Tank truck loading with vapor recovery.

Sample Calculation -

Loading losses ($L_L$) from a gasoline tank truck in dedicated vapor balance service and practicing vapor recovery would be calculated as follows, using Equation 1:

Design basis -

Cargo tank volume is 8000 gal
Gasoline Reid vapor pressure (RVP) is 9 psia
Product temperature is 80°F
Vapor recovery efficiency is 95 percent
Vapor collection efficiency is 98.7 percent (NSPS-level annual leak test)

Loading loss equation -

$$L_L = 12.46 \frac{SPM}{T}\left(1 - \frac{eff}{100}\right)$$

where:

S = saturation factor (see Table 5.2-1) - 1.00
P = true vapor pressure of gasoline = 6.6 psia
M = molecular weight of gasoline vapors = 66
T = temperature of gasoline = 540°R
eff = overall reduction efficiency (95 percent control x 98.7 percent collection) = 94 percent

$$L_L = 12.46 \frac{(1.00)(6.6)(66)}{540}\left(1 - \frac{94}{100}\right)$$

$$= 0.60 \text{ lb}/10^3 \text{ gal}$$

Total loading losses are:

$$(0.60 \text{ lb}/10^3 \text{ gal})(8.0 \times 10^3 \text{ gal}) = 4.8 \text{ pounds (lb)}$$

Measurements of gasoline loading losses from ships and barges have led to the development of emission factors for these specific loading operations.[8] These factors are presented in Table 5.2-2 and should be used instead of Equation 1 for gasoline loading operations at marine terminals. Factors are expressed in units of milligrams per liter (mg/L) and pounds per 1000 gallons (lb/$10^3$ gal).

Table 5.2-2 (Metric And English Units). VOLATILE ORGANIC COMPOUND (VOC) EMISSION FACTORS FOR GASOLINE LOADING OPERATIONS AT MARINE TERMINALS[a]

| Vessel Tank Condition | Previous Cargo | Ships/Ocean Barges[b] | | Barges[b] | |
|---|---|---|---|---|---|
| | | mg/L Transferred | lb/$10^3$ gal Transferred | mg/L Transferred | lb/$10^3$ gal Transferred |
| Uncleaned | Volatile[c] | 315 | 2.6 | 465 | 3.9 |
| Ballasted | Volatile | 205 | 1.7 | —[d] | —[d] |
| Cleaned | Volatile | 180 | 1.5 | ND | ND |
| Gas-freed | Volatile | 85 | 0.7 | ND | ND |
| Any condition | Nonvolatile | 85 | 0.7 | ND | ND |
| Gas-freed | Any cargo | ND | ND | 245 | 2.0 |
| Typical overall situation[e] | Any cargo | 215 | 1.8 | 410 | 3.4 |

[a] References 2,9. Factors are for both VOC emissions (which excludes methane and ethane) and total organic emissions, because methane and ethane have been found to constitute a negligible weight fraction of the evaporative emissions from gasoline. ND = no data.
[b] Ocean barges (tank compartment depth about 12.2 m [40 ft]) exhibit emission levels similar to tank ships. Shallow draft barges (compartment depth 3.0 to 3.7 m [10 to 12 ft]) exhibit higher emission levels.
[c] Volatile cargoes are those with a true vapor pressure greater than 10 kilopascals (kPa) (1.5 psia).
[d] Barges are usually not ballasted.
[e] Based on observation that 41% of tested ship compartments were uncleaned, 11% ballasted, 24% cleaned, and 24% gas-freed. For barges, 76% were uncleaned.

In addition to Equation 1, which estimates emissions from the loading of petroleum liquids, Equation 2 has been developed specifically for estimating emissions from the loading of crude oil into ships and ocean barges:

$$C_L = C_A + C_G \quad (2)$$

where:

$C_L$ = total loading loss, lb/$10^3$ gal of crude oil loaded
$C_A$ = arrival emission factor, contributed by vapors in the empty tank compartment before loading, lb/$10^3$ gal loaded (see Note below)
$C_G$ = generated emission factor, contributed by evaporation during loading, lb/$10^3$ gal loaded

Note: Values of $C_A$ for various cargo tank conditions are listed in Table 5.2-3.

5.2-3 (English Units). AVERAGE ARRIVAL EMISSION FACTORS, $C_A$, FOR CRUDE OIL LOADING EMISSION EQUATION[a]

| Ship/Ocean Barge Tank Condition | Previous Cargo | Arrival Emission Factor, lb/$10^3$ gal |
|---|---|---|
| Uncleaned | Volatile[b] | 0.86 |
| Ballasted | Volatile | 0.46 |
| Cleaned or gas-freed | Volatile | 0.33 |
| Any condition | Nonvolatile | 0.33 |

[a] Arrival emission factors ($C_A$) to be added to generated emission factors ($C_G$) calculated in Equation 3 to produce total crude oil loading loss ($C_L$). Factors are for total organic compounds; VOC emission factors average about 15% lower, because VOC does not include methane or ethane.
[b] Volatile cargoes are those with a true vapor pressure greater than 10 kPa (1.5 psia).

This equation was developed empirically from test measurements of several vessel compartments.[8] The quantity $C_G$ can be calculated using Equation 3:

$$C_G = 1.84\ (0.44\ P - 0.42)\ \frac{M\ G}{T} \qquad (3)$$

where:

P = true vapor pressure of loaded crude oil, psia
M = molecular weight of vapors, lb/lb-mole
G = vapor growth factor = 1.02 (dimensionless)
T = temperature of vapors, °R (°F + 460)

Emission factors derived from Equation 3 and Table 5.2-3 represent total organic compounds. Volatile organic compound (VOC) emission factors (which exclude methane and ethane because they are exempted from the regulatory definition of "VOC") for crude oil vapors have been found to range from approximately 55 to 100 weight percent of these total organic factors. When specific vapor composition information is not available, the VOC emission factor can be estimated by taking 85 percent of the total organic factor.[3]

5.2.2.1.2 Ballasting Losses -

Ballasting operations are a major source of evaporative emissions associated with the unloading of petroleum liquids at marine terminals. It is common practice to load several cargo tank compartments with sea water after the cargo has been unloaded. This water, termed "ballast", improves the stability of the empty tanker during the subsequent voyage. Although ballasting practices vary, individual cargo tanks are ballasted typically about 80 percent, and the total vessel 15 to 40 percent, of capacity. Ballasting emissions occur as vapor-laden air in the "empty" cargo tank is displaced to the atmosphere by ballast water being pumped into the tank. Upon arrival at a loading port, the ballast water is pumped from the cargo tanks before the new cargo is loaded. The ballasting of cargo tanks reduces the quantity of vapors returning in the empty tank, thereby reducing the quantity of vapors emitted during subsequent tanker loading. Regulations administered by the U. S. Coast Guard require that, at marine terminals located in ozone nonattainment areas, large tankers with crude oil washing systems contain the organic vapors from ballasting.[10] This is accomplished principally by displacing the vapors during ballasting into a cargo tank being simultaneously unloaded. In other areas, marine vessels emit organic vapors directly to the atmosphere.

Equation 4 has been developed from test data to calculate the ballasting emissions from crude oil ships and ocean barges[8]:

$$L_B = 0.31 + 0.20\ P + 0.01\ PU_A \qquad (4)$$

where:

$L_B$ = ballasting emission factor, lb/$10^3$ gal of ballast water
P = true vapor pressure of discharged crude oil, psia
$U_A$ = arrival cargo true ullage, before dockside discharge, measured from the deck, feet; (the term "ullage" here refers to the distance between the cargo surface level and the deck level)

Table 5.2-4 lists average total organic emission factors for ballasting into uncleaned crude oil cargo compartments. The first category applies to "full" compartments wherein the crude oil true ullage just before cargo discharge is less than 1.5 meters (m) (5 ft). The second category applies to lightered, or short-loaded, compartments (part of cargo previously discharged, or original load a partial fill), with an arrival true ullage greater than 1.5 m (5 ft). It should be remembered that these tabulated emission factors are examples only, based on average conditions, to be used when crude oil vapor pressure is unknown. Equation 4 should be used when information about crude oil vapor pressure and cargo compartment condition is available. The following sample calculation illustrates the use of Equation 4.

5.2-4 (Metric And English Units). TOTAL ORGANIC EMISSION FACTORS FOR CRUDE OIL BALLASTING[a]

| Compartment Condition Before Cargo Discharge | Average Emission Factors | | | |
|---|---|---|---|---|
| | By Category | | Typical Overall[b] | |
| | mg/L Ballast Water | lb/$10^3$ gal Ballast Water | mg/L Ballast Water | lb/$10^3$ gal Ballast Water |
| Fully loaded[c] | 111 | 0.9 | 129 | 1.1 |
| Lightered or previously short loaded[d] | 171 | 1.4 | | |

[a] Assumes crude oil temperature of 16°C (60°F) and RVP of 34 kPa (5 psia). VOC emission factors average about 85% of these total organic factors, because VOCs do not include methane or ethane.
[b] Based on observation that 70% of tested compartments had been fully loaded before ballasting. May not represent average vessel practices.
[c] Assumed typical arrival ullage of 0.6 m (2 ft).
[d] Assumed typical arrival ullage of 6.1 m (20 ft).

Sample Calculation -

Ballasting emissions from a crude oil cargo ship would be calculated as follows, using Equation 4:

Design basis -

Vessel and cargo description: 80,000 dead-weight-ton tanker, crude oil capacity 500,000 barrels (bbl); 20 percent of the cargo capacity is filled with ballast water after cargo discharge. The crude oil has an RVP of 6 psia and is discharged at 75°F.

Compartment conditions: 70 percent of the ballast water is loaded into compartments that had been fully loaded to 2 ft ullage, and 30 percent is loaded into compartments that had been lightered to 15 ft ullage before arrival at dockside.

Ballasting emission equation -

$$L_B = 0.31 + 0.20\ P + 0.01\ PU_A$$

where:

P = true vapor pressure of crude oil
= 4.6 psia
$U_A$ = true cargo ullage for the full compartments = 2 ft, and true cargo ullage for the lightered compartments = 15 ft

$$L_B = 0.70\ [0.31 + (0.20)\ (4.6) + (0.01)\ (4.6)\ (2)] + 0.30\ [0.31 + (0.20)\ (4.6) + (0.01)\ (4.6)\ (15)]$$

$$= 1.5\ lb/10^3\ gal$$

Total ballasting emissions are:

$$(1.5\ lb/10^3\ gal)\ (0.20)\ (500{,}000\ bbl)\ (42\ gal/bbl) = 6{,}300\ lb$$

Since VOC emissions average about 85 percent of these total organic emissions, emissions of VOCs are about: (0.85)(6,300 lb) = 5,360 lb

5.2.2.1.3 Transit Losses -

In addition to loading and ballasting losses, losses occur while the cargo is in transit. Transit losses are similar in many ways to breathing losses associated with petroleum storage (see Section 7.1, "Organic Liquid Storage Tanks"). Experimental tests on ships and barges[4] have indicated that transit losses can be calculated using Equation 5:

$$L_T = 0.1\ PW \qquad (5)$$

where:

$L_T$ = transit loss from ships and barges, lb/week-$10^3$ gal transported
P = true vapor pressure of the transported liquid, psia
W = density of the condensed vapors, lb/gal

Emissions from gasoline truck cargo tanks during transit have been studied by a combination of theoretical and experimental techniques, and typical emission values are presented in Table 5.2-5.[11-12] Emissions depend on the extent of venting from the cargo tank during transit, which in turn depends on the vapor tightness of the tank, the pressure relief valve settings, the pressure in the tank at the start of the trip, the vapor pressure of the fuel being transported, and the degree of fuel vapor saturation of the space in the tank. The emissions are not directly proportional to the time spent in transit. If the vapor leakage rate of the tank increases, emissions increase up to a point, and then the rate changes as other determining factors take over. Truck tanks in dedicated vapor balance service usually contain saturated vapors, and this leads to lower emissions during transit because no additional fuel evaporates to raise the pressure in the tank to cause venting. Table 5.2-5 lists "typical" values for transit emissions and "extreme" values that could occur in the unlikely event that all determining factors combined to cause maximum emissions.

Table 5.2-5 (Metric And English Units). TOTAL UNCONTROLLED ORGANIC EMISSION FACTORS FOR PETROLEUM LIQUID RAIL TANK CARS AND TANK TRUCKS

| Emission Source | Gasoline[a] | Crude Oil[b] | Jet Naphtha (JP-4) | Jet Kerosene | Distillate Oil No. 2 | Residual Oil No. 6 |
|---|---|---|---|---|---|---|
| Loading operations[c] | | | | | | |
| Submerged loading - Dedicated normal service[d] | | | | | | |
| mg/L transferred | 590 | 240 | 180 | 1.9 | 1.7 | 0.01 |
| lb/$10^3$ gal transferred | 5 | 2 | 1.5 | 0.016 | 0.014 | 0.0001 |
| Submerged loading - Vapor balance service[d] | | | | | | |
| mg/L transferred | 980 | 400 | 300 | —[e] | —[e] | —[e] |
| lb/$10^3$ gal transferred | 8 | 3 | 2.5 | —[e] | —[e] | —[e] |
| Splash loading - Dedicated normal service | | | | | | |
| mg/L transferred | 1,430 | 580 | 430 | 5 | 4 | 0.03 |
| lb/$10^3$ gal transferred | 12 | 5 | 4 | 0.04 | 0.03 | 0.0003 |
| Splash loading - Vapor balance service | | | | | | |
| mg/L transferred | 980 | 400 | 300 | —[e] | —[e] | —[e] |
| lb/$10^3$ gal transferred | 8 | 3 | 2.5 | —[e] | —[e] | —[e] |

Table 5.2-5 (cont.).

| Emission Source | Gasoline[a] | Crude Oil[b] | Jet Naphtha (JP-4) | Jet Kerosene | Distillate Oil No. 2 | Residual Oil No. 6 |
|---|---|---|---|---|---|---|
| Transit losses | | | | | | |
| Loaded with product | | | | | | |
| mg/L transported | | | | | | |
| Typical | 0 - 1.0 | ND | ND | ND | ND | ND |
| Extreme | 0 - 9.0 | ND | ND | ND | ND | ND |
| lb/$10^3$ gal transported | | | | | | |
| Typical | 0 - 0.01 | ND | ND | ND | ND | ND |
| Extreme | 0 - 0.08 | ND | ND | ND | ND | ND |
| Return with vapor | | | | | | |
| mg/L transported | | | | | | |
| Typical | 0 - 13.0 | ND | ND | ND | ND | ND |
| Extreme | 0 - 44.0 | ND | ND | ND | ND | ND |
| lb/$10^3$ gal transported | | | | | | |
| Typical | 0 - 0.11 | ND | ND | ND | ND | ND |
| Extreme | 0 - 0.37 | ND | ND | ND | ND | ND |

[a] Reference 2. Gasoline factors represent emissions of VOC as well as total organics, because methane and ethane constitute a negligible weight fraction of the evaporative emissions from gasoline. VOC factors for crude oil can be assumed to be 15% lower than the total organic factors, to account for the methane and ethane content of crude oil evaporative emissions. All other products should be assumed to have VOC factors equal to total organics. The example gasoline has an RVP of 69 kPa (10 psia). ND = no data.
[b] The example crude oil has an RVP of 34 kPa (5 psia).
[c] Loading emission factors are calculated using Equation 1 for a dispensed product temperature of 16°C (60°F).
[d] Reference 2.
[e] Not normally used.

In the absence of specific inputs for Equations 1 through 5, the typical evaporative emission factors presented in Tables 5.2-5 and 5.2-6 should be used. It should be noted that, although the crude oil used to calculate the emission values presented in these tables has an RVP of 5, the RVP of crude oils can range from less than 1 up to 10. Similarly, the RVP of gasolines ranges from 7 to 13. In areas where loading and transportation sources are major factors affecting air quality, it is advisable to obtain the necessary parameters and to calculate emission estimates using Equations 1 through 5.

5.2.2.2 Service Stations -

Another major source of evaporative emissions is the filling of underground gasoline storage tanks at service stations. Gasoline is usually delivered to service stations in 30,000-liter (8,000-gal) tank trucks or smaller account trucks. Emissions are generated when gasoline vapors in the underground storage tank are displaced to the atmosphere by the gasoline being loaded into the tank. As with other loading losses, the quantity of loss in service station tank filling depends on several variables, including the method and rate of filling, the tank configuration, and the gasoline temperature, vapor pressure and composition. An average emission rate for submerged filling is 880 mg/L (7.3 lb/1000 gal) of transferred gasoline, and the rate for splash filling is 1380 mg/L (11.5 lb/1000 gal) transferred gasoline (see Table 5.2-7).[5]

Table 5.2-6 (Metric And English Units). TOTAL ORGANIC EMISSION FACTORS FOR PETROLEUM MARINE VESSEL SOURCES[a]

| Emission Source | Gasoline[b] | Crude Oil[c] | Jet Naphtha (JP-4) | Jet Kerosene | Distillate Oil No. 2 | Residual Oil No. 6 |
|---|---|---|---|---|---|---|
| Loading operations | | | | | | |
| Ships/ocean barges | | | | | | |
| mg/L transferred | —[d] | 73 | 60 | 0.63 | 0.55 | 0.004 |
| lb/$10^3$ gal transferred | —[d] | 0.61 | 0.50 | 0.005 | 0.005 | 0.00004 |
| Barges | | | | | | |
| mg/L transferred | —[d] | 120 | 150 | 1.60 | 1.40 | 0.011 |
| lb/$10^3$ gal transferred | —[d] | 1.0 | 1.2 | 0.013 | 0.012 | 0.00009 |
| Tanker ballasting | | | | | | |
| mg/L ballast water | 100 | —[e] | ND | ND | ND | ND |
| lb/$10^3$ gal ballast water | 0.8 | —[e] | ND | ND | ND | ND |
| Transit | | | | | | |
| mg/week-L transported | 320 | 150 | 84 | 0.60 | 0.54 | 0.003 |
| lb/week-$10^3$ gal transported | 2.7 | 1.3 | 0.7 | 0.005 | 0.005 | 0.00003 |

[a] Factors are for a dispensed product of 16°C (60°F). ND = no data.
[b] Factors represent VOC as well as total organic emissions, because methane and ethane constitute a negligible fraction of gasoline evaporative emissions. All products other than crude oil can be assumed to have VOC factors equal to total organic factors. The example gasoline has an RVP of 69 kPa (10 psia).
[c] VOC emission factors for a typical crude oil are 15% lower than the total organic factors shown, in order to account for methane and ethane. The example crude oil has an RVP of 34 kPa (5 psia).
[d] See Table 5.2-2 for these factors.
[e] See Table 5.2-4 for these factors.

Emissions from underground tank filling operations at service stations can be reduced by the use of a vapor balance system such as in Figure 5.2-5 (termed Stage I vapor control). The vapor balance system employs a hose that returns gasoline vapors displaced from the underground tank to the tank truck cargo compartments being emptied. The control efficiency of the balance system ranges from 93 to 100 percent. Organic emissions from underground tank filling operations at a service station employing a vapor balance system and submerged filling are not expected to exceed 40 mg/L (0.3 lb/1000 gal) of transferred gasoline.

Table 5.2-7 (Metric And English Units). EVAPORATIVE EMISSIONS FROM GASOLINE SERVICE STATION OPERATIONS[a]

| Emission Source | Emission Rate | |
|---|---|---|
| | mg/L Throughput | lb/$10^3$ gal Throughput |
| Filling underground tank (Stage I) | | |
| Submerged filling | 880 | 7.3 |
| Splash filling | 1,380 | 11.5 |
| Balanced submerged filling | 40 | 0.3 |
| Underground tank breathing and emptying[b] | 120 | 1.0 |
| Vehicle refueling operations (Stage II) | | |
| Displacement losses (uncontrolled)[c] | 1,320 | 11.0 |
| Displacement losses (controlled) | 132 | 1.1 |
| Spillage | 80 | 0.7 |

[a] Factors are for VOC as well as total organic emissions, because of the methane and ethane content of gasoline evaporative emissions is negligible.
[b] Includes any vapor loss between underground tank and gas pump.
[c] Based on Equation 6, using average conditions.

A second source of vapor emissions from service stations is underground tank breathing. Breathing losses occur daily and are attributable to gasoline evaporation and barometric pressure changes. The frequency with which gasoline is withdrawn from the tank, allowing fresh air to enter to enhance evaporation, also has a major effect on the quantity of these emissions. An average breathing emission rate is 120 mg/L (1.0 lb/1000 gal) of throughput.

5.2.2.3 Motor Vehicle Refueling -

Service station vehicle refueling activity also produces evaporative emissions. Vehicle refueling emissions come from vapors displaced from the automobile tank by dispensed gasoline and from spillage. The quantity of displaced vapors depends on gasoline temperature, auto tank temperature, gasoline RVP, and dispensing rate. Equation 6 can be used to estimate uncontrolled displacement losses from vehicle refueling for a particular set of conditions.[14]

$$E_R = 264.2\ [(-5.909) - 0.0949\ (\Delta T) + 0.0884\ (T_D) + 0.485\ (RVP)] \quad (6)$$

where:

$E_R$ = refueling emissions, mg/L
$\Delta T$ = difference between temperature of fuel in vehicle tank and temperature of dispensed fuel, °F
$T_D$ = temperature of dispensed fuel, °F
RVP = Reid vapor pressure, psia

Note that this equation and the spillage loss factor are incorporated into the *MOBILE* model. The *MOBILE* model allows for disabling of this calculation if it is desired to include these emissions in the stationary area source portion of an inventory rather than in the mobile source portion. It is estimated that the uncontrolled emissions from vapors displaced during vehicle refueling average 1320 mg/L (11.0 lb/1000 gal) of dispensed gasoline.[5,13]

Spillage loss is made up of contributions from prefill and postfill nozzle drip and from spit-back and

overflow from the vehicles's fuel tank filler pipe during filling. The amount of spillage loss can depend on several variables, including service station business characteristics, tank configuration, and operator techniques. An average spillage loss is 80 mg/L (0.7 lb/1000 gal) of dispensed gasoline.[5,13]

Control methods for vehicle refueling emissions are based on conveying the vapors displaced from the vehicle fuel tank to the underground storage tank vapor space through the use of a special hose and nozzle, as depicted in Figure 5.2-7 (termed Stage II vapor control). In "balance" vapor control systems, the vapors are conveyed by natural pressure differentials established during refueling. In "vacuum assist" systems, the conveyance of vapors from the auto fuel tank to the underground storage tank is assisted by a vacuum pump. Tests on a few systems have indicated overall systems control efficiencies in the range of 88 to 92 percent.[5,13] When inventorying these emissions as an area source, rule penetration and rule effectiveness should also be taken into account. *Procedures For Emission Inventory Preparation, Volume IV: Mobile Sources*, EPA-450/4-81-026d, provides more detail on this.

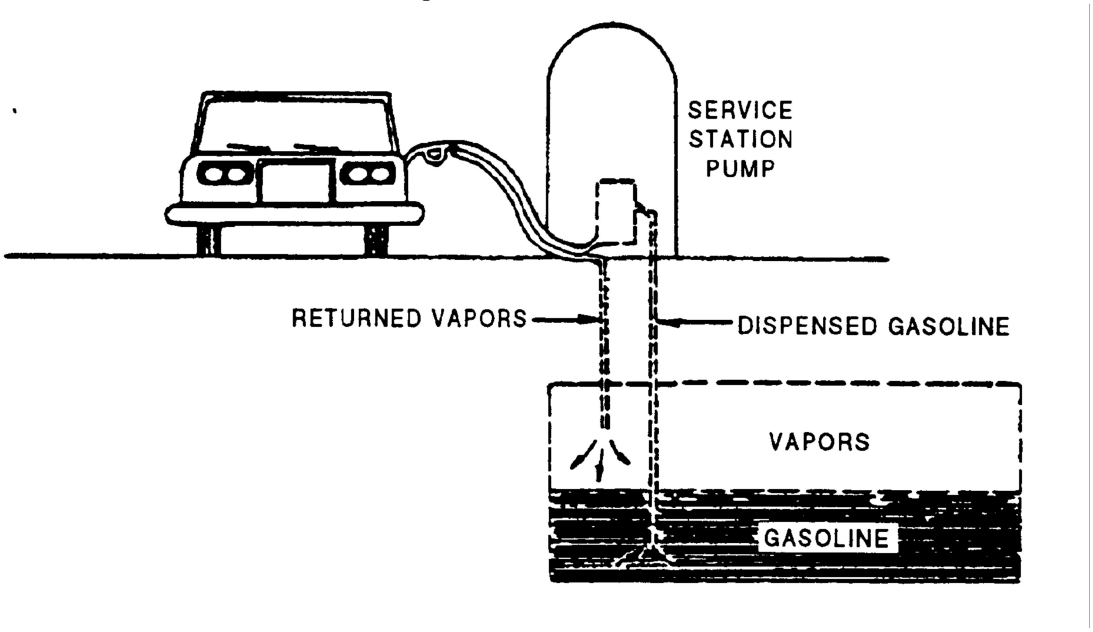



Figure 5.2-7. Automobile refueling vapor recovery system.

References For Section 5.2

1. C. E. Burklin and R. L. Honercamp, *Revision Of Evaporative Hydrocarbon Emission Factors*, EPA-450/3-76-039, U. S. Environmental Protection Agency, Research Triangle Park, NC, August 1976.

2. G. A. LaFlam, *et al*., *Revision Of Tank Truck Loading Hydrocarbon Emission Factors*, Pacific Environmental Services, Inc., Durham, NC, May 1982.

3. G. A. LaFlam, *Revision Of Marine Vessel Evaporative Emission Factors*, Pacific Environmental Services, Inc., Durham, NC, November 1984.

4. *Evaporation Loss From Tank Cars, Tank Trucks And Marine Vessels*, Bulletin No. 2514, American Petroleum Institute, Washington, DC, 1959.

5. C. E. Burklin, *et al*., *A Study Of Vapor Control Methods For Gasoline Marketing Operations*, EPA-450/3-75-046A and -046B, U. S. Environmental Protection Agency, Research Triangle Park, NC, May 1975.

6. *Bulk Gasoline Terminals - Background Information For Proposed Standards*, EPA-450/3-80-038a, U. S. Environmental Protection Agency, Research Triangle Park, NC, December 1980.

7. *Gasoline Distribution Industry (Stage I) - Background Information for Promulgated Standards*, EPA-453/R-94-002b, U.S. Environmental Protection Agency, Research Triangle Park, NC, 1995.

8. *Atmospheric Hydrocarbon Emissions From Marine Vessel Transfer Operations*, Publication 2514A, American Petroleum Institute, Washington, DC, 1981.

9. C. E. Burklin, *et al.*, *Background Information On Hydrocarbon Emissions From Marine Terminal Operations*, EPA-450/3-76-038a and -038b, U. S. Environmental Protection Agency, Research Triangle Park, NC, November 1976.

10. *Rules For The Protection Of The Marine Environment Relating To Tank Vessels Carrying Oil In Bulk*, 45 FR 43705, June 30, 1980.

11. R. A. Nichols, *Analytical Calculation Of Fuel Transit Breathing Loss*, Chevron USA, Inc., San Francisco, CA, March 21, 1977.

12. R. A. Nichols, *Tank Truck Leakage Measurements*, Chevron USA, Inc., San Francisco, CA, June 7, 1977.

13. *Investigation Of Passenger Car Refueling Losses: Final Report, 2nd Year Program*, APTD-1453, U. S. Environmental Protection Agency, Research Triangle Park, NC, September 1972.

14. *Refueling Emissions From Uncontrolled Vehicles*, EPA-AA-SDSB-85-6, U. S. Environmental Protection Agency, Ann Arbor, MI, June 1985.

Table 3.2-2. UNCONTROLLED EMISSION FACTORS FOR 4-STROKE LEAN-BURN ENGINES[a]
(SCC 2-02-002-54)

| Pollutant | Emission Factor (lb/MMBtu)b (fuel input) | Emission Factor Rating |
|---|---|---|
| Criteria Pollutants and Greenhouse Gases | | |
| $NO_x$ [c] 90 - 105% Load | 4.08 E+00 | B |
| $NO_x$ [c] <90% Load | 8.47 E-01 | B |
| CO [c] 90 - 105% Load | 3.17 E-01 | C |
| CO [c] <90% Load | 5.57 E-01 | B |
| $CO_2$ [d] | 1.10 E+02 | A |
| $SO_2$ [e] | 5.88 E-04 | A |
| TOC[f] | 1.47 E+00 | A |
| Methane[g] | 1.25 E+00 | C |
| VOC[h] | 1.18 E-01 | C |
| PM10 (filterable)[i] | 7.71 E-05 | D |
| PM2.5 (filterable)[i] | 7.71 E-05 | D |
| PM Condensable[j] | 9.91 E-03 | D |
| Trace Organic Compounds | | |
| 1,1,2,2-Tetrachloroethane[k] | <4.00 E-05 | E |
| 1,1,2-Trichloroethane [k] | <3.18 E-05 | E |
| 1,1-Dichloroethane | <2.36 E-05 | E |
| 1,2,3-Trimethylbenzene | 2.30 E-05 | D |
| 1,2,4-Trimethylbenzene | 1.43 E-05 | C |
| 1,2-Dichloroethane | <2.36 E-05 | E |
| 1,2-Dichloropropane | <2.69 E-05 | E |
| 1,3,5-Trimethylbenzene | 3.38 E-05 | D |
| 1,3-Butadiene [k] | 2.67E-04 | D |
| 1,3-Dichloropropene [k] | <2.64 E-05 | E |
| 2-Methylnaphthalene [k] | 3.32 E-05 | C |
| 2,2,4-Trimethylpentane [k] | 2.50 E-04 | C |
| Acenaphthene [k] | 1.25 E-06 | C |

Table 3.2-2. UNCONTROLLED EMISSION FACTORS FOR 4-STROKE LEAN-BURN ENGINES (Continued)

| Pollutant | Emission Factor (lb/MMBtu)b (fuel input) | Emission Factor Rating |
|---|---|---|
| Acenaphthylene[k] | 5.53 E-06 | C |
| Acetaldehydek,[l] | 8.36 E-03 | A |
| Acroleink,[l] | 5.14 E-03 | A |
| Benzene[k] | 4.40 E-04 | A |
| Benzo(b)fluoranthene[k] | 1.66 E-07 | D |
| Benzo(e)pyrene[k] | 4.15 E-07 | D |
| Benzo(g,h,i)perylene[k] | 4.14 E-07 | D |
| Biphenyl[k] | 2.12 E-04 | D |
| Butane | 5.41 E-04 | D |
| Butyr/Isobutyraldehyde | 1.01 E-04 | C |
| Carbon Tetrachloride[k] | <3.67 E-05 | E |
| Chlorobenzene[k] | <3.04 E-05 | E |
| Chloroethane | 1.87 E-06 | D |
| Chloroform[k] | <2.85 E-05 | E |
| Chrysene[k] | 6.93 E-07 | C |
| Cyclopentane | 2.27 E-04 | C |
| Ethane | 1.05 E-01 | C |
| Ethylbenzene[k] | 3.97 E-05 | B |
| Ethylene Dibromide[k] | <4.43 E-05 | E |
| Fluoranthene[k] | 1.11 E-06 | C |
| Fluorene[k] | 5.67 E-06 | C |
| Formaldehyde[k, l] | 5.28 E-02 | A |
| Methanol[k] | 2.50 E-03 | B |
| Methylcyclohexane | 1.23 E-03 | C |
| Methylene Chloride[k] | 2.00 E-05 | C |
| n-Hexane[k] | 1.11 E-03 | C |
| n-Nonane | 1.10 E-04 | C |

Table 3.2-2. UNCONTROLLED EMISSION FACTORS FOR 4-STROKE LEAN-BURN ENGINES (Continued)

| Pollutant | Emission Factor (lb/MMBtu)b (fuel input) | Emission Factor Rating |
|---|---|---|
| n-Octane | 3.51 E-04 | C |
| n-Pentane | 2.60 E-03 | C |
| Naphthalene[k] | 7.44 E-05 | C |
| PAH[k] | 2.69 E-05 | D |
| Phenanthrene[k] | 1.04 E-05 | D |
| Phenol[k] | 2.40 E-05 | D |
| Propane | 4.19 E-02 | C |
| Pyrene[k] | 1.36 E-06 | C |
| Styrene[k] | <2.36 E-05 | E |
| Perchloroethylene[k, m] | 2.48 E-06 | D |
| Toluene[k] | 4.08 E-04 | B |
| Vinyl Chloride[k] | 1.49 E-05 | C |
| Xylene[k] | 1.84 E-04 | B |

[a] Reference 7. Factors represent uncontrolled levels. For $NO_x$, CO, and PM10, "uncontrolled" means no combustion or add-on controls; however, the factor may include turbocharged units. For all other pollutants, "uncontrolled" means no oxidation control; the data set may include units with control techniques used for $NO_x$ control, such as PCC and SCR for lean burn engines, and PSC for rich burn engines. Factors are based on large population of engines. Factors are for engines at all loads, except as indicated. SCC = Source Classification Code. TOC = Total Organic Compounds. PM-10 ≤ Particulate Matter 10 microns (µm) aerodynamic diameter. A "<" sign in front of a factor means that the corresponding emission factor is based on one-half of the method detection limit.

[b] Emission factors were calculated in units of (lb/MMBtu) based on procedures in EPA Method 19. To convert from (lb/MMBtu) to (lb/$10^6$ scf), multiply by the heat content of the fuel. If the heat content is not available, use 1020 Btu/scf. To convert from (lb/MMBtu) to (lb/hp-hr) use the following equation:

lb/hp-hr = (lb/MMBtu) (heat input, MMBtu/hr) (1/operating HP, 1/hp)

[c] Emission tests with unreported load conditions were not included in the data set.

[d] Based on 99.5% conversion of the fuel carbon to $CO_2$. $CO_2$ [lb/MMBtu] = (3.67)(%CON)(C)(D)(1/h), where %CON = percent conversion of fuel carbon to $CO_2$, C = carbon content of fuel by weight (0.75), D = density of fuel, 4.1 E+04 lb/$10^6$ scf, and

Table 3.2-2. UNCONTROLLED EMISSION FACTORS FOR 4-STROKE LEAN-BURN ENGINES (Continued)

h = heating value of natural gas (assume 1020 Btu/scf at 60°F).
[e] Based on 100% conversion of fuel sulfur to $SO_2$. Assumes sulfur content in natural gas of 2,000 gr/$10^6$ scf.
[f] Emission factor for TOC is based on measured emission levels from 22 source tests.
[g] Emission factor for methane is determined by subtracting the VOC and ethane emission factors from the TOC emission factor. Measured emission factor for methane compares well with the calculated emission factor, 1.31 lb/MMBtu vs. 1.25 lb/MMBtu, respectively.
[h] VOC emission factor is based on the sum of the emission factors for all speciated organic compounds less ethane and methane.
[i] Considered ≤ 1 µm in aerodynamic diameter. Therefore, for filterable PM emissions, PM10(filterable) = PM2.5(filterable).
[j] PM Condensable = PM Condensable Inorganic + PM-Condensable Organic
[k] Hazardous Air Pollutant as defined by Section 112(b) of the Clean Air Act.
[l] For lean burn engines, aldehyde emissions quantification using CARB 430 may reflect interference with the sampling compounds due to the nitrogen concentration in the stack. The presented emission factor is based on FTIR measurements. Emissions data based on CARB 430 are available in the background report.
[m]Error identified in pollutant name – October 2024. Pollutant name changed from tetrachloroethane to perchloroethylene.

## 13.2.2 Unpaved Roads

### 13.2.2.1 General

When a vehicle travels an unpaved road, the force of the wheels on the road surface causes pulverization of surface material. Particles are lifted and dropped from the rolling wheels, and the road surface is exposed to strong air currents in turbulent shear with the surface. The turbulent wake behind the vehicle continues to act on the road surface after the vehicle has passed.

The particulate emission factors presented in the previous draft version of this section of AP-42, dated October 2001, implicitly included the emissions from vehicles in the form of exhaust, brake wear, and tire wear as well as resuspended road surface material[25]. EPA included these sources in the emission factor equation for unpaved public roads (equation 1b in this section) since the field testing data used to develop the equation included both the direct emissions from vehicles and emissions from resuspension of road dust.

This version of the unpaved public road emission factor equation only estimates particulate emissions from resuspended road surface material [23, 26]. The particulate emissions from vehicle exhaust, brake wear, and tire wear are now estimated separately using EPA's MOBILE6.2 [24]. This approach eliminates the possibility of double counting emissions. Double counting results when employing the previous version of the emission factor equation in this section and MOBILE6.2 to estimate particulate emissions from vehicle traffic on unpaved public roads. It also incorporates the decrease in exhaust emissions that has occurred since the unpaved public road emission factor equation was developed. The previous version of the unpaved public road emission factor equation includes estimates of emissions from exhaust, brake wear, and tire wear based on emission rates for vehicles in the 1980 calendar year fleet. The amount of PM released from vehicle exhaust has decreased since 1980 due to lower new vehicle emission standards and changes in fuel characteristics.

### 13.2.2.2 Emissions Calculation And Correction Parameters[1-6]

The quantity of dust emissions from a given segment of unpaved road varies linearly with the volume of traffic. Field investigations also have shown that emissions depend on source parameters that characterize the condition of a particular road and the associated vehicle traffic. Characterization of these source parameters allow for "correction" of emission estimates to specific road and traffic conditions present on public and industrial roadways.

Dust emissions from unpaved roads have been found to vary directly with the fraction of silt (particles smaller than 75 micrometers [μm] in diameter) in the road surface materials.[1] The silt fraction is determined by measuring the proportion of loose dry surface dust that passes a 200-mesh screen, using the ASTM-C-136 method. A summary of this method is contained in Appendix C of AP-42. Table 13.2.2-1 summarizes measured silt values for industrial unpaved roads. Table 13.2.2-2 summarizes measured silt values for public unpaved roads. It should be noted that the ranges of silt content vary over two orders of magnitude. Therefore, the use of data from this table can potentially introduce considerable error. Use of this data is strongly discouraged when it is feasible to obtain locally gathered data.

Since the silt content of a rural dirt road will vary with geographic location, it should be measured for use in projecting emissions. As a conservative approximation, the silt content of the parent soil in the area can be used. Tests, however, show that road silt content is normally lower than in the surrounding parent soil, because the fines are continually removed by the vehicle traffic, leaving a higher percentage of coarse particles.

Other variables are important in addition to the silt content of the road surface material. For example, at industrial sites, where haul trucks and other heavy equipment are common, emissions are highly correlated with vehicle weight. On the other hand, there is far less variability in the weights of cars and pickup trucks that commonly travel publicly accessible unpaved roads throughout the United States. For those roads, the moisture content of the road surface material may be more dominant in determining differences in emission levels between, for example a hot, desert environment and a cool, moist location.

The PM-10 and TSP emission factors presented below are the outcomes from stepwise linear regressions of field emission test results of vehicles traveling over unpaved surfaces. Due to a limited amount of information available for PM-2.5, the expression for that particle size range has been scaled against the result for PM-10. Consequently, the quality rating for the PM-2.5 factor is lower than that for the PM-10 expression.

Table 13.2.2-1. TYPICAL SILT CONTENT VALUES OF SURFACE MATERIAL ON INDUSTRIAL UNPAVED ROADS[a]

| Industry | Road Use Or Surface Material | Plant Sites | No. Of Samples | Silt Content (%) | |
|---|---|---|---|---|---|
| | | | | Range | Mean |
| Copper smelting | Plant road | 1 | 3 | 16 - 19 | 17 |
| Iron and steel production | Plant road | 19 | 135 | 0.2 - 19 | 6.0 |
| Sand and gravel processing | Plant road | 1 | 3 | 4.1 - 6.0 | 4.8 |
| | Material storage area | 1 | 1 | - | 7.1 |
| Stone quarrying and processing | Plant road | 2 | 10 | 2.4 - 16 | 10 |
| | Haul road to/from pit | 4 | 20 | 5.0-15 | 8.3 |
| Taconite mining and processing | Service road | 1 | 8 | 2.4 - 7.1 | 4.3 |
| | Haul road to/from pit | 1 | 12 | 3.9 - 9.7 | 5.8 |
| Western surface coal mining | Haul road to/from pit | 3 | 21 | 2.8 - 18 | 8.4 |
| | Plant road | 2 | 2 | 4.9 - 5.3 | 5.1 |
| | Scraper route | 3 | 10 | 7.2 - 25 | 17 |
| | Haul road (freshly graded) | 2 | 5 | 18 - 29 | 24 |
| Construction sites | Scraper routes | 7 | 20 | 0.56-23 | 8.5 |
| Lumber sawmills | Log yards | 2 | 2 | 4.8-12 | 8.4 |
| Municipal solid waste landfills | Disposal routes | 4 | 20 | 2.2 - 21 | 6.4 |

[a]References 1,5-15.

The following empirical expressions may be used to estimate the quantity in pounds (lb) of size-specific particulate emissions from an unpaved road, per vehicle mile traveled (VMT):

For vehicles traveling on unpaved surfaces at industrial sites, emissions are estimated from the following equation:

$$E = k\,(s/12)^a (W/3)^b \quad (1a)$$

and, for vehicles traveling on publicly accessible roads, dominated by light duty vehicles, emissions may be estimated from the following:

$$E = \frac{k\,(s/12)^a (S/30)^d}{(M/0.5)^c} - C \quad (1b)$$

where k, a, b, c and d are empirical constants (Reference 6) given below and

E = size-specific emission factor (lb/VMT)
s = surface material silt content (%)
W = mean vehicle weight (tons)
M = surface material moisture content (%)
S = mean vehicle speed (mph)
*C* = emission factor for 1980's vehicle fleet exhaust, brake wear and tire wear.

The source characteristics s, W and M are referred to as correction parameters for adjusting the emission estimates to local conditions. The metric conversion from lb/VMT to grams (g) per vehicle kilometer traveled (VKT) is as follows:

1 lb/VMT = 281.9 g/VKT

The constants for Equations 1a and 1b based on the stated aerodynamic particle sizes are shown in Tables 13.2.2-2 and 13.2.2-4. The PM-2.5 particle size multipliers (k-factors) are taken from Reference 27.

Table 13.2.2-2. CONSTANTS FOR EQUATIONS 1a AND 1b

| Constant | Industrial Roads (Equation 1a) | | | Public Roads (Equation 1b) | | |
|---|---|---|---|---|---|---|
| | PM-2.5 | PM-10 | PM-30* | PM-2.5 | PM-10 | PM-30* |
| k (lb/VMT) | 0.15 | 1.5 | 4.9 | 0.18 | 1.8 | 6.0 |
| a | 0.9 | 0.9 | 0.7 | 1 | 1 | 1 |
| b | 0.45 | 0.45 | 0.45 | - | - | - |
| c | - | - | - | 0.2 | 0.2 | 0.3 |
| d | - | - | - | 0.5 | 0.5 | 0.3 |
| Quality Rating | B | B | B | B | B | B |

*Assumed equivalent to total suspended particulate matter (TSP)
"-" = not used in the emission factor equation

Table 13.2.2-2 also contains the quality ratings for the various size-specific versions of Equation 1a and 1b. The equation retains the assigned quality rating, if applied within the ranges of source conditions, shown in Table 13.2.2-3, that were tested in developing the equation:

Table 13.2.2-3. RANGE OF SOURCE CONDITIONS USED IN DEVELOPING EQUATION 1a AND 1b

| Emission Factor | Surface Silt Content, % | Mean Vehicle Weight | | Mean Vehicle Speed | | Mean No. of Wheels | Surface Moisture Content, % |
|---|---|---|---|---|---|---|---|
| | | Mg | ton | km/hr | mph | | |
| Industrial Roads (Equation 1a) | 1.8-25.2 | 1.8-260 | 2-290 | 8-69 | 5-43 | 4-17[a] | 0.03-13 |
| Public Roads (Equation 1b) | 1.8-35 | 1.4-2.7 | 1.5-3 | 16-88 | 10-55 | 4-4.8 | 0.03-13 |

[a] See discussion in text.

As noted earlier, the models presented as Equations 1a and 1b were developed from tests of traffic on unpaved surfaces. Unpaved roads have a hard, generally nonporous surface that usually dries quickly after a rainfall or watering, because of traffic-enhanced natural evaporation. (Factors influencing how fast a road dries are discussed in Section 13.2.2.3, below.) The quality ratings given above pertain to the mid-range of the measured source conditions for the equation. A higher mean vehicle weight and a higher than normal traffic rate may be justified when performing a worst-case analysis of emissions from unpaved roads.

The emission factors for the exhaust, brake wear and tire wear of a 1980's vehicle fleet (*C*) was obtained from EPA's MOBILE6.2 model [23]. The emission factor also varies with aerodynamic size range

**Texas Commission on Environmental Quality**
**Air Permits Division**
**New Source Review (NSR) Emission Calculations**

This information is maintained by the Chemical NSR Section and is subject to change. Last update was made March 2021. These emission calculations represent current NSR guidelines and are provided for informational purposes only. The emission calculations are subject to change based on TCEQ case by case evaluation. Please contact the appropriate Chemical NSR Section management if there are questions related to the emission calculations.

**Sample Calculations for Flares**

The flare destruction efficiencies and emission factors are used in the sample calculations that follow. The TCEQ accepted destruction efficiencies and emission factors used in the sample calculations are included in Attachment A. Assuming an ideal gas mixture, use the ideal gas law to convert the volumetric flow rates from Attachment B (table template uses TCEQ NSR Table 8, Flare systems) and Table 1 into mass flow rates. The values are shown in Table 2.

$$m = \frac{60(MW)PV}{RT}$$

Where: $m$ = mass flow rate in lb/hr,
$MW$ = molecular weight in lb/lbmole,
$P$ = standard pressure = 14.7 psia,
$V$ = flow rate in scfm,
$R$ = gas constant = $10.73 \frac{psia \cdot ft^3}{lbmol \cdot {}^{o}R}$
$T$ = standard temperature = $528\ {}^{o}R$

Table 1. Waste Stream Constituents in Mole Percent

| Constituent | Average Case | | Maximum Case | |
|---|---|---|---|---|
| | scfm | Mole % | scfm | Mole % |
| Butane | 10.16 | 5.08 | 12.70 | 5.08 |
| Propylene | 5.94 | 2.97 | 7.43 | 2.97 |
| Propane | 5.08 | 2.54 | 6.35 | 2.54 |
| Ethylene | 84.74 | 42.37 | 105.93 | 42.37 |
| Ethane | 37.28 | 18.64 | 46.60 | 18.64 |
| Hydrogen | 22.04 | 11.02 | 27.55 | 11.02 |
| Ammonia | 4.24 | 2.12 | 5.30 | 2.12 |
| Inerts | 30.50 | 15.26 | 38.15 | 15.26 |
| Totals | 200.00 | 100.00 | 250.00 | 100.00 |

Table 2. Estimation of Average Mass Flow Rate

| Constituent | scfm | MW | lb/hr |
|---|---|---|---|
| Butane | 10.16 | 58.12 | 91.93 |
| Propylene | 5.94 | 42.08 | 38.91 |
| Propane | 5.08 | 44.09 | 34.87 |
| Ethylene | 84.74 | 28.05 | 370.05 |
| Ethane | 37.28 | 30.07 | 174.52 |
| Hydrogen | 22.04 | 2.02 | 6.93 |
| Ammonia | 4.24 | 17.03 | 11.24 |

***Waste Stream DRE*.**
Applying 98 percent destruction efficiency for butane+ and hydrogen, and 99 percent destruction efficiency for propylene, propane, ethylene, and ammonia[1], the hourly maximum and annual emission rates may then be estimated (Table 3). The hourly emissions are calculated using the maximum case flow rate, which is 25 percent greater than the average case. Note that the ethane and hydrogen emission rates need not be shown on the NSR Table 1(a) submitted with the permit application, since these emissions are not regulated as pollutants.

Table 3. Emission Rates

| Constituent | lb/hr | tpy |
|---|---|---|
| Butane | 2.30 | 8.05 |
| Propylene | 0.49 | 1.70 |
| Propane | 0.44 | 1.53 |
| Ethylene | 4.63 | 16.21 |
| Ethane | 2.18 | 7.64 |
| Hydrogen | 0.17 | 0.61 |
| Ammonia | 0.14 | 0.49 |

***$NO_x$ and CO Emissions*.**
The mole percent of each constituent in the waste stream may be calculated for both the average and maximum scenarios by dividing the individual flow rates by the total flow rates and multiplying by 100 percent (Table 1). In this case, the calculations are simplified since the average and maximum case waste streams have the same compositions. If they were of different composition, the heating value calculations would be required for both cases. Note that the maximum case shows the maximum vent stream to the flare under normal operating conditions for calculating emissions from the flare (upset and maintenance conditions are not considered). Emergency and maintenance emissions are not directed to the example flare.

Next, estimate the net, or lower, heating value of the waste stream by assuming a basis of 1 scf. Heats of combustion for most compounds may be found in any common engineering reference book. The net heat release will be used in determining which $NO_x$ and CO factors to use as well as verifying that the flare will meet the minimum heating value requirements of 40 CFR § 60.18.

[1] The destruction efficiency of ammonia is subject to case-by-case review.

Based on the overall net heat release (see Table 4), it is now evident that the $NO_x$ and CO factors for high-Btu[2], air-assisted flares should be used. Using these factors:

$$\left(\frac{0.138\ lb\ NO_x}{MMBtu}\right)\left(\frac{1228\ Btu}{scf}\right)\left(\frac{1\ MMBtu}{10^6\ Btu}\right)\left(\frac{250\ scf}{\min}\right)\left(\frac{60\ \min}{hr}\right) = 2.54\ lb\ NO_x/hr$$

$$\left(\frac{0.138\ lb\ NO_x}{MMBtu}\right)\left(\frac{1228\ Btu}{scf}\right)\left(\frac{1\ MMBtu}{10^6\ Btu}\right)\left(\frac{200\ scf}{\min}\right)\left(\frac{ton}{2000\ lb}\right)\left(\frac{60\ \min}{hr}\right)\left(\frac{8760\ hr}{yr}\right) = 8.91\ tons\ NO_x/yr$$

$$\left(\frac{0.2755\ lb\ CO}{MMBtu}\right)\left(\frac{1228\ Btu}{scf}\right)\left(\frac{1\ MMBtu}{10^6\ Btu}\right)\left(\frac{250\ scf}{\min}\right)\left(\frac{60\ \min}{hr}\right) = 5.07\ lb\ CO/hr$$

$$\left(\frac{0.2755\ lb\ CO}{MMBtu}\right)\left(\frac{1228\ Btu}{scf}\right)\left(\frac{1\ MMBtu}{10^6\ Btu}\right)\left(\frac{200\ scf}{\min}\right)\left(\frac{ton}{2000\ lb}\right)\left(\frac{60\ \min}{hr}\right)\left(\frac{8760\ hr}{yr}\right) = 17.78\ tons\ CO/yr$$

Table 4. Estimation of Net Heat Releases

| Constituent | scf | Net Heating Value Btu/scf | Net Heat Release[3] Btu/scf |
|---|---|---|---|
| Butane | 0.0508 | 2,956 | 150 |
| Propylene | 0.0297 | 2,142 | 64 |
| Propane | 0.0254 | 2,272 | 58 |
| Ethylene | 0.4237 | 1,471 | 623 |
| Ethane | 0.1864 | 1,587 | 296 |
| Hydrogen | 0.1102 | 269 | 30 |
| Ammonia | 0.0212 | 352 | 7 |
| Inerts | 0.1526 | 0 | 0 |
| Totals | 1.000 | | 1,228 |

The $NO_x$ emissions also need to be corrected for the fuel $NO_x$ from ammonia. Fuel $NO_x$ is assumed 0.5 wt percent of inlet $NH_3$[4].

[2] The high-Btu waste streams referred to streams have a heating value greater than 1,000 Btu/scf.
[3] Net heat release assumes a basis of 1 scf.
[4] $NH_3$ to fuel $NO_x$ conversion is subject to case-by-case review.

In this case,

$$\left(11.24\,\frac{lb}{hr}\,ammonia\right)\left(\frac{0.5\,NO_x}{100\,ammonia}\right)\left(\frac{250\,scfm}{200\,scfm}\right)=0.07\,\frac{lb}{hr}\,NO_x$$

$$\left(11.24\,\frac{lb}{hr}\,ammonia\right)\left(\frac{0.5\,NO_x}{100\,ammnonia}\right)\left(\frac{24\,hr}{day}\right)\left(\frac{365\,day}{yr}\right)\left(\frac{1\,ton}{2000\,lb}\right)=0.25\,tpy\,NO_x$$

This results in total $NO_x$ emissions of 2.61 lb/hr (=2.54 lb/hr +0.07 lb/hr) and 9.16 tpy (=8.91 tpy+0.25 tpy).

***Particulate Emissions.***
Particulate emissions should be negligible and should therefore not be estimated since smoking flares are excluded from permitting as defined in 30 TAC Section 111.111. There may be cases where there are noncombustible elements (such as metals) associated with the VOC being combusted. If this is the case, these emissions should be estimated based on sampling results from the waste stream. The AP-42 landfill flare particulate matter factor may be used if the flare controls landfill gas.

The following sample calculation demonstrates how to handle waste streams with hydrogen sulfide.

***$H_2S$ Emissions.***
For instances where a waste stream to a flare contains $H_2S$, assume that 100 percent by weight of $H_2S$ is converted to $SO_2$ (the $H_2S$ allowable DRE is 98 percent but actual flare operation could combust almost 100 percent of the waste stream). Referring to Attachment C (table template uses TCEQ NSR Table 8, Flare systems), convert the design maximum $H_2S$ volumetric waste flow rate into a molar flow rate using the ideal gas law:

$$\frac{(4.5\ ft^3/\min)(14.7\ psia)(60\ \min/hr)}{(10.73\ psia\cdot ft^3/lbmol\cdot{}^oR)(528\ {}^oR)}=0.701\ lbmol\ H_2S/hr$$

One mole of $H_2S$ will form one mole of $SO_2$:

$$\frac{(0.701\ lbmol\ H_2S/hr)(1\ lbmol\ SO_2/lbmol\ H_2S)}{(1\ lbmol\ SO_2/64\ lb\ SO_2)}=44.9\ lb\ SO_2/hr$$

and as much as 2 percent of the $H_2S$ will remain:

$$(0.02)\left(\frac{0.701\ lbmol\,H_2S}{hr}\right)\left(\frac{34\,lb\,H_2S}{lbmol\,H_2S}\right)=0.48\ lb\,H_2S/hr$$

Calculations for annual emissions should be performed in a similar manner using the average $H_2S$ flow rate of 3.5 scfm, resulting in 0.55 lbmol $H_2S$/hr, and 34.9 lb $SO_2$/hr. The annual $SO_2$ emissions should then be estimated on a tons-per-year (tpy) basis:

$$\left(\frac{34.9\,lb}{hr}\right)\left(\frac{1\ ton}{2000\,lb}\right)\left(\frac{24\,hr}{day}\right)\left(\frac{365\,day}{yr}\right)=152.7\ TPY\ \ SO_2$$

and, likewise, 2 percent of the $H_2S$ will remain:

$$\frac{(3.5\frac{ft^3}{min})(14.7\ psia)(\frac{60min}{hr})}{(10.73\ psia\cdot\frac{ft^3}{lbmol}\cdot o_R)(528 o_R)}=0.545\ \frac{lbmol\ H_2S}{hr}$$

$$(0.02)\left(0.545\ \frac{lbmol\ H_2S}{hr}\right)\left(\frac{34\ lb\ H_2S}{lbmol\ H_2S}\right)=\frac{0.37lb\ H_2S}{hr}$$

$$\left(\frac{0.37lb\ H_2S}{hr}\right)\left(\frac{1\ ton}{2000\ lb}\right)\left(\frac{24\ hr}{day}\right)\left(\frac{365\ day}{yr}\right)=1.62\ ton\ SO_2/yr$$

**40 CFR § 60.18 BACT Check**

Calculations should also be performed to ensure the proposed flare meets BACT requirements of 40 CFR § 60.18. It was noted that $H_T$ = 1,228 Btu/scf (Table 4) is greater than the minimum heating value of 300 Btu/scf required for air-assisted flares according to 40 CFR § 60.18(c)(3); therefore, this flare would be in compliance. In accordance with 60.18(5), air-assisted flares designed for and operated with an exit velocity less than the value $V_{max}$ as calculated below, and less than 122 m/s (400 ft/s) are allowed. For this flare:

$V_{max} = 8.706 + 0.7084H_T = 8.706 + 0.7084(43.3) = 39.4$ m/s

The actual flare tip velocity may then be calculated for comparison using the design maximum flow rate and the flare tip area based on the flare tip diameter:

$V_{actual} = Q/A$

where Q = volumetric flow rate, $ft^3$/min, and
A = flare tip area, $ft^2$

$$V_{actual}=\left(\frac{250\,ft^3}{\min}\right)\left(\frac{4}{\pi\cdot(1ft)^2}\right)\left(\frac{1\,\min}{60\sec}\right)\left(\frac{0.3048m}{ft}\right)=1.62\,m/s$$

So, the sample flare meets the flare tip velocity restrictions of 40 CFR § 60.18.

**40 CFR § 60.18 BACT Check for Hydrogen Flares**

Similar to the previous example, calculations should also be performed to ensure a proposed hydrogen flare meets the BACT requirements of 40 CFR § 60.18. The heating value is calculated in the same manner as the above example. The flare diameter must be greater than 3 inches, the hydrogen content must be greater than 8.0 percent by volume and the exit velocity, Vmax, less than 37.2 m/s (122 ft/s) as calculated below. For example, a stream with an 11.0 percent hydrogen volume on a wet basis the maximum velocity would be:

$$V_{\max}=(X_{H_2}-K_1)\cdot K_2=(11.0-6.0)\cdot 3.9=19.5\,m/s\ (64.0\,ft/s)$$

So, the sample hydrogen flare would meet the flare tip velocity requirements of 40 CFR § 60.18.

**Modeling Calculations**

The net heating value of the waste gas stream to the flare and the flare height is sufficient information for the reviewing engineer to perform initial screen modeling using the EPA Screen 3 model with the built-in flare source algorithm; however, additional calculations must be provided to the reviewing engineer if refined modeling using the EPA ISC series of models and the point source algorithm is required. It should be noted that refined modeling is the applicant's responsibility and may be requested as determined to be appropriate by the reviewing engineer.

Flares are considered a special type of elevated source that may be modeled as a point source. In a flare, the velocity of the waste stream and the flare temperature are not used to determine the plume rise; rather, the TCEQ suggests use of the parameters and formula explained below to calculate the effective stack diameter based upon the net heat release and the average molecular weight of the compounds being burned.

If a flare is to be treated as a point source, accurate determination of all stack parameters is not possible. Since combustion occurs at or beyond the flare tip in the atmosphere, appropriate values for stack exit temperature and exit velocity cannot be accurately determined. The diameter of the pipe leading to the flare tip is not a factor in determining plume rise. The point source algorithm can be used with arbitrary values assigned

for stack exit velocity (20 m/s or 66 fps) and temperature (1,273K or 1,831F) to predict dispersion for flare type sources.

A stack height equal to the height of the flare tip is recommended for flares. The effective flare tip diameter is determined using the following equation:

$$D = \sqrt{(10^{-6})q(1 - 0.048\sqrt{(MW)})}$$

where D = effective flare tip diameter, meters,
q = net or lower heat release, cal/sec, and
MW = volume average molecular weight, g/g-mole.

First, estimate the net heat release based upon the overall net heating value from Table 4 and maximum waste gas stream flow rate from Table 1:

$$q = \left(\frac{1228\,Btu}{scf}\right)\left(\frac{250\,scf}{\min}\right)\left(\frac{1\min}{60\sec}\right)\left(\frac{252\,cal}{Btu}\right) = 1.289{,}400\,cal/\sec$$

Next, estimate the volume average molecular weight based upon the maximum volumetric flow rate (Table 1) and the molecular weights of the individual constituents (Table 5). Finally, estimate the effective flare tip diameter based on the net heat release and average molecular weight:

$$D = \sqrt{(10^{-6})\left(1{,}289{,}400\frac{cal}{\sec}\right)(1 - 0.048\sqrt{(27.61)})} = 3.22\ ft$$

Enclosed vapor combustion units should not be modeled with the above parameters, but instead with stack parameters that reflect the physical characteristics of the process unit.

Table 5. Estimation of Volume Average Molecular Weight

| Constituent | scfm | Mole Fraction (MF) | Molecular Weight (MW) | MF x MW |
|---|---|---|---|---|
| Butane | 10.16 | 0.060 | 58.12 | 3.49 |
| Propylene | 5.94 | 0.035 | 42.08 | 1.47 |
| Propane | 5.08 | 0.030 | 44.09 | 1.32 |
| Ethylene | 84.74 | 0.500 | 28.05 | 14.02 |
| Ethane | 37.28 | 0.220 | 30.07 | 6.62 |
| Hydrogen | 22.04 | 0.130 | 2.02 | 0.26 |
| Ammonia | 4.24 | 0.025 | 17.03 | 0.43 |
| Totals | | 1.0000 | | 27.61 |

| Waste Stream[5] | Destruction/Removal Efficiency (DRE) |
|---|---|
| VOC | 98 percent (generic) |
| | 99 percent for compounds containing no more than 3 carbons that contain no elements other than carbon and hydrogen in addition to the following compounds: methanol, ethanol, propanol, ethylene oxide and propylene oxide. |
| $H_2S$ | 98 percent |
| $NH_3$ | case-by-case |
| CO | case-by-case |

| Air Contaminants | Emission Factors | Btu | lb/MMBtu |
|---|---|---|---|
| Thermal $NO_x$ | Steam-assist | High Btu | 0.0485 lb/MMBtu |
| | | Low Btu | 0.068 lb/MMBtu |
| | Other | High Btu | 0.138 lb/MMBtu |
| | | Low Btu | 0.0641 lb/MMBtu |

| Air Contaminants | Emission Factors |
|---|---|
| Fuel $NO_x$ | $NO_x$ is 0.5 wt percent of inlet $NH_3$ in the sample calculations.<br>The actual conversion of ammonia and other fuels to Fuel $NO_x$ are subject to case-by-case review. |

| Air Contaminants | Emission Factors | Btu | lb/MMBtu |
|---|---|---|---|
| CO | Steam-assist | High Btu | 0.3503 lb/MMBtu |
| | | Low Btu | 0.3465 lb/MMBtu |
| | Other | High Btu | 0.2755 lb/MMBtu |
| | | Low Btu | 0.5496 lb/MMBtu |

| Air Contaminants | Emission Factors |
|---|---|
| PM | None, required to be smokeless |
| $SO_2$ | 100 percent S in fuel to $SO_2$ |

[5]The only exception of this is if inorganics might be emitted from the flare. In the case of landfills, the AP-42 PM factor may be used. In other cases, the emissions should be based on the composition of the waste stream routed to the flare.

Attachment B - Example Refinery Flare Data

**Texas Commission on Environmental Quality**
**Table 8**
**Flare Systems**

| |
|---|
| Emission Point No. (EPN): Refinery Flare |
| Manufacturer: NA |
| Model No. (if available): NA |

| Type (elevated, ground level, pit) | Assisted (air, steam, non-assisted) | Operation (routine, MSS, emergency, dual) | Flare Height (ft.) | Flare tip inside diameter (ft.) |
|---|---|---|---|---|
| Elevated | Steam-assisted | Routine | 60 | 1 |

Characteristics of Input

| Waste Gas Stream Material (identify stream) | Minimum Value Expected (scfm [68°F, 14.7 psia]) | Average Value Expected (scfm [68°F, 14.7 psia]) | Design Maximum (scfm [68°F, 14.7 psia]) | BTU/scf Rating |
|---|---|---|---|---|
| 1. Butane | 0 | 10.16 | 12.70 | 2956 |
| 2. Propylene | 0 | 5.94 | 7.43 | 2142 |
| 3. Propane | 0 | 5.08 | 6.35 | 2272 |
| 4. Ethylene | 0 | 84.74 | 105.93 | 1471 |
| 5. Ethane | 0 | 37.28 | 46.60 | 1587 |
| 6. $H_2$ | 0 | 22.04 | 27.55 | 269 |
| 7. $NH_3$ | 0 | 4.24 | 5.30 | 352 |
| 8. Inerts | 0 | 30.50 | 38.15 | 0 |
| Percent of time this condition occurs: | 5 | 80 | 15 | |

Commercial products appearing in our Effects Screening Levels (ESLs) list, such as gasoline, may appear on this table as such or as individual constituents.

Attachment B — Example Refinery Flare Data

| Number of Pilots | Type Fuel | Fuel Flow Rate (scfm [70°F and 14.7 psia]) per pilot | Total Heat Release Rate (Btu/hr) | Fuel Usage (scfm) Minimum | Fuel Usage (scfm) Maximum |
|---|---|---|---|---|---|
| 1 | Natural Gas | 0.5 | | | |

| Stream | Flow Rate (scfm [68°F, 14.7 psia]) Minimum Expected | Flow Rate (scfm [68°F, 14.7 psia]) Design Maximum | Total Heat Release Rate Average Btu/hr | Total Heat Release Rate Maximum Btu/hr | Btu/scf | Temp. °F | Pressure (psig) |
|---|---|---|---|---|---|---|---|
| Assist Gas | | 0.5 | | | | 110 | 0 |
| Waste Gas | 200 | 250 | | | | 130 | 0 |

For Steam Injection

| Steam Pressure (psig) Minimum Expected | Steam Pressure (psig) Design Maximum | Total Steam Flow Rate (lb/hr) | Temp. °F | Velocity (ft/sec) | Number of Jet Streams | Diameter of Steam Jets (inches) | Design basis for steam injected (lb steam/lb hydrocarbon) |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

For Water Injection

| Water Pressure (psig) Minimum Expected | Water Pressure (psig) Design Maximum | Total Water Flow Rate (gpm) Minimum Expected | Total Water Flow Rate (gpm) Design Maximum | Number of Water Jets | Diameter of Water Jets (inches) |
|---|---|---|---|---|---|
| | | | | | |

Operating Schedule

| Normal (hours/day) | Normal (days/week) | Normal (weeks/yr) | Maximum (hours/day) | Maximum (days/week) | Maximum (weeks/yr) |
|---|---|---|---|---|---|
| 24 | 7 | | | | |

Supply an assembly drawing, dimensioned and to scale, to clearly show the operation of the flare system. Show interior dimensions and features of the equipment necessary to calculate its performance. Also describe the type of ignition system and its method of operation. Provide an explanation of the control system for steam flow rate and other operating variables.

**Texas Commission on Environmental Quality**
**Table 8**
**Flare Systems**

| |
|---|
| Emission Point No. (EPN): Acid Gas Flare |
| Manufacturer: NA |
| Model No. (if available): NA |

| Type (elevated, ground level, pit) | Assisted (air, steam, non-assisted) | Operation (routine, MSS, emergency, dual) | Flare Height (ft.) | Flare Tip Inside Diameter (ft.) |
|---|---|---|---|---|
| Elevated | Non-assisted | Routine | 60 | 0.20 |

Characteristics of Input

| Waste Gas Stream Material (identify stream) | Minimum Value Expected (scfm [68°F, 14.7 psia]) | Average Value Expected (scfm [68°F, 14.7 psia]) | Design Maximum (scfm [68°F, 14.7 psia]) | BTU/scf Rating |
|---|---|---|---|---|
| 1. $H_2S$ | 0 | 3.5 | 4.5 | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | | | | |
| 7. | | | | |
| 8. | | | | |
| Percent of time this condition occurs: | | | | |

Commercial products appearing in our Effects Screening Levels (ESLs) list, such as gasoline, may appear on this table as such or as individual constituents.

Attachment C — Example Acid Gas Glare Data

| Number of Pilots | Type Fuel | Fuel Flow Rate (scfm [70°F and 14.7 psia]) per pilot | Total Heat Release Rate (Btu/hr) | Fuel Usage (scfm) Minimum | Fuel Usage (scfm) Maximum |
|---|---|---|---|---|---|
| 1 | Natural Gas | 0.6 | | | |

| Stream | Flow Rate (scfm [68°F, 14.7 psia]) Minimum Expected | Flow Rate (scfm [68°F, 14.7 psia]) Design Maximum | Total Heat Release Rate Average Btu/hr | Total Heat Release Rate Maximum Btu/hr | Btu/scf | Temp. °F | Pressure (psig) |
|---|---|---|---|---|---|---|---|
| Assist Gas | 0 | 7.5 | | | | 90 | 10 |
| Waste Gas | 0 | 4.5 | | | | 200 | 10 |

For Steam Injection

| Steam Pressure (psig) Minimum Expected | Steam Pressure (psig) Design Maximum | Total Steam Flow Rate (lb/hr) | Temp. °F | Velocity (ft/sec) | Number of Jet Streams | Diameter of Steam Jets (inches) | Design Basis for Steam Injected (lb steam/lb hydrocarbon) |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

For Water Injection

| Water Pressure (psig) Minimum Expected | Water Pressure (psig) Design Maximum | Total Water Flow Rate (gpm) Minimum Expected | Total Water Flow Rate (gpm) Design Maximum | Number of Water Jets | Diameter of Water Jets (inches) |
|---|---|---|---|---|---|
| | | | | | |

Attachment C — Example Acid Gas Glare Data

Operating Schedule

| Normal (hours/day) | Normal (days/week) | Normal (weeks/yr) | Maximum (hours/day) | Maximum (days/week) | Maximum (weeks/yr) |
|---|---|---|---|---|---|
| | | | 24 | 7 | 52 |

Supply an assembly drawing, dimensioned and to scale, to clearly show the operation of the flare system. Show interior dimensions and features of the equipment necessary to calculate its performance. Also describe the type of ignition system and its method of operation. Provide an explanation of the control system for steam flow rate and other operating variables.

Fugitives

United States Environmental Protection Agency
Office of Air Quality Planning and Standards Research Triangle Park NC 27711
EPA-453/R-95-017 November 1995

Air

EPA

# Protocol for Equipment Leak Emission Estimates

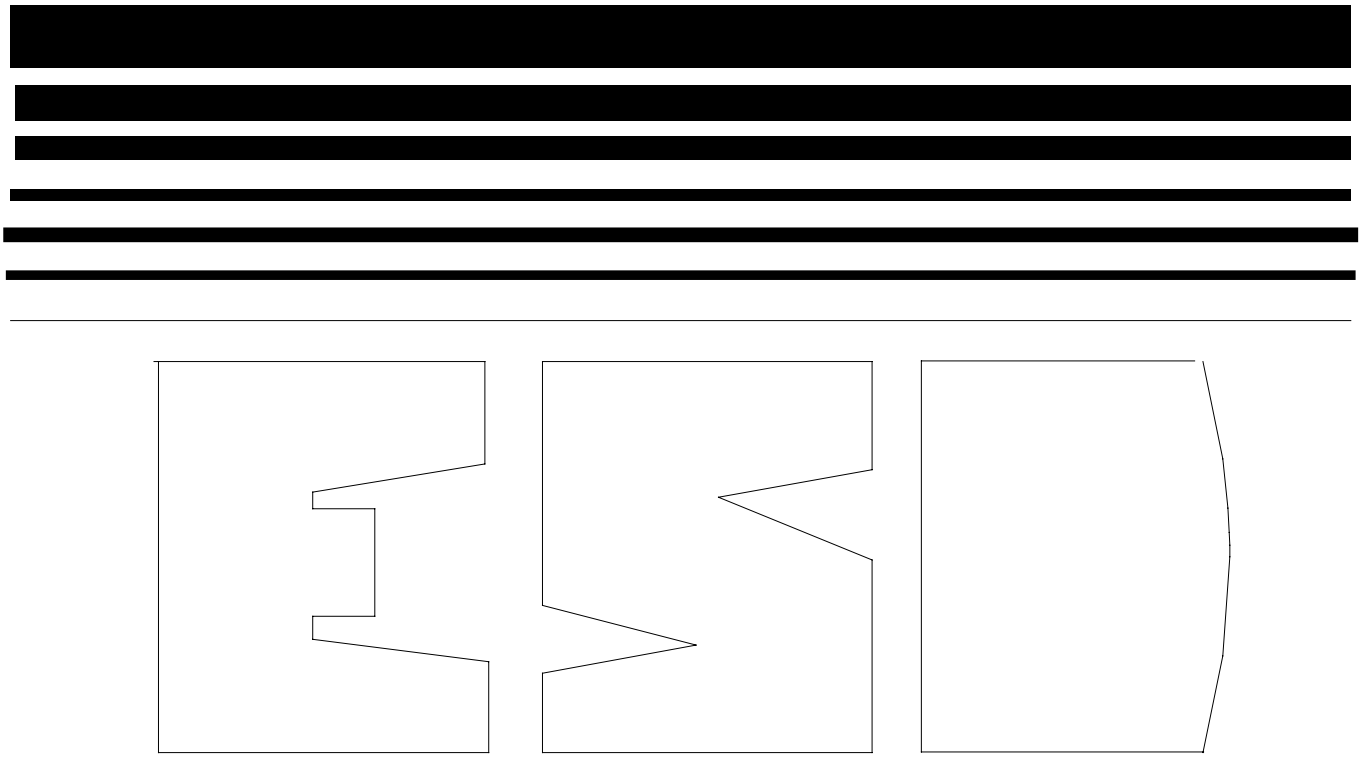


TABLE 2-4. OIL AND GAS PRODUCTION OPERATIONS AVERAGE EMISSION FACTORS (kg/hr/source)

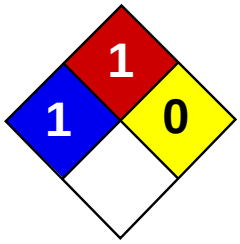
| Equipment Type | Service[a] | Emission Factor (kg/hr/source)[b] |
|---|---|---|
| Valves | Gas | 4.5E-03 |
| | Heavy Oil | 8.4E-06 |
| | Light Oil | 2.5E-03 |
| | Water/Oil | 9.8E-05 |
| Pump seals | Gas | 2.4E-03 |
| | Heavy Oil | NA |
| | Light Oil | 1.3E-02 |
| | Water/Oil | 2.4E-05 |
| Others[c] | Gas | 8.8E-03 |
| | Heavy Oil | 3.2E-05 |
| | Light Oil | 7.5E-03 |
| | Water/Oil | 1.4E-02 |
| Connectors | Gas | 2.0E-04 |
| | Heavy Oil | 7.5E-06 |
| | Light Oil | 2.1E-04 |
| | Water/Oil | 1.1E-04 |
| Flanges | Gas | 3.9E-04 |
| | Heavy Oil | 3.9E-07 |
| | Light Oil | 1.1E-04 |
| | Water/Oil | 2.9E-06 |
| Open-ended lines | Gas | 2.0E-03 |
| | Heavy Oil | 1.4E-04 |
| | Light Oil | 1.4E-03 |
| | Water/Oil | 2.5E-04 |

[a]Water/Oil emission factors apply to water streams in oil service with a water content greater than 50%, from the point of origin to the point where the water content reaches 99%. For water streams with a water content greater than 99%, the emission rate is considered negligible.

[b]These factors are for total organic compound emission rates (including non-VOC's such as methane and ethane) and apply to light crude, heavy crude, gas plant, gas production, and off shore facilities. "NA" indicates that not enough data were available to develop the indicated emission factor.

[c]The "other" equipment type was derived from compressors, diaphrams, drains, dump arms, hatches, instruments, meters, pressure relief valves, polished rods, relief valves, and vents. This "other" equipment type should be applied for any equipment type other than connectors, flanges, open-ended lines, pumps, or valves.







# Material Safety Data Sheet
## Ethylene glycol MSDS

## Section 1: Chemical Product and Company Identification

**Product Name:** Ethylene glycol

**Catalog Codes:** SLE1072

**CAS#:** 107-21-1

**RTECS:** KW2975000

**TSCA:** TSCA 8(b) inventory: Ethylene glycol

**CI#:** Not available.

**Synonym:** 1,2-Dihydroxyethane; 1,2-Ethanediol; 1,2-Ethandiol; Ethylene dihydrate; Glycol alcohol; Monoethylene glycol; Tescol

**Chemical Name:** Ethylene Glycol

**Chemical Formula:** HOCH2CH2OH

**Contact Information:**

**Sciencelab.com, Inc.**
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

**CHEMTREC (24HR Emergency Telephone), call:** 1-800-424-9300

**International CHEMTREC, call:** 1-703-527-3887

**For non-emergency assistance, call:** 1-281-441-4400

## Section 2: Composition and Information on Ingredients

**Composition:**

| Name | CAS # | % by Weight |
|---|---|---|
| Ethylene glycol | 107-21-1 | 100 |

**Toxicological Data on Ingredients:** Ethylene glycol: ORAL (LD50): Acute: 4700 mg/kg [Rat]. 5500 mg/kg [Mouse]. 6610 mg/kg [Guinea pig]. VAPOR (LC50): Acute: >200 mg/m 4 hours [Rat].

## Section 3: Hazards Identification

**Potential Acute Health Effects:**
Hazardous in case of ingestion. Slightly hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of inhalation. Severe over-exposure can result in death.

**Potential Chronic Health Effects:**
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Non-mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to kidneys, liver, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

## Section 4: First Aid Measures

**Eye Contact:**
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention if irritation occurs.

**Skin Contact:**
Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops. Cold water may be used.

**Serious Skin Contact:** Not available.

**Inhalation:**
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

**Serious Inhalation:** Not available.

**Ingestion:**
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

**Serious Ingestion:**
Medical Conditions Aggravated by Exposure: Persons with pre-existiing kidney, respiratory, eye, or neurological problems might be more sensitive to Ethylene Glycol. Notes to Physician: 1. Support vital functions, correct for dehydration and shock, and manage fluid balance. 2. The currently recommended medical management of Ethylene Glycol poisoning includes elimination of Ethylene Glycol and metabolites. Elimination of Ethylene Glycol may be achieved by the following methods: a. Emptying the stomach by gastric lavage. It is useful if initiated within < 1 of ingestion. b. Correct metabolic acidosis with intravenous administration of sodium bicarbonate, adjusting the administration rate accoridng to repeated and frequent measurement of acid/base status. c. Administer ethanol (orally or by IV (intravenously)) or fomepizole (4-methylpyrazole or Antizol)) therapy by IV as an antidote to inhibit the ormation of toxic metabolites. d. If patients are diagnosed and treated early in the course with the above methods, hemodialysis may be avoided if fomepizole or ethanol therapy is effective and has corrected the metabolic acidosis, and no renal failure is present. However, once severe acidosis and renal failure occured, however, hemodialysis is necessary. It is effective in removing Ethylene Glycol and toxic metabolites, and correcting metabolic acidosis.

## Section 5: Fire and Explosion Data

**Flammability of the Product:** May be combustible at high temperature.

**Auto-Ignition Temperature:** 398°C (748.4°F)

**Flash Points:** CLOSED CUP: 111°C (231.8°F). (Tagliabue.)

**Flammable Limits:** LOWER: 3.2%

**Products of Combustion:** These products are carbon oxides (CO, CO2).

**Fire Hazards in Presence of Various Substances:**
Slightly flammable to flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

**Explosion Hazards in Presence of Various Substances:**
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:**
SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

**Special Remarks on Fire Hazards:** Not available.

**Special Remarks on Explosion Hazards:**
Explosive decomposition may occur if combined with strong acids or strong bases and subjected to elevated temperatures.

## Section 6: Accidental Release Measures

**Small Spill:**
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

**Large Spill:**
Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

## Section 7: Handling and Storage

**Precautions:**
Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, acids, alkalis.

**Storage:** Keep container tightly closed. Keep container in a cool, well-ventilated area. Hygroscopic

## Section 8: Exposure Controls/Personal Protection

**Engineering Controls:**
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

**Personal Protection:**
Safety glasses. Synthetic apron. Gloves (impervious). For most conditions, no respiratory protection should be needed. However, if material is heated or sprayed and if atmospheric levels exceed exposure guidelines, use an approved vapor (air purifying) respirator.

**Personal Protection in Case of a Large Spill:**
Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:**
STEL: 120 (mg/m3) [Australia] TWA: 100 (mg/m3) from ACGIH (TLV) [United States] CEIL: 125 (mg/m3) from OSHA (PEL) [United States] CEIL: 50 (ppm) from OSHA (PEL) [United States] TWA: 52 STEL: 104 (mg/m3) [United Kingdom (UK)] Inhalation TWA: 10 (mg/m3) [United Kingdom (UK)] SKIN3 Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Liquid. (syrupy)

**Odor:** Odorless.

**Taste:** Mild sweet

**Molecular Weight:** 62.07 g/mole

**Color:** Clear Colorless.

**pH (1% soln/water):** Not available.

**Boiling Point:** 197.6°C (387.7°F)

**Melting Point:** -13°C (8.6°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 1.1088 (Water = 1)

**Vapor Pressure:** .06 mmHg @ 20 C; .092 mmHg at 25 C

**Vapor Density:** 2.14 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** The product is more soluble in water; log(oil/water) = -1.4

**Ionicity (in Water):** Not available.

**Dispersion Properties:** See solubility in water, acetone.

**Solubility:**
Soluble in cold water, hot water, acetone. Slightly soluble in diethyl ether. Miscible with lower aliphatic alcohols, glycerol, acetic acid, acetone and similar ketones, aldehydes, pyridine, similar coal tar bases. Practically insoluble in benzene and its homologs, chlorinated hydrocarbons, petroleum ether.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Excess heat, incompatible materials.

**Incompatibility with various substances:** Reactive with oxidizing agents, acids, alkalis.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:**
Hygroscopic. Absorbs moisture from the air. Avoid contamination with materials with hydroxyl compounds. Also incompatible with aliphatic amines, isocyanates, chlorosulfonic acid, and oleum

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

**Routes of Entry:** Absorbed through skin. Ingestion.

**Toxicity to Animals:**
Acute oral toxicity (LD50): 4700 mg/kg [Rat]. Acute toxicity of the vapor (LC50): >200 mg/m3 4 hours [Rat].

**Chronic Effects on Humans:**
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Non-mutagenic for bacteria and/or yeast. May cause damage to the following organs: kidneys, liver, central nervous system (CNS).

**Other Toxic Effects on Humans:**
Hazardous in case of ingestion. Slightly hazardous in case of skin contact (irritant, permeator), of inhalation.

**Special Remarks on Toxicity to Animals:**
Lowest Published Toxic Dose/Conc: TDL [Man] - Route: oral; Dose: 15gm/kg Lethal Dose/Conc 50% Kill LD50 [Rabbit] - Route: dermal; Dose: 9530 ul/kg

**Special Remarks on Chronic Effects on Humans:**
May cause adverse reproductive effects and birth defects (teratogenic) based on animal test data. No human data has been reported at this time. May affect genetic material (mutagenic)

**Special Remarks on other Toxic Effects on Humans:**
Acute Potential Health Effects: Skin: May cause skin irritation. May cause more severe response if skin is abraded. A single prolonged exposure is not likely to result in material being absorbed through skin in harmful amounts. Massive contact with damaged skin may result in absorption of potentially harmful amounts Eyes: Vapors or mist may cause temporary eye irritation (mild temporary conjunctival inflammation) and lacrimation. Corneal injury is unlikely or insignificant.. Ingestion: It is rapidly absorbed from the gastrointestinal tract. Oral toxicity is expected to be moderate in humans due to Ethylene Glycol even though tests with animals show a lower degree of toxicity. Excessive exposure (swallowing large amounts) may cause gastrointestinal tract irritation with nausea, vomiting, abdominal discomfort, diarrhea. It can affect behavior/central nervous system within 0.5 to 12 hours after ingestion. A transient inebriation with excitement, stupor, headache, slurred speech, ataxia, somnolence, and euphoria, similar to ethanol intoxication, can occur within the first several hours. As sthe Ethylene Glycol is metabolized, metabolic acidosis and further central nervous system depression (convulsions, muscle weakness) develop. Serious intoxication may develop to coma associated with hypotonia, hyporeflexia, and less commonly seizures, and meningismus. 12 to 24 hours

## Section 12: Ecological Information

**Ecotoxicity:**
Ecotoxicity in water (LC50): 41000 mg/l 96 hours [Fish (Trout)]. 46300 mg/l 48 hours [water flea]. 34250 mg/l 96 hours [Fish (bluegill fish)]. 34250 mg/l 72 hours [Fish (Goldfish)].

**BOD5 and COD:** Not available.

**Products of Biodegradation:**
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The products of degradation are less toxic than the product itself.

**Special Remarks on the Products of Biodegradation:** Not available.

## Section 13: Disposal Considerations

**Waste Disposal:**
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

## Section 14: Transport Information

**DOT Classification:** Not a DOT controlled material (United States).

**Identification:** Not applicable.

**Special Provisions for Transport:** Not applicable.

## Section 15: Other Regulatory Information

**Federal and State Regulations:**
Illinois toxic substances disclosure to employee act: Ethylene glycol Illinois chemical safety act: Ethylene glycol New York release reporting list: Ethylene glycol Rhode Island RTK hazardous substances: Ethylene glycol Pennsylvania RTK: Ethylene glycol Minnesota: Ethylene glycol Massachusetts RTK: Ethylene glycol Massachusetts spill list: Ethylene glycol New Jersey: Ethylene glycol Louisiana spill reporting: Ethylene glycol TSCA 8(b) inventory: Ethylene glycol TSCA 4(a) proposed test rules: Ethylene glycol SARA 313 toxic chemical notification and release reporting: Ethylene glycol CERCLA: Hazardous substances.: Ethylene glycol: 5000 lbs. (2268 kg)

**Other Regulations:**
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

**Other Classifications:**

**WHMIS (Canada):** CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

**DSCL (EEC):**
R22- Harmful if swallowed. S46- If swallowed, seek medical advice immediately and show this container or label.

**HMIS (U.S.A.):**

**Health Hazard:** 1

**Fire Hazard:** 1

**Reactivity:** 0

**Personal Protection:** C

**National Fire Protection Association (U.S.A.):**

**Health:** 1

**Flammability:** 1

**Reactivity:** 0

**Specific hazard:**

**Protective Equipment:**
Gloves. Lab coat. Not applicable. Safety glasses.

## Section 16: Other Information

**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/10/2005 08:18 PM

**Last Updated:** 05/21/2013 12:00 PM

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# SAFETY DATA SHEET
## Lubricating Oil
According to Appendix D, OSHA Hazard Communication Standard 29 CFR §1910.1200

## 1. Identification

### Product identifier

**Product name** Lubricating Oil

**Chemical name** Process Oil

**Product number** 1003, 1003B, 1003RB, 1003CN

**Internal identification** 1000-202

**CAS number** 64742-54-7

### Recommended use of the chemical and restrictions on use

**Application** Firearm Lubrication

**Uses advised against** No specific uses advised against are identified.

### Details of the supplier of the safety data sheet

**Manufacturer** Bushnell Holdings Inc
9200 Cody
Overland Park, KS 66214
1-800-423-3537
dangerous.goods@vistaoutdoor.com

### Emergency telephone number

**Emergency telephone** Emergency Telephone Number (Hazardous Material/Dangerous Goods Transportation Emergency Only) 1-800-424-9300 (Inside US Only) +01-703-527-3887 (Outside US) - (CHEMTREC, Day and Night)

## 2. Hazard(s) identification

### Classification of the substance or mixture

**Physical hazards** Not Classified

**Health hazards** Not Classified

**Environmental hazards** Not Classified

### Label elements

**Hazard statements** NC Not Classified

### Other hazards

This substance is not classified as PBT or vPvB according to current EU criteria.

## 3. Composition/information on ingredients

### Substances

**Product name** Lubricating Oil

**Chemical name** Process Oil

**CAS number** 64742-54-7

## 4. First-aid measures

### Description of first aid measures

# Lubricating Oil

| | |
|---|---|
| **General information** | If in doubt, get medical attention promptly. Show this Safety Data Sheet to the medical personnel. |
| **Inhalation** | No specific recommendations. If throat irritation or coughing persists, proceed as follows. Move affected person to fresh air and keep warm and at rest in a position comfortable for breathing. Loosen tight clothing such as collar, tie or belt. Get medical attention if any discomfort continues. |
| **Ingestion** | No specific recommendations. If throat irritation or coughing persists, proceed as follows. Rinse mouth. Get medical attention if any discomfort continues. |
| **Skin Contact** | No specific recommendations. Rinse with water. Get medical attention if any discomfort continues. |
| **Eye contact** | Remove any contact lenses and open eyelids wide apart. Rinse with water. Get medical attention if any discomfort continues. |
| **Protection of first aiders** | Use protective equipment appropriate for surrounding materials. |

### Most important symptoms and effects, both acute and delayed

| | |
|---|---|
| **General information** | The severity of the symptoms described will vary dependent on the concentration and the length of exposure. |
| **Inhalation** | No specific symptoms known. Spray/mists may cause respiratory tract irritation. |
| **Ingestion** | No specific symptoms known. May cause discomfort if swallowed. |
| **Skin contact** | No specific symptoms known. May cause discomfort. |
| **Eye contact** | No specific symptoms known. May be slightly irritating to eyes. |

### Indication of immediate medical attention and special treatment needed

| | |
|---|---|
| **Notes for the doctor** | Treat symptomatically. |
| **Specific treatments** | No special treatment required. |

## 5. Fire-fighting measures

### Extinguishing media

| | |
|---|---|
| **Suitable extinguishing media** | The product is not flammable. Extinguish with alcohol-resistant foam, carbon dioxide, dry powder or water fog. Use fire-extinguishing media suitable for the surrounding fire. |
| **Unsuitable extinguishing media** | Do not use water jet as an extinguisher, as this will spread the fire. |

### Special hazards arising from the substance or mixture

| | |
|---|---|
| **Specific hazards** | Containers can burst violently or explode when heated, due to excessive pressure build-up. |
| **Hazardous combustion products** | Thermal decomposition or combustion products may include the following substances: Harmful gases or vapors. |

### Advice for firefighters

| | |
|---|---|
| **Protective actions during firefighting** | Avoid breathing fire gases or vapors. Evacuate area. Cool containers exposed to heat with water spray and remove them from the fire area if it can be done without risk. Cool containers exposed to flames with water until well after the fire is out. If a leak or spill has not ignited, use water spray to disperse vapors and protect men stopping the leak. |
| **Special protective equipment for firefighters** | Wear positive-pressure self-contained breathing apparatus (SCBA) and appropriate protective clothing. Standard Firefighter's clothing including helmets, protective boots and gloves will provide a basic level of protection for chemical incidents. |

# Lubricating Oil

## 6. Accidental release measures

### Personal precautions, protective equipment and emergency procedures

**Personal precautions** No specific recommendations. For personal protection, see Section 8.

### Environmental precautions

**Environmental precautions** Avoid discharge into drains or watercourses or onto the ground.

### Methods and material for containment and cleaning up

**Methods for cleaning up** Reuse or recycle products wherever possible. Absorb spillage to prevent material damage. Flush contaminated area with plenty of water. Wash thoroughly after dealing with a spillage. Dispose of contents/container in accordance with national regulations.

**Reference to other sections** For personal protection, see Section 8. For waste disposal, see Section 13.

## 7. Handling and storage

### Precautions for safe handling

**Usage precautions** Read and follow manufacturer's recommendations. Wear protective clothing as described in Section 8 of this safety data sheet. Keep away from food, drink and animal feeding stuffs. Handle all packages and containers carefully to minimize spills. Keep container tightly sealed when not in use. Avoid the formation of mists.

**Advice on general occupational hygiene** Wash promptly if skin becomes contaminated. Take off contaminated clothing and wash before reuse. Wash contaminated clothing before reuse.

### Conditions for safe storage, including any incompatibilities

**Storage precautions** Store away from incompatible materials (see Section 10). No specific recommendations.

**Storage class** Unspecified storage.

### Specific end uses(s)

**Specific end use(s)** The identified uses for this product are detailed in Section 1.

## 8. Exposure Controls/personal protection

### Control parameters

### Occupational exposure limits

Long-term exposure limit (8-hour TWA): OSHA 5 mg/m³
Long-term exposure limit (8-hour TWA): ACGIH 5 mg/m³
Short-term exposure limit (15-minute): ACGIH 10 mg/m³

OSHA = Occupational Safety and Health Administration.
ACGIH = American Conference of Governmental Industrial Hygienists.

### Exposure controls

**Protective equipment**



**Appropriate engineering controls** No specific ventilation requirements.

**Eye/face protection** No specific eye protection required during normal use. Large Spillages: Eyewear complying with an approved standard should be worn if a risk assessment indicates eye contact is possible.

# Lubricating Oil

| | |
|---|---|
| **Hand protection** | No specific hand protection recommended. Large Spillages: Wear protective gloves. |
| **Other skin and body protection** | Wear appropriate clothing to prevent repeated or prolonged skin contact. |
| **Hygiene measures** | Wash after use and before eating, smoking and using the toilet. Do not eat, drink or smoke when using this product. |
| **Respiratory protection** | No specific recommendations. Provide adequate ventilation. Large Spillages: If ventilation is inadequate, suitable respiratory protection must be worn. |
| **Environmental exposure controls** | Not regarded as dangerous for the environment. |

## 9. Physical and Chemical Properties

### Information on basic physical and chemical properties

| | |
|---|---|
| **Appearance** | Clear liquid. |
| **Color** | Water-white. |
| **Odor** | Odorless. |
| **pH** | Not applicable. |
| **Melting point** | Not determined. |
| **Initial boiling point and range** | 315°C/599°F |
| **Flash point** | 192°C/378°F |
| **Evaporation rate** | No information available. |
| **Flammability (solid, gas)** | Class IIIB Liquid |
| **Upper/lower flammability or explosive limits** | Not available. |
| **Vapor pressure** | < 0.01 mm Hg @ 25°C |
| **Vapor density** | > 1.0 g/cc |
| **Relative density** | 0.866 |
| **Bulk density** | 7.228 lb/gal |
| **Solubility(ies)** | Insoluble in water. |
| **Partition coefficient** | Not determined. |
| **Auto-ignition temperature** | 210°C/410°F |
| **Decomposition Temperature** | Not determined. |
| **Volatility** | 3% wt (Max) |

## 10. Stability and reactivity

| | |
|---|---|
| **Reactivity** | See the other subsections of this section for further details. |
| **Stability** | Stable at normal ambient temperatures and when used as recommended. Stable under the prescribed storage conditions. |
| **Possibility of hazardous reactions** | No potentially hazardous reactions known. |

# Lubricating Oil

| | |
|---|---|
| **Conditions to avoid** | There are no known conditions that are likely to result in a hazardous situation. |
| **Materials to avoid** | No specific material or group of materials is likely to react with the product to produce a hazardous situation. |
| **Hazardous decomposition products** | Does not decompose when used and stored as recommended. Thermal decomposition or combustion products may include the following substances: Harmful gases or vapors. |

## 11. Toxicological information

### Information on toxicological effects

| | |
|---|---|
| **Toxicological effects** | Not regarded as a health hazard under current legislation. |

**Acute toxicity - oral**

| | |
|---|---|
| **Notes (oral $LD_{50}$)** | Based on available data the classification criteria are not met. |

**Acute toxicity - dermal**

| | |
|---|---|
| **Notes (dermal $LD_{50}$)** | Based on available data the classification criteria are not met. |

**Acute toxicity - inhalation**

| | |
|---|---|
| **Notes (inhalation $LC_{50}$)** | Based on available data the classification criteria are not met. |

**Skin corrosion/irritation**

| | |
|---|---|
| **Animal data** | Based on available data the classification criteria are not met. |

**Serious eye damage/irritation**

| | |
|---|---|
| **Serious eye damage/irritation** | Based on available data the classification criteria are not met. |

**Respiratory sensitization**

| | |
|---|---|
| **Respiratory sensitization** | Based on available data the classification criteria are not met. |

**Skin sensitization**

| | |
|---|---|
| **Skin sensitization** | Based on available data the classification criteria are not met. |

**Germ cell mutagenicity**

| | |
|---|---|
| **Genotoxicity - in vitro** | Based on available data the classification criteria are not met. |

**Carcinogenicity**

| | |
|---|---|
| **Carcinogenicity** | Based on available data the classification criteria are not met. |
| **IARC carcinogenicity** | None of the ingredients are listed or exempt. |

**Reproductive toxicity**

| | |
|---|---|
| **Reproductive toxicity - fertility** | Based on available data the classification criteria are not met. |
| **Reproductive toxicity - development** | Based on available data the classification criteria are not met. |

**Specific target organ toxicity - single exposure**

| | |
|---|---|
| **STOT - single exposure** | Not classified as a specific target organ toxicant after a single exposure. |

**Specific target organ toxicity - repeated exposure**

| | |
|---|---|
| **STOT - repeated exposure** | Not classified as a specific target organ toxicant after repeated exposure. |

**Aspiration hazard**

| | |
|---|---|
| **Aspiration hazard** | Based on available data the classification criteria are not met. |

# Lubricating Oil

| | |
|---|---|
| **General information** | No specific health hazards known. The severity of the symptoms described will vary dependent on the concentration and the length of exposure. |
| **Inhalation** | No specific symptoms known. Spray/mists may cause respiratory tract irritation. |
| **Ingestion** | No specific symptoms known. May cause discomfort if swallowed. |
| **Skin Contact** | No specific symptoms known. May cause discomfort. |
| **Eye contact** | No specific symptoms known. May be slightly irritating to eyes. |
| **Route of entry** | Ingestion Inhalation Skin and/or eye contact |
| **Target Organs** | No specific target organs known. |

## 12. Ecological Information

| | |
|---|---|
| **Ecotoxicity** | Not regarded as dangerous for the environment. However, large or frequent spills may have hazardous effects on the environment. |
| **Toxicity** | Based on available data the classification criteria are not met. |

**Persistence and degradability**

| | |
|---|---|
| **Persistence and degradability** | The degradability of the product is not known. |

**Bioaccumulative potential**

| | |
|---|---|
| **Bio-Accumulative Potential** | No data available on bioaccumulation. |
| **Partition coefficient** | Not determined. |

**Mobility in soil**

| | |
|---|---|
| **Mobility** | No data available. |

**Other adverse effects**

| | |
|---|---|
| **Other adverse effects** | None known. |

## 13. Disposal considerations

**Waste treatment methods**

| | |
|---|---|
| **General information** | The generation of waste should be minimized or avoided wherever possible. Reuse or recycle products wherever possible. This material and its container must be disposed of in a safe way. |
| **Disposal methods** | Dispose of surplus products and those that cannot be recycled via a licensed waste disposal contractor. Waste packaging should be collected for reuse or recycling. Incineration or landfill should only be considered when recycling is not feasible. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of the local water authority. |

## 14. Transport information

| | |
|---|---|
| **General** | The product is not covered by international regulations on the transport of dangerous goods (IMDG, IATA, DOT). |

**UN Number**

Not applicable.

**UN proper shipping name**

Not applicable.

# Lubricating Oil

### Transport hazard class(es)

No transport warning sign required.

### Packing group

Not applicable.

### Environmental hazards

**Environmentally Hazardous Substance**
No.

### Special precautions for user

Not applicable.

**Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code** Not applicable.

## 15. Regulatory information

### US Federal Regulations

**SARA Section 302 Extremely Hazardous Substances Tier II Threshold Planning Quantities**
None of the ingredients are listed or exempt.

**CERCLA/Superfund, Hazardous Substances/Reportable Quantities (EPA)**
None of the ingredients are listed or exempt.

**SARA Extremely Hazardous Substances EPCRA Reportable Quantities**
None of the ingredients are listed or exempt.

**SARA 313 Emission Reporting**
None of the ingredients are listed or exempt.

**CAA Accidental Release Prevention**
None of the ingredients are listed or exempt.

**FDA - Essential Chemical**
None of the ingredients are listed or exempt.

**FDA - Precursor Chemical**
None of the ingredients are listed or exempt.

**SARA (311/312) Hazard Categories**
None of the ingredients are listed or exempt.

**OSHA Highly Hazardous Chemicals**
None of the ingredients are listed or exempt.

### US State Regulations

**California Proposition 65 Carcinogens and Reproductive Toxins**
None of the ingredients are listed or exempt.

**California Air Toxics "Hot Spots" (A-I)**
None of the ingredients are listed or exempt.

**California Air Toxics "Hot Spots" (A-II)**
None of the ingredients are listed or exempt.

# Lubricating Oil

**California Directors List of Hazardous Substances**
None of the ingredients are listed or exempt.

**Massachusetts "Right To Know" List**
None of the ingredients are listed or exempt.

**Rhode Island "Right To Know" List**
None of the ingredients are listed or exempt.

**Minnesota "Right To Know" List**
None of the ingredients are listed or exempt.

**New Jersey "Right To Know" List**
None of the ingredients are listed or exempt.

**Pennsylvania "Right To Know" List**
None of the ingredients are listed or exempt.

**Inventories**

**US - TSCA**
None of the ingredients are listed or exempt.

**US - TSCA 12(b) Export Notification**
None of the ingredients are listed or exempt.

## 16. Other information

| | |
|---|---|
| **Classification abbreviations and acronyms** | Asp. Tox. = Aspiration hazard |
| **Training advice** | Only trained personnel should use this material. |
| **Revision date** | 2/8/2019 |
| **Revision** | 7 |
| **Supersedes date** | 10/9/2017 |
| **SDS No.** | 4634 |

**End of Safety Data Sheet**

This information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process. Such information is, to the best of the company's knowledge and belief, accurate and reliable as of the date indicated. However, no warranty, guarantee or representation is made to its accuracy, reliability or completeness. It is the user's responsibility to satisfy himself as to the suitability of such information for his own particular use.

# Safety Data Sheet
# METHYLDIETHANOLAMINE

Version 1.4 Revision Date: 01/20/2025

## SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

**Product name** : METHYLDIETHANOLAMINE

**Recommended use of the chemical and restrictions on use**

Recommended use : Industrial chemical

**Manufacturer or supplier's details**

**Company** : Univar Solutions USA
**Address** 3075 Highland Pkwy Suite 200
Downers Grove, IL 60515
United States of America (USA)

**Emergency telephone number:**
Transport North America: CHEMTREC (1-800-424-9300)
CHEMTREC INTERNATIONAL Tel # 703-527-3887

**Additional Information:** : Responsible Party: Product Compliance Department
E-mail: SDSNA@univarsolutions.com
SDS Requests: 1-855-429-2661
Website: www.univarsolutions.com

## SECTION 2. HAZARDS IDENTIFICATION

**GHS Classification**

Eye irritation : Category 2A

**GHS label elements**

Hazard pictograms :



Signal word : Warning

Hazard statements : H319 Causes serious eye irritation.

Precautionary statements : **Prevention:**
P264 Wash skin thoroughly after handling.
P280 Wear eye protection/ face protection.
**Response:**
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313 If eye irritation persists: Get medical advice/ attention.

**Other hazards**

None known.

## SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Substance

**Hazardous components**

| CAS-No. | Chemical name | Weight percent |
|---|---|---|
| 105-59-9 | 2,2'-methyliminodiethanol | 90 - 100 |
| 111-42-2 | Diethanolamine | 0.1 - 1 |

Actual concentration is withheld as a trade secret
Any Concentration shown as a range is due to batch variation.

**Synonyms** : N-METHYLDIETHANOLAMINE,

## SECTION 4. FIRST AID MEASURES

General advice : Move out of dangerous area.
Show this safety data sheet to the doctor in attendance.
Do not leave the victim unattended.

If inhaled : If unconscious, place in recovery position and seek medical advice.
If symptoms persist, call a physician.

In case of skin contact : If skin irritation persists, call a physician.
If on skin, rinse well with water.
If on clothes, remove clothes.

In case of eye contact : Immediately flush eye(s) with plenty of water.
Remove contact lenses.
Protect unharmed eye.
Keep eye wide open while rinsing.
If eye irritation persists, consult a specialist.

If swallowed : Keep respiratory tract clear.
Do not induce vomiting without medical advice.
Do not give milk or alcoholic beverages.
Never give anything by mouth to an unconscious person.
If symptoms persist, call a physician.

Notes to physician : Treat symptomatically

## SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media : Water spray
Dry chemical
Carbon dioxide (CO2)
Alcohol-resistant foam

Unsuitable extinguishing media : High volume water jet

Specific hazards during fire-fighting : Do not allow run-off from fire fighting to enter drains or water courses.

Hazardous combustion products : No hazardous combustion products are known

Specific extinguishing methods : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Further information : Standard procedure for chemical fires.
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Special protective equipment for firefighters : Wear self-contained breathing apparatus for firefighting if necessary.

Use personal protective equipment.

## SECTION 6. ACCIDENTAL RELEASE MEASURES

| | | |
|---|---|---|
| Personal precautions, protective equipment and emergency procedures | : | Use personal protective equipment. |
| Environmental precautions | : | Prevent further leakage or spillage if safe to do so.<br>Do not let product enter drains.<br>If the product contaminates rivers and lakes or drains inform respective authorities. |
| Methods and materials for containment and cleaning up | : | Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust).<br>Keep in suitable, closed containers for disposal. |

## SECTION 7. HANDLING AND STORAGE

| | | |
|---|---|---|
| Advice on protection against fire and explosion | : | Normal measures for preventive fire protection. |
| Advice on safe handling | : | Do not breathe vapours/dust.<br>Avoid contact with skin and eyes.<br>For personal protection see section 8.<br>Smoking, eating and drinking should be prohibited in the application area.<br>Dispose of rinse water in accordance with local and national regulations. |
| Conditions for safe storage | : | Keep container tightly closed in a dry and well-ventilated place.<br>Electrical installations / working materials must comply with the technological safety standards. |

## SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Components with workplace control parameters**

| CAS-No. | Components | Value type (Form of exposure) | Control parameters / Permissible concentration | Basis |
|---|---|---|---|---|
| 111-42-2 | Diethanolamine | TWA (Inhalable fraction and vapor) | 1 mg/m3 | ACGIH |
| | | TWA | 3 ppm<br>15 mg/m3 | NIOSH REL |
| | | TWA | 3 ppm<br>15 mg/m3 | OSHA P0 |
| | | PEL | 0.46 ppm<br>2 mg/m3 | CAL PEL |

**Personal protective equipment**

Respiratory protection : No personal respiratory protective equipment normally re-

quired.
In the case of vapour formation use a respirator with an approved filter.

Hand protection

| | | |
|---|---|---|
| Remarks | : | The suitability for a specific workplace should be discussed with the producers of the protective gloves. |
| Eye protection | : | Eye wash bottle with pure water<br>Tightly fitting safety goggles<br>Wear face-shield and protective suit for abnormal processing problems. |
| Skin and body protection | : | Impervious clothing<br>Choose body protection according to the amount and concentration of the dangerous substance at the work place. |
| Hygiene measures | : | When using do not eat or drink.<br>When using do not smoke.<br>Wash hands before breaks and at the end of workday. |

## SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

| | | |
|---|---|---|
| Appearance | : | liquid |
| Colour | : | Clear, colorless, yellow |
| Odour | : | amine-like, ammoniacal |
| Odour Threshold | : | No data available |
| pH | : | 10.4 - 11.5 @ 20 - 25 °C (68 - 77 °F) |
| Freezing Point (Melting point/freezing point) | : | -21 °C (-6 °F) |
| Boiling Point (Boiling point/boiling range) | : | 240 - 255 °C (464 - 491 °F)<br>(1013 hPa) |
| Flash point | : | 116 °C (241 °F)<br>Method: Pensky-Martens closed cup |
| Evaporation rate | : | No data available |
| Flammability (solid, gas) | : | No data available |
| Upper explosion limit | : | 10 %(V) |
| Lower explosion limit | : | 0.9 %(V) |
| Vapour pressure | : | < 0.01 mmHg @ 20 °C (68 °F) |
| Relative vapour density | : | 4 @ 20 - 25 °C (68 - 77 °F)<br>(Air = 1.0) |
| Relative density | : | 1.041 @ 20 °C (68 °F)<br>Reference substance: (water = 1) |
| Density | : | 1.04 g/cm3 @ 20 °C (68 °F) |
| Solubility(ies)<br>Water solubility | : | > 1,000 g/l completely miscible @ 20 °C (68 °F) , 1,013 hPa |

| | | |
|---|---|---|
| Solubility in other solvents | : | No data available |
| Partition coefficient: n-octanol/water | : | log Pow: -1.08 @ 25 °C (77 °F) |
| Auto-ignition temperature | : | 265 - 280 °C |
| Thermal decomposition | : | No data available |
| Viscosity | | |
| Viscosity, dynamic | : | 34.78 mPa.s @ 40 °C (104 °F) |
| Viscosity, kinematic | : | 99.05 mm2/s @ 20 °C (68 °F) |

## SECTION 10. STABILITY AND REACTIVITY

| | | |
|---|---|---|
| Reactivity | : | Exothermic reaction with acids. |
| Chemical stability | : | Stable under normal conditions. |
| Possibility of hazardous reactions | : | No hazards to be specially mentioned. |
| Conditions to avoid | : | Keep away from heat, flame, sparks and other ignition sources.<br>Exposure to moisture |
| Incompatible materials | : | Strong acids<br>Strong oxidizing agents<br>nitrites<br>Halogenated compounds |
| Hazardous decomposition products | : | Carbon dioxide (CO2), carbon monoxide (CO), oxides of nitrogen (NOx), dense black smoke. |

## SECTION 11. TOXICOLOGICAL INFORMATION

**Acute toxicity**

**Components:**

**111-42-2:**

Acute oral toxicity : LD50 (Rat, male and female): 1,600 mg/kg

**Skin corrosion/irritation**

**Components:**

**111-42-2:**

Species: Rabbit
Result: Irritating to skin.

**Serious eye damage/eye irritation**

**Components:**

**105-59-9:**

Species: Rabbit
Result: Irritating to eyes.

**111-42-2:**
Species: Rabbit
Result: Risk of serious damage to eyes.

**Germ cell mutagenicity**

**Components:**
**111-42-2:**

| | | |
|---|---|---|
| Germ cell mutagenicity - Assessment | : | Tests on bacterial or mammalian cell cultures did not show mutagenic effects. |

**Carcinogenicity**

**Components:**
**111-42-2:**

| | | |
|---|---|---|
| Carcinogenicity - Assessment | : | Not classifiable as a human carcinogen. |
| **IARC** | | Group 2B: Possibly carcinogenic to humans |
| | | 111-42-2 Diethanolamine |
| **OSHA** | | No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens. |
| **NTP** | | No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP. |

**Reproductive toxicity**

**Components:**
**111-42-2:**

| | | |
|---|---|---|
| Effects on fertility | : | Remarks: In laboratory animal studies, effects on reproduction have been seen only at doses that produced significant toxicity to the parent animals. Repeated excessive exposures to high amounts may cause effects on testes and fertility in males. |
| Reproductive toxicity - Assessment | | Fertility classification not possible from current data. |
| Teratogenicity - Assessment | : | Embryotoxicity classification not possible from current data. |

**STOT - repeated exposure**

**Components:**
**111-42-2:**
Target Organs: Kidney, Blood, Liver
Assessment: The substance or mixture is classified as specific target organ toxicant, repeated exposure, category 2.

**Further information**

**Product:**

Remarks: No data available

## SECTION 12. ECOLOGICAL INFORMATION

**Ecotoxicity**

**Components:**

**111-42-2:**

| | | |
|---|---|---|
| Toxicity to daphnia and other aquatic invertebrates | : | EC50 (Ceriodaphnia dubia): 30.1 mg/l<br>Exposure time: 48 h<br>Test Type: static test |
| Toxicity to algae | : | EC50 (Pseudokirchneriella subcapitata (algae)): 86.96 mg/l<br>End point: Growth rate<br>Exposure time: 96 h<br>Test Type: static test |
| Toxicity to fish (Chronic toxicity) | : | NOEC: Calculated > 1 mg/l |
| Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) | : | NOEC (Daphnia magna (Water flea)): 0.78 mg/l<br>Exposure time: 21 d |
| Acute aquatic toxicity- Assessment | : | Harmful to aquatic life. |
| Chronic aquatic toxicity- Assessment | : | Harmful to aquatic life with long lasting effects. |

**Persistence and degradability**

No data available

**Bioaccumulative potential**

No data available

**Mobility in soil**

No data available

**Other adverse effects**

**Product:**

| | | |
|---|---|---|
| Ozone-Depletion Potential | : | Regulation: 40 CFR Protection of Environment; Part 82 Protection of Stratospheric Ozone - CAA Section 602 Class I Substances<br>Remarks: This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B). |
| Additional ecological information | : | No data available |

## SECTION 13. DISPOSAL CONSIDERATIONS

**Disposal methods**

Waste from residues : Dispose of in accordance with all applicable local, state and federal regulations.
For assistance with your waste management needs - including disposal, recycling and waste stream reduction, contact Univar Solutions ChemCare: 1-800-637-7922

Contaminated packaging : Empty remaining contents.
Dispose of as unused product.
Do not re-use empty containers.

## SECTION 14. TRANSPORT INFORMATION

**DOT (Department of Transportation)**: Not regulated as a dangerous good

**IATA (International Air Transport Association)**: Not regulated as a dangerous good

**IMDG-Code**: Not regulated as a dangerous good

## SECTION 15. REGULATORY INFORMATION

**WHMIS Classification** : D2B: Toxic Material Causing Other Toxic Effects

**EPCRA - Emergency Planning and Community Right-to-Know Act**

**CERCLA Reportable Quantity**

| Components | CAS-No. | Component RQ (lbs) | Calculated product RQ (lbs) |
|---|---|---|---|
| Diethanolamine | 111-42-2 | 100 | 100000 |

**SARA 304 Extremely Hazardous Substances Reportable Quantity**

This material does not contain any components with a section 304 EHS RQ.

**SARA 311/312 Hazards** : Serious eye damage or eye irritation

**SARA 302** : No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313** : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

**Clean Air Act**

This product does not contain any hazardous air pollutants (HAP), as defined by the U.S. Clean Air Act Section 112 (40 CFR 61).

This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F).
This product does not contain any chemicals listed under the U.S. Clean Air Act Section 111 SOCMI Intermediate or Final VOC's (40 CFR 60.489).

**Clean Water Act**

This product does not contain any Hazardous Substances listed under the U.S. CleanWater Act, Section 311, Table 116.4A.
This product does not contain any Hazardous Chemicals listed under the U.S. CleanWater Act, Section 311, Table 117.3.
This product does not contain any toxic pollutants listed under the U.S. Clean Water Act Section 307

**Massachusetts Right To Know**

No components are subject to the Massachusetts Right to Know Act.

**Pennsylvania Right To Know**

| | |
|---|---|
| 105-59-9 | 2,2'-methyliminodiethanol |
| 111-42-2 | Diethanolamine |

**California Prop 65**

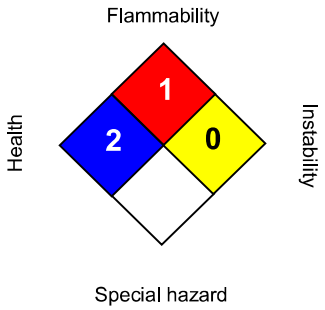
⚠ **WARNING**: This product can expose you to chemicals including Diethanolamine, which is/are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

**The components of this product are reported in the following inventories:**

| | | |
|---|---|---|
| TSCA | : | On TSCA Inventory |
| DSL | : | All components of this product are on the Canadian DSL |
| AICS | : | On the inventory, or in compliance with the inventory |
| NZIoC | : | On the inventory, or in compliance with the inventory |
| ENCS | : | On the inventory, or in compliance with the inventory |
| KECI | : | On the inventory, or in compliance with the inventory |
| IECSC | : | On the inventory, or in compliance with the inventory |
| PHIL | : | On the inventory, or in compliance with the inventory |

## SECTION16. OTHER INFORMATION

**NFPA:**




**HMIS III:**

| | |
|---|---|
| HEALTH | 2 |
| FLAMMABILITY | 1 |
| PHYSICAL HAZARD | 0 |

0 = not significant, 1 =Slight,
2 = Moderate, 3 = High
4 =Extreme, * = Chronic

The information accumulated is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made become available subsequently to the date hereof, we do not assume any responsibility for the results of its use. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This SDS has been prepared by Univar Solutions Product Compliance Department (1-855-429-2661) SDSNA@univarsolutions.com.

**Revision Date** : 01/20/2025

**Legacy SDS:** : R0017045

**Material number:**
16221993, 16204065, 16159430, 16182976, 16158004, 16158090, 16155000, 16116632, 16114651, 16015982, 573683, 573105, 105747, 104023, 71737, 55402, 165592, 503990

| Key or legend to abbreviations and acronyms used in the safety data sheet | | | |
|---|---|---|---|
| ACGIH | American Conference of Government Industrial Hygienists | LD50 | Lethal Dose 50% |
| AICS | Australia, Inventory of Chemical Substances | LOAEL | Lowest Observed Adverse Effect Level |
| DSL | Canada, Domestic Substances List | NFPA | National Fire Protection Agency |
| NDSL | Canada, Non-Domestic Substances List | NIOSH | National Institute for Occupational Safety & Health |
| CNS | Central Nervous System | NTP | National Toxicology Program |
| CAS | Chemical Abstract Service | NZIoC | New Zealand Inventory of Chemicals |
| EC50 | Effective Concentration | NOAEL | No Observable Adverse Effect Level |
| EC50 | Effective Concentration 50% | NOEC | No Observed Effect Concentration |
| EGEST | EOSCA Generic Exposure Scenario Tool | OSHA | Occupational Safety & Health Administration |
| EOSCA | European Oilfield Specialty Chem- | PEL | Permissible Exposure Limit |

| | | | |
|---|---|---|---|
| | icals Association | | |
| EINECS | European Inventory of Existing Chemical Substances | PICCS | Philippines Inventory of Commercial Chemical Substances |
| MAK | Germany Maximum Concentration Values | PRNT | Presumed Not Toxic |
| GHS | Globally Harmonized System | RCRA | Resource Conservation Recovery Act |
| >= | Greater Than or Equal To | STEL | Short-term Exposure Limit |
| IC50 | Inhibition Concentration 50% | SARA | Superfund Amendments and Reauthorization Act. |
| IARC | International Agency for Research on Cancer | TLV | Threshold Limit Value |
| IECSC | Inventory of Existing Chemical Substances in China | TWA | Time Weighted Average |
| ENCS | Japan, Inventory of Existing and New Chemical Substances | TSCA | Toxic Substance Control Act |
| KECI | Korea, Existing Chemical Inventory | UVCB | Unknown or Variable Composition, Complex Reaction Products, and Biological Materials |
| <= | Less Than or Equal To | WHMIS | Workplace Hazardous Materials Information System |
| LC50 | Lethal Concentration 50% | | |

# Material Safety Data Sheet

## Section 1. Chemical Product and Company Identification

| | |
|---|---|
| **Common Name** | **Chemtherm 550** (HMO) |
| **Supplier** | Coastal Chemical Co., L.L.C.<br>3520 Veterans Memorial Drive<br>Abbeville, La. 70510<br>337-893-3862 |
| **Synonym** | Paraffinic Oil |
| **Trade name** | Chemtherm 550 |
| **Material Uses** | Not available. |
| **Manufacturer** | Coastal Chemical Co., Inc.<br>3520 Charity Street<br>Abbeville, La. |

| | |
|---|---|
| **Code** | 35402 |
| **MSDS#** | Not available. |
| **Validation Date** | **6/14/2002** |
| **Print Date** | 6/14/2002 |
| **Responsible Name** | **Charles Toups** |

| | |
|---|---|
| **In Case of Emergency** | Transportation Emergency Call<br>CHEMTREC 800-424-9300<br>Other Information Call<br>Charles Toups<br>337-898-0001 |

## Section 2. Composition and Information on Ingredients

| Name | CAS # | % by Weight | Exposure Limits |
|---|---|---|---|
| 1) Heavy Hydrotreated Naphthenic Distillates (petroleum) | 64742-52-5 | 100% | |

## Section 3. Hazards Identification

| | |
|---|---|
| **Physical State and Appearance** | Liquid. |
| **Emergency Overview** | CAUTION!<br>Not expected to cause adverse health effects |
| **Routes of Entry** | Skin contact. |
| **Potential Acute Health Effects** | |
| ***Eyes*** | Not available. |
| ***Skin*** | Irritation of the product in case of skin contact: Not available. Sensitization of the product: Not available. |
| ***Inhalation*** | Not available. |
| ***Ingestion*** | Not available. |
| **Potential Chronic Health Effects** | **CARCINOGENIC EFFECTS**: Not available.<br>**MUTAGENIC EFFECTS**: Not available.<br>**TERATOGENIC EFFECTS**: Not available. |
| **Medical Conditions Aggravated by Overexposure:** | Repeated or prolonged exposure is not known to aggravate medical condition. |
| **Overexposure /Signs/Symptoms** | Not available. |

**See Toxicological Information (section 11)**

*Continued on Next Page*

## Section 4. First Aid Measures

| | |
|---|---|
| **Eye Contact** | Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention. |
| **Skin Contact** | In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention. |
| **Inhalation** | If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention. |
| **Ingestion** | DO NOT induce vomiting. Seek medical attention. |
| **Notes to Physician** | Not available. |

## Section 5. Fire Fighting Measures

| | |
|---|---|
| **Flammability of the Product** | May be combustible at high temperature. |
| **Auto-ignition Temperature** | >343°C (649.4°F) |
| **Flash Points** | OPEN CUP: >160°C (320°F) (Cleveland.). |
| **Flammable Limits** | Not available. |
| **Products of Combustion** | Not available. |
| **Fire Hazards in Presence of Various Substances** | Not available. |
| **Explosion Hazards in Presence of Various Substances** | Risks of explosion of the product in presence of mechanical impact: Not available.<br>Risks of explosion of the product in presence of static discharge: Not available. |
| **Fire Fighting Media and Instructions** | SMALL FIRE: Use DRY chemical powder.<br>LARGE FIRE: Use water spray, fog or foam. Do not use water jet. |
| **Protective Clothing (Fire)** | Be sure to use an approved/certified respirator or equivalent. |
| **Special Remarks on Fire Hazards** | Not available. |
| **Special Remarks on Explosion Hazards** | Not available. |

## Section 6. Accidental Release Measures

| | |
|---|---|
| **Small Spill and Leak** | Absorb with an inert material and put the spilled material in an appropriate waste disposal. |
| **Large Spill and Leak** | Absorb with an inert material and put the spilled material in an appropriate waste disposal. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. |

## Section 7. Handling and Storage

| | |
|---|---|
| **Handling** | Avoid breathing vapors or spray mists. |
| **Storage** | Keep container tightly closed. Keep container in a cool, well-ventilated area. |

Continued on Next Page

## Section 8. Exposure Controls/Personal Protection

| | |
|---|---|
| **Engineering Controls** | Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location. |
| **Personal Protection** | |
| ***Eyes*** | Safety glasses. |
| ***Body*** | Lab coat. |
| ***Respiratory*** | Not applicable. |
| ***Hands*** | Gloves (impervious). |
| ***Feet*** | Not applicable. |
| **Personal Protection in Case of a Large Spill** | Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product. |

| Product Name | Exposure Limits |
|---|---|
| 1) Heavy Hydrotreated Naphthenic Distillates (petroleum) | |

**Consult local authorities for acceptable exposure limits.**

## Section 9. Physical and Chemical Properties

| | |
|---|---|
| **Physical State and Appearance** | Liquid. |
| **Molecular Weight** | Not applicable. |
| **Molecular Formula** | Not applicable. |
| **pH (1% Soln/Water)** | Not applicable. |
| **Boiling/Condensation Point** | >274°C (525.2°F) |
| **Melting/Freezing Point** | Not available. |
| **Critical Temperature** | Not available. |
| **Specific Gravity** | 0.9 (Water = 1) |
| **Vapor Pressure** | <0 kPa (@ 20°C) |
| **Vapor Density** | >5 (Air = 1) |
| **Volatility** | 0% (v/v). 0% (w/w). |
| **Odor Threshold** | Not available. |
| **Evaporation Rate** | Not available. |
| **VOC** | 0 (%) |
| **Viscosity** | Not available. |
| **$LogK_{ow}$** | Not available. |
| **Ionicity (in Water)** | Not available. |
| **Dispersion Properties** | Not available. |

| | |
|---|---|
| **Odor** | Bland. (Slight.) |
| **Taste** | Not available. |
| **Color** | Colorless to light yellow. (Light.) |

*Continued on Next Page*

| | |
|---|---|
| **Solubility** | Insoluble in cold water, hot water. |
| **Physical Chemical Comments** | Not available. |

## Section 10. Stability and Reactivity

| | |
|---|---|
| **Stability and Reactivity** | The product is stable. |
| **Conditions of Instability** | Not available. |
| **Incompatibility with Various Substances** | Not available. |
| **Hazardous Decomposition Products** | Not available. |
| **Hazardous Polymerization** | Will not occur. |

## Section 11. Toxicological Information

| | |
|---|---|
| **Toxicity to Animals** | LD50: Not available.<br>LC50: Not available. |
| **Chronic Effects on Humans** | Not available. |
| **Other Toxic Effects on Humans** | No specific information is available in our database regarding the other toxic effects of this material for humans. |
| **Special Remarks on Toxicity to Animals** | Not available. |
| **Special Remarks on Chronic Effects on Humans** | Not available. |
| **Special Remarks on Other Toxic Effects on Humans** | Not available. |

## Section 12. Ecological Information

| | |
|---|---|
| **Ecotoxicity** | Not available. |
| **BOD5 and COD** | Not available. |
| **Biodegradable/OECD** | Not available. |
| **Mobility** | Not available. |
| | Not available. |
| **Toxicity of the Products of Biodegradation** | Not available. |
| **Special Remarks on the Products of Biodegradation** | Not available. |

## Section 13. Disposal Considerations

| | |
|---|---|
| **Waste Information** | Waste must be disposed of in accordance with federal, state and local environmental control regulations. |
| **Waste Stream** | Not available. |

**Consult your local or regional authorities.**

Continued on Next Page

## Section 14. Transport Information

| | |
|---|---|
| **Shipping Description** | Not a DOT controlled material (United States).<br>Not regulated. |
| **Reportable Quantity** | Not available. |
| **Marine Pollutant** | Not available. |
| **Special Provisions for Transport** | Not applicable. |

## Section 15. Regulatory Information

| | |
|---|---|
| **HCS Classification** | Not controlled under the HCS (United States). |
| **U.S. Federal Regulations** | TSCA 8(b) inventory: Chemtherm 550<br>SARA 302/304/311/312 extremely hazardous substances: No products were found.<br>SARA 302/304 emergency planning and notification: No products were found.<br>SARA 302/304/311/312 hazardous chemicals: No products were found.<br>SARA 311/312 MSDS distribution - chemical inventory - hazard identification: No products were found.<br>SARA 313 toxic chemical notification and release reporting: No products were found.<br>Clean Water Act (CWA) 307: No products were found.<br>Clean Water Act (CWA) 311: No products were found.<br>Clean air act (CAA) 112 accidental release prevention: No products were found.<br>Clean air act (CAA) 112 regulated flammable substances: No products were found.<br>Clean air act (CAA) 112 regulated toxic substances: No products were found. |
| **International Regulations** | |
| **EINECS** | Not available. |
| **DSCL (EEC)** | This product is not classified according to the EU regulations. |
| **International Lists** | No products were found. |
| **State Regulations** | No products were found.<br>California prop. 65: No products were found. |

## Section 16. Other Information

| | |
|---|---|
| **Label Requirements** | Not expected to cause adverse health effects |

**Hazardous Material Information System (U.S.A.)**

| | |
|---|---|
| Health | 0 |
| Fire Hazard | 1 |
| Reactivity | 0 |
| Personal Protection | B |

**National Fire Protection Association (U.S.A.)**




| | |
|---|---|
| **References** | Not available. |
| **Other Special Considerations** | Not available. |

Continued on Next Page

**Validated by Charles Toups on 6/14/2002.**

**Verified by Charles Toups.**

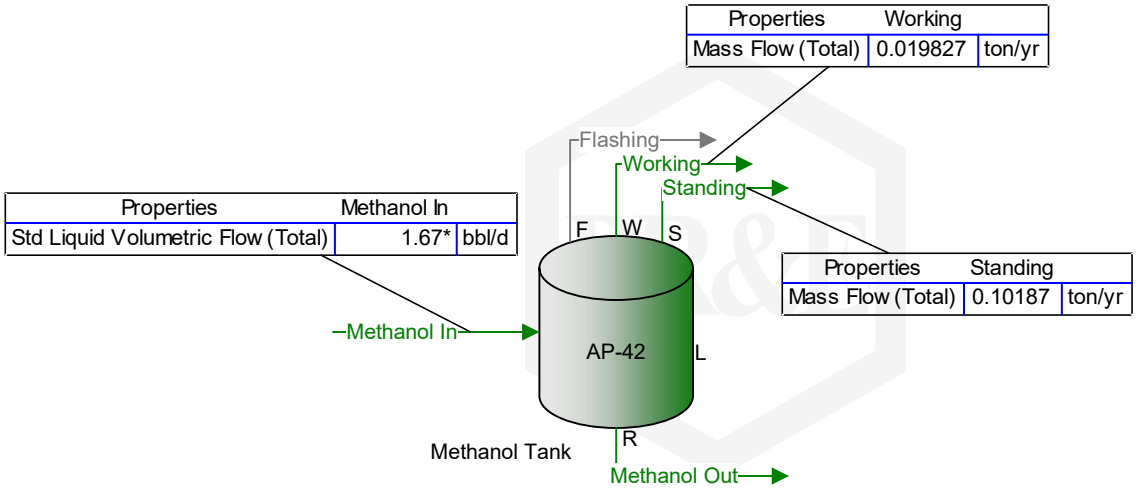
**Printed 6/14/2002.**

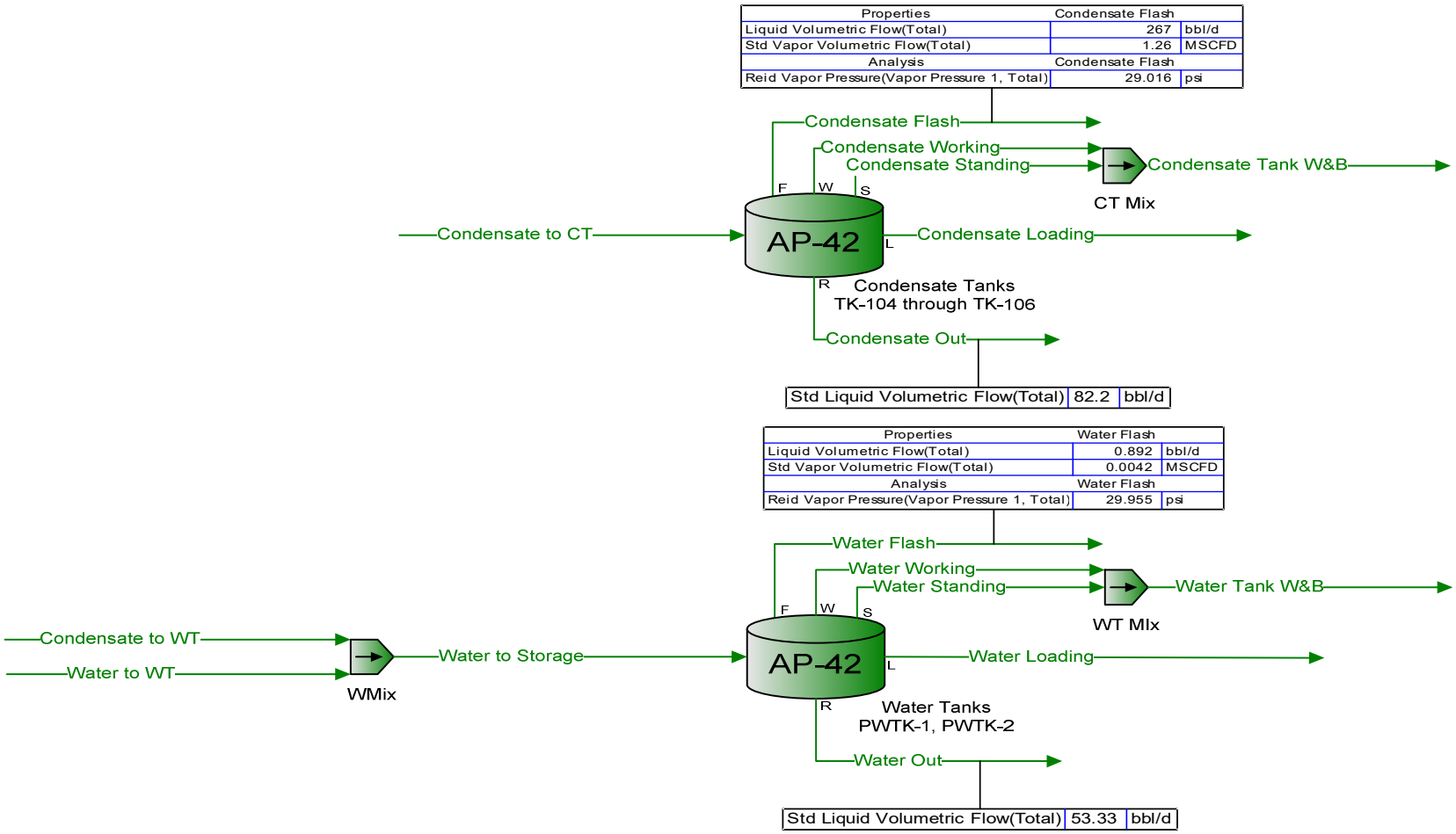
**Transportation Emergency Call**
**CHEMTREC 800-424-9300**
**Other Information Call**
**Charles Toups**
**337-898-0001**

**Notice to Reader**

***To the best of our knowledge, the information contained herein is accurate. However, neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein.***
***Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.***

Methanol Tank Calculations (EPN: TK-M)




Properties Condensate Flash
Liquid Volumetric Flow(Total) 267 bbl/d
Std Vapor Volumetric Flow(Total) 1.26 MSCFD
Analysis Condensate Flash
Reid Vapor Pressure(Vapor Pressure 1, Total) 29.016 psi
Condensate Flash
Condensate Working
Condensate Standing
Condensate Tank W&B
CT Mix
F
W
S
Condensate to CT
AP-42
L
Condensate Loading
R
Condensate Tanks
TK-104 through TK-106
Condensate Out
Std Liquid Volumetric Flow(Total) 82.2 bbl/d
Properties Water Flash
Liquid Volumetric Flow(Total) 0.892 bbl/d
Std Vapor Volumetric Flow(Total) 0.0042 MSCFD
Analysis Water Flash
Reid Vapor Pressure(Vapor Pressure 1, Total) 29.955 psi
Water Flash
Water Working
Water Standing
Water Tank W&B
WT MIx
F
W
S
Condensate to WT
Water to WT
WMix
Water to Storage
AP-42
L
Water Loading
R
Water Tanks
PWTK-1, PWTK-2
Water Out
Std Liquid Volumetric Flow(Total) 53.33 bbl/d

| Process Streams | | Condensate Flash | Condensate Loading | Condensate Out | Condensate Standing | Condensate Tank W&B |
|---|---|---|---|---|---|---|
| Composition | Status: | Solved | Solved | Solved | Solved | Solved |
| Phase: Total | From Block: | Condensate Tanks TK-104 through TK-106 | Condensate Tanks TK-104 through TK-106 | Condensate Tanks TK-104 through TK-106 | Condensate Tanks TK-104 through TK-106 | CT Mix |
| | To Block: | -- | -- | -- | CT Mix | -- |
| Mole Fraction | | % | | % | % | % |
| Hydrogen Sulfide | | 2.41744 | 2.42208 | 0.0585695 | 2.75011 | 2.75011 |
| Carbon Dioxide | | 0.467758 | 0.100756 | 0.000786708 | 0.543813 | 0.543813 |
| Nitrogen | | 3.76581 | 0 | 0 | 0.520790 | 0.520790 |
| Methane | | 10.2532 | 0 | 0 | 5.22163 | 5.22163 |
| Ethane | | 11.7328 | 10.1090 | 0.174455 | 13.4813 | 13.4813 |
| Propane | | 30.1203 | 36.0906 | 2.09401 | 33.6858 | 33.6858 |
| i-Butane | | 5.41664 | 6.82152 | 1.04801 | 5.92468 | 5.92468 |
| n-Butane | | 14.6320 | 18.4940 | 4.16232 | 15.8696 | 15.8696 |
| i-Pentane | | 5.16769 | 6.48689 | 3.64071 | 5.49426 | 5.49426 |
| n-Pentane | | 5.78783 | 7.21514 | 5.35674 | 6.10531 | 6.10531 |
| C6Alkanes(iso) | | 2.92059 | 3.58540 | 6.36623 | 3.03096 | 3.03096 |
| Heptane | | 2.32691 | 2.72944 | 21.9104 | 2.32320 | 2.32320 |
| Octane | | 0.697366 | 0.791884 | 20.2680 | 0.678096 | 0.678096 |
| n-Nonane | | 0.0665689 | 0.0731613 | 5.70692 | 0.0630111 | 0.0630111 |
| C10+ | | 0.000721953 | 0.000697237 | 5.73172 | 0.000616736 | 0.000616736 |
| Benzene | | 1.45385 | 1.76330 | 4.76743 | 1.49307 | 1.49307 |
| Toluene | | 0.700652 | 0.823133 | 7.39151 | 0.700568 | 0.700568 |
| Ethylbenzene | | 0.0639380 | 0.0726771 | 2.04392 | 0.0622521 | 0.0622521 |
| m-Xylene | | 0.0673319 | 0.0764614 | 2.34751 | 0.0655045 | 0.0655045 |
| n-Hexane | | 1.75786 | 2.12752 | 5.31883 | 1.80158 | 1.80158 |
| 2,2,4-Trimethylpentane | | 0.182811 | 0.216325 | 1.61190 | 0.183843 | 0.183843 |
| Water | | 0 | 0 | 0 | 0 | 0 |
| Methylcyclohexane | | 0 | 0 | 0 | 0 | 0 |
| Cyclohexane | | 0 | 0 | 0 | 0 | 0 |
| Cyclopentene | | 0 | 0 | 0 | 0 | 0 |
| TEG | | 0 | 0 | 0 | 0 | 0 |
| Oxygen | | 0 | 0 | 0 | 0 | 0 |
| SO2 | | 0 | 0 | 0 | 0 | 0 |
| Molar Flow | | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h |
| Hydrogen Sulfide | | 0.00333950 | 0.000208795 | 0.00498185 | 0.000930198 | 0.00189517 |
| Carbon Dioxide | | 0.000646169 | 8.68568E-06 | 6.69165E-05 | 0.000183939 | 0.000374755 |
| Nitrogen | | 0.00520215 | 0 | 0 | 0.000176152 | 0.000358889 |
| Methane | | 0.0141639 | 0 | 0 | 0.00176617 | 0.00359835 |
| Ethane | | 0.0162079 | 0.000871441 | 0.0148389 | 0.00455992 | 0.00929030 |
| Propane | | 0.0416086 | 0.00311118 | 0.178114 | 0.0113939 | 0.0232137 |
| i-Butane | | 0.00748264 | 0.000588048 | 0.0891424 | 0.00200396 | 0.00408284 |
| n-Butane | | 0.0202129 | 0.00159428 | 0.354042 | 0.00536773 | 0.0109361 |
| i-Pentane | | 0.00713873 | 0.000559201 | 0.309675 | 0.00185838 | 0.00378623 |
| n-Pentane | | 0.00799540 | 0.000621980 | 0.455638 | 0.00206506 | 0.00420732 |
| C6Alkanes(iso) | | 0.00403455 | 0.000309078 | 0.541504 | 0.00102519 | 0.00208871 |
| Heptane | | 0.00321443 | 0.000235291 | 1.86368 | 0.000785798 | 0.00160097 |
| Octane | | 0.000963353 | 6.82642E-05 | 1.72397 | 0.000229359 | 0.000467292 |
| n-Nonane | | 9.19593E-05 | 6.30686E-06 | 0.485424 | 2.13129E-05 | 4.34225E-05 |
| C10+ | | 9.97318E-07 | 6.01052E-08 | 0.487534 | 2.08605E-07 | 4.25008E-07 |
| Benzene | | 0.00200837 | 0.000152005 | 0.405512 | 0.000505017 | 0.00102891 |
| Toluene | | 0.000967892 | 7.09580E-05 | 0.628713 | 0.000236960 | 0.000482779 |
| Ethylbenzene | | 8.83250E-05 | 6.26511E-06 | 0.173854 | 2.10562E-05 | 4.28994E-05 |
| m-Xylene | | 9.30134E-05 | 6.59134E-06 | 0.199676 | 2.21563E-05 | 4.51408E-05 |
| n-Hexane | | 0.0024284 | 0.000183403 | 0.452414 | 0.000609366 | 0.00124151 |
| 2,2,4-Trimethylpentane | | 0.000252538 | 1.86483E-05 | 0.137106 | 6.21831E-05 | 0.000126691 |
| Water | | 0 | 0 | 0 | 0 | 0 |
| Methylcyclohexane | | 0 | 0 | 0 | 0 | 0 |
| Cyclohexane | | 0 | 0 | 0 | 0 | 0 |
| Cyclopentene | | 0 | 0 | 0 | 0 | 0 |
| TEG | | 0 | 0 | 0 | 0 | 0 |
| Oxygen | | 0 | 0 | 0 | 0 | 0 |
| SO2 | | 0 | 0 | 0 | 0 | 0 |
| Mass Fraction | | % | % | % | % | % |
| Hydrogen Sulfide | | 1.66535 | 1.48405 | 0.0197797 | 1.81603 | 1.81603 |
| Carbon Dioxide | | 0.416109 | 0.0797199 | 0.000343081 | 0.463723 | 0.463723 |
| Nitrogen | | 2.13237 | 0 | 0 | 0.282677 | 0.282677 |
| Methane | | 3.32482 | 0 | 0 | 1.62308 | 1.62308 |
| Ethane | | 7.13117 | 5.46480 | 0.0519803 | 7.85443 | 7.85443 |
| Propane | | 26.8468 | 28.6113 | 0.914979 | 28.7810 | 28.7810 |
| i-Butane | | 6.36372 | 7.12806 | 0.603593 | 6.67221 | 6.67221 |
| n-Butane | | 17.1903 | 19.3251 | 2.39726 | 17.8719 | 17.8719 |
| i-Pentane | | 7.53641 | 8.41422 | 2.60287 | 7.68071 | 7.68071 |
| n-Pentane | | 8.44080 | 9.35884 | 3.82972 | 8.53492 | 8.53492 |
| C6Alkanes(iso) | | 5.08737 | 5.55480 | 5.43629 | 5.06089 | 5.06089 |
| Heptane | | 4.71296 | 4.91698 | 21.7553 | 4.51050 | 4.51050 |
| Octane | | 1.61018 | 1.62624 | 22.9415 | 1.50082 | 1.50082 |
| n-Nonane | | 0.172578 | 0.168696 | 7.25293 | 0.156587 | 0.156587 |
| C10+ | | 0.00276685 | 0.00237666 | 10.7686 | 0.00226569 | 0.00226569 |
| Benzene | | 2.29548 | 2.47624 | 3.69010 | 2.25975 | 2.25975 |
| Toluene | | 1.30491 | 1.36351 | 6.74856 | 1.25070 | 1.25070 |
| Ethylbenzene | | 0.137208 | 0.138716 | 2.15022 | 0.128055 | 0.128055 |
| m-Xylene | | 0.144491 | 0.145939 | 2.46959 | 0.134746 | 0.134746 |
| n-Hexane | | 3.06201 | 3.29614 | 4.54189 | 3.00815 | 3.00815 |
| 2,2,4-Trimethylpentane | | 0.422101 | 0.444253 | 1.82452 | 0.406897 | 0.406897 |
| Water | | 0 | 0 | 0 | 0 | 0 |
| Methylcyclohexane | | 0 | 0 | 0 | 0 | 0 |
| Cyclohexane | | 0 | 0 | 0 | 0 | 0 |
| Cyclopentene | | 0 | 0 | 0 | 0 | 0 |
| TEG | | 0 | 0 | 0 | 0 | 0 |
| Oxygen | | 0 | 0 | 0 | 0 | 0 |
| SO2 | | 0 | 0 | 0 | 0 | 0 |

| Process Streams | | Condensate to CT | Condensate to WT | Condensate Working | Water Flash | Water Loading |
|---|---|---|---|---|---|---|
| Composition | Status: | Solved | Solved | Solved | Solved | Solved |
| Phase: Total | From Block: | -- | -- | Condensate Tanks TK-104 through TK-106 | Water Tanks PWTK-1, PWTK-2 | Water Tanks PWTK-1, PWTK-2 |
| | To Block: | Condensate Tanks TK-104 through TK-106 | WMix | CT Mix | -- | -- |
| **Mole Fraction** | | % | % | % | % | |
| Hydrogen Sulfide | | 0.117257* | 0.117257* | 2.75011 | 4.21680 | 0 |
| Carbon Dioxide | | 0.0124853* | 0.0124853* | 0.543813 | 0.0417884 | 0 |
| Nitrogen | | 0.0638251* | 0.0638251* | 0.520790 | 3.80871 | 0 |
| Methane | | 0.203861* | 0.203861* | 5.22163 | 7.46529 | 0 |
| Ethane | | 0.462957* | 0.462957* | 13.4813 | 8.86525 | 0 |
| Propane | | 2.78823* | 2.78823* | 33.6858 | 28.5040 | 0 |
| i-Butane | | 1.15584* | 1.15584* | 5.92468 | 5.48049 | 0 |
| n-Butane | | 4.42091* | 4.42091* | 15.8696 | 14.6608 | 0 |
| i-Pentane | | 3.67958* | 3.67958* | 5.49426 | 5.28208 | 8.20995E-18 |
| n-Pentane | | 5.36950* | 5.36950* | 6.10531 | 5.94919 | 1.63911 |
| C6Alkanes(iso) | | 6.28522* | 6.28522* | 3.03096 | 2.99722 | 15.3056 |
| Heptane | | 21.4450* | 21.4450* | 2.32320 | 2.39171 | 17.8386 |
| Octane | | 19.8028* | 19.8028* | 0.678096 | 0.716471 | 5.51018 |
| n-Nonane | | 5.57286* | 5.57286* | 0.0630111 | 0.0679036 | 0.516149 |
| C10+ | | 5.59553* | 5.59553* | 0.000616736 | 0.000736920 | 0.00484947 |
| Benzene | | 4.68900* | 4.68900* | 1.49307 | 0.998796 | 6.22812 |
| Toluene | | 7.23251* | 7.23251* | 0.700568 | 0.649157 | 4.71618 |
| Ethylbenzene | | 1.99686* | 1.99686* | 0.0622521 | 0.0646849 | 0.478816 |
| m-Xylene | | 2.29331* | 2.29331* | 0.0655045 | 0.0684778 | 0.508750 |
| n-Hexane | | 5.23455* | 5.23455* | 1.80158 | 1.80429 | 10.8762 |
| 2,2,4-Trimethylpentane | | 1.57795* | 1.57795* | 0.183843 | 0.187632 | 1.40812 |
| Water | | 0* | 0* | 0 | 5.77850 | 34.9693 |
| Methylcyclohexane | | 0* | 0* | 0 | 0 | 0 |
| Cyclohexane | | 0* | 0* | 0 | 0 | 0 |
| Cyclopentene | | 0* | 0* | 0 | 0 | 0 |
| TEG | | 0* | 0* | 0 | 0 | 0 |
| Oxygen | | 0* | 0* | 0 | 0 | 0 |
| SO2 | | 0* | 0* | 0 | 0 | 0 |
| **Molar Flow** | | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h |
| Hydrogen Sulfide | | 0.0102165* | 6.47558E-05* | 0.000964971 | 1.94380E-05 | 0 |
| Carbon Dioxide | | 0.00108784* | 6.89510E-06* | 0.000190815 | 1.92631E-07 | 0 |
| Nitrogen | | 0.00556104* | 3.52478E-05* | 0.000182737 | 1.75569E-05 | 0 |
| Methane | | 0.0177623* | 0.000112583* | 0.00183219 | 3.44125E-05 | 0 |
| Ethane | | 0.0403371* | 0.000255670* | 0.00473038 | 4.08658E-05 | 0 |
| Propane | | 0.242936* | 0.00153981* | 0.0118198 | 0.000131394 | 0 |
| i-Butane | | 0.100708* | 0.000638321* | 0.00207888 | 2.52632E-05 | 0 |
| n-Butane | | 0.385191* | 0.00244147* | 0.00556839 | 6.75815E-05 | 0 |
| i-Pentane | | 0.320600* | 0.00203207* | 0.00192785 | 2.43486E-05 | 8.46551E-23 |
| n-Pentane | | 0.467841* | 0.00296534* | 0.00214226 | 2.74238E-05 | 1.69013E-05 |
| C6Alkanes(iso) | | 0.547627* | 0.00347105* | 0.00106352 | 1.38162E-05 | 0.000157820 |
| Heptane | | 1.86849* | 0.0118431* | 0.000815173 | 1.10250E-05 | 0.000183939 |
| Octane | | 1.72540* | 0.0109362* | 0.000237933 | 3.30269E-06 | 5.68169E-05 |
| n-Nonane | | 0.485560* | 0.00307764* | 2.21096E-05 | 3.13013E-07 | 5.32216E-06 |
| C10+ | | 0.487535* | 0.00309016* | 2.16403E-07 | 3.39695E-09 | 5.00042E-08 |
| Benzene | | 0.408549* | 0.00258952* | 0.000523896 | 4.60411E-06 | 6.42199E-05 |
| Toluene | | 0.630164* | 0.00399420* | 0.000245818 | 2.99240E-06 | 4.86298E-05 |
| Ethylbenzene | | 0.173985* | 0.00110278* | 2.18433E-05 | 2.98176E-07 | 4.93720E-06 |
| m-Xylene | | 0.199814* | 0.00126649* | 2.29845E-05 | 3.15659E-07 | 5.24586E-06 |
| n-Hexane | | 0.456083* | 0.00289081* | 0.000632146 | 8.31718E-06 | 0.000112148 |
| 2,2,4-Trimethylpentane | | 0.137486* | 0.000871431* | 6.45077E-05 | 8.64919E-07 | 1.45195E-05 |
| Water | | 0* | 0* | 0 | 2.66370E-05 | 0.000360578 |
| Methylcyclohexane | | 0* | 0* | 0 | 0 | 0 |
| Cyclohexane | | 0* | 0* | 0 | 0 | 0 |
| Cyclopentene | | 0* | 0* | 0 | 0 | 0 |
| TEG | | 0* | 0* | 0 | 0 | 0 |
| Oxygen | | 0* | 0* | 0 | 0 | 0 |
| SO2 | | 0* | 0* | 0 | 0 | 0 |
| **Mass Fraction** | | % | % | % | % | % |
| Hydrogen Sulfide | | 0.0400780* | 0.0400780* | 1.81603 | 2.93405 | 0 |
| Carbon Dioxide | | 0.00551066* | 0.00551066* | 0.463723 | 0.0375471 | 0 |
| Nitrogen | | 0.0179314* | 0.0179314* | 0.282677 | 2.17830 | 0 |
| Methane | | 0.0327990* | 0.0327990* | 1.62308 | 2.44508 | 0 |
| Ethane | | 0.139610* | 0.139610* | 7.85443 | 5.44233 | 0 |
| Propane | | 1.23305* | 1.23305* | 28.7810 | 25.6611 | 0 |
| i-Butane | | 0.673748* | 0.673748* | 6.67221 | 6.50333 | 0 |
| n-Butane | | 2.57698* | 2.57698* | 17.8719 | 17.3970 | 0 |
| i-Pentane | | 2.66246* | 2.66246* | 7.68071 | 7.78052 | 8.87372E-18 |
| n-Pentane | | 3.88525* | 3.88525* | 8.53492 | 8.76317 | 1.77163 |
| C6Alkanes(iso) | | 5.43201* | 5.43201* | 5.06089 | 5.27322 | 19.7592 |
| Heptane | | 21.5506* | 21.5506* | 4.51050 | 4.89282 | 26.7777 |
| Octane | | 22.6859* | 22.6859* | 1.50082 | 1.67089 | 9.42923 |
| n-Nonane | | 7.16818* | 7.16818* | 0.156587 | 0.177804 | 0.991714 |
| C10+ | | 10.6399* | 10.6399* | 0.00226569 | 0.00285255 | 0.0137743 |
| Benzene | | 3.67327* | 3.67327* | 2.25975 | 1.59283 | 7.28803 |
| Toluene | | 6.68323* | 6.68323* | 1.25070 | 1.22114 | 6.50980 |
| Ethylbenzene | | 2.12610* | 2.12610* | 0.128055 | 0.140204 | 0.761528 |
| m-Xylene | | 2.44174* | 2.44174* | 0.134746 | 0.148424 | 0.809137 |
| n-Hexane | | 4.52397* | 4.52397* | 3.00815 | 3.17442 | 14.0410 |
| 2,2,4-Trimethylpentane | | 1.80769* | 1.80769* | 0.406897 | 0.437578 | 2.40963 |
| Water | | 0* | 0* | 0 | 2.12535 | 9.43766 |
| Methylcyclohexane | | 0* | 0* | 0 | 0 | 0 |
| Cyclohexane | | 0* | 0* | 0 | 0 | 0 |
| Cyclopentene | | 0* | 0* | 0 | 0 | 0 |
| TEG | | 0* | 0* | 0 | 0 | 0 |
| Oxygen | | 0* | 0* | 0 | 0 | 0 |
| SO2 | | 0* | 0* | 0 | 0 | 0 |

| Process Streams | | Water Out | Water Standing | Water Tank W&B | Water to Storage | Water to WT | Water Working |
|---|---|---|---|---|---|---|---|
| Composition | Status: | Solved | Solved | Solved | Solved | Solved | Solved |
| Phase: Total | From Block: | Water Tanks PWTK-1, PWTK-2 | Water Tanks PWTK-1, PWTK-2 | WT Mix | WMix | -- | Water Tanks PWTK-1, PWTK-2 |
| | To Block: | -- | WT Mix | -- | Water Tanks PWTK-1, PWTK-2 | WMix | WT Mix |
| **Mole Fraction** | | % | % | % | % | % | % |
| Hydrogen Sulfide | | 0 | 10.9696 | 10.9696 | 0.00483466 | 0.00468979* | 10.9696 |
| Carbon Dioxide | | 0 | 0.0357733 | 0.0357733 | 1.60676E-05 | 0* | 0.0357733 |
| Nitrogen | | 0 | 0.0944222 | 0.0944222 | 8.21377E-05 | 0* | 0.0944222 |
| Methane | | 0 | 0.417223 | 0.417223 | 0.000262352 | 0* | 0.417223 |
| Ethane | | 0 | 1.14648 | 1.14648 | 0.000595788 | 0* | 1.14648 |
| Propane | | 0 | 7.51721 | 7.51721 | 0.00358822 | 0* | 7.51721 |
| i-Butane | | 0 | 3.27209 | 3.27209 | 0.00148748 | 0* | 3.27209 |
| n-Butane | | 0 | 12.6702 | 12.6702 | 0.00568935 | 0* | 12.6702 |
| i-Pentane | | 8.68907E-19 | 10.7159 | 10.7159 | 0.00473532 | 0* | 10.7159 |
| n-Pentane | | 0.000211520 | 15.1964 | 15.1964 | 0.00691011 | 0* | 15.1964 |
| C6Alkanes(iso) | | 0.00477103 | 7.52967 | 7.52967 | 0.00808857 | 0* | 7.52967 |
| Heptane | | 0.0250603 | 5.77924 | 5.77924 | 0.0275980 | 0* | 5.77924 |
| Octane | | 0.0247518 | 1.68593 | 1.68593 | 0.0254845 | 0* | 1.68593 |
| n-Nonane | | 0.00710636 | 0.155533 | 0.155533 | 0.00717182 | 0* | 0.155533 |
| C10+ | | 0.00720355 | 0.00152300 | 0.00152300 | 0.00720100 | 0* | 0.00152300 |
| Benzene | | 0.00493323 | 2.50252 | 2.50252 | 0.00603436 | 0* | 2.50252 |
| Toluene | | 0.00861471 | 1.57999 | 1.57999 | 0.00930765 | 0* | 1.57999 |
| Ethylbenzene | | 0.00250355 | 0.152692 | 0.152692 | 0.00256979 | 0* | 0.152692 |
| m-Xylene | | 0.00288134 | 0.161508 | 0.161508 | 0.00295130 | 0* | 0.161508 |
| n-Hexane | | 0.00476517 | 4.47552 | 4.47552 | 0.00673645 | 0* | 4.47552 |
| 2,2,4-Trimethylpentane | | 0.00183012 | 0.456655 | 0.456655 | 0.00203069 | 0* | 0.456655 |
| Water | | 99.9054 | 13.4839 | 13.4839 | 99.8666 | 99.9953* | 13.4839 |
| Methylcyclohexane | | 0 | 0 | 0 | 0 | 0* | 0 |
| Cyclohexane | | 0 | 0 | 0 | 0 | 0* | 0 |
| Cyclopentene | | 0 | 0 | 0 | 0 | 0* | 0 |
| TEG | | 0 | 0 | 0 | 0 | 0* | 0 |
| Oxygen | | 0 | 0 | 0 | 0 | 0* | 0 |
| SO2 | | 0 | 0 | 0 | 0 | 0* | 0 |
| **Molar Flow** | | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h |
| Hydrogen Sulfide | | 0 | 0.00103318 | 0.00205526 | 0.00207470 | 0.00200994* | 0.00102208 |
| Carbon Dioxide | | 0 | 3.36933E-06 | 6.70247E-06 | 6.89510E-06 | 0* | 3.33314E-06 |
| Nitrogen | | 0 | 8.89321E-06 | 1.76908E-05 | 3.52478E-05 | 0* | 8.79769E-06 |
| Methane | | 0 | 3.92964E-05 | 7.81707E-05 | 0.000112583 | 0* | 3.88743E-05 |
| Ethane | | 0 | 0.000107982 | 0.000214805 | 0.000255670 | 0* | 0.000106822 |
| Propane | | 0 | 0.000708012 | 0.00140842 | 0.00153981 | 0* | 0.000700408 |
| i-Butane | | 0 | 0.000308184 | 0.000613058 | 0.000638321 | 0* | 0.000304874 |
| n-Butane | | 0 | 0.00119335 | 0.00237389 | 0.00244147 | 0* | 0.00118054 |
| i-Pentane | | 3.72707E-19 | 0.00100928 | 0.00200772 | 0.00203207 | 0* | 0.000998441 |
| n-Pentane | | 9.07290E-05 | 0.00143128 | 0.00284718 | 0.00296534 | 0* | 0.00141591 |
| C6Alkanes(iso) | | 0.00204648 | 0.000709187 | 0.00141076 | 0.00347105 | 0* | 0.000701570 |
| Heptane | | 0.0107493 | 0.000544321 | 0.00108280 | 0.0118431 | 0* | 0.000538475 |
| Octane | | 0.0106170 | 0.000158790 | 0.000315874 | 0.0109362 | 0* | 0.000157084 |
| n-Nonane | | 0.00304819 | 1.46489E-05 | 2.91405E-05 | 0.00307764 | 0* | 1.44916E-05 |
| C10+ | | 0.00308988 | 1.43445E-07 | 2.85349E-07 | 0.00309016 | 0* | 1.41904E-07 |
| Benzene | | 0.00211605 | 0.000235701 | 0.000468871 | 0.00258952 | 0* | 0.000233170 |
| Toluene | | 0.00369518 | 0.000148812 | 0.000296027 | 0.00399420 | 0* | 0.000147214 |
| Ethylbenzene | | 0.00107387 | 1.43814E-05 | 2.86083E-05 | 0.00110278 | 0* | 1.42269E-05 |
| m-Xylene | | 0.00123592 | 1.52117E-05 | 3.02600E-05 | 0.00126649 | 0* | 1.50483E-05 |
| n-Hexane | | 0.00204396 | 0.000421529 | 0.000838531 | 0.00289081 | 0* | 0.000417002 |
| 2,2,4-Trimethylpentane | | 0.000785007 | 4.30103E-05 | 8.55587E-05 | 0.000871431 | 0* | 4.25484E-05 |
| Water | | 42.8532 | 0.00126999 | 0.00252635 | 42.8558 | 42.8558* | 0.00125635 |
| Methylcyclohexane | | 0 | 0 | 0 | 0 | 0* | 0 |
| Cyclohexane | | 0 | 0 | 0 | 0 | 0* | 0 |
| Cyclopentene | | 0 | 0 | 0 | 0 | 0* | 0 |
| TEG | | 0 | 0 | 0 | 0 | 0* | 0 |
| Oxygen | | 0 | 0 | 0 | 0 | 0* | 0 |
| SO2 | | 0 | 0 | 0 | 0 | 0* | 0 |
| **Mass Fraction** | | % | % | % | % | % | % |
| Hydrogen Sulfide | | 0 | 6.18675 | 6.18675 | 0.00909265 | 0.00887167* | 6.18675 |
| Carbon Dioxide | | 0 | 0.0260535 | 0.0260535 | 3.90222E-05 | 0* | 0.0260535 |
| Nitrogen | | 0 | 0.0437725 | 0.0437725 | 0.000126976 | 0* | 0.0437725 |
| Methane | | 0 | 0.110764 | 0.110764 | 0.000232257 | 0* | 0.110764 |
| Ethane | | 0 | 0.570491 | 0.570491 | 0.000988610 | 0* | 0.570491 |
| Propane | | 0 | 5.48546 | 5.48546 | 0.00873149 | 0* | 5.48546 |
| i-Butane | | 0 | 3.14723 | 3.14723 | 0.00477096 | 0* | 3.14723 |
| n-Butane | | 0 | 12.1868 | 12.1868 | 0.0182481 | 0* | 12.1868 |
| i-Pentane | | 3.46312E-18 | 12.7943 | 12.7943 | 0.0188535 | 0* | 12.7943 |
| n-Pentane | | 0.000843034 | 18.1439 | 18.1439 | 0.0275123 | 0* | 18.1439 |
| C6Alkanes(iso) | | 0.0227122 | 10.7379 | 10.7379 | 0.0384653 | 0* | 10.7379 |
| Heptane | | 0.138716 | 9.58315 | 9.58315 | 0.152605 | 0* | 9.58315 |
| Octane | | 0.156188 | 3.18694 | 3.18694 | 0.160644 | 0* | 3.18694 |
| n-Nonane | | 0.0503485 | 0.330109 | 0.330109 | 0.0507595 | 0* | 0.330109 |
| C10+ | | 0.0754483 | 0.00477859 | 0.00477859 | 0.0753433 | 0* | 0.00477859 |
| Benzene | | 0.0212869 | 3.23486 | 3.23486 | 0.0260113 | 0* | 3.23486 |
| Toluene | | 0.0438476 | 2.40911 | 2.40911 | 0.0473255 | 0* | 2.40911 |
| Ethylbenzene | | 0.0146826 | 0.268262 | 0.268262 | 0.0150554 | 0* | 0.268262 |
| m-Xylene | | 0.0168982 | 0.283750 | 0.283750 | 0.0172905 | 0* | 0.283750 |
| n-Hexane | | 0.0226844 | 6.38246 | 6.38246 | 0.0320352 | 0* | 6.38246 |
| 2,2,4-Trimethylpentane | | 0.0115483 | 0.863225 | 0.863225 | 0.0128007 | 0* | 0.863225 |
| Water | | 99.4248 | 4.01994 | 4.01994 | 99.2831 | 99.9911* | 4.01994 |
| Methylcyclohexane | | 0 | 0 | 0 | 0 | 0* | 0 |
| Cyclohexane | | 0 | 0 | 0 | 0 | 0* | 0 |
| Cyclopentene | | 0 | 0 | 0 | 0 | 0* | 0 |
| TEG | | 0 | 0 | 0 | 0 | 0* | 0 |
| Oxygen | | 0 | 0 | 0 | 0 | 0* | 0 |
| SO2 | | 0 | 0 | 0 | 0 | 0* | 0 |

| Process Streams | | Condensate Flash | Condensate Loading | Condensate Out | Condensate Standing | Condensate Tank W&B |
|---|---|---|---|---|---|---|
| Composition | Status: | Solved | Solved | Solved | Solved | Solved |
| Phase: Total | From Block: | Condensate Tanks TK-104 through TK-106 | Condensate Tanks TK-104 through TK-106 | Condensate Tanks TK-104 through TK-106 | Condensate Tanks TK-104 through TK-106 | CT Mix |
| | To Block: | -- | -- | -- | CT Mix | -- |
| **Mass Flow** | | lb/h | lb/h | lb/h | lb/h | lb/h |
| Hydrogen Sulfide | | 0.113813 | 0.00711591 | 0.169786 | 0.0317020 | 0.0645890 |
| Carbon Dioxide | | 0.0284376 | 0.000382252 | 0.00294496 | 0.00809508 | 0.0164928 |
| Nitrogen | | 0.145730 | 0 | 0 | 0.00493462 | 0.0100537 |
| Methane | | 0.227224 | 0 | 0 | 0.0283336 | 0.0577265 |
| Ethane | | 0.487356 | 0.0262034 | 0.446192 | 0.137112 | 0.279350 |
| Propane | | 1.83476 | 0.137190 | 7.85405 | 0.502421 | 1.02362 |
| i-Butane | | 0.434907 | 0.0341786 | 5.18115 | 0.116475 | 0.237304 |
| n-Butane | | 1.17482 | 0.0926628 | 20.5777 | 0.311984 | 0.635631 |
| i-Pentane | | 0.515051 | 0.0403457 | 22.3426 | 0.134080 | 0.273172 |
| n-Pentane | | 0.576858 | 0.0448751 | 32.8737 | 0.148992 | 0.303553 |
| C6Alkanes(iso) | | 0.347679 | 0.0266349 | 46.6643 | 0.0883465 | 0.179996 |
| Heptane | | 0.322092 | 0.0235766 | 186.744 | 0.0787385 | 0.160420 |
| Octane | | 0.110042 | 0.00779771 | 196.927 | 0.0261994 | 0.0533781 |
| n-Nonane | | 0.0117943 | 0.00080887 | 62.2581 | 0.00273349 | 0.00556916 |
| C10+ | | 0.000189091 | 1.13959E-05 | 92.4364 | 3.95515E-05 | 8.05815E-05 |
| Benzene | | 0.156877 | 0.0118734 | 31.6753 | 0.0394478 | 0.0803703 |
| Toluene | | 0.0891800 | 0.00653796 | 57.9287 | 0.0218331 | 0.0444825 |
| Ethylbenzene | | 0.00937702 | 0.000665136 | 18.4572 | 0.00223543 | 0.00455442 |
| m-Xylene | | 0.00967477 | 0.000699770 | 21.1986 | 0.00235222 | 0.00479237 |
| n-Hexane | | 0.209263 | 0.0158048 | 38.9869 | 0.0525124 | 0.106988 |
| 2,2,4-Trimethylpentane | | 0.0288471 | 0.00213016 | 15.6615 | 0.00710309 | 0.0144717 |
| Water | | 0 | 0 | 0 | 0 | 0 |
| Methylcyclohexane | | 0 | 0 | 0 | 0 | 0 |
| Cyclohexane | | 0 | 0 | 0 | 0 | 0 |
| Cyclopentene | | 0 | 0 | 0 | 0 | 0 |
| TEG | | 0 | 0 | 0 | 0 | 0 |
| Oxygen | | 0 | 0 | 0 | 0 | 0 |
| SO2 | | 0 | 0 | 0 | 0 | 0 |
| **Property** | **Units** | | | | | |
| Temperature | °F | 92.0795 | 92.0795 | 92.0795 | 92.0795 | 92.0795 |
| Pressure | psia | 12.88 | 12.88 | 12.88 | 12.88 | 12.88 |
| Mole Fraction Vapor | % | 100 | 99.1214 | 0 | 100 | 100 |
| Mole Fraction Light Liquid | % | 0 | 0.878592 | 100 | 0 | 0 |
| Mole Fraction Heavy Liquid | % | 0 | 0 | 0 | 0 | 0 |
| Phase Mole Fraction | % | 100 | 100 | 100 | 100 | 100 |
| Molecular Weight | lb/lbmol | 49.4722 | 55.6227 | 100.917 | 51.6104 | 51.6104 |
| Mass Density | lb/ft^3 | 0.109318 | 0.124570 | 43.9917 | 0.114260 | 0.114260 |
| Molar Flow | lbmol/h | 0.138142 | 0.0086204 | 8.50588 | 0.0338240 | 0.0689125 |
| Mass Flow | lb/h | 6.83417 | 0.479494 | 858.386 | 1.74567 | 3.55660 |
| Vapor Volumetric Flow | ft^3/h | 62.5164 | 3.84918 | 19.5125 | 15.2781 | 31.1273 |
| Liquid Volumetric Flow | gpm | 7.79425 | 0.479898 | 2.43272 | 1.90480 | 3.88080 |
| Std Vapor Volumetric Flow | MMSCFD | 0.00125814 | 7.85120E-05 | 0.0774683 | 0.000308056 | 0.000627628 |
| Std Liquid Volumetric Flow | sgpm | 0.0248825 | 0.00168811 | 2.3975 | 0.00633762 | 0.0129121 |
| Compressibility | | 0.984418 | 0.971286 | 0.0049003 | 0.982548 | 0.982548 |
| Specific Gravity | | 1.70815 | | 0.705348 | 1.78197 | 1.78197 |
| API Gravity | | | | 64.7202 | | |
| Enthalpy | Btu/h | -6280.96 | -426.805 | -672381 | -1613.32 | -3286.95 |
| Mass Enthalpy | Btu/lb | -919.053 | -890.116 | -783.309 | -924.184 | -924.184 |
| Mass Cp | Btu/(lb*°F) | 0.403340 | 0.405117 | 0.505984 | 0.404257 | 0.404257 |
| Ideal Gas CpCv Ratio | | 1.11132 | 1.09793 | 1.05443 | 1.10600 | 1.10600 |
| Dynamic Viscosity | cP | 0.00855095 | | 0.391919 | 0.00827961 | 0.00827961 |
| Kinematic Viscosity | cSt | 4.88317 | | 0.556167 | 4.52372 | 4.52372 |
| Thermal Conductivity | Btu/(h*ft*°F) | 0.0109139 | | 0.0693652 | 0.0104154 | 0.0104154 |
| Surface Tension | lbf/ft | | | 0.00145435 | | |
| Net Ideal Gas Heating Value | Btu/ft^3 | 2471.84 | 2841.78 | 5051.74 | 2621.77 | 2621.77 |
| Net Liquid Heating Value | Btu/lb | 18808.7 | 19226.9 | 18835.1 | 19119.9 | 19119.9 |
| Gross Ideal Gas Heating Value | Btu/ft^3 | 2679.20 | 3076.55 | 5422.77 | 2840.84 | 2840.84 |
| Gross Liquid Heating Value | Btu/lb | 20399.6 | 20828.9 | 20230.4 | 20731.0 | 20731.0 |

| Process Streams | | Condensate to CT | Condensate to WT | Condensate Working | Water Flash | Water Loading |
|---|---|---|---|---|---|---|
| Composition | Status: | Solved | Solved | Solved | Solved | Solved |
| Phase: Total | From Block: | -- | -- | Condensate Tanks TK-104 through TK-106 | Water Tanks PWTK-1, PWTK-2 | Water Tanks PWTK-1, PWTK-2 |
| | To Block: | Condensate Tanks TK-104 through TK-106 | WMix | CT Mix | -- | -- |
| Mass Flow | | lb/h | lb/h | lb/h | lb/h | lb/h |
| Hydrogen Sulfide | | 0.348188* | 0.00220693* | 0.0328871 | 0.000662465 | 0 |
| Carbon Dioxide | | 0.0478753* | 0.000303450* | 0.00839769 | 8.47757E-06 | 0 |
| Nitrogen | | 0.155784* | 0.000987410* | 0.00511908 | 0.000491828 | 0 |
| Methane | | 0.284950* | 0.00180611* | 0.0293928 | 0.000552061 | 0 |
| Ethane | | 1.21290* | 0.00768776* | 0.142238 | 0.00122880 | 0 |
| Propane | | 10.7124* | 0.0678991* | 0.521203 | 0.00579389 | 0 |
| i-Butane | | 5.85336* | 0.0371006* | 0.120829 | 0.00146835 | 0 |
| n-Butane | | 22.3882* | 0.141904* | 0.323647 | 0.00392798 | 0 |
| i-Pentane | | 23.1309* | 0.146611* | 0.139092 | 0.00175672 | 6.10776E-21 |
| n-Pentane | | 33.7541* | 0.213945* | 0.154561 | 0.00197859 | 0.00121941 |
| C6Alkanes(iso) | | 47.1920* | 0.299119* | 0.0916490 | 0.00119061 | 0.0136002 |
| Heptane | | 187.226* | 1.18671* | 0.0816819 | 0.00110473 | 0.0184310 |
| Octane | | 197.090* | 1.24922* | 0.0271788 | 0.000377261 | 0.00649011 |
| n-Nonane | | 62.2755* | 0.394723* | 0.00283567 | 4.01455E-05 | 0.000682594 |
| C10+ | | 92.4367* | 0.585895* | 4.10300E-05 | 6.44063E-07 | 9.48080E-06 |
| Benzene | | 31.9125* | 0.202273* | 0.0409225 | 0.000359636 | 0.00501633 |
| Toluene | | 58.0623* | 0.368019* | 0.0226493 | 0.000275715 | 0.00448068 |
| Ethylbenzene | | 18.4711* | 0.117076* | 0.00231899 | 3.16558E-05 | 0.000524158 |
| m-Xylene | | 21.2133* | 0.134457* | 0.00244015 | 3.35120E-05 | 0.000556927 |
| n-Hexane | | 39.3032* | 0.249117* | 0.0544754 | 0.000716736 | 0.00966437 |
| 2,2,4-Trimethylpentane | | 15.7048* | 0.0995422* | 0.00736862 | 9.87984E-05 | 0.00165854 |
| Water | | 0* | 0* | 0 | 0.000479872 | 0.00649592 |
| Methylcyclohexane | | 0* | 0* | 0 | 0 | 0 |
| Cyclohexane | | 0* | 0* | 0 | 0 | 0 |
| Cyclopentene | | 0* | 0* | 0 | 0 | 0 |
| TEG | | 0* | 0* | 0 | 0 | 0 |
| Oxygen | | 0* | 0* | 0 | 0 | 0 |
| SO2 | | 0* | 0* | 0 | 0 | 0 |
| **Property** | **Units** | | | | | |
| Temperature | °F | 60* | 60* | 92.0795 | 92.0795 | 92.0795 |
| Pressure | psia | 17.88* | 17.88* | 12.88 | 12.88 | 12.88 |
| Mole Fraction Vapor | % | 0.102053 | 0.102053 | 100 | 100 | 0 |
| Mole Fraction Light Liquid | % | 99.8979 | 99.8979 | 0 | 0 | 65.0920 |
| Mole Fraction Heavy Liquid | % | 0 | 0 | 0 | 0 | 34.9080 |
| Phase Mole Fraction | % | 100 | 100 | 100 | 100 | 100 |
| Molecular Weight | lb/lbmol | 99.7111 | 99.7111 | 51.6104 | 48.9808 | 66.7519 |
| Mass Density | lb/ft^3 | 39.3060 | 39.3060 | 0.114260 | 0.108200 | 44.4091 |
| Molar Flow | lbmol/h | 8.71294 | 0.0552256 | 0.0350884 | 0.000460966 | 0.00103113 |
| Mass Flow | lb/h | 868.777 | 5.50660 | 1.81093 | 0.0225785 | 0.0688297 |
| Vapor Volumetric Flow | ft^3/h | 22.1029 | 0.140096 | 15.8492 | 0.208673 | 0.00154990 |
| Liquid Volumetric Flow | gpm | 2.75568 | 0.0174665 | 1.97600 | 0.0260164 | 0.000193235 |
| Std Vapor Volumetric Flow | MMSCFD | 0.0793541 | 0.000502973 | 0.000319572 | 4.19831E-06 | 9.39111E-06 |
| Std Liquid Volumetric Flow | sgpm | 2.43529* | 0.0154357* | 0.00657453 | 7.98331E-05 | 0.000189676 |
| Compressibility | | 0.00813318 | 0.00813318 | 0.982548 | 0.984707 | 0.00326966 |
| Specific Gravity | | | | 1.78197 | 1.69118 | 0.712040 |
| API Gravity | | | | | | 62.9321 |
| Enthalpy | Btu/h | -697321 | -4419.86 | -1673.63 | -22.5083 | -92.9022 |
| Mass Enthalpy | Btu/lb | -802.647 | -802.647 | -924.184 | -996.892 | -1349.74 |
| Mass Cp | Btu/(lb*°F) | 0.486944 | 0.486944 | 0.404257 | 0.402379 | 0.553554 |
| Ideal Gas CpCv Ratio | | 1.05810 | 1.05810 | 1.10600 | 1.11286 | 1.08322 |
| Dynamic Viscosity | cP | | | 0.00827961 | 0.00866079 | 0.353601 |
| Kinematic Viscosity | cSt | | | 4.52372 | 4.99698 | 0.497074 |
| Thermal Conductivity | Btu/(h*ft*°F) | | | 0.0104154 | 0.0106525 | 0.0880216 |
| Surface Tension | lbf/ft | | | | | 0.00181842 |
| Net Ideal Gas Heating Value | Btu/ft^3 | 4991.61 | 4991.61 | 2621.77 | 2377.95 | 3030.39 |
| Net Liquid Heating Value | Btu/lb | 18836.1 | 18836.1 | 19119.9 | 18250.3 | 16980.7 |
| Gross Ideal Gas Heating Value | Btu/ft^3 | 5358.85 | 5358.85 | 2840.84 | 2579.83 | 3272.23 |
| Gross Liquid Heating Value | Btu/lb | 20233.8 | 20233.8 | 20731.0 | 19814.7 | 18355.6 |

| Process Streams | | Water Out | Water Standing | Water Tank W&B | Water to Storage | Water to WT | Water Working |
|---|---|---|---|---|---|---|---|
| Composition | Status: | Solved | Solved | Solved | Solved | Solved | Solved |
| Phase: Total | From Block: | Water Tanks PWTK-1, PWTK-2 | Water Tanks PWTK-1, PWTK-2 | WT Mix | WMix | -- | Water Tanks PWTK-1, PWTK-2 |
| | To Block: | -- | WT Mix | -- | Water Tanks PWTK-1, PWTK-2 | WMix | WT Mix |
| Mass Flow | | lb/h | lb/h | lb/h | lb/h | lb/h | lb/h |
| Hydrogen Sulfide | | 0 | 0.0352116 | 0.0700451 | 0.0707075 | 0.0685006* | 0.0348334 |
| Carbon Dioxide | | 0 | 0.000148283 | 0.000294972 | 0.000303450 | 0* | 0.000146690 |
| Nitrogen | | 0 | 0.000249129 | 0.000495582 | 0.000987410 | 0* | 0.000246453 |
| Methane | | 0 | 0.000630411 | 0.00125405 | 0.00180611 | 0* | 0.000623640 |
| Ethane | | 0 | 0.00324692 | 0.00645897 | 0.00768776 | 0* | 0.00321205 |
| Propane | | 0 | 0.0312202 | 0.0621052 | 0.0678991 | 0* | 0.0308849 |
| i-Butane | | 0 | 0.0179123 | 0.0356323 | 0.0371006 | 0* | 0.0177199 |
| n-Butane | | 0 | 0.0693604 | 0.137976 | 0.141904 | 0* | 0.0686154 |
| i-Pentane | | 2.68904E-17 | 0.0728183 | 0.144855 | 0.146611 | 0* | 0.0720363 |
| n-Pentane | | 0.00654599 | 0.103265 | 0.205421 | 0.213945 | 0* | 0.102156 |
| C6Alkanes(iso) | | 0.176356 | 0.0611144 | 0.121572 | 0.299119 | 0* | 0.0604580 |
| Heptane | | 1.07710 | 0.0545421 | 0.108498 | 1.18671 | 0* | 0.0539563 |
| Octane | | 1.21277 | 0.0181383 | 0.0360818 | 1.24922 | 0* | 0.0179435 |
| n-Nonane | | 0.390946 | 0.00187880 | 0.00373742 | 0.394723 | 0* | 0.00185862 |
| C10+ | | 0.585840 | 2.71971E-05 | 5.41022E-05 | 0.585895 | 0* | 2.69050E-05 |
| Benzene | | 0.165289 | 0.0184110 | 0.0366244 | 0.202273 | 0* | 0.0182133 |
| Toluene | | 0.340468 | 0.0137113 | 0.0272754 | 0.368019 | 0* | 0.0135641 |
| Ethylbenzene | | 0.114007 | 0.00152680 | 0.00303720 | 0.117076 | 0* | 0.00151040 |
| m-Xylene | | 0.131211 | 0.00161495 | 0.00321256 | 0.134457 | 0* | 0.00159761 |
| n-Hexane | | 0.176139 | 0.0363254 | 0.0722608 | 0.249117 | 0* | 0.0359353 |
| 2,2,4-Trimethylpentane | | 0.0896702 | 0.00491301 | 0.00977325 | 0.0995422 | 0* | 0.00486024 |
| Water | | 772.013 | 0.0228793 | 0.0455128 | 772.059 | 772.059* | 0.0226335 |
| Methylcyclohexane | | 0 | 0 | 0 | 0 | 0* | 0 |
| Cyclohexane | | 0 | 0 | 0 | 0 | 0* | 0 |
| Cyclopentene | | 0 | 0 | 0 | 0 | 0* | 0 |
| TEG | | 0 | 0 | 0 | 0 | 0* | 0 |
| Oxygen | | 0 | 0 | 0 | 0 | 0* | 0 |
| SO2 | | 0 | 0 | 0 | 0 | 0* | 0 |
| **Property** | **Units** | | | | | | |
| Temperature | °F | 92.0795 | 92.0795 | 92.0795 | 59.9974 | 60* | 92.0795 |
| Pressure | psia | 12.88 | 12.88 | 12.88 | 17.88 | 17.88* | 12.88 |
| Mole Fraction Vapor | % | 0 | 70.3017 | 70.3017 | 0 | 0 | 70.3017 |
| Mole Fraction Light Liquid | % | 0.0913474 | 20.2796 | 20.2796 | 0.124340 | 100 | 20.2796 |
| Mole Fraction Heavy Liquid | % | 99.9087 | 9.41870 | 9.41870 | 99.8757 | 0 | 9.41870 |
| Phase Mole Fraction | % | 100 | 100 | 100 | 100 | 100 | 100 |
| Molecular Weight | lb/lbmol | 18.1024 | 60.4281 | 60.4281 | 18.1212 | 18.0160 | 60.4281 |
| Mass Density | lb/ft^3 | 61.9158 | 0.190872 | 0.190872 | 62.2001 | 62.3694 | 0.190872 |
| Molar Flow | lbmol/h | 42.8938 | 0.00941856 | 0.0187360 | 42.9130 | 42.8578 | 0.00931740 |
| Mass Flow | lb/h | 776.479 | 0.569145 | 1.13218 | 777.634 | 772.127 | 0.563033 |
| Vapor Volumetric Flow | ft^3/h | 12.5409 | 2.98181 | 5.93160 | 12.5021 | 12.3799 | 2.94979 |
| Liquid Volumetric Flow | gpm | 1.56354 | 0.371758 | 0.739524 | 1.55871 | 1.54347 | 0.367766 |
| Std Vapor Volumetric Flow | MMSCFD | 0.390661 | 8.57806E-05 | 0.000170640 | 0.390835 | 0.390332 | 8.48593E-05 |
| Std Liquid Volumetric Flow | sgpm | 1.55546 | 0.00174469 | 0.00347065 | 1.55901 | 1.54357* | 0.00172596 |
| Compressibility | | 0.000635980 | 0.688662 | 0.688662 | 0.000934058 | 0.000926113 | 0.688662 |
| Specific Gravity | | 0.992738 | | | 0.997295 | 1.00001 | |
| API Gravity | | 10.2827 | | | 10.3838 | 9.99844 | |
| Enthalpy | Btu/h | -5.25804E+06 | -592.746 | -1179.12 | -5.28369E+06 | -5.27927E+06 | -586.379 |
| Mass Enthalpy | Btu/lb | -6771.65 | -1041.47 | -1041.47 | -6794.58 | -6837.31 | -1041.47 |
| Mass Cp | Btu/(lb*°F) | 0.974562 | 0.445538 | 0.445538 | 0.976371 | 0.979792 | 0.445538 |
| Ideal Gas CpCv Ratio | | 1.32675 | 1.09224 | 1.09224 | 1.32759 | 1.32956 | 1.09224 |
| Dynamic Viscosity | cP | 0.762280 | | | 1.12793 | 1.13445 | |
| Kinematic Viscosity | cSt | 0.768585 | | | 1.13206 | 1.13551 | |
| Thermal Conductivity | Btu/(h*ft*°F) | 0.354563 | | | 0.339575 | 0.342269 | |
| Surface Tension | lbf/ft | 0.00484214 | | | 0.005072717 | 0.00510696 | |
| Net Ideal Gas Heating Value | Btu/ft^3 | 5.19247 | 2830.02 | 2830.02 | 6.45129 | 0.0275192 | 2830.02 |
| Net Liquid Heating Value | Btu/lb | -945.739 | 17573.2 | 17573.2 | -918.220 | -1059.10 | 17573.2 |
| Gross Ideal Gas Heating Value | Btu/ft^3 | 55.8297 | 3061.62 | 3061.62 | 57.1691 | 50.3375 | 3061.62 |
| Gross Liquid Heating Value | Btu/lb | 115.781 | 19028.0 | 19028.0 | 143.887 | 0.611471 | 19028.0 |

# Tank Losses Report
## Condensate Tanks TK-104 through TK-106

| | | | |
|---|---|---|---|
| **Client Name:** | Kinetik | **Job:** | BKU CS |
| **Location:** | Eddy County, NM | **Modified:** | 3/25/2026 16:02 |
| **Flowsheet:** | Compressor Station | **Status:** | Solved 4:03 PM, 3/25/2026 |

### Stream Connections

| Stream | Connection Type | Other Block | Stream | Connection Type | Other Block |
|---|---|---|---|---|---|
| Condensate to CT | Inlet | | Condensate Flash | Flashing Losses Stream | |
| Condensate Working | Working Losses Stream | CT Mix | Condensate Standing | Standing Losses Stream | CT Mix |
| Condensate Loading | Loading Losses Stream | | Condensate Out | Residual Liquid Stream | |

### Working and Standing Properties : Scalar Data

| | | | | | |
|---|---|---|---|---|---|
| Tank Geometry | Vertical Cylinder | | Roof Type | Cone | |
| Shell Length | 15* | ft | Slope of Coned Roof | 0.0625 | |
| Shell Diameter | 12* | ft | Breather Vent Pressure | 0.03 | psi |
| Number of Storage Tanks | 3* | | Breather Vacuum Pressure | -0.03 | psi |
| Maximum Fraction Fill of Tank | 90 | % | Location | Roswell, NM* | |
| Average Fraction Fill of Tank | 50 | % | Time Frame | July* | |
| Minimum Fraction Fill of Tank | 10 | % | Known Liquid Bulk Temperature? | FALSE | |
| Material Category | Light Organics* | | Liquid Bulk Temperature | 82.9265 | °F |
| Insulation | Uninsulated | | Use AP 42 Raoult's Vapor Pressure? | FALSE | |
| Bolted or Riveted Construction? | FALSE | | Flashing Temperature | 92.0795 | °F |
| Vapor Balanced Tank? | FALSE | | Average Daily Maximum Ambient Temperature | 93.9 | °F |
| Known Sum of Increases in Liquid Level? | FALSE | | Average Daily Minimum Ambient Temperature | 68.5 | °F |
| Sum of Increases in Liquid Level | 503.590 | ft/yr | Atmospheric Pressure at Tank Location | 12.88 | psia |
| Shell Color | White | | Daily Solar Insolation | 2302 | Btu/(day*ft^2) |
| Shell Paint Condition | Average | | Average Wind Speed | 8.5 | mph |
| Roof Color | White | | Include Short Term Emissions | TRUE | |
| Roof Paint Condition | Average | | | | |

### Composition Subset Properties : Scalar Data

| | | | |
|---|---|---|---|
| Component Subset | All Selected* | Species in Results | Selected Species |
| Atomic Basis | FALSE | Fraction Denominator | Selected Species |

### Composition Subset Properties : Tabulated Data

| Index | Selected Components |
|---|---|
| Hydrogen Sulfide | TRUE |
| Carbon Dioxide | TRUE |
| Nitrogen | TRUE |
| Methane | TRUE |
| Ethane | TRUE |
| Propane | TRUE |
| i-Butane | TRUE |
| n-Butane | TRUE |
| i-Pentane | TRUE |
| n-Pentane | TRUE |
| C6Alkanes(iso) | TRUE |
| Heptane | TRUE |
| Octane | TRUE |
| n-Nonane | TRUE |
| C10+ | TRUE |
| Benzene | TRUE |
| Toluene | TRUE |
| Ethylbenzene | TRUE |
| m-Xylene | TRUE |
| n-Hexane | TRUE |
| 2,2,4-Trimethylpentane | TRUE |
| Water | TRUE |
| Methylcyclohexane | TRUE |
| Cyclohexane | TRUE |
| Cyclopentene | TRUE |
| TEG | TRUE |
| Oxygen | TRUE |
| SO2 | TRUE |

### Details Properties : Scalar Data

| | | | | | |
|---|---|---|---|---|---|
| Vapor Space Volume | 862.367 | ft^3 | Roof Outage | 0.125 | ft |
| Vapor Density | 0.0969542 | lb/ft^3 | Tank Roof Height | 0.375 | ft |
| Vapor Space Expansion Factor | 1 | 1/day | Tank Shell Radius | 6 | ft |
| Vented Vapor Saturation Factor | 0.174424 | | Vapor Molecular Weight | 48.4853 | lb/lbmol |
| Vapor Space Outage | 7.625 | ft | Average Vapor Temperature | 545.777 | °R |
| Average Daily Vapor Temperature Range | 30.2505 | °R | Average Daily Ambient Temperature | 540.87 | °R |
| Average Daily Vapor Pressure Range | 2.24134 | psi | Net Working Loss Throughput | 56954.7 | ft^3/yr |
| Breather Vent Pressure Setting Range | 0.06 | psi | Working Loss Turnover (Saturation) Factor | 1 | |
| Vapor Pressure at Average Daily Liquid Surface Temperature | 11.7121 | psia | Number of Turnovers per Year | 41.9659 | |
| Average Daily Liquid Surface Temperature | 544.187 | °R | Annual Net Throughput | 30435.4 | bbl/yr |
| Average Daily Ambient Temperature Range | 25.4 | °R | Maximum Liquid Height | 13.5 | ft |
| Tank Roof Surface Solar Absorptance | 0.25 | | Minimum Liquid Height | 1.5 | ft |
| Tank Shell Surface Solar Absorptance | 0.25 | | Working Loss Product Factor | 1 | |
| Vapor Pressure at Maximum Liquid Surface Temperature | 12.8800 | psia | Vent Setting Correction Factor | 1 | |
| Vapor Pressure at Minimum Liquid Surface Temperature | 10.6387 | psia | Saturation Factor | 1 | |
| Maximum Liquid Surface Temperature | 551.749 | °R | Vapor Pressure of Liquid Loaded | 8.28413 | psia |
| Minimum Liquid Surface Temperature | 536.624 | °R | Collection Efficiency | 70 | % |
| Liquid Height | 7.5 | ft | Annual Net Throughput Per Tank | 10145.1 | bbl/yr |

**Notes:**

| Process Streams | | Blowdown | Compression/Recycle | Dry Basis Gas | Dry Gas | Dry Gas Stripping Gas | Feed Saturant (Methanol) | Flash Gas | Flash Gas Stripping Gas |
|---|---|---|---|---|---|---|---|---|---|
| Composition | Status: | Solved | Solved | Solved | Solved | Solved | Solved | Solved | Solved |
| Phase: Total | From Block: | Glycol Makeup | SPLT-100 | -- | SPLT-103 | SPLT-103 | -- | Rich Flash | SPLT-100 |
| | To Block: | -- | Compressor | Feed Fraction MeOH Saturator | -- | SPLT-109 | Feed Fraction MeOH Saturator | SPLT-100 | SPLT-107 |
| **Mole Fraction** | | % | % | % | % | % | % | % | % |
| Hydrogen Sulfide | | 1.52421E-06 | 6.37593 | 1* | 0.986743 | 0.986743 | 0* | 6.37593 | 6.37593 |
| Carbon Dioxide | | 2.99976E-09 | 3.55307 | 0.943* | 0.941949 | 0.941949 | 0* | 3.55307 | 3.55307 |
| Nitrogen | | 0 | 0.357381 | 1.791* | 1.79200 | 1.79200 | 0* | 0.357381 | 0.357381 |
| Methane | | 1.54719E-11 | 47.4233 | 72.807* | 72.8450 | 72.8450 | 0* | 47.4233 | 47.4233 |
| Ethane | | 6.21699E-10 | 19.5354 | 12.792* | 12.7954 | 12.7954 | 0* | 19.5354 | 19.5354 |
| Propane | | 5.18155E-09 | 12.7430 | 6.385* | 6.38370 | 6.38370 | 0* | 12.7430 | 12.7430 |
| i-Butane | | 2.34693E-09 | 1.54698 | 0.778* | 0.777550 | 0.777550 | 0* | 1.54698 | 1.54698 |
| n-Butane | | 2.61367E-08 | 4.47313 | 1.867* | 1.86441 | 1.86441 | 0* | 4.47313 | 4.47313 |
| i-Pentane | | 3.66612E-08 | 0.995610 | 0.447* | 0.445888 | 0.445888 | 0* | 0.995610 | 0.995610 |
| n-Pentane | | 7.36388E-08 | 1.06141 | 0.442* | 0.440498 | 0.440498 | 0* | 1.06141 | 1.06141 |
| Cyclopentane | | 0 | 0 | 0* | 0 | 0 | 0* | 0 | 0 |
| C6Alkanes(iso) | | 7.77206E-07 | 0.760968 | 0.3256* | 0.323207 | 0.323207 | 0* | 0.760968 | 0.760968 |
| Cyclohexane | | 1.57868E-05 | 0.227736 | 0.0871* | 0.0849993 | 0.0849993 | 0* | 0.227736 | 0.227736 |
| n-Heptane | | 1.23826E-06 | 0.193677 | 0.1055* | 0.104183 | 0.104183 | 0* | 0.193677 | 0.193677 |
| Methylcyclohexane | | 1.70070E-05 | 0.128491 | 0.0613* | 0.0596941 | 0.0596941 | 0* | 0.128491 | 0.128491 |
| Octane | | 1.68889E-06 | 0.0434503 | 0.0301* | 0.0295016 | 0.0295016 | 0* | 0.0434503 | 0.0434503 |
| Nonane | | 2.11751E-06 | 0.00761514 | 0.0071* | 0.00687008 | 0.00687008 | 0* | 0.00761514 | 0.00761514 |
| Decanes+ | | 0.00854508 | 0.000918682 | 0.0033* | 0.00225923 | 0.00225923 | 0* | 0.000918682 | 0.000918682 |
| Benzene | | 0.00246504 | 0.248373 | 0.0853* | 0.0725309 | 0.0725309 | 0* | 0.248373 | 0.248373 |
| Toluene | | 0.00705493 | 0.0819471 | 0.0371* | 0.0287342 | 0.0287342 | 0* | 0.0819471 | 0.0819471 |
| Ethylbenzene | | 0.000360617 | 0.000676279 | 0.0004* | 0.000279304 | 0.000279304 | 0* | 0.000676279 | 0.000676279 |
| o-Xylene | | 0.00658192 | 0.00428590 | 0.0029* | 0.00183882 | 0.00183882 | 0* | 0.00428590 | 0.00428590 |
| n-Hexane | | 1.50357E-08 | 0.00520896 | 0.0023* | 0.00228390 | 0.00228390 | 0* | 0.00520896 | 0.00520896 |
| 2,2,4-Trimethylpentane | | 0 | 0 | 0* | 0 | 0 | 0* | 0 | 0 |
| Triethylene Glycol | | 93.1918 | 7.74993E-05 | 0* | 0.000161393 | 0.000161393 | 0* | 7.74993E-05 | 7.74993E-05 |
| Ethylene Glycol | | 0 | 0 | 0* | 0 | 0 | 0* | 0 | 0 |
| Water | | 6.78311 | 0.231328 | 0* | 0.0102612 | 0.0102612 | 0* | 0.231328 | 0.231328 |
| Methanol | | 0 | 0 | 0* | 0 | 0 | 100* | 0 | 0 |
| O2 | | 0 | 0 | 0* | 0 | 0 | 0* | 0 | 0 |
| SO2 | | 0 | 0 | 0* | 0 | 0 | 0* | 0 | 0 |
| **Molar Flow** | | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h |
| Hydrogen Sulfide | | 3.73386E-11 | 0.201527 | 43.8274* | 43.2218 | 0 | 0 | 0.201527 | 0 |
| Carbon Dioxide | | 7.34850E-14 | 0.112304 | 41.3292* | 41.2597 | 0 | 0 | 0.112304 | 0 |
| Nitrogen | | 0 | 0.0112959 | 78.4949* | 78.4941 | 0 | 0 | 0.0112959 | 0 |
| Methane | | 3.79016E-16 | 1.49893 | 3190.94* | 3190.79 | 0 | 0 | 1.49893 | 0 |
| Ethane | | 1.52297E-14 | 0.617467 | 560.640* | 560.472 | 0 | 0 | 0.617467 | 0 |
| Propane | | 1.26932E-13 | 0.402776 | 279.838* | 279.622 | 0 | 0 | 0.402776 | 0 |
| i-Butane | | 5.74927E-14 | 0.0488961 | 34.0977* | 34.0586 | 0 | 0 | 0.0488961 | 0 |
| n-Butane | | 6.40271E-13 | 0.141385 | 81.8258* | 81.6658 | 0 | 0 | 0.141385 | 0 |
| i-Pentane | | 8.98090E-13 | 0.0314688 | 19.5909* | 19.5310 | 0 | 0 | 0.0314688 | 0 |
| n-Pentane | | 1.80393E-12 | 0.0335487 | 19.3717* | 19.2949 | 0 | 0 | 0.0335487 | 0 |
| Cyclopentane | | 0 | 0 | 0* | 0 | 0 | 0 | 0 | 0 |
| C6Alkanes(iso) | | 1.90392E-11 | 0.0240523 | 14.2702* | 14.1573 | 0 | 0 | 0.0240523 | 0 |
| Cyclohexane | | 3.86728E-10 | 0.00719818 | 3.81737* | 3.72318 | 0 | 0 | 0.00719818 | 0 |
| n-Heptane | | 3.03337E-11 | 0.00612165 | 4.62379* | 4.56348 | 0 | 0 | 0.00612165 | 0 |
| Methylcyclohexane | | 4.16620E-10 | 0.00406128 | 2.68662* | 2.61475 | 0 | 0 | 0.00406128 | 0 |
| Octane | | 4.13726E-11 | 0.00137336 | 1.31920* | 1.29224 | 0 | 0 | 0.00137336 | 0 |
| Nonane | | 5.18727E-11 | 0.000240696 | 0.311175* | 0.300927 | 0 | 0 | 0.000240696 | 0 |
| Decanes+ | | 2.09329E-07 | 2.90373E-05 | 0.144630* | 0.0989599 | 0 | 0 | 2.90373E-05 | 0 |
| Benzene | | 6.03861E-08 | 0.00785047 | 3.73848* | 3.17704 | 0 | 0 | 0.00785047 | 0 |
| Toluene | | 1.72824E-07 | 0.00259015 | 1.62600* | 1.25863 | 0 | 0 | 0.00259015 | 0 |
| Ethylbenzene | | 8.83404E-09 | 2.13755E-05 | 0.0175310* | 0.0122342 | 0 | 0 | 2.13755E-05 | 0 |
| o-Xylene | | 1.61237E-07 | 0.000135467 | 0.127099* | 0.0805451 | 0 | 0 | 0.000135467 | 0 |
| n-Hexane | | 3.68330E-13 | 0.000164643 | 0.100803* | 0.100040 | 0 | 0 | 0.000164643 | 0 |
| 2,2,4-Trimethylpentane | | 0 | 0 | 0* | 0 | 0 | 0 | 0 | 0 |
| Triethylene Glycol | | 0.00228292 | 2.44956E-06 | 0* | 0.00706941 | 0 | 0 | 2.44956E-06 | 0 |
| Ethylene Glycol | | 0 | 0 | 0* | 0 | 0 | 0 | 0 | 0 |
| Water | | 0.000166166 | 0.00731172 | 0* | 0.449466 | 0 | 0 | 0.00731172 | 0 |
| Methanol | | 0 | 0 | 0* | 0 | 0 | 0 | 0 | 0 |
| O2 | | 0 | 0 | 0* | 0 | 0 | 0 | 0 | 0 |
| SO2 | | 0 | 0 | 0* | 0 | 0 | 0 | 0 | 0 |
| **Mass Fraction** | | % | % | % | % | % | % | % | % |
| Hydrogen Sulfide | | 3.67885E-07 | 7.37329 | 1.51780* | 1.49957 | 1.49957 | 0* | 7.37329 | 7.37329 |
| Carbon Dioxide | | 9.34951E-10 | 5.30588 | 1.84826* | 1.84853 | 1.84853 | 0* | 5.30588 | 5.30588 |
| Nitrogen | | 0 | 0.339707 | 2.23443* | 2.23850 | 2.23850 | 0* | 0.339707 | 0.339707 |
| Methane | | 1.75781E-12 | 25.8149 | 52.0174* | 52.1103 | 52.1103 | 0* | 25.8149 | 25.8149 |
| Ethane | | 1.32390E-10 | 19.9319 | 17.1302* | 17.1565 | 17.1565 | 0* | 19.9319 | 19.9319 |
| Propane | | 1.61812E-09 | 19.0667 | 12.5389* | 12.5522 | 12.5522 | 0* | 19.0667 | 19.0667 |
| i-Butane | | 9.66047E-10 | 3.05094 | 2.01385* | 2.01522 | 2.01522 | 0* | 3.05094 | 3.05094 |
| n-Butane | | 1.07584E-08 | 8.82188 | 4.83271* | 4.83211 | 4.83211 | 0* | 8.82188 | 8.82188 |
| i-Pentane | | 1.87323E-08 | 2.43739 | 1.43629* | 1.43452 | 1.43452 | 0* | 2.43739 | 2.43739 |
| n-Pentane | | 3.76263E-08 | 2.59849 | 1.42022* | 1.41718 | 1.41718 | 0* | 2.59849 | 2.59849 |
| Cyclopentane | | 0 | 0 | 0* | 0 | 0 | 0* | 0 | 0 |
| C6Alkanes(iso) | | 4.74324E-07 | 2.22514 | 1.24960* | 1.24199 | 1.24199 | 0* | 2.22514 | 2.22514 |
| Cyclohexane | | 9.40920E-06 | 0.650343 | 0.326457* | 0.318986 | 0.318986 | 0* | 0.650343 | 0.650343 |
| n-Heptane | | 8.78707E-07 | 0.658508 | 0.470797* | 0.465507 | 0.465507 | 0* | 0.658508 | 0.658508 |
| Methylcyclohexane | | 1.18259E-05 | 0.428084 | 0.268050* | 0.261357 | 0.261357 | 0* | 0.428084 | 0.428084 |
| Octane | | 1.36625E-06 | 0.168413 | 0.153125* | 0.150270 | 0.150270 | 0* | 0.168413 | 0.168413 |
| Nonane | | 1.92334E-06 | 0.0331405 | 0.0405544* | 0.0392907 | 0.0392907 | 0* | 0.0331405 | 0.0331405 |
| Decanes+ | | 0.0114741 | 0.00591043 | 0.0278654* | 0.0191012 | 0.0191012 | 0* | 0.00591043 | 0.00591043 |
| Benzene | | 0.00136363 | 0.658308 | 0.296736* | 0.252635 | 0.252635 | 0* | 0.658308 | 0.658308 |
| Toluene | | 0.00460351 | 0.256201 | 0.152237* | 0.118057 | 0.118057 | 0* | 0.256201 | 0.256201 |
| Ethylbenzene | | 0.000271134 | 0.00243621 | 0.00189124* | 0.00132224 | 0.00132224 | 0* | 0.00243621 | 0.00243621 |
| o-Xylene | | 0.00494869 | 0.0154394 | 0.0137115* | 0.00870512 | 0.00870512 | 0* | 0.0154394 | 0.0154394 |
| n-Hexane | | 9.17622E-09 | 0.0152315 | 0.00882705* | 0.00877633 | 0.00877633 | 0* | 0.0152315 | 0.0152315 |
| 2,2,4-Trimethylpentane | | 0 | 0 | 0* | 0 | 0 | 0* | 0 | 0 |
| Triethylene Glycol | | 99.1119 | 0.000394909 | 0* | 0.00108076 | 0.00108076 | 0* | 0.000394909 | 0.000394909 |
| Ethylene Glycol | | 0 | 0 | 0* | 0 | 0 | 0* | 0 | 0 |
| Water | | 0.865418 | 0.141409 | 0* | 0.00824312 | 0.00824312 | 0* | 0.141409 | 0.141409 |
| Methanol | | 0 | 0 | 0* | 0 | 0 | 100* | 0 | 0 |
| O2 | | 0 | 0 | 0* | 0 | 0 | 0* | 0 | 0 |
| SO2 | | 0 | 0 | 0* | 0 | 0 | 0* | 0 | 0 |

| Process Streams | | Flash Gas Vapors Vented | Gas Injection Rate for Kimray Pump | Lean Glycol Feed | Lean TEG | Liquid | Makeup | MeOH if Flow Known |
|---|---|---|---|---|---|---|---|---|
| Composition | Status: | Solved | Solved | Solved | Solved | Solved | Solved | Solved |
| Phase: Total | From Block: | SPLT-100 | SPLT-101 | Cooler | MIX-105 | KO Drum | -- | -- |
| | To Block: | Flash Gas Vent | MIX-101 | Glycol Contactor | Cross Exchanger | -- | Glycol Makeup | MIX-103 |
| **Mole Fraction** | | % | % | % | % | % | % | % |
| Hydrogen Sulfide | | 6.37593 | 1.00176 | 1.52421E-06 | 3.72831E-06 | 1.15259 | 0* | 0* |
| Carbon Dioxide | | 3.55307 | 0.942939 | 0 | 2.87612E-09 | 0.496163 | 0* | 0* |
| Nitrogen | | 0.357381 | 1.78634 | 0 | 7.42781E-16 | 0.209888 | 0* | 0* |
| Methane | | 47.4233 | 72.6404 | 0 | 1.45693E-11 | 20.6622 | 0* | 0* |
| Ethane | | 19.5354 | 12.7702 | 0 | 5.89763E-10 | 11.6943 | 0* | 0* |
| Propane | | 12.7430 | 6.37576 | 0 | 4.94820E-09 | 12.7056 | 0* | 0* |
| i-Butane | | 1.54698 | 0.776777 | 0 | 2.24981E-09 | 2.79391 | 0* | 0* |
| n-Butane | | 4.47313 | 1.86447 | 0 | 2.51900E-08 | 8.58054 | 0* | 0* |
| i-Pentane | | 0.995610 | 0.446233 | 0 | 3.55221E-08 | 3.50472 | 0* | 0* |
| n-Pentane | | 1.06141 | 0.441241 | 7.36388E-08 | 7.15747E-08 | 4.21652 | 0* | 0* |
| Cyclopentane | | 0 | 0 | 0 | 0 | 0 | 0* | 0* |
| C6Alkanes(iso) | | 0.760968 | 0.324865 | 7.77206E-07 | 7.60237E-07 | 5.27621 | 0* | 0* |
| Cyclohexane | | 0.227736 | 0.0868609 | 1.57868E-05 | 1.55596E-05 | 2.21966 | 0* | 0* |
| n-Heptane | | 0.193677 | 0.105032 | 1.23826E-06 | 1.21641E-06 | 4.29960 | 0* | 0* |
| Methylcyclohexane | | 0.128491 | 0.0610295 | 1.70070E-05 | 1.67803E-05 | 2.63110 | 0* | 0* |
| Octane | | 0.0434503 | 0.0298653 | 1.68889E-06 | 1.66236E-06 | 2.47535 | 0* | 0* |
| Nonane | | 0.00761514 | 0.00699708 | 2.11751E-06 | 2.08843E-06 | 1.19929 | 0* | 0* |
| Decanes+ | | 0.000918682 | 0.00267816 | 0.00854508 | 0.00854668 | 8.26933 | 0* | 0* |
| Benzene | | 0.248373 | 0.0851049 | 0.00246504 | 0.00244462 | 1.89195 | 0* | 0* |
| Toluene | | 0.0819471 | 0.0369274 | 0.00705493 | 0.00699750 | 1.75264 | 0* | 0* |
| Ethylbenzene | | 0.000676279 | 0.000396532 | 0.000360617 | 0.000357311 | 0.0385530 | 0* | 0* |
| o-Xylene | | 0.00428590 | 0.00287186 | 0.00658192 | 0.00654279 | 0.313939 | 0* | 0* |
| n-Hexane | | 0.00520896 | 0.00229400 | 0 | 1.46864E-08 | 0.0465676 | 0* | 0* |
| 2,2,4-Trimethylpentane | | 0 | 0 | 0 | 0 | 0 | 0* | 0* |
| Triethylene Glycol | | 7.74993E-05 | 2.01787E-08 | 93.1918 | 93.1918 | 0.000479326 | 99.1725* | 0* |
| Ethylene Glycol | | 0 | 0 | 0 | 0 | 0 | 0* | 0* |
| Water | | 0.231328 | 0.208946 | 6.78311 | 6.78332 | 3.56883 | 0.827516* | 0* |
| Methanol | | 0 | 0 | 0 | 0 | 0 | 0* | 100* |
| O2 | | 0 | 0 | 0 | 0 | 0 | 0* | 0* |
| SO2 | | 0 | 0 | 0 | 0 | 0 | 0* | 0* |
| **Molar Flow** | | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h |
| Hydrogen Sulfide | | 0 | 2.08828E-18 | 8.22447E-07 | 2.01147E-06 | 0.00375782 | 0 | 0 |
| Carbon Dioxide | | 0 | 1.96566E-18 | 0 | 1.55170E-09 | 0.00161766 | 0 | 0 |
| Nitrogen | | 0 | 3.72382E-18 | 0 | 4.00739E-16 | 0.000684307 | 0 | 0 |
| Methane | | 0 | 1.51427E-16 | 0 | 7.86032E-12 | 0.0673658 | 0 | 0 |
| Ethane | | 0 | 2.66208E-17 | 0 | 3.18184E-10 | 0.0381274 | 0 | 0 |
| Propane | | 0 | 1.32909E-17 | 0 | 2.66961E-09 | 0.0414247 | 0 | 0 |
| i-Butane | | 0 | 1.61927E-18 | 0 | 1.21380E-09 | 0.00910908 | 0 | 0 |
| n-Butane | | 0 | 3.88669E-18 | 0 | 1.35903E-08 | 0.0279755 | 0 | 0 |
| i-Pentane | | 0 | 9.30220E-19 | 0 | 1.91646E-08 | 0.0114266 | 0 | 0 |
| n-Pentane | | 0 | 9.19814E-19 | 3.97347E-08 | 3.86154E-08 | 0.0137473 | 0 | 0 |
| Cyclopentane | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C6Alkanes(iso) | | 0 | 6.77216E-19 | 4.19372E-07 | 4.10157E-07 | 0.0172022 | 0 | 0 |
| Cyclohexane | | 0 | 1.81071E-19 | 8.51837E-06 | 8.39458E-06 | 0.00723685 | 0 | 0 |
| n-Heptane | | 0 | 2.18950E-19 | 6.68152E-07 | 6.56267E-07 | 0.0140181 | 0 | 0 |
| Methylcyclohexane | | 0 | 1.27222E-19 | 9.17680E-06 | 9.05317E-06 | 0.00857826 | 0 | 0 |
| Octane | | 0 | 6.22573E-20 | 9.11305E-07 | 8.96862E-07 | 0.00807049 | 0 | 0 |
| Nonane | | 0 | 1.45862E-20 | 1.14259E-06 | 1.12673E-06 | 0.00391009 | 0 | 0 |
| Decanes+ | | 0 | 5.58290E-21 | 0.00461083 | 0.00461104 | 0.0269608 | 0 | 0 |
| Benzene | | 0 | 1.77410E-19 | 0.00133011 | 0.00131890 | 0.00616839 | 0 | 0 |
| Toluene | | 0 | 7.69791E-20 | 0.00380676 | 0.00377523 | 0.00571420 | 0 | 0 |
| Ethylbenzene | | 0 | 8.26613E-22 | 0.000194585 | 0.000192773 | 0.000125696 | 0 | 0 |
| o-Xylene | | 0 | 5.98669E-21 | 0.00355153 | 0.00352992 | 0.00102355 | 0 | 0 |
| n-Hexane | | 0 | 4.78208E-21 | 0 | 7.92351E-09 | 0.000151826 | 0 | 0 |
| 2,2,4-Trimethylpentane | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Triethylene Glycol | | 0 | 4.20645E-26 | 50.2853 | 50.2781 | 1.56277E-06 | 0 | 0 |
| Ethylene Glycol | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water | | 0 | 4.35569E-19 | 3.66009 | 3.65968 | 0.0116356 | 0 | 0 |
| Methanol | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| O2 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SO2 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Mass Fraction** | | % | % | % | % | % | % | % |
| Hydrogen Sulfide | | 7.37329 | 1.52097 | 3.67885E-07 | 8.99869E-07 | 0.625622 | 0* | 0* |
| Carbon Dioxide | | 5.30588 | 1.84873 | 0 | 8.96417E-10 | 0.347775 | 0* | 0* |
| Nitrogen | | 0.339707 | 2.22933 | 0 | 1.47361E-16 | 0.0936443 | 0* | 0* |
| Methane | | 25.8149 | 51.9151 | 0 | 1.65526E-12 | 5.27929 | 0* | 0* |
| Ethane | | 19.9319 | 17.1065 | 0 | 1.25590E-10 | 5.60043 | 0* | 0* |
| Propane | | 19.0667 | 12.5248 | 0 | 1.54525E-09 | 8.92318 | 0* | 0* |
| i-Butane | | 3.05094 | 2.01133 | 0 | 9.26072E-10 | 2.58632 | 0* | 0* |
| n-Butane | | 8.82188 | 4.82773 | 0 | 1.03688E-08 | 7.94299 | 0* | 0* |
| i-Pentane | | 2.43739 | 1.43429 | 0 | 1.81503E-08 | 4.02726 | 0* | 0* |
| n-Pentane | | 2.59849 | 1.41824 | 3.76263E-08 | 3.65717E-08 | 4.84519 | 0* | 0* |
| Cyclopentane | | 0 | 0 | 0 | 0 | 0 | 0* | 0* |
| C6Alkanes(iso) | | 2.22514 | 1.24718 | 4.74324E-07 | 4.63969E-07 | 7.24157 | 0* | 0* |
| Cyclohexane | | 0.650343 | 0.325665 | 9.40920E-06 | 9.27380E-06 | 2.97521 | 0* | 0* |
| n-Heptane | | 0.658508 | 0.468858 | 8.78707E-07 | 8.63202E-07 | 6.86169 | 0* | 0* |
| Methylcyclohexane | | 0.428084 | 0.266953 | 1.18259E-05 | 1.16683E-05 | 4.11447 | 0* | 0* |
| Octane | | 0.168413 | 0.151980 | 1.36625E-06 | 1.34479E-06 | 4.50339 | 0* | 0* |
| Nonane | | 0.0331405 | 0.0399794 | 1.92334E-06 | 1.89693E-06 | 2.44977 | 0* | 0* |
| Decanes+ | | 0.00591043 | 0.0226218 | 0.0114741 | 0.0114763 | 24.9715 | 0* | 0* |
| Benzene | | 0.658308 | 0.296153 | 0.00136363 | 0.00135234 | 2.35371 | 0* | 0* |
| Toluene | | 0.256201 | 0.151577 | 0.00460351 | 0.00456605 | 2.57194 | 0* | 0* |
| Ethylbenzene | | 0.00243621 | 0.00187544 | 0.000271134 | 0.000268648 | 0.0651879 | 0* | 0* |
| o-Xylene | | 0.0154394 | 0.0135828 | 0.00494869 | 0.00491928 | 0.530829 | 0* | 0* |
| n-Hexane | | 0.0152315 | 0.00880686 | 0 | 8.96306E-09 | 0.0639138 | 0* | 0* |
| 2,2,4-Trimethylpentane | | 0 | 0 | 0 | 0 | 0 | 0* | 0* |
| Triethylene Glycol | | 0.000394909 | 1.34998E-07 | 99.1119 | 99.1119 | 0.00114644 | 99.9* | 0* |
| Ethylene Glycol | | 0 | 0 | 0 | 0 | 0 | 0* | 0* |
| Water | | 0.141409 | 0.167695 | 0.865418 | 0.865446 | 1.02399 | 0.1* | 0* |
| Methanol | | 0 | 0 | 0 | 0 | 0 | 0* | 100* |
| O2 | | 0 | 0 | 0 | 0 | 0 | 0* | 0* |
| SO2 | | 0 | 0 | 0 | 0 | 0 | 0* | 0* |

| Process Streams | | Nitrogen Stripping Gas | No Flash Tank | Overheads | OVHD to Emissions Control Device | OVHD Vent Emissions | Recycle Guess | Rich TEG | Saturant (Methanol) |
|---|---|---|---|---|---|---|---|---|---|
| Composition | Status: | Solved | Solved | Solved | Solved | Solved | Solved | Solved | Solved |
| Phase: Total | From Block: | -- | SPLT-102 | MIX-104 | SPLT-104 | SPLT-104 | TEG Recycle | Glycol Contactor | |
| | To Block: | SPLT-108 | MIX-102 | SPLT-104 | Regen Control | Regen Vent | Glycol Makeup | MIX-101 | Methanol Saturator |
| **Mole Fraction** | | % | % | % | % | % | % | % | % |
| Hydrogen Sulfide | | 0* | 1.17325 | 5.29804 | 5.29804 | 5.29804 | 1.52421E-06 | 1.17325 | 0* |
| Carbon Dioxide | | 0* | 0.263183 | 0.597761 | 0.597761 | 0.597761 | 2.99976E-09 | 0.263183 | 0* |
| Nitrogen | | 100* | 0.0167012 | 0.00122867 | 0.00122867 | 0.00122867 | 0 | 0.0167012 | 0* |
| Methane | | 0* | 2.30632 | 0.706306 | 0.706306 | 0.706306 | 1.54719E-11 | 2.30632 | 0* |
| Ethane | | 0* | 1.09187 | 1.14575 | 1.14575 | 1.14575 | 6.21699E-10 | 1.09187 | 0* |
| Propane | | 0* | 0.843130 | 1.53642 | 1.53642 | 1.53642 | 5.18155E-09 | 0.843130 | 0* |
| i-Butane | | 0* | 0.115202 | 0.263967 | 0.263967 | 0.263967 | 2.34693E-09 | 0.115202 | 0* |
| n-Butane | | 0* | 0.399193 | 1.16159 | 1.16159 | 1.16159 | 2.61367E-08 | 0.399193 | 0* |
| i-Pentane | | 0* | 0.116651 | 0.426117 | 0.426117 | 0.426117 | 3.66612E-08 | 0.116651 | 0* |
| n-Pentane | | 0* | 0.141077 | 0.555047 | 0.555047 | 0.555047 | 7.36388E-08 | 0.141077 | 0* |
| Cyclopentane | | 0* | 0 | 0 | 0 | 0 | 0 | 0 | 0* |
| C6Alkanes(iso) | | 0* | 0.174912 | 0.842597 | 0.842597 | 0.842597 | 7.77206E-07 | 0.174912 | 0* |
| Cyclohexane | | 0* | 0.137510 | 0.765449 | 0.765449 | 0.765449 | 1.57868E-05 | 0.137510 | 0* |
| n-Heptane | | 0* | 0.0765487 | 0.407527 | 0.407527 | 0.407527 | 1.23826E-06 | 0.0765487 | 0* |
| Methylcyclohexane | | 0* | 0.0983762 | 0.557164 | 0.557164 | 0.557164 | 1.70070E-05 | 0.0983762 | 0* |
| Octane | | 0* | 0.0295967 | 0.166307 | 0.166307 | 0.166307 | 1.68889E-06 | 0.0295967 | 0* |
| Nonane | | 0* | 0.00960958 | 0.0557963 | 0.0557963 | 0.0557963 | 2.11751E-06 | 0.00960958 | 0* |
| Decanes+ | | 0* | 0.0341015 | 0.164710 | 0.164710 | 0.164710 | 0.00854508 | 0.0341015 | 0* |
| Benzene | | 0* | 0.824369 | 4.88846 | 4.88846 | 4.88846 | 0.00246504 | 0.824369 | 0* |
| Toluene | | 0* | 0.537526 | 3.18409 | 3.18409 | 3.18409 | 0.00705493 | 0.537526 | 0* |
| Ethylbenzene | | 0* | 0.00786756 | 0.0455393 | 0.0455393 | 0.0455393 | 0.000360617 | 0.00786756 | 0* |
| o-Xylene | | 0* | 0.0718812 | 0.401022 | 0.401022 | 0.401022 | 0.00658192 | 0.0718812 | 0* |
| n-Hexane | | 0* | 0.00113250 | 0.00537702 | 0.00537702 | 0.00537702 | 1.50357E-08 | 0.00113250 | 0* |
| 2,2,4-Trimethylpentane | | 0* | 0 | 0 | 0 | 0 | 0 | 0 | 0* |
| Triethylene Glycol | | 0* | 73.4299 | 0.00157861 | 0.00157861 | 0.00157861 | 93.1918 | 73.4299 | 0* |
| Ethylene Glycol | | 0* | 0 | 0 | 0 | 0 | 0 | 0 | 0* |
| Water | | 0* | 18.1001 | 76.8221 | 76.8221 | 76.8221 | 6.78311 | 18.1001 | 0* |
| Methanol | | 0* | 0 | 0 | 0 | 0 | 0 | 0 | 100* |
| O2 | | 0* | 0 | 0 | 0 | 0 | 0 | 0 | 0* |
| SO2 | | 0* | 0 | 0 | 0 | 0 | 0 | 0 | 0* |
| **Molar Flow** | | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h |
| Hydrogen Sulfide | | 0 | 0 | 0.601810 | 0.601810 | 0 | 8.22485E-07 | 0.803339 | 0 |
| Carbon Dioxide | | 0 | 0 | 0.0679003 | 0.0679003 | 0 | 1.61871E-09 | 0.180204 | 0 |
| Nitrogen | | 0 | 0 | 0.000139566 | 0.000139566 | 0 | 0 | 0.0114355 | 0 |
| Methane | | 0 | 0 | 0.0802300 | 0.0802300 | 0 | 8.34887E-12 | 1.57916 | 0 |
| Ethane | | 0 | 0 | 0.130147 | 0.130147 | 0 | 3.35477E-10 | 0.747613 | 0 |
| Propane | | 0 | 0 | 0.174524 | 0.174524 | 0 | 2.79603E-09 | 0.577300 | 0 |
| i-Butane | | 0 | 0 | 0.0299842 | 0.0299842 | 0 | 1.26644E-09 | 0.0788804 | 0 |
| n-Butane | | 0 | 0 | 0.131947 | 0.131947 | 0 | 1.41037E-08 | 0.273331 | 0 |
| i-Pentane | | 0 | 0 | 0.0484031 | 0.0484031 | 0 | 1.97829E-08 | 0.0798719 | 0 |
| n-Pentane | | 0 | 0 | 0.0630483 | 0.0630483 | 0 | 3.97365E-08 | 0.0965970 | 0 |
| Cyclopentane | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C6Alkanes(iso) | | 0 | 0 | 0.0957114 | 0.0957114 | 0 | 4.19391E-07 | 0.119764 | 0 |
| Cyclohexane | | 0 | 0 | 0.0869482 | 0.0869482 | 0 | 8.51876E-06 | 0.0941547 | 0 |
| n-Heptane | | 0 | 0 | 0.0462914 | 0.0462914 | 0 | 6.68182E-07 | 0.0524137 | 0 |
| Methylcyclohexane | | 0 | 0 | 0.0632889 | 0.0632889 | 0 | 9.17721E-06 | 0.0673592 | 0 |
| Octane | | 0 | 0 | 0.0188909 | 0.0188909 | 0 | 9.11346E-07 | 0.0202652 | 0 |
| Nonane | | 0 | 0 | 0.00633796 | 0.00633796 | 0 | 1.14264E-06 | 0.00657978 | 0 |
| Decanes+ | | 0 | 0 | 0.0187096 | 0.0187096 | 0 | 0.00461104 | 0.0233496 | 0 |
| Benzene | | 0 | 0 | 0.555285 | 0.555285 | 0 | 0.00133017 | 0.564455 | 0 |
| Toluene | | 0 | 0 | 0.361684 | 0.361684 | 0 | 0.00380694 | 0.368050 | 0 |
| Ethylbenzene | | 0 | 0 | 0.00517286 | 0.00517286 | 0 | 0.000194594 | 0.00538700 | 0 |
| o-Xylene | | 0 | 0 | 0.0455525 | 0.0455525 | 0 | 0.00355169 | 0.0492178 | 0 |
| n-Hexane | | 0 | 0 | 0.000610782 | 0.000610782 | 0 | 8.11349E-09 | 0.000775432 | 0 |
| 2,2,4-Trimethylpentane | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Triethylene Glycol | | 0 | 0 | 0.000179316 | 0.000179316 | 0 | 50.2876 | 50.2783 | 0 |
| Ethylene Glycol | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water | | 0 | 0 | 8.72631 | 8.72631 | 0 | 3.66026 | 12.3933 | 0 |
| Methanol | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| O2 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SO2 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Mass Fraction** | | % | % | % | % | % | % | % | % |
| Hydrogen Sulfide | | 0* | 0.340640 | 6.28842 | 6.28842 | 6.28842 | 3.67885E-07 | 0.340640 | 0* |
| Carbon Dioxide | | 0* | 0.0986728 | 0.916198 | 0.916198 | 0.916198 | 9.34951E-10 | 0.0986728 | 0* |
| Nitrogen | | 100* | 0.00398572 | 0.00119871 | 0.00119871 | 0.00119871 | 0 | 0.00398572 | 0* |
| Methane | | 0* | 0.315199 | 0.394620 | 0.394620 | 0.394620 | 1.75781E-12 | 0.315199 | 0* |
| Ethane | | 0* | 0.279694 | 1.19984 | 1.19984 | 1.19984 | 1.32390E-10 | 0.279694 | 0* |
| Propane | | 0* | 0.316725 | 2.35951 | 2.35951 | 2.35951 | 1.61812E-09 | 0.316725 | 0* |
| i-Butane | | 0* | 0.0570423 | 0.534326 | 0.534326 | 0.534326 | 9.66047E-10 | 0.0570423 | 0* |
| n-Butane | | 0* | 0.197660 | 2.35132 | 2.35132 | 2.35132 | 1.07584E-08 | 0.197660 | 0* |
| i-Pentane | | 0* | 0.0716983 | 1.07071 | 1.07071 | 1.07071 | 1.87323E-08 | 0.0716983 | 0* |
| n-Pentane | | 0* | 0.0867119 | 1.39468 | 1.39468 | 1.39468 | 3.76263E-08 | 0.0867119 | 0* |
| Cyclopentane | | 0* | 0 | 0 | 0 | 0 | 0 | 0 | 0* |
| C6Alkanes(iso) | | 0* | 0.128409 | 2.52882 | 2.52882 | 2.52882 | 4.74324E-07 | 0.128409 | 0* |
| Cyclohexane | | 0* | 0.0985896 | 2.24354 | 2.24354 | 2.24354 | 9.40920E-06 | 0.0985896 | 0* |
| n-Heptane | | 0* | 0.0653442 | 1.42216 | 1.42216 | 1.42216 | 8.78707E-07 | 0.0653442 | 0* |
| Methylcyclohexane | | 0* | 0.0822873 | 1.90523 | 1.90523 | 1.90523 | 1.18259E-05 | 0.0822873 | 0* |
| Octane | | 0* | 0.0288012 | 0.661605 | 0.661605 | 0.661605 | 1.36625E-06 | 0.0288012 | 0* |
| Nonane | | 0* | 0.0104996 | 0.249227 | 0.249227 | 0.249227 | 1.92334E-06 | 0.0104996 | 0* |
| Decanes+ | | 0* | 0.0550824 | 1.08763 | 1.08763 | 1.08763 | 0.0114741 | 0.0550824 | 0* |
| Benzene | | 0* | 0.548570 | 13.2985 | 13.2985 | 13.2985 | 0.00136363 | 0.548570 | 0* |
| Toluene | | 0* | 0.421923 | 10.2174 | 10.2174 | 10.2174 | 0.00460351 | 0.421923 | 0* |
| Ethylbenzene | | 0* | 0.00711565 | 0.168377 | 0.168377 | 0.168377 | 0.000271134 | 0.00711565 | 0* |
| o-Xylene | | 0* | 0.0650115 | 1.48274 | 1.48274 | 1.48274 | 0.00494869 | 0.0650115 | 0* |
| n-Hexane | | 0* | 0.000831406 | 0.0161376 | 0.0161376 | 0.0161376 | 9.17622E-09 | 0.000831406 | 0* |
| 2,2,4-Trimethylpentane | | 0* | 0 | 0 | 0 | 0 | 0 | 0 | 0* |
| Triethylene Glycol | | 0* | 93.9416 | 0.00825623 | 0.00825623 | 0.00825623 | 99.1119 | 93.9416 | 0* |
| Ethylene Glycol | | 0* | 0 | 0 | 0 | 0 | 0 | 0 | 0* |
| Water | | 0* | 2.77788 | 48.1995 | 48.1995 | 48.1995 | 0.865418 | 2.77788 | 0* |
| Methanol | | 0* | 0 | 0 | 0 | 0 | 0 | 0 | 100* |
| O2 | | 0* | 0 | 0 | 0 | 0 | 0 | 0 | 0* |
| SO2 | | 0* | 0 | 0 | 0 | 0 | 0 | 0 | 0* |

| Process Streams | | Saturant (Water) | Slop Oil | To Flare | To Flash Tank | Wet Gas | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|
| Composition | Status: | Solved | Solved | Solved | Solved | Solved | Solved | Solved | Solved | Solved |
| Phase: Total | From Block: | | Rich Flash | SPLT-100 | SPLT-102 | Water Saturator | Feed Fraction MeOH Saturator | Methanol Saturator | MIX-103 | MIX-100 |
| | To Block: | Water Saturator | – | Flash Gas Control | Rich Flash | SPLT-105 | Water Saturator | MIX-103 | MIX-100 | KO Drum |
| Mole Fraction | | % | | % | % | % | % | % | % | % |
| Hydrogen Sulfide | | 0* | | 6.37593 | 1.17325 | 0.997908 | 1 | 0.997908 | 0.997908 | 1.00178 |
| Carbon Dioxide | | 0* | | 3.55307 | 0.263183 | 0.941027 | 0.943 | 0.941027 | 0.941027 | 0.942906 |
| Nitrogen | | 0* | | 0.357381 | 0.0167012 | 1.78725 | 1.791 | 1.78725 | 1.78725 | 1.78623 |
| Methane | | 0* | | 47.4233 | 2.30632 | 72.6547 | 72.807 | 72.6547 | 72.6547 | 72.6366 |
| Ethane | | 0* | | 19.5354 | 1.09187 | 12.7652 | 12.792 | 12.7652 | 12.7652 | 12.7701 |
| Propane | | 0* | | 12.7430 | 0.843130 | 6.37164 | 6.385 | 6.37164 | 6.37164 | 6.37623 |
| i-Butane | | 0* | | 1.54698 | 0.115202 | 0.776373 | 0.778 | 0.776373 | 0.776373 | 0.776927 |
| n-Butane | | 0* | | 4.47313 | 0.399193 | 1.86309 | 1.867 | 1.86309 | 1.86309 | 1.86497 |
| i-Pentane | | 0* | | 0.995610 | 0.116651 | 0.446065 | 0.447 | 0.446065 | 0.446065 | 0.446460 |
| n-Pentane | | 0* | | 1.06141 | 0.141077 | 0.441075 | 0.442 | 0.441075 | 0.441075 | 0.441522 |
| Cyclopentane | | 0* | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C6Alkanes(iso) | | 0* | | 0.760968 | 0.174912 | 0.324919 | 0.3256 | 0.324919 | 0.324919 | 0.325233 |
| Cyclohexane | | 0* | | 0.227736 | 0.137510 | 0.0869178 | 0.0871 | 0.0869178 | 0.0869178 | 0.0870191 |
| n-Heptane | | 0* | | 0.193677 | 0.0765487 | 0.105279 | 0.1055 | 0.105279 | 0.105279 | 0.105343 |
| Methylcyclohexane | | 0* | | 0.128491 | 0.0983762 | 0.0611718 | 0.0613 | 0.0611718 | 0.0611718 | 0.0612202 |
| Octane | | 0* | | 0.0434503 | 0.0295967 | 0.0300370 | 0.0301 | 0.0300370 | 0.0300370 | 0.0300467 |
| Nonane | | 0* | | 0.00761514 | 0.00960958 | 0.00708515 | 0.0071 | 0.00708515 | 0.00708515 | 0.00708553 |
| Decanes+ | | 0* | | 0.000918682 | 0.0341015 | 0.00329310 | 0.0033 | 0.00329310 | 0.00329310 | 0.00329139 |
| Benzene | | 0* | | 0.248373 | 0.824369 | 0.0851216 | 0.0853 | 0.0851216 | 0.0851216 | 0.0852390 |
| Toluene | | 0* | | 0.0819471 | 0.537526 | 0.0370224 | 0.0371 | 0.0370224 | 0.0370224 | 0.0370547 |
| Ethylbenzene | | 0* | | 0.000676279 | 0.00786756 | 0.000399163 | 0.0004 | 0.000399163 | 0.000399163 | 0.000399363 |
| o-Xylene | | 0* | | 0.00428590 | 0.0718812 | 0.00289393 | 0.0029 | 0.00289393 | 0.00289393 | 0.00289493 |
| n-Hexane | | 0* | | 0.00520896 | 0.00113250 | 0.00229519 | 0.0023 | 0.00229519 | 0.00229519 | 0.00229728 |
| 2,2,4-Trimethylpentane | | 0* | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Triethylene Glycol | | 0* | | 7.74993E-05 | 73.4299 | 0 | 0 | 0 | 0 | 5.57342E-08 |
| Ethylene Glycol | | 0* | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water | | 100* | | 0.231328 | 18.1001 | 0.209179 | 0 | 0.209179 | 0.209179 | 0.209195 |
| Methanol | | 0* | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| O2 | | 0* | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SO2 | | 0* | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Molar Flow | | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h |
| Hydrogen Sulfide | | 0* | 0 | 0 | 0.803339 | 43.8274 | 43.8274 | 43.8274 | 43.8274 | 44.0289 |
| Carbon Dioxide | | 0* | 0 | 0 | 0.180204 | 41.3292 | 41.3292 | 41.3292 | 41.3292 | 41.4415 |
| Nitrogen | | 0* | 0 | 0 | 0.0114355 | 78.4949 | 78.4949 | 78.4949 | 78.4949 | 78.5062 |
| Methane | | 0* | 0 | 0 | 1.57916 | 3190.94 | 3190.94 | 3190.94 | 3190.94 | 3192.44 |
| Ethane | | 0* | 0 | 0 | 0.747613 | 560.640 | 560.640 | 560.640 | 560.640 | 561.258 |
| Propane | | 0* | 0 | 0 | 0.577300 | 279.838 | 279.838 | 279.838 | 279.838 | 280.241 |
| i-Butane | | 0* | 0 | 0 | 0.0788804 | 34.0977 | 34.0977 | 34.0977 | 34.0977 | 34.1466 |
| n-Butane | | 0* | 0 | 0 | 0.273331 | 81.8258 | 81.8258 | 81.8258 | 81.8258 | 81.9672 |
| i-Pentane | | 0* | 0 | 0 | 0.0798719 | 19.5909 | 19.5909 | 19.5909 | 19.5909 | 19.6223 |
| n-Pentane | | 0* | 0 | 0 | 0.0965970 | 19.3717 | 19.3717 | 19.3717 | 19.3717 | 19.4053 |
| Cyclopentane | | 0* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C6Alkanes(iso) | | 0* | 0 | 0 | 0.119764 | 14.2702 | 14.2702 | 14.2702 | 14.2702 | 14.2943 |
| Cyclohexane | | 0* | 0 | 0 | 0.0941547 | 3.81737 | 3.81737 | 3.81737 | 3.81737 | 3.82457 |
| n-Heptane | | 0* | 0 | 0 | 0.0524137 | 4.62379 | 4.62379 | 4.62379 | 4.62379 | 4.62991 |
| Methylcyclohexane | | 0* | 0 | 0 | 0.0673592 | 2.68662 | 2.68662 | 2.68662 | 2.68662 | 2.69068 |
| Octane | | 0* | 0 | 0 | 0.0202652 | 1.31920 | 1.31920 | 1.31920 | 1.31920 | 1.32058 |
| Nonane | | 0* | 0 | 0 | 0.00657978 | 0.311175 | 0.311175 | 0.311175 | 0.311175 | 0.311415 |
| Decanes+ | | 0* | 0 | 0 | 0.0233496 | 0.144630 | 0.144630 | 0.144630 | 0.144630 | 0.144659 |
| Benzene | | 0* | 0 | 0 | 0.564455 | 3.73848 | 3.73848 | 3.73848 | 3.73848 | 3.74633 |
| Toluene | | 0* | 0 | 0 | 0.368050 | 1.62600 | 1.62600 | 1.62600 | 1.62600 | 1.62859 |
| Ethylbenzene | | 0* | 0 | 0 | 0.00538700 | 0.0175310 | 0.0175310 | 0.0175310 | 0.0175310 | 0.0175523 |
| o-Xylene | | 0* | 0 | 0 | 0.0492178 | 0.127099 | 0.127099 | 0.127099 | 0.127099 | 0.127235 |
| n-Hexane | | 0* | 0 | 0 | 0.000775432 | 0.100803 | 0.100803 | 0.100803 | 0.100803 | 0.100968 |
| 2,2,4-Trimethylpentane | | 0* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Triethylene Glycol | | 0* | 0 | 0 | 50.2783 | 0 | 0 | 0 | 0 | 2.44957E-06 |
| Ethylene Glycol | | 0* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water | | 9.18700* | 0 | 0 | 12.3933 | 9.18700 | 0 | 9.18700 | 9.18700 | 9.19431 |
| Methanol | | 0* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| O2 | | 0* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SO2 | | 0* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mass Fraction | | % | | % | % | % | % | % | % | % |
| Hydrogen Sulfide | | 0* | | 7.37329 | 0.340640 | 1.51526 | 1.51780 | 1.51526 | 1.51526 | 1.52079 |
| Carbon Dioxide | | 0* | | 5.30588 | 0.0986728 | 1.84516 | 1.84826 | 1.84516 | 1.84516 | 1.84842 |
| Nitrogen | | 0* | | 0.339707 | 0.00398572 | 2.23068 | 2.23443 | 2.23068 | 2.23068 | 2.22889 |
| Methane | | 0* | | 25.8149 | 0.315199 | 51.9301 | 52.0174 | 51.9301 | 51.9301 | 51.9054 |
| Ethane | | 0* | | 19.9319 | 0.279894 | 17.1015 | 17.1302 | 17.1015 | 17.1015 | 17.1041 |
| Propane | | 0* | | 19.0667 | 0.316725 | 12.5179 | 12.5389 | 12.5179 | 12.5179 | 12.5241 |
| i-Butane | | 0* | | 3.05094 | 0.0570423 | 2.01047 | 2.01385 | 2.01047 | 2.01047 | 2.01145 |
| n-Butane | | 0* | | 8.82188 | 0.197660 | 4.82460 | 4.83271 | 4.82460 | 4.82460 | 4.82837 |
| i-Pentane | | 0* | | 2.43739 | 0.0716983 | 1.43388 | 1.43629 | 1.43388 | 1.43388 | 1.43482 |
| n-Pentane | | 0* | | 2.59849 | 0.0867119 | 1.41784 | 1.42022 | 1.41784 | 1.41784 | 1.41895 |
| Cyclopentane | | 0* | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C6Alkanes(iso) | | 0* | | 2.22514 | 0.128409 | 1.24751 | 1.24960 | 1.24751 | 1.24751 | 1.24843 |
| Cyclohexane | | 0* | | 0.650343 | 0.0985896 | 0.325909 | 0.326457 | 0.325909 | 0.325909 | 0.326215 |
| n-Heptane | | 0* | | 0.658508 | 0.0653442 | 0.470006 | 0.470797 | 0.470006 | 0.470006 | 0.470184 |
| Methylcyclohexane | | 0* | | 0.428084 | 0.0822873 | 0.267599 | 0.268050 | 0.267599 | 0.267599 | 0.267751 |
| Octane | | 0* | | 0.168413 | 0.0288012 | 0.152868 | 0.153125 | 0.152868 | 0.152868 | 0.152882 |
| Nonane | | 0* | | 0.0331405 | 0.0104996 | 0.0404863 | 0.0405544 | 0.0404863 | 0.0404863 | 0.0404794 |
| Decanes+ | | 0* | | 0.00591043 | 0.0550824 | 0.0278186 | 0.0278654 | 0.0278186 | 0.0278186 | 0.0277979 |
| Benzene | | 0* | | 0.658308 | 0.548570 | 0.296238 | 0.296736 | 0.296238 | 0.296238 | 0.296580 |
| Toluene | | 0* | | 0.256201 | 0.421923 | 0.151981 | 0.152237 | 0.151981 | 0.151981 | 0.152080 |
| Ethylbenzene | | 0* | | 0.00243621 | 0.00711565 | 0.00188806 | 0.00189124 | 0.00188806 | 0.00188806 | 0.00188858 |
| o-Xylene | | 0* | | 0.0154394 | 0.0650115 | 0.0136885 | 0.0137115 | 0.0136885 | 0.0136885 | 0.0136901 |
| n-Hexane | | 0* | | 0.0152315 | 0.000831406 | 0.00881223 | 0.00882705 | 0.00881223 | 0.00881223 | 0.00881829 |
| 2,2,4-Trimethylpentane | | 0* | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Triethylene Glycol | | 0* | | 0.000394909 | 93.9416 | 0 | 0 | 0 | 0 | 3.72821E-07 |
| Ethylene Glycol | | 0* | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water | | 100* | | 0.141409 | 2.77788 | 0.167897 | 0 | 0.167897 | 0.167897 | 0.167872 |
| Methanol | | 0* | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| O2 | | 0* | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SO2 | | 0* | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Process Streams | | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|
| Composition | Status: | Solved | Solved | Solved | Solved | Solved | Solved | Solved | Solved |
| Phase: Total | From Block: | KO Drum | SPLT-101 | MIX-101 | Rich Flash | MIX-102 | Cross Exchanger | Glycol Regenerator | Reboiler |
| | To Block: | SPLT-101 | Glycol Contactor | SPLT-102 | MIX-102 | Cross Exchanger | SPLT-106 | Reboiler | Glycol Regenerator |
| **Mole Fraction** | | % | % | % | % | % | % | | |
| Hydrogen Sulfide | | 1.00176 | 1.00176 | 1.17325 | 0.921466 | 0.921466 | 0.921466 | | |
| Carbon Dioxide | | 0.942939 | 0.942939 | 0.263183 | 0.103966 | 0.103966 | 0.103966 | | |
| Nitrogen | | 1.78634 | 1.78634 | 0.0167012 | 0.000213696 | 0.000213696 | 0.000213696 | | |
| Methane | | 72.6404 | 72.6404 | 2.30632 | 0.122844 | 0.122844 | 0.122844 | | |
| Ethane | | 12.7702 | 12.7702 | 1.09187 | 0.199274 | 0.199274 | 0.199274 | | |
| Propane | | 6.37576 | 6.37576 | 0.843130 | 0.267223 | 0.267223 | 0.267223 | | |
| i-Butane | | 0.776777 | 0.776777 | 0.115202 | 0.0459104 | 0.0459104 | 0.0459104 | | |
| n-Butane | | 1.86447 | 1.86447 | 0.399193 | 0.202030 | 0.202030 | 0.202030 | | |
| i-Pentane | | 0.446233 | 0.446233 | 0.116651 | 0.0741125 | 0.0741125 | 0.0741125 | | |
| n-Pentane | | 0.441241 | 0.441241 | 0.141077 | 0.0965366 | 0.0965366 | 0.0965366 | | |
| Cyclopentane | | 0 | 0 | 0 | 0 | 0 | 0 | | |
| C6Alkanes(iso) | | 0.324865 | 0.324865 | 0.174912 | 0.146549 | 0.146549 | 0.146549 | | |
| Cyclohexane | | 0.0868609 | 0.0868609 | 0.137510 | 0.133144 | 0.133144 | 0.133144 | | |
| n-Heptane | | 0.105032 | 0.105032 | 0.0765487 | 0.0708802 | 0.0708802 | 0.0708802 | | |
| Methylcyclohexane | | 0.0610295 | 0.0610295 | 0.0983762 | 0.0969187 | 0.0969187 | 0.0969187 | | |
| Octane | | 0.0298653 | 0.0298653 | 0.0295967 | 0.0289263 | 0.0289263 | 0.0289263 | | |
| Nonane | | 0.00699708 | 0.00699708 | 0.00960958 | 0.00970610 | 0.00970610 | 0.00970610 | | |
| Decanes+ | | 0.00267816 | 0.00267816 | 0.0341015 | 0.0357074 | 0.0357074 | 0.0357074 | | |
| Benzene | | 0.0851049 | 0.0851049 | 0.824369 | 0.852245 | 0.852245 | 0.852245 | | |
| Toluene | | 0.0369274 | 0.0369274 | 0.537526 | 0.559574 | 0.559574 | 0.559574 | | |
| Ethylbenzene | | 0.000396532 | 0.000396532 | 0.00786756 | 0.00821559 | 0.00821559 | 0.00821559 | | |
| o-Xylene | | 0.00287186 | 0.00287186 | 0.0718812 | 0.0751526 | 0.0751526 | 0.0751526 | | |
| n-Hexane | | 0.00229400 | 0.00229400 | 0.00113250 | 0.000935212 | 0.000935212 | 0.000935212 | | |
| 2,2,4-Trimethylpentane | | 0 | 0 | 0 | 0 | 0 | 0 | | |
| Triethylene Glycol | | 2.01787E-08 | 2.01787E-08 | 73.4299 | 76.9836 | 76.9836 | 76.9836 | | |
| Ethylene Glycol | | 0 | 0 | 0 | 0 | 0 | 0 | | |
| Water | | 0.208946 | 0.208946 | 18.1001 | 18.9648 | 18.9648 | 18.9648 | | |
| Methanol | | 0 | 0 | 0 | 0 | 0 | 0 | | |
| O2 | | 0 | 0 | 0 | 0 | 0 | 0 | | |
| SO2 | | 0 | 0 | 0 | 0 | 0 | 0 | | |
| **Molar Flow** | | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h |
| Hydrogen Sulfide | | 44.0252 | 44.0252 | 0.803339 | 0.601812 | 0.601812 | 0.601812 | 0 | 0 |
| Carbon Dioxide | | 41.4399 | 41.4399 | 0.180204 | 0.0679003 | 0.0679003 | 0.0679003 | 0 | 0 |
| Nitrogen | | 78.5055 | 78.5055 | 0.0114355 | 0.000139566 | 0.000139566 | 0.000139566 | 0 | 0 |
| Methane | | 3192.37 | 3192.37 | 1.57916 | 0.0802300 | 0.0802300 | 0.0802300 | 0 | 0 |
| Ethane | | 561.220 | 561.220 | 0.747613 | 0.130147 | 0.130147 | 0.130147 | 0 | 0 |
| Propane | | 280.199 | 280.199 | 0.577300 | 0.174524 | 0.174524 | 0.174524 | 0 | 0 |
| i-Butane | | 34.1375 | 34.1375 | 0.0788804 | 0.0299842 | 0.0299842 | 0.0299842 | 0 | 0 |
| n-Butane | | 81.9392 | 81.9392 | 0.273331 | 0.131947 | 0.131947 | 0.131947 | 0 | 0 |
| i-Pentane | | 19.6109 | 19.6109 | 0.0798719 | 0.0484031 | 0.0484031 | 0.0484031 | 0 | 0 |
| n-Pentane | | 19.3915 | 19.3915 | 0.0965970 | 0.0630483 | 0.0630483 | 0.0630483 | 0 | 0 |
| Cyclopentane | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C6Alkanes(iso) | | 14.2771 | 14.2771 | 0.119764 | 0.0957118 | 0.0957118 | 0.0957118 | 0 | 0 |
| Cyclohexane | | 3.81733 | 3.81733 | 0.0941547 | 0.0869566 | 0.0869566 | 0.0869566 | 0 | 0 |
| n-Heptane | | 4.61589 | 4.61589 | 0.0524137 | 0.0462921 | 0.0462921 | 0.0462921 | 0 | 0 |
| Methylcyclohexane | | 2.68210 | 2.68210 | 0.0673592 | 0.0632979 | 0.0632979 | 0.0632979 | 0 | 0 |
| Octane | | 1.31251 | 1.31251 | 0.0202652 | 0.0188918 | 0.0188918 | 0.0188918 | 0 | 0 |
| Nonane | | 0.307505 | 0.307505 | 0.00657978 | 0.00633909 | 0.00633909 | 0.00633909 | 0 | 0 |
| Decanes+ | | 0.117699 | 0.117699 | 0.0233496 | 0.0233206 | 0.0233206 | 0.0233206 | 0 | 0 |
| Benzene | | 3.74016 | 3.74016 | 0.564455 | 0.556604 | 0.556604 | 0.556604 | 0 | 0 |
| Toluene | | 1.62287 | 1.62287 | 0.368050 | 0.365460 | 0.365460 | 0.365460 | 0 | 0 |
| Ethylbenzene | | 0.0174266 | 0.0174266 | 0.00538700 | 0.00536563 | 0.00536563 | 0.00536563 | 0 | 0 |
| o-Xylene | | 0.126211 | 0.126211 | 0.0492178 | 0.0490824 | 0.0490824 | 0.0490824 | 0 | 0 |
| n-Hexane | | 0.100816 | 0.100816 | 0.000775432 | 0.000610790 | 0.000610790 | 0.000610790 | 0 | 0 |
| 2,2,4-Trimethylpentane | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Triethylene Glycol | | 8.86804E-07 | 8.86804E-07 | 50.2783 | 50.2783 | 50.2783 | 50.2783 | 0 | 0 |
| Ethylene Glycol | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water | | 9.18267 | 9.18267 | 12.3933 | 12.3860 | 12.3860 | 12.3860 | 0 | 0 |
| Methanol | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| O2 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SO2 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Mass Fraction** | | % | % | % | % | % | % | | |
| Hydrogen Sulfide | | 1.52097 | 1.52097 | 0.340640 | 0.258179 | 0.258179 | 0.258179 | | |
| Carbon Dioxide | | 1.84873 | 1.84873 | 0.0986728 | 0.0376155 | 0.0376155 | 0.0376155 | | |
| Nitrogen | | 2.22933 | 2.22933 | 0.00398572 | 4.92146E-05 | 4.92146E-05 | 4.92146E-05 | | |
| Methane | | 51.9151 | 51.9151 | 0.315199 | 0.0162015 | 0.0162015 | 0.0162015 | | |
| Ethane | | 17.1065 | 17.1065 | 0.279694 | 0.0492608 | 0.0492608 | 0.0492608 | | |
| Propane | | 12.5248 | 12.5248 | 0.316725 | 0.0968722 | 0.0968722 | 0.0968722 | | |
| i-Butane | | 2.01133 | 2.01133 | 0.0570423 | 0.0219373 | 0.0219373 | 0.0219373 | | |
| n-Butane | | 4.82773 | 4.82773 | 0.197660 | 0.0965360 | 0.0965360 | 0.0965360 | | |
| i-Pentane | | 1.43429 | 1.43429 | 0.0716983 | 0.0439593 | 0.0439593 | 0.0439593 | | |
| n-Pentane | | 1.41824 | 1.41824 | 0.0867119 | 0.0572600 | 0.0572600 | 0.0572600 | | |
| Cyclopentane | | 0 | 0 | 0 | 0 | 0 | 0 | | |
| C6Alkanes(iso) | | 1.24718 | 1.24718 | 0.128409 | 0.103824 | 0.103824 | 0.103824 | | |
| Cyclohexane | | 0.325665 | 0.325665 | 0.0985896 | 0.0921200 | 0.0921200 | 0.0921200 | | |
| n-Heptane | | 0.468858 | 0.468858 | 0.0653442 | 0.0583891 | 0.0583891 | 0.0583891 | | |
| Methylcyclohexane | | 0.266953 | 0.266953 | 0.0822873 | 0.0782327 | 0.0782327 | 0.0782327 | | |
| Octane | | 0.151980 | 0.151980 | 0.0288012 | 0.0271642 | 0.0271642 | 0.0271642 | | |
| Nonane | | 0.0399794 | 0.0399794 | 0.0104996 | 0.0102341 | 0.0102341 | 0.0102341 | | |
| Decanes+ | | 0.0226218 | 0.0226218 | 0.0550824 | 0.0556590 | 0.0556590 | 0.0556590 | | |
| Benzene | | 0.296153 | 0.296153 | 0.548570 | 0.547283 | 0.547283 | 0.547283 | | |
| Toluene | | 0.151577 | 0.151577 | 0.421923 | 0.423866 | 0.423866 | 0.423866 | | |
| Ethylbenzene | | 0.00187544 | 0.00187544 | 0.00711565 | 0.00717052 | 0.00717052 | 0.00717052 | | |
| o-Xylene | | 0.0135828 | 0.0135828 | 0.0650115 | 0.0655927 | 0.0655927 | 0.0655927 | | |
| n-Hexane | | 0.00880686 | 0.00880686 | 0.000831406 | 0.000662558 | 0.000662558 | 0.000662558 | | |
| 2,2,4-Trimethylpentane | | 0 | 0 | 0 | 0 | 0 | 0 | | |
| Triethylene Glycol | | 1.34998E-07 | 1.34998E-07 | 93.9416 | 95.0431 | 95.0431 | 95.0431 | | |
| Ethylene Glycol | | 0 | 0 | 0 | 0 | 0 | 0 | | |
| Water | | 0.167695 | 0.167695 | 2.77788 | 2.80880 | 2.80880 | 2.80880 | | |
| Methanol | | 0 | 0 | 0 | 0 | 0 | 0 | | |
| O2 | | 0 | 0 | 0 | 0 | 0 | 0 | | |
| SO2 | | 0 | 0 | 0 | 0 | 0 | 0 | | |

| Process Streams | | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|
| Composition | Status: | Solved | Solved | Solved | Solved | Solved | Solved | Solved | Solved |
| Phase: Total | From Block: | Cross Exchanger | Glycol Makeup | Glycol Pump | Glycol Contactor | Compressor | Air Cooler | Compression Recycle | SPLT-105 |
| | To Block: | TEG Recycle | Glycol Pump | Cooler | SPLT-103 | Air Cooler | Compression Recycle | MIX-100 | Methanol Saturator |
| **Mole Fraction** | | % | % | % | % | % | % | % | % |
| Hydrogen Sulfide | | 3.72831E-06 | 1.52421E-06 | 1.52421E-06 | 0.986743 | 6.37593 | 6.37593 | 6.37581 | 0.997908 |
| Carbon Dioxide | | 2.87612E-09 | 0 | 0 | 0.941949 | 3.55307 | 3.55307 | 3.55305 | 0.941027 |
| Nitrogen | | 7.42781E-16 | 0 | 0 | 1.79200 | 0.357381 | 0.357381 | 0.357383 | 1.78725 |
| Methane | | 1.45693E-11 | 0 | 0 | 72.8450 | 47.4233 | 47.4233 | 47.4234 | 72.6547 |
| Ethane | | 5.89763E-10 | 0 | 0 | 12.7954 | 19.5354 | 19.5354 | 19.5354 | 12.7652 |
| Propane | | 4.94820E-09 | 0 | 0 | 6.38370 | 12.7430 | 12.7430 | 12.7430 | 6.37164 |
| i-Butane | | 2.24981E-09 | 0 | 0 | 0.777550 | 1.54698 | 1.54698 | 1.54698 | 0.776373 |
| n-Butane | | 2.51900E-08 | 0 | 0 | 1.86441 | 4.47313 | 4.47313 | 4.47313 | 1.86309 |
| i-Pentane | | 3.55221E-08 | 0 | 0 | 0.445888 | 0.995610 | 0.995610 | 0.995611 | 0.446065 |
| n-Pentane | | 7.15747E-08 | 7.36388E-08 | 7.36388E-08 | 0.440498 | 1.06141 | 1.06141 | 1.06141 | 0.441075 |
| Cyclopentane | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C6Alkanes(iso) | | 7.60237E-07 | 7.77206E-07 | 7.77206E-07 | 0.323207 | 0.760968 | 0.760968 | 0.760969 | 0.324919 |
| Cyclohexane | | 1.55596E-05 | 1.57868E-05 | 1.57868E-05 | 0.0849993 | 0.227736 | 0.227736 | 0.227736 | 0.0869178 |
| n-Heptane | | 1.21641E-06 | 1.23826E-06 | 1.23826E-06 | 0.104183 | 0.193677 | 0.193677 | 0.193677 | 0.105279 |
| Methylcyclohexane | | 1.67803E-05 | 1.70070E-05 | 1.70070E-05 | 0.0596941 | 0.128491 | 0.128491 | 0.128490 | 0.0611718 |
| Octane | | 1.66236E-06 | 1.68889E-06 | 1.68889E-06 | 0.0295016 | 0.0434503 | 0.0434503 | 0.0434503 | 0.0300370 |
| Nonane | | 2.08843E-06 | 2.11751E-06 | 2.11751E-06 | 0.00687008 | 0.00761514 | 0.00761514 | 0.00761513 | 0.00708515 |
| Decanes+ | | 0.00854668 | 0.00854508 | 0.00854508 | 0.00225923 | 0.000918682 | 0.000918682 | 0.000918679 | 0.00329310 |
| Benzene | | 0.00244462 | 0.00246504 | 0.00246504 | 0.0725309 | 0.248373 | 0.248373 | 0.248371 | 0.0851216 |
| Toluene | | 0.00699750 | 0.00705493 | 0.00705493 | 0.0287342 | 0.0819471 | 0.0819471 | 0.0819462 | 0.0370224 |
| Ethylbenzene | | 0.000357311 | 0.000360617 | 0.000360617 | 0.000279304 | 0.000676279 | 0.000676279 | 0.000676272 | 0.000399163 |
| o-Xylene | | 0.00654279 | 0.00658192 | 0.00658192 | 0.00183882 | 0.00428590 | 0.00428590 | 0.00428585 | 0.00289393 |
| n-Hexane | | 1.46864E-08 | 0 | 0 | 0.00228390 | 0.00520896 | 0.00520896 | 0.00520898 | 0.00229519 |
| 2,2,4-Trimethylpentane | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Triethylene Glycol | | 93.1918 | 93.1918 | 93.1918 | 0.000161393 | 7.74993E-05 | 7.74993E-05 | 7.74993E-05 | 0 |
| Ethylene Glycol | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water | | 6.78332 | 6.78311 | 6.78311 | 0.0102612 | 0.231328 | 0.231328 | 0.231328 | 0.209179 |
| Methanol | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| O2 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SO2 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Molar Flow** | | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h |
| Hydrogen Sulfide | | 2.01147E-06 | 8.22447E-07 | 8.22447E-07 | 43.2218 | 0.201527 | 0.201527 | 0.201524 | 43.8274 |
| Carbon Dioxide | | 1.55170E-09 | 0 | 0 | 41.2597 | 0.112304 | 0.112304 | 0.112304 | 41.3292 |
| Nitrogen | | 4.00739E-16 | 0 | 0 | 78.4941 | 0.0112959 | 0.0112959 | 0.0112960 | 78.4949 |
| Methane | | 7.86032E-12 | 0 | 0 | 3190.79 | 1.49893 | 1.49893 | 1.49894 | 3190.94 |
| Ethane | | 3.18184E-10 | 0 | 0 | 560.472 | 0.617467 | 0.617467 | 0.617468 | 560.640 |
| Propane | | 2.66961E-09 | 0 | 0 | 279.622 | 0.402776 | 0.402776 | 0.402777 | 279.838 |
| i-Butane | | 1.21380E-09 | 0 | 0 | 34.0586 | 0.0488961 | 0.0488961 | 0.0488963 | 34.0977 |
| n-Butane | | 1.35903E-08 | 0 | 0 | 81.6658 | 0.141385 | 0.141385 | 0.141385 | 81.8258 |
| i-Pentane | | 1.91646E-08 | 0 | 0 | 19.5310 | 0.0314688 | 0.0314688 | 0.0314689 | 19.5909 |
| n-Pentane | | 3.86154E-08 | 3.97347E-08 | 3.97347E-08 | 19.2949 | 0.0335487 | 0.0335487 | 0.0335488 | 19.3717 |
| Cyclopentane | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C6Alkanes(iso) | | 4.10157E-07 | 4.19372E-07 | 4.19372E-07 | 14.1573 | 0.0240523 | 0.0240523 | 0.0240524 | 14.2702 |
| Cyclohexane | | 8.39458E-06 | 8.51837E-06 | 8.51837E-06 | 3.72318 | 0.00719818 | 0.00719818 | 0.00719819 | 3.81737 |
| n-Heptane | | 6.56267E-07 | 6.68152E-07 | 6.68152E-07 | 4.56348 | 0.00612165 | 0.00612165 | 0.00612166 | 4.62379 |
| Methylcyclohexane | | 9.05317E-06 | 9.17680E-06 | 9.17680E-06 | 2.61475 | 0.00406128 | 0.00406128 | 0.00406128 | 2.68662 |
| Octane | | 8.96862E-07 | 9.11305E-07 | 9.11305E-07 | 1.29224 | 0.00137336 | 0.00137336 | 0.00137336 | 1.31920 |
| Nonane | | 1.12673E-06 | 1.14259E-06 | 1.14259E-06 | 0.300927 | 0.000240696 | 0.000240696 | 0.000240696 | 0.311175 |
| Decanes+ | | 0.00461104 | 0.00461083 | 0.00461083 | 0.0989599 | 2.90373E-05 | 2.90373E-05 | 2.90373E-05 | 0.144630 |
| Benzene | | 0.00131890 | 0.00133011 | 0.00133011 | 3.17704 | 0.00785047 | 0.00785047 | 0.00785041 | 3.73848 |
| Toluene | | 0.00377523 | 0.00380676 | 0.00380676 | 1.25863 | 0.00259015 | 0.00259015 | 0.00259013 | 1.62600 |
| Ethylbenzene | | 0.000192773 | 0.000194585 | 0.000194585 | 0.0122342 | 2.13755E-05 | 2.13755E-05 | 2.13754E-05 | 0.0175310 |
| o-Xylene | | 0.00352992 | 0.00355153 | 0.00355153 | 0.0805451 | 0.000135467 | 0.000135467 | 0.000135466 | 0.127099 |
| n-Hexane | | 7.92351E-09 | 0 | 0 | 0.100040 | 0.000164643 | 0.000164643 | 0.000164644 | 0.100803 |
| 2,2,4-Trimethylpentane | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Triethylene Glycol | | 50.2781 | 50.2853 | 50.2853 | 0.00706941 | 2.44956E-06 | 2.44956E-06 | 2.44957E-06 | 0 |
| Ethylene Glycol | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water | | 3.65968 | 3.66009 | 3.66009 | 0.449466 | 0.00731172 | 0.00731172 | 0.00731174 | 9.18700 |
| Methanol | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| O2 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SO2 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Mass Fraction** | | % | % | % | % | % | % | % | % |
| Hydrogen Sulfide | | 8.99869E-07 | 3.67885E-07 | 3.67885E-07 | 1.49957 | 7.37329 | 7.37329 | 7.37316 | 1.51526 |
| Carbon Dioxide | | 8.96417E-10 | 0 | 0 | 1.84853 | 5.30588 | 5.30588 | 5.30586 | 1.84516 |
| Nitrogen | | 1.47361E-16 | 0 | 0 | 2.23850 | 0.339707 | 0.339707 | 0.339709 | 2.23068 |
| Methane | | 1.65526E-12 | 0 | 0 | 52.1103 | 25.8149 | 25.8149 | 25.8150 | 51.9301 |
| Ethane | | 1.25590E-10 | 0 | 0 | 17.1565 | 19.9319 | 19.9319 | 19.9320 | 17.1015 |
| Propane | | 1.54525E-09 | 0 | 0 | 12.5522 | 19.0667 | 19.0667 | 19.0667 | 12.5179 |
| i-Butane | | 9.26072E-10 | 0 | 0 | 2.01522 | 3.05094 | 3.05094 | 3.05094 | 2.01047 |
| n-Butane | | 1.03688E-08 | 0 | 0 | 4.83211 | 8.82188 | 8.82188 | 8.82188 | 4.82460 |
| i-Pentane | | 1.81503E-08 | 0 | 0 | 1.43452 | 2.43739 | 2.43739 | 2.43740 | 1.43388 |
| n-Pentane | | 3.65717E-08 | 3.76263E-08 | 3.76263E-08 | 1.41718 | 2.59849 | 2.59849 | 2.59849 | 1.41784 |
| Cyclopentane | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C6Alkanes(iso) | | 4.63969E-07 | 4.74324E-07 | 4.74324E-07 | 1.24199 | 2.22514 | 2.22514 | 2.22514 | 1.24751 |
| Cyclohexane | | 9.27380E-06 | 9.40920E-06 | 9.40920E-06 | 0.318986 | 0.650343 | 0.650343 | 0.650342 | 0.325909 |
| n-Heptane | | 8.63202E-07 | 8.78707E-07 | 8.78707E-07 | 0.465507 | 0.658508 | 0.658508 | 0.658508 | 0.470006 |
| Methylcyclohexane | | 1.16683E-05 | 1.18259E-05 | 1.18259E-05 | 0.261357 | 0.428084 | 0.428084 | 0.428083 | 0.267599 |
| Octane | | 1.34479E-06 | 1.36625E-06 | 1.36625E-06 | 0.150270 | 0.168413 | 0.168413 | 0.168413 | 0.152868 |
| Nonane | | 1.89693E-06 | 1.92334E-06 | 1.92334E-06 | 0.0392907 | 0.0331405 | 0.0331405 | 0.0331405 | 0.0404863 |
| Decanes+ | | 0.0114763 | 0.0114741 | 0.0114741 | 0.0191012 | 0.00591043 | 0.00591043 | 0.00591042 | 0.0278186 |
| Benzene | | 0.00135234 | 0.00136363 | 0.00136363 | 0.252635 | 0.658308 | 0.658308 | 0.658301 | 0.296238 |
| Toluene | | 0.00456605 | 0.00460351 | 0.00460351 | 0.118057 | 0.256201 | 0.256201 | 0.256199 | 0.151981 |
| Ethylbenzene | | 0.000268648 | 0.000271134 | 0.000271134 | 0.00132224 | 0.00243621 | 0.00243621 | 0.00243619 | 0.00188806 |
| o-Xylene | | 0.00491928 | 0.00494869 | 0.00494869 | 0.00870512 | 0.0154394 | 0.0154394 | 0.0154393 | 0.0136885 |
| n-Hexane | | 8.96306E-09 | 0 | 0 | 0.00877633 | 0.0152315 | 0.0152315 | 0.0152315 | 0.00881223 |
| 2,2,4-Trimethylpentane | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Triethylene Glycol | | 99.1119 | 99.1119 | 99.1119 | 0.00108076 | 0.000394909 | 0.000394909 | 0.000394909 | 0 |
| Ethylene Glycol | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water | | 0.865446 | 0.865418 | 0.865418 | 0.00824312 | 0.141409 | 0.141409 | 0.141409 | 0.167897 |
| Methanol | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| O2 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SO2 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Process Streams | | 21 | 22 | 23 | 24 | 25 | 26 | 27 |
|---|---|---|---|---|---|---|---|---|
| Composition | Status: | Solved | Solved | Solved | Solved | Solved | Solved | Solved |
| Phase: Total | From Block: | SPLT-105 | Reboiler2 | Glycol Regen (with Reflux Coil) | Glycol Regen (with Reflux Coil) | Reflux Coil | Glycol Regenerator | Reflux Coil |
| | To Block: | MIX-103 | Glycol Regen (with Reflux Coil) | Reboiler2 | Reflux Coil | Glycol Regen (with Reflux Coil) | MIX-104 | MIX-104 |
| **Mole Fraction** | | % | % | % | % | % | | % |
| Hydrogen Sulfide | | 0.997908 | 0.000601632 | 0.000110010 | 4.81740 | 0.0109671 | | 5.29804 |
| Carbon Dioxide | | 0.941027 | 1.37375E-06 | 2.46559E-07 | 0.543451 | 0.000344015 | | 0.597761 |
| Nitrogen | | 1.78725 | 2.31011E-12 | 4.11250E-13 | 0.00111698 | 3.21480E-08 | | 0.00122867 |
| Methane | | 72.6547 | 2.14222E-08 | 3.81992E-09 | 0.642100 | 4.31871E-05 | | 0.706306 |
| Ethane | | 12.7652 | 4.35167E-07 | 7.78390E-08 | 1.04160 | 0.000116161 | | 1.14575 |
| Propane | | 6.37164 | 2.44114E-06 | 4.37998E-07 | 1.39677 | 0.000177919 | | 1.53642 |
| i-Butane | | 0.776373 | 8.77775E-07 | 1.57881E-07 | 0.239972 | 2.31805E-05 | | 0.263967 |
| n-Butane | | 1.86309 | 8.20459E-06 | 1.47914E-06 | 1.05601 | 0.000187958 | | 1.16159 |
| i-Pentane | | 0.446065 | 8.43324E-06 | 1.52827E-06 | 0.387384 | 5.94503E-05 | | 0.426117 |
| n-Pentane | | 0.441075 | 1.56327E-05 | 2.83767E-06 | 0.504595 | 7.78646E-05 | | 0.555047 |
| Cyclopentane | | 0 | 0 | 0 | 0 | 0 | | 0 |
| C6Alkanes(iso) | | 0.324919 | 0.000107884 | 1.98023E-05 | 0.766010 | 0.000138913 | | 0.842597 |
| Cyclohexane | | 0.0869178 | 0.00108220 | 0.000205162 | 0.695906 | 0.000477616 | | 0.765449 |
| n-Heptane | | 0.105279 | 0.000135046 | 2.50056E-05 | 0.370484 | 5.55254E-05 | | 0.407527 |
| Methylcyclohexane | | 0.0611718 | 0.00107937 | 0.000205664 | 0.506538 | 0.000268108 | | 0.557164 |
| Octane | | 0.0300370 | 0.000145510 | 2.72323E-05 | 0.151190 | 2.36389E-05 | | 0.166307 |
| Nonane | | 0.00708515 | 0.000135578 | 2.58172E-05 | 0.0507244 | 5.50480E-06 | | 0.0557963 |
| Decanes+ | | 0.00329310 | 0.112546 | 0.0270332 | 0.149830 | 0.00103579 | | 0.164710 |
| Benzene | | 0.0851216 | 0.0934838 | 0.0186275 | 4.44697 | 0.0321202 | | 4.88846 |
| Toluene | | 0.0370224 | 0.194004 | 0.0402393 | 2.89703 | 0.0263971 | | 3.18409 |
| Ethylbenzene | | 0.000399163 | 0.00726734 | 0.00158562 | 0.0414357 | 0.000400007 | | 0.0455393 |
| o-Xylene | | 0.00289393 | 0.112146 | 0.0253144 | 0.365027 | 0.00507604 | | 0.401022 |
| n-Hexane | | 0.00229519 | 1.47458E-06 | 2.74193E-07 | 0.00488828 | 8.15432E-07 | | 0.00537702 |
| 2,2,4-Trimethylpentane | | 0 | 0 | 0 | 0 | 0 | | 0 |
| Triethylene Glycol | | 0 | 8.28699 | 78.0993 | 0.603342 | 6.62097 | | 0.00157861 |
| Ethylene Glycol | | 0 | 0 | 0 | 0 | 0 | | 0 |
| Water | | 0.209179 | 91.1902 | 21.7872 | 78.3202 | 93.3010 | | 76.8221 |
| Methanol | | 0 | 0 | 0 | 0 | 0 | | 0 |
| O2 | | 0 | 0 | 0 | 0 | 0 | | 0 |
| SO2 | | 0 | 0 | 0 | 0 | 0 | | 0 |
| **Molar Flow** | | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h |
| Hydrogen Sulfide | | 0 | 7.01711E-05 | 7.21826E-05 | 0.601935 | 0.000124576 | 0 | 0.601810 |
| Carbon Dioxide | | 0 | 1.60227E-07 | 1.61779E-07 | 0.0679042 | 3.90770E-06 | 0 | 0.0679003 |
| Nitrogen | | 0 | 2.69439E-13 | 2.69840E-13 | 0.000139566 | 3.65172E-10 | 0 | 0.000139566 |
| Methane | | 0 | 2.49857E-09 | 2.50643E-09 | 0.0802305 | 4.90566E-07 | 0 | 0.0802300 |
| Ethane | | 0 | 5.07556E-08 | 5.10738E-08 | 0.130148 | 1.31948E-06 | 0 | 0.130147 |
| Propane | | 0 | 2.84722E-07 | 2.87391E-07 | 0.174526 | 2.02100E-06 | 0 | 0.174524 |
| i-Butane | | 0 | 1.02379E-07 | 1.03593E-07 | 0.0299845 | 2.63310E-07 | 0 | 0.0299842 |
| n-Butane | | 0 | 9.56940E-07 | 9.70530E-07 | 0.131949 | 2.13503E-06 | 0 | 0.131947 |
| i-Pentane | | 0 | 9.83608E-07 | 1.00277E-06 | 0.0484037 | 6.75302E-07 | 0 | 0.0484031 |
| n-Pentane | | 0 | 1.82331E-06 | 1.86193E-06 | 0.0630492 | 8.84472E-07 | 0 | 0.0630483 |
| Cyclopentane | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C6Alkanes(iso) | | 0 | 1.25831E-05 | 1.29932E-05 | 0.0957130 | 1.57793E-06 | 0 | 0.0957114 |
| Cyclohexane | | 0 | 0.000126222 | 0.000134616 | 0.0869536 | 5.42529E-06 | 0 | 0.0869482 |
| n-Heptane | | 0 | 1.57511E-05 | 1.64074E-05 | 0.0462921 | 6.30718E-07 | 0 | 0.0462914 |
| Methylcyclohexane | | 0 | 0.000125892 | 0.000134946 | 0.0632919 | 3.04546E-06 | 0 | 0.0632889 |
| Octane | | 0 | 1.69715E-05 | 1.78684E-05 | 0.0188912 | 2.68516E-07 | 0 | 0.0188909 |
| Nonane | | 0 | 1.58131E-05 | 1.69398E-05 | 0.00633802 | 6.25296E-08 | 0 | 0.00633796 |
| Decanes+ | | 0 | 0.0131267 | 0.0177378 | 0.0187213 | 1.17657E-05 | 0 | 0.0187096 |
| Benzene | | 0 | 0.0109034 | 0.0122224 | 0.555650 | 0.000364856 | 0 | 0.555285 |
| Toluene | | 0 | 0.0226276 | 0.0264029 | 0.361984 | 0.000299847 | 0 | 0.361684 |
| Ethylbenzene | | 0 | 0.000847623 | 0.00104040 | 0.00517740 | 4.54372E-06 | 0 | 0.00517286 |
| o-Xylene | | 0 | 0.0130801 | 0.0166100 | 0.0456101 | 5.76593E-05 | 0 | 0.0455525 |
| n-Hexane | | 0 | 1.71987E-07 | 1.79911E-07 | 0.000610791 | 9.26258E-09 | 0 | 0.000610782 |
| 2,2,4-Trimethylpentane | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Triethylene Glycol | | 0 | 0.966550 | 51.2446 | 0.0753876 | 0.0752083 | 0 | 0.000179316 |
| Ethylene Glycol | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water | | 0 | 10.6359 | 14.2956 | 9.78612 | 1.05982 | 0 | 8.72631 |
| Methanol | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| O2 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SO2 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Mass Fraction** | | % | % | % | % | % | | % |
| Hydrogen Sulfide | | 1.51526 | 0.000695818 | 3.08983E-05 | 5.75253 | 0.0139395 | | 6.28842 |
| Carbon Dioxide | | 1.84516 | 2.05167E-06 | 8.94250E-08 | 0.837996 | 0.000564635 | | 0.916198 |
| Nitrogen | | 2.23068 | 2.19610E-12 | 9.49431E-14 | 0.00109634 | 3.35864E-08 | | 0.00119871 |
| Methane | | 51.9301 | 1.16624E-08 | 5.05031E-10 | 0.360918 | 2.58386E-05 | | 0.394620 |
| Ethane | | 17.1015 | 4.44048E-07 | 1.92890E-08 | 1.09738 | 0.000130263 | | 1.19984 |
| Propane | | 12.5179 | 3.65293E-06 | 1.59170E-07 | 2.15801 | 0.000292592 | | 2.35951 |
| i-Butane | | 2.01047 | 1.73133E-06 | 7.56246E-08 | 0.488694 | 5.02469E-05 | | 0.534326 |
| n-Butane | | 4.82460 | 1.61828E-05 | 7.08504E-07 | 2.15053 | 0.000407424 | | 2.35132 |
| i-Pentane | | 1.43388 | 2.06480E-05 | 9.08704E-07 | 0.979279 | 0.000159966 | | 1.07071 |
| n-Pentane | | 1.41784 | 3.82751E-05 | 1.68726E-06 | 1.27558 | 0.000209514 | | 1.39468 |
| Cyclopentane | | 0 | 0 | 0 | 0 | 0 | | 0 |
| C6Alkanes(iso) | | 1.24751 | 0.000315497 | 1.40634E-05 | 2.31288 | 0.000446448 | | 2.52882 |
| Cyclohexane | | 0.325909 | 0.00309075 | 0.000142296 | 2.05205 | 0.00149908 | | 2.24354 |
| n-Heptane | | 0.470006 | 0.000459212 | 2.06493E-05 | 1.30071 | 0.000207497 | | 1.42216 |
| Methylcyclohexane | | 0.267599 | 0.00359646 | 0.000166418 | 1.74260 | 0.000981755 | | 1.90523 |
| Octane | | 0.152868 | 0.000564055 | 2.56361E-05 | 0.605108 | 0.000100704 | | 0.661605 |
| Nonane | | 0.0404863 | 0.000590090 | 2.72882E-05 | 0.227943 | 2.63306E-05 | | 0.249227 |
| Decanes+ | | 0.0278186 | 0.724151 | 0.0422413 | 0.995364 | 0.00732427 | | 1.08763 |
| Benzene | | 0.296238 | 0.247803 | 0.0119912 | 12.1707 | 0.0935705 | | 13.2985 |
| Toluene | | 0.151981 | 0.606605 | 0.0305551 | 9.35253 | 0.0907070 | | 10.2174 |
| Ethylbenzene | | 0.00188806 | 0.0261825 | 0.00138730 | 0.154132 | 0.00158377 | | 0.168377 |
| o-Xylene | | 0.0136885 | 0.404034 | 0.0221484 | 1.35782 | 0.0200979 | | 1.48274 |
| n-Hexane | | 0.00881223 | 4.31226E-06 | 1.94729E-07 | 0.0147596 | 2.62069E-06 | | 0.0161376 |
| 2,2,4-Trimethylpentane | | 0 | 0 | 0 | 0 | 0 | | 0 |
| Triethylene Glycol | | 0 | 42.2321 | 96.6565 | 3.17461 | 37.0815 | | 0.00825623 |
| Ethylene Glycol | | 0 | 0 | 0 | 0 | 0 | | 0 |
| Water | | 0.167897 | 55.7498 | 3.23471 | 49.4368 | 62.6862 | | 48.1995 |
| Methanol | | 0 | 0 | 0 | 0 | 0 | | 0 |
| O2 | | 0 | 0 | 0 | 0 | 0 | | 0 |
| SO2 | | 0 | 0 | 0 | 0 | 0 | | 0 |

| Process Streams | | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Composition | Status: | Solved | Solved | Solved | Solved | Solved | Solved | Solved | Solved | Solved | Solved |
| Phase: Total | From Block: | SPLT-106 | SPLT-106 | Reboiler2 | Reboiler | SPLT-109 | SPLT-108 | SPLT-107 | SPLT-107 | SPLT-108 | SPLT-109 |
| | To Block: | Glycol Regen (with Reflux Coil) | Glycol Regenerator | MIX-105 | MIX-105 | Reboiler | Reboiler | Reboiler | Reboiler2 | Reboiler2 | Reboiler2 |
| **Mole Fraction** | | % | % | % | | % | % | % | % | % | % |
| Hydrogen Sulfide | | 0.921466 | 0.921466 | 3.72831E-06 | | 0.986743 | 0 | 6.37593 | 6.37593 | 0 | 0.986743 |
| Carbon Dioxide | | 0.103966 | 0.103966 | 2.87612E-09 | | 0.941949 | 0 | 3.55307 | 3.55307 | 0 | 0.941949 |
| Nitrogen | | 0.000213696 | 0.000213696 | 7.42781E-16 | | 1.79200 | 100 | 0.357381 | 0.357381 | 100 | 1.79200 |
| Methane | | 0.122844 | 0.122844 | 1.45693E-11 | | 72.8450 | 0 | 47.4233 | 47.4233 | 0 | 72.8450 |
| Ethane | | 0.199274 | 0.199274 | 5.89763E-10 | | 12.7954 | 0 | 19.5354 | 19.5354 | 0 | 12.7954 |
| Propane | | 0.267223 | 0.267223 | 4.94820E-09 | | 6.38370 | 0 | 12.7430 | 12.7430 | 0 | 6.38370 |
| i-Butane | | 0.0459104 | 0.0459104 | 2.24981E-09 | | 0.777550 | 0 | 1.54698 | 1.54698 | 0 | 0.777550 |
| n-Butane | | 0.202030 | 0.202030 | 2.51900E-08 | | 1.86441 | 0 | 4.47313 | 4.47313 | 0 | 1.86441 |
| i-Pentane | | 0.0741125 | 0.0741125 | 3.55221E-08 | | 0.445888 | 0 | 0.995610 | 0.995610 | 0 | 0.445888 |
| n-Pentane | | 0.0965366 | 0.0965366 | 7.15747E-08 | | 0.440498 | 0 | 1.06141 | 1.06141 | 0 | 0.440498 |
| Cyclopentane | | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| C6Alkanes(iso) | | 0.146549 | 0.146549 | 7.60237E-07 | | 0.323207 | 0 | 0.760968 | 0.760968 | 0 | 0.323207 |
| Cyclohexane | | 0.133144 | 0.133144 | 1.55596E-05 | | 0.0849993 | 0 | 0.227736 | 0.227736 | 0 | 0.0849993 |
| n-Heptane | | 0.0708802 | 0.0708802 | 1.21641E-06 | | 0.104183 | 0 | 0.193677 | 0.193677 | 0 | 0.104183 |
| Methylcyclohexane | | 0.0969187 | 0.0969187 | 1.67803E-05 | | 0.0596941 | 0 | 0.128491 | 0.128491 | 0 | 0.0596941 |
| Octane | | 0.0289263 | 0.0289263 | 1.66236E-06 | | 0.0295016 | 0 | 0.0434503 | 0.0434503 | 0 | 0.0295016 |
| Nonane | | 0.00970610 | 0.00970610 | 2.08843E-06 | | 0.00687008 | 0 | 0.00761514 | 0.00761514 | 0 | 0.00687008 |
| Decanes+ | | 0.0357074 | 0.0357074 | 0.00854668 | | 0.00225923 | 0 | 0.000918682 | 0.000918682 | 0 | 0.00225923 |
| Benzene | | 0.852245 | 0.852245 | 0.00244462 | | 0.0725309 | 0 | 0.248373 | 0.248373 | 0 | 0.0725309 |
| Toluene | | 0.559574 | 0.559574 | 0.00699750 | | 0.0287342 | 0 | 0.0819471 | 0.0819471 | 0 | 0.0287342 |
| Ethylbenzene | | 0.00821559 | 0.00821559 | 0.000357311 | | 0.000279304 | 0 | 0.000676279 | 0.000676279 | 0 | 0.000279304 |
| o-Xylene | | 0.0751526 | 0.0751526 | 0.00654279 | | 0.00183882 | 0 | 0.00428590 | 0.00428590 | 0 | 0.00183882 |
| n-Hexane | | 0.000935212 | 0.000935212 | 1.46864E-08 | | 0.00228390 | 0 | 0.00520896 | 0.00520896 | 0 | 0.00228390 |
| 2,2,4-Trimethylpentane | | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Triethylene Glycol | | 76.9836 | 76.9836 | 93.1918 | | 0.000161393 | 0 | 7.74993E-05 | 7.74993E-05 | 0 | 0.000161393 |
| Ethylene Glycol | | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Water | | 18.9648 | 18.9648 | 6.78332 | | 0.0102612 | 0 | 0.231328 | 0.231328 | 0 | 0.0102612 |
| Methanol | | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| O2 | | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| SO2 | | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| **Molar Flow** | | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h | lbmol/h |
| Hydrogen Sulfide | | 0.601812 | 0 | 2.01147E-06 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Carbon Dioxide | | 0.0679003 | 0 | 1.55170E-09 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nitrogen | | 0.000139566 | 0 | 4.00739E-16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Methane | | 0.0802300 | 0 | 7.86032E-12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ethane | | 0.130147 | 0 | 3.18184E-10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Propane | | 0.174524 | 0 | 2.66961E-09 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| i-Butane | | 0.0299842 | 0 | 1.21380E-09 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| n-Butane | | 0.131947 | 0 | 1.35903E-08 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| i-Pentane | | 0.0484031 | 0 | 1.91646E-08 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| n-Pentane | | 0.0630483 | 0 | 3.86154E-08 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cyclopentane | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C6Alkanes(iso) | | 0.0957118 | 0 | 4.10157E-07 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cyclohexane | | 0.0869566 | 0 | 8.39458E-06 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| n-Heptane | | 0.0462921 | 0 | 6.56267E-07 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Methylcyclohexane | | 0.0632979 | 0 | 9.05317E-06 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Octane | | 0.0188918 | 0 | 8.96862E-07 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nonane | | 0.00633909 | 0 | 1.12673E-06 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Decanes+ | | 0.0233206 | 0 | 0.00461104 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Benzene | | 0.556604 | 0 | 0.00131890 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Toluene | | 0.365460 | 0 | 0.00377523 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ethylbenzene | | 0.00536563 | 0 | 0.000192773 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| o-Xylene | | 0.0490824 | 0 | 0.00352992 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| n-Hexane | | 0.000610790 | 0 | 7.92351E-09 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2,2,4-Trimethylpentane | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Triethylene Glycol | | 50.2783 | 0 | 50.2781 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ethylene Glycol | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water | | 12.3860 | 0 | 3.65968 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Methanol | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| O2 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SO2 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Mass Fraction** | | % | % | % | | % | % | % | % | % | % |
| Hydrogen Sulfide | | 0.258179 | 0.258179 | 8.99869E-07 | | 1.49957 | 0 | 7.37329 | 7.37329 | 0 | 1.49957 |
| Carbon Dioxide | | 0.0376155 | 0.0376155 | 8.96417E-10 | | 1.84853 | 0 | 5.30588 | 5.30588 | 0 | 1.84853 |
| Nitrogen | | 4.92146E-05 | 4.92146E-05 | 1.47361E-16 | | 2.23850 | 100 | 0.339707 | 0.339707 | 100 | 2.23850 |
| Methane | | 0.0162015 | 0.0162015 | 1.65526E-12 | | 52.1103 | 0 | 25.8149 | 25.8149 | 0 | 52.1103 |
| Ethane | | 0.0492608 | 0.0492608 | 1.25590E-10 | | 17.1565 | 0 | 19.9319 | 19.9319 | 0 | 17.1565 |
| Propane | | 0.0968722 | 0.0968722 | 1.54525E-09 | | 12.5522 | 0 | 19.0667 | 19.0667 | 0 | 12.5522 |
| i-Butane | | 0.0219373 | 0.0219373 | 9.26072E-10 | | 2.01522 | 0 | 3.05094 | 3.05094 | 0 | 2.01522 |
| n-Butane | | 0.0965360 | 0.0965360 | 1.03688E-08 | | 4.83211 | 0 | 8.82188 | 8.82188 | 0 | 4.83211 |
| i-Pentane | | 0.0439593 | 0.0439593 | 1.81503E-08 | | 1.43452 | 0 | 2.43739 | 2.43739 | 0 | 1.43452 |
| n-Pentane | | 0.0572600 | 0.0572600 | 3.65717E-08 | | 1.41718 | 0 | 2.59849 | 2.59849 | 0 | 1.41718 |
| Cyclopentane | | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| C6Alkanes(iso) | | 0.103824 | 0.103824 | 4.63969E-07 | | 1.24199 | 0 | 2.22514 | 2.22514 | 0 | 1.24199 |
| Cyclohexane | | 0.0921200 | 0.0921200 | 9.27380E-06 | | 0.318986 | 0 | 0.650343 | 0.650343 | 0 | 0.318986 |
| n-Heptane | | 0.0583891 | 0.0583891 | 8.63202E-07 | | 0.465507 | 0 | 0.658508 | 0.658508 | 0 | 0.465507 |
| Methylcyclohexane | | 0.0782327 | 0.0782327 | 1.16683E-05 | | 0.261357 | 0 | 0.428084 | 0.428084 | 0 | 0.261357 |
| Octane | | 0.0271642 | 0.0271642 | 1.34479E-06 | | 0.150270 | 0 | 0.168413 | 0.168413 | 0 | 0.150270 |
| Nonane | | 0.0102341 | 0.0102341 | 1.89693E-06 | | 0.0392907 | 0 | 0.0331405 | 0.0331405 | 0 | 0.0392907 |
| Decanes+ | | 0.0556590 | 0.0556590 | 0.0114763 | | 0.0191012 | 0 | 0.00591043 | 0.00591043 | 0 | 0.0191012 |
| Benzene | | 0.547283 | 0.547283 | 0.00135234 | | 0.252635 | 0 | 0.658308 | 0.658308 | 0 | 0.252635 |
| Toluene | | 0.423866 | 0.423866 | 0.00456605 | | 0.118057 | 0 | 0.256201 | 0.256201 | 0 | 0.118057 |
| Ethylbenzene | | 0.00717052 | 0.00717052 | 0.000268648 | | 0.00132224 | 0 | 0.00243621 | 0.00243621 | 0 | 0.00132224 |
| o-Xylene | | 0.0655927 | 0.0655927 | 0.00491928 | | 0.00870512 | 0 | 0.0154394 | 0.0154394 | 0 | 0.00870512 |
| n-Hexane | | 0.000662558 | 0.000662558 | 8.96306E-09 | | 0.00877633 | 0 | 0.0152315 | 0.0152315 | 0 | 0.00877633 |
| 2,2,4-Trimethylpentane | | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Triethylene Glycol | | 95.0431 | 95.0431 | 99.1119 | | 0.00108076 | 0 | 0.000394909 | 0.000394909 | 0 | 0.00108076 |
| Ethylene Glycol | | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Water | | 2.80880 | 2.80880 | 0.865446 | | 0.00824312 | 0 | 0.141409 | 0.141409 | 0 | 0.00824312 |
| Methanol | | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| O2 | | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| SO2 | | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |

| Process Streams | | Blowdown | Compression/Recycle | Dry Basis Gas | Dry Gas | Dry Gas Stripping Gas | Feed Saturant (Methanol) | Flash Gas | Flash Gas Stripping Gas |
|---|---|---|---|---|---|---|---|---|---|
| Composition | Status: | Solved | Solved | Solved | Solved | Solved | Solved | Solved | Solved |
| Phase: Total | From Block: | Glycol Makeup | SPLT-100 | – | SPLT-103 | SPLT-103 | – | Rich Flash | SPLT-100 |
| | To Block: | – | Compressor | Feed Fraction MeOH Saturator | – | SPLT-109 | Feed Fraction MeOH Saturator | SPLT-100 | SPLT-107 |
| Mass Flow | | lb/h | lb/h | lb/h | lb/h | lb/h | lb/h | lb/h | lb/h |
| Hydrogen Sulfide | | 1.27253E-09 | 6.86823 | 1493.68* | 1473.04 | 0 | 0 | 6.86823 | 0 |
| Carbon Dioxide | | 3.23404E-12 | 4.94244 | 1818.88* | 1815.82 | 0 | 0 | 4.94244 | 0 |
| Nitrogen | | 0 | 0.316438 | 2198.91* | 2198.89 | 0 | 0 | 0.316438 | 0 |
| Methane | | 6.08035E-15 | 24.0466 | 51190.6* | 51188.2 | 0 | 0 | 24.0466 | 0 |
| Ethane | | 4.57944E-13 | 18.5666 | 16857.9* | 16852.9 | 0 | 0 | 18.5666 | 0 |
| Propane | | 5.59716E-12 | 17.7607 | 12339.6* | 12330.1 | 0 | 0 | 17.7607 | 0 |
| i-Butane | | 3.34160E-12 | 2.84195 | 1981.83* | 1979.56 | 0 | 0 | 2.84195 | 0 |
| n-Butane | | 3.72140E-11 | 8.21759 | 4755.89* | 4746.60 | 0 | 0 | 8.21759 | 0 |
| i-Pentane | | 6.47961E-11 | 2.27043 | 1413.46* | 1409.14 | 0 | 0 | 2.27043 | 0 |
| n-Pentane | | 1.30151E-10 | 2.42050 | 1397.65* | 1392.10 | 0 | 0 | 2.42050 | 0 |
| Cyclopentane | | 0 | 0 | 0* | 0 | 0 | 0 | 0 | 0 |
| C6Alkanes(iso) | | 1.64071E-09 | 2.07272 | 1229.74* | 1220.01 | 0 | 0 | 2.07272 | 0 |
| Cyclohexane | | 3.25469E-08 | 0.605795 | 321.268* | 313.341 | 0 | 0 | 0.605795 | 0 |
| n-Heptane | | 3.03949E-09 | 0.613401 | 463.313* | 457.270 | 0 | 0 | 0.613401 | 0 |
| Methylcyclohexane | | 4.09063E-08 | 0.398761 | 263.789* | 256.732 | 0 | 0 | 0.398761 | 0 |
| Octane | | 4.72593E-09 | 0.156877 | 150.691* | 147.611 | 0 | 0 | 0.156877 | 0 |
| Nonane | | 6.65294E-09 | 0.0308705 | 39.9097* | 38.5954 | 0 | 0 | 0.0308705 | 0 |
| Decanes+ | | 3.96895E-05 | 0.00550558 | 27.4225* | 18.7632 | 0 | 0 | 0.00550558 | 0 |
| Benzene | | 4.71687E-06 | 0.613215 | 292.019* | 248.164 | 0 | 0 | 0.613215 | 0 |
| Toluene | | 1.59238E-05 | 0.238652 | 149.817* | 115.968 | 0 | 0 | 0.238652 | 0 |
| Ethylbenzene | | 9.37866E-07 | 0.00226933 | 1.86117* | 1.29885 | 0 | 0 | 0.00226933 | 0 |
| o-Xylene | | 1.71177E-05 | 0.0143818 | 13.4935* | 8.55107 | 0 | 0 | 0.0143818 | 0 |
| n-Hexane | | 3.17410E-11 | 0.0141881 | 8.68674* | 8.62102 | 0 | 0 | 0.0141881 | 0 |
| 2,2,4-Trimethylpentane | | 0 | 0 | 0* | 0 | 0 | 0 | 0 | 0 |
| Triethylene Glycol | | 0.342833 | 0.000367858 | 0* | 1.06163 | 0 | 0 | 0.000367858 | 0 |
| Ethylene Glycol | | 0 | 0 | 0* | 0 | 0 | 0 | 0 | 0 |
| Water | | 0.00299352 | 0.131723 | 0* | 8.09725 | 0 | 0 | 0.131723 | 0 |
| Methanol | | 0 | 0 | 0* | 0 | 0 | 0 | 0 | 0 |
| O2 | | 0 | 0 | 0* | 0 | 0 | 0 | 0 | 0 |
| SO2 | | 0 | 0 | 0* | 0 | 0 | 0 | 0 | 0 |
| **Property** | **Units** | | | | | | | | |
| Temperature | °F | 208.762 | 110 | 120* | 123.119 | | | 110* | 110 |
| Pressure | psig | 0.104051 | 60 | 1000* | 995 | 995 | 1000 | 60* | 60 |
| Mole Fraction Vapor | % | 0 | 100 | 99.9928 | 100 | | | 100 | |
| Mole Fraction Light Liquid | % | 100 | 0 | 0.00724482 | 0 | | | 0 | |
| Mole Fraction Heavy Liquid | % | 0 | 0 | 0 | 0 | | | 0 | |
| Phase Mole Fraction | % | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Molecular Weight | lb/lbmol | 141.203 | 29.4709 | 22.4541 | 22.4257 | 22.4257 | 32.0419 | 29.4709 | 29.4709 |
| Mass Density | lb/ft^3 | 65.3901 | 0.369339 | 4.54309 | 4.46065 | | | 0.369339 | |
| Molar Flow | lbmol/h | 0.00244970 | 3.16076 | 4382.74 | 4380.25 | 0 | 0 | 3.16076 | 0 |
| Mass Flow | lb/h | 0.345905 | 93.1502 | 98410.4 | 98230.4 | 0 | 0 | 93.1502 | 0 |
| Vapor Volumetric Flow | ft^3/h | 0.00528986 | 252.208 | 21661.6 | 22021.5 | 0 | 0 | 252.208 | 0 |
| Liquid Volumetric Flow | gpm | 0.000659515 | 31.4441 | 2700.66 | 2745.54 | 0 | 0 | 31.4441 | 0 |
| Std Vapor Volumetric Flow | MMSCFD | 2.23109E-05 | 0.0287870 | 39.9163 | 39.8936 | 0* | 0 | 0.0287870 | 0 |
| Std Liquid Volumetric Flow | sgpm | 0.000612891 | 0.431134 | 538.622 | 538.120 | 0 | 0 | 0.431134 | 0 |
| Compressibility | | 0.00436616 | 0.971077 | 0.805952 | 0.811403 | | | 0.971077 | |
| Specific Gravity | | 1.04844 | 1.01755 | | 0.774303 | | | 1.01755 | |
| API Gravity | | -6.72483 | | | | | | | |
| Enthalpy | Btu/h | -786.104 | -126519 | -1.55214E+08 | -1.54978E+08 | 0 | 0 | -126519 | 0 |
| Mass Enthalpy | Btu/lb | -2272.60 | -1358.23 | -1577.21 | -1577.70 | -1577.70 | | -1358.23 | |
| Mass Cp | Btu/(lb*°F) | 0.595890 | 0.436360 | 0.635111 | 0.631747 | | | 0.436360 | |
| Ideal Gas CpCv Ratio | | 1.03296 | 1.18742 | 1.22665 | 1.22604 | | | 1.18742 | 1.18742 |
| Dynamic Viscosity | cP | 3.65050 | 0.0108090 | | 0.0137123 | | | 0.0108090 | |
| Kinematic Viscosity | cSt | 3.48514 | 1.82700 | | 0.191907 | | | 1.82700 | |
| Thermal Conductivity | Btu/(h*ft*°F) | 0.113444? | 0.0157425 | | 0.0229020 | | | 0.0157425 | |
| Surface Tension | lbf/ft | 0.00266870? | | | | | | | |
| Net Ideal Gas Heating Value | Btu/ft^3 | 3521.40 | 1412.33 | 1169.11 | 1167.86 | 1167.86 | 766.100 | 1412.33 | 1412.33 |
| Net Liquid Heating Value | Btu/lb | 9197.24 | 18069.7 | 19687.7 | 19691.7 | 19691.7 | 8557 | 18069.7 | 18069.7 |
| Gross Ideal Gas Heating Value | Btu/ft^3 | 3852.77 | 1545.18 | 1286.77 | 1285.47 | 1285.47 | 866.700 | 1545.18 | 1545.18 |
| Gross Liquid Heating Value | Btu/lb | 10087.8 | 19780.9 | 21676.7 | 21682.2 | 21682.2 | 9749 | 19780.9 | 19780.9 |

| Process Streams | | Flash Gas Vapors Vented | Gas Injection Rate for Kimray Pump | Lean Glycol Feed | Lean TEG | Liquid | Makeup | MeOH if Flow Known |
|---|---|---|---|---|---|---|---|---|
| Composition | Status: | Solved | Solved | Solved | Solved | Solved | Solved | Solved |
| Phase: Total | From Block: | SPLT-100 | -- | Cooler | MIX-105 | KO Drum | -- | -- |
| | To Block: | Flash Gas Vent | MIX-101 | Glycol Contactor | Cross Exchanger | -- | Glycol Makeup | MIX-103 |
| Mass Flow | | lb/h | lb/h | lb/h | lb/h | lb/h | lb/h | lb/h |
| Hydrogen Sulfide | | 0 | 7.11705E-17 | 2.80297E-05 | 6.85526E-05 | 0.128070 | 0 | 0 |
| Carbon Dioxide | | 0 | 8.65075E-17 | 0 | 6.82896E-08 | 0.0711923 | 0 | 0 |
| Nitrogen | | 0 | 1.04317E-16 | 0 | 1.12261E-14 | 0.0191698 | 0 | 0 |
| Methane | | 0 | 2.42925E-15 | 0 | 1.26099E-10 | 1.08071 | 0 | 0 |
| Ethane | | 0 | 8.00462E-16 | 0 | 9.56750E-09 | 1.14645 | 0 | 0 |
| Propane | | 0 | 5.86072E-16 | 0 | 1.17718E-07 | 1.82665 | 0 | 0 |
| i-Butane | | 0 | 9.41157E-17 | 0 | 7.05487E-08 | 0.529440 | 0 | 0 |
| n-Butane | | 0 | 2.25903E-16 | 0 | 7.89899E-07 | 1.62600 | 0 | 0 |
| i-Pentane | | 0 | 6.71142E-17 | 0 | 1.38270E-06 | 0.824412 | 0 | 0 |
| n-Pentane | | 0 | 6.63635E-17 | 2.86681E-06 | 2.78605E-06 | 0.991850 | 0 | 0 |
| Cyclopentane | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C6Alkanes(iso) | | 0 | 5.83593E-17 | 3.61395E-05 | 3.53454E-05 | 1.48241 | 0 | 0 |
| Cyclohexane | | 0 | 1.52388E-17 | 0.000716902 | 0.000706483 | 0.609049 | 0 | 0 |
| n-Heptane | | 0 | 2.19392E-17 | 6.69501E-05 | 6.57593E-05 | 1.40465 | 0 | 0 |
| Methylcyclohexane | | 0 | 1.24915E-17 | 0.000901034 | 0.000888895 | 0.842266 | 0 | 0 |
| Octane | | 0 | 7.11156E-18 | 0.000104097 | 0.000102447 | 0.921880 | 0 | 0 |
| Nonane | | 0 | 1.87075E-18 | 0.000146543 | 0.000144509 | 0.501489 | 0 | 0 |
| Decanes+ | | 0 | 1.05854E-18 | 0.874231 | 0.874270 | 5.11187 | 0 | 0 |
| Benzene | | 0 | 1.38578E-17 | 0.103897 | 0.103022 | 0.481824 | 0 | 0 |
| Toluene | | 0 | 7.09273E-18 | 0.350749 | 0.347844 | 0.526498 | 0 | 0 |
| Ethylbenzene | | 0 | 8.77573E-20 | 0.0206582 | 0.0204658 | 0.0133445 | 0 | 0 |
| o-Xylene | | 0 | 6.35577E-19 | 0.377048 | 0.374754 | 0.108665 | 0 | 0 |
| n-Hexane | | 0 | 4.12098E-19 | 0 | 6.82812E-07 | 0.0130837 | 0 | 0 |
| 2,2,4-Trimethylpentane | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Triethylene Glycol | | 0 | 6.31695E-24 | 7551.50 | 7550.41 | 0.000234685 | 0 | 0 |
| Ethylene Glycol | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water | | 0 | 7.84691E-18 | 65.9376 | 65.9302 | 0.209619 | 0 | 0 |
| Methanol | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| O2 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SO2 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Property** | **Units** | | | | | | | |
| Temperature | °F | 110 | 119.975 | 129.975* | 400.000 | 119.975 | 80* | 120* |
| Pressure | psig | 60 | 1000 | 1005 | 0.204051 | 1000 | 14.7041* | 1000* |
| Mole Fraction Vapor | % | | 100 | 0 | 0 | 0 | | |
| Mole Fraction Light Liquid | % | | 0 | 100 | 100 | 96.5910 | | |
| Mole Fraction Heavy Liquid | % | | 0 | 0 | 0 | 3.40903 | | |
| Phase Mole Fraction | % | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Molecular Weight | lb/lbmol | 29.4709 | 22.4469 | 141.203 | 141.203 | 62.7874 | 149.079 | 32.0419 |
| Mass Density | lb/ft^3 | | 4.54218 | 68.3420 | 58.0654 | 37.8391 | | |
| Molar Flow | lbmol/h | 0 | 2.08460E-16 | 53.9589 | 53.9512 | 0.326034 | 0 | 0 |
| Mass Flow | lb/h | 0 | 4.67928E-15 | 7619.16 | 7618.06 | 20.4708 | 0 | 0 |
| Vapor Volumetric Flow | ft^3/h | 0 | 1.03018E-15 | 111.486 | 131.198 | 0.540996 | 0 | 0 |
| Liquid Volumetric Flow | gpm | 0 | 1.28438E-16 | 13.8995 | 16.3571 | 0.0674488 | 0 | 0 |
| Std Vapor Volumetric Flow | MMSCFD | 0 | 1.89858E-18 | 0.491437 | 0.491367 | 0.00296939 | 0 | 0 |
| Std Liquid Volumetric Flow | sgpm | 0 | 2.55819E-17 | 13.5 | 13.4980 | 0.0665521 | 0 | 0* |
| Compressibility | | | 0.805887 | 0.332849 | 0.00384949 | 0.270592 | | |
| Specific Gravity | | | 0.775032 | 1.09577 | 0.931002 | 0.606701 | | |
| API Gravity | | | | -6.86586 | -6.72488 | 87.3896 | | |
| Enthalpy | Btu/h | 0 | -7.41309E-12 | -1.76422E+07 | -1.63961E+07 | -20510.5 | 0 | 0 |
| Mass Enthalpy | Btu/lb | | -1584.24 | -2315.50 | -2152.27 | -1001.94 | | |
| Mass Cp | Btu/(lb*°F) | | 0.635015 | 0.561678 | 0.659768 | 0.574062 | | |
| Ideal Gas CpCv Ratio | | 1.18742 | 1.22679 | 1.03607 | 1.02869 | 1.08395 | 1.03675 | 1.22233 |
| Dynamic Viscosity | cP | | 0.0137236 | 11.7939 | 0.748874 | 0.178459 | | |
| Kinematic Viscosity | cSt | | 0.188617 | 10.7733 | 0.805139 | 0.294426 | | |
| Thermal Conductivity | Btu/(h*ft*°F) | | 0.0228410 | 0.113546 | 0.106405? | 0.0619705 | | |
| Surface Tension | lbf/ft | | | 0.00291972 | 0.002010127 | 0.000533997? | | |
| Net Ideal Gas Heating Value | Btu/ft^3 | 1412.33 | 1166.69 | 3521.40 | 3521.39 | 3136.79 | 3745.75 | 766.100 |
| Net Liquid Heating Value | Btu/lb | 18069.7 | 19651.6 | 9197.24 | 9197.23 | 18804.5 | 9274.43 | 8557 |
| Gross Ideal Gas Heating Value | Btu/ft^3 | 1545.18 | 1284.22 | 3852.77 | 3852.76 | 3383.44 | 4095.08 | 866.700 |
| Gross Liquid Heating Value | Btu/lb | 19780.9 | 21638.8 | 10087.8 | 10087.8 | 20295.5 | 10163.6 | 9749 |

| Process Streams | | Nitrogen Stripping Gas | No Flash Tank | Overheads | OVHD to Emissions Control Device | OVHD Vent Emissions | Recycle Guess | Rich TEG | Saturant (Methanol) |
|---|---|---|---|---|---|---|---|---|---|
| Composition | Status: | Solved | Solved | Solved | Solved | Solved | Solved | Solved | Solved |
| Phase: Total | From Block: | -- | SPLT-102 | MIX-104 | SPLT-104 | SPLT-104 | TEG Recycle | Glycol Contactor | |
| | To Block: | SPLT-108 | MIX-102 | SPLT-104 | Regen Control | Regen Vent | Glycol Makeup | MIX-101 | Methanol Saturator |
| Mass Flow | | lb/h | lb/h | lb/h | lb/h | lb/h | lb/h | lb/h | lb/h |
| Hydrogen Sulfide | | 0 | 0 | 20.5102 | 20.5102 | 0 | 2.80310E-05 | 27.3785 | 0 |
| Carbon Dioxide | | 0 | 0 | 2.98826 | 2.98826 | 0 | 7.12386E-08 | 7.93070 | 0 |
| Nitrogen | | 0 | 0 | 0.00390971 | 0.00390971 | 0 | 0 | 0.320347 | 0 |
| Methane | | 0 | 0 | 1.28709 | 1.28709 | 0 | 1.33936E-10 | 25.3337 | 0 |
| Ethane | | 0 | 0 | 3.91339 | 3.91339 | 0 | 1.00875E-08 | 22.4800 | 0 |
| Propane | | 0 | 0 | 7.69574 | 7.69574 | 0 | 1.23293E-07 | 25.4564 | 0 |
| i-Butane | | 0 | 0 | 1.74275 | 1.74275 | 0 | 7.36080E-08 | 4.58470 | 0 |
| n-Butane | | 0 | 0 | 7.66903 | 7.66903 | 0 | 8.19740E-07 | 15.8866 | 0 |
| i-Pentane | | 0 | 0 | 3.49222 | 3.49222 | 0 | 1.42731E-06 | 5.76266 | 0 |
| n-Pentane | | 0 | 0 | 4.54886 | 4.54886 | 0 | 2.86694E-06 | 6.96936 | 0 |
| Cyclopentane | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C6Alkanes(iso) | | 0 | 0 | 8.24797 | 8.24797 | 0 | 3.61412E-05 | 10.3207 | 0 |
| Cyclohexane | | 0 | 0 | 7.31751 | 7.31751 | 0 | 0.000716934 | 7.92401 | 0 |
| n-Heptane | | 0 | 0 | 4.63849 | 4.63849 | 0 | 6.69532E-05 | 5.25196 | 0 |
| Methylcyclohexane | | 0 | 0 | 6.21409 | 6.21409 | 0 | 0.000901074 | 6.61374 | 0 |
| Octane | | 0 | 0 | 2.15788 | 2.15788 | 0 | 0.000104102 | 2.31486 | 0 |
| Nonane | | 0 | 0 | 0.812876 | 0.812876 | 0 | 0.000146549 | 0.843891 | 0 |
| Decanes+ | | 0 | 0 | 3.54740 | 3.54740 | 0 | 0.874271 | 4.42718 | 0 |
| Benzene | | 0 | 0 | 43.3743 | 43.3743 | 0 | 0.103902 | 44.0906 | 0 |
| Toluene | | 0 | 0 | 33.3250 | 33.3250 | 0 | 0.350765 | 33.9115 | 0 |
| Ethylbenzene | | 0 | 0 | 0.549176 | 0.549176 | 0 | 0.0206591 | 0.571911 | 0 |
| o-Xylene | | 0 | 0 | 4.83608 | 4.83608 | 0 | 0.377066 | 5.22521 | 0 |
| n-Hexane | | 0 | 0 | 0.0526343 | 0.0526343 | 0 | 6.99183E-07 | 0.0668232 | 0 |
| 2,2,4-Trimethylpentane | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Triethylene Glycol | | 0 | 0 | 0.0269284 | 0.0269284 | 0 | 7551.84 | 7550.44 | 0 |
| Ethylene Glycol | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water | | 0 | 0 | 157.207 | 157.207 | 0 | 65.9406 | 223.269 | 0 |
| Methanol | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| O2 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SO2 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Property** | **Units** | | | | | | | | |
| Temperature | °F | 75* | | 198.799 | 198.799 | | 208.762 | 122.436 | |
| Pressure | psig | 0.204051* | 1000 | -0.295949 | -0.295949 | -0.295949 | 0.104051 | 1000 | 1000 |
| Mole Fraction Vapor | % | | | 100 | 100 | | 0 | 0 | |
| Mole Fraction Light Liquid | % | | | 0 | 0 | | 100 | 100 | |
| Mole Fraction Heavy Liquid | % | | | 0 | 0 | | 0 | 0 | |
| Phase Mole Fraction | % | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Molecular Weight | lb/lbmol | 28.0134 | 117.383 | 28.7134 | 28.7134 | 28.7134 | 141.203 | 117.383 | 32.0419 |
| Mass Density | lb/ft^3 | | | 0.0578078 | 0.0578078 | | 65.3901 | 66.3499 | |
| Molar Flow | lbmol/h | 0 | 0 | 11.3591 | 11.3591 | 0 | 53.9614 | 68.4711 | 0 |
| Mass Flow | lb/h | 0 | 0 | 326.159 | 326.159 | 0 | 7619.51 | 8037.37 | 0 |
| Vapor Volumetric Flow | ft^3/h | 0 | 0 | 5642.12 | 5642.12 | 0 | 116.524 | 121.136 | 0 |
| Liquid Volumetric Flow | gpm | 0 | 0 | 703.434 | 703.434 | 0 | 14.5276 | 15.1027 | 0 |
| Std Vapor Volumetric Flow | MMSCFD | 0* | 0 | 0.103454 | 0.103454 | 0 | 0.491460 | 0.623608 | 0 |
| Std Liquid Volumetric Flow | sgpm | 0 | 0 | 0.768857 | 0.768857 | 0 | 13.5006 | 14.6980 | 0 |
| Compressibility | | | | 0.991388 | 0.991388 | | 0.00436616 | 0.287283 | |
| Specific Gravity | | | | 0.991400 | 0.991400 | | 1.04844 | 1.06383 | |
| API Gravity | | | | | | | -6.72483 | -2.42227 | |
| Enthalpy | Btu/h | 0 | 0 | -936360 | -936360 | 0 | -1.73161E+07 | -1.89472E+07 | 0 |
| Mass Enthalpy | Btu/lb | | -2357.39 | -2870.87 | -2870.87 | -2870.87 | -2272.60 | -2357.39 | |
| Mass Cp | Btu/(lb*°F) | | | 0.407666 | 0.407666 | | 0.595890 | 0.571954 | |
| Ideal Gas CpCv Ratio | | 1.40000 | | 1.20573 | 1.20573 | | 1.03296 | 1.04419 | |
| Dynamic Viscosity | cP | | | 0.0123565 | 0.0123565 | | 3.65050 | 7.66433 | |
| Kinematic Viscosity | cSt | | | 13.3441 | 13.3441 | | 3.48514 | 7.21130 | |
| Thermal Conductivity | Btu/(h*ft*°F) | | | 0.0131907 | 0.0131907 | | 0.113444? | 0.112017 | |
| Surface Tension | lbf/ft | | | | | | 0.00266870? | 0.00273616 | |
| Net Ideal Gas Heating Value | Btu/ft^3 | 0 | 2947.77 | 650.523 | 650.523 | 650.523 | 3521.40 | 2947.77 | 766.100 |
| Net Liquid Heating Value | Btu/lb | 0 | 9251.44 | 7999.16 | 7999.16 | 7999.16 | 9197.24 | 9251.44 | 8557 |
| Gross Ideal Gas Heating Value | Btu/ft^3 | 0 | 3228.15 | 729.794 | 729.794 | 729.794 | 3852.77 | 3228.15 | 866.700 |
| Gross Liquid Heating Value | Btu/lb | 0 | 10157.9 | 9046.82 | 9046.82 | 9046.82 | 10087.8 | 10157.9 | 9749 |

| Process Streams | | Saturant (Water) | Slop Oil | To Flare | To Flash Tank | Wet Gas | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|
| Composition | Status: | Solved | Solved | Solved | Solved | Solved | Solved | Solved | Solved | Solved |
| Phase: Total | From Block: | | Rich Flash | SPLT-100 | SPLT-102 | Water Saturator | Feed Fraction MeOH Saturator | Methanol Saturator | MIX-103 | MIX-100 |
| | To Block: | Water Saturator | – | Flash Gas Control | Rich Flash | SPLT-105 | Water Saturator | MIX-103 | MIX-100 | KO Drum |
| Mass Flow | | lb/h | lb/h | lb/h | lb/h | lb/h | lb/h | lb/h | lb/h | lb/h |
| Hydrogen Sulfide | | 0* | 0 | 0 | 27.3785 | 1493.68 | 1493.68 | 1493.68 | 1493.68 | 1500.54 |
| Carbon Dioxide | | 0* | 0 | 0 | 7.93070 | 1818.88 | 1818.88 | 1818.88 | 1818.88 | 1823.82 |
| Nitrogen | | 0* | 0 | 0 | 0.320347 | 2198.91 | 2198.91 | 2198.91 | 2198.91 | 2199.23 |
| Methane | | 0* | 0 | 0 | 25.3337 | 51190.6 | 51190.6 | 51190.6 | 51190.6 | 51214.6 |
| Ethane | | 0* | 0 | 0 | 22.4800 | 16857.9 | 16857.9 | 16857.9 | 16857.9 | 16876.5 |
| Propane | | 0* | 0 | 0 | 25.4564 | 12339.6 | 12339.6 | 12339.6 | 12339.6 | 12357.4 |
| i-Butane | | 0* | 0 | 0 | 4.58470 | 1981.83 | 1981.83 | 1981.83 | 1981.83 | 1984.68 |
| n-Butane | | 0* | 0 | 0 | 15.8866 | 4755.89 | 4755.89 | 4755.89 | 4755.89 | 4764.11 |
| i-Pentane | | 0* | 0 | 0 | 5.76266 | 1413.46 | 1413.46 | 1413.46 | 1413.46 | 1415.73 |
| n-Pentane | | 0* | 0 | 0 | 6.96936 | 1397.65 | 1397.65 | 1397.65 | 1397.65 | 1400.07 |
| Cyclopentane | | 0* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C6Alkanes(iso) | | 0* | 0 | 0 | 10.3207 | 1229.74 | 1229.74 | 1229.74 | 1229.74 | 1231.81 |
| Cyclohexane | | 0* | 0 | 0 | 7.92401 | 321.268 | 321.268 | 321.268 | 321.268 | 321.873 |
| n-Heptane | | 0* | 0 | 0 | 5.25196 | 463.313 | 463.313 | 463.313 | 463.313 | 463.926 |
| Methylcyclohexane | | 0* | 0 | 0 | 6.61374 | 263.789 | 263.789 | 263.789 | 263.789 | 264.187 |
| Octane | | 0* | 0 | 0 | 2.31486 | 150.691 | 150.691 | 150.691 | 150.691 | 150.848 |
| Nonane | | 0* | 0 | 0 | 0.843891 | 39.9097 | 39.9097 | 39.9097 | 39.9097 | 39.9406 |
| Decanes+ | | 0* | 0 | 0 | 4.42718 | 27.4225 | 27.4225 | 27.4225 | 27.4225 | 27.4280 |
| Benzene | | 0* | 0 | 0 | 44.0906 | 292.019 | 292.019 | 292.019 | 292.019 | 292.633 |
| Toluene | | 0* | 0 | 0 | 33.9115 | 149.817 | 149.817 | 149.817 | 149.817 | 150.055 |
| Ethylbenzene | | 0* | 0 | 0 | 0.571911 | 1.86117 | 1.86117 | 1.86117 | 1.86117 | 1.86344 |
| o-Xylene | | 0* | 0 | 0 | 5.22521 | 13.4935 | 13.4935 | 13.4935 | 13.4935 | 13.5079 |
| n-Hexane | | 0* | 0 | 0 | 0.0668232 | 8.68674 | 8.68674 | 8.68674 | 8.68674 | 8.70093 |
| 2,2,4-Trimethylpentane | | 0* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Triethylene Glycol | | 0* | 0 | 0 | 7550.44 | 0 | 0 | 0 | 0 | 0.000367859 |
| Ethylene Glycol | | 0* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water | | 165.506* | 0 | 0 | 223.269 | 165.506 | 0 | 165.506 | 165.506 | 165.638 |
| Methanol | | 0* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| O2 | | 0* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SO2 | | 0* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Property** | **Units** | | | | | | | | | |
| Temperature | °F | 546.015 | 110 | 110 | 122.436 | 120 | 120 | 120 | 120 | 119.975 |
| Pressure | psig | 1000 | 60 | 60 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 |
| Mole Fraction Vapor | % | 77.8666 | | | 0 | 99.9930 | 99.9928 | 99.9930 | 99.9930 | 99.9926 |
| Mole Fraction Light Liquid | % | 22.1334 | | | 100 | 0.00698971 | 0.00724482 | 0.00698971 | 0.00698971 | 0.00716525 |
| Mole Fraction Heavy Liquid | % | 0 | | | 0 | 0 | 0 | 0 | 0 | 0.000252886 |
| Phase Mole Fraction | % | 100 | | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Molecular Weight | lb/lbmol | 18.0153 | | 29.4709 | 117.383 | 22.4448 | 22.4541 | 22.4448 | 22.4448 | 22.4498 |
| Mass Density | lb/ft^3 | 2.77471 | | | 66.3499 | 4.54100 | 4.54309 | 4.54100 | 4.54100 | 4.54301 |
| Molar Flow | lbmol/h | 9.18700 | 0 | 0 | 68.4711 | 4391.93 | 4382.74 | 4391.93 | 4391.93 | 4395.09 |
| Mass Flow | lb/h | 165.506 | 0 | 0 | 8037.37 | 98575.9 | 98410.4 | 98575.9 | 98575.9 | 98669.1 |
| Vapor Volumetric Flow | ft^3/h | 59.6481 | 0 | 0 | 121.136 | 21708.0 | 21661.6 | 21708.0 | 21708.0 | 21718.9 |
| Liquid Volumetric Flow | gpm | 7.43665 | 0 | 0 | 15.1027 | 2706.45 | 2700.66 | 2706.45 | 2706.45 | 2707.81 |
| Std Vapor Volumetric Flow | MMSCFD | 0.0836717 | 0 | 0 | 0.623608 | 40.0000 | 39.9163* | 40.0000 | 40.0000 | 40.0288 |
| Std Liquid Volumetric Flow | sgpm | 0.330859 | 0 | 0 | 14.6980 | 538.953 | 538.622 | 538.953 | 538.953 | 539.384 |
| Compressibility | | 0.610249 | | | 0.287283 | 0.805988 | 0.805952 | 0.805988 | 0.805988 | 0.805848 |
| Specific Gravity | | | | | 1.06383 | | | | | |
| API Gravity | | | | | -2.42227 | | | | | |
| Enthalpy | Btu/h | -957127 | | 0 | -1.89472E+07 | -1.56171E+08 | -1.55214E+08 | -1.56171E+08 | -1.56171E+08 | -1.56303E+08 |
| Mass Enthalpy | Btu/lb | -5783.03 | | | -2357.39 | -1584.27 | -1577.21 | -1584.27 | -1584.27 | -1584.12 |
| Mass Cp | Btu/(lb*°F) | 0.867450 | | | 0.571954 | 0.634959 | 0.635111 | 0.634959 | 0.634959 | 0.635002 |
| Ideal Gas CpCv Ratio | | 1.30205 | | 1.18742 | 1.04419 | 1.22680 | 1.22665 | 1.22680 | 1.22680 | 1.22677 |
| Dynamic Viscosity | cP | | | | 7.66433 | | | | | |
| Kinematic Viscosity | cSt | | | | 7.21130 | | | | | |
| Thermal Conductivity | Btu/(h*ft*°F) | | | | 0.112017 | | | | | |
| Surface Tension | lbf/ft | | | | 0.00273616 | | | | | |
| Net Ideal Gas Heating Value | Btu/ft^3 | 0 | | 1412.33 | 2947.77 | 1166.66 | 1169.11 | 1166.66 | 1166.66 | 1166.84 |
| Net Liquid Heating Value | Btu/lb | -1059.76 | | 18069.7 | 9251.44 | 19652.9 | 19687.7 | 19652.9 | 19652.9 | 19651.4 |
| Gross Ideal Gas Heating Value | Btu/ft^3 | 50.3100 | | 1545.18 | 3228.15 | 1284.18 | 1286.77 | 1284.18 | 1284.18 | 1284.37 |
| Gross Liquid Heating Value | Btu/lb | 0 | | 19780.9 | 10157.9 | 21640.3 | 21676.7 | 21640.3 | 21640.3 | 21638.5 |

| Process Streams | | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|
| Composition | Status: | Solved | Solved | Solved | Solved | Solved | Solved | Solved | Solved |
| Phase: Total | From Block: | KO Drum | SPLT-101 | MIX-101 | Rich Flash | MIX-102 | Cross Exchanger | Glycol Regenerator | Reboiler |
| | To Block: | SPLT-101 | Glycol Contactor | SPLT-102 | MIX-102 | Cross Exchanger | SPLT-106 | Reboiler | Glycol Regenerator |
| Mass Flow | | lb/h | lb/h | lb/h | lb/h | lb/h | lb/h | lb/h | lb/h |
| Hydrogen Sulfide | | 1500.42 | 1500.42 | 27.3785 | 20.5103 | 20.5103 | 20.5103 | 0 | 0 |
| Carbon Dioxide | | 1823.75 | 1823.75 | 7.93070 | 2.98826 | 2.98826 | 2.98826 | 0 | 0 |
| Nitrogen | | 2199.21 | 2199.21 | 0.320347 | 0.00390971 | 0.00390971 | 0.00390971 | 0 | 0 |
| Methane | | 51213.5 | 51213.5 | 25.3337 | 1.28709 | 1.28709 | 1.28709 | 0 | 0 |
| Ethane | | 16875.3 | 16875.3 | 22.4800 | 3.91339 | 3.91339 | 3.91339 | 0 | 0 |
| Propane | | 12355.6 | 12355.6 | 25.4564 | 7.69574 | 7.69574 | 7.69574 | 0 | 0 |
| i-Butane | | 1984.15 | 1984.15 | 4.58470 | 1.74275 | 1.74275 | 1.74275 | 0 | 0 |
| n-Butane | | 4762.49 | 4762.49 | 15.8866 | 7.66903 | 7.66903 | 7.66903 | 0 | 0 |
| i-Pentane | | 1414.90 | 1414.90 | 5.76266 | 3.49222 | 3.49222 | 3.49222 | 0 | 0 |
| n-Pentane | | 1399.07 | 1399.07 | 6.96936 | 4.54886 | 4.54886 | 4.54886 | 0 | 0 |
| Cyclopentane | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C6Alkanes(iso) | | 1230.33 | 1230.33 | 10.3207 | 8.24800 | 8.24800 | 8.24800 | 0 | 0 |
| Cyclohexane | | 321.264 | 321.264 | 7.92401 | 7.31822 | 7.31822 | 7.31822 | 0 | 0 |
| n-Heptane | | 462.522 | 462.522 | 5.25196 | 4.63856 | 4.63856 | 4.63856 | 0 | 0 |
| Methylcyclohexane | | 263.345 | 263.345 | 6.61374 | 6.21498 | 6.21498 | 6.21498 | 0 | 0 |
| Octane | | 149.926 | 149.926 | 2.31486 | 2.15799 | 2.15799 | 2.15799 | 0 | 0 |
| Nonane | | 39.4391 | 39.4391 | 0.843891 | 0.813020 | 0.813020 | 0.813020 | 0 | 0 |
| Decanes+ | | 22.3161 | 22.3161 | 4.42718 | 4.42167 | 4.42167 | 4.42167 | 0 | 0 |
| Benzene | | 292.151 | 292.151 | 44.0906 | 43.4774 | 43.4774 | 43.4774 | 0 | 0 |
| Toluene | | 149.529 | 149.529 | 33.9115 | 33.6729 | 33.6729 | 33.6729 | 0 | 0 |
| Ethylbenzene | | 1.85010 | 1.85010 | 0.571911 | 0.569642 | 0.569642 | 0.569642 | 0 | 0 |
| o-Xylene | | 13.3992 | 13.3992 | 5.22521 | 5.21083 | 5.21083 | 5.21083 | 0 | 0 |
| n-Hexane | | 8.68784 | 8.68784 | 0.0668232 | 0.0526350 | 0.0526350 | 0.0526350 | 0 | 0 |
| 2,2,4-Trimethylpentane | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Triethylene Glycol | | 0.000133174 | 0.000133174 | 7550.44 | 7550.44 | 7550.44 | 7550.44 | 0 | 0 |
| Ethylene Glycol | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water | | 165.428 | 165.428 | 223.269 | 223.137 | 223.137 | 223.137 | 0 | 0 |
| Methanol | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| O2 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SO2 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Property** | **Units** | | | | | | | | |
| Temperature | °F | 119.975 | 119.975 | 122.436 | 110 | 110 | 300* | | |
| Pressure | psig | 1000 | 1000 | 1000 | 60 | 60 | 55 | 0.204051 | |
| Mole Fraction Vapor | % | 100 | 100 | 0 | 0 | 0 | 0.994663 | | 100 |
| Mole Fraction Light Liquid | % | 0 | 0 | 100 | 100 | 100 | 99.0053 | | |
| Mole Fraction Heavy Liquid | % | 0 | 0 | 0 | 0 | 0 | 0 | | |
| Phase Mole Fraction | % | 100 | 100 | 100 | 100 | 100 | 100 | | |
| Molecular Weight | lb/lbmol | 22.4469 | 22.4469 | 117.383 | 121.638 | 121.638 | 121.638 | | |
| Mass Density | lb/ft^3 | 4.54218 | 4.54218 | 66.3499 | 67.9343 | 67.9343 | 39.0460 | | |
| Molar Flow | lbmol/h | 4394.76 | 4394.76 | 68.4711 | 65.3103 | 65.3103 | 65.3103 | 0 | 0 |
| Mass Flow | lb/h | 98648.6 | 98648.6 | 8037.37 | 7944.22 | 7944.22 | 7944.22 | 0 | 0 |
| Vapor Volumetric Flow | ft^3/h | 21718.3 | 21718.3 | 121.136 | 116.940 | 116.940 | 203.458 | 0 | 0 |
| Liquid Volumetric Flow | gpm | 2707.74 | 2707.74 | 15.1027 | 14.5795 | 14.5795 | 25.3662 | 0 | 0 |
| Std Vapor Volumetric Flow | MMSCFD | 40.0258 | 40.0258 | 0.623608 | 0.594821 | 0.594821 | 0.594821 | 0 | 0 |
| Std Liquid Volumetric Flow | sgpm | 539.318 | 539.318 | 14.6980 | 14.2669 | 14.2669 | 14.2669 | 0 | 0 |
| Compressibility | | 0.805887 | 0.805887 | 0.287283 | 0.0217905 | 0.0217905 | 0.0265194 | | |
| Specific Gravity | | 0.775032 | 0.775032 | 1.06383 | 1.08924 | 1.08924 | | | |
| API Gravity | | | | -2.42227 | -4.58077 | -4.58077 | | | |
| Enthalpy | Btu/h | -1.56283E+08 | -1.56283E+08 | -1.89472E+07 | -1.88919E+07 | -1.88919E+07 | -1.79735E+07 | | |
| Mass Enthalpy | Btu/lb | -1584.24 | -1584.24 | -2357.39 | -2378.07 | -2378.07 | -2262.46 | | |
| Mass Cp | Btu/(lb*°F) | 0.635015 | 0.635015 | 0.571954 | 0.566419 | 0.566419 | 0.641106 | | |
| Ideal Gas CpCv Ratio | | 1.22679 | 1.22679 | 1.04419 | 1.04336 | 1.04336 | 1.03574 | | |
| Dynamic Viscosity | cP | 0.0137236 | 0.0137236 | 7.66433 | 13.0643 | 13.0643 | | | |
| Kinematic Viscosity | cSt | 0.188617 | 0.188617 | 7.21130 | 12.0054 | 12.0054 | | | |
| Thermal Conductivity | Btu/(h*ft*°F) | 0.0228410 | 0.0228410 | 0.112017 | 0.114052 | 0.114052 | | | |
| Surface Tension | lbf/ft | | | 0.00273616 | 0.00291146 | 0.00291146 | | | |
| Net Ideal Gas Heating Value | Btu/ft^3 | 1166.69 | 1166.69 | 2947.77 | 3022.08 | 3022.08 | 3022.08 | | |
| Net Liquid Heating Value | Btu/lb | 19651.6 | 19651.6 | 9251.44 | 9148.04 | 9148.04 | 9148.04 | | |
| Gross Ideal Gas Heating Value | Btu/ft^3 | 1284.22 | 1284.22 | 3228.15 | 3309.60 | 3309.60 | 3309.60 | | |
| Gross Liquid Heating Value | Btu/lb | 21638.8 | 21638.8 | 10157.9 | 10045.0 | 10045.0 | 10045.0 | | |

| Process Streams | | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|
| Composition | Status: | Solved | Solved | Solved | Solved | Solved | Solved | Solved | Solved |
| Phase: Total | From Block: | Cross Exchanger | Glycol Makeup | Glycol Pump | Glycol Contactor | Compressor | Air Cooler | Compression Recycle | SPLT-105 |
| | To Block: | TEG Recycle | Glycol Pump | Cooler | SPLT-103 | Air Cooler | Compression Recycle | MIX-100 | Methanol Saturator |
| Mass Flow | | lb/h | lb/h | lb/h | lb/h | lb/h | lb/h | lb/h | lb/h |
| Hydrogen Sulfide | | 6.85526E-05 | 2.80297E-05 | 2.80297E-05 | 1473.04 | 6.86823 | 6.86823 | 6.86813 | 1493.68 |
| Carbon Dioxide | | 6.82896E-08 | 0 | 0 | 1815.82 | 4.94244 | 4.94244 | 4.94243 | 1818.88 |
| Nitrogen | | 1.12261E-14 | 0 | 0 | 2198.89 | 0.316438 | 0.316438 | 0.316440 | 2198.91 |
| Methane | | 1.26099E-10 | 0 | 0 | 51188.2 | 24.0466 | 24.0466 | 24.0467 | 51190.6 |
| Ethane | | 9.56750E-09 | 0 | 0 | 16852.9 | 18.5666 | 18.5666 | 18.5667 | 16857.9 |
| Propane | | 1.17718E-07 | 0 | 0 | 12330.1 | 17.7607 | 17.7607 | 17.7607 | 12339.6 |
| i-Butane | | 7.05487E-08 | 0 | 0 | 1979.56 | 2.84195 | 2.84195 | 2.84196 | 1981.83 |
| n-Butane | | 7.89899E-07 | 0 | 0 | 4746.60 | 8.21759 | 8.21759 | 8.21762 | 4755.89 |
| i-Pentane | | 1.38270E-06 | 0 | 0 | 1409.14 | 2.27043 | 2.27043 | 2.27044 | 1413.46 |
| n-Pentane | | 2.78605E-06 | 2.86681E-06 | 2.86681E-06 | 1392.10 | 2.42050 | 2.42050 | 2.42050 | 1397.65 |
| Cyclopentane | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C6Alkanes(iso) | | 3.53454E-05 | 3.61395E-05 | 3.61395E-05 | 1220.01 | 2.07272 | 2.07272 | 2.07273 | 1229.74 |
| Cyclohexane | | 0.000706483 | 0.000716902 | 0.000716902 | 313.341 | 0.605795 | 0.605795 | 0.605796 | 321.268 |
| n-Heptane | | 6.57593E-05 | 6.69501E-05 | 6.69501E-05 | 457.270 | 0.613401 | 0.613401 | 0.613403 | 463.313 |
| Methylcyclohexane | | 0.000888895 | 0.000901034 | 0.000901034 | 256.732 | 0.398761 | 0.398761 | 0.398761 | 263.789 |
| Octane | | 0.000102447 | 0.000104097 | 0.000104097 | 147.611 | 0.156877 | 0.156877 | 0.156877 | 150.691 |
| Nonane | | 0.000144509 | 0.000146543 | 0.000146543 | 38.5954 | 0.0308705 | 0.0308705 | 0.0308705 | 39.9097 |
| Decanes+ | | 0.874270 | 0.874231 | 0.874231 | 18.7632 | 0.00550558 | 0.00550558 | 0.00550558 | 27.4225 |
| Benzene | | 0.103022 | 0.103897 | 0.103897 | 248.164 | 0.613215 | 0.613215 | 0.613210 | 292.019 |
| Toluene | | 0.347844 | 0.350749 | 0.350749 | 115.968 | 0.238652 | 0.238652 | 0.238650 | 149.817 |
| Ethylbenzene | | 0.0204658 | 0.0206582 | 0.0206582 | 1.29885 | 0.00226933 | 0.00226933 | 0.00226932 | 1.86117 |
| o-Xylene | | 0.374754 | 0.377048 | 0.377048 | 8.55107 | 0.0143818 | 0.0143818 | 0.0143817 | 13.4935 |
| n-Hexane | | 6.82812E-07 | 0 | 0 | 8.62102 | 0.0141881 | 0.0141881 | 0.0141882 | 8.68674 |
| 2,2,4-Trimethylpentane | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Triethylene Glycol | | 7550.41 | 7551.50 | 7551.50 | 1.06163 | 0.000367858 | 0.000367858 | 0.000367859 | 0 |
| Ethylene Glycol | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water | | 65.9302 | 65.9376 | 65.9376 | 8.09725 | 0.131723 | 0.131723 | 0.131723 | 165.506 |
| Methanol | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| O2 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SO2 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Property | Units | | | | | | | | |
| Temperature | °F | 208.385 | 208.762 | 211.632 | 123.119 | 465.786 | 120* | 120 | 120 |
| Pressure | psig | 0.104051 | 0.104051 | 1010* | 995 | 1005 | 1000* | 1000 | 1000 |
| Mole Fraction Vapor | % | 0 | 0 | 0 | 100 | 100 | 84.8850 | 84.8851 | 99.9930 |
| Mole Fraction Light Liquid | % | 100 | 100 | 100 | 0 | 0 | 15.0827 | 15.0826 | 0.00698971 |
| Mole Fraction Heavy Liquid | % | 0 | 0 | 0 | 0 | 0 | 0.0322978 | 0.0322978 | 0 |
| Phase Mole Fraction | % | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Molecular Weight | lb/lbmol | 141.203 | 141.203 | 141.203 | 22.4257 | 29.4709 | 29.4709 | 29.4708 | 22.4448 |
| Mass Density | lb/ft^3 | 65.4041 | 65.3901 | 65.3811 | 4.46065 | 3.17618 | 7.80529 | 7.80528 | 4.54100 |
| Molar Flow | lbmol/h | 53.9512 | 53.9589 | 53.9589 | 4380.25 | 3.16076 | 3.16076 | 3.16076 | 4391.93 |
| Mass Flow | lb/h | 7618.06 | 7619.16 | 7619.16 | 98230.4 | 93.1502 | 93.1502 | 93.1503 | 98575.9 |
| Vapor Volumetric Flow | ft^3/h | 116.477 | 116.519 | 116.535 | 22021.5 | 29.3278 | 11.9342 | 11.9343 | 21708.0 |
| Liquid Volumetric Flow | gpm | 14.5218 | 14.5270 | 14.5290 | 2745.54 | 3.65645 | 1.48790 | 1.48791 | 2706.45 |
| Std Vapor Volumetric Flow | MMSCFD | 0.491367 | 0.491437 | 0.491437 | 39.8936 | 0.0287870 | 0.0287870 | 0.0287870 | 40.0000 |
| Std Liquid Volumetric Flow | sgpm | 13.4980 | 13.5* | 13.5 | 538.120 | 0.431134 | 0.431134 | 0.431135 | 538.953 |
| Compressibility | | 0.00436769 | 0.00436616 | 0.307100 | 0.811403 | 0.952388 | 0.615699 | 0.615700 | 0.805988 |
| Specific Gravity | | 1.04867 | 1.04844 | 1.04830 | 0.774303 | 1.01755 | | | |
| API Gravity | | -6.72486 | -6.72483 | -6.86656 | | | | | |
| Enthalpy | Btu/h | -1.73146E+07 | -1.73153E+07 | -1.72818E+07 | -1.54978E+08 | -111032 | -132178 | -132178 | -1.56171E+08 |
| Mass Enthalpy | Btu/lb | -2272.83 | -2272.60 | -2268.21 | -1577.70 | -1191.97 | -1418.97 | -1418.97 | -1584.27 |
| Mass Cp | Btu/(lb*°F) | 0.595744 | 0.595890 | 0.595457 | 0.631747 | 0.638507 | 0.710701 | 0.710701 | 0.634959 |
| Ideal Gas CpCv Ratio | | 1.03298 | 1.03296 | 1.03287 | 1.22604 | 1.12777 | 1.18504 | 1.18504 | 1.22680 |
| Dynamic Viscosity | cP | 3.66645 | 3.65050 | 3.65805 | 0.0137123 | 0.0176818 | | | |
| Kinematic Viscosity | cSt | 3.49961 | 3.48514 | 3.49282 | 0.191907 | 0.347538 | | | |
| Thermal Conductivity | Btu/(h*ft*°F) | 0.113448? | 0.113444 | 0.113409? | 0.0229020 | 0.0342399 | | | |
| Surface Tension | lbf/ft | 0.002669937 | 0.002668707 | 0.002660627 | | | | | |
| Net Ideal Gas Heating Value | Btu/ft^3 | 3521.39 | 3521.40 | 3521.40 | 1167.86 | 1412.33 | 1412.33 | 1412.33 | 1166.66 |
| Net Liquid Heating Value | Btu/lb | 9197.23 | 9197.24 | 9197.24 | 19691.7 | 18069.7 | 18069.7 | 18069.7 | 19652.9 |
| Gross Ideal Gas Heating Value | Btu/ft^3 | 3852.76 | 3852.77 | 3852.77 | 1285.47 | 1545.18 | 1545.18 | 1545.18 | 1284.18 |
| Gross Liquid Heating Value | Btu/lb | 10087.8 | 10087.8 | 10087.8 | 21682.2 | 19780.9 | 19780.9 | 19780.9 | 21640.3 |

| Process Streams | | 21 | 22 | 23 | 24 | 25 | 26 | 27 |
|---|---|---|---|---|---|---|---|---|
| Composition | Status: | Solved | Solved | Solved | Solved | Solved | Solved | Solved |
| Phase: Total | From Block: | SPLT-105 | Reboiler2 | Glycol Regen (with Reflux Coil) | Glycol Regen (with Reflux Coil) | Reflux Coil | Glycol Regenerator | Reflux Coil |
| | To Block: | MIX-103 | Glycol Regen (with Reflux Coil) | Reboiler2 | Reflux Coil | Glycol Regen (with Reflux Coil) | MIX-104 | MIX-104 |
| Mass Flow | | lb/h | lb/h | lb/h | lb/h | lb/h | lb/h | lb/h |
| Hydrogen Sulfide | | 0 | 0.00239149 | 0.00246005 | 20.5145 | 0.00424567 | 0 | 20.5102 |
| Carbon Dioxide | | 0 | 7.05151E-06 | 7.11980E-06 | 2.98843 | 0.000171976 | 0 | 2.98826 |
| Nitrogen | | 0 | 7.54791E-12 | 7.55914E-12 | 0.00390972 | 1.02297E-08 | 0 | 0.00390971 |
| Methane | | 0 | 4.00832E-08 | 4.02093E-08 | 1.28709 | 7.86989E-06 | 0 | 1.28709 |
| Ethane | | 0 | 1.52617E-06 | 1.53574E-06 | 3.91343 | 3.96755E-05 | 0 | 3.91339 |
| Propane | | 0 | 1.25550E-05 | 1.26727E-05 | 7.69583 | 8.91174E-05 | 0 | 7.69574 |
| i-Butane | | 0 | 5.95049E-06 | 6.02104E-06 | 1.74276 | 1.53042E-05 | 0 | 1.74275 |
| n-Butane | | 0 | 5.56195E-05 | 5.64094E-05 | 7.66915 | 0.000124093 | 0 | 7.66903 |
| i-Pentane | | 0 | 7.09661E-05 | 7.23488E-05 | 3.49227 | 4.87222E-05 | 0 | 3.49222 |
| n-Pentane | | 0 | 0.000131550 | 0.000134336 | 4.54892 | 6.38136E-05 | 0 | 4.54886 |
| Cyclopentane | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C6Alkanes(iso) | | 0 | 0.00108435 | 0.00111969 | 8.24810 | 0.000135979 | 0 | 8.24797 |
| Cyclohexane | | 0 | 0.0106228 | 0.0113292 | 7.31797 | 0.000456589 | 0 | 7.31751 |
| n-Heptane | | 0 | 0.00157829 | 0.00164405 | 4.63855 | 6.31992E-05 | 0 | 4.63849 |
| Methylcyclohexane | | 0 | 0.0123609 | 0.0132498 | 6.21439 | 0.000299022 | 0 | 6.21409 |
| Octane | | 0 | 0.00193863 | 0.00204108 | 2.15791 | 3.06722E-05 | 0 | 2.15788 |
| Nonane | | 0 | 0.00202811 | 0.00217262 | 0.812884 | 8.01974E-06 | 0 | 0.812876 |
| Decanes+ | | 0 | 2.48888 | 3.36315 | 3.54963 | 0.00223082 | 0 | 3.54740 |
| Benzene | | 0 | 0.851689 | 0.954710 | 43.4028 | 0.0284996 | 0 | 43.3743 |
| Toluene | | 0 | 2.08487 | 2.43272 | 33.3527 | 0.0276275 | 0 | 33.3250 |
| Ethylbenzene | | 0 | 0.0899879 | 0.110454 | 0.549659 | 0.000482384 | 0 | 0.549176 |
| o-Xylene | | 0 | 1.38865 | 1.76340 | 4.84220 | 0.00612140 | 0 | 4.83608 |
| n-Hexane | | 0 | 1.48211E-05 | 1.55039E-05 | 0.0526351 | 7.98206E-07 | 0 | 0.0526343 |
| 2,2,4-Trimethylpentane | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Triethylene Glycol | | 0 | 145.150 | 7695.56 | 11.3212 | 11.2943 | 0 | 0.0269284 |
| Ethylene Glycol | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water | | 0 | 191.609 | 257.540 | 176.300 | 19.0929 | 0 | 157.207 |
| Methanol | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| O2 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SO2 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Property** | **Units** | | | | | | | |
| Temperature | °F | 120 | 400.000 | 308.738 | 296.197 | 198.799 | | 198.799 |
| Pressure | psig | 1000 | 0.204051 | 0.204051 | -0.295949 | -0.295949 | -0.295949 | -0.295949 |
| Mole Fraction Vapor | % | 99.9930 | 100 | 0 | 100 | 0 | | 100 |
| Mole Fraction Light Liquid | % | 0.00698971 | 0 | 100 | 0 | 100 | | 0 |
| Mole Fraction Heavy Liquid | % | 0 | 0 | 0 | 0 | 0 | | 0 |
| Phase Mole Fraction | % | 100 | 100 | 100 | 100 | 100 | | 100 |
| Molecular Weight | lb/lbmol | 22.4448 | 29.4677 | 121.341 | 28.5407 | 26.8136 | | 28.7134 |
| Mass Density | lb/ft^3 | 4.54100 | 0.0469672 | 61.7520 | 0.0499291 | 63.1197 | | 0.0578078 |
| Molar Flow | lbmol/h | 0 | 11.6635 | 65.6147 | 12.4950 | 1.13591 | 0 | 11.3591 |
| Mass Flow | lb/h | 0 | 343.696 | 7961.76 | 356.617 | 30.4579 | 0 | 326.159 |
| Vapor Volumetric Flow | ft^3/h | 0 | 7317.78 | 128.931 | 7142.46 | 0.482542 | 0 | 5642.12 |
| Liquid Volumetric Flow | gpm | 0 | 912.346 | 16.0745 | 890.488 | 0.0601610 | 0 | 703.434 |
| Std Vapor Volumetric Flow | MMSCFD | 0 | 0.106226 | 0.597593 | 0.113800 | 0.0103454 | 0 | 0.103454 |
| Std Liquid Volumetric Flow | sgpm | 0 | 0.656203 | 14.1542 | 0.827176 | 0.0583191 | 0 | 0.768857 |
| Compressibility | | | 0.993184 | 0.00347996 | 0.993908 | 0.000847883 | | 0.991388 |
| Specific Gravity | | | 1.01744 | 0.990112 | 0.985437 | 1.01204 | | 0.991400 |
| API Gravity | | | | -6.05213 | | 2.21816 | | |
| Enthalpy | Btu/h | 0 | -1.35591E+06 | -1.84295E+07 | -1.05354E+06 | -153674 | | -936360 |
| Mass Enthalpy | Btu/lb | -1584.27 | -3945.10 | -2314.76 | -2954.26 | -5045.45 | | -2870.87 |
| Mass Cp | Btu/(lb*°F) | | 0.483418 | 0.649515 | 0.436052 | 0.926760 | | 0.407666 |
| Ideal Gas CpCv Ratio | | 1.22680 | 1.16285 | 1.03552 | 1.19078 | 1.19958 | | 1.20573 |
| Dynamic Viscosity | cP | | 0.0157535 | 1.36102 | 0.0142163 | 0.669819 | | 0.0123565 |
| Kinematic Viscosity | cSt | | 20.9393 | 1.37591 | 17.7751 | 0.662478 | | 13.3441 |
| Thermal Conductivity | Btu/(h*ft*°F) | | 0.0181670 | 0.114231? | 0.0159989 | 0.256028 | | 0.0131907 |
| Surface Tension | lbf/ft | | | 0.00239146 | | 0.003773127 | | |
| Net Ideal Gas Heating Value | Btu/ft^3 | 1166.66 | 341.245 | 2956.10 | 614.371 | 252.850 | | 650.523 |
| Net Liquid Heating Value | Btu/lb | 19652.9 | 3690.64 | 8959.52 | 7556.61 | 2817.48 | | 7999.16 |
| Gross Ideal Gas Heating Value | Btu/ft^3 | 1284.18 | 417.827 | 3242.18 | 692.832 | 323.216 | | 729.794 |
| Gross Liquid Heating Value | Btu/lb | 21640.3 | 4676.84 | 9854.20 | 8599.84 | 3813.34 | | 9046.82 |

| Process Streams | | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Composition | Status: | Solved | Solved | Solved | Solved | Solved | Solved | Solved | Solved | Solved | Solved |
| Phase: Total | From Block: | SPLT-106 | SPLT-106 | Reboiler2 | Reboiler | SPLT-109 | SPLT-108 | SPLT-107 | SPLT-107 | SPLT-108 | SPLT-109 |
| | To Block: | Glycol Regen (with Reflux Coil) | Glycol Regenerator | MIX-105 | MIX-105 | Reboiler | Reboiler | Reboiler | Reboiler2 | Reboiler2 | Reboiler2 |
| Mass Flow | | lb/h | lb/h | lb/h | lb/h | lb/h | lb/h | lb/h | lb/h | lb/h | lb/h |
| Hydrogen Sulfide | | 20.5103 | 0 | 6.85526E-05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Carbon Dioxide | | 2.98826 | 0 | 6.82896E-08 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nitrogen | | 0.00390971 | 0 | 1.12261E-14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Methane | | 1.28709 | 0 | 1.26099E-10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ethane | | 3.91339 | 0 | 9.56750E-09 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Propane | | 7.69574 | 0 | 1.17718E-07 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| i-Butane | | 1.74275 | 0 | 7.05487E-08 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| n-Butane | | 7.66903 | 0 | 7.89899E-07 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| i-Pentane | | 3.49222 | 0 | 1.38270E-06 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| n-Pentane | | 4.54886 | 0 | 2.78605E-06 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cyclopentane | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| C6Alkanes(iso) | | 8.24800 | 0 | 3.53454E-05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cyclohexane | | 7.31822 | 0 | 0.000706483 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| n-Heptane | | 4.63856 | 0 | 6.57593E-05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Methylcyclohexane | | 6.21498 | 0 | 0.000888895 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Octane | | 2.15799 | 0 | 0.000102447 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nonane | | 0.813020 | 0 | 0.000144509 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Decanes+ | | 4.42167 | 0 | 0.874270 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Benzene | | 43.4774 | 0 | 0.103022 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Toluene | | 33.6729 | 0 | 0.347844 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ethylbenzene | | 0.569642 | 0 | 0.0204658 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| o-Xylene | | 5.21083 | 0 | 0.374754 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| n-Hexane | | 0.0526350 | 0 | 6.82812E-07 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2,2,4-Trimethylpentane | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Triethylene Glycol | | 7550.44 | 0 | 7550.41 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ethylene Glycol | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water | | 223.137 | 0 | 65.9302 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Methanol | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| O2 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| SO2 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Property** | **Units** | | | | | | | | | | |
| Temperature | °F | 300 | 300 | 400.000 | | | 75 | 110 | 110 | | |
| Pressure | psig | 55 | 55 | 0.204051 | | 1092.70 | 0.204051 | 60 | 60 | | |
| Mole Fraction Vapor | % | 0.994663 | | 0 | 0 | | | | | | |
| Mole Fraction Light Liquid | % | 99.0053 | | 100 | | | | | | | |
| Mole Fraction Heavy Liquid | % | 0 | | 0 | | | | | | | |
| Phase Mole Fraction | % | 100 | 100 | 100 | | 100 | 100 | 100 | 100 | 100 | 100 |
| Molecular Weight | lb/lbmol | 121.638 | 121.638 | 141.203 | | 22.4257 | 28.0134 | 29.4709 | 29.4709 | 28.0134 | 22.4257 |
| Mass Density | lb/ft^3 | 39.0460 | | 58.0654 | | | | | | | |
| Molar Flow | lbmol/h | 65.3103 | 0 | 53.9512 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mass Flow | lb/h | 7944.22 | 0 | 7618.06 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Vapor Volumetric Flow | ft^3/h | 203.458 | 0 | 131.198 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Liquid Volumetric Flow | gpm | 25.3662 | 0 | 16.3571 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Std Vapor Volumetric Flow | MMSCFD | 0.594821 | 0 | 0.491367 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Std Liquid Volumetric Flow | sgpm | 14.2669 | 0 | 13.4980 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Compressibility | | 0.0265194 | | 0.00384949 | | | | | | | |
| Specific Gravity | | | | 0.931002 | | | | | | | |
| API Gravity | | | | -6.72488 | | | | | | | |
| Enthalpy | Btu/h | -1.79735E+07 | 0 | -1.63961E+07 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Mass Enthalpy | Btu/lb | -2262.46 | | -2152.27 | | | | | | | |
| Mass Cp | Btu/(lb*°F) | 0.641106 | | 0.659768 | | | | | | | |
| Ideal Gas CpCv Ratio | | 1.03574 | 1.03574 | 1.02869 | | | 1.40000 | 1.18742 | 1.18742 | | |
| Dynamic Viscosity | cP | | | 0.748874 | | | | | | | |
| Kinematic Viscosity | cSt | | | 0.805139 | | | | | | | |
| Thermal Conductivity | Btu/(h*ft*°F) | | | 0.106405? | | | | | | | |
| Surface Tension | lbf/ft | | | 0.002010127 | | | | | | | |
| Net Ideal Gas Heating Value | Btu/ft^3 | 3022.08 | 3022.08 | 3521.39 | | 1167.86 | 0 | 1412.33 | 1412.33 | 0 | 1167.86 |
| Net Liquid Heating Value | Btu/lb | 9148.04 | 9148.04 | 9197.23 | | 19691.7 | 0 | 18069.7 | 18069.7 | 0 | 19691.7 |
| Gross Ideal Gas Heating Value | Btu/ft^3 | 3309.60 | 3309.60 | 3852.76 | | 1285.47 | 0 | 1545.18 | 1545.18 | 0 | 1285.47 |
| Gross Liquid Heating Value | Btu/lb | 10045.0 | 10045.0 | 10087.8 | | 21682.2 | 0 | 19780.9 | 19780.9 | 0 | 21682.2 |

# Section 8

## Map(s)

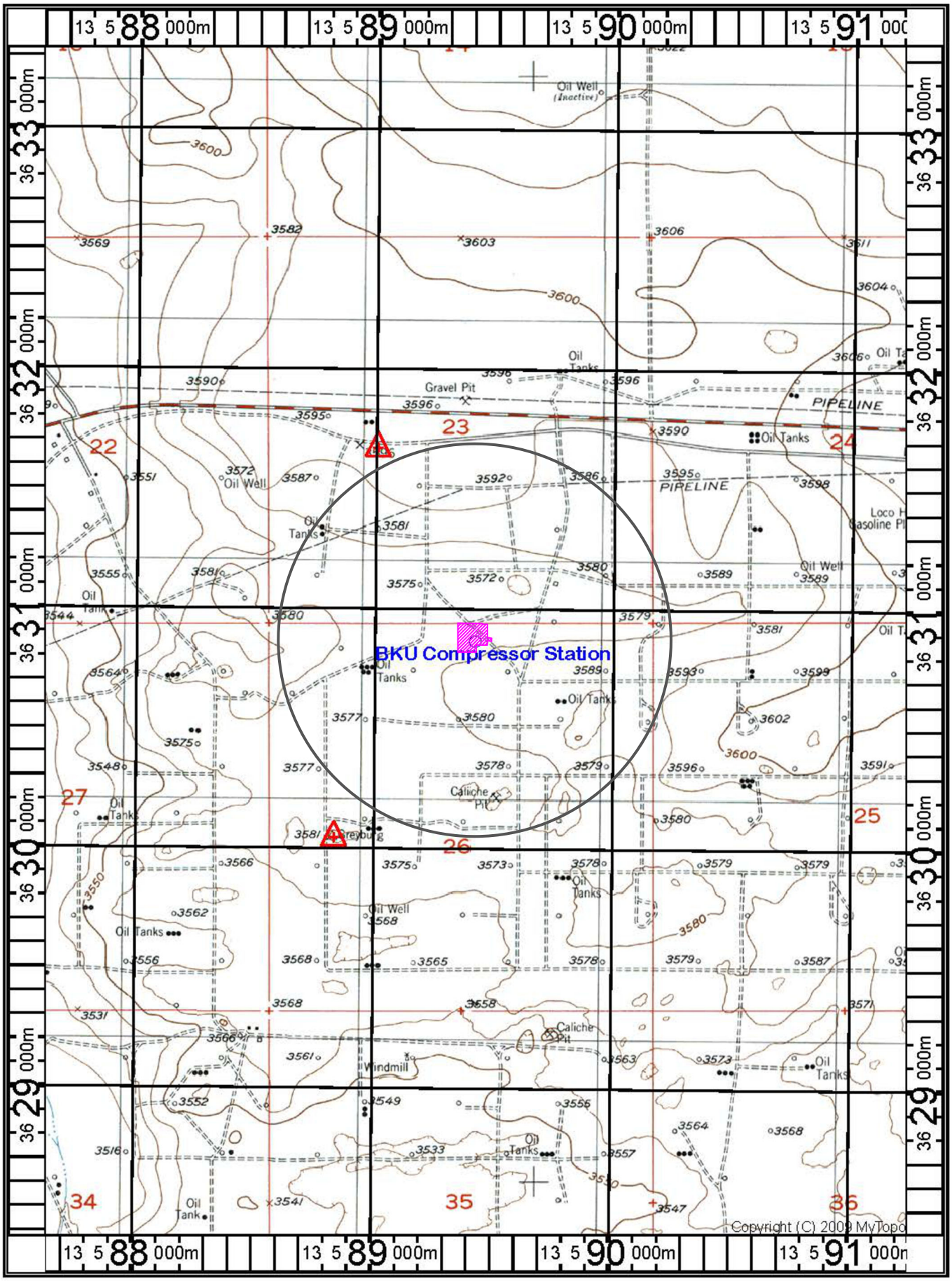
---

**A map** such as a 7.5 minute topographic quadrangle showing the exact location of the source. The map shall also include the following:

| | |
|---|---|
| The UTM or Longitudinal coordinate system on both axes | An indicator showing which direction is north |
| A minimum radius around the plant of 0.8km (0.5 miles) | Access and haul roads |
| Topographic features of the area | Facility property boundaries |
| The name of the map | The area which will be restricted to public access |
| A graphical scale | |

---

A topographic map is attached.




Map Name: Red Lake SE (NM)
Print Date: 04/22/26
Scale: 1 inch = 2000 ft
Map Center: Zone 13S, 32.812183, -104.044811
Horizontal Datum: WGS84

Trinity Consultants

KINETIK\NM\BKU CS\254404.0698

# Section 9

## Proof of Public Notice

(for NSR applications submitting under 20.2.72 or 20.2.74 NMAC)

(This proof is required by: 20.2.72.203.A.14 NMAC "Documentary Proof of applicant's public notice")

---

☑ **I have read the AQB "Guidelines for Public Notification for Air Quality Permit Applications"**
This document provides detailed instructions about public notice requirements for various permitting actions. It also provides public notice examples and certification forms. Material mistakes in the public notice will require a re-notice before issuance of the permit.

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Unless otherwise allowed elsewhere in this document, the following items document proof of the applicant's Public Notification. Please include this page in your proof of public notice submittal with checkmarks indicating which documents are being submitted with the application.

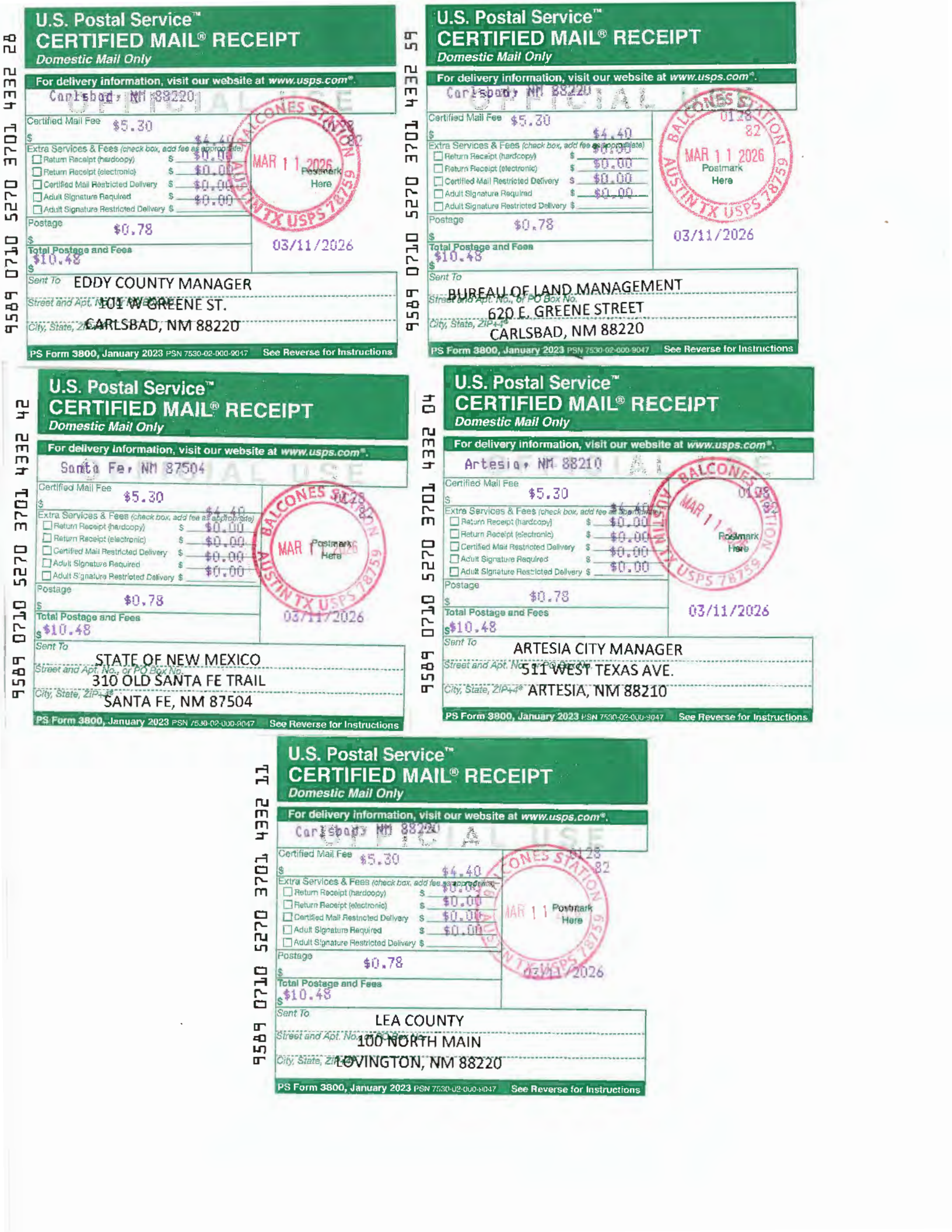
**New Permit** and **Significant Permit Revision** public notices must include all items in this list.

**Technical Revision** public notices require only items 1, 5, 9, and 10.

Per the Guidelines for Public Notification document mentioned above, include:

1. ☑ A copy of the certified letter receipts with post marks (20.2.72.203.B NMAC)
2. ☑ A list of the places where the public notice has been posted in at least four publicly accessible and conspicuous places, including the proposed or existing facility entrance. (e.g: post office, library, grocery, etc.)
3. ☑ A copy of the property tax record (20.2.72.203.B NMAC).
4. ☑ A sample of the letters sent to the owners of record.
5. ☑ A sample of the letters sent to counties, municipalities, and Indian tribes.
6. ☑ A sample of the public notice posted and a verification of the local postings.
7. ☑ A table of the noticed citizens, counties, municipalities and tribes and to whom the notices were sent in each group.
8. ☑ A copy of the public service announcement (PSA) sent to a local radio station and documentary proof of submittal.
9. ☑ A copy of the classified or legal ad including the page header (date and newspaper title) or its affidavit of publication stating the ad date, and a copy of the ad. When appropriate, this ad shall be printed in both English and Spanish.
10. ☑ A copy of the display ad including the page header (date and newspaper title) or its affidavit of publication stating the ad date, and a copy of the ad. When appropriate, this ad shall be printed in both English and Spanish.
11. ☑ A map with a graphic scale showing the facility boundary and the surrounding area in which owners of record were notified by mail. This is necessary for verification that the correct facility boundary was used in determining distance for notifying land owners of record.

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U.S. Postal Service™
CERTIFIED MAIL® RECEIPT
Domestic Mail Only

For delivery information, visit our website at www.usps.com®.

Carlsbad, NM 88220

Certified Mail Fee $5.30
Extra Services & Fees (check box, add fee as appropriate)
- Return Receipt (hardcopy) $0.00
- Return Receipt (electronic) $0.00
- Certified Mail Restricted Delivery $0.00
- Adult Signature Required $0.00
- Adult Signature Restricted Delivery $

Postage $0.78
Total Postage and Fees $10.48

Postmark Here
MAR 11 2026
AUSTIN TX USPS 78759
03/11/2026

9589 0710 5270 3701 4332 28

Sent To EDDY COUNTY MANAGER
Street and Apt. No., or PO Box No. 101 W GREENE ST.
City, State, ZIP+4® CARLSBAD, NM 88220

PS Form 3800, January 2023 PSN 7530-02-000-9047 See Reverse for Instructions

U.S. Postal Service™
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- Adult Signature Required $0.00
- Adult Signature Restricted Delivery $

Postage $0.78
Total Postage and Fees $10.48

Postmark Here
MAR 11 2026
AUSTIN TX USPS 78759
03/11/2026

9589 0710 5270 3701 4332 59

Sent To BUREAU OF LAND MANAGEMENT
Street and Apt. No., or PO Box No. 620 E. GREENE STREET
City, State, ZIP+4® CARLSBAD, NM 88220

PS Form 3800, January 2023 PSN 7530-02-000-9047 See Reverse for Instructions

U.S. Postal Service™
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For delivery information, visit our website at www.usps.com®.

Santa Fe, NM 87504

Certified Mail Fee $5.30
Extra Services & Fees (check box, add fee as appropriate)
- Return Receipt (hardcopy) $0.00
- Return Receipt (electronic) $0.00
- Certified Mail Restricted Delivery $0.00
- Adult Signature Required $0.00
- Adult Signature Restricted Delivery $

Postage $0.78
Total Postage and Fees $10.48

Postmark Here
MAR 11 2026
AUSTIN TX USPS 78759
03/11/2026

9589 0710 5270 3701 4332 42

Sent To STATE OF NEW MEXICO
Street and Apt. No., or PO Box No. 310 OLD SANTA FE TRAIL
City, State, ZIP+4® SANTA FE, NM 87504

PS Form 3800, January 2023 PSN 7530-02-000-9047 See Reverse for Instructions

U.S. Postal Service™
CERTIFIED MAIL® RECEIPT
Domestic Mail Only

For delivery information, visit our website at www.usps.com®.

Artesia, NM 88210

Certified Mail Fee $5.30
Extra Services & Fees (check box, add fee as appropriate)
- Return Receipt (hardcopy) $0.00
- Return Receipt (electronic) $0.00
- Certified Mail Restricted Delivery $0.00
- Adult Signature Required $0.00
- Adult Signature Restricted Delivery $

Postage $0.78
Total Postage and Fees $10.48

Postmark Here
MAR 11 2026
AUSTIN TX USPS 78759
03/11/2026

9589 0710 5270 3701 4332 04

Sent To ARTESIA CITY MANAGER
Street and Apt. No., or PO Box No. 511 WEST TEXAS AVE.
City, State, ZIP+4® ARTESIA, NM 88210

PS Form 3800, January 2023 PSN 7530-02-000-9047 See Reverse for Instructions

U.S. Postal Service™
CERTIFIED MAIL® RECEIPT
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Postage $0.78
Total Postage and Fees $10.48

Postmark Here
MAR 11 2026
AUSTIN TX USPS 78759
03/11/2026

9589 0710 5270 3701 4332 11

Sent To LEA COUNTY
Street and Apt. No., or PO Box No. 100 NORTH MAIN
City, State, ZIP+4® LOVINGTON, NM 88220

PS Form 3800, January 2023 PSN 7530-02-000-9047 See Reverse for Instructions

## BKU Compressor Station- Public Notice

### Table of Posted Notices

| Location Name | Address | City | State | ZIP |
|---|---|---|---|---|
| BKU CS Facility Entrance | 32.812019, -104.045647 | Loco Hills | NM | 88255 |
| Loco Hills USPS | 3 Goat Ropers Rd | Loco Hills | NM | 88255 |
| Loco Hills Supply Store | 132445 Lovington Hwy | Loco Hills | NM | 88255 |
| Loco Hills General Store | 132205 Lovington Hwy | Loco Hills | NM | 88255 |

East

80°E (T) LAT: 32.812019 LON: -104.045647 ±32ft ▲ 3518ft

DANGER

RIZED

EL ONLY

$H_2S$

MAY BE PRESENT

# NOTICE

**Frontier Field Services, LLC** announces its application submittal to the New Mexico Environment Department for an air quality permit for the **modification** of its **compressor station** facility. The expected date of application submittal to the Air Quality Bureau is **March 13, 2026.**

The exact location for the proposed facility, known as **BKU Compressor Station**, is at **32.812183°N, -104.044811°W.** The approximate location of this facility is **21** miles E of **Artesia** in **Eddy** County.

The proposed **modification** consists of updates to the inlet gas and liquids compositions at the station, updates to emissions for the compressor engines, and updates to emissions from the flare, vapor combustor, tanks, and fugitive sources.

The estimated maximum quantities of any regulated air contaminants will be as follows in pounds per hour (pph) and tons per year (tpy) and could change slightly during the course of the Department's review:

| Pollutant: | Pounds per hour | Tons per year |
|---|---|---|
| Particulate Matter (PM) | 2 pph | 4 tpy |
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| $PM_{2.5}$ | 2 pph | 4 tpy |
| Sulfur Dioxide ($SO_2$) | 2,103 pph | 249 tpy |
| Nitrogen Oxides ($NO_x$) | 254 pph | 173 tpy |
| Carbon Monoxide (CO) | 454 pph | 118 tpy |
| Volatile Organic Compounds (VOC) | 406 pph | 82 tpy |
| Total sum of all Hazardous Air Pollutants (HAPs) | 19 pph | 15 tpy |
| Hydrogen Sulfide ($H_2S$) | 25 pph | 5 tpy |
| Toxic Air Pollutant (TAP) | N/A | N/A |
| Green House Gas Emissions as Total $CO_2e$ | N/A | 68,826 tpy |

The standard and maximum operating schedules of the facility will be 24 hours per day, 7 days a week and a maximum of 52 weeks per year

The owner and/or operator of the Facility is **Frontier Field Services, LLC, 303 Veterans Airpark Lane, Suite 2000, Midland, Texas 79705.**

If you have any comments about the construction or operation of this facility, and you want your comments to be made as part of the permit review process, you must submit your comments in writing to this address: Permit Programs Manager; New Mexico Environment

Department; Air Quality Bureau; 525 Camino de los Marquez, Suite 1; Santa Fe, New Mexico; 87505-1816. Other comments and questions may be submitted verbally. (505) 476-4300; 1 800 224-7009.

With your comments, please refer to the company name and facility name, or send a copy of this notice along with your comments. This information is necessary since the Department may not yet have received the permit application. Please include a legible return mailing address. Once the Department has completed its preliminary review of the application and its air quality impacts, the Department's notice will be published in the legal section of a newspaper circulated near the facility location.

**Atención**

Este es un aviso de la oficina de Calidad del Aire del Departamento del Medio Ambiente de Nuevo México, acerca de las emisiones producidas por un establecimiento en esta área. Si usted desea información en español, por favor comuníquese con esa oficina al teléfono 505-629-7748.

**Notice of Non-Discrimination**

NMED does not discriminate on the basis of race, color, national origin, disability, age or sex in the administration of its programs or activities, as required by applicable laws and regulations. NMED is responsible for coordination of compliance efforts and receipt of inquiries concerning non-discrimination requirements implemented by 40 C.F.R. Part 7, including Title VI of the Civil Rights Act of 1964, as amended, Section 504 of the Rehabilitation Act of 1973; the Age Discrimination Act of 1975, Title IX of the Education Amendments of 1972, and Section 13 of the Federal Water Pollution Control Act Amendments of 1972. If you have any questions about this notice or any of NMED's non-discrimination programs, policies or procedures, or if you believe that you have been discriminated against with respect to a NMED program or activity, you may contact: Non-Discrimination Coordinator, NMED, 1190 St. Francis Dr., Suite N4050, P.O. Box 5469, Santa Fe, NM 87502, (505) 827-2855, nd.coordinator@env.nm.gov. You may also visit our website at https://www.env.nm.gov/non-employee-discrimination-complaint-page/ to learn how and where to file a complaint of discrimination.

05 Mar 2026, 07:07:16

South

158°S (T) LAT: 32.818813 LON: -103.989723 ±32ft ▲ 3578ft

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05 Mar 2026, 06:51:57

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OUTDOOR EDGE KNIVES/TOOLS

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**The owner and/or operator of the Facility is Frontier Field Services, LLC, 303 Veterans Airpark Lane, Suite 2000, Midland, Texas 79705.**
**If you have any comments about the construction or operation of this facility, and you want your comments to be made as part of the permit review process, you must submit your comments in writing to this address: Permit Programs Manager; New Mexico Environment Department; Air Quality Bureau; 525 Camino de los Marquez, Suite 1; Santa Fe, New Mexico; 87505-1816. Other comments and questions may be submitted verbally. (505) 476-4300; 1 800 224-7009.**

**With your comments, please refer to the company name and facility name, or send a copy of this notice along with your comments. This information is necessary since the Department may not yet have received the permit application. Please include a legible return mailing address. Once the Department has completed its preliminary review of the application and its air quality impacts, the Department's notice will be published in the legal section of a newspaper circulated near the facility location.**

**Atención**
**Este es un aviso de la oficina de Calidad del Aire del Departamento del Medio Ambiente de Nuevo México, acerca de las emisiones producidas por un establecimiento en esta área. Si usted desea información en español, por favor comuníquese con esa oficina al teléfono 505-629-7748.**

**Notice of Non-Discrimination**
**NMED does not discriminate on the basis of race, color, national origin, disability, age or sex in the administration of its programs or activities, as required by applicable laws and regulations. NMED is responsible for coordination of compliance efforts and receipt of inquiries concerning non-discrimination requirements implemented by 40 C.F.R. Part 7, including Title VI of the Civil Rights Act of 1964, as amended; Section 504 of the Rehabilitation Act of 1973; the Age Discrimination Act of 1975, Title IX of the Education Amendments of 1972, and Section 13 of the Federal Water Pollution Control Act Amendments of 1972. If you have any questions about this notice or any of NMED's non-discrimination programs, policies or procedures, or if you believe that you have been discriminated against with respect to a NMED program or activity, you may contact: Non-Discrimination Coordinator, NMED, 1190 St. Francis Dr., Suite N4050, P.O. Box 5469, Santa Fe, NM 87502, (505) 827-2855, nd.coordinator@env.nm.gov. You may also visit our website at https://www.env.nm.gov/non-employee-discrimination-complaint-page/ to learn how and where to file a complaint of discrimination.**

# Property Record Card

Eddy Assessor

**BUREAU OF LAND MANAGEMENT**

**Account: R092366**

Tax Area: 16O_NR - ARTESIA-OUT (Nonresidential)

Acres: 640.000

**Parcel: 4-173-101-264-264**

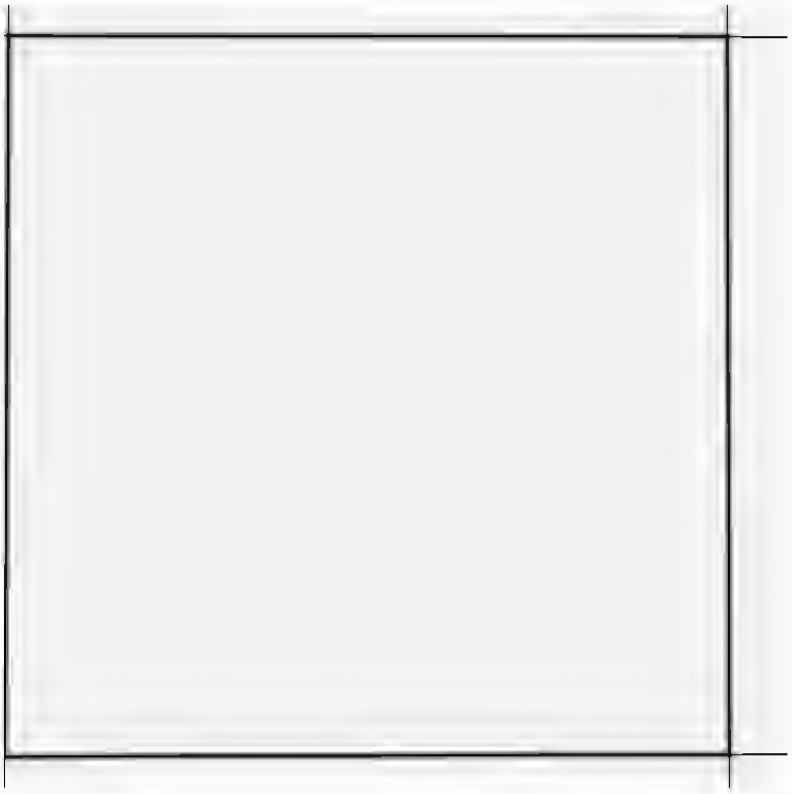
Situs Address:
NE OF 180 STANDARD ROAD
ARTESIA, 88210

## Value Summary

| Value By: | Market | Override |
|---|---|---|
| Land (1) | $2,880 | N/A |
| **Total** | **$2,880** | **$2,880** |

**Legal Description**

Quarter: NE S: 26 T: 17S R: 29E Quarter: NW S: 26 T: 17S R: 29E Quarter: SW S: 26 T: 17S R: 29E Quarter: SE S: 26 T: 17S R: 29E



## Public Remarks

| Entry Date | Model | Remark |
|---|---|---|

## Land Occurrence 1

| | | | |
|---|---|---|---|
| Property Code | 9400 - EXEMPT AGRICULTURAL LAND | Land Code | 141_4_5 - Grazing E Federal - 4.5 |
| Description | EXEMPT AGRICULTURAL LAND | Measure | A - Acres |

## Abstract Summary

| Code | Classification | Actual Value Value | Taxable Value | Actual Value Override | Taxable Override |
|---|---|---|---|---|---|
| 9400 | EXEMPT AGRICULTURAL LAND | $2,880 | $960 | NA | NA |
| **Total** | | **$2,880** | **$960** | **NA** | **NA** |

**March 11, 2026**

CERTIFIED MAIL 9589 0710 5270 3701 4332 59
RETURN RECEIPT REQUESTED

Dear **County Neighbor,**
**Frontier Field Services, LLC** announces its application submittal to the New Mexico Environment Department for an air quality permit for the **modification** of its **compressor station** facility. The expected date of application submittal to the Air Quality Bureau is **March 13, 2026.**

The exact location of the proposed facility, known as **BKU Compressor Station**, is at **32.812183°N,-104.044811°W.** The approximate location of this facility is **21** miles **east** of **Artesia** in **Eddy** County.

The proposed **modification** consists of updates to the inlet gas and liquids compositions at the station, updates to emissions for the compressor engines, and updates to emissions from the flare, vapor combustor, tanks, and fugitive sources.

The estimated maximum quantities of any regulated air contaminant will be as follows in pounds per hour (pph) and tons per year (tpy) and may change slightly during the course of the Department's review:

| Pollutant: | Pounds per hour | Tons per year |
|---|---|---|
| Particulate Matter (PM) | 2 pph | 4 tpy |
| $PM_{10}$ | 2 pph | 4 tpy |
| $PM_{2.5}$ | 2 pph | 4 tpy |
| Sulfur Dioxide ($SO_2$) | 2,103 pph | 249 tpy |
| Nitrogen Oxides ($NO_x$) | 254 pph | 173 tpy |
| Carbon Monoxide (CO) | 454 pph | 118 tpy |
| Volatile Organic Compounds (VOC) | 408 pph | 82 tpy |
| Total sum of all Hazardous Air Pollutants (HAPs) | 19 pph | 15 tpy |
| Hydrogen Sulfide ($H_2S$) | 25 pph | 5 tpy |
| Toxic Air Pollutant (TAP) | N/A | N/A |
| Green House Gas Emissions as Total $CO_2e$ | N/A | 68,626 tpy |

The standard and maximum operating schedules of the facility will be 24 hours per day, 7 days per week, and a maximum of 52 weeks per year.

Owners and operators of the facility include:
**Attention: Molly Greer**
**Frontier Field Services, LLC**
**303 Veterans Airpark Lane, Suite 2000,**
**Midland, Texas, 79705**

If you have any comments about the construction or operation of this facility, and you want your comments to be made as part of the permit review process, you must submit your comments in writing to this address: Permit Programs Manager; New Mexico Environment Department; Air Quality Bureau; 525 Camino de los Marquez, Suite 1; Santa Fe, New Mexico; 87505-1816. Other comments and questions may be submitted verbally. (505) 476-4300; 1 800 224-7009.

Please refer to the company name and facility name or send a copy of this notice along with your comments, since the Department may not have yet received the permit application. Please include a legible return mailing address with your comments. Once the Department has performed a preliminary review of the

application and its air quality impacts, the Department's notice will be published in the legal section of a newspaper circulated near the facility location.

General information about air quality and the permitting process, and links to the regulations can be found at the Air Quality Bureau's website: www.env.nm.gov/air-quality/permitting-section-home-page/. The regulation dealing with public participation in the permit review process is 20.2.72.206 NMAC.

**Attención**
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Sincerely,
**Frontier Field Services, LLC**
**303 Veterans Airpark Lane, Suite 2000,**
**Midland, Texas, 79705**

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**March 11, 2026**

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RETURN RECEIPT REQUESTED

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# NOTICE

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The exact location for the proposed facility, known as **BKU Compressor Station**, is at **32.812183°N, -104.044811°W.** The approximate location of this facility is **21** miles **E** of **Artesia** in **Eddy** County.

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# General Posting of Notices – Certification

I, Ivan Jimenez, the undersigned, certify that on March 5, 2026 posted a true and correct copy of the attached Public Notice in the following publicly accessible and conspicuous places in the village of **Loco Hills** of **Eddy** County, State of New Mexico on the following dates:

1. Facility Entrance: 3/05/2026
2. Loco Hills USPS: 3 Goat Ropers Rd, Loco Hills, NM 88255, 3/05/2026
3. Loco Hills Supply Store: 132445 Lovington Hwy, Loco Hills, NM 88255, 3/05/2026
4. Loco Hills General Store: 132205 Lovington Hwy, Loco Hills, NM 88255, 3/05/2026

Signed this 5 day of March, 2026,

Ivan Jimenez
Signature

3/5/2026
Date

Ivan Jimenez
Printed Name

Environmental Technician II
Title {APPLICANT OR RELATIONSHIP TO APPLICANT}

## BKU Compressor Station - Public Notice

### Table of Noticed Neighbors (within 0.5 miles of facility)

| Owner Name | Owner Address | City | State | ZIP |
|---|---|---|---|---|
| Bureau of Land Management | 620 E Green St | Carlsbad | NM | 88220 |
| State of New Mexico | 310 Old Santa Fe Trail | Santa Fe | NM | 87501 |

### Table of Noticed Municipalities (within 10 miles of facility)

| Location | Owner Address | City | State | ZIP |
|---|---|---|---|---|
| Artesia City Manager | 511 W Texas Ave | Artesia | NM | 88210 |

### Table of Noticed Counties (within 10 miles of facility)

| Location | Owner Address | City | State | ZIP |
|---|---|---|---|---|
| Lea County | 100 North Main | Lovington | NM | 88260 |
| Eddy County Manager | 101 W Greene St | Carlsbad | NM | 88220 |

### Table of Noticed Tribes (within 10 miles of facility)

| Location | Owner Address | City | State | ZIP |
|---|---|---|---|---|
| N/A - No tribes within 10-mile radius. | | | | |

PUBLIC SERVICE ANNOUNCEMENT

*Per New Mexico Administrative Code 20.2.72.203.D. NMAC and according to the Guidance for Public Notice for Air Quality Permit Applications –* ***(5) Notifications: Submittal of Public Service Announcement (PSA)****: A public service announcement required for permits and significant permit revisions must be submitted to at least one radio or television station, which services the municipality, or county in which the facility is or will be located.* ***Therefore, based on the above, we respectfully ask that you air the information below as a Public Service Announcement.***

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This is a public service announcement per the air permit requirements of New Mexico Administrative Code 20.2.72.203.D. Frontier Field Services, LLC, announces its application submittal to the New Mexico Environment Department for an air quality permit for the modification of the compressor station known as the BKU Compressor Station.

**The BKU Compressor Station** facility is at **32.812183°N, - 104.044811°W**. The approximate location of this facility is **21** miles **east** of **Artesia** in **Eddy** County.

The owner and/or operator of the Facility is: **Frontier Field Services, LLC, 303 Veterans Airpark Lane, Suite 2000, Midland, Texas, 79705.**

The locations where notices have been posted:

- Facility entrance
- Loco Hills Post Office, 3 Goat Ropers Rd, Loco Hills, NM 88255
- Loco Hills Supply Store, 132445 Lovington Hwy, Loco Hills, NM 88255
- Loco Hills General Store, 132205 Lovington Hwy, Loco Hills, NM 88255

If you have any comments about the construction or operation of this facility, you must submit your comments in writing to this address**: Permit Programs Manager, New Mexico Environment Department, Air Quality Bureau, 525 Camino de los Marquez, Suite 1, Santa Fe, New Mexico, 87505-1816. Other comments and questions may be submitted verbally to (505) 476-4300 or 1-800 224-7009.**

## Tina Purington

**From:** Tina Purington
**Sent:** Tuesday, March 10, 2026 9:03 AM
**To:** 'Aaron Forrister'
**Subject:** RE: Public Service Announcement Request - BKU

Great! Thank you, Aaron. Send me an invoice at your convenience, and I'll call to pay over the phone.

Regards,

**Tina Purington**
Associate Consultant

(512) 608.1034
9737 Great Hills Trail, Ste 340, Austin, TX 78759
Email: Tina.Purington@trinityconsultants.com

---

**From:** Aaron Forrister <aaron@noalmark.com>
**Sent:** Tuesday, March 10, 2026 9:01 AM
**To:** Tina Purington <tina.purington@trinityconsultants.com>
**Subject:** Re: Public Service Announcement Request

Hi Tina!

We can run it Thursday March 12, 2026.

**Aaron Forrister, CRMC**
New Mexico Market Manager
KZOR-KIXN-KPZA-KEJL-KLEA-KBIM FM-KBIM
575-318-7217 mobile
575-397-4969 office
575-393-4310 fax
619 North Turner
Hobbs, NM 88240

Noalmark Broadcasting Corporation and its stations do not discriminate in advertising contracts on the basis of race or ethnicity, and will not accept any advertising which is intended to discriminate on the basis of race or ethnicity. Advertiser

represents and warrants that it is not purchasing advertising time from Noalmark Broadcasting Corporation or its stations that is intended to discriminate on the basis of race or ethnicity.

---

**From:** Tina Purington <tina.purington@trinityconsultants.com>
**Sent:** Tuesday, March 10, 2026 7:50 AM
**To:** Aaron Forrister <aaron@noalmark.com>
**Cc:** Dawna Allen <Dawna.Allen@trinityconsultants.com>
**Subject:** Public Service Announcement Request

Aaron,

I am reaching out on behalf of Frontier Field Services to submit a request for a public service announcement for the **BKU Compressor Station**. Attached is the announcement script, which we would like to air once at the earliest opportunity. Let me know the scheduled air date.

I will call to make the payment over the phone.

Please let me know if you have any questions or need any further information.

Thank you,

**Tina Purington**
Associate Consultant

(512) 608.1034
9737 Great Hills Trail, Ste 340, Austin, TX 78759
Email: Tina.Purington@trinityconsultants.com



# Submittal of Public Service Announcement – Certification

I, Tina Purington, the undersigned, certify that on **March XX**, **2026** submitted a public service announcement to **KZOR 94.1** that serves the City\Town\Village of **Loco Hills**, **Eddy** County, New Mexico, in which the source is or is proposed to be located and that **KZOR 94.1 RESPONDED THAT IT WOULD AIR THE ANNOUNCEMENT.**

Signed this 11th day of March, 2026,

Tina Purington
Signature

3/11/2026
Date

Tina Purington
Printed Name

Associate Consultant
Title {APPLICANT OR RELATIONSHIP TO APPLICANT}

# Affidavit of Publication

No. 91140

State of New Mexico

County of Eddy:

**Adrian Hedden**

being duly sworn, sayes that he is the **Publisher**

of the Artesia Daily Press, a weekly newspaper of General circulation, published in English at Artesia,

said county and state, and that the hereto attached

**Legal Ad**

was published in a regular and entire issue of the said Artesia Daily Press, a weekly newspaper duly qualified for that purpose within the meaning of Chapter 167 of the 1937 Session Laws of the state of New Mexico for

1 Consecutive weeks/day on the same day as follows:

| | |
|---|---|
| First Publication | March 26, 2026 |
| Second Publication | |
| Third Publication | |
| Fourth Publication | |
| Fifth Publication | |
| Sixth Publication | |
| Seventh Publication | |
| Eighth Publication | |

Subscribed ans sworn before me this

26th day of March 2026

LATISHA ROMINE
Notary Public, State of New Mexico
Commission No. 1076338
My Commission Expires
05-12-2027

Latisha Romine

Latisha Romine

Notary Public, Eddy County, New Mexico

# Copy of Publication:

**NOTICE OF AIR QUALITY PERMIT APPLICATION**

**Frontier Field Services, LLC** announces its application submittal to the New Mexico Environment Department for an air quality permit for the **modification** of a compressor station facility. The expected date of application submittal to the Air Quality Bureau is **March 27, 2026**.

The exact location for the proposed facility, known as **BKU Compressor Station, is at 32.812183°N, - 104.044811°W**. The approximate location of this facility is **21** miles **E** of **Artesia** in **Eddy** County.

The proposed **modification** consists of updates to the inlet gas and liquids compositions at the station, updates to emissions for the compressor engines, and updates to emissions from the flare, vapor combustor, tanks, and fugitive sources.
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| PM 10 | 2 pph | 4 tpy |
| PM 2.5 | 2 pph | 4 tpy |
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**Notice of Non-Discrimination**
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Third Publication

Fourth Publication

Fifth Publication

Sixth Publication

Seventh Publication

Eighth Publication

Subscribed ans sworn before me this

26th day of March 2026

LATISHA ROMINE
Notary Public, State of New Mexico
Commission No. 1076338
My Commission Expires
05-12-2027

Latisha Romine

Latisha Romine

Notary Public, Eddy County, New Mexico

weeks per year

The owner and/or operator of the Facility is: **Frontier Field Services, LLC, 303 Veterans Airpark Lane, Suite 2000, Midland, Texas, 79705**

If you have any comments about the construction or operation of this facility, and you want your comments to be made as part of the permit review process, you must submit your comments in writing to this address: Permit Programs Manager; New Mexico Environment Department; Air Quality Bureau; 525 Camino de los Marquez, Suite 1; Santa Fe, New Mexico; 87505-1816. Other comments and questions may be submitted verbally. (505) 476-4300; 1 800 224-7009.

Please refer to the company name and site name, or send a copy of this notice along with your comments, since the Department may have not yet received the permit application. Please include a legible return mailing address with your comments. Once the Department has performed a preliminary review of the application and its air quality impacts, the Departments notice will be published in the legal section of a newspaper circulated near the facility location.

General information about air quality and the permitting process, and links to the regulations can be found at the Air Quality Bureaus website: www.env.nm.gov/air-quality/permitting-section-home-page/. The regulation dealing with public participation in the permit review process is 20.2.72.206 NMAC.

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91140-Published in Artesia Daily Press March 26, 2026.

# Affidavit of Publication

No.

State of New Mexico

County of Eddy:

**Adrian Hedden**

being duly sworn, sayes that he is the **Publisher**

of the Artesia Daily Press, a weekly newspaper of General circulation, published in English at Artesia, said county and state, and that the hereto attached

**Display Ad**

was published in a regular and entire issue of the said Artesia Daily Press, a weekly newspaper duly qualified for that purpose within the meaning of Chapter 167 of the 1937 Session Laws of the state of New Mexico for

1 Consecutive weeks/day on the same day as follows:

| | |
|---|---|
| First Publication | March 26, 2026 |
| Second Publication | |
| Third Publication | |
| Fourth Publication | |
| Fifth Publication | |
| Sixth Publication | |
| Seventh Publication | |
| Eighth Publication | |

Subscribed ans sworn before me this

26th day of March 2026

LATISHA ROMINE
Notary Public, State of New Mexico
Commission No. 1076338
My Commission Expires
05-12-2027

Latisha Romine

Latisha Romine

Notary Public, Eddy County, New Mexico

# Copy of Publication:

## NOTICE OF AIR QUALITY PERMIT APPLICATION

**Frontier Field Services, LLC** announces its application submittal to the New Mexico Environment Department for an air quality permit for the **modification** of a compressor station facility. The expected date of application submittal to the Air Quality Bureau is **March 27, 2026**.

The exact location for the proposed facility, known as **BKU Compressor Station,** is at **32.812183°N, - 104.044811°W.** The approximate location of this facility is **21** miles **E** of **Artesia** in **Eddy** County.

The proposed **modification** consists of updates to the inlet gas and liquids compositions at the station, updates to emissions for the compressor engines, and updates to emissions from the flare, vapor combustor, tanks, and fugitive sources.

The estimated maximum quantities of any regulated air contaminant will be as follows in pound per hour (pph) and tons per year (tpy) and could change slightly during the course of the Department's review:

| Pollutant: | Pounds per hour | Tons per year |
|---|---|---|
| Particulate Matter (PM) | 2 pph | 4 tpy |
| $PM_{10}$ | 2 pph | 4 tpy |
| $PM_{2.5}$ | 2 pph | 4 tpy |
| Sulfur Dioxide ($SO_2$) | 2,103 pph | 249 tpy |
| Nitrogen Oxides (NOx) | 254 pph | 173 tpy |
| Carbon Monoxide (CO) | 454 pph | 118 tpy |
| Volatile Organic Compounds (VOC) | 408 pph | 82 tpy |
| Total sum of all Hazardous Air Pollutants (HAPs) | 19 pph | 15 tpy |
| Hydrogen Sulfide (H2S) | 25 pph | 5 tpy |
| Toxic Air Pollutant (TAP) | N/A | N/A |
| Green House Gas Emissions as Total $CO_2e$ | N/A | 68,626 tpy |

The standard and maximum operating schedules of the facility will be 24 hours per day, 7 days a week and a maximum of 52 weeks per year

The owner and/or operator of the Facility is: **Frontier Field Services, LLC, 303 Veterans Airpark Lane, Suite 2000, Midland, Texas, 79705**

If you have any comments about the construction or operation of this facility, and you want your comments to be made as part of the permit review process, you must submit your comments in writing to this address: Permit Programs Manager; New Mexico Environment Department; Air Quality Bureau; 525 Camino de los Marquez, Suite 1; Santa Fe, New Mexico; 87505-1816. Other comments and questions may be submitted verbally. (505) 476-4300; 1 800 224-7009.

Please refer to the company name and site name, or send a copy of this notice along with your comments, since the Department may have not yet received the permit application. Please include a legible return mailing address with your comments. Once the Department has performed a preliminary review of the application and its air quality impacts, the Department's notice will be published in the legal section of a newspaper circulated near the facility location.

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The owner and/or operator of the Facility is: **Frontier Field Services, LLC, 303 Veterans Airpark Lane, Suite 2000, Midland, Texas, 79705**

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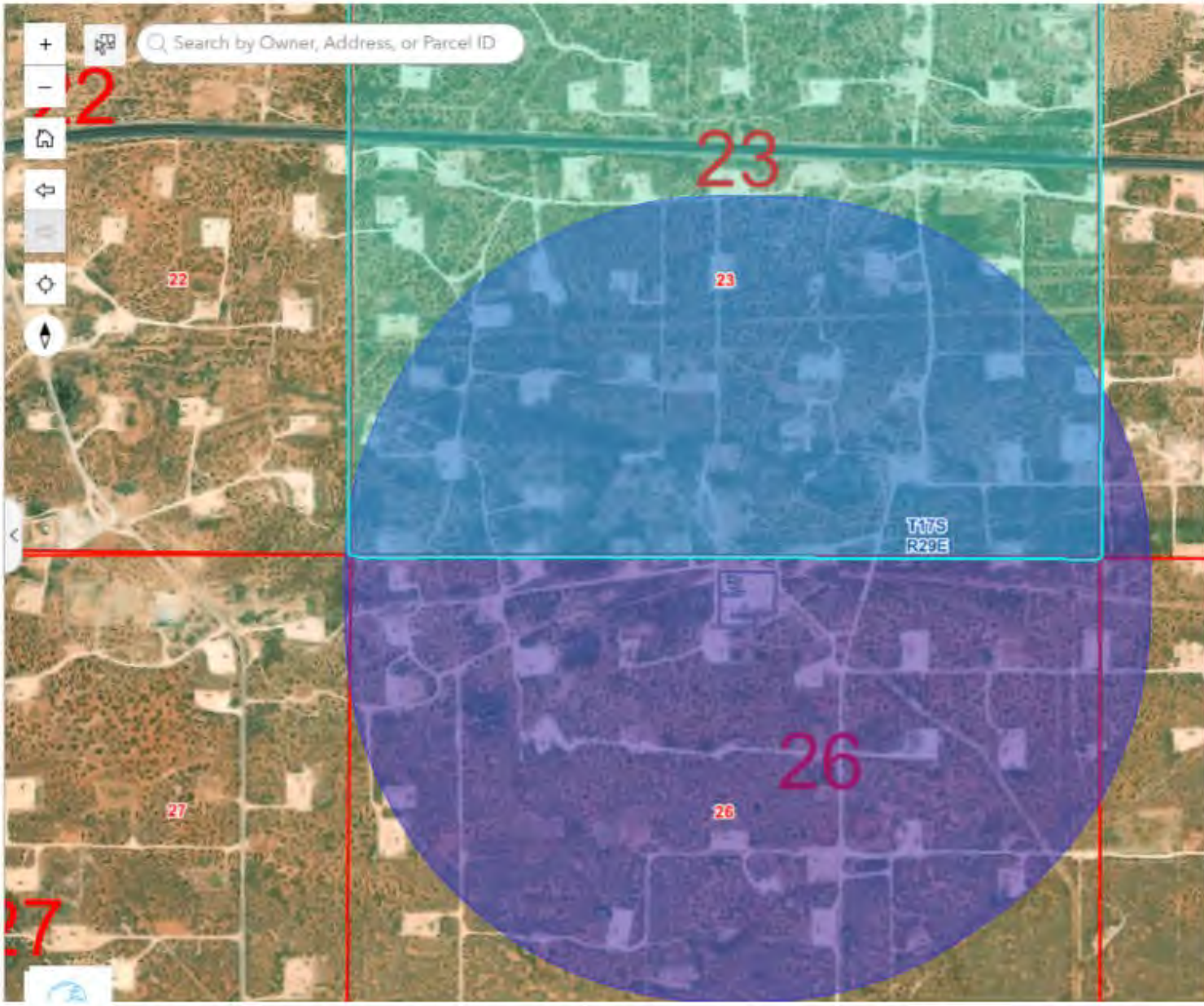
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## Parcel Information

Assessor Property Information

| | |
|---|---|
| **UPC** | 4-173-100-264-264 |
| **Map Number** | |
| **Owner Name** | BUREAU OF LAND MANAGEMENT |
| **Owner Address** | |
| **Owner City** | |
| **Owner State** | |
| **Owner ZIP** | |
| **Site Address** | |
| **Legal Summary** | Quarter: NE S: 23 T: 17S R: 29E Quarter: NW S: 23 T: 17S R: 29E Quarter: SW S: 23 T: 17S R: 29E Quarter: SE S: 23 T: 17S R: 29E ALL MAP# 97-23 LOC ARTESIA EXEMPT |
| **Model Type** | Land |
| **Land Actual** | 2880 |
| **Actual Area** | 640 |
| **Tax Area** | 16O_NR |
| **Land Code** | 141_4_5 |
| **Book** | |
| **Page** | |

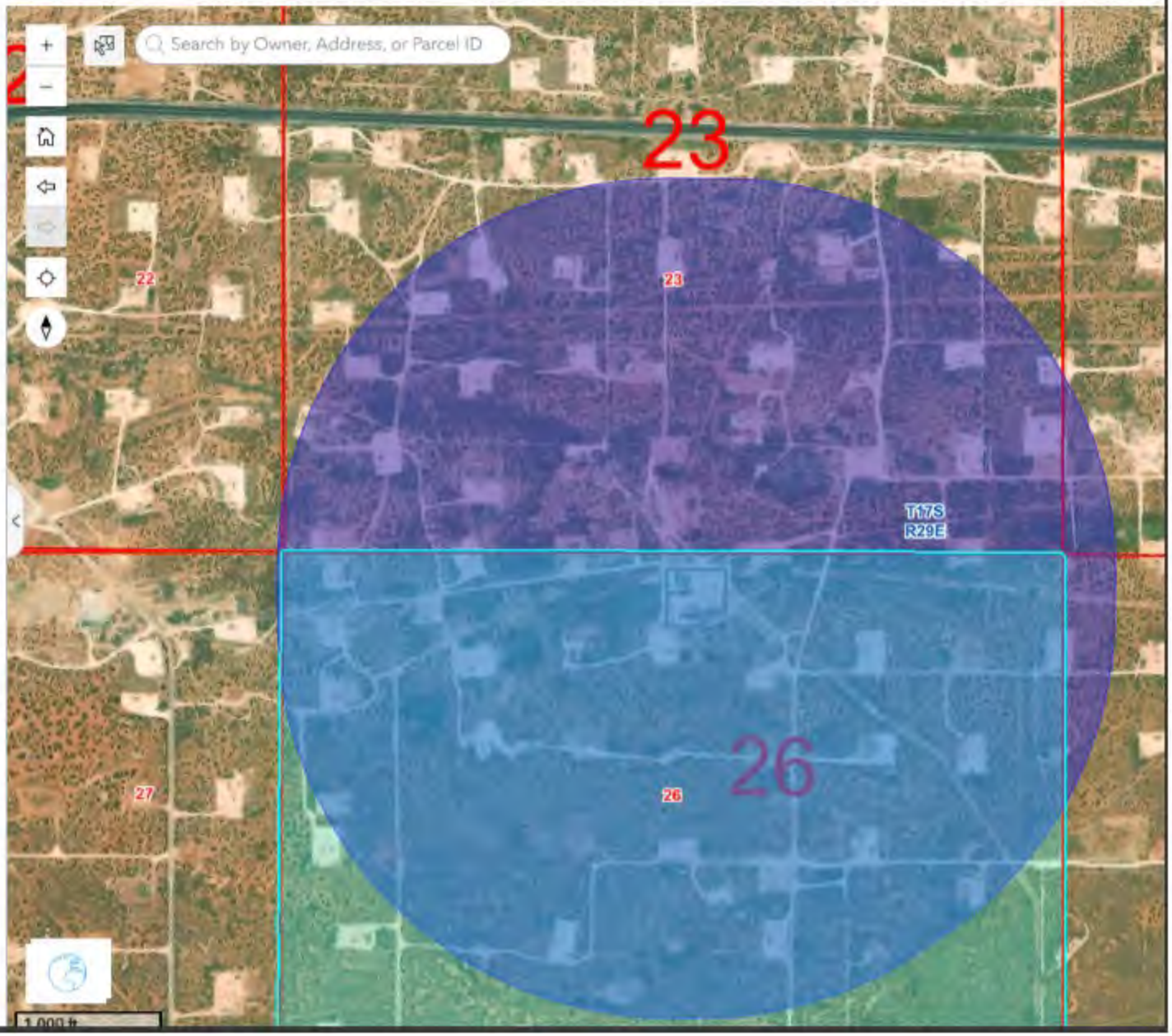


Results

## Parcel Information

Assessor Property Information

| | |
|---|---|
| **UPC** | 4-173-101-264-264 |
| **Map Number** | |
| **Owner Name** | BUREAU OF LAND MANAGEMENT |
| **Owner Address** | |
| **Owner City** | |
| **Owner State** | |
| **Owner ZIP** | |
| **Site Address** | |
| **Legal Summary** | Quarter: NE S: 26 T: 17S R: 29E Quarter: NW S: 26 T: 17S R: 29E Quarter: SW S: 26 T: 17S R: 29E Quarter: SE S: 26 T: 17S R: 29E ALL MAP# 97-26 LOC ARTESIA EXEMPT |
| **Model Type** | Land |
| **Land Actual** | 2880 |
| **Actual Area** | 640 |
| **Tax Area** | 16O_NR |
| **Land Code** | 141_4_5 |
| **Book** | |
| **Page** | |

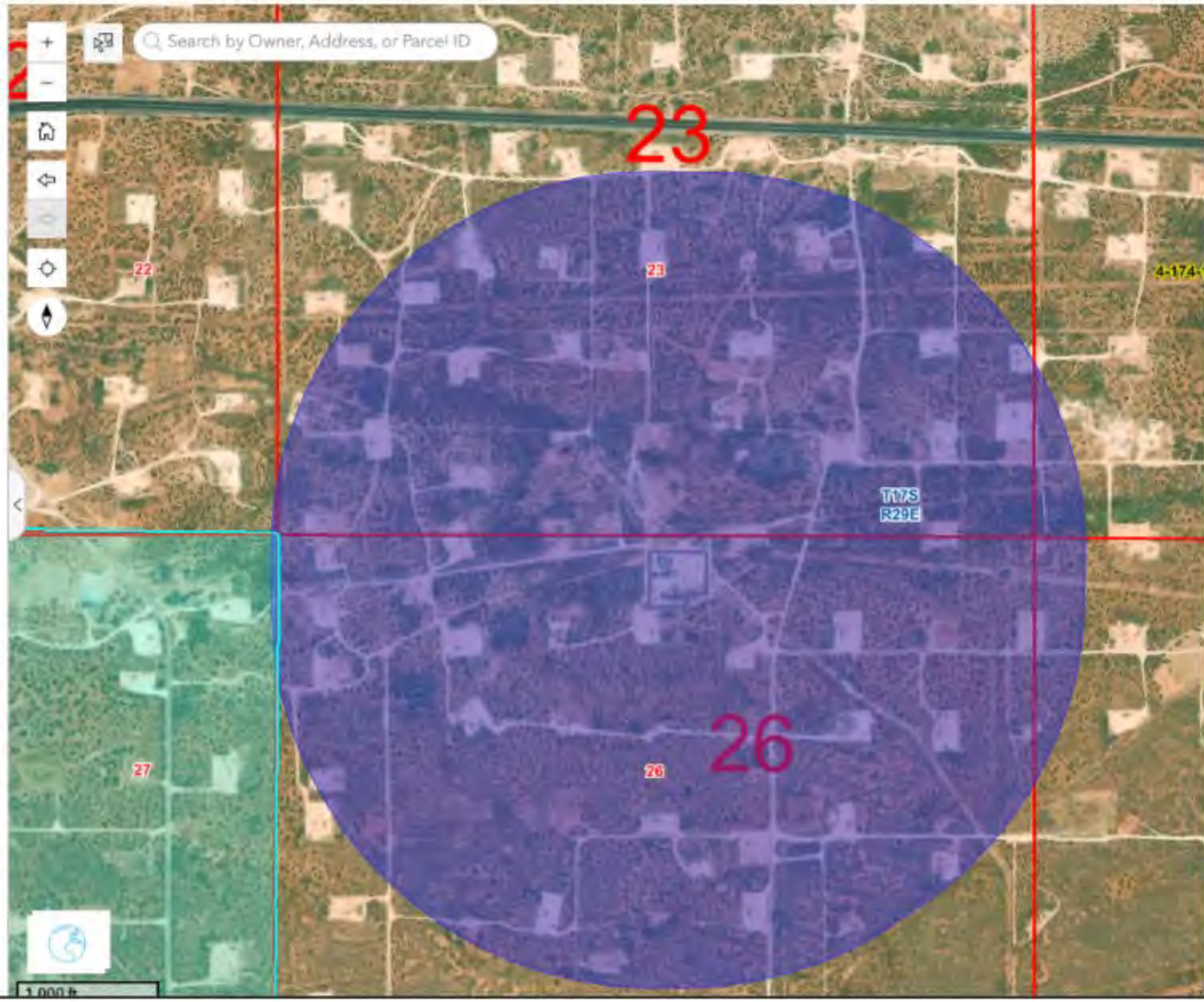


Results

## Parcel Information

Assessor Property Information

| | |
|---|---|
| **UPC** | 4-172-101-330-264 |
| **Map Number** | |
| **Owner Name** | BUREAU OF LAND MANAGEMENT |
| **Owner Address** | |
| **Owner City** | |
| **Owner State** | |
| **Owner ZIP** | |
| **Site Address** | |
| **Legal Summary** | Quarter: NE S: 27 T: 17S R: 29E Quarter: NW S: 27 T: 17S R: 29E Quarter: SW S: 27 T: 17S R: 29E Quarter: SE S: 27 T: 17S R: 29E E2, E2W2 MAP# 97-27 LOC ARTESIA EXEMPT |
| **Model Type** | Land |
| **Land Actual** | 2160 |
| **Actual Area** | 480 |
| **Tax Area** | 16O_NR |
| **Land Code** | 141_4_5 |
| **Book** | |
| **Page** | |

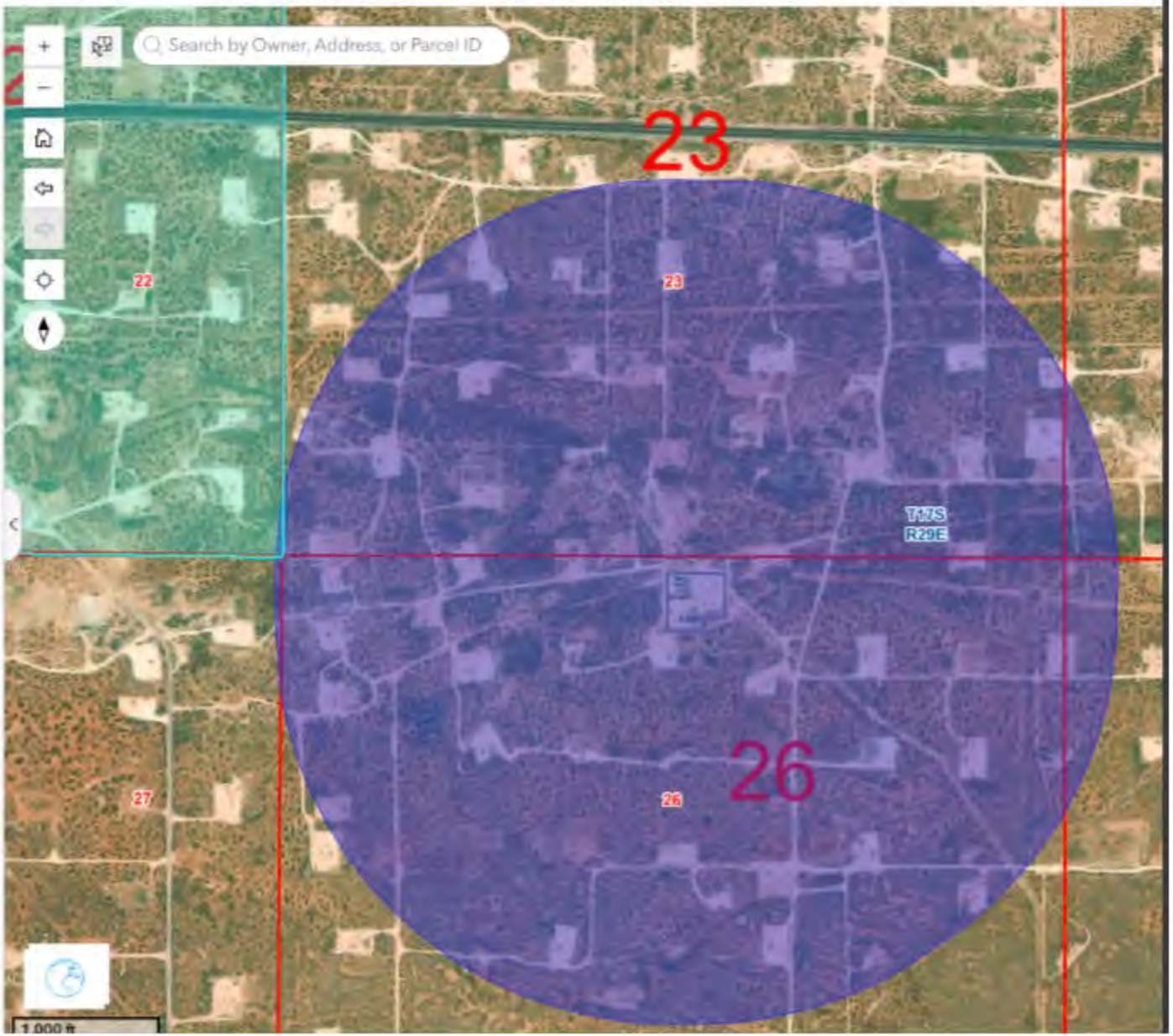


Results

## Parcel Information

Assessor Property Information

| | |
|---|---|
| **UPC** | 4-172-100-396-264 |
| **Map Number** | |
| **Owner Name** | BUREAU OF LAND MANAGEMENT |
| **Owner Address** | |
| **Owner City** | |
| **Owner State** | |
| **Owner ZIP** | |
| **Site Address** | |
| **Legal Summary** | Quarter: NE S: 22 T: 17S R: 29E Quarter: SW S: 22 T: 17S R: 29E Quarter: SE S: 22 T: 17S R: 29E NENE, S2NE, SESW, SE MAP# 97-22 LOC ARTESIA EXEMPT |
| **Model Type** | Land |
| **Land Actual** | 1440 |
| **Actual Area** | 320 |
| **Tax Area** | 16O_NR |
| **Land Code** | 141_4_5 |
| **Book** | |
| **Page** | |

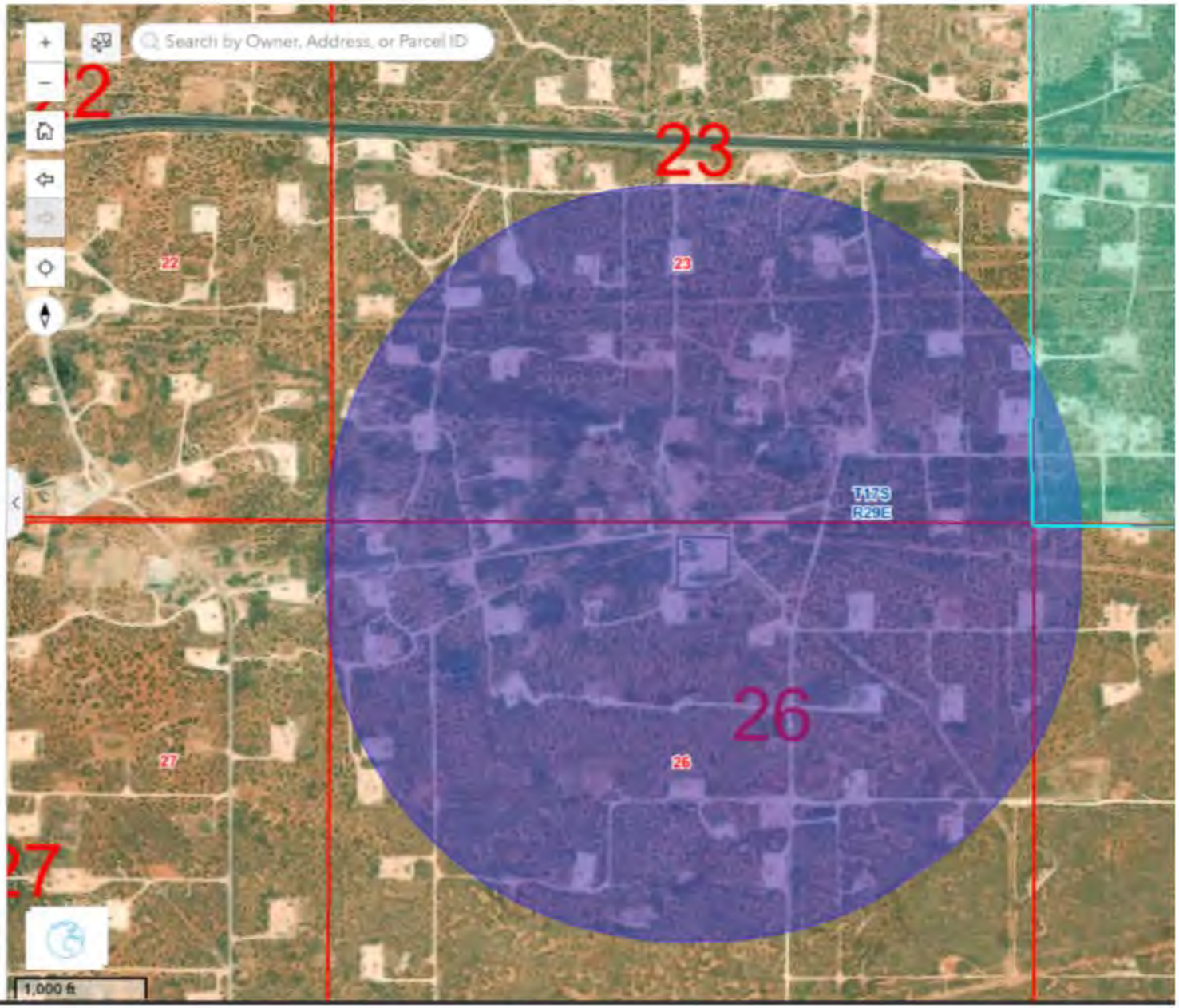


Results

## Parcel Information

Assessor Property Information

| | |
|---|---|
| UPC | 4-174-100-264-297 |
| Map Number | |
| Owner Name | BUREAU OF LAND MANAGEMENT |
| Owner Address | |
| Owner City | |
| Owner State | |
| Owner ZIP | |
| Site Address | |
| Legal Summary | Quarter: NE S: 24 T: 17S R: 29E Quarter: NW S: 24 T: 17S R: 29E Quarter: SW S: 24 T: 17S R: 29E Quarter: SE S: 24 T: 17S R: 29E NE, N2NW, SWNW, SW, NESESE, SENESE, S2NWSESE, SWNWSE, S2NESWSE, NWSWSE N2N2SE, S2S2SE MAP# 97-24 LOC ARTESIA EXEMPT |
| Model Type | Land |
| Land Actual | 2565 |
| Actual Area | 570 |
| Tax Area | 16O_NR |
| Land Code | 141_4_5 |
| Book | |
| Page | |

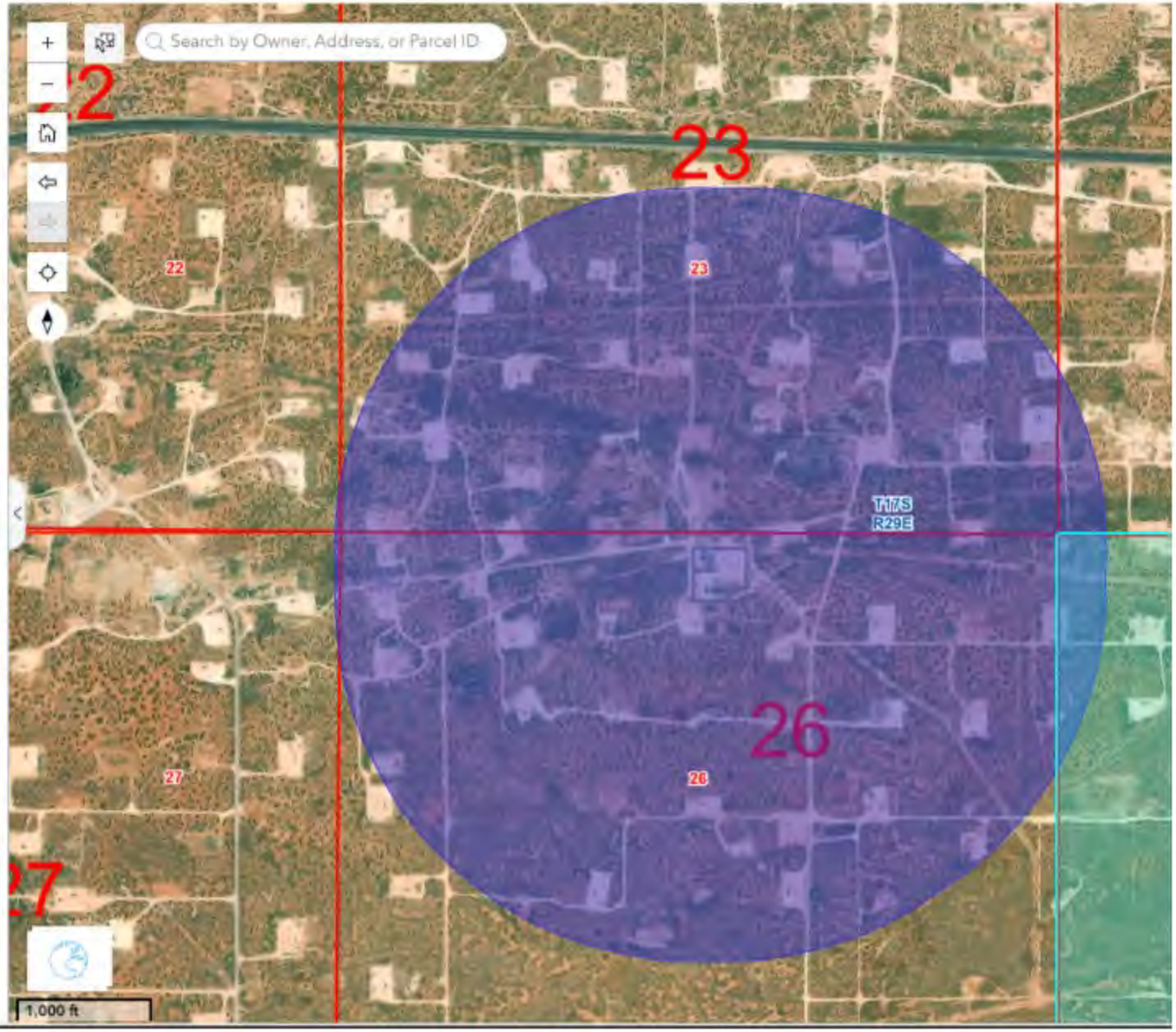


Results

## Parcel Information

Assessor Property Information

| | |
|---|---|
| **UPC** | 4-174-101-264-264 |
| **Map Number** | |
| **Owner Name** | BUREAU OF LAND MANAGEMENT |
| **Owner Address** | |
| **Owner City** | |
| **Owner State** | |
| **Owner ZIP** | |
| **Site Address** | |
| **Legal Summary** | Quarter: NE S: 25 T: 17S R: 29E Quarter: NW S: 25 T: 17S R: 29E Quarter: SW S: 25 T: 17S R: 29E Quarter: SE S: 25 T: 17S R: 29E ALL MAP# 97-25 LOC ARTESIA EXEMPT |
| **Model Type** | Land |
| **Land Actual** | 2880 |
| **Actual Area** | 640 |
| **Tax Area** | 16O_NR |
| **Land Code** | 141_4_5 |
| **Book** | |
| **Page** | |



# Section 10

## Written Description of the Routine Operations of the Facility

---

**A written description of the routine operations of the facility**. Include a description of how each piece of equipment will be operated, how controls will be used, and the fate of both the products and waste generated. For modifications and/or revisions, explain how the changes will affect the existing process. In a separate paragraph describe the major process bottlenecks that limit production. The purpose of this description is to provide sufficient information about plant operations for the permit writer to determine appropriate emission sources.

---

The BKU Compressor Station is an existing facility located in Eddy County. Gas enters the station at a rate of 40 MMSCFD. The compressor station operates continuously year-round to move natural gas from third party field producers to downstream gas plant for further processing. Prior to compression, incoming gas passes through an inlet separator to remove hydrocarbon condensate and produced water. The condensate/water mixture is separated, then sent to a condensate stabilizer (H-3) for additional separation. From the separator, condensate is stored in three 300 bbl tanks (TK-104 through TK-106) at a maximum rate of 82.19 bbl/day and produced water is stored in two 300 bbl produced water tanks (PWT-1, PWT-2) at a maximum rate of 53.33 bbl/day. Emissions from TK-104 through TK-106 are routed to a vapor combustor (VCU-1) for control. Emissions from the produced water tanks PWT-1 and PWT-2 are uncontrolled. Condensate and produced water are removed from the facility via truck. Condensate truck load-out emissions (L1) are vapor balanced back to the tank and controlled with the vapor combustor VCU-1. Produced water truck loading is uncontrolled (L2).

Gas that leaves the inlet separator is pressurized using natural gas-fired engines (C-311 – C-316) which power reciprocating compressors (COMP-311 through COMP-316). Fuel for the engines is pipeline-quality dry natural gas. The compressors raise the discharge pressure of the field gas in the pipeline to overcome the effect of frictional losses in the pipeline upstream of the station or from pressure losses/changes within the facility in order to maintain the required suction pressure at the next downstream facility. The volume of gas flowing and the amount of subsequent frictional losses in the pipeline are dependent on field conditions and downstream plant conditions.

After gas is compressed, it is routed to the glycol dehydrator (V2/F2) to remove moisture from the saturated gas stream. The wet gas is brought into contact with dry “lean” glycol in a countercurrent contactor tower. Water vapor is absorbed in the TEG solution. Wet gas passing through the contactor tower is dehydrated. The dry gas from the dehydrator leaves the facility via pipeline. The wet (or “rich”) glycol then flows from the absorber to a regeneration system in which it is partially decompressed, then heated to remove water vapor resulting in “lean” glycol that is reintroduced to the contactor tower. Heat needed to regenerate rich TEG is provided by a dehy reboiler (H-2). The flash tank is routed back to the facility inlet. The regenerator overheads sent to a BTEX condenser and any remaining non-condensable gas is also routed back to the facility inlet. There are no expected emissions from the glycol dehydrator system.

There is also a facility flare FL-1 to control SSM. Routine emissions from the flare FL-1 consist of emissions from a continuous pilot. The vapor combustor VCU-1 also has a continuous pilot.

Other emissions sources include facility-wide fugitives (FUG). Unpaved haul roads are present at the site (HAUL), and it is an exempted source per 20.2.72.202.B.5 NMAC. Miscellaneous tanks are also located at the facility and are exempted sources per 20.2.72.202.B.5 NMAC or 20.2.72.202.B.2 NMAC.

Startup, Shutdown, and Maintenance (SSM) Emissions

SSM emissions will occur from the site as follows:

- FL-1 SSM: In the event of an upset condition and the plant needs to flare inlet gas, the gas will be combusted in the Flare FL-1. Compressors can also be depressured to the flare FL-1 during SSM.
- SSM: The SSM unit ID represents vented SSM. Equipment blowdowns to the atmosphere will occur for compressors, scrubbers, reboilers, pigging, small filter/strainer/small vessel openings, and tank maintenance. Compressors will first depressure back to suction header or to FL-1, after which a small remaining volume will be

released to atmosphere. On an hourly basis, only one SSM event type will occur in one single hour; therefore, the hourly H2S emission rate is the maximum of the SSM event types.

Fugitive Emissions Clarification

Fugitive emissions sources of H2S include both routine fugitive emission sources and event-based fugitive emission sources.

- Routine fugitive emission sources are: Produced Water Tank emissions (PWT-1, PWT-2) and fugitives (FUG)
- Event-based fugitive emission sources: SSM (vented SSM), produced water loading (L2), and the uncaptured fugitives from condensate loading (L2)

The event-based fugitive emissions sources will not occur within the same hour and this has been taken into account in the air dispersion modeling for the facility. Truck loading of condensate and produced water will not occur within the same hour and while truck loading is occurring, the site will not be performing SSM venting activities.

# Section 11

## Source Determination

Source submitting under 20.2.70, 20.2.72, 20.2.73, and 20.2.74 NMAC

Sources applying for a construction permit, PSD permit, or operating permit shall evaluate surrounding and/or associated sources (including those sources directly connected to this source for business reasons) and complete this section. Responses to the following questions shall be consistent with the Air Quality Bureau's permitting guidance, Single Source Determination Guidance, which may be found on the Applications Page in the Permitting Section of the Air Quality Bureau website.

Typically, buildings, structures, installations, or facilities that have the same SIC code, that are under common ownership or control, and that are contiguous or adjacent constitute a single stationary source for 20.2.70, 20.2.72, 20.2.73, and 20.2.74 NMAC applicability purposes. Submission of your analysis of these factors in support of the responses below is optional, unless requested by NMED.

**A. Identify the emission sources evaluated in this section** (list and describe)**: The BKU Compressor Station, See Table 2-A for the equipment at this facility.**

**B. Apply the 3 criteria for determining a single source:**

**SIC Code:** Surrounding or associated sources belong to the same 2-digit industrial grouping (2-digit SIC code) as this facility, OR surrounding or associated sources that belong to different 2-digit SIC codes are support facilities for this source.

☑ **Yes** ☐ **No**

**Common Ownership or Control:** Surrounding or associated sources are under common ownership or control as this source.

☑ **Yes** ☐ **No**

**Contiguous or Adjacent:** Surrounding or associated sources are contiguous or adjacent with this source.

☑ **Yes** ☐ **No**

**C. Make a determination:**

☑ The source, as described in this application, constitutes the entire source for 20.2.70, 20.2.72, 20.2.73, or 20.2.74 NMAC applicability purposes. If in "A" above you evaluated only the source that is the subject of this application, all "**YES**" boxes should be checked. If in "A" above you evaluated other sources as well, you must check **AT LEAST ONE** of the boxes "**NO**" to conclude that the source, as described in the application, is the entire source for 20.2.70, 20.2.72, 20.2.73, and 20.2.74 NMAC applicability purposes.

☐ The source, as described in this application, **does not** constitute the entire source for 20.2.70, 20.2.72, 20.2.73, or 20.2.74 NMAC applicability purposes (A permit may be issued for a portion of a source). The entire source consists of the following facilities or emissions sources (list and describe):

# Section 12

## Section 12.A

## PSD Applicability Determination for All Sources

(Submitting under 20.2.72, 20.2.74 NMAC)

---

**A PSD applicability determination for all sources**. For sources applying for a significant permit revision, apply the applicable requirements of 20.2.74.AG and 20.2.74.200 NMAC and to determine whether this facility is a major or minor PSD source, and whether this modification is a major or a minor PSD modification. It may be helpful to refer to the procedures for Determining the Net Emissions Change at a Source as specified by Table A-5 (Page A.45) of the EPA New Source Review Workshop Manual to determine if the revision is subject to PSD review.

A. This facility is:

- **X** **a minor PSD source before and after this modification (if so, delete C and D below).**
- ☐ **a major PSD source before this modification. This modification will make this a PSD minor source.**
- ☐ **an existing PSD Major Source that has never had a major modification requiring a BACT analysis.**
- ☐ **an existing PSD Major Source that has had a major modification requiring a BACT analysis**
- ☐ **a new PSD Major Source after this modification.**

---

This facility is not one of the listed 20.2.74.501 Table I – PSD Source Categories. The BKU Compressor Station is currently and will remain a minor PSD source. The total emissions from the facility are less than PSD major source thresholds:

a. NOx: 143.49 TPY
b. CO: 96.77 TPY
c. VOC: 73.74 TPY
d. SOx: 244.10 TPY
e. PM: 2.72 TPY
f. PM10: 2.72 TPY
g. PM2.5: 2.72 TPY
h. Fluorides: 0 TPY
i. Lead: 0 TPY
j. Hydrogen Sulfide (H2S): 3.18 TPY
k. GHG: 56,681 TPY

# Section 13

## Determination of State & Federal Air Quality Regulations

---

**This section lists each state and federal air quality regulation that may apply to your facility and/or equipment that are stationary sources of regulated air pollutants.**

Not all state and federal air quality regulations are included in this list. Go to the Code of Federal Regulations (CFR) or to the Air Quality Bureau's regulation page to see the full set of air quality regulations.

**Required Information for Specific Equipment:**
For regulations that apply to specific source types, in the 'Justification' column **provide any information needed to determine if the regulation does or does not apply**. **For example**, to determine if emissions standards at 40 CFR 60, Subpart IIII apply to your three identical stationary engines, we need to know the construction date as defined in that regulation; the manufacturer date; the date of reconstruction or modification, if any; if they are or are not fire pump engines; if they are or are not emergency engines as defined in that regulation; their site ratings; and the cylinder displacement.

**Required Information for Regulations that Apply to the Entire Facility:**
See instructions in the 'Justification' column for the information that is needed to determine if an 'Entire Facility' type of regulation applies (e.g. 20.2.70 or 20.2.73 NMAC).

**Regulatory Citations for Regulations That Do Not, but Could Apply:**
If there is a state or federal air quality regulation that does not apply, but you have a piece of equipment in a source category for which a regulation has been promulgated, you must **provide the low level regulatory citation showing why your piece of equipment is not subject to or exempt from the regulation. For example** if you have a stationary internal combustion engine that is not subject to 40 CFR 63, Subpart ZZZZ because it is an existing 2 stroke lean burn stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions, your citation would be 40 CFR 63.6590(b)(3)(i). **We don't want a discussion of every non-applicable regulation, but if it is possible a regulation could apply, explain why it does not. For example,** if your facility is a power plant, you do not need to include a citation to show that 40 CFR 60, Subpart OOO does not apply to your non-existent rock crusher.

**Regulatory Citations for Emission Standards:**
**For each unit that is subject to an emission standard in a source specific regulation, such as 40 CFR 60, Subpart OOO or 40 CFR 63, Subpart HH, include the low level regulatory citation of that emission standard.** Emission standards can be numerical emission limits, work practice standards, or other requirements such as maintenance. **Here are examples:** a glycol dehydrator is subject to the general standards at 63.764C(1)(i) through (iii); an engine is subject to 63.6601, Tables 2a and 2b; a crusher is subject to 60.672(b), Table 3 and all transfer points are subject to 60.672(e)(1)

**Federally Enforceable Conditions:**
All federal regulations are federally enforceable. All Air Quality Bureau State regulations are federally enforceable except for the following: affirmative defense portions at 20.2.7.6.B, 20.2.7.110(B)(15), 20.2.7.11 through 20.2.7.113, 20.2.7.115, and 20.2.7.116; 20.2.37; 20.2.42; 20.2.43; 20.2.62; 20.2.63; 20.2.86; 20.2.89; and 20.2.90 NMAC. Federally enforceable means that EPA can enforce the regulation as well as the Air Quality Bureau and federally enforceable regulations can count toward determining a facility's potential to emit (PTE) for the Title V, PSD, and nonattainment permit regulations.

INCLUDE ANY OTHER INFORMATION NEEDED TO COMPLETE AN APPLICABILITY DETERMINATION OR THAT IS RELEVENT TO YOUR FACILITY'S NOTICE OF INTENT OR PERMIT.

**EPA Applicability Determination Index for 40 CFR 60, 61, 63, etc**: http://cfpub.epa.gov/adi/

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To save paper and to standardize the application format, delete this sentence, and begin your submittal for this attachment on this page.

## Example of a Table for State Regulations:

| State Regulation Citation | Title | Applies? Enter Yes or No | Unit(s) or Facility | Justification: (You may delete instructions or statements that do not apply in the justification column to shorten the document.) |
|---|---|---|---|---|
| 20.2.1 NMAC | General Provisions | Yes | Facility | The conditions of this part are applicable to all regulated equipment and facilities within the state of New Mexico. Therefore, this regulation applies. |
| 20.2.3 NMAC | Ambient Air Quality Standards NMAAQS | Yes | Facility | This facility is an emission source of nitrogen dioxide, carbon monoxide, and sulfur compounds. The facility meets the maximum allowable concentrations of sulfur compounds, carbon monoxide, and nitrogen dioxide. NMAAQS are shown to be met in the modeling in this application. |
| 20.2.7 NMAC | Excess Emissions | Yes | Facility | This regulation establishes requirements for the facility if operations at the facility result in any excess emissions. The owner or operator will operate the source at the facility having an excess emission, to the extent practicable, including associated air pollution control equipment, in a manner consistent with good air pollution control practices for minimizing emissions. The facility will also notify the NMED of any excess emissions per 20.2.7.110 NMAC. |
| 20.2.23 NMAC | Fugitive Dust Control | No | Facility | This regulation does not apply as the facility has no need to incorporate fugitive dust control measures as the facility does not generate enough emissions.<br>As of January 2019, the only areas of the state subject to a mitigation plan per 40 CFR 51.930 are in Dona Ana and Luna Counties. As this site is located in Eddy County, a mitigation plan is not required. |
| 20.2.33 NMAC | Gas Burning Equipment - Nitrogen Dioxide | No | N/A | This regulation does not apply to internal combustion equipment such as engines. It only applies to external combustion equipment such as heaters or boilers.<br>This facility does not have gas burning equipment (external combustion emission sources, such as gas fired boilers and heaters) having heat input greater than 1,000,000 million British Thermal Units per year per unit. The facility is not subject to this regulation and does not have emission sources that meet the applicability requirements under 20.2.33.108 NMAC. |
| 20.2.34 NMAC | Oil Burning Equipment: $NO_2$ | No | N/A | This facility does not have oil burning equipment with a heat input of greater than 1,000,000 million British Thermal Units per year per unit. Therefore, this regulation does not apply. |
| 20.2.35 NMAC | Natural Gas Processing Plant – Sulfur | No | N/A | This facility is not a natural gas processing plant. Therefore, this regulation does not apply. |
| 20.2.37 and 20.2.36 NMAC | Petroleum Processing Facilities and Petroleum Refineries | N/A | N/A | These regulations were repealed by the Environmental Improvement Board. If you had equipment subject to 20.2.37 NMAC before the repeal, your combustion emission sources are now subject to 20.2.61 NMAC. |
| 20.2.38 NMAC | Hydrocarbon Storage Facility | No | N/A | This regulation could apply to storage tanks at petroleum production facilities, processing facilities, tanks batteries, or hydrocarbon storage facilities. This facility does not have a crude oil or condensate storage capacity greater than 65,000 gallons (1547.6 bbl) and is therefore not subject to this regulation. |
| 20.2.39 NMAC | Sulfur Recovery Plant - Sulfur | No | N/A | This facility is not a sulfur recovery plant. Therefore, this regulation does not apply. |
| 20.2.50 NMAC | Oil and Gas Sector – Ozone Precursor Pollutants | Yes | C-311, C-312, C-313, C-314, C-315, C-316 COMP-311, COMP-312, COMP-313, | This regulation establishes emission standards for volatile organic compounds (VOC) and oxides of nitrogen (NOx) for oil and gas production, processing, compression, and transmission sources. 20.2.50 NMAC subparts below:<br><br>Check the box for the subparts that are applicable:<br>☒113 – Engines and Turbines. C-311 through C-316 are considered existing natural gasfired spark ignition engines and meet the emissions standards in 20.2.50.113.B.(2) Table 1.<br>☒114 – Compressor Seals. Compressors are existing reciprocating compressors (COMP-311 through COMP-316) associated with the engines. Thus, this facility is subject to this subpart and will comply with the applicable requirements as stated in 20.2.50.114.B(2) NMAC and 20.2.50.114.B(4) NMAC.<br>☐115 – Control Devices and Closed Vent Systems. N/A – There is no applicable |

| State Regulation Citation | Title | Applies? Enter Yes or No | Unit(s) or Facility | Justification: (You may delete instructions or statements that do not apply in the justification column to shorten the document.) |
|---|---|---|---|---|
| | | | COMP-314, COMP-315, COMP-316,<br><br>L1<br><br>FUG | equipment used to comply with the requirements of this rule; therefore, this subpart does not apply<br>☒116 – Equipment Leaks and Fugitive Emissions. The facility has equipment leaks and fugitive emissions (FUG). Thus, this facility will comply with this subpart as stated in 20.2.50.116.B NMAC.<br>☐ 117 – Natural Gas Well Liquid Unloading. There are no liquid unloading operations resulting in the venting of natural gas at natural gas wells at this facility; therefore, this subpart does not apply.<br>☐ 118 – Glycol Dehydrators. V2/F2 does not have a PTE equal to or greater than two tpy of VOC; therefore, this subpart does not apply.<br>☐ 119 – Heaters. N/A – There are no heaters at the facility with a rated heat input ≥ 20 MMBtu/hr; therefore, this subpart does not apply.<br>☒ 120 – Hydrocarbon Liquid Transfers. This facility is a compressor station with hydrocarbon liquid transfers for condensate (L1). Per the requirements of 20.2.50.120.B.(1) through (6) NMAC, the facility will comply with the requirements of this subpart.<br>☐121 – Pig Launching and Receiving There are pig launchers and receivers at this facility. Records of pigging activities are kept that demonstrate the emissions are <1 ton/year VOC; therefore, these activities are not subject to this subpart (20.2.50.121.A NMAC).<br>☐122 – Pneumatic Controllers and Pumps. All pneumatic devices at BKU are air driven, non-emitting equipment; therefore, they are not subject to 20.2.50.122 NMAC.<br>☐ 123 – Storage Vessels. TK-104 through TK-106 are existing storage vessels with a PTE less than three tpy of VOC. PWT-1 and PWT-2 are existing storage vessels and have a PTE less than three tpy of VOC. Therefore, the tanks at this site are not subject to this subpart.<br>☐124 – Well Workovers. N/A – There are no oil or natural gas wells at this facility; therefore, this subpart does not apply.<br>☐ 125 – Small Business Facilities. N/A – This facility does not qualify as a small business facility; therefore, this subpart does not apply.<br>☐126 – Produced Water Management Unit. N/A – There are no produced water management units located at this facility; therefore, this subpart does not apply.<br>☐127 – Flowback Vessels and Preproduction Operations. N/A – There are no wells at this facility; therefore, this subpart does not apply. |
| 20.2.61.109 NMAC | Smoke & Visible Emissions | Yes | C-311, C-312, C-313, C-314, C-315, C-316, H2, H3, FL-1, VCU-1 | This regulation that limits opacity to 20% applies to Stationary Combustion Equipment, such as engines, boilers, heaters, and flares unless your equipment is subject to another state regulation that limits particulate matter such as 20.2.19 NMAC (see 20.2.61.109 NMAC). This regulation applies to the units listed and the facility will comply |
| 20.2.70 NMAC | Operating Permits | Yes | Facility | This regulation establishes requirements for obtaining an operating permit. With this application, the facility will become a Title V facility once the NSR permit is issued. An application for Title V permit will be submitted separate from this application. |
| 20.2.71 NMAC | Operating Permit Fees | Yes | Facility | This regulation establishes a schedule of operating permit emission fees. The facility is subject to 20.2.70 NMAC and is therefore subject to requirements of this regulation. |
| 20.2.72 NMAC | Construction Permits | Yes | Facility | This regulation establishes the requirements for obtaining a construction permit. This facility is a stationary source with a potential emission rate greater than 10 pounds per hour or 25 tons per year of any regulated air contaminant for which |

| State Regulation Citation | Title | Applies? Enter Yes or No | Unit(s) or Facility | Justification: (You may delete instructions or statements that do not apply in the justification column to shorten the document.) |
|---|---|---|---|---|
| | | | | there is a National or New Mexico Air Quality Standard. This application is for a construction permit under 20.2.72 NMAC. |
| 20.2.73 NMAC | NOI & Emissions Inventory Requirements | Yes | Facility | This facility is required to submit an annual emission inventory report pursuant to 20.2.73.300.A(1) NMAC. This regulation applies. |
| 20.2.74 NMAC | Permits – Prevention of Significant Deterioration (PSD) | No | Facility | This regulation establishes requirements for obtaining a prevention of significant deterioration permit. This facility is not a major source with respect to PSD and is therefore not subject to 20.2.74 NMAC. |
| 20.2.75 NMAC | Construction Permit Fees | Yes | Facility | This application is being submitted under 20.2.72 and is therefore subject to this regulation. |
| 20.2.77 NMAC | New Source Performance | Yes | C-311, C-312, C-313, C-314, C-315, C-316, COMP-314, COMP-315, COMP-312, COMP-316 | This facility is a stationary source with units that are subject to 40 CFR 60. Therefore, this regulation applies.<br>C-311 through C-316 – NSPS JJJJ applies<br>COMP-314, COMP-315 – NSPS OOOO applies<br>COMP-312, COMP-316 – NSPS OOOOa applies |
| 20.2.78 NMAC | Emission Standards for HAPS | No | N/A | This facility does not include equipment subject to 40 CFR 61. Therefore, this regulation does not apply. |
| 20.2.79 NMAC | Permits – Nonattainment Areas | No | Facility | This facility is not located in a non-attainment area. Therefore, this regulation does not apply. |
| 20.2.80 NMAC | Stack Heights | No | N/A | This regulation establishes requirements for the evaluation of stack heights and other dispersion techniques. This regulation does not apply as all stacks at the facility will follow good engineering practice. |
| 20.2.82 NMAC | MACT Standards for source categories of HAPS | Yes | C-311, C-312, C-313, C-314, C-315, C-316, V2/F2 | This regulation applies to all sources emitting hazardous air pollutants, which are subject to the requirements of 40 CFR Part 63. This facility operates units which are subject to 40 CFR 63. Therefore, this regulation applies.<br>C-311 through C-316 – 63 Subpart ZZZZ applies<br>V2/F2 – 63 Subpart HH applies |

## Example of a Table for Applicable Federal Regulations (Note: This is not an exhaustive list):

| Federal Regulation Citation | Title | Applies? Enter Yes or No | Unit(s) or Facility | Justification: |
|---|---|---|---|---|
| 40 CFR 50 | NAAQS | No | N/A | This regulation defines National Ambient Air Quality Standards (NAAQS). The facility meets all applicable NAAQS for NOx, CO, $SO_2$, $H_2S$, $PM_{10}$, and $PM_{2.5}$ under |

| Federal Regulation Citation | Title | Applies? Enter Yes or No | Unit(s) or Facility | Justification: |
|---|---|---|---|---|
| | | | | this regulation. The modeling and conditions developed from the modeling are the applicable requirements to demonstrate compliance with the NAAQ. |
| NSPS 40 CFR 60, Subpart A | General Provisions | Yes | C-311, C-312, C-313, C-314, C-315, C-316, COMP-314, COMP-315, COMP-312, COMP-316 | This facility operates units which are subject to 40 CFR 60. Therefore, this regulation applies.<br>C-311 through C-316 – NSPS JJJJ applies<br>COMP-314, COMP-315 – NSPS OOOO applies<br>COMP-312, COMP-316 – NSPS OOOOa applies |
| NSPS 40 CFR60.40a, Subpart Da | Subpart Da, Performance Standards for **Electric Utility Steam Generating Units** | No | N/A | No units are subject to NSPS Subpart Da since there is no electric utility steam generating unit 250 MMBtu/hr. |
| NSPS 40 CFR60.40b Subpart Db | **Electric Utility Steam Generating Units** | No | N/A | No units are subject to NSPS Subpart Db since there is no industrial-commercial-institutional steam generating unit 100 MMBtu/hr. |
| 40 CFR 60.40c, Subpart Dc | Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units | No | N/A | There is no Small Industrial-Commercial-Institutional Steam Generating Unit with a throughput greater than 10 MMBtu/hr and therefore there is no unit subject to this regulation. 40 CFR 60.40c(a). |
| NSPS 40 CFR 60, Subpart Ka | Standards of Performance for **Storage Vessels for Petroleum Liquids** for which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and **Prior** to July 23, 1984 | No | N/A | This facility does not have any tanks with a volume of 420,000 gallons or larger. Therefore, this subpart does not apply. 40 CFR 60.110a(b). |
| NSPS 40 CFR 60, Subpart Kb | Standards of Performance for **Volatile Organic Liquid Storage Vessels** (Including Petroleum Liquid Storage Vessels) for Which Construction, | No | N/A | This facility does not have any storage vessels with a volume of 75 cubic meters. Therefor this regulation does not apply. 40 CFR 60.110b(a). |

| Federal Regulation Citation | Title | Applies? Enter Yes or No | Unit(s) or Facility | Justification: |
|---|---|---|---|---|
| | Reconstruction, or Modification Commenced **After** July 23, 1984 | | | |
| NSPS 40 CFR 60.330 Subpart GG | **Stationary Gas Turbines** | No | N/A | This facility does not have any stationary turbines. Therefore, this regulation does not apply. |
| NSPS 40 CFR 60, Subpart KKK | Leaks of VOC from **Onshore Gas Plants** | No | N/A | This facility is not an onshore gas plant. Therefore, this regulation does not apply. |
| NSPS 40 CFR Part 60 Subpart LLL | Standards of Performance for **Onshore Natural Gas Processing**: $SO_2$ Emissions | No | N/A | This facility is not an onshore gas plant. Therefore, this regulation does not apply. |
| NSPS 40 CFR Part 60 Subpart OOOO | Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution for which construction, modification or reconstruction commenced after August 23, 2011 and before September 18, 2015 | Yes | COMP-314, COMP-315 | The reciprocating compressors associated with C-314 and C-315 engines (COMP-314 and COMP-315) at the facility were manufactured after 8/23/2011 and before 9/19/2015. Therefore, those compressors are subject to this regulation. They will comply with all applicable requirements in §60.5385(a) through (d).<br><br>The condensate storage tanks were installed during the applicability date but have had federally enforceable limits such that they do not exceed 6 tons/yr VOC and are not subject to this rule (40 CFR 60.5365(e)). |
| NSPS 40 CFR Part 60 Subpart OOOOa | Standards of Performance for Crude Oil and Natural Gas Facilities for which Construction, Modification or Reconstruction Commenced **After** September 18, 2015 and on or before December 6, 2022 | Yes | COMP-312, COMP-316 | The reciprocating compressors associated with C-312 and C-316 engines (COMP-312 and COMP-316) at the facility were manufactured/reconstructed after 9/18/2015. Therefore, those compressors are subject to this regulation. They will comply with all applicable requirements in §60.5385a(a) through (d). |
| NSPS 40 CFR Part 60 Subpart OOOOb | Standards of Performance for Crude Oil and Natural Gas Facilities for which Construction, Modification or Reconstruction Commenced After December 6, 2022 | No | N/A | There has been no new storage vessel added or storage capacity increase that will cause the storage vessels to become subject to OOOOb. The condensate storage vessels have increased throughput, but the throughput increase did not occur after the January 22, 2027 date listed in 40 CFR 60.5365b(e)(3)(ii)(D). Therefore, the condensate storage vessels have not been modified and are not subject to OOOOb.<br><br>There are no facilities that were constructed, modified, or reconstructed after December 6, 2022 that are subject to the provisions of this rule. |

| Federal Regulation Citation | Title | Applies? Enter Yes or No | Unit(s) or Facility | Justification: |
|---|---|---|---|---|
| NSPS 40 CFR 60 Subpart IIII | Standards of performance for Stationary Compression Ignition Internal Combustion Engines | No | N/A | There are no compression ignition engines installed at this facility. Therefore, this regulation does not apply. |
| NSPS 40 CFR Part 60 Subpart JJJJ | Standards of Performance for Stationary Spark Ignition Internal Combustion Engines | Yes | C-311, C-312, C-313, C-314, C-315, C-316 | The C-311 through C-316 engines at this facility were manufactured after the NSPS JJJJ date of June, 12 2006. The units are therefore subject to this regulation and will comply with 40 CFR 60.4233(e), Table 1. |
| NSPS 40 CFR 60 Subpart TTTT | Standards of Performance for Greenhouse Gas Emissions for Electric Generating Units | No | N/A | There are no electric generating units at this facility. Therefore, this regulation does not apply. |
| NSPS 40 CFR 60 Subpart UUUU | Emissions Guidelines for Greenhouse Gas Emissions and Compliance Times for Electric Utility Generating Units | No | N/A | There are no electric generating units at this facility. Therefore, this regulation does not apply. |
| NSPS 40 CFR 60, Subparts WWW, XXX, Cc, and Cf | Standards of performance for Municipal Solid Waste (MSW) Landfills | No | N/A | This facility is not a Municipal Solid Waste Landfill. Therefore, this regulation does not apply. |
| NESHAP 40 CFR 61 Subpart A | General Provisions | No | N/A | No units at this facility are subject to any of the subparts of 40 CFR 61. Therefore, this regulation does not apply. |
| NESHAP 40 CFR 61 Subpart E | National Emission Standards for **Mercury** | No | N/A | This facility does not process mercury. Therefore, this regulation does not apply. |
| NESHAP 40 CFR 61 Subpart V | National Emission Standards for **Equipment Leaks** (Fugitive Emission Sources) | No | N/A | This facility is not a major source of HAPs. Therefore, this regulation does not apply. |
| MACT 40 CFR 63, Subpart A | General Provisions | Yes | C-311, C-312, C-313, C-314, C-315, C-316, V2/F2 | The engines C-311 through C-316 and the dehy V2/F2 at this facility are subject to subparts of 40 CFR 63. Therefore, this regulation applies. |

| Federal Regulation Citation | Title | Applies? Enter Yes or No | Unit(s) or Facility | Justification: |
|---|---|---|---|---|
| MACT 40 CFR 63.760 Subpart HH | Oil and Natural Gas Production Facilities | Yes | V2/F2 | This facility is a HAP area source. The dehy V2/F2 is subject to the requirements of 40 CFR 63 Subpart HH. The dehydrator has the potential to emit less than 1 tpy (0.90 megagram per year) of benzene and is therefore exempt from the requirements of §63.764(d) pursuant to §63.764(e)(1)(ii) and will keep records. CFR 63.764(e)(1)(ii), 40 CFR 63.772(b)(2). |
| MACT 40 CFR 63 Subpart HHH | | No | N/A | This subpart applies to owners and operators of natural gas transmission and storage facilities that transport or store natural gas prior to entering the pipeline to a local distribution company or to a final end user. This facility is not a natural gas transmission facility. Therefore, this regulation does not apply. |
| MACT 40 CFR 63 Subpart DDDDD | National Emission Standards for Hazardous Air Pollutants for Major Industrial, Commercial, and Institutional Boilers & Process Heaters | No | N/A | This facility does not operate major industrial, commercial, and institutional boilers & process heaters. Therefore, this regulation does not apply. |
| MACT 40 CFR 63 Subpart UUUUU | National Emission Standards for Hazardous Air Pollutants Coal & Oil Fire Electric Utility Steam Generating Unit | No | N/A | This facility does not operate any coal & oil fire electric utility steam generating units. Therefore, this regulation does not apply. |
| MACT 40 CFR 63 Subpart ZZZZ | National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (**RICE MACT**) | Yes | C-311, C-312, C-313, C-314, C-315, C-316 | The engines C-311 through C-316 at this facility are subject to MACT ZZZZ and will comply with this regulation by complying with the requirements of NSPS JJJJ, per 40 CFR 63.6590(c) |
| 40 CFR 64 | **Compliance Assurance Monitoring** | No | N/A | This regulation establishes requirements for a Compliance Assurance Monitoring (CAM) plan for pollutant-specific emissions units at a major source required for part 70 or 71 permitting. CAM is not addressed in this part 72 application and it will be addressed as part of the initial Title V permit. |
| 40 CFR 68 | **Chemical Accident Prevention** | No | N/A | The facility does not store chemicals in quantities that meet the applicability thresholds. |
| Title IV – Acid Rain 40 CFR 72 | **Acid Rain** | No | N/A | This facility does not generate commercial electric power or electric power for sale. Therefore, this regulation does not apply. |
| Title IV – Acid Rain 40 CFR 73 | **Sulfur Dioxide** Allowance Emissions | No | N/A | This facility does not generate commercial electric power or electric power for sale. Therefore, this regulation does not apply. |

| Federal Regulation Citation | Title | Applies? Enter Yes or No | Unit(s) or Facility | Justification: |
|---|---|---|---|---|
| Title IV-Acid Rain 40 CFR 75 | **Continuous Emissions Monitoring** | No | N/A | This facility does not generate commercial electric power or electric power for sale. Therefore, this regulation does not apply. |
| Title IV – Acid Rain 40 CFR 76 | **Acid Rain** Nitrogen Oxides **Emission Reduction Program** | No | N/A | This facility does not generate commercial electric power or electric power for sale. Therefore, this regulation does not apply. |
| Title VI – 40 CFR 82 | Protection of **Stratospheric Ozone** | No | N/A | The facility does not service, maintain, or repair equipment containing refrigerants. Therefore, this regulation does not apply. |

# Section 14

## Operational Plan to Mitigate Emissions

(Submitting under 20.2.70, 20.2.72, 20.2.74 NMAC)

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☐ **Title V Sources** (20.2.70 NMAC)**:** By checking this box and certifying this application the permittee certifies that it has developed an **Operational Plan to Mitigate Emissions During Startups, Shutdowns, and Emergencies** defining the measures to be taken to mitigate source emissions during startups, shutdowns, and emergencies as required by 20.2.70.300.D.5(f) and (g) NMAC. This plan shall be kept on site to be made available to the Department upon request. This plan should not be submitted with this application.

☒ **NSR** (20.2.72 NMAC)**, PSD** (20.2.74 NMAC) **& Nonattainment** (20.2.79 NMAC) **Sources:** By checking this box and certifying this application the permittee certifies that it has developed an **Operational Plan to Mitigate Source Emissions During Malfunction, Startup, or Shutdown** defining the measures to be taken to mitigate source emissions during malfunction, startup, or shutdown as required by 20.2.72.203.A.5 NMAC. This plan shall be kept on site to be made available to the Department upon request. This plan should not be submitted with this application.

☒ **Title V** (20.2.70 NMAC)**, NSR** (20.2.72 NMAC)**, PSD** (20.2.74 NMAC) **& Nonattainment** (20.2.79 NMAC) **Sources:** By checking this box and certifying this application the permittee certifies that it has established and implemented a Plan to Minimize Emissions During Routine or Predictable Startup, Shutdown, and Scheduled Maintenance through work practice standards and good air pollution control practices as required by 20.2.7.14.A and B NMAC. This plan shall be kept on site or at the nearest field office to be made available to the Department upon request. This plan should not be submitted with this application.

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Startup and shutdown procedures are performed according to guidelines, which dictate proper procedural sequence to minimize emissions from the facility during such activities. Frontier has all required documentation and it can be made available to the department upon request.

Equipment located at the plant is equipped with various safety devices that aid in preventing excess emissions to the atmosphere in the event of an operational emergency. In the event of a malfunction, startup, shutdown, or scheduled maintenance in which emission rates from the facility exceed permitted allowable emissions, Frontier will notify the AQB in accordance with 20.2.7 NMAC and the equipment responsible for the exceedance will be repaired as soon as possible.

# Section 15

## Alternative Operating Scenarios

(Submitting under 20.2.70, 20.2.72, 20.2.74 NMAC)

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**Alternative Operating Scenarios:** Provide all information required by the department to define alternative operating scenarios. This includes process, material and product changes; facility emissions information; air pollution control equipment requirements; any applicable requirements; monitoring, recordkeeping, and reporting requirements; and compliance certification requirements. Please ensure applicable Tables in this application are clearly marked to show alternative operating scenario.

**Construction Scenarios**: When a permit is modified authorizing new construction to an existing facility, NMED includes a condition to clearly address which permit condition(s) (from the previous permit and the new permit) govern during the interval between the date of issuance of the modification permit and the completion of construction of the modification(s). There are many possible variables that need to be addressed such as: Is simultaneous operation of the old and new units permitted and, if so for example, for how long and under what restraints? In general, these types of requirements will be addressed in Section A100 of the permit, but additional requirements may be added elsewhere. Look in A100 of our NSR and/or TV permit template for sample language dealing with these requirements. Find these permit templates at: www.env.nm.gov/air-quality/permitting-section-procedures-and-guidance/. Compliance with standards must be maintained during construction, which should not usually be a problem unless simultaneous operation of old and new equipment is requested.

In this section, under the bolded title “Construction Scenarios”, specify any information necessary to write these conditions, such as: conservative-realistic estimated time for completion of construction of the various units, whether simultaneous operation of old and new units is being requested (and, if so, modeled), whether the old units will be removed or decommissioned, any PSD ramifications, any temporary limits requested during phased construction, whether any increase in emissions is being requested as SSM emissions or will instead be handled as a separate Construction Scenario (with corresponding emission limits and conditions, etc.

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There are no alternative operating scenarios in this application.

# Section 16

## Air Dispersion Modeling

1) Minor Source Construction (20.2.72 NMAC) and Prevention of Significant Deterioration (PSD) (20.2.74 NMAC) ambient impact analysis (modeling): Provide an ambient impact analysis as required at 20.2.72.203.A(4) and/or 20.2.74.303 NMAC and as outlined in the Air Quality Bureau's Dispersion Modeling Guidelines found on the Planning Section's modeling website. If air dispersion modeling has been waived for one or more pollutants, attach the AQB Modeling Section modeling waiver approval documentation.
2) SSM Modeling: Applicants must conduct dispersion modeling for the total short term emissions during routine or predictable startup, shutdown, or maintenance (SSM) using realistic worst case scenarios following guidance from the Air Quality Bureau's dispersion modeling section. Refer to "Guidance for Submittal of Startup, Shutdown, Maintenance Emissions in Permit Applications (http://www.env.nm.gov/aqb/permit/app_form.html) for more detailed instructions on SSM emissions modeling requirements.
3) Title V (20.2.70 NMAC) ambient impact analysis: Title V applications must specify the construction permit and/or Title V Permit number(s) for which air quality dispersion modeling was last approved. Facilities that have only a Title V permit, such as landfills and air curtain incinerators, are subject to the same modeling required for preconstruction permits required by 20.2.72 and 20.2.74 NMAC.

| **What is the purpose of this application?** | Enter an X for each purpose that applies |
|---|---|
| New PSD major source or PSD major modification (20.2.74 NMAC). See #1 above. | |
| New Minor Source or significant permit revision under 20.2.72 NMAC (20.2.72.219.D NMAC). See #1 above. **Note:** Neither modeling nor a modeling waiver is required for VOC emissions. | X |
| Reporting existing pollutants that were not previously reported. | |
| Reporting existing pollutants where the ambient impact is being addressed for the first time. | |
| Title V application (new, renewal, significant, or minor modification. 20.2.70 NMAC). See #3 above. | |
| Relocation (20.2.72.202.B.4 or 72.202.D.3.c NMAC) | |
| Minor Source Technical Permit Revision 20.2.72.219.B.1.d.vi NMAC for like-kind unit replacements. | |
| Other: i.e. SSM modeling. See #2 above. | |
| This application does not require modeling since this is a No Permit Required (NPR) application. | |
| This application does not require modeling since this is a Notice of Intent (NOI) application (20.2.73 NMAC). | |
| This application does not require modeling according to 20.2.70.7.E(11), 20.2.72.203.A(4), 20.2.74.303, 20.2.79.109.D NMAC and in accordance with the Air Quality Bureau's Modeling Guidelines. | |

**Check each box that applies:**

☐ See attached, approved modeling **waiver for all** pollutants from the facility.

☐ See attached, approved modeling **waiver for some** pollutants from the facility.

☒ Attached in Universal Application Form 4 (UA4) is a **modeling report for all** pollutants from the facility.

☐ Attached in UA4 is a **modeling report for some** pollutants from the facility.

☐ No modeling is required.

# Universal Application 4

## Air Dispersion Modeling Report

Refer to and complete Section 16 of the Universal Application form (UA3) to assist your determination as to whether modeling is required. If, after filling out Section 16, you are still unsure if modeling is required, e-mail the completed Section 16 to the AQB Modeling Manager for assistance in making this determination. If modeling is required, a modeling protocol would be submitted and approved prior to an application submittal. The protocol should be emailed to the modeling manager. A protocol is recommended but optional for minor sources and is required for new PSD sources or PSD major modifications. Fill out and submit this portion of the Universal Application form (UA4), the "Air Dispersion Modeling Report", only if air dispersion modeling is required for this application submittal. This serves as your modeling report submittal and should contain all the information needed to describe the modeling. No other modeling report or modeling protocol should be submitted with this permit application.

### 16-A: Identification

| | | |
|---|---|---|
| 1 | Name of facility: | BKU Compressor Station |
| 2 | Name of company: | Frontier Field Services, LLC |
| 3 | Current Permit number: | 4208M5 |
| 4 | Name of applicant's modeler: | John Ke |
| 5 | Phone number of modeler: | 651-275-9900 |
| 6 | E-mail of modeler: | jke@trinityconsultants.com |

### 16-B: Brief

| | | | |
|---|---|---|---|
| 1 | Was a modeling protocol submitted and approved? | Yes☒ | No☐ |
| 2 | Why is the modeling being done? | Other (describe below) | |
| 3 | Describe the permit changes relevant to the modeling. | | |
| | Frontier is updating emissions for units on-site, which requires the site to be authorized under an NSR permit, as the site is currently operating under a GCP-O&G permit. | | |
| 4 | What geodetic datum was used in the modeling? | WGS84 | |
| 5 | How long will the facility be at this location? | More than 1 year | |
| 6 | Is the facility a major source with respect to Prevention of Significant Deterioration (PSD)? | Yes☐ | No☒ |

| | | | |
|---|---|---|---|
| 7 | Identify the Air Quality Control Region (AQCR) in which the facility is located | 155 | |
| 8 | List the PSD baseline dates for this region (minor or major, as appropriate). | | |
| | NO2 | 3/16/1988 | |
| | SO2 | 7/28/1978 | |
| | PM10 | 2/20/1979 | |
| | PM2.5 | 11/13/2013 | |
| 9 | Provide the name and distance to Class I areas within 50 km of the facility (300 km for PSD permits). | | |
| | Carlsbad Caverns National Park – 75.5 km | | |
| 10 | Is the facility located in a non-attainment area? If so describe below | Yes☐ | No☒ |
| | | | |
| 11 | Describe any special modeling requirements, such as streamline permit requirements. | | |
| | N/A | | |

## 16-C: Modeling History of Facility

1. Describe the modeling history of the facility, including the air permit numbers, the pollutants modeled, the National Ambient Air Quality Standards (NAAQS), New Mexico AAQS (NMAAQS), and PSD increments modeled. (Do not include modeling waivers).

| Pollutant | Latest permit and modification number that modeled the pollutant facility-wide. | Date of Permit | Comments |
|---|---|---|---|
| CO | 4208M2 | 6/4/2015 | CIA Analysis was conducted |
| $NO_2$ | 4208M2 | 6/4/2015 | CIA Analysis was conducted |
| $SO_2$ | 4208M2 | 6/4/2015 | CIA Analysis was conducted |
| $H_2S$ | 4208M2 | 6/4/2015 | CIA Analysis was conducted |
| PM2.5 | N/A | N/A | |
| PM10 | N/A | N/A | |
| Lead | N/A | N/A | |
| Ozone (PSD only) | N/A | N/A | |
| NM Toxic Air Pollutants (20.2.72.402 NMAC) | N/A | N/A | |

## 16-D: Modeling performed for this application

1. For each pollutant, indicate the modeling performed and submitted with this application.
Choose the most complicated modeling applicable for that pollutant, i.e., culpability analysis assumes ROI and cumulative analysis were also performed.

| Pollutant | ROI | Cumulative analysis | Culpability analysis | Waiver approved | Pollutant not emitted or not changed. |
|---|---|---|---|---|---|
| CO | ☒ | ☐ | ☐ | ☐ | ☐ |

| | | | | | | |
|---|---|---|---|---|---|---|
| | $NO_2$ | ☐ | ☒ | ☐ | ☐ | ☐ |
| | $SO_2$ | ☐ | ☐ | ☒ | ☐ | ☐ |
| | $H_2S$ | ☐ | ☒ | ☐ | ☐ | ☐ |
| | PM2.5 | ☐ | ☐ | ☒ | ☐ | ☐ |
| | PM10 | ☐ | ☒ | ☐ | ☐ | ☐ |
| | Lead | ☐ | ☐ | ☐ | ☐ | ☒ |
| | Ozone | ☐ | ☐ | ☐ | ☐ | ☒ |
| | State air toxic(s) (20.2.72.402 NMAC) | ☐ | ☐ | ☐ | ☐ | ☒ |

## 16-E: New Mexico toxic air pollutants modeling

1 List any New Mexico toxic air pollutants (NMTAPs) from Tables A and B in 20.2.72.502 NMAC that are modeled for this application.
N/A – Exempt per 20.2.72.402.C(5) NMAC

2 List any NMTAPs that are emitted but not modeled because stack height correction factor. Add additional rows to the table below, if required.

| Pollutant | Emission Rate (pounds/hour) | Emission Rate Screening Level (pounds/hour) | Stack Height (meters) | Correction Factor | Emission Rate/ Correction Factor |
|---|---|---|---|---|---|
| N/A | | | | | |
| | | | | | |

## 16-F: Modeling options

| | | | |
|---|---|---|---|
| 1 | Was the latest version of AERMOD used with regulatory default options? If not explain below. | Yes☒ | No☐ |
| | | | |

## 16-G: Surrounding source modeling

| | | |
|---|---|---|
| 1 | Date of surrounding source retrieval | |

2 If the surrounding source inventory provided by the Air Quality Bureau was believed to be inaccurate, describe how the sources modeled differ from the inventory provided. If changes to the surrounding source inventory were made, use the table below to describe them. Add rows as needed.

| AQB Source ID | Description of Corrections |
|---|---|
| 40201E2 | Modeled as point source using parameters based on facility's most recent permit application; Exit velocity based on unit's heat input. Calculations for exit velocity and most recent permit application are provided in modeling file submittal. |
| 40201E3 | Modeled as point source using parameters based on facility's most recent permit application; Exit velocity based on unit's heat input. Calculations for exit velocity and most recent permit application are provided in modeling file submittal. |
| 37992E1 | Modeled as point source using parameters based on facility's most recent permit application; Exit velocity based on unit's heat input. Calculations for exit velocity and most recent permit application are provided in modeling file submittal. |

| | | |
|---|---|---|
| | 29790E12 | Modeled as point source using parameters based on facility's most recent permit application; Exit velocity based on unit's heat input. Calculations for exit velocity and most recent permit application are provided in modeling file submittal. |
| | 29790E13 | Modeled as point source using parameters based on facility's most recent permit application; Exit velocity based on unit's heat input. Calculations for exit velocity and most recent permit application are provided in modeling file submittal. |

## 16-H: Building and structure downwash

| | | | |
|---|---|---|---|
| 1 | How many buildings are present at the facility? | 0 | |
| 2 | How many above ground storage tanks are present at the facility? | 5 | |
| 3 | Was building downwash modeled for all buildings and tanks? If not explain why below. | Yes☒ | No☐ |
| | | | |
| 4 | Building comments | N/A | |

## 16-I: Receptors and modeled property boundary

| | | | |
|---|---|---|---|
| 1 | "Restricted Area" is an area to which public entry is effectively precluded. Effective barriers include continuous fencing, continuous walls, or other continuous barriers approved by the Department, such as rugged physical terrain with a steep grade that would require special equipment to traverse. If a large property is completely enclosed by fencing, a restricted area within the property may be identified with signage only. Public roads cannot be part of a Restricted Area. A Restricted Area is required in order to exclude receptors from the facility property. If the facility does not have a Restricted Area, then receptors shall be placed within the property boundaries of the facility.<br><br>Describe the fence or other physical barrier at the facility that defines the restricted area. | | |
| | The facility is enclosed by continuous fencing. | | |
| 2 | Receptors must be placed along publicly accessible roads in the restricted area.<br>Are there public roads passing through the restricted area? | Yes☐ | No☒ |
| 3 | Are restricted area boundary coordinates included in the modeling files? | Yes☒ | No☐ |

4 Describe the receptor grids and their spacing. The table below may be used, adding rows as needed.

| Grid Type | Shape | Spacing | Start distance from restricted area or center of facility | End distance from restricted area or center of facility | Comments |
|---|---|---|---|---|---|
| Variable Density | Square | 50 m | 0 m | 800 m | |
| Variable Density | Square | 100 m | 800 m | 3000 m | |
| Variable Density | Square | 250 m | 3000 m | 6000 m | |
| Variable Density | Square | 500 m | 6000 m | 10000 m | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Variable Density | Square | 1000 m | 10000 m | 50000 m | |

| | |
|---|---|
| 5 | Describe receptor spacing along the fence line. |
| | 50-m resolution along the ambient air boundary. |
| 6 | Describe the PSD Class I area receptors. |
| | N/A – There are no Class I areas within 50 km. |

## 16-J: Modeling Scenarios

| | |
|---|---|
| | Identify, define, and describe all modeling scenarios. Examples of modeling scenarios include using different production rates, times of day, times of year, simultaneous or alternate operation of old and new equipment during transition periods, etc. Alternative operating scenarios should correspond to all parts of the Universal Application and should be fully described in Section 15 of the Universal Application (UA3). |
| 1 | For short-term averaging periods, Frontier is modeling routine operations and SSM operations separately. This applies to the flare source (FL1 and FL1SSM in the modeling) and to the following models:<br>- CO 1-hour<br>- CO 8-hour<br>- $NO_2$ 1-hour<br>- $NO_2$ 24-hour<br><br>For CO, the scenarios are modeled as separate source groups in the model. For $NO_2$, the scenarios are modeled in separate modeling files. Scenario 1 represents when FL-1 is operating under routine operations, while Scenario 2 represents when FL-1 is operating under SSM operations. |
| | Which scenario produces the highest concentrations? Why? |
| 2 | - CO 1-hour; Scenario 2 due to higher emission rates<br>- CO 8-hour; Scenario 1 due to longer residence times<br>- $NO_2$ 1-hour; both scenarios have the same highest concentration; modeling Scenario 2 for CIA analysis, due to higher emission rates.<br>- $NO_2$ 24-hour; both scenarios have the same highest concentration; modeling Scenario 2 for CIA analysis, due to higher emission rates. |

| | | | |
|---|---|---|---|
| 3 | Were emission factor sets used to limit emission rates or hours of operation?<br>(This question pertains to the "SEASON", "MONTH", "HROFDY" and related factor sets, not to the factors used for calculating the maximum emission rate.) | Yes☐ | No☒ |

| | |
|---|---|
| 4 | If so, describe factors for each group of sources. List the sources in each group before the factor table for that group. (Modify or duplicate table as necessary. It's ok to put the table below section 16-K if it makes formatting easier.)<br>Sources: N/A |

5

| Hour of Day | Factor | Hour of Day | Factor | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | 13 | | | | | | | | | |
| 2 | | 14 | | | | | | | | | |
| 3 | | 15 | | | | | | | | | |
| 4 | | 16 | | | | | | | | | |
| 5 | | 17 | | | | | | | | | |
| 6 | | 18 | | | | | | | | | |
| 7 | | 19 | | | | | | | | | |
| 8 | | 20 | | | | | | | | | |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 9 | | 21 | | | | | | | | | |
| | 10 | | 22 | | | | | | | | | |
| | 11 | | 23 | | | | | | | | | |
| | 12 | | 24 | | | | | | | | | |
| | If hourly, variable emission rates were used that were not described above, describe them below. | | | | | | | | | | | |
| | | | | | | | | | | | | |

| | | | |
|---|---|---|---|
| 6 | Were different emission rates used for short-term and annual modeling? If so describe below. | Yes☒ | No☐ |
| | Different VCU-1 emission rates were used for short-term and annual modeling, calculations are provided in the modeling file submittal. Short-term emissions were based on max hourly emissions, while annual emissions were based on annual average emissions. SSM emissions were also not included in annual standards, per NMED modeling guidelines. | | |

## 16-K: $NO_2$ Modeling

| | | |
|---|---|---|
| 1 | Which types of $NO_2$ modeling were used?<br>Check all that apply. | |
| | ☒ | ARM2 |
| | ☐ | 100% $NO_X$ to $NO_2$ conversion |
| | ☐ | PVMRM |
| | ☐ | OLM |
| | ☐ | Other: |

| | | | |
|---|---|---|---|
| 2 | Describe the $NO_2$ modeling. | | |
| | The ARM2 methodology was used with the default minimum and maximum ambient ratios. | | |
| 3 | Were default $NO_2/NO_X$ ratios (0.5 minimum, 0.9 maximum or equilibrium) used? If not describe and justify the ratios used below. | Yes☒ | No☐ |
| | N/A | | |
| 4 | Describe the design value used for each averaging period modeled. | | |
| | 1-hour: High eighth high<br>Annual One Year Annual Average: | | |

## 16-L: Ozone Analysis

| | |
|---|---|
| 1 | NMED has performed a generic analysis that demonstrates sources that are minor with respect to PSD do not cause or contribute to any violations of ozone NAAQS. The analysis follows.<br>The basis of the ozone SIL is documented in *Guidance on Significant Impact Levels for Ozone and Fine Particles in the Prevention of Significant Deterioration Permitting Program*, EPA, April 17, 2018 and associated documents. NMED accepts this SIL basis and incorporates it into this permit record by reference. Complete documentation of the ozone concentration analysis using MERPS is included in the New Mexico Air Quality Bureau Air Dispersion Modeling Guidelines. |
| 2 | The MERP values presented in Table 10 and Table 11 of the NM AQB Modeling Guidelines that produce the highest concentrations indicate that facilities emitting no more than 250 tons/year of $NO_X$ and no more than 250 tons/year of VOCs will cause less formation of $O_3$ than the $O_3$ significance level. |

$$[O_3]_{8-hou} = \left( \frac{250 \frac{ton}{yr}}{340_{MERP_{NOX}}} + \frac{250 \frac{ton}{yr}}{4679_{MERP_{VOC}}} \right) \times 1.96\ \mu g/m^3$$

=1.546 µg/m$^3$, which is below the significance level of 1.96 µg/m$^3$.

Sources that produce ozone concentrations below the ozone SIL do not cause or contribute to air contaminant levels exceeding the ozone NAAQS.

| | | | |
|---|---|---|---|
| 3 | Does the facility emit at least 250 tons per year of $NO_X$ or at least 250 tons per year of VOCs? Sources that emit at least 250 tons per year of $NO_X$ or at least 250 tons per year of VOCs are covered by the analysis above and require an individual analysis. | Yes☐ | No☒ |

5 For new PSD Major Sources or PSD major modifications, if MERPs were used to account for ozone fill out the information below. If another method was used describe below.

| $NO_X$ (ton/yr) | $MERP_{NOX}$ | VOCs (ton/yr) | $MERP_{VOC}$ | $[O_3]_{8\text{-hour}}$ |
|---|---|---|---|---|
| | | | | |

N/A – Facility is a minor source.

## 16-M: Particulate Matter Modeling

1 Select the pollutants for which plume depletion modeling was used.

| | |
|---|---|
| ☐ | PM2.5 |
| ☐ | PM10 |
| ☒ | None |

2 Describe the particle size distributions used. Include the source of information.

N/A

| | | | |
|---|---|---|---|
| 3 | Does the facility emit at least 40 tons per year of $NO_X$ or at least 40 tons per year of $SO_2$? Sources that emit at least 40 tons per year of $NO_X$ or at least 40 tons per year of $SO_2$ are considered to emit significant amounts of precursors and must account for secondary formation of PM2.5. | Yes☒ | No☐ |
| 4 | Was secondary PM modeled for PM2.5? | Yes☐ | No☒ |

5 If MERPs were used to account for secondary PM2.5 fill out the information below. If another method was used describe below.

| Pollutant | $NO_X$ | $SO_2$ | | $[PM2.5]_{24\text{-hour}}$ |
|---|---|---|---|---|
| $MERP_{annual}$ | 26780 | 14978 | | 0.14 |
| $MERP_{24\text{-hour}}$ | 7331 | 1981 | | $[PM2.5]_{annual}$ |
| Emission rate (ton/yr) | 143.49 | 244.10 | | 0.02 |

## 16-N: Setback Distances

| | |
|---|---|
| 1 | Portable sources or sources that need flexibility in their site configuration requires that setback distances be determined between the emission sources and the restricted area boundary (e.g. fence line) for both the initial location and future locations. Describe the setback distances for the initial location. |
| | N/A – There are no portable sources at this facility. |
| 2 | Describe the requested, modeled, setback distances for future locations, if this permit is for a portable stationary source. Include a haul road in the relocation modeling. |
| | N/A – There are no portable sources at this facility. |

## 16-O: PSD Increment and Source IDs

| | | | |
|---|---|---|---|
| 1 | The unit numbers in the Tables 2-A, 2-B, 2-C, 2-E, 2-F, and 2-I should match the ones in the modeling files. Do these match? If not, provide a cross-reference table between unit numbers if they do not match below. | Yes☐ | No☒ |

| Unit Number in UA-2 | Unit Number in Modeling Files |
|---|---|
| C-311 | C311 |
| C-312 | C312 |
| C-313 | C313 |
| C-314 | C314 |
| C-315 | C315 |
| C-316 | C316 |
| H-2 | H2 |
| H-3 | H3 |
| FL-1 | FL1 |
| FL-1 | FL1SSM |
| VCU-1 | VCU1 |
| PWT-1 | Modeled as part of the FUG volume source |
| PWT-2 | Modeled as part of the FUG volume source |
| L1 | Modeled as part of the FUG volume source |
| L2 | Modeled as part of the FUG volume source |
| SSM | Modeled as part of the FUG volume source |

| | | | |
|---|---|---|---|
| 2 | The emission rates in the Tables 2-E and 2-F should match the ones in the modeling files. Do these match? If not, explain why below. | Yes☐ | No☒ |
| | As discussed in the UA-3 form, Section 10, fugitive emission sources of H2S include routine and event-based fugitive emission sources. These emissions are represented by the FUG volume source. The event-based fugitive emissions sources will not occur within the same hour and this has been taken into account in the air dispersion modeling for the facility. Truck loading of condensate and produced water will not occur within the same hour and while truck loading is occurring, the site will not be performing SSM venting activities. | | |
| 3 | Have the minor NSR exempt sources or Title V Insignificant Activities" (Table 2-B) sources been modeled? | Yes☐ | No☒ |

4 Which units consume increment for which pollutants?

| Unit ID | $NO_2$ | $SO_2$ | PM10 | PM2.5 |
|---|---|---|---|---|
| C-311 | X | X | X | X |
| C-312 | X | X | X | X |
| C-313 | X | X | X | X |

| | | | | | |
|---|---|---|---|---|---|
| | C-314 | X | X | X | X |
| | C-315 | X | X | X | X |
| | C-316 | X | X | X | X |
| | H-2 | X | X | X | X |
| | H-3 | X | X | X | X |
| | FL-1 | X | X | | |
| | VCU-1 | X | X | X | X |

| | | | |
|---|---|---|---|
| 5 | PSD increment description for sources.<br>(for unusual cases, i.e., baseline unit expanded emissions after baseline date). | SSM emissions from FL-1 do not consume increment, per NMED modeling guideline. | |
| 6 | Are all the actual installation dates included in Table 2A of the application form, as required? This is necessary to verify the accuracy of PSD increment modeling. If not please explain how increment consumption status is determined for the missing installation dates below. | Yes☒ | No☐ |
| | | | |

## 16-P: Flare Modeling

| | | | | |
|---|---|---|---|---|
| 1 | For each flare or flaring scenario, complete the following | | | |
| | Flare ID (and scenario) | Average Molecular Weight | Gross Heat Release (cal/s) | Effective Flare Diameter (m) |
| | FL-1 (Pilot) | 17.04 | 13,734.00 | 0.1049 |
| | FL-1 (SSM) | 22.45 | 93,357,856.42 | 8.4926 |

## 16-Q: Volume and Related Sources

| | | | |
|---|---|---|---|
| 1 | Were the dimensions of volume sources different from standard dimensions in the Air Quality Bureau (AQB) Modeling Guidelines?<br><br>If not please explain how increment consumption status is determined for the missing installation dates below. | Yes☒ | No☐ |
| | | | |
| 2 | Describe the determination of sigma-Y and sigma-Z for fugitive sources. | | |
| | FUG represent emissions from SSM, PWT-1, PWT-2, L1, L2, and FUG. Lateral dimension based on the area covering all these sources; using this lateral dimension to calculate the sigma-y would result in receptors located within the volume source exclusion zone, so sigma-y is conservatively lowered so that no receptors are within the volume source exclusion zone. Sigma z based on height of fugitive sources. | | |
| 3 | Describe how the volume sources are related to unit numbers.<br>Or say they are the same. | | |
| | FUG: includes FUG, L1, L2, PWT-1, PWT-2, SSM | | |
| 4 | Describe any open pits. | | |
| | N/A – there are no open pits | | |
| 5 | Describe emission units included in each open pit. | | |
| | N/A – there are no open pits | | |

## 16-R: Background Concentrations

| | | | |
|---|---|---|---|
| 1 | Were NMED provided background concentrations used? Identify the background station used below. If non-NMED provided background concentrations were used describe the data that was used. | Yes☒ | No☐ |
| | CO: Choose an item. | | |
| | $NO_2$: Outside Carlsbad (350151005) | | |
| | PM2.5: Hobbs-Jefferson (350450019) | | |
| | PM10: Hobbs-Jefferson (350250008) | | |
| | $SO_2$: Choose an item. | | |
| | Other: | | |
| | Comments: 2024 design values were used for background concentrations. | | |
| 2 | Were background concentrations refined to monthly or hourly values? If so describe below. | Yes☐ | No☒ |
| | | | |

## 16-S: Meteorological Data

| | | | |
|---|---|---|---|
| 1 | Was NMED provided meteorological data used? If so select the station used.<br><br>Artesia | Yes☒ | No☐ |
| 2 | If NMED provided meteorological data was not used describe the data set(s) used below. Discuss how missing data were handled, how stability class was determined, and how the data were processed. | | |
| | N/A – NMED provided meteorological data was used. | | |

## 16-T: Terrain

| | | | |
|---|---|---|---|
| 1 | Was complex terrain used in the modeling? If not, describe why below. | Yes☒ | No☐ |
| | N/A | | |
| 2 | What was the source of the terrain data? | | |
| | Terrain was incorporated into the modeling analysis through the use of AERMAP with the most recent 1/3 degree NED data currently available from https://apps.nationalmap.gov/downloader/#/. | | |

## 16-U: Modeling Files

| | |
|---|---|
| 1 | Describe the modeling files:<br><br>Significant Impact Models<br>- File name format – "BKU_Poll AvgPer_S_SIL.inp"<br>- "Poll" = NO2…nitrogen dioxide; CO…carbon monoxide; PM10…particulate matter, $PM_{10}$ ; PM2.5…particulate matter, $PM_{2.5}$; SO2…sulfur dioxide; H2S…hydrogen sulfide<br>- "AvgPer" = averaging period, 1hr = 1-hour, Ann = annual etc.<br>- "S" = Scenario; S1 = SSM Flaring scenario, S2 = Routine Flaring scenario (applies only to $NO_2$ modeling files)<br><br>NM/AAQS and Increment Models |

- File name format – "BKU_Poll AvgPer_Standard.inp"
- "Poll" = NO2…nitrogen dioxide; CO…carbon monoxide; PM10…particulate matter, $PM_{10}$ ; PM2.5…particulate matter, $PM_{2.5}$; SO2…sulfur dioxide; H2S…hydrogen sulfide
- "AvgPer" = averaging period, 1hr = 1-hour, Ann = annual etc.
- "Standard" = NAAQS…NAAQS; INC…PSD Increment Class II

Culpability

- File name format – "BKU_Poll AvgPer_Standard_CP.inp"
- "Poll" = NO2…nitrogen dioxide; CO…carbon monoxide; PM10…particulate matter, $PM_{10}$ ; PM2.5…particulate matter, $PM_{2.5}$; SO2…sulfur dioxide; H2S…hydrogen sulfide
- "AvgPer" = averaging period, 1hr = 1-hour, Ann = annual etc.
- "Standard" = NAAQS…NAAQS; INC…PSD Increment Class II
- "CP" = culpability file designator

| File name (or folder and file name) | Pollutant(s) | Purpose (ROI/SIA, cumulative, culpability analysis, other) |
|---|---|---|
| BKU_CO 1hr8hr_SIL | CO | ROI/SIA |
| BKU_NO2 1hr_S1_SIL | $NO_2$ | ROI/SIA |
| BKU_NO2 1hr_S2_SIL | $NO_2$ | ROI/SIA |
| BKU_NO2 24hr_S1_SIL | $NO_2$ | ROI/SIA |
| BKU_NO2 24hr_S2_SIL | $NO_2$ | ROI/SIA |
| BKU_NO2 Ann_S1_SIL | $NO_2$ | ROI/SIA |
| BKU_NO2 Ann_S2_SIL | $NO_2$ | ROI/SIA |
| BKU_PM10 24hr_SIL | $PM_{10}$ | ROI/SIA |
| BKU_PM10 Ann_SIL | $PM_{10}$ | ROI/SIA |
| BKU_PM25 24hr_SIL | $PM_{2.5}$ | ROI/SIA |
| BKU_PM25 Ann_SIL | $PM_{2.5}$ | ROI/SIA |
| BKU_H2S 1hr_SIL | $H_2S$ | ROI/SIA |
| BKU_SO2 1hr_SIL | $SO_2$ | ROI/SIA |
| BKU_SO2 3hr_SIL | $SO_2$ | ROI/SIA |
| BKU_SO2 24hr_SIL | $SO_2$ | ROI/SIA |
| BKU_SO2 Ann_SIL | $SO_2$ | ROI/SIA |
| BKU_H2S 1hr_NAAQS | $H_2S$ | CIA |
| BKU_NO2 1hr_NAAQS | $NO_2$ | CIA |
| BKU_PM25 24hr_NAAQS | $PM_{2.5}$ | CIA |
| BKU_PM25 Ann_NAAQS | $PM_{2.5}$ | CIA |
| BKU_SO2 1hr_NAAQS | $SO_2$ | CIA |
| BKU_PM10 24hr_INC | $PM_{10}$ | CIA |
| BKU_PM25 24hr_INC | $PM_{2.5}$ | CIA |
| BKU_PM25 Ann_INC | $PM_{2.5}$ | CIA |
| BKU_SO2 3hr_INC | $SO_2$ | CIA |
| BKU_SO2 24hr_INC | $SO_2$ | CIA |
| BKU_SO2 1hr_NAAQS_CP | $SO_2$ | Culpability Analysis |
| BKU_SO2 24hr_INC_CP | $SO_2$ | Culpability Analysis |
| BKU_PM25 24hr_NAAQS_CP | $PM_{2.5}$ | Culpability Analysis |
| | | |

## 16-V: PSD New or Major Modification Applications – N/A

| | | | |
|---|---|---|---|
| 1 | A new PSD major source or a major modification to an existing PSD major source requires additional analysis.<br>Was preconstruction monitoring done (see 20.2.74.306 NMAC and PSD Preapplication Guidance on the AQB website)? | Yes☐ | No☐ |
| 2 | If not, did AQB approve an exemption from preconstruction monitoring? | Yes☐ | No☐ |
| 3 | Describe how preconstruction monitoring has been addressed or attach the approved preconstruction monitoring or monitoring exemption. | | |
| | | | |
| 4 | Describe the additional impacts analysis required at 20.2.74.304 NMAC. | | |
| | | | |
| 5 | If required, have ozone and secondary PM2.5 ambient impacts analyses been completed? If so describe below. | Yes☐ | No☐ |
| | | | |

## 16-W: Modeling Results

| | | | |
|---|---|---|---|
| | If ambient standards are exceeded because of surrounding sources, a culpability analysis is required for the source to show that the contribution from this source is less than the significance levels for the specific pollutant. Was culpability analysis performed? If so describe below. | Yes☒ | No☐ |
| 1 | Culpability analysis were conducted for 1-hr $SO_2$ NAAQS, 24-hr $SO_2$ PSD Increment, and 24-hr $PM_{2.5}$ PSD Increment. The analysis included all receptors from the cumulative models that exceeded the relevant thresholds. Either postfiles were pulled or a maximum daily concentration analysis to determine whether Frontier was culpable for any NAAQS/PSD Increment exceedance was completed. All analyses showed that for any exceedance of the relevant thresholds, BKU was below the SIL. Thus, the BKU Compressor Station does not cause or contribute to an exceedance of the NAAQS or PSD Class II Increment. Postfiles and the MAXDCONT spreadsheet are included with the modeling file submittal. | | |
| 2 | Identify the maximum concentrations from the modeling analysis. Rows may be modified, added and removed from the table below as necessary. | | |

| Pollutant, Time Period and Standard | Modeled Facility Concentration (µg/m3) | Modeled Concentration with Surrounding Sources (µg/m3) | Secondary PM (µg/m3) | Background Concentration (µg/m3) | Cumulative Concentration (µg/m3) | Value of Standard (µg/m3) | Percent of Standard | Location | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | UTM E (m) | UTM N (m) | Elevation (ft) |
| CO 8-hr SIL | 45.53 | - | - | - | 45.53 | 500 | 9.1% | 589304 | 3631043 | 3578.12 |
| CO 1-hr SIL | 66.45 | - | - | - | 66.45 | 2000 | 3.3% | 589754 | 3631043 | 3578.12 |
| $H_2S$ 1/2-hr SIL | 96.74 | - | - | - | 96.74 | 5 | 1934.8% | 589422 | 3630816 | 3578.61 |
| $NO_2$ Annual SIL | 11.35 | - | - | - | 11.35 | 1 | 1135.2% | 589304 | 3630993 | 3576.21 |
| NO2 24-hr SIL | 68.55 | - | - | - | 68.55 | 5 | 1371.0% | 589304 | 3630993 | 3576.21 |
| $NO_2$ 1-hr SIL | 123.75 | - | - | - | 123.75 | 7.52 | 1645.6% | 589504 | 3630843 | 3580.15 |
| $PM_{2.5}$ Annual SIL | 0.30 | - | - | - | 0.30 | 0.13 | 231.5% | 589304 | 3630993 | 3576.21 |
| $PM_{2.5}$ 24-hr SIL | 1.77 | - | - | - | 1.77 | 1.2 | 147.1% | 589304 | 3630993 | 3576.21 |

| Pollutant, Time Period and Standard | Modeled Facility Concentration (µg/m3) | Modeled Concentration with Surrounding Sources (µg/m3) | Secondary PM (µg/m3) | Background Concentration (µg/m3) | Cumulative Concentration (µg/m3) | Value of Standard (µg/m3) | Percent of Standard | Location | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | UTM E (m) | UTM N (m) | Elevation (ft) |
| $PM_{10}$ Annual SIL | 0.32 | - | - | - | 0.32 | 1 | 32.1% | 589304 | 3630993 | 3576.21 |
| $PM_{10}$ 24-hr SIL | 1.86 | - | - | - | 1.86 | 5 | 37.3% | 589304 | 3630993 | 3576.21 |
| $SO_2$ Annual SIL | 0.85 | - | - | - | 0.85 | 1 | 84.9% | 589354 | 3630943 | 3576.71 |
| $SO_2$ 24-hr SIL | 51.57 | - | - | - | 51.57 | 5 | 1031.5% | 589854 | 3631043 | 3579.56 |
| $SO_2$ 3-hr SIL | 184.47 | - | - | - | 184.47 | 25 | 737.9% | 589754 | 3631043 | 3578.12 |
| $SO_2$ 1-hr SIL | 152.88 | - | - | - | 152.88 | 7.8 | 1960.0% | 590004 | 3631093 | 3579.69 |
| $NO_2$ Annual PSD Class II Increment | 11.35 | 0.00 | - | 9.4 | 20.75 | 25 | 83.0% | 589304 | 3630993 | 3576.21 |
| $NO_2$ Annual NMAAQS | 11.35 | 0.00 | - | 9.4 | 20.75 | 94.02 | 22.1% | 589304 | 3630993 | 3576.21 |
| $NO_2$ 1-hr NAAQS | 118.56 | 0.00 | - | 60.16 | 178.72 | 188.03 | 95.0% | 589554 | 3630843 | 3580.64 |
| $PM_{2.5}$ Annual PSD Class II Increment | - | 2.64 | 2.82E-03 | - | 2.64 | 4.00 | 66.1% | 589304.00 | 3631093.00 | 1089.79 |
| $PM_{2.5}$ Annual NAAQS | - | 2.29 | 2.82E-03 | 6.50 | 8.79 | 9.00 | 97.6% | 589304.00 | 3631093.00 | 1089.79 |
| $PM_{2.5}$ 24-hr PSD Class II Increment | - | 10.88 | 0.17 | - | 11.05 | 9.00 | 122.8% | 589304.00 | 3631093.00 | 1089.79 |

| Pollutant, Time Period and Standard | Modeled Facility Concentration (µg/m3) | Modeled Concentration with Surrounding Sources (µg/m3) | Secondary PM (µg/m3) | Background Concentration (µg/m3) | Cumulative Concentration (µg/m3) | Value of Standard (µg/m3) | Percent of Standard | Location | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | UTM E (m) | UTM N (m) | Elevation (ft) |
| $PM_{2.5}$ 24-hr NAAQS | - | 7.00 | 0.17 | 19.00 | 26.17 | 35.00 | 74.8% | 589304.00 | 3631093.00 | 1089.79 |
| $SO_2$ 24-hr PSD Class II Increment | - | 97.94 | - | - | 97.94 | 91.00 | 107.6% | 587504.00 | 3632343.00 | 1082.95 |
| $SO_2$ 3-hr PSD Class II Increment | - | 235.41 | - | - | 235.41 | 512.00 | 46.0% | 585904.00 | 3633843.00 | 1090.66 |
| $SO_2$ 1-hr NAAQS | - | 3248.76 | - | - | 3248.76 | 196.00 | 1657.5% | 586154.00 | 3630843.00 | 1090.75 |

## 16-X: Summary/conclusions

| | |
|---|---|
| 1 | A statement that modeling requirements have been satisfied and that the permit can be issued. |
| | Frontier has demonstrated that the proposed changes would neither cause nor contribute to an exceedance of any applicable standards for CO, $H_2S$, $PM_{10}$, $PM_{2.5}$, $NO_2$, and $SO_2$. |

# AIR DISPERSION MODELING PROTOCOL

## NSR Initial Modeling Protocol

**Frontier Field Services, LLC**
**BKU Compressor Station**

**Prepared By:**

**TRINITY CONSULTANTS**
9737 Great Hills Trail
Suite 340
Austin, TX 78759
(361) 215-9994

February 2026

Project 254404.0698

Trinity Consultants

# 1. INTRODUCTION

## 1.1 Purpose of Modeling

This NSR permit application is being submitted by Frontier Field Services, LLC (Frontier) for the BKU Compressor Station (BKU). BKU is a natural gas compressor station rated up to 40 MMSCFD and is located in Eddy County, New Mexico. The plant consists of inlet separation, natural gas compression, a condensate stabilizer, condensate and produced water tanks and loading, a glycol dehydrator, a vapor combustor, and a flare. BKU (AI 29329) was previously under an NSR Permit but was transitioned to a GCP-O&G facility, issued June 23, 2025 (4208M5). Frontier is now updating the emissions for the compressor engines as well as other emissions updates for the site, which will require a transition to an NSR permit. The last modeling prepared for BKU per NMED files appears to be performed for Permit 4208-M2 in 2015. Frontier is preparing comprehensive air dispersion modeling for the NSR permit application.

The equipment at the site is as follows:

- Six (6) compressor engines (C-311 through C-316)
- Two (2) heaters/reboilers (H-2, H-3)
- One (1) enclosed combustion device (VCU-1) controlling the following sources:
  - Three (3) condensate storage tanks
  - One (1) condensate truck loading (L1)
- Two Produced Water Tanks (PWT-1, PWT-2)
- Produced Water Truck Loading (L2)
- Backup loading connection to L1 and L2 (L3)
- One (1) Flare (FL-1) with normal and SSM operations
- Fugitives (FUG, SSM, HAUL)

Frontier seeks to demonstrate compliance with the National Ambient Air Quality Standards (NAAQS), the New Mexico Ambient Air Quality Standards (NMAAQS), and PSD Increment standards, as applicable, for the following pollutants and averaging periods: $NO_2$ (1-hour, 24-hour, and annual), CO (1-hour and 8-hour), $SO_2$ (1-hour, 3-hour, 24-hour, and annual), $H_2S$ (1/2-hour), $PM_{2.5}$ (24-hour and annual), and $PM_{10}$ (24-hour and annual).

## 1.2 Facility Description and Location

The approximate UTM coordinates of the facility are in Zone 13, 589,420 meters East and 3,630,870 meters North with WGS84 datum at an elevation of approximately 3,577 feet above mean sea level.

# 2. PROPOSED MODELING

## 2.1 Model Input Options

The latest version of the AERMOD dispersion model (version 24142) will be used for this analysis. The model will be run in regulatory mode with all default options. The ARM2 method will be used to convert $NO_X$ to $NO_2$. Default minimum and maximum ambient ratios will be utilized.

Tables 1 and 2 show the emission sources and stack parameters for the facility including the new units. Please note that emissions and stack parameters may vary throughout the development of this application.

**Table 1 - Emission Stack Parameters**

| Emission Point | Model ID | Height | Temperature | Velocity | Diameter |
|---|---|---|---|---|---|
| | | ft | F | ft/s | ft |
| C-311 | C311 | 23 | 851 | 200.44 | 0.90 |
| C-312 | C312 | 23 | 851 | 200.44 | 0.90 |
| C-313 | C313 | 23 | 851 | 200.44 | 0.90 |
| C-314 | C314 | 23 | 851 | 200.44 | 0.90 |
| C-315 | C315 | 20 | 870 | 128.78 | 1.10 |
| C-316 | C316 | 20 | 870 | 128.78 | 1.10 |
| H-2 | H2 | 16 | 600 | 31.26 | 0.70 |
| H-3 | H3 | 23 | 620 | 25 | 0.70 |
| FL-1 (pilot only) | FL1 | 60 | 1832 | 65.6 | 0.34 |
| FL-1 SSM | FL1SSM | 60 | 1832 | 65.6 | 27.86 |
| VCU-1 | VCU1 | 12 | 1500 | 22 | 1.58 |

**Table 2 – Emission Point Source Emission Rates**

| Model ID | $NO_X$ Hourly (lb/hr) | $NO_X$ Annual (tpy) | $SO_2$ Hourly (lb/hr) | $SO_2$ Annual (tpy) | CO Hourly (lb/hr) | $PM_{10}$ Hourly (lb/hr) | $PM_{2.5}$ Hourly (lb/hr) | $PM_{2.5}$ Annual (tpy) | $H_2S$ Hourly (lb/hr) |
|---|---|---|---|---|---|---|---|---|---|
| C311 | 5.91 | 25.88 | 0.01 | 0.03 | 1.62 | 0.10 | 0.10 | 0.44 | -- |
| C312 | 5.91 | 25.88 | 0.01 | 0.03 | 1.62 | 0.10 | 0.10 | 0.44 | -- |
| C313 | 5.91 | 25.88 | 0.01 | 0.03 | 1.62 | 0.10 | 0.10 | 0.44 | -- |
| C314 | 5.91 | 25.88 | 0.01 | 0.03 | 1.62 | 0.10 | 0.10 | 0.44 | -- |
| C315 | 1.52 | 6.66 | 0.01 | 0.03 | 1.83 | 0.10 | 0.10 | 0.44 | -- |
| C316 | 1.52 | 6.66 | 0.01 | 0.03 | 1.83 | 0.10 | 0.10 | 0.44 | -- |
| H2 | 0.10 | 0.43 | 5.88E-04 | 2.58E-03 | 0.08 | 0.01 | 0.01 | 0.03 | -- |
| H3 | 0.08 | 0.34 | 4.71E-04 | 2.06E-03 | 0.07 | 0.01 | 0.01 | 0.03 | -- |
| FL1 | 0.03 | 0.12 | -- | -- | 0.05 | -- | -- | -- | -- |
| FL1SSM | 184.05 | 806.13 | 1749.55 | 218.69 | 367.43 | -- | -- | -- | 18.62 |
| VCU1 | 0.27 | 1.18 | 5.55 | 24.30 | 0.54 | 0.01 | 0.01 | 0.01 | 0.06 |

**Table 3 - Emission Volume Sources Emission Rates and Modeling Parameters**

| Model ID | $H_2S$ | Release Height | Initial lateral Dimension | Initial Vertical Dimension |
|---|---|---|---|---|
| | lb/hr | ft | ft | ft |
| **PWT-1** | 0.11 | 7.5 | 2.47 | 6.98 |
| **PWT-2** | 0.11 | 7.5 | 2.47 | 6.98 |
| **FUG** | 5.79 | 20 | 79.29 | 18.60 |

All fugitive emissions (EPNs: FUG, SSM, L1, L2) are represented as a single volume source called FUG located at the center of the facility.

A downwash analysis using the latest version of BPIP will be conducted and incorporated into the modeling analysis to account for potential effluent downwash due to structures at the facility.

## 2.2 Receptor Grid Description and Elevation Data

The center point of the facility will be designated at 589,404 meters east and 3,630,843 meters north. This will serve as the center point for a variable density circular receptor grid that will extend outwards from the facility fenceline. The facility will be modeled with the following receptor grid design:

- Fenceline: 50 m grid spacing
- Very Fine Grid Resolution: 50 m grid spacing from 0 m to 800 m of center point
- Fine Grid Resolution: 100 m spacing from 800 m to 3,000 m of center point
- Medium Grid Resolution: 250 m spacing from 3,000 m to 6,000 m of center point
- Course Grid Resolution: 500 m spacing from 6,000 m to 10,000 m of center point
- Very Course Grid Resolution: 1,000 m from 10,000 m to 50,000 m of center point

It is expected that the highest impacts from the proposed source will be at or near the facility property.

The elevations of receptors and facility sources will be determined using the most recent NED data currently available (1/3 arc-second NED).

## 2.3 Meteorological Data

The Artesia NWS dataset will be used for five meteorological years (2017-2021) as available on the NMED website.

## 2.4 Significance Analysis (SIL) and Cumulative Impact Analysis (CIA)

The modeled ground-level concentrations will be compared to the corresponding significant impact levels (SILs) to determine whether any modeled ground-level concentrations at any receptor locations are greater than the SIL (i.e., "significant" receptors). If the significance analysis reveals that modeled ground-level concentrations for a particular pollutant and averaging period are greater than the applicable SIL, a Cumulative Impact Analysis (CIA) will be performed at the significant receptors. The CIA will include impacts from the facility sources, as well as background concentrations and/or surrounding sources, as applicable.

The inclusion of background concentrations will follow the guidance shown in Table 20: "Modeling the Design Value Summary (Default Modeling)" from the Modeling Guidelines[1]. If necessary, the following monitors will be used for background concentrations:

- El Paso Chamizal Monitor (481410044) for CO;
- Carlsbad Monitor (5ZR, 350151005) for $NO_2$;
- Hobbs-Jefferson Monitor (5ZS, 350250008) for $PM_{2.5}$; and
- Hobbs-Jefferson Monitor (5ZS, 350250008) for $PM_{10}$

Based on the NMED Modeling Guidelines for $SO_2$ modeling, if the facility is in the Pecos-Permian Basin Intrastate AQCR (AQCR 155), it will be modeled with surrounding sources, as representative monitoring is not available for background data.

For $PM_{2.5}$ and $PM_{10}$ modeling, the facility will be modeled with surrounding sources, and a background concentration and secondary formation (if applicable) will be added to the modeling results. For modeling nearby sources, all sources within 10 km of the facility will be included in the model. An inventory of the surrounding sources will be obtained from the NMED MergeMaster database. Based on EPA's Guidance for $PM_{2.5}$ Permit Modeling and NMED's Modeling Guidelines, sources that emit at least 40 tons per year of $NO_x$ or at least 40 tons per year of $SO_2$ are considered to emit significant amounts of precursors. Sources with significant increases of $PM_{2.5}$ precursors must qualitatively and/or quantitatively account for the secondary formation of $PM_{2.5}$. The secondary formation of $PM_{2.5}$ will be calculated in this modeling following the NMED Modeling Guidelines.

For $H_2S$ modeling, all units will be modeled as point sources with the exception of FUG, PWT-1, and PWT-2. Fugitives will be modeled as a single volume source at the center of the facility with dimensions determined per Section 4.3.2 of NMED's modeling guidelines. Produced water tank emissions will be modeled as volume sources centered on the tank locations. Based on the NMED Modeling Guidelines for $H_2S$ modeling, if the facility is in the Pecos-Permian Basin Intrastate AQCR, $H_2S$ will be modeled using the 1-hour averaging time and compared to the 1/2-hour averaging period standard.

## 2.5 PSD Increment Analysis

If the results of the ROI analysis for $NO_x$, $SO_2$, $PM_{10}$, or $PM_{2.5}$ indicate concentrations greater than significance levels, PSD increment analysis will be conducted for the appropriate averaging periods. If required, the PSD increment analysis will be conducted including all PSD increment consuming and expanding sources within 25 km of the facility, plus sources emitting over 1000 pounds per hour within 50 km of the facility. The surrounding source information will be obtained from the NMED MergeMaster database. The predicted maximum concentrations will be compared to the appropriate Class II PSD Standard.

## 2.6 Class I Areas Analysis

Per section 7.2.5 of the NMED Modeling Guidelines, if a PSD Class II increment analysis is required and the proposed construction of a minor source is within 50 km of a Class I area, then PSD increment consumption at the Class I area(s) must be determined and compared with the Class I PSD Increment. The nearest Class I area is Carlsbad Caverns National Park 75.5 km from the facility. Since the nearest Class I area is more than 50 km away, a Class I analysis is not required.

[1] New Mexico Air Quality Bureau Air Dispersion Modeling Guidelines Revised June 2024

## Dawna Allen

**From:** Rathod, Sagar, ENV <sagar.rathod@env.nm.gov>
**Sent:** Thursday, February 26, 2026 4:43 PM
**To:** Dawna Allen
**Cc:** Mustafa, Sufi A., ENV; mgreer@kinetik.com; John Ke
**Subject:** Frontier Field Services - BKU CS - Modeling Protocol

Hi Dawna,
Thank you for clarifying the fugitive sources on the phone call. Your modeling protocol is approved.

Thank you,
Sagar

---

**Sagar Rathod, Ph.D. (he/him)**
Environmental Scientist - Air Dispersion Modeling
New Mexico Environment Department - Air Quality Bureau
525 Camino de los Marquez, Suite 1, Sante Fe, NM 87505
sagar.rathod@env.nm.gov
TEL: 505-670-9487
https://www.env.nm.gov/air-quality/



## Dawna Allen

**From:** Rathod, Sagar, ENV <sagar.rathod@env.nm.gov>
**Sent:** Wednesday, April 22, 2026 10:19 AM
**To:** Dawna Allen
**Cc:** Molly Greer; John Ke; Mustafa, Sufi A., ENV
**Subject:** Re: [EXTERNAL] RE: Frontier Field Services - BKU CS - Modeling Protocol

Hi Dawna,

Thank you for the clarification email. Your request to use effective stack height for flares based on Equations 1 and 2 in your attached protocol is approved.

Thank you,
Sagar

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**Sagar Rathod, Ph.D. (he/him)**
Environmental Scientist - Air Dispersion Modeling
New Mexico Environment Department - Air Quality Bureau
525 Camino de los Marquez, Suite 1, Sante Fe, NM 87505
sagar.rathod@env.nm.gov
TEL: 505-670-9487
https://www.env.nm.gov/air-quality/

---

**From:** Dawna Allen <Dawna.Allen@trinityconsultants.com>
**Sent:** Tuesday, April 21, 2026 5:21 PM
**To:** Rathod, Sagar, ENV <sagar.rathod@env.nm.gov>
**Cc:** Molly Greer <mgreer@kinetik.com>; John Ke <JKe@trinityconsultants.com>; Mustafa, Sufi A., ENV <sufi.mustafa@env.nm.gov>
**Subject:** [EXTERNAL] RE: Frontier Field Services - BKU CS - Modeling Protocol

CAUTION: This email originated outside of our organization. Exercise caution prior to clicking on links or opening attachments.

Dear Sagar,

Thank you for previously approving our modeling protocol for BKU CS (email attached).
It advance of submitting the application and modeling results, we wanted to provide some information regarding a change we're making to the modeling.

1. We are modeling the flare emissions using effective height in AERMOD. We have provided a memo that discusses the justification for using effective height, as opposed to the physical stack height when modeling flare emissions.

Please let us know if you have any questions between now and when we submit the application, which we expect to do within the next few days. Since we understand this method has been used and approved for other projects with NMED, we are anticipating the use of effective height will not be a concern.

Thank you very much,

**Dawna Allen**
Managing Consultant

M 512.484.4478
Email: dawna.allen@trinityconsultants.com
9737 Great Hills Trl #340, Austin, TX 78759
Trinity Consultants

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**From:** Dawna Allen
**Sent:** Monday, February 23, 2026 11:53 AM
**To:** sufi.mustafa@env.nm.gov
**Cc:** Molly Greer <mgreer@kinetik.com>; John Ke <JKe@trinityconsultants.com>
**Subject:** Frontier Field Services - BKU CS - Modeling Protocol

Dear Sufi,

Please find attached a modeling protocol for the Frontier Field Services LLC, BKU Compressor Station.

BKU Compressor Station was previously under an NSR permit but is currently under GCP-O&G (AI 29329, Permit No. 4208M5). Modeling is being prepared as part of an NSR application, as the facility will now be transitioning back to an NSR permit.

Will you please review and let us know if this protocol is approved.

Thank you,

**Dawna Allen**
Managing Consultant

M 512.484.4478
Email: dawna.allen@trinityconsultants.com
9737 Great Hills Trl #340, Austin, TX 78759
Trinity Consultants

Trinity Consultants

# MEMORANDUM

**To:** Sagar Rathod, Ph.D., New Mexico Environment Department – Air Quality Bureau

**From:** Dawna Allen, Trinity Consultants

**cc:** Sufi Mustafa, Ph.D., New Mexico Environment Department – Air Quality Bureau

John Ke, Trinity Consultants

Molly Greer, Frontier Field Services, LLC

**Date:** April 21, 2026

**RE:** Frontier Field Services, LLC, BKU Compressor Station – Effective Flaring Height

Frontier Field Services, LLC (Frontier) is submitting an NSR permit application for the BKU Compressor Station (BKU). As part of the NSR permit application, Frontier is preparing comprehensive air dispersion modeling. A modeling protocol was submitted to the New Mexico Environment Department (NMED) by Trinity Consultants (Trinity) on behalf of Frontier on February 23, 2026 and the protocol was approved on February 26, 2026 by Sagar Rathod, NMED.

Following submittal of the protocol, Frontier has updated the methodology to model the flare at the facility using effective height and effective diameter. This memo serves as an addendum to the modeling protocol explaining how the stack parameters are calculated along with the basis for using these parameters in the modeling demonstration.

The regulatory default model, AERMOD, does not have a specific source type for flares. Rather, analysts must use the point source type to model emissions from flares in AERMOD. For a standard point source, AERMOD determines an effective height of the source, which is the height of the centerline of the plume above ground. AERMOD calculates the effective height by adding the physical height of the stack (supplied as a direct input) with the final plume rise, which is a function of buoyancy (exit temperature in relation to ambient air) and momentum (stack exhaust velocity). Flare source inputs are unique and difficult to quantify since "combustion occurs at or beyond the flare tip, appropriate values for stack exit temperature and exit velocity cannot be accurately determined."[1] Thus, flare temperature and exit velocity are modeled using default parameters, which means that AERMOD does not account for flare-specific characteristics, such as buoyancy flux due to the flare's heat release rate or the actual release height of pollutants. Appendix W to Title 40 Code of Federal Regulations Part 51 (40 CFR 51), the Guideline of Air Quality Models, also states that no "explicit provisions in [AERMOD] are made for…the handling of such special plumes as flares."[2]

For flare stack height, the height of the flame can exceed the original height of the flare itself, such that modeling the release of emissions at the base height of the flare would underestimate the actual release height.

The EPA's recommended screening model, AERSCREEN, does include a flare source option. For that source type, AERSCREEN requests users to input the emission rate, stack height, total heat release rate, and radiative heat loss fraction and then calculates effective stack diameter and stack height using this data. AERSCREEN then inputs into AERMOD the calculated effective stack height and diameter, along with default parameters of 20 m/s and 1,273 K, as the stack parameters for a point source. AERMOD does not natively

[1] New Source Review Emission Calculations, APD-ID 6v1. TCEQ, Revised 3/21.

[2] 40 CFR Part 51, Appendix W, 7.2.2.2

have a flare source type, so unlike AERSCREEN, this calculation of effective stack height and diameter is not done automatically.

To account for the characteristics of the flare emission source when directly entered in AERMOD, Frontier calculated effective stack heights and diameters for each flare by scaling the flare stack's exit diameter based on the total flared gas heat release rate using Equation 1 (below)[3] and finding the sum of the expected height of the flame, also based on the total flared gas heat release rate, and the actual height of the flare to model the correct release height using Equation 2.[4] AERMOD can then calculate plume rise and model the emissions release reflecting the operational flare data while using the standard point source algorithm.

$$D = \sqrt{10^{-6} q_n} \quad \text{Eq. 1}$$

Where:

- D – diameter
- $q_n$ – net heat release

$$H_{eff} = H_s + 4.56 \times 10^{-3} \times HR^{0.478} \quad \text{Eq. 2}$$

Where:

- $H_{eff}$ – effective stack height
- $H_s$ – physical stack height
- HR – total heat release rate

[3] Air Dispersion Modeling Guidelines. New Mexico Air Quality Bureau, June 2024.

[4] Engineering Guide #69: Air Dispersion Modeling Guidance. Ohio Environmental Protection Agency, November 14, 2018.

# Section 17

## Compliance Test History

(Submitting under 20.2.70, 20.2.72, 20.2.74 NMAC)

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To show compliance with existing NSR permits conditions, you must submit a compliance test history. The table below provides an example.

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### Compliance Test History Table

| Unit No. | Test Description | Test Date |
|---|---|---|
| C-101 | Annual JJJJ Emissions Test, A201 | 3/13/2023 |
| C-102 | Annual JJJJ Emissions Test, A201 | 3/13/2023 |
| C-103 | Annual JJJJ Emissions Test, A201 | 3/14/2023 |
| C-104 | Annual JJJJ Emissions Test, A201 | 3/14/2023 |
| C-105 | Annual JJJJ Emissions Test, A201 | 3/15/2023 |
| C-106 | Annual JJJJ Emissions Test, A201 | 3/15/2023 |
| C-102 | Quarterly PEA Emissions Test, A201 | 5/1/2023 |
| C-104 | Quarterly PEA Emissions Test, A201 | 5/1/2023 |
| C-105 | Quarterly PEA Emissions Test, A201 | 5/1/2023 |
| C-106 | Quarterly PEA Emissions Test, A201 | 5/1/2023 |
| C-102 | Quarterly PEA Emissions Test, A201 | 8/2/2023 |
| C-104 | Quarterly PEA Emissions Test, A201 | 8/2/2023 |
| C-105 | Quarterly PEA Emissions Test, A201 | 8/2/2023 |
| C-106 | Quarterly PEA Emissions Test, A201 | 8/2/2023 |
| TO-1 | 40 CFR 60 App A, Method 25A | 9/26/2023 |
| C-102 | Quarterly PEA Emissions Test, A201 | 11/16/2023 |
| C-104 | Quarterly PEA Emissions Test, A201 | 11/16/2023 |
| C-105 | Quarterly PEA Emissions Test, A201 | 11/16/2023 |
| C-106 | Quarterly PEA Emissions Test, A201 | 11/16/2023 |
| C-101 | Annual JJJJ Emissions Test, A201 | 1/3/2024 |
| C-102 | Annual JJJJ Emissions Test, A201 | 1/3/2024 |
| C-104 | Annual JJJJ Emissions Test, A201 | 1/3/2024 |
| C-105 | Annual JJJJ Emissions Test, A201 | 1/3/2024 |
| C-106 | Annual JJJJ Emissions Test, A201 | 1/3/2024 |
| C-103 | Annual JJJJ Emissions Test, A201 | 2/23/2024 |
| C-102 | Quarterly PEA Emissions Test, A201 | 6/12/2024 |
| C-104 | Quarterly PEA Emissions Test, A201 | 6/12/2024 |
| C-105 | Quarterly PEA Emissions Test, A201 | 6/12/2024 |
| C-106 | Quarterly PEA Emissions Test, A201 | 6/12/2024 |
| C-104 | Quarterly PEA Emissions Test, A201 | 8/16/2024 |
| C-105 | Quarterly PEA Emissions Test, A201 | 8/16/2024 |
| C-106 | Quarterly PEA Emissions Test, A201 | 8/16/2024 |

| | | |
|---|---|---|
| TO-1 | 40 CFR 60 App A, Method 25A | 9/10/2024 |
| C-102 | Quarterly PEA Emissions Test, A201 | 9/30/2024 |
| C-104 | Quarterly PEA Emissions Test, A201 | 11/20/2024 |
| C-105 | Quarterly PEA Emissions Test, A201 | 11/20/2024 |
| C-106 | Quarterly PEA Emissions Test, A201 | 11/20/2024 |
| C-102 | Quarterly PEA Emissions Test, A201 | 12/19/2024 |
| C-103 | Annual JJJJ Emissions Test, A201 | 1/15/2025 |
| C-106 | Annual JJJJ Emissions Test, A201 | 1/15/2025 |
| C-104 | Annual JJJJ Emissions Test, A201 | 1/16/2025 |
| C-101 | Annual JJJJ Emissions Test, A201 | 1/17/2025 |
| C-102 | Annual JJJJ Emissions Test, A201 | 1/17/2025 |
| C-105 | Annual JJJJ Emissions Test, A201 | 1/17/2025 |
| C-102 | Quarterly PEA Emissions Test, A201 | 5/13/2025 |
| C-104 | Quarterly PEA Emissions Test, A201 | 5/13/2025 |
| C-105 | Quarterly PEA Emissions Test, A201 | 5/13/2025 |
| C-106 | Quarterly PEA Emissions Test, A201 | 5/13/2025 |

# Section 20

## Other Relevant Information

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**Other relevant information**. Use this attachment to clarify any part in the application that you think needs explaining. Reference the section, table, column, and/or field. Include any additional text, tables, calculations or clarifying information.

Additionally, the applicant may propose specific permit language for AQB consideration. In the case of a revision to an existing permit, the applicant should provide the old language and the new language in track changes format to highlight the proposed changes. If proposing language for a new facility or language for a new unit, submit the proposed operating condition(s), along with the associated monitoring, recordkeeping, and reporting conditions. In either case, please limit the proposed language to the affected portion of the permit.

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No other relevant information is being submitted with this application.

# Section 22: Certification

Company Name: Frontier Field Services LLC

I, Bryan Graham, hereby certify that the information and data submitted in this application are true and as accurate as possible, to the best of my knowledge and professional expertise and experience.

Signed this 16 day of March, 2026 upon my oath or affirmation, before a notary of the State of Texas.

Bryan Graham
*Signature

16 MAR 2026
Date

BRIAN GRAHAM
Printed Name

VP, OPERATIONS
Title

Scribed and sworn before me on this 16 day of MARCH, 2026.

My authorization as a notary of the State of TEXAS expires on the 19 day of January, 2027.

Megan Elizabeth Easley
Notary's Signature

3/16/2026
Date

Megan Elizabeth EASLEY
Notary's Printed Name

MEGAN ELIZABETH EASLEY
Notary Public, State of Texas
Comm. Expires 01-19-2027
Notary ID 131819424

*For Title V applications, the signature must be of the Responsible Official as defined in 20.2.70.7.AE NMAC.