



Enterprise Products™

May 14, 2010

ENTERPRISE PRODUCTS PARTNERS LP
ENTERPRISE PRODUCTS OPERATING LLC

ENTERPRISE PRODUCTS GP, LLC, GENERAL PARTNER
ENTERPRISE PRODUCTS OLPGP, INC., SOLE MANAGER

Return Receipt Requested
7009 2820 0002 5083 2840

Mr. Jeffrey Robinson, Chief, Air Permits Section, 6PD-R
Multimedia Permitting and Planning Division
Environmental Protection Agency – Region 6
1445 Ross Avenue
Dallas, TX 75202-2733

**Re: Enterprise Field Services, LLC
Lindrith Compressor Station (Facility)
Revision to Previously Submitted Application Dated May 12, 2008
Permit Number R6FOPP71-03**

Dear Mr. Robinson:

Enterprise Field Services, LLC (Enterprise) is submitting a permit application update for the above referenced Facility. Enterprise submitted a permit renewal package to EPA on May 12, 2008. The renewal application remains pending before EPA. This submittal updates that application and represents recent changes that were designed to reduce emissions from the station.

By way of background, in a letter to EPA dated November 3, 2008, Enterprise requested a significant revision to the Lindrith Compressor Operating Permit R6FOPP71-03. In that letter, Enterprise had requested, among other things, removal of two, existing 500-bbl condensate storage tanks and installation of eight new 450-bbl condensate storage tanks, three 120 bbl drain tanks, one 120 bbl sump, and a new loading rack for transporting the condensate from the tanks. The estimated annual condensate throughput at that time was up to 50,000 bbls total for the new tanks. A copy of the November 3, 2008 letter is attached for your reference. In addition to the removal of the two existing 500 bbl condensate storage tanks located within the station fence line, four 500-bbl tanks located in a battery approximately 225 yards to the southeast of the facility were removed. The former tank battery within the station fence line was used to capture liquids associated with various "scrubber dumps" associated with natural gas compression. The former tank battery located southeast of the facility was used to collect and temporarily store liquids associated with pipeline pigging operations. Both of these tank batteries were removed in the summer of 2009 after construction of the new, eight 450 bbl tank battery. Produced liquids stored in the new tanks (water and petroleum condensate) will gravity separate. The drain tanks are used to separate water from the petroleum condensate prior to trucking off site.

In the May 12, 2008 renewal application, based on Enterprise's understanding of operating criteria and the best emissions estimates at that time, Enterprise voluntarily proposed to install a vapor recovery unit (VRU) or a stabilizer by November, 2008 to recover volatile organic compounds from petroleum condensate prior to routing stabilized condensate to atmospheric storage tanks at the Facility. Enterprise thereafter installed the proposed VRU, but encountered significant operating

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issues with the unit, which required that Enterprise review other options to address VOC emissions from the tanks at the Facility. Shortly after it became clear that the VRU/stabilizer would not work, Enterprise changed the operating scenario at the Facility. Specifically, it rerouted the final discharge stream, a two phase flow of hydrocarbon vapors and liquids, past the facility "discharge contactor scrubbers," which has resulted in a dramatic decrease in volatile organic compound emissions from the condensate storage tanks. The discharge scrubbers typically operated around 250 PSIG which resulted in the liquid phase of hydrocarbons, such as propane, butane and other VOCs, dumping to the facilities atmospheric storage tanks. The result of rerouting the product flow was that most of the VOC liquids no longer relieve to the tanks, but instead, remain in the pipeline to be later removed and processed at a downstream facility. The annual emissions from the Facility's condensate storage tanks following the change in the operating scenario are estimated to be below five tons per year *in the aggregate* using the HySys model. The condensate storage tanks currently collect mostly produced water and some petroleum condensate. The discharge line from the discharge contactor scrubber is being permanently disconnected.

The following table provides approximate volumes of liquids produced and transported from Lindrith in 2009.

2009 Liquid Production	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Totals
Condensate (bbls)	1578	1497	2290	1726	1422	418	0	0	0	0	0	0	8931
Water/Condensate (bbls)	1520	1840	1520	1770	2320	1360	400	390	560	800	1050	960	14490
Water	560	320	800	160	0	240	0	320	80	80	0	0	2560
Total Liquids	3658	3657	4610	3656	3742	2018	400	710	640	880	1050	960	25981

The majority of liquids currently being removed from Lindrith consist of a water / condensate mix of 42/58 % respectively.

Enterprise emphasizes that it takes environmental compliance most seriously, and has worked diligently to develop a solution to the issue outlined above.

If you need additional information regarding this submittal, please call Don Fernald, our Area Environmental Scientist, at (505) 599-2141, or me directly at (713) 381-6684.

Sincerely,



Matthew E. Marra
Director, Environmental

/mem

enclosures:

Title V Air Permit Application
Revised Calculations for Condensate Storage Tanks

cc: Environmental Director,
Jicarilla Apache Reservation,



**PART 71 AIR PERMIT
RENEWAL APPLICATION UPDATE
ENTERPRISE FIELD SERVICES LLC**

**LINDRITH COMPRESSOR STATION
RIO ARRIBA COUNTY, NEW MEXICO
PERMIT NO. R6FOPP71-03**

MAY 2010

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Executive Summary

Lindrith Compressor Station

Part 71 Renewal Application Update

Enterprise Field Services LLC (Enterprise) owns and operates the Lindrith Compressor Station located in Rio Arriba County, New Mexico. The station is located on Jicarilla Apache Nation land and is subject to the 40 CFR Part 71 federal operating program. The station is currently authorized to operate under EPA Part 71 Permit No. R6FOPP71-03. The current operating permit expired on 11/16/2008. Enterprise submitted the required renewal application in 2008 and is currently operating under the application shield. At this time Enterprise is submitting a permit renewal update package to document changes to the station.

The Lindrith Compressor Station is a natural gas gathering compressor station defined by Standard Industrial Classification (SIC) code 1311. The existing operating permit authorizes the following emission sources:

1. Two 3,267-hp Caterpillar 3612LE compressor engines equipped with oxidation catalysts (A-01 and A-02)
2. One 3,267-hp Caterpillar 3612LE compressor engine (A-03)
3. One Glycol Dehydrator equipped with controls (DEHY-1RBLR and DEHY-STL)
4. Two 500-bbl condensate tanks (TK-1 and TK-2)
5. Insignificant sources (drain tanks, lube oil tanks, etc.).

Proposed Changes

This application is an update of the renewal application to account for recent changes to the station. Enterprise is representing the following changes to the Lindrith Compressor Station.

1. The glycol dehydrator and reboiler are permanently shutdown and will be removed from the permit along with all applicable requirements;
2. Remove the two 500-barrel condensate storage tanks;
3. Install eight (8) 450-bbl Fixed Roof Storage Tanks for Condensate and Water Storage. Include these emission sources under a single emission cap (TBATTERY);
4. Add condensate truck loading emissions (TLOAD);
5. Add fugitive emissions (FUGVOC); and
6. Add Maintenance, Startup, and Shutdown Emissions (MSS).

Enterprise is also updating the insignificant source activity list with three 120 bbl drain tanks, which collected gravity separated water from the condensate tanks.

Table 1-1

Pollutant	Current Limits (tpy)	Proposed Limits (tpy)	Change in PTE (tpy)
Nitrogen Oxides	68.48	66.26	-2.22
Carbon Monoxide	95.5	102.54	+7.04
Volatile Organic Compounds	153.3	137.21	-16.09
PM10	N/A	2.90	+2.90
Sulfur Dioxides	0.22	4.27	+4.05
Total HAP	55	36.85	-18.15
Formaldehyde	21	31.05	+10.05

The changes in the proposed station potential to emit totals are due to equipment shutdown and removals, equipment installations, and changes in the emission calculation methodologies. These changes are discussed further in this application.

Calculations Summary

Lindrith Compressor Station

Part 71 Renewal Application Update

The Lindrith Compressor Station is equipped with gas-fired engines, storage tanks in volatile organic liquid service, truck loading, fugitives, and natural gas releases for MSS purposes. The methodologies used to estimate emissions from these sources are detailed in this section.

Engine Emissions (A-01, A-02, A-03)

The station is equipped with three identical 3,267-hp Caterpillar 3612LE gas-fired low emission technology engines to drive gas compressors. Two of the three engines are equipped with oxidation catalysts to reduce CO and VOC/HAP emissions. The engines are permitted to operate continuously at full load (8,760 hours/year). Enterprise is proposing no physical changes to these sources other than updating the emission methodologies.

Emissions of NO_x, CO, VOC, and formaldehyde are based on vendor data. The Caterpillar 3612LE is a clean burn source that does not require any add-on control device to reduce emissions of NO_x. Engines A-01 and A-02 are equipped with oxidation catalysts to reduce emissions of CO by up to 85%. This control technology all reduces VOC/HAP by up to 30%.

Emissions on PM₁₀ and PM_{2.5} are calculated using the current AP-42 factors for 4-cycle lean burn engines. Enterprise summed both the filterable and the condensable factors to get a total factor.

Emissions of SO₂ are based on the current AP-42 factor adjusted for higher instances of sulfur in the fuel gas. The AP-42 factor (0.000588 lb/MMBtu) is based on up to 2,000 grains sulfur per million scf of fuel gas. Enterprise adjusted the factor to account for up to 5 grains/100 scf.

All other engine HAP emissions, other than formaldehyde, are current AP-42 for 4-cycle lean burn engines. For the two engines equipped with oxidation catalysts it was assumed that the emissions were reduce by 30%.

Maintenance, Startup, and Shutdown Emissions (MSS)

Enterprise conducts periodic planned and unplanned maintenance, startup, and shutdown activities that result in the venting of natural gas from the stations blowdown vent. These activities include, but are not limited to, engine starts, compressor shutdowns, vessel and piping blowdowns, pipeline pigging activities, etc. Enterprise is including emission estimates for these activities using an estimated volume of natural gas that may be released during an operating year and calculating the mass of VOC released using a station gas analysis.

Condensate Storage Tank Battery (TBATTERY)

Enterprise has replaced the two 500-bbl fixed roof condensate tanks with eight (8) 454-bbl fixed roof storage tanks to handle the produced condensate and water at the station.

Enterprise has re-engineered the liquid collection systems in the vicinity of the station to reduce the potential volume of liquids which can be collected at the Lindrith Compressor Station. This reduction in liquid storage potential also reduces the potential VOC emissions at the station.

The eight storage tanks (T-1, T-2, T-3, T-4, T-5, T-6, T-7 and T-8) are plumbed together to aid in the collection of natural gas condensates and produced water. Each tank is vented to atmosphere individually. However, Enterprise is proposing to establish an emission cap on the eight tanks (TBATTERY) to allow maximum operational flexibility for operations. An emission cap will allow operations to direct the collected condensate and water to any of the eight storage tanks in the battery. As long as the volumetric limits (bbls/year) represented in the permit application are not exceeded then the limits on VOC emissions from the tank battery will not be exceeded.

Emissions from the new condensate tanks were calculated using both a process model (AspenTech) and the EPA Tanks software. The process model was used to calculate potential flash emissions from the storage tanks. The EPA Tanks software was used to estimate breathing and working losses from the tanks. The process model estimates a liquid production rate of 6,389 barrels per year (bbl/yr) under the defined operating conditions. To account for operational variables Enterprise is basing the storage tank emissions on an annual rate of 20,000 bbl/yr.

Process Model

For given input parameters the AspenTech process model estimates liquid volume production numbers as well as component analyses for the storage tank vapor stream and the liquid product. Based on the Lindrith inlet gas quality the process model predicts liquids are produced at the station during cool ambient conditions. During warmer months the model predicts the compressed inlet gas is not condensable even after it runs through the gas coolers. However, for this application Enterprise is conservatively assuming that liquids are produced year around.

The process model predicts a total VOC emission rate (lb/hr) from the tank battery at the referenced liquid production rate over the specified time period. Enterprise then pro-rated these emission totals up based on a ratio of the proposed permit representation to the model production rate. The total flash emissions were then speciated using the calculated mass fractions from the process model.

EPA Tanks

This software is used to calculate breathing and working losses from storage tanks. For this application Enterprise modeled a single storage tank handling gasoline (RVP 7) at 2500 bbl/yr to get an estimate of the tank emissions. These emissions were multiplied by eight (8) to get total emissions from the tank battery. Enterprise speciated the tank breathing and working emissions by conservatively assuming these emissions would be

similar to the flash gas characteristics. The only difference is Enterprise deleted the non-VOC components and then normalized the mass fraction total.

Condensate Truck Loading Emissions (TLOAD)

Emissions from the condensate truck loading were estimated using the AP-42 loading loss equation, hourly filling rate and annual throughput. The annual throughput was estimated by assuming that the total throughput for the eight condensate tanks was loaded.

Speciated emissions from this operation were done conservatively assuming the loading vapors were of similar makeup as the storage tank flash gas. The only difference is Enterprise deleted the non-VOC components and then normalized the mass fraction total.

Fugitive Emissions (FUGVOC)

Fugitive emissions were estimated based on an estimated piping component count and the April 2010 Gas Analysis mole percentage of non-methane/non-ethane hydrocarbons. The EPA Oil and Gas factors were used to estimate fugitives.

Applicable Requirements

Lindrith Compressor Station

Part 71 Renewal Application Update

The following discussion addresses applicable and non-applicable requirements of Code of Federal Regulations, Title 40. General requirements imposed by the current operating permit are not addressed in this section.

Applicable Requirements

The following regulatory requirements have been determined to be potentially applicable to the Lindrith Compressor Station:

40 CFR 71 – Federal Operating Permits

The facility is a major source of CO, VOC, and HAP as defined by 40 CFR 71. Regulation 40 CFR 71.5(a)(1) requires that “for each part 71 source, the owner or operators shall submit a timely and complete application in accordance with this section”. 40 CFR 71.5(a)(1)(iii) goes on to state that “for purposes of permit renewal, a timely application is one that is submitted at least 6 months but not more than 18 months prior to the expiration of the part 70 or 71 permit”.

Operating permit R6FOPP71-03 expired on 11/16/08; as required by this regulation, this application was submitted prior to 5/16/08. This current application is a revision to the initial application due to changes that have occurred during the period of review.

Non-Applicable Requirements

Certain regulatory requirements are discussed below for non-applicability because of the facility type and potential applicability.

40 CFR 50 – National Ambient Air Quality Standards

40 CFR 50 establishes National Ambient Air Quality Standards but does not directly impose requirements on a specific stationary source and is therefore not applicable.

40 CFR 52.21 – Prevention of Significant Deterioration of Air Quality

Enterprise has made a determination in accordance with 40 CFR 52.21(a)(1)(2) that the Lindrith Compressor Station is a minor source for PSD purposes as defined under 40 CFR 52.21(b). Lindrith Compressor Station is not a source identified in 40 CFR 52.21(a), and the facility-wide potential to emit is less than 250 tons per year (tpy) of any regulated pollutant. Therefore, PSD is not required for this permit renewal.

40 CFR 60, Subpart A – General Provisions

This subpart is only applicable to facilities that are subject to another NSPS. As detailed in this section no NSPS regulations currently apply to this facility

40 CFR 60, Subparts K, Ka, and Kb

The eight new fixed roof condensate storage tanks at the facility were constructed after July 23, 1984 making them potentially subject to the Subpart Kb rule. However, all eight of these storage tanks have a storage capacity of 454-bbbls (72 m³). Per 40 C FR 60.110b(a) storage tanks in VOL service with less than 75 m³ in storage capacity are exempt from this regulation. Therefore, the condensate storage tanks included in the source cap TBATTERY are not subject to NSPS Subpart Kb. There are no storage tanks at the Lindrith Compressor Station which exceed 75 m³.

40 CFR 60, Subpart KKK – Standards of Performance for Equipment Leaks

The Lindrith Compressor Station is not a natural gas processing plant as defined under this subpart. Therefore, Subpart KKK is not applicable.

40 CFR 60, Subpart LLL – Standards of Performance for Onshore Natural Gas Processing: SO₂ Emissions

The Lindrith Compressor Station is not an onshore natural gas treating plant as defined in this subpart. Therefore, Subpart LLL is not applicable.

40 CFR 60, Subpart JJJJ – Standards of Performance for Station Spark Ignition Internal Combustion Engines

All engines at the facility were constructed before June 12, 2006 (40 CFR 60.4230.a.4) and have not been modified or reconstructed since (40 CFR 40.4230.a.5). Therefore, this subpart does not currently apply to this facility.

40 CFR 61 – National Emissions Standards for Hazardous Air Pollutants (NESHAP)

There are no 40 CFR 61 NESHAPs regulation currently applicable to this facility.

40 CFR 63 Subpart HH – National Emissions Standards for Hazardous Air Pollutants from Oil and Gas Production Facilities

The Lindrith Compressor Station is a major HAP source and is equipped with condensate storage tanks with the potential for flash emissions. Therefore, the requirements of this subpart are potentially applicable. Enterprise has removed the glycol dehydrator from the station which would have been an affected source.

By definition storage vessels with the potential for flash emissions means any storage vessel that contains a hydrocarbon liquid with a stock tank GOR equal to or greater than 0.31 cubic meters per liter (1740 scf/bbl) and an API gravity equal to or greater than 40 degrees and an actual annual average hydrocarbon liquid throughput equal to or greater than 79,500 liters per day (500 bbls/day). The volume of condensate collected at the Lindrith Compressor Station is less than 79,500 liters per day. Therefore, Subpart HH is not currently applicable.

40 CFR 63 Subpart ZZZZ – National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

The three existing RICE units currently operating at the facility are “existing” (constructed before December 19, 2002) 4 stroke lean burn engines and therefore do not have to meet

the requirements of Subpart ZZZZ, including the initial notification, as stated at 40 CFR 63.6590(b)(3). Enterprise will comply with any applicable revisions to this regulation as they occur.

Case-by-Case MACT Determinations

The Lindrith Compressor Station is a major HAP source. The RICE units, condensate storage tanks, and fugitives are addressed under the promulgated MACT Subpart HH and ZZZZ regulations as addressed above. Emissions of HAP from truck loading (TLOAD) AND maintenance, startup, and shutdown releases (MSS) do not exceed major source levels for HAP. Therefore, case-by-case MACT determinations for these two source categories are not required.

40 CFR 68 – Accidental Release Prevention Program

This regulation arises from section 112 (r) of the Clean Air Act and establishes thresholds based on inventoried quantities of specific substances in process. This facility does not manufacture, process, use, store or otherwise handle regulated substances in excess of the quantities specified in 40 CFR 68, therefore this regulation does not apply.

40 CFR 72 – Acid Rain Regulation

The facility is not an electric utility generating facility as defined in under this part and therefore is not an affected facility under the Acid Rain Program

40 CFR 82, Subpart F & H – Protection of Stratospheric Ozone

No operations involving CFCs are conducted at this facility and no halon-containing fire extinguishers are used, stored or disposed of at this facility.

Federal Operating Permit Program (40 CFR Part 71)

GENERAL INFORMATION AND SUMMARY (GIS)

A. Mailing Address and Contact Information

Facility name: Lindrith Compressor Station

Mailing address: Street or P.O. Box: Enterprise Field Services, LLC c/o Environmental Dep't: PO Box 4324

City: Houston State: TX ZIP: 77210 - 4324

Contact person: Don Fernald Title: Environmental Scientist

Telephone (505) 599 - 2141 Ext.

Facsimile (505) 599 - 2119

B. Facility Location

Temporary source? Yes X No Plant site location: 20 miles West of Lindrith, NM, East ½ of the
Southeast ¼ of Section 18, Township 24 North, Range 5 West

City: Lindrith State: NM County: Rio Arriba EPA Region: 6

Is the facility located within:

Indian lands? X YES NO OCS waters? YES X NO

Non-attainment area? YES X NO If yes, for what air pollutants?

Within 50 miles of affected State? X YES NO If yes, What State(s)? NM

C. Owner

Name: Enterprise Field Service LLC Street/P.O. Box: PO Box 4324

City: Houston State: TX ZIP: 77210 - 4324

Telephone (713) 381 - 6595 Ext

D. Operator

Name: Enterprise Products Operating LLC Street/P.O. Box: PO Box 4324

City: Houston State: TX ZIP: 77210 - 4324

Telephone (713) 381 - 6500 Ext

H. Process Description

List processes, products, and SIC codes for the facility.

Process	Products	SIC
Natural gas gathering and transmission facility, with pressurized natural gas as product delivered to pipeline.	Pressurized natural gas	1311

I. Emission Unit Identification

Assign an emissions unit ID and describe each emissions unit at the facility. Control equipment and/or alternative operating scenarios associated with emissions units should be listed on a separate line. Applicants may exclude from this list any insignificant emissions units or activities.

Emissions Unit ID	Description of Unit
A-01	Caterpillar 3612 LE, Natural Gas Fired Engine
A-01-CD#1	Oxidation Catalyst for RICE A-01 (Control Device)
A-02	Caterpillar 3612 LE, Natural Gas Fired Engine
A-02-CD#2	Oxidation Catalyst for RICE A-02 (Control Device)
A-03	Caterpillar 3612 LE, Natural Gas Fired Engine
FUG	Fugitive VOCs
TBATTERY	Eight 450-bbl Condensate Storage Tanks (capped emissions and throughput)
TLOAD	Condensate Truck Loading
MSS	Maintenance, Startup, and Shutdown Emissions

J. Facility Emissions Summary

Enter potential to emit (PTE) for the facility as a whole for each air pollutant listed below. Enter the name of the single HAP emitted in the greatest amount and its PTE. For all pollutants stipulations to major source status may be indicated by entering "major" in the space for PTE. Indicate the total actual emissions for fee purposes for the facility in the space provided. Applications for permit modifications need not include actual emissions information.

NOx 66.26 tons/yr VOC: 126.63 tons/yr SO₂: 4.27 tons/yr
PM-10: 2.90 tons/yr CO: 102.54 tons/yr Lead: N/A tons/yr Total HAP: 37.57 tons/yr
Single HAP emitted in the greatest amount Formaldehyde PTE: 31.05 tons/yr
Total of regulated pollutants (for fee calculation), Sec. F, line 5 of form FEE: N/A tons/yr

K. Existing Federally-Enforceable Permits

Permit number(s): NM 1644 M1 Permit type: NSR Permitting Authority: NMED
Permit number(s): R6FOPP71-03 Permit type: Title V (Part 71) Permitting Authority: USEPA

L. Emission Unit(s) Covered by General Permits

Emission unit(s) subject to general permit _____
Check one: ☐ Application made ☐ Coverage granted
General permit identifier _____ Expiration Date ____/____/____

M. Cross-referenced Information

Does this application cross-reference information? ☐ YES ☒ NO (If yes, see instructions)

INSTRUCTIONS FOLLOW

09/30/2010

Federal Operating Permit Program (40 CFR Part 71)

POTENTIAL TO EMIT (PTE)

For each unit with emissions that count towards applicability, list the emissions unit ID and the PTE for the air pollutants listed below and sum them up to show totals for the facility. You may find it helpful to complete form **EMISS** before completing this form. Show other pollutants not listed that are present in major amounts at the facility on attachment in a similar fashion. You may round values to the nearest tenth of a ton. Also report facility totals in section **J** of form **GIS**.

Emissions Unit ID	Regulated Air Pollutants and Pollutants for which the Source is Major (tons/yr)						
	NOx	VOC	SO2	PM10	CO	Lead	HAP
A-01	22.09	20.54	1.42	0.97	11.83	0	10.28
A-02	22.09	20.54	1.42	0.97	11.83	0	10.28
A-03	22.09	29.34	1.42	0.97	78.88	0	14.69
MSS		23.85					0.62
FUGVOC		2.23					0.03
TBATTERY		37.39					1.07
TLOAD		2.23					0.07

FACILITY TOTALS 66.26 137.21 4.27 2.90 102.54 0 37.04

Federal Operating Permit Program (40 CFR Part 71)

INITIAL COMPLIANCE PLAN AND COMPLIANCE CERTIFICATION (I-COMP)

SECTION A - COMPLIANCE STATUS AND COMPLIANCE PLAN

Complete this section for each unique combination of applicable requirements and emissions units at the facility. List all compliance methods (monitoring, recordkeeping and reporting) you used to determine compliance with the applicable requirement described above. Indicate your compliance status at this time for this requirement and compliance methods and check "YES" or "NO" to the follow-up question.

Emission Unit ID(s): N/A

Applicable Requirement (Describe and Cite)

There are no units for which an initial compliance plan or compliance certification is required. Enterprise will comply with any future regulations (i.e. 40 CFR 63 Subpart ZZZZ) which become applicable during the term of this permit.

Compliance Methods for the Above (Description and Citation):

Compliance Status:

☒ In Compliance: Will you continue to comply up to permit issuance? ☒ Yes
☐ No

☐ Not In Compliance: Will you be in compliance at permit issuance? ☐ Yes ☐ No

☒ Future-Effective Requirement: Do you expect to meet this on a timely basis? ☒ Yes
☐ No

B. SCHEDULE OF COMPLIANCE

Complete this section if you answered "NO" to any of the questions in section A. Also complete this section if required to submit a schedule of compliance by an applicable requirement. Please attach copies of any judicial consent decrees or administrative orders for this requirement.

Unit(s) _____ Requirement _____

Reason for Noncompliance. Briefly explain reason for noncompliance at time of permit issuance or that future-effective requirement will not be met on a timely basis:

Narrative Description of how Source Compliance Will be Achieved. Briefly explain your plan for achieving compliance:

Schedule of Compliance. Provide a schedule of remedial measures, including an enforceable sequence of actions with milestones, leading to compliance, including a date for final compliance.

Remedial Measure or Action	Date to be Achieved
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

C. SCHEDULE FOR SUBMISSION OF PROGRESS REPORTS

Only complete this section if you are required to submit one or more schedules of compliance in section B or if an applicable requirement requires submittal of a progress report. If a schedule of compliance is required, your progress report should start within 6 months of application submittal and subsequently, no less than every six months. One progress report may include information on multiple schedules of compliance.

Contents of Progress Report (describe):

First Report ____/____/____ Frequency of Submittal _____

Contents of Progress Report (describe):

First Report ____/____/____ Frequency of Submittal _____

D. SCHEDULE FOR SUBMISSION OF COMPLIANCE CERTIFICATIONS

This section must be completed once by every source. Indicate when you would prefer to submit compliance certifications during the term of your permit (at least once per year).

Frequency of submittal _____ Beginning ____/____/____

E. COMPLIANCE WITH ENHANCED MONITORING & COMPLIANCE CERTIFICATION REQUIREMENTS

This section must be completed once by every source. To certify compliance with these, you must be able to certify compliance for every applicable requirement related to monitoring and compliance certification at every unit.

Enhanced Monitoring Requirements: ☐ In Compliance ☐ Not In Compliance

Compliance Certification Requirements: ☐ In Compliance ☐ Not In Compliance

09/30/2010

Federal Operating Permit Program (40 CFR Part 71)

CERTIFICATION OF TRUTH, ACCURACY, AND COMPLETENESS (CTAC)

This form must be completed, signed by the "Responsible Official" designated for the facility or emission unit, and sent with each submission of documents (i.e., application forms, updates to applications, reports, or any information required by a part 71 permit).

A. Responsible Official

Name: (Last) Hurlburt (First) Terry (MI) L.

Title: Senior Vice President – Operations

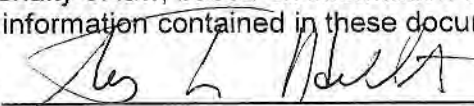
Street or P.O. Box: P.O. Box 4324

City: Houston State: TX ZIP: 77210 - 4324

Telephone (713) 381 - 6595 Ext. Facsimile (713) 381 - 6660

B. Certification of Truth, Accuracy and Completeness (to be signed by the responsible official)

I certify under penalty of law, based on information and belief formed after reasonable inquiry, the statements and information contained in these documents are true, accurate and complete.

Name (signed): 

Name (typed): Terry L. Hurlburt Date: 4/14/10

EPA Part 71 Application Source Forms

Lindrith Compressor Station

Part 71 Renewal Application Update

09/30/2010

Federal Operating Permit Program (40 CFR Part 71)

EMISSION CALCULATIONS (EMISS)

Calculate potential to emit (PTE) for applicability purposes and actual emissions for fee purposes for each emissions unit, control device, or alternative operating scenario identified in section I of form **GIS**. If form **FEE** does not need to be submitted with the application, do not calculate actual emissions.

A. Emissions Unit ID: A-01

B. Identification and Quantification of Emissions

First, list each air pollutant that is either regulated at the unit or present in major amounts, then list any other regulated pollutant (for fee calculation) not already listed. HAP may be simply listed as "HAP." Next, calculate PTE for applicability purposes and actual emissions for fee purposes for each pollutant. Do not calculate PTE for air pollutants listed solely for fee purposes. Include all fugitives for fee purposes. You may round to the nearest tenth of a ton for yearly values or tenth of a pound for hourly values.

Air Pollutants	Emission Rates			CAS No.
	Actual Annual Emissions (tons/yr)	Potential to Emit		
		Hourly (lb/hr)	Annual (tons/yr)	
PM	N/A	0.22	0.97	N/A
SO ₂	N/A	0.32	1.42	7446-09-5
NOx	N/A	5.04	22.09	N/A
CO	N/A	2.70	11.83	630-08-0
VOC	N/A	4.69	20.54	N/A
Acetaldehyde	N/A	0.13	0.57	00075-07-0
Acrolein	N/A	0.08	0.35	00107-02-8
Benzene	N/A	0.01	0.03	00071-43-2
Formaldehyde	N/A	2.07	9.06	00050-00-0
Methanol	N/A	0.04	0.17	00067-56-1
n-hexane	N/A	0.02	0.08	00110-54-3
Toluene	N/A	0.01	0.03	00108-88-3
Xylene (mixed isomers)	N/A	0.00	0.01	N/A



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Federal Operating Permit Program (40 CFR Part 71)

EMISSION CALCULATIONS (EMISS)

Calculate potential to emit (PTE) for applicability purposes and actual emissions for fee purposes for each emissions unit, control device, or alternative operating scenario identified in section I of form **GIS**. If form **FEE** does not need to be submitted with the application, do not calculate actual emissions.

A. Emissions Unit ID: A-02

B. Identification and Quantification of Emissions

First, list each air pollutant that is either regulated at the unit or present in major amounts, then list any other regulated pollutant (for fee calculation) not already listed. HAP may be simply listed as "HAP." Next, calculate PTE for applicability purposes and actual emissions for fee purposes for each pollutant. Do not calculate PTE for air pollutants listed solely for fee purposes. Include all fugitives for fee purposes. You may round to the nearest tenth of a ton for yearly values or tenth of a pound for hourly values.

Air Pollutants	Emission Rates			CAS No.
	Actual Annual Emissions (tons/yr)	Potential to Emit		
		Hourly (lb/hr)	Annual (tons/yr)	
PM	N/A	0.22	0.97	N/A
SO ₂	N/A	0.32	1.42	7446-09-5
NOx	N/A	5.04	22.09	N/A
CO	N/A	2.70	11.83	630-08-0
VOC	N/A	4.69	20.54	N/A
Acetaldehyde	N/A	0.13	0.57	00075-07-0
Acrolein	N/A	0.08	0.35	00107-02-8
Benzene	N/A	0.01	0.03	00071-43-2
Formaldehyde	N/A	2.07	9.06	00050-00-0
Methanol	N/A	0.04	0.17	00067-56-1
n-hexane	N/A	0.02	0.08	00110-54-3
Toluene	N/A	0.01	0.03	00108-88-3
Xylene (mixed isomers)	N/A	0.00	0.01	N/A



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Federal Operating Permit Program (40 CFR Part 71)

EMISSION CALCULATIONS (EMISS)

Calculate potential to emit (PTE) for applicability purposes and actual emissions for fee purposes for each emissions unit, control device, or alternative operating scenario identified in section I of form **GIS**. If form **FEE** does not need to be submitted with the application, do not calculate actual emissions.

A. Emissions Unit ID: A-03

B. Identification and Quantification of Emissions

First, list each air pollutant that is either regulated at the unit or present in major amounts, then list any other regulated pollutant (for fee calculation) not already listed. HAP may be simply listed as "HAP." Next, calculate PTE for applicability purposes and actual emissions for fee purposes for each pollutant. Do not calculate PTE for air pollutants listed solely for fee purposes. Include all fugitives for fee purposes. You may round to the nearest tenth of a ton for yearly values or tenth of a pound for hourly values.

Air Pollutants	Emission Rates			CAS No.
	Actual Annual Emissions (tons/yr)	Potential to Emit		
		Hourly (lb/hr)	Annual (tons/yr)	
PM	N/A	0.22	0.97	N/A
SO ₂	N/A	0.32	1.42	7446-09-5
NOx	N/A	5.04	22.09	N/A
CO	N/A	18.01	78.88	630-08-0
VOC	N/A	6.70	29.34	N/A
Acetaldehyde	N/A	0.18	0.81	00075-07-0
Acrolein	N/A	0.11	0.50	00107-02-8
Benzene	N/A	0.01	0.04	00071-43-2
Formaldehyde	N/A	2.95	12.94	00050-00-0
Methanol	N/A	0.06	0.24	00067-56-1
n-hexane	N/A	0.02	0.11	00110-54-3
Toluene	N/A	0.01	0.04	00108-88-3
Xylene (mixed isomers)	N/A	0.00	0.02	N/A



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Federal Operating Permit Program (40 CFR Part 71)

EMISSION CALCULATIONS (EMISS)

Calculate potential to emit (PTE) for applicability purposes and actual emissions for fee purposes for each emissions unit, control device, or alternative operating scenario identified in section I of form **GIS**. If form **FEE** does not need to be submitted with the application, do not calculate actual emissions.

A. Emissions Unit ID: TBATTERY (Includes emissions from 8 Condensate Tanks)

B. Identification and Quantification of Emissions

First, list each air pollutant that is either regulated at the unit or present in major amounts, then list any other regulated pollutant (for fee calculation) not already listed. HAP may be simply listed as "HAP." Next, calculate PTE for applicability purposes and actual emissions for fee purposes for each pollutant. Do not calculate PTE for air pollutants listed solely for fee purposes. Include all fugitives for fee purposes. You may round to the nearest tenth of a ton for yearly values or tenth of a pound for hourly values.

Air Pollutants	Emission Rates			CAS No.
	Actual Annual Emissions (tons/yr)	Potential to Emit		
		Hourly (lb/hr)	Annual (tons/yr)	
VOC	<u>N/A</u>	8.54	37.39	N/A
n-Hexane	<u>N/A</u>	0.19	0.84	00110-54-3
Benzene	<u>N/A</u>	0.03	0.12	00071-43-2
Toluene	<u>N/A</u>	0.03	0.11	00108-88-3



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Federal Operating Permit Program (40 CFR Part 71)

EMISSION CALCULATIONS (EMISS)

Calculate potential to emit (PTE) for applicability purposes and actual emissions for fee purposes for each emissions unit, control device, or alternative operating scenario identified in section I of form **GIS**. If form **FEE** does not need to be submitted with the application, do not calculate actual emissions.

A. Emissions Unit ID: MSS**B. Identification and Quantification of Emissions**

First, list each air pollutant that is either regulated at the unit or present in major amounts, then list any other regulated pollutant (for fee calculation) not already listed. HAP may be simply listed as "HAP." Next, calculate PTE for applicability purposes and actual emissions for fee purposes for each pollutant. Do not calculate PTE for air pollutants listed solely for fee purposes. Include all fugitives for fee purposes. You may round to the nearest tenth of a ton for yearly values or tenth of a pound for hourly values.

Air Pollutants	Emission Rates			CAS No.
	Actual Annual Emissions (tons/yr)	Potential to Emit		
		Hourly (lb/hr)	Annual (tons/yr)	
VOC	N/A	119.25	23.85	N/A
Benzene	N/A	0.35	0.07	00071-43-2
n-Hexane	N/A	2.74	0.55	00110-54-3



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Federal Operating Permit Program (40 CFR Part 71)

EMISSION CALCULATIONS (EMISS)

Calculate potential to emit (PTE) for applicability purposes and actual emissions for fee purposes for each emissions unit, control device, or alternative operating scenario identified in section I of form **GIS**. If form **FEE** does not need to be submitted with the application, do not calculate actual emissions.

A. Emissions Unit ID: FUGVOC

B. Identification and Quantification of Emissions

First, list each air pollutant that is either regulated at the unit or present in major amounts, then list any other regulated pollutant (for fee calculation) not already listed. HAP may be simply listed as "HAP." Next, calculate PTE for applicability purposes and actual emissions for fee purposes for each pollutant. Do not calculate PTE for air pollutants listed solely for fee purposes. Include all fugitives for fee purposes. You may round to the nearest tenth of a ton for yearly values or tenth of a pound for hourly values.

Air Pollutants	Emission Rates			CAS No.
	Actual Annual Emissions (tons/yr)	Potential to Emit		
		Hourly (lb/hr)	Annual (tons/yr)	
VOC	N/A	0.76	3.31	N/A
Benzene	N/A	0.001	0.004	00071-43-2
n-Hexane	N/A	0.007	0.031	00110-54-3



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Federal Operating Permit Program (40 CFR Part 71)

EMISSION CALCULATIONS (EMISS)

Calculate potential to emit (PTE) for applicability purposes and actual emissions for fee purposes for each emissions unit, control device, or alternative operating scenario identified in section I of form **GIS**. If form **FEE** does not need to be submitted with the application, do not calculate actual emissions.

A. Emissions Unit ID: TLOAD

B. Identification and Quantification of Emissions

First, list each air pollutant that is either regulated at the unit or present in major amounts, then list any other regulated pollutant (for fee calculation) not already listed. HAP may be simply listed as "HAP." Next, calculate PTE for applicability purposes and actual emissions for fee purposes for each pollutant. Do not calculate PTE for air pollutants listed solely for fee purposes. Include all fugitives for fee purposes. You may round to the nearest tenth of a ton for yearly values or tenth of a pound for hourly values.

Air Pollutants	Emission Rates			CAS No.
	Actual Annual Emissions (tons/yr)	Potential to Emit		
		Hourly (lb/hr)	Annual (tons/yr)	
VOC	<u>N/A</u>		2.23	N/A
		89.32 (Max)		
Benzene	<u>N/A</u>		0.01	00071-43-2
		0.30 (Max)		
Toluene	<u>N/A</u>		0.01	00108-88-3
		0.25 (Max)		
n-Hexane	<u>N/A</u>		0.05	00110-54-3
		2.0 (Max)		



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Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)

A. General Information

Emissions unit ID: A-01 Description: Compressor No. 1 Engine

SIC Code (4-digit): 4922 SCC Code: 31000203

B. Emissions Unit Description

Primary use: Engine for Compressor No. 1 Temporary Source Yes X No

Manufacturer: Caterpillar Model No.: 3612 LE

Serial Number: 1YG00055 Installation Date: 4 / 17 / 1995

Boiler Type: Industrial boiler Process burner Electric utility boiler

Other (describe) _____

Horsepower rating: 3,267 Boiler steam flow (lb/hr) _____

Type of Fuel-Burning Equipment (coal burning only):

Hand fired Spreader stoker Underfeed stoker Overfeed stoker

Traveling grate Shaking grate Pulverized, wet bed Pulverized, dry bed

Actual Heat Input 22.09 MM BTU/hr Max. Design Heat Input 22.09 MM BTU/hr

C. Fuel Data

Primary fuel type(s)_____ Standby fuel type(s)_____

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Natural Gas	5 grains/100 scf	N/A	905 Btu/scf

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage	
		Hourly	Annual
Natural Gas	N/A	0.024 MMscf/hr	213.83 MMscf/yr

E. Associated Air Pollution Control Equipment

Emissions unit ID: A-01-CD#1 Device type: Catalytic Oxidation System

Air pollutant(s) Controlled: CO, VOC Manufacturer: Houston Industrial Silencing

Model No.: DeCOHx33c22/24PL Serial No.: Unknown

Installation date: 4 / 17 / 1995 Control efficiency (%): 85% (CO); 30% (VOC)

Efficiency estimation method _____

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Stack height (ft): 15.0Inside stack diameter (ft): 1.5Stack temp (°F): 858Design stack flow rate (ACFM): 24273Actual stack flow rate (ACFM): 24273Velocity (ft/sec): 228.9

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Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)**A. General Information**Emissions unit ID: A-02 Description: Compressor No. 2 EngineSIC Code (4-digit): 4922 SCC Code: 31000203**B. Emissions Unit Description**Primary use: Engine for Compressor No. 2 Temporary Source ☐ Yes ☒ NoManufacturer: Caterpillar Model No.: 3612 LESerial Number: 1YG00054 Installation Date: 5 / 1 / 1995Boiler Type: ☐ Industrial boiler ☐ Process burner ☐ Electric utility boiler

Other (describe) _____

Horsepower rating: 3,267 Boiler steam flow (lb/hr) _____

Type of Fuel-Burning Equipment (coal burning only):

☐ Hand fired ☐ Spreader stoker ☐ Underfeed stoker ☐ Overfeed stoker☐ Traveling grate ☐ Shaking grate ☐ Pulverized, wet bed ☐ Pulverized, dry bedActual Heat Input 22.09 MM BTU/hr Max. Design Heat Input 22.09 MM BTU/hr

C. Fuel Data

Primary fuel type(s) _____ Standby fuel type(s) _____

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Natural Gas	0.02%	Negligible	905 Btu/scf

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage	
		Hourly	Annual
Natural Gas	N/A	0.024 MMscf/hr	213.83 MMscf/yr

E. Associated Air Pollution Control Equipment

Emissions unit ID: A-01-CD#1 Device type: Catalytic Oxidation System

Air pollutant(s) Controlled: CO, VOC Manufacturer: Houston Industrial Silencing

Model No.: DeCOHx33c22/24PL Serial No.: Unknown

Installation date: 4 / 17 / 1995 Control efficiency (%): 85% (CO); 30% (VOC)

Efficiency estimation method _____

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Stack height (ft): 15.0Inside stack diameter (ft): 1.5Stack temp (°F): 858Design stack flow rate (ACFM): 24273Actual stack flow rate (ACFM): 24273Velocity (ft/sec): 228.9

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Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR FUEL COMBUSTION SOURCES (EUD-1)**A. General Information**Emissions unit ID: A-03 Description: Compressor No. 3 EngineSIC Code (4-digit): 4922 SCC Code: 31000203**B. Emissions Unit Description**Primary use: Engine for Compressor No. 3 Temporary Source Yes ☒ NoManufacturer: Caterpillar Model No.: 3612 LESerial Number: 1YG00072 Installation Date: 5 / 15 / 1995Boiler Type: Industrial boiler Process burner Electric utility boiler

Other (describe) _____

Horsepower rating: 3,267 Boiler steam flow (lb/hr) _____

Type of Fuel-Burning Equipment (coal burning only):

Hand fired Spreader stoker Underfeed stoker Overfeed stokerTraveling grate Shaking grate Pulverized, wet bed Pulverized, dry bedActual Heat Input 22.09 MM BTU/hr Max. Design Heat Input 22.09 MM BTU/hr

C. Fuel Data

Primary fuel type(s): Natural Gas Standby fuel type(s): N/A

Describe each fuel you expected to use during the term of the permit.

Fuel Type	Max. Sulfur Content (%)	Max. Ash Content (%)	BTU Value (cf, gal., or lb.)
Natural Gas	0.02%	Negligible	905 Btu/scf

D. Fuel Usage Rates

Fuel Type	Annual Actual Usage	Maximum Usage	
		Hourly	Annual
Natural Gas	N/A	0.024 MMscf/hr	213.83 MMscf/yr

E. Associated Air Pollution Control Equipment

Emissions unit ID: <u>N/A</u> Device type: _____	
Air pollutant(s) Controlled: _____ Manufacturer: _____	
Model No.: _____	Serial No.: _____
Installation date: ____/____/____ Control efficiency (%): _____	
Efficiency estimation method _____	

F. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (this is not common).

Stack height (ft): 15.0Inside stack diameter (ft): 1.5Stack temp (°F): 858Design stack flow rate (ACFM): 24273Actual stack flow rate (ACFM): 24273Velocity (ft/sec): 228.9

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Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR PROCESS SOURCES (EUD-3)

A. General Information

Emissions unit ID: FUGVOC Description: Fugitive emissions from leaking components

SIC Code (4-digit): 4922 SCC Code: 31000220

B. Emissions Unit Description

Primary use or equipment type: Components associated with equipment at the facility

Manufacturer: N/A Model No.: N/A

Serial No.: N/A Installation date ____/____/____

Raw materials _____

Finished products _____

Temporary source: X No Yes

C. Activity or Production Rates

Activity or Production Rate	Amount/Hour	Amount/Year
Actual Rate	0.76 lb/hr	3.31 TPY
Maximum rate		

D. Associated Air Pollution Control Equipment

Emissions unit ID: N/A Device Type _____

Manufacturer _____ Model No _____

Serial No. _____ Installation date ____/____/____

Control efficiency (%) _____ Capture efficiency (%) _____

Air pollutant(s) controlled _____ Efficiency estimation method _____

E. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (This is not common)).

Stack height (ft) _____ Inside stack diameter (ft) _____

Stack temp (F) _____ Design stack flow rate (ACFM) _____

Actual stack flow rate (ACFM) _____ Velocity (ft/sec) _____

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Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR PROCESS SOURCES (EUD-3)**A. General Information**

Emissions unit ID: MSS Description: Compressor blowdowns for maintenance, startup and shutdown
 SIC Code (4-digit): 4922 SCC Code: _____

B. Emissions Unit Description

Primary use or equipment type: Blowdowns associated with station operation
 Manufacturer: N/A Model No.: N/A
 Serial No.: N/A Installation date ____/____/____
 Raw materials _____
 Finished products _____
 Temporary source: X No Yes

C. Activity or Production Rates

Activity or Production Rate	Amount/Hour	Amount/Year
Actual Rate		
Maximum rate	10,000 scf/hr	4.0 MMscf/yr

D. Associated Air Pollution Control Equipment

Emissions unit ID: N/A Device Type: N/A
 Manufacturer _____ Model No _____
 Serial No. _____ Installation date ____/____/____
 Control efficiency (%) _____ Capture efficiency (%) _____
 Air pollutant(s) controlled _____ Efficiency estimation method _____

E. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (This is not common).

Stack height (ft) _____ Inside stack diameter (ft) _____

Stack temp (F) _____ Design stack flow rate (ACFM) _____

Actual stack flow rate (ACFM) _____ Velocity (ft/sec) _____

E. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (This is not common)).

Diameter (ft): 12.75 Shell Height (ft): 20.00 Average Liquid Height (ft.): 8

Capacity (bbls): 454 Design stack flow rate (ACFM): N/A

Actual stack flow rate (ACFM): N/A Velocity (ft/sec): N/A

** For each tank in battery

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Federal Operating Permit Program (40 CFR Part 71)

EMISSION UNIT DESCRIPTION FOR PROCESS SOURCES (EUD-3)**A. General Information**

Emissions unit ID: TLOAD Description: Loading of condensate from tanks into trucks
 SIC Code (4-digit): 4922 SCC Code _____

B. Emissions Unit Description

Primary use or equipment type: Emissions associated with loading condensate into trucks
 Manufacturer: N/A Model No.: N/A
 Serial No.: N/A Installation date / /
 Raw materials _____
 Finished products _____
 Temporary source: ☒ No ☐ Yes

C. Activity or Production Rates

Activity or Production Rate	Amount/Hour	Amount/Year
Actual Rate	-	-
Maximum rate	-	20,000 bbls/yr

D. Associated Air Pollution Control Equipment

Emissions unit ID: N/A Device Type: N/A
 Manufacturer _____ Model No _____
 Serial No. _____ Installation date / /
 Control efficiency (%) _____ Capture efficiency (%) _____
 Air pollutant(s) controlled _____ Efficiency estimation method _____

E. Ambient Impact Assessment

This information must be completed by temporary sources or when ambient impact assessment is an applicable requirement for this emissions unit (This is not common)).

Stack height (ft) _____ Inside stack diameter (ft) _____

Stack temp (F) _____ Design stack flow rate (ACFM) _____

Actual stack flow rate (ACFM) _____ Velocity (ft/sec) _____

Federal Operating Permit Program (40 CFR Part 71)

INSIGNIFICANT EMISSIONS (IE)

List each insignificant activity or emission unit. In the "number" column, indicate the number of units in this category. Descriptions should be brief but unique. Indicate which emissions criterion of part 71 is the basis for the exemption.

Number	Description of Activities or Emissions Units	RAP, except HAP	HAP
T-9	120 bbl Compressor Skid Sump Drain Tank	X	
T-10	120 bbl Water Separation Tank	X	
T-11	120 bbl Water Separation Tank	X	
T-12	120 bbl Water Separation Tank	X	
T-13	500 gal Lube Oil Tank	X	
T-14	500 gal Lube Oil Tank	X	
T-15	500 gal Lube Oil Tank	X	
T-16	500 gal Ambitrol (AntiFreeze) Tank	X	
T-17	500 gal Ambitrol (AntiFreeze) Tank	X	
T-18	500 gal Ambitrol (AntiFreeze) Tank	X	

Enterprise Field Services LLC

Lindrith Compressor Station

Part 71 Renewal Application Update

Emissions Calculations

Summary of Emissions

Max Single HAP 31.05

Total HAPs 37.04

Pollutant	CAS No.	Emissions (tons/yr)							
		A-01	A-02	A-03	FUGVOC	MSS	TLOAD	TBATTERY	Total
Particulate Matter (PM ₁₀)		0.97	0.97	0.97					2.90
Particulate Matter (PM _{2.5})		0.97	0.97	0.97					2.90
Sulfur Dioxide (SO ₂)		1.42	1.42	1.42					4.27
Nitrogen Oxides (NO _x)		22.09	22.09	22.09					66.26
Carbon Monoxide (CO)		11.83	11.83	78.88					102.54
Volatile Organic Compounds (VOC)		20.54	20.54	29.34	3.31	23.85	2.23	37.39	137.21
Acetaldehyde	00075-07-0	0.57	0.57	0.81					1.94
Acrolein	00107-02-8	0.35	0.35	0.50					1.19
Benzene	00071-43-2	0.03	0.03	0.04	0.00	0.07	0.01	0.12	0.31
Formaldehyde	00050-00-0	9.06	9.06	12.94					31.05
Methanol	00067-56-1	0.17	0.17	0.24					0.58
n-Hexane	00110-54-3	0.08	0.08	0.11	0.03	0.55	0.05	0.84	1.72
Toluene	00108-88-3	0.03	0.03	0.04			0.01	0.11	0.21
Xylene (mixed isomers)	0	0.01	0.01	0.02			0.00	0.00	0.04

Engines

Enterprise Field Services LLC

Lindrith Compressor Station
Part 71 Renewal Application Update

Emissions Calculations
Compressor No. 1 Engine
Source ID No.: A-01

Operating Parameters

Annual Operation: 8,760 hrs/yr
Mfr Rating 3,550 bhp =
Elevation 6,653 ft MSL
DeRate 3% per 1,000 ft > 4000 ft
Average Operating Rate: 3,267 bhp = 6,761 BTU/bhp-hr = 22.09 MMBtu/hr
0.024 MMscf/hr @905 Btu/scf
213.83 MMscf/yr
Maximum Operating Rate: 3,267 bhp = 6,761 BTU/bhp-hr = 22.09 MMBtu/hr
0.024 MMscf/hr @905 Btu/scf
213.83 MMscf/yr

Pollutant	CAS No.	Emission Factor ⁽¹⁾	Control Efficiency ⁽²⁾ (%)	Emissions		
				Average ⁽³⁾ (lbs/hr)	Maximum ⁽⁴⁾ (lbs/hr)	Annual ⁽⁵⁾ (tons/yr)
Particulate Matter (PM ₁₀)		9.99E-03 lbs/MMBtu	0%	0.22	0.22	0.97
Particulate Matter (PM _{2.5})		9.99E-03 lbs/MMBtu	0%	0.22	0.22	0.97
Sulfur Dioxide (SO ₂)		1.47E-02 lbs/MMBtu	0%	0.32	0.32	1.42
Nitrogen Oxides (NO _x)		0.70 g/bhp-hr	0%	5.04	5.04	22.09
Carbon Monoxide (CO)		2.50 g/bhp-hr	85%	2.70	2.70	11.83
Volatile Organic Compounds (VOC)		0.93 g/bhp-hr	30%	4.69	4.69	20.54
Acetaldehyde	00075-07-0	8.36E-03 lbs/MMBtu	30%	0.13	0.13	0.57
Acrolein	00107-02-8	5.14E-03 lbs/MMBtu	30%	0.08	0.08	0.35
Benzene	00071-43-2	4.40E-04 lbs/MMBtu	30%	0.01	0.01	0.03
Formaldehyde	00050-00-0	0.41 g/bhp-hr	30%	2.07	2.07	9.06
Methanol	00067-56-1	2.50E-03 lbs/MMBtu	30%	0.04	0.04	0.17
n-Hexane	00110-54-3	1.11E-03 lbs/MMBtu	30%	0.02	0.02	0.08
Toluene	00108-88-3	4.08E-04 lbs/MMBtu	30%	0.01	0.01	0.03
Xylene (mixed isomers)	#N/A	1.84E-04 lbs/MMBtu	30%	0.00	0.00	0.01

⁽¹⁾ Emission factors for NO_x, CO, and VOC based on vendor specifications. All other emission factors from AP-42 (7/00); Table 3.2-2.

The AP-42 factor for SO₂ is based on 2,000 grains/MMscf. The factor is adjusted to allow for up to 5 grains sulfur per 100 scf.

PM₁₀ and PM_{2.5} include both condensable and filterable portions.

⁽²⁾ Control efficiency based on vendor data for CO and VOC. Reduction efficiency for HAP assumed to be same as for VOC.

⁽³⁾ For NO_x, CO, and VOC, calculated as: Emission Factor (g/bhp-hr) X Avg Operating Rate (bhp) X (100 - % Control Eff.) ÷ 453.59 g/lb

All other pollutants calculated as: Emission Factor (lbs/MMBtu) X Avg Operating Rate (MMBtu/hr) X (100 - % Control Eff.)

⁽⁴⁾ For NO_x, CO, and VOC, calculated as: Emission Factor (g/bhp-hr) X Max Operating Rate (bhp) X (100 - % Control Eff.) ÷ 453.59 g/lb

All other pollutants calculated as: Emission Factor (lbs/MMBtu) X Max Operating Rate (MMBtu/hr) X (100 - % Control Eff.)

⁽⁵⁾ Calculated as: Average Emissions (lbs/hr) X Annual Operation (hrs/yr) ÷ 2,000 lbs/ton

Enterprise Field Services LLC

Lindrith Compressor Station
Part 71 Renewal Application Update

Emissions Calculations
Compressor No. 1 Engine
Source ID No.: A-02

Operating Parameters

Annual Operation: 8,760 hrs/yr
Mfr Rating 3,550 bhp =
Elevation 6,653 ft MSL
DeRate 3% per 1,000 ft > 4000 ft
Average Operating Rate: 3,267 bhp = 6,761 BTU/bhp-hr = 22.09 MMBtu/hr
0.024 MMscf/hr @905 Btu/scf
213.83 MMscf/yr
Maximum Operating Rate: 3,267 bhp = 6,761 BTU/bhp-hr = 22.09 MMBtu/hr
0.024 MMscf/hr @905 Btu/scf
213.83 MMscf/yr

Pollutant	CAS No.	Emission Factor ⁽¹⁾	Control Efficiency ⁽²⁾ (%)	Emissions		
				Average ⁽³⁾ (lbs/hr)	Maximum ⁽⁴⁾ (lbs/hr)	Annual ⁽⁵⁾ (tons/yr)
Particulate Matter (PM ₁₀)		9.99E-03 lbs/MMBtu	0%	0.22	0.22	0.97
Particulate Matter (PM _{2.5})		9.99E-03 lbs/MMBtu	0%	0.22	0.22	0.97
Sulfur Dioxide (SO ₂)		1.47E-02 lbs/MMBtu	0%	0.32	0.32	1.42
Nitrogen Oxides (NO _x)		0.70 g/bhp-hr	0%	5.04	5.04	22.09
Carbon Monoxide (CO)		2.50 g/bhp-hr	85%	2.70	2.70	11.83
Volatile Organic Compounds (VOC)		0.93 g/bhp-hr	30%	4.69	4.69	20.54
Acetaldehyde	00075-07-0	8.36E-03 lbs/MMBtu	30%	0.13	0.13	0.57
Acrolein	00107-02-8	5.14E-03 lbs/MMBtu	30%	0.08	0.08	0.35
Benzene	00071-43-2	4.40E-04 lbs/MMBtu	30%	0.01	0.01	0.03
Formaldehyde	00050-00-0	0.41 g/bhp-hr	30%	2.07	2.07	9.06
Methanol	00067-56-1	2.50E-03 lbs/MMBtu	30%	0.04	0.04	0.17
n-Hexane	00110-54-3	1.11E-03 lbs/MMBtu	30%	0.02	0.02	0.08
Toluene	00108-88-3	4.08E-04 lbs/MMBtu	30%	0.01	0.01	0.03
Xylene (mixed isomers)	#N/A	1.84E-04 lbs/MMBtu	30%	0.00	0.00	0.01

(1) Emission factors for NO_x, CO, and VOC based on vendor specifications. All other emission factors from AP-42 (7/00); Table 3.2-2.

The AP-42 factor for SO₂ is based on 2,000 grains/MMscf. The factor is adjusted to allow for up to 5 grains sulfur per 100 scf.

PM₁₀ and PM_{2.5} include both condensable and filterable portions.

(2) Control efficiency based on vendor data for CO and VOC. Reduction efficiency for HAP assumed to be same as for VOC.

(3) For NO_x, CO, and VOC, calculated as: Emission Factor (g/bhp-hr) X Avg Operating Rate (bhp) X (100 - % Control Eff.) ÷ 453.59 g/lb

All other pollutants calculated as: Emission Factor (lbs/MMBtu) X Avg Operating Rate (MMBtu/hr) X (100 - % Control Eff.)

(4) For NO_x, CO, and VOC, calculated as: Emission Factor (g/bhp-hr) X Max Operating Rate (bhp) X (100 - % Control Eff.) ÷ 453.59 g/lb

All other pollutants calculated as: Emission Factor (lbs/MMBtu) X Max Operating Rate (MMBtu/hr) X (100 - % Control Eff.)

(5) Calculated as: Average Emissions (lbs/hr) X Annual Operation (hrs/yr) ÷ 2,000 lbs/ton

Enterprise Field Services LLC

Lindrith Compressor Station
Part 71 Renewal Application Update

Emissions Calculations
Compressor No. 1 Engine
Source ID No.: A-03

Operating Parameters

Annual Operation: 8,760 hrs/yr
Mfr Rating 3,550 bhp =
Elevation 6,653 ft MSL
DeRate 3% per 1,000 ft > 4000 ft
Average Operating Rate: 3,267 bhp = 6,761 BTU/bhp-hr = 22.09 MMBtu/hr
0.024 MMscf/hr @905 Btu/scf
213.83 MMscf/yr
Maximum Operating Rate: 3,267 bhp = 6,761 BTU/bhp-hr = 22.09 MMBtu/hr
0.024 MMscf/hr @905 Btu/scf
213.83 MMscf/yr

Pollutant	CAS No.	Emission Factor ⁽¹⁾	Control Efficiency ⁽²⁾ (%)	Emissions		
				Average ⁽³⁾ (lbs/hr)	Maximum ⁽⁴⁾ (lbs/hr)	Annual ⁽⁵⁾ (tons/yr)
Particulate Matter (PM ₁₀)		9.99E-03 lbs/MMBtu	0%	0.22	0.22	0.97
Particulate Matter (PM _{2.5})		9.99E-03 lbs/MMBtu	0%	0.22	0.22	0.97
Sulfur Dioxide (SO ₂)		1.47E-02 lbs/MMBtu	0%	0.32	0.32	1.42
Nitrogen Oxides (NO _x)		0.70 g/bhp-hr	0%	5.04	5.04	22.09
Carbon Monoxide (CO)		2.50 g/bhp-hr	0%	18.01	18.01	78.88
Volatile Organic Compounds (VOC)		0.93 g/bhp-hr	0%	6.70	6.70	29.34
Acetaldehyde	00075-07-0	8.36E-03 lbs/MMBtu	0%	0.18	0.18	0.81
Acrolein	00107-02-8	5.14E-03 lbs/MMBtu	0%	0.11	0.11	0.50
Benzene	00071-43-2	4.40E-04 lbs/MMBtu	0%	0.01	0.01	0.04
Formaldehyde	00050-00-0	0.41 g/bhp-hr	0%	2.95	2.95	12.94
Methanol	00067-56-1	2.50E-03 lbs/MMBtu	0%	0.06	0.06	0.24
n-Hexane	00110-54-3	1.11E-03 lbs/MMBtu	0%	0.02	0.02	0.11
Toluene	00108-88-3	4.08E-04 lbs/MMBtu	0%	0.01	0.01	0.04
Xylene (mixed isomers)	#N/A	1.84E-04 lbs/MMBtu	0%	0.00	0.00	0.02

(1) Emission factors for NO_x, CO, and VOC based on vendor specifications. All other emission factors from AP-42 (7/00); Table 3.2-2.

The AP-42 factor for SO₂ is based on 2,000 grains/MMscf. The factor is adjusted to allow for up to 5 grains sulfur per 100 scf.

PM₁₀ and PM_{2.5} include both condensable and filterable portions.

(2) Control efficiency based on vendor data for CO and VOC. Reduction efficiency for HAP assumed to be same as for VOC.

(3) For NO_x, CO, and VOC, calculated as: Emission Factor (g/bhp-hr) X Avg Operating Rate (bhp) X (100 - % Control Eff.) ÷ 453.59 g/lb

All other pollutants calculated as: Emission Factor (lbs/MMBtu) X Avg Operating Rate (MMBtu/hr) X (100 - % Control Eff.)

(4) For NO_x, CO, and VOC, calculated as: Emission Factor (g/bhp-hr) X Max Operating Rate (bhp) X (100 - % Control Eff.) ÷ 453.59 g/lb

All other pollutants calculated as: Emission Factor (lbs/MMBtu) X Max Operating Rate (MMBtu/hr) X (100 - % Control Eff.)

(5) Calculated as: Average Emissions (lbs/hr) X Annual Operation (hrs/yr) ÷ 2,000 lbs/ton

G3612**GAS ENGINE TECHNICAL DATA****CATERPILLAR®****Industrial/Petroleum**

07/01

ENGINE SPEED (rpm): 1000
 COMPRESSION RATIO: 9:1
 AFTERCOOLER WATER (°F): 129
 JACKET WATER OUTLET (°F): 190
 IGNITION SYSTEM: DST
 EXHAUST MANIFOLD: DRY

FUEL TYPE: Nat Gas
 MIN. FUEL PRESSURE (PSIG): 43
 MIN. RATED METHANE NUMBER: 66
 RATED ALTITUDE @ 77°F (ft): 5000
 FUEL LHV (BTU/SCF): 905

RATING	NOTES	LOAD	100%	75%	50%
ENGINE POWER	(1) (2)	bhp	3550	2662	1775
ENGINE EFFICIENCY (ISO 3046/1)	(1)	%	38.6	37.0	34.1
ENGINE EFFICIENCY (NOMINAL)	(1)	%	37.6	36.1	33.3

ENGINE DATA						
FUEL CONSUMPTION (ISO 3046/1)	(1)	BTU/bhp-hr	6601	6884	7468	
FUEL CONSUMPTION (NOMINAL)	(1)	BTU/bhp-hr	6761	7051	7650	
AIR FLOW (@ 77°F, 13.9 psia)		ft³/min	9,823	7,384	5,051	
AIR MASS FLOW		lb/hr	40,345	30,958	21,175	
COMPRESSOR OUTLET PRESSURE		psi (abs)	36.4	28.4	20.4	
COMPRESSOR OUTLET TEMPERATURE		°F	300	248	154	
INLET MANIFOLD PRESSURE		psi (abs)	35.1	27.3	18.7	
INLET MANIFOLD TEMPERATURE		°F	147	144	140	
LAMBDA			2.07	2.03	1.92	
TIMING		*BTDC	18.3	17.6	16.2	
EXHAUST STACK TEMPERATURE		°F	858	896	946	
EXHAUST GAS FLOW (@ stack temp, 14.5 psia)		ft³/min	24,273	19,160	13,592	
EXHAUST GAS MASS FLOW		lb/hr	41,575	31,901	21,820	

EMISSIONS						
NOx (as NO)	(3)	g/bhp-hr	0.7	0.7	0.7	
CO	(3)	g/bhp-hr	2.5	2.5	2.5	
THC (molecular weight of 15.84)	(3)	g/bhp-hr	6.15	6.31	6.5	
NMHC (molecular weight of 15.84)	(3)	g/bhp-hr	0.93	0.95	0.98	
EXHAUST OXYGEN		%	12.5	11.8	10.7	

ENERGY BALANCE DATA						
FUEL INPUT ENERGY (LHV) (NOMINAL)	(1)	BTU/min	399,965	312,844	226,312	
WORK ENERGY (NOMINAL)	(2)	BTU/min	150,544	112,908	75,272	
HEAT REJ. TO JACKET WATER (NOMINAL)	(4)	BTU/min	38,431	31,107	29,390	
HEAT REJ. TO ATMOSPHERE (NOMINAL)	(5)	BTU/min	13,999	13,139	12,447	
HEAT REJ. TO LUBE OIL (NOMINAL)	(6)	BTU/min	17,998	17,206	16,973	
HEAT REJ. TO EXH. (LHV to 77°F) (NOMINAL)	(4)	BTU/min	154,449	124,159	90,239	
HEAT REJ. TO EXH. (LHV to 350°F) (NOMINAL)	(4)	BTU/min	93,314	77,170	57,985	
HEAT REJ. TO AFTERCOOLER (NOMINAL)	(7) (8)	BTU/min	26,544	14,324	1,990	

CONDITIONS AND DEFINITIONS

ENGINE RATING OBTAINED AND PRESENTED IN ACCORDANCE WITH ISO 3046/1 (STD. REF. CONDITIONS OF 25°C, 100 kPa).
 NO OVERLOAD PERMITTED AT RATING SHOWN. CONSULT ALTITUDE CURVES FOR APPLICATIONS ABOVE MAXIMUM
 RATED ALTITUDE AND/OR TEMPERATURE.

NOTES

- 1) FUEL CONSUMPTION TOLERANCE, ISO 3046/1 IS 0, + 5% OF FULL LOAD DATA. NOMINAL IS ± 2.5 % OF FULL LOAD DATA.
- 2) ENGINE POWER AND WORK ENERGY INCLUDE 2 ENGINE DRIVEN WATER PUMPS.
- 3) EMISSION DATA SHOWN ARE DRY AND NOT TO EXCEED VALUES.
- 4) HEAT REJECTION TO JACKET AND EXHAUST TOLERANCE IS ± 10% OF FULL LOAD DATA. (heat rate based on treated water)
- 5) HEAT REJECTION TO ATMOSPHERE TOLERANCE IS ± 50% OF FULL LOAD DATA. (heat rate based on treated water)
- 6) HEAT REJECTION TO LUBE OIL TOLERANCE IS ± 20% OF FULL LOAD DATA. (heat rate based on treated water)
- 7) HEAT REJECTION TO AFTERCOOLER TOLERANCE IS ± 5% OF FULL LOAD DATA. (heat rate based on treated water)
- 8) TOTAL AFTERCOOLER HEAT = AFTERCOOLER HEAT x ACHRF (heat rate based on treated water)

DM5310-01

FUEL USAGE GUIDE

Methane Number	DERATE FACTOR vs CATERPILLAR METHANE NUMBER							
	30	35	40	45	50	55	60	70 >=100
Rating Factor	0.00	0.00	0.00	0.76	0.82	0.87	0.93	0.98

Minimum Methane Number for Full Rating = 55.3
 Fuel System Limit (minimum Wobbe index) = 1126 BTU/SCF

TOTAL DERATION FACTORS - ALTITUDE & COOLING

AIR TO TURBO (°F)	130	120	110	100	90	80	70	60	50
	0	1000	2000	3000	4000	5000	6000	7000	8000
130	0.93	0.89	0.85	0.81	0.78	0.74	0.71	0.68	0.65
120	0.98	0.94	0.90	0.86	0.82	0.78	0.75	0.72	0.68
110	1.00	1.00	0.95	0.91	0.87	0.83	0.80	0.78	0.73
100	1.00	1.00	1.00	0.97	0.93	0.89	0.85	0.81	0.77
90	1.00	1.00	1.00	1.00	0.98	0.94	0.90	0.86	0.82
80	1.00	1.00	1.00	1.00	1.00	0.99	0.95	0.91	0.87
70	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.94	0.90
60	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.95	0.92
50	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.94	0.90

ALTITUDE (FEET ABOVE SEA LEVEL)

AFTERCOOLER HEAT REJECTION FACTORS

AIR TO TURBO (°F)	130	120	110	100	90	80	70	60	50
	0	1000	2000	3000	4000	5000	6000	7000	8000
130	1.42	1.49	1.56	1.63	1.70	1.77	1.77	1.77	1.77
120	1.34	1.40	1.47	1.54	1.61	1.68	1.68	1.68	1.68
110	1.25	1.32	1.38	1.45	1.52	1.59	1.59	1.59	1.59
100	1.17	1.23	1.30	1.36	1.43	1.50	1.50	1.50	1.50
90	1.08	1.14	1.21	1.27	1.34	1.41	1.41	1.41	1.41
80	1.00	1.06	1.12	1.18	1.25	1.31	1.31	1.31	1.31
70	1.00	1.00	1.03	1.08	1.16	1.22	1.22	1.22	1.22
60	1.00	1.00	1.00	1.00	1.07	1.13	1.13	1.13	1.13
50	1.00	1.00	1.00	1.00	1.00	1.04	1.04	1.04	1.04

ALTITUDE (FEET ABOVE SEA LEVEL)

MINIMUM SPEED CAPABILITY AT MAX SITE TORQUE (RPM)

AIR TO TURBO (°F)	130	120	110	100	90	80	70	60	50
	0	1000	2000	3000	4000	5000	6000	7000	8000
130	760	780	800	850	850	850	850	850	850
120	760	770	790	850	850	850	850	850	850
110	750	770	780	800	850	850	850	850	850
100	750	780	770	790	850	850	850	850	850
90	750	750	770	780	800	850	850	850	850
80	750	750	780	770	790	850	850	850	850
70	750	750	750	770	780	800	850	850	850
60	750	750	750	760	770	790	850	850	850
50	750	750	750	750	770	780	800	850	850

ALTITUDE (FEET ABOVE SEA LEVEL)

ALLOWABLE INERTS IN THE FUEL:

The maximum amount of free inerts in the fuel is limited to 5%.

FUEL SYSTEM LIMIT:

Fuels with a Wobbe index lower than the limit, require a custom fuel system and engine control system mapping from the factory. The Wobbe index is determined using the Caterpillar Methane Number Calculation program.

FUEL USAGE GUIDE:

This table shows the derate factor required for a given fuel. Note that deration occurs as the methane number decreases. Methane number is a scale to measure detonation characteristics of various fuels. The methane number of a fuel is determined by using the Caterpillar Methane Number Calculation program.

TOTAL DERATION FACTORS:

This table shows the deration required for various air inlet temperatures and altitudes. Use this information along with the fuel usage guide chart to help determine actual engine power for your site. The total deration factor includes deration due to altitude and ambient temperature, and air inlet manifold temperature deration.

ACTUAL ENGINE RATING:

It is important to note that the Altitude/Temperature deration and the Fuel Usage Guide deration are not cumulative. They are not to be added together. To determine the actual power available, take the lowest rating between the Altitude/Temperature Deration and the Fuel Usage Guide Deration.

AFTERCOOLER HEAT REJECTION FACTORS:

Aftercooler heat rejection is given for standard conditions of 77°F and 500 ft altitude. To maintain a constant air inlet manifold temperature, as the air to turbo temperature goes up, so must the heat rejection. As altitude increases, the turbocharger must work harder to overcome the lower atmospheric pressure. This increases the amount of heat that must be removed from the inlet air by the aftercooler. Use the aftercooler heat rejection factor to adjust for ambient and altitude conditions. Multiply this factor by the standard aftercooler heat rejection. Failure to properly account for these factors could result in detonation and cause the engine to shutdown or fail.

MINIMUM SPEED CAPABILITY AT MAX SITE TORQUE:

This table shows the minimum allowable engine operating speed for site-specific ratings as determined by the Total Deration Factor chart. The minimum allowable engine operating speed cannot be lowered even if the actual engine power falls below the site-specific rating allowed by the Total Deration Factor chart. Turbocharger compressor surge or damage will result if the engine is operated lower than the minimum allowable speed.

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
Acetaldehyde ^{k,l}	8.36 E-03	A
Acrolein ^{k,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
Tetrachloroethane ^k	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/10⁶ 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:

$$\text{lb/hp-hr} = (\text{lb/MMBtu}) (\text{heat input, MMBtu/hr}) (1/\text{operating HP, 1/hp})$$

^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 CO₂. CO₂ [lb/MMBtu] = (3.67)(%CON)(C)(D)(1/h), where %CON = percent conversion of fuel carbon to CO₂, C = carbon content of fuel by weight (0.75), D = density of fuel, 4.1 E+04 lb/10⁶ scf, and

Storage Tanks

Condensate Storage Tank Battery Operating Parameters

Throughput Estimates (Hysis Model)

	days	gpm	bbl/day	bbl/yr	gal/yr
Summer	90	-	-	-	-
Spring/Fall	155	-	-	-	-
Winter	120	1.55	53.25	6,389	268,358

Proposed Throughput Limit: 20,000 bbl/yr
55 bbl/day (average)
Numbr of Tanks in Battery 8

Estimated Emissions (NonSpeciated)

	Modeled		Proposed
Steam	lb/yr	Data Source	tpy
Flash	18,060.8	Hysis	28.27
Breathing	4,401.1	EPA Tanks	17.60
Working	686.8	EPA Tanks	2.75

Notes

1. The Hysis VOC estimate is for the battery - not per tank.
2. The EPA Tanks estimates are per tank.
3. Flash emissions are prorated by ratio of (Proposed Throughput / Hysis Throughput * Hysis Flash VOC tpy)
4. AspenTech predicts 6.271 lb/hr of flash emissions over the 120 day "Winter" period. This equates to 9.03 tons.

Speciated Tank Emissions (Vapor Phase)

Component	Aspen Analysis	Normalized Aspen Analysis	Flash tpy	Breathing/Working tpy	Total tpy
	Flash Mass Fraction	Breathing/Working Mass Fraction			
Nitrogen	0.0008		0.02	-	0.02
CO2	0.0089		0.25	-	0.25
Methane	0.1857		5.25	-	5.25
Ethane	0.1969		5.57	-	5.57
Propane	0.2589	0.43	7.32	8.74	16.06
i-Butane	0.069	0.11	1.95	2.33	4.28
n-Butane	0.1131	0.19	3.20	3.82	7.02
i-Pentane	0.0481	0.08	1.36	1.62	2.98
n-Pentane	0.0376	0.06	1.06	1.27	2.33
n-Hexane	0.0135	0.02	0.38	0.46	0.84
n-Heptane	0.0142	0.02	0.40	0.48	0.88
n-Octane	0.0027	0.00	0.08	0.09	0.17
Cyclopentane	0.0031	0.01	0.09	0.10	0.19
Benzene	0.002	0.00	0.06	0.07	0.12
Cyclohexane	0.0064	0.01	0.18	0.22	0.40
2-Mhexane	0.0297	0.05	0.84	1.00	1.84
25-Mhexane	0.0028	0.00	0.08	0.09	0.17
Toluene	0.0017	0.00	0.05	0.06	0.11
H2O	0.0047		0.13	-	0.13
Total	1.00	1.00	17.17	20.35	37.52
Total VOC	0.60	1.00	17.04	20.35	37.39
Total HAP	0.02	0.04	0.67	0.80	1.46

Aspen VOC	Normalized Aspen VOC
0.2589	0.43
0.069	0.11
0.1131	0.19
0.0481	0.08
0.0376	0.06
0.0135	0.02
0.0142	0.02
0.0027	0.00
0.0031	0.01
0.002	0.00
0.0064	0.01
0.0297	0.05
0.0028	0.00
0.0017	0.00
0.6028	1.00

Notes:

1. The speciated flash emissions are based on the AspenTech process model results.
2. The speciated breathing/working losses were conservatively based on the AspenTech process model results minus the non-VOC components. The AspenTech VOC mass fraction was normalized to 1.0.

1	 EPCO HOLDINGS, INC. Burlington, MA USA			Case Name: LINDRITH LIQUIDS WEATHERING WINTER CASE REV 5.hsc	
2				Unit Set: USField3	
3				Date/Time: Wed May 12 08:13:01 2010	
4					
5				Fluid Package: Basis-1	
6	Material Stream: VENT1			Property Package: Peng-Robinson	
7					
8					
9	CONDITIONS				
10					
11		Overall	Vapour Phase	Liquid Phase	Aqueous Phase
12	Vapour / Phase Fraction	1.0000	1.0000	0.0000	0.0000
13	Temperature: (F)	36.62	36.62	36.62	36.62
14	Pressure: (psig*)	0.0000	0.0000	0.0000	0.0000
15	Molar Flow (MMSCFD)	1.691e-003	1.691e-003	0.0000	0.0000
16	Mass Flow (lb/hr)	6.271	6.271	0.0000	0.0000
17	Std Ideal Liq Vol Flow (USGPM)	2.836e-002	2.836e-002	0.0000	0.0000
18	Molar Enthalpy (Btu/lbmole)	-4.255e+004	-4.255e+004	-8.874e+004	-1.235e+005
19	Molar Entropy (Btu/lbmole-F)	44.25	44.25	17.78	11.38
20	Heat Flow (Btu/hr)	-7903	-7903	0.0000	0.0000
21	Liq Vol Flow @Std Cond (USGPM)	3.343e-002 *	3.343e-002	0.0000	0.0000
22	PROPERTIES				
23					
24		Overall	Vapour Phase	Liquid Phase	Aqueous Phase
25	Molecular Weight	33.76	33.76	92.61	18.02
26	Molar Density (lbmole/ft3)	2.238e-003	2.238e-003	0.4697	3.548
27	Mass Density (lb/ft3)	7.555e-002	7.555e-002	43.50	63.93
28	Act. Volume Flow (USGPM)	10.35	10.35	0.0000	0.0000
29	Mass Enthalpy (Btu/lb)	-1260	-1260	-958.3	-6853
30	Mass Entropy (Btu/lb-F)	1.311	1.311	0.1920	0.6314
31	Heat Capacity (Btu/lbmole-F)	13.79	13.79	44.45	18.60
32	Mass Heat Capacity (Btu/lb-F)	0.4083	0.4083	0.4800	1.033
33	Lower Heating Value (Btu/lbmole)	6.716e+005	6.716e+005	1.783e+006	1.342e-004
34	Mass Lower Heating Value (Btu/lb)	1.989e+004	1.989e+004	1.926e+004	7.447e-006
35	Phase Fraction [Vol. Basis]	---	1.000	---	---
36	Phase Fraction [Mass Basis]	2.122e-314	1.000	0.0000	0.0000
37	Partial Pressure of CO2 (psig*)	-11.72	---	---	---
38	Cost Based on Flow (Cost/s)	0.0000	0.0000	0.0000	0.0000
39	Act. Gas Flow (ACFM)	1.383	1.383	---	---
40	Avg. Liq. Density (lbmole/ft3)	0.8166	0.8166	0.4582	3.458
41	Specific Heat (Btu/lbmole-F)	13.79	13.79	44.45	18.60
42	Std. Gas Flow (MMSCFD)	1.692e-003	1.692e-003	0.0000	0.0000
43	Std. Ideal Liq. Mass Density (lb/ft3)	27.57	27.57	42.44	62.30
44	Act. Liq. Flow (USGPM)	0.0000	---	---	0.0000
45	Z Factor	---	0.9904	4.718e-003	6.245e-004
46	Watson K	15.81	15.81	12.62	8.520
47	User Property	---	---	---	---
48	Cp/(Cp - R)	1.168	1.168	1.047	1.120
49	Cp/Cv	1.175	1.175	1.047	1.130
50	Heat of Vap. (Btu/lbmole)	1.060e+004	---	---	---
51	Kinematic Viscosity (cSt)	7.446	7.446	0.6690	1.579
52	Liq. Mass Density (Std. Cond) (lb/ft3)	23.39	23.39	42.78	63.33
53	Liq. Vol. Flow (Std. Cond) (USGPM)	3.343e-002	3.343e-002	0.0000	0.0000
54	Liquid Fraction	0.0000	0.0000	1.000	1.000
55	Molar Volume (ft3/lbmole)	446.9	446.9	2.129	0.2818
56	Mass Heat of Vap. (Btu/lb)	314.1	---	---	---
57	Phase Fraction [Molar Basis]	1.0000	1.0000	0.0000	0.0000
58	Surface Tension (dyne/cm)	---	---	20.63	75.96
59	Thermal Conductivity (Btu/hr-ft-F)	1.175e-002	1.175e-002	7.013e-002	0.3314
60	Viscosity (cP)	9.011e-003	9.011e-003	0.4661	1.616
61	Cv (Semi-Ideal) (Btu/lbmole-F)	11.80	11.80	42.46	16.62
62	Mass Cv (Semi-Ideal) (Btu/lb-F)	0.3495	0.3495	0.4585	0.9223
63	Aspen HYSYS Version 7 (22.0.1.7021) Page 1 of 7				

1				Case Name: LINDRITH LIQUIDS WEATHERING WINTER CASE REV 5.hsc		
2		EPCO HOLDINGS, INC.				
3		Burlington, MA			Unit Set: USField3	
4		USA			Date/Time: Wed May 12 08:13:01 2010	
5						
6	Material Stream: VENT1 (continued)				Fluid Package:	Basis-1
7					Property Package:	Peng-Robinson
8						
9	PROPERTIES					
10						
11		Overall	Vapour Phase	Liquid Phase	Aqueous Phase	
12	Cv (Btu/lbmole-F)	11.73	11.73	42.46	16.46	
13	Mass Cv (Btu/lb-F)	0.3475	0.3475	0.4585	0.9136	
14	Cv (Ent. Method) (Btu/lbmole-F)	---	---	---	16.11	
15	Mass Cv (Ent. Method) (Btu/lb-F)	---	---	---	0.8944	
16	Cp/Cv (Ent. Method)	---	---	---	1.155	
17	Liq. Vol. Flow - Sum(Std. Cond)USGPM	3.343e-002	3.343e-002	0.0000	0.0000	
18	Reid VP at 37.8 C (psig*)	---	---	3.010	---	
19	True VP at 37.8 C (psig*)	1309	1309	11.46	-10.00	
20	Partial Pressure of H2S (psig*)	-11.80	---	---	---	
21	Viscosity Index	---	---	-2.140	-0.1073	
22	COMPOSITION					
23						
24	Overall Phase				Vapour Fraction	1.0000
25						
26	COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (USGPM)
27						LIQUID VOLUME FRACTION
28	Nitrogen	0.0002	0.0009	0.0048	0.0008	0.0000
29	CO2	0.0013	0.0069	0.0560	0.0089	0.0001
30	Methane	0.0726	0.3909	1.1647	0.1857	0.0078
31	Ethane	0.0411	0.2211	1.2348	0.1969	0.0069
32	Propane	0.0368	0.1982	1.6236	0.2589	0.0064
33	i-Butane	0.0074	0.0401	0.4330	0.0690	0.0015
34	n-Butane	0.0122	0.0657	0.7091	0.1131	0.0024
35	i-Pentane	0.0042	0.0225	0.3016	0.0481	0.0010
36	n-Pentane	0.0033	0.0176	0.2360	0.0376	0.0007
37	n-Hexane	0.0010	0.0053	0.0847	0.0135	0.0003
38	n-Heptane	0.0009	0.0048	0.0891	0.0142	0.0003
39	n-Octane	0.0002	0.0008	0.0171	0.0027	0.0000
40	n-Nonane	0.0000	0.0000	0.0000	0.0000	0.0000
41	n-C11	0.0000	0.0000	0.0000	0.0000	0.0000
42	22-Mbutane	0.0000	0.0000	0.0000	0.0000	0.0000
43	Cyclopentane	0.0003	0.0015	0.0195	0.0031	0.0001
44	2-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000
45	3-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000
46	22-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000
47	Mcyclopentan	0.0000	0.0000	0.0000	0.0000	0.0000
48	24-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000
49	Benzene	0.0002	0.0009	0.0129	0.0020	0.0000
50	33-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000
51	Cyclohexane	0.0005	0.0026	0.0401	0.0064	0.0001
52	2-Mhexane	0.0019	0.0100	0.1863	0.0297	0.0005
53	23-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000
54	11Mcycpenta	0.0000	0.0000	0.0000	0.0000	0.0000
55	3-Mhexane	0.0000	0.0000	0.0000	0.0000	0.0000
56	1-tr3-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000
57	1-cl3-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000
58	Mcyclohexane	0.0000	0.0000	0.0000	0.0000	0.0000
59	113-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000
60	25-Mhexane	0.0002	0.0008	0.0177	0.0028	0.0001
61	MCC5==	0.0000	0.0000	0.0000	0.0000	0.0000
62	Toluene	0.0001	0.0006	0.0106	0.0017	0.0000
63	Hyprotech Ltd. Aspen HYSYS Version 7 (22.0.1.7021) Page 2 of 7					

1	 EPCO HOLDINGS, INC. Burlington, MA USA				Case Name: LINDRITH LIQUIDS WEATHERING WINTER CASE REV 5.hsc		
2					Unit Set: USField3		
3					Date/Time: Wed May 12 08:13:01 2010		
4							
5					Fluid Package:	Basis-1	
6	Material Stream: VENT1 (continued)				Property Package:	Peng-Robinson	
7							
8							
9	COMPOSITION						
10							
11	Overall Phase (continued)				Vapour Fraction	1.0000	
12							
13	COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (USGPM)	LIQUID VOLUME FRACTION
14							
15	Naphthalene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
16	Ecyclohexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	p-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18	m-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
19	2-Moctane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
20	o-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21	H2O	0.0016	0.0088	0.0293	0.0047	0.0001	0.0021
22	Methanol	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
23	Total	0.1857	1.0000	6.2711	1.0000	0.0284	1.0000
24					Vapour Phase	Phase Fraction	1.000
25							
26	COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (USGPM)	LIQUID VOLUME FRACTION
27							
28	Nitrogen	0.0002	0.0009	0.0048	0.0008	0.0000	0.0004
29	CO2	0.0013	0.0069	0.0560	0.0089	0.0001	0.0048
30	Methane	0.0726	0.3909	1.1647	0.1857	0.0078	0.2740
31	Ethane	0.0411	0.2211	1.2348	0.1969	0.0069	0.2445
32	Propane	0.0368	0.1982	1.6236	0.2589	0.0064	0.2257
33	i-Butane	0.0074	0.0401	0.4330	0.0690	0.0015	0.0543
34	n-Butane	0.0122	0.0657	0.7091	0.1131	0.0024	0.0856
35	i-Pentane	0.0042	0.0225	0.3016	0.0481	0.0010	0.0341
36	n-Pentane	0.0033	0.0176	0.2360	0.0376	0.0007	0.0264
37	n-Hexane	0.0010	0.0053	0.0847	0.0135	0.0003	0.0090
38	n-Heptane	0.0009	0.0048	0.0891	0.0142	0.0003	0.0091
39	n-Octane	0.0002	0.0008	0.0171	0.0027	0.0000	0.0017
40	n-Nonane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
41	n-C11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
42	22-Mbutane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
43	Cyclopentane	0.0003	0.0015	0.0195	0.0031	0.0001	0.0018
44	2-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
45	3-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
46	22-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
47	Mcyclopentan	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
48	24-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
49	Benzene	0.0002	0.0009	0.0129	0.0020	0.0000	0.0010
50	33-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
51	Cyclohexane	0.0005	0.0026	0.0401	0.0064	0.0001	0.0036
52	2-Mhexane	0.0019	0.0100	0.1863	0.0297	0.0005	0.0193
53	23-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
54	11Mcycpentan	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
55	3-Mhexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
56	1-tr3-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
57	1-ci3-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
58	Mcyclohexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
59	113-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
60	25-Mhexane	0.0002	0.0008	0.0177	0.0028	0.0001	0.0018
61	MCC5==	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
62	Toluene	0.0001	0.0006	0.0106	0.0017	0.0000	0.0009
63	Hyprotech Ltd. Aspen HYSYS Version 7 (22.0.1.7021) Page 3 of 7						

1	 EPCO HOLDINGS, INC. Burlington, MA USA			Case Name: LINDRITH LIQUIDS WEATHERING WINTER CASE REV 5.hsc			
2				Unit Set: USField3			
3				Date/Time: Wed May 12 08:13:01 2010			
4							
5				Fluid Package: Basis-1			
6	Material Stream: VENT1 (continued)			Property Package: Peng-Robinson			
7							
8							
9	COMPOSITION						
10							
11	Vapour Phase (continued) Phase Fraction 1.000						
12							
13	COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (USGPM)	LIQUID VOLUME FRACTION
14							
15	Naphthalene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
16	Eyclohexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	p-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18	m-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
19	2-Moctane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
20	o-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21	H2O	0.0016	0.0088	0.0293	0.0047	0.0001	0.0021
22	Methanol	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
23	Total	0.1857	1.0000	6.2711	1.0000	0.0284	1.0000
24	Liquid Phase Phase Fraction 0.0000						
25							
26	COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (USGPM)	LIQUID VOLUME FRACTION
27							
28	Nitrogen	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
29	CO2	0.0000	0.0001	0.0000	0.0001	0.0000	0.0000
30	Methane	0.0000	0.0019	0.0000	0.0003	0.0000	0.0008
31	Ethane	0.0000	0.0080	0.0000	0.0026	0.0000	0.0050
32	Propane	0.0000	0.0315	0.0000	0.0150	0.0000	0.0201
33	i-Butane	0.0000	0.0188	0.0000	0.0118	0.0000	0.0143
34	n-Butane	0.0000	0.0461	0.0000	0.0289	0.0000	0.0337
35	i-Pentane	0.0000	0.0454	0.0000	0.0354	0.0000	0.0386
36	n-Pentane	0.0000	0.0503	0.0000	0.0392	0.0000	0.0423
37	n-Hexane	0.0000	0.0588	0.0000	0.0547	0.0000	0.0562
38	n-Heptane	0.0000	0.1967	0.0000	0.2128	0.0000	0.2107
39	n-Octane	0.0000	0.1217	0.0000	0.1501	0.0000	0.1446
40	n-Nonane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
41	n-C11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
42	22-Mbutane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
43	Cyclopentane	0.0000	0.0059	0.0000	0.0045	0.0000	0.0041
44	2-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
45	3-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
46	22-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
47	Mycyclopentan	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
48	24-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
49	Benzene	0.0000	0.0104	0.0000	0.0088	0.0000	0.0068
50	33-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
51	Cyclohexane	0.0000	0.0368	0.0000	0.0335	0.0000	0.0291
52	2-Mhexane	0.0000	0.2908	0.0000	0.3146	0.0000	0.3138
53	23-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
54	11Mcycpentan	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
55	3-Mhexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
56	1-tr3-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
57	1-ci3-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
58	Mycyclohexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
59	113-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
60	25-Mhexane	0.0000	0.0481	0.0000	0.0594	0.0000	0.0579
61	MCC5==	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
62	Toluene	0.0000	0.0285	0.0000	0.0283	0.0000	0.0221
63	Aspen HYSYS Version 7 (22.0.1.7021) Page 4 of 7						

1	 EPCO HOLDINGS, INC. Burlington, MA USA			Case Name: LINDRITH LIQUIDS WEATHERING WINTER CASE REV 5.hsc			
2				Unit Set: USField3			
3				Date/Time: Wed May 12 08:13:01 2010			
4							
5				Fluid Package: Basis-1			
6	Material Stream: VENT1 (continued)			Property Package: Peng-Robinson			
7							
8							
9	COMPOSITION						
10							
11	Liquid Phase (continued)					Phase Fraction	0.0000
12							
13	COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (USGPM)	LIQUID VOLUME FRACTION
14							
15	Naphthalene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
16	Ecyclohexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	p-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18	m-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
19	2-Moctane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
20	o-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21	H2O	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
22	Methanol	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
23	Total	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000
24							
25	Aqueous Phase					Phase Fraction	0.0000
26	COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (USGPM)	LIQUID VOLUME FRACTION
27							
28	Nitrogen	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
29	CO2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
30	Methane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
31	Ethane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
32	Propane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
33	i-Butane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
34	n-Butane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
35	i-Pentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
36	n-Pentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
37	n-Hexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
38	n-Heptane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
39	n-Octane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
40	n-Nonane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
41	n-C11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
42	22-Mbutane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
43	Cyclopentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
44	2-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
45	3-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
46	22-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
47	Mcyclopentan	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
48	24-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
49	Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
50	33-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
51	Cyclohexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
52	2-Mhexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
53	23-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
54	11Mcyclopentan	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
55	3-Mhexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
56	1-tr3-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
57	1-ci3-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
58	Mcyclohexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
59	113-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
60	25-Mhexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
61	MCC5==	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
62	Toluene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
63	Hvprotech Ltd.			Aspen HYSYS Version 7 (22.0.1.7021)		Page 5 of 7	

1				Case Name: LINDRITH LIQUIDS WEATHERING WINTER CASE REV 5.hsc		
2	 EPCO HOLDINGS, INC. Burlington, MA USA			Unit Set: USField3		
Date/Time: Wed May 12 08:13:01 2010						
6	Material Stream: VENT1 (continued)				Fluid Package: Basis-1	
Property Package: Peng-Robinson						
9	COMPOSITION					
11	Aqueous Phase (continued)					Phase Fraction 0.0000
12						
13	COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (USGPM)
14						LIQUID VOLUME FRACTION
15	Naphthalene	0.0000	0.0000	0.0000	0.0000	0.0000
16	Ecyclohexane	0.0000	0.0000	0.0000	0.0000	0.0000
17	p-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000
18	m-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000
19	2-Moctane	0.0000	0.0000	0.0000	0.0000	0.0000
20	o-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000
21	H2O	0.0000	1.0000	0.0000	1.0000	0.0000
22	Methanol	0.0000	0.0000	0.0000	0.0000	0.0000
23	Total	0.0000	1.0000	0.0000	1.0000	0.0000
24						
25	K VALUE					
26	COMPONENTS		MIXED	LIGHT		HEAVY
27	Nitrogen		786.2	786.2		6.176e+004
28	CO2		62.97	62.97		1389
29	Methane		203.2	203.2		1.017e+009
30	Ethane		27.66	27.66		9.300e+010
31	Propane		6.292	6.292		---
32	i-Butane		2.136	2.136		---
33	n-Butane		1.424	1.424		---
34	i-Pentane		0.4954	0.4954		---
35	n-Pentane		0.3499	0.3499		---
36	n-Hexane		8.992e-002	8.992e-002		---
37	n-Heptane		2.435e-002	2.435e-002		---
38	n-Octane		6.639e-003	6.639e-003		---
39	n-Nonane		---	---		---
40	n-C11		---	---		---
41	22-Mbutane		---	---		---
42	Cyclopentane		0.2536	0.2536		---
43	2-Mpentane		---	---		---
44	3-Mpentane		---	---		---
45	22-Mpentane		---	---		---
46	Mcyclopentan		---	---		---
47	24-Mpentane		---	---		---
48	Benzene		8.516e-002	8.516e-002		---
49	33-Mpentane		---	---		---
50	Cyclohexane		6.962e-002	6.962e-002		---
51	2-Mhexane		3.444e-002	3.444e-002		---
52	23-Mpentane		---	---		---
53	11Mcycpenta		---	---		---
54	3-Mhexane		---	---		---
55	1-tr3-MCC5		---	---		---
56	1-ci3-MCC5		---	---		---
57	Mcyclohexane		---	---		---
58	113-MCC5		---	---		---
59	25-Mhexane		1.734e-002	1.734e-002		---
60	MCC5==		---	---		---
61	Toluene		2.172e-002	2.172e-002		---
62	Naphthalene		---	---		---
63	Aspen HYSYS Version 7 (22.0.1.7021)					
Hyprotech Ltd.						
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1	 EPCO HOLDINGS, INC. Burlington, MA USA		Case Name: LINDRITH LIQUIDS WEATHERING WINTER CASE REV 5.hsc	
Unit Set: USField3				
Date/Time: Wed May 12 08:13:01 2010				
6	Material Stream: VENT1 (continued)		Fluid Package: Basis-1	
Property Package: Peng-Robinson				
9	K VALUE			
11	COMPONENTS	MIXED	LIGHT	HEAVY
12	Ecyclohexane	---	---	---
13	p-Xylene	---	---	---
14	m-Xylene	---	---	---
15	2-Moctane	---	---	---
16	o-Xylene	---	---	---
17	H2O	60.45	60.45	8.766e-003
18	Methanol	---	---	---
19				
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63	Hyprotech Ltd.		Aspen HYSYS Version 7 (22.0.1.7021)	

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1			Case Name:	LINDRITH LIQUIDS WEATHERING WINTER CASE REV 5.hsc	
2	 EPCO HOLDINGS, INC. Burlington, MA USA		Unit Set:	USField3	
Date/Time:			Wed May 12 08:16:12 2010		
5					
6	Material Stream: CONDENSATE1		Fluid Package:	Basis-1	
Property Package:			Peng-Robinson		
8					
9	CONDITIONS				
10					
11		Overall	Vapour Phase	Liquid Phase	Aqueous Phase
12	Vapour / Phase Fraction	0.0000	0.0000	0.1928	0.8072
13	Temperature: (F)	36.62	36.62	36.62	36.62
14	Pressure: (psig*)	0.0000	0.0000	0.0000	0.0000
15	Molar Flow (MMSCFD)	0.1286	0.0000	2.479e-002	0.1038
16	Mass Flow (lb/hr)	457.5	0.0000	252.1	205.3
17	Std Ideal Liq Vol Flow (USGPM)	1.152	0.0000	0.7407	0.4109
18	Molar Enthalpy (Btu/lbmole)	-1.168e+005	-4.255e+004	-8.874e+004	-1.235e+005
19	Molar Entropy (Btu/lbmole-F)	12.61	44.25	17.78	11.38
20	Heat Flow (Btu/hr)	-1.649e+006	0.0000	-2.416e+005	-1.407e+006
21	Liq Vol Flow @Std Cond (USGPM)	1.069 *	0.0000	0.7349	0.4043
22	PROPERTIES				
23					
24		Overall	Vapour Phase	Liquid Phase	Aqueous Phase
25	Molecular Weight	32.40	33.76	92.61	18.02
26	Molar Density (lbmole/ft3)	1.568	2.238e-003	0.4697	3.548
27	Mass Density (lb/ft3)	50.78	7.555e-002	43.50	63.93
28	Act. Volume Flow (USGPM)	1.123	0.0000	0.7226	0.4005
29	Mass Enthalpy (Btu/lb)	-3604	-1260	-958.3	-6853
30	Mass Entropy (Btu/lb-F)	0.3893	1.311	0.1920	0.6314
31	Heat Capacity (Btu/lbmole-F)	23.58	13.79	44.45	18.60
32	Mass Heat Capacity (Btu/lb-F)	0.7280	0.4083	0.4800	1.033
33	Lower Heating Value (Btu/lbmole)	3.438e+005	6.716e+005	1.783e+006	1.342e-004
34	Mass Lower Heating Value (Btu/lb)	1.061e+004	1.989e+004	1.926e+004	7.447e-006
35	Phase Fraction [Vol. Basis]	---	---	0.6432	0.3568
36	Phase Fraction [Mass Basis]	2.122e-314	0.0000	0.5511	0.4489
37	Partial Pressure of CO2 (psig*)	-11.80	---	---	---
38	Cost Based on Flow (Cost/s)	0.0000	0.0000	0.0000	0.0000
39	Act. Gas Flow (ACFM)	---	---	---	---
40	Avg. Liq. Density (lbmole/ft3)	1.529	0.8166	0.4582	3.458
41	Specific Heat (Btu/lbmole-F)	23.58	13.79	44.45	18.60
42	Std. Gas Flow (MMSCFD)	0.1286	0.0000	2.480e-002	0.1038
43	Std. Ideal Liq. Mass Density (lb/ft3)	49.52	27.57	42.44	62.30
44	Act. Liq. Flow (USGPM)	1.123	---	0.7226	0.4005
45	Z Factor	---	0.9904	4.718e-003	6.245e-004
46	Watson K	12.62	15.81	12.62	8.520
47	User Property	---	---	---	---
48	Cp/(Cp - R)	1.092	1.168	1.047	1.120
49	Cp/Cv	1.092	1.175	1.047	1.130
50	Heat of Vap. (Btu/lbmole)	2.068e+004	---	---	---
51	Kinematic Viscosity (cSt)	2.069	7.446	0.6690	1.579
52	Liq. Mass Density (Std. Cond) (lb/ft3)	53.36	23.39	42.78	63.33
53	Liq. Vol. Flow (Std. Cond) (USGPM)	1.069	0.0000	0.7349	0.4043
54	Liquid Fraction	1.000	0.0000	1.000	1.000
55	Molar Volume (ft3/lbmole)	0.6379	446.9	2.129	0.2818
56	Mass Heat of Vap. (Btu/lb)	638.2	---	---	---
57	Phase Fraction [Molar Basis]	0.0000	0.0000	0.1928	0.8072
58	Surface Tension (dyne/cm)	---	---	20.63	75.96
59	Thermal Conductivity (Btu/hr-ft-F)	0.1243	1.175e-002	7.013e-002	0.3314
60	Viscosity (cP)	1.683	9.011e-003	0.4661	1.616
61	Cv (Semi-Ideal) (Btu/lbmole-F)	21.60	11.80	42.46	16.62
62	Mass Cv (Semi-Ideal) (Btu/lb-F)	0.6667	0.3495	0.4585	0.9223
63	Hyprotech Ltd. Aspen HYSYS Version 7 (22.0.1.7021) Page 1 of 7				

EPCO HOLDINGS, INC. Burlington, MA USA		Case Name: LINDRITH LIQUIDS WEATHERING WINTER CASE REV 5.hsc				
		Unit Set: USField3				
		Date/Time: Wed May 12 08:16:12 2010				
Material Stream: CONDENSATE1 (continued)		Fluid Package: Basis-1				
		Property Package: Peng-Robinson				
PROPERTIES						
	Overall	Vapour Phase	Liquid Phase	Aqueous Phase		
Cv (Btu/lbmole-F)	21.60	11.73	42.46	16.46		
Mass Cv (Btu/lb-F)	0.6667	0.3475	0.4585	0.9136		
Cv (Ent. Method) (Btu/lbmole-F)	---	---	---	16.11		
Mass Cv (Ent. Method) (Btu/lb-F)	---	---	---	0.8944		
Cp/Cv (Ent. Method)	---	---	---	1.155		
Liq. Vol. Flow - Sum(Std. Cond)USGPM	1.139	0.0000	0.7349	0.4043		
Reid VP at 37.8 C (psig*)	3.019	---	3.010	---		
True VP at 37.8 C (psig*)	12.14	1309	11.46	-10.00		
Partial Pressure of H2S (psig*)	-11.80	---	---	---		
Viscosity Index	-0.2559	---	-2.140	-0.1073		
COMPOSITION						
Overall Phase				Vapour Fraction 0.0000		
COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (USGPM)	LIQUID VOLUME FRACTION
Nitrogen	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000
CO2	0.0004	0.0000	0.0155	0.0000	0.0000	0.0000
Methane	0.0052	0.0004	0.0840	0.0002	0.0006	0.0005
Ethane	0.0218	0.0015	0.6545	0.0014	0.0037	0.0032
Propane	0.0858	0.0061	3.7827	0.0083	0.0149	0.0129
i-Butane	0.0511	0.0036	2.9721	0.0065	0.0106	0.0092
n-Butane	0.1255	0.0089	7.2974	0.0160	0.0250	0.0217
i-Pentane	0.1237	0.0088	8.9238	0.0195	0.0286	0.0248
n-Pentane	0.1370	0.0097	9.8877	0.0216	0.0314	0.0272
n-Hexane	0.1602	0.0113	13.8017	0.0302	0.0416	0.0361
n-Heptane	0.5355	0.0379	53.6629	0.1173	0.1560	0.1355
n-Octane	0.3312	0.0235	37.8337	0.0827	0.1071	0.0930
n-Nonane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Decane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Undecane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Dodecane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2,2-Dimethylbutane	0.0161	0.0011	1.1269	0.0025	0.0030	0.0026
Cyclopentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2-Methylpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3-Methylpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2,2-Dimethylpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2,4-Dimethylpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Benzene	0.0283	0.0020	2.2124	0.0048	0.0050	0.0043
3,3-Dimethylpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cyclohexane	0.1002	0.0071	8.4361	0.0184	0.0215	0.0187
2-Methylhexane	0.7916	0.0561	79.3196	0.1734	0.2324	0.2018
2,3-Dimethylpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1,1-Dimethylcyclopentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3-Methylhexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1-trimethylcyclopentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1-cis-3-dimethylcyclopentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Methylcyclohexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1,1,3-trimethylcyclopentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2,5-Methylhexane	0.1310	0.0093	14.9641	0.0327	0.0429	0.0372
Methylcyclopentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Methylcyclopentane	0.0775	0.0055	7.1431	0.0156	0.0164	0.0142
Toluene						
Aspen HYSYS Version 7 (22.0.1.7021)				Page 2 of 7		
Hyprotech Ltd.				* Specified by user.		

1	 EPCO HOLDINGS, INC. Burlington, MA USA			Case Name: LINDRITH LIQUIDS WEATHERING WINTER CASE REV 5.hsc			
2				Unit Set: USField3			
3				Date/Time: Wed May 12 08:16:12 2010			
4							
5				Fluid Package: Basis-1			
6	Material Stream: CONDENSATE1 (continued)			Property Package: Peng-Robinson			
7							
8							
9	COMPOSITION						
10							
11	Overall Phase (continued)					Vapour Fraction 0.0000	
12							
13	COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (USGPM)	LIQUID VOLUME FRACTION
14							
15	Naphthalene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
16	Ecyclohexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	p-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18	m-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
19	2-Moctane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
20	o-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21	H2O	11.3985	0.8072	205.3451	0.4489	0.4109	0.3568
22	Methanol	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
23	Total	14.1207	1.0000	457.4633	1.0000	1.1516	1.0000
24							
25	Vapour Phase					Phase Fraction 0.0000	
26	COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (USGPM)	LIQUID VOLUME FRACTION
27							
28	Nitrogen	0.0000	0.0009	0.0000	0.0008	0.0000	0.0004
29	CO2	0.0000	0.0069	0.0000	0.0089	0.0000	0.0048
30	Methane	0.0000	0.3909	0.0000	0.1857	0.0000	0.2740
31	Ethane	0.0000	0.2211	0.0000	0.1969	0.0000	0.2445
32	Propane	0.0000	0.1982	0.0000	0.2589	0.0000	0.2257
33	i-Butane	0.0000	0.0401	0.0000	0.0690	0.0000	0.0543
34	n-Butane	0.0000	0.0657	0.0000	0.1131	0.0000	0.0856
35	i-Pentane	0.0000	0.0225	0.0000	0.0481	0.0000	0.0341
36	n-Pentane	0.0000	0.0176	0.0000	0.0376	0.0000	0.0264
37	n-Hexane	0.0000	0.0053	0.0000	0.0135	0.0000	0.0090
38	n-Heptane	0.0000	0.0048	0.0000	0.0142	0.0000	0.0091
39	n-Octane	0.0000	0.0008	0.0000	0.0027	0.0000	0.0017
40	n-Nonane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
41	n-C11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
42	22-Mbutane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
43	Cyclopentane	0.0000	0.0015	0.0000	0.0031	0.0000	0.0018
44	2-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
45	3-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
46	22-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
47	Mcyclopentan	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
48	24-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
49	Benzene	0.0000	0.0009	0.0000	0.0020	0.0000	0.0010
50	33-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
51	Cyclohexane	0.0000	0.0026	0.0000	0.0064	0.0000	0.0036
52	2-Mhexane	0.0000	0.0100	0.0000	0.0297	0.0000	0.0193
53	23-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
54	11Mcycpontan	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
55	3-Mhexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
56	1-tr3-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
57	1-ci3-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
58	Mcyclohexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
59	113-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
60	25-Mhexane	0.0000	0.0008	0.0000	0.0028	0.0000	0.0018
61	MCC5==	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
62	Toluene	0.0000	0.0006	0.0000	0.0017	0.0000	0.0009
63	Hyprotech Ltd. Aspen HYSYS Version 7 (22.0.1.7021) Page 3 of 7						

1				Case Name: LINDRITH LIQUIDS WEATHERING WINTER CASE REV 5.hsc			
2	 EPCO HOLDINGS, INC. Burlington, MA USA			Unit Set: USField3			
Date/Time: Wed May 12 08:16:12 2010							
6	Material Stream: CONDENSATE1 (continued)			Fluid Package: Basis-1			
Property Package: Peng-Robinson							
9	COMPOSITION						
11	Vapour Phase (continued)					Phase Fraction 0.0000	
12							
13	COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (USGPM)	LIQUID VOLUME FRACTION
14							
15	Naphthalene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
16	Ecyclohexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	p-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18	m-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
19	2-Moctane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
20	o-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21	H2O	0.0000	0.0088	0.0000	0.0047	0.0000	0.0021
22	Methanol	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
23	Total	0.0000	1.0000	0.0000	1.0000	0.0000	1.0000
24						Phase Fraction 0.1928	
25	Liquid Phase						
26	COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (USGPM)	LIQUID VOLUME FRACTION
27							
28	Nitrogen	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000
29	CO2	0.0003	0.0001	0.0130	0.0001	0.0000	0.0000
30	Methane	0.0052	0.0019	0.0840	0.0003	0.0006	0.0008
31	Ethane	0.0218	0.0080	0.6545	0.0026	0.0037	0.0050
32	Propane	0.0858	0.0315	3.7827	0.0150	0.0149	0.0201
33	i-Butane	0.0511	0.0188	2.9721	0.0118	0.0106	0.0143
34	n-Butane	0.1255	0.0461	7.2974	0.0289	0.0250	0.0337
35	i-Pentane	0.1237	0.0454	8.9238	0.0354	0.0286	0.0386
36	n-Pentane	0.1370	0.0503	9.8877	0.0392	0.0314	0.0423
37	n-Hexane	0.1602	0.0588	13.8017	0.0547	0.0416	0.0562
38	n-Heptane	0.5355	0.1967	53.6629	0.2128	0.1560	0.2107
39	n-Octane	0.3312	0.1217	37.8337	0.1501	0.1071	0.1446
40	n-Nonane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
41	n-C11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
42	22-Mbutane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
43	Cyclopentane	0.0161	0.0059	1.1269	0.0045	0.0030	0.0041
44	2-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
45	3-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
46	22-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
47	Mcyclopentan	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
48	24-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
49	Benzene	0.0283	0.0104	2.2124	0.0088	0.0050	0.0068
50	33-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
51	Cyclohexane	0.1002	0.0368	8.4361	0.0335	0.0215	0.0291
52	2-Mhexane	0.7916	0.2908	79.3196	0.3146	0.2324	0.3138
53	23-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
54	11Mcycpenta	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
55	3-Mhexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
56	1-tr3-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
57	1-ci3-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
58	Mcyclohexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
59	113-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
60	25-Mhexane	0.1310	0.0481	14.9641	0.0594	0.0429	0.0579
61	MCC5==	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
62	Toluene	0.0775	0.0285	7.1431	0.0283	0.0164	0.0221
63	Aspen HYSYS Version 7 (22.0.1.7021)						

Page 4 of 7

1	 EPCO HOLDINGS, INC. Burlington, MA USA			Case Name: LINDRITH LIQUIDS WEATHERING WINTER CASE REV 5.hsc				
2				Unit Set: USField3				
3				Date/Time: Wed May 12 08:16:12 2010				
4								
5				Fluid Package: Basis-1				
6	Material Stream: CONDENSATE1 (continued)			Property Package: Peng-Robinson				
7								
8								
9	COMPOSITION							
10								
11	Liquid Phase (continued)					Phase Fraction	0.1928	
12								
13	COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (USGPM)	LIQUID VOLUME FRACTION	
14								
15	Naphthalene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
16	Ecyclohexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
17	p-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
18	m-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
19	2-Moctane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
20	o-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
21	H2O	0.0004	0.0001	0.0071	0.0000	0.0000	0.0000	
22	Methanol	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
23	Total	2.7225	1.0000	252.1228	1.0000	0.7407	1.0000	
24	Aqueous Phase					Phase Fraction	0.8072	
25								
26	COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (USGPM)	LIQUID VOLUME FRACTION	
27								
28	Nitrogen	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
29	CO2	0.0001	0.0000	0.0025	0.0000	0.0000	0.0000	
30	Methane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
31	Ethane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
32	Propane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
33	i-Butane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
34	n-Butane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
35	i-Pentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
36	n-Pentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
37	n-Hexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
38	n-Heptane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
39	n-Octane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
40	n-Nonane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
41	n-C11	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
42	22-Mbutane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
43	Cyclopentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
44	2-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
45	3-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
46	22-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
47	Mcyclopentan	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
48	24-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
49	Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
50	33-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
51	Cyclohexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
52	2-Mhexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
53	23-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
54	11Mcycpentan	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
55	3-Mhexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
56	1-tr3-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
57	1-ci3-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
58	Mcyclohexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
59	113-MCC5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
60	25-Mhexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
61	MCC5==	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
62	Toluene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
63	Hyprotech Ltd.						Aspen HYSYS Version 7 (22.0.1.7021)	Page 5 of 7

1					Case Name: LINDRITH LIQUIDS WEATHERING WINTER CASE REV 5.hsc		
2	 EPCO HOLDINGS, INC. Burlington, MA USA				Unit Set: USField3		
Date/Time: Wed May 12 08:16:12 2010							
6	Material Stream: CONDENSATE1 (continued)				Fluid Package: Basis-1		
Property Package: Peng-Robinson							
9	COMPOSITION						
11	Aqueous Phase (continued)					Phase Fraction 0.8072	
12							
13	COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (USGPM)	LIQUID VOLUME FRACTION
14							
15	Naphthalene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
16	Ecyclohexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	p-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18	m-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
19	2-Moctane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
20	o-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21	H2O	11.3981	1.0000	205.3380	1.0000	0.4109	1.0000
22	Methanol	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
23	Total	11.3982	1.0000	205.3405	1.0000	0.4109	1.0000
24	K VALUE						
25							
26	COMPONENTS		MIXED		LIGHT		HEAVY
27	Nitrogen		3872		786.2		6.176e+004
28	CO2		274.5		62.97		1389
29	Methane		1054		203.2		1.017e+009
30	Ethane		143.4		27.66		9.300e+010
31	Propane		32.63		6.292		---
32	i-Butane		11.08		2.136		---
33	n-Butane		7.388		1.424		---
34	i-Pentane		2.570		0.4954		---
35	n-Pentane		1.815		0.3499		---
36	n-Hexane		0.4664		8.992e-002		---
37	n-Heptane		0.1263		2.435e-002		---
38	n-Octane		3.444e-002		6.639e-003		---
39	n-Nonane		---		---		---
40	n-C11		---		---		---
41	22-Mbutane		---		---		---
42	Cyclopentane		1.315		0.2536		---
43	2-Mpentane		---		---		---
44	3-Mpentane		---		---		---
45	22-Mpentane		---		---		---
46	Mcyclopentan		---		---		---
47	24-Mpentane		---		---		---
48	Benzene		0.4417		8.516e-002		---
49	33-Mpentane		---		---		---
50	Cyclohexane		0.3611		6.962e-002		---
51	2-Mhexane		0.1786		3.444e-002		---
52	23-Mpentane		---		---		---
53	11Mcycpenta		---		---		---
54	3-Mhexane		---		---		---
55	1-tr3-MCC5		---		---		---
56	1-ci3-MCC5		---		---		---
57	Mcyclohexane		---		---		---
58	113-MCC5		---		---		---
59	25-Mhexane		8.995e-002		1.734e-002		---
60	MCC5==		---		---		---
61	Toluene		0.1126		2.172e-002		---
62	Naphthalene		---		---		---
63	Hyprotech Ltd. Aspen HYSYS Version 7 (22.0.1.7021) Page 6 of 7						

1	 EPCO HOLDINGS, INC. Burlington, MA USA		Case Name: LINDRITH LIQUIDS WEATHERING WINTER CASE REV 5.hsc	
2			Unit Set: USField3	
3			Date/Time: Wed May 12 08:16:12 2010	
4				
5				Fluid Package: Basis-1
6	Material Stream: CONDENSATE1 (continued)			Property Package: Peng-Robinson
7				
8				
9	K VALUE			
10				
11	COMPONENTS	MIXED	LIGHT	HEAVY
12	Ecyclohexane	---	---	---
13	p-Xylene	---	---	---
14	m-Xylene	---	---	---
15	2-Moctane	---	---	---
16	o-Xylene	---	---	---
17	H2O	1.086e-002	60.45	8.766e-003
18	Methanol	---	---	---
19				
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63	Hyprotech Ltd.		Aspen HYSYS Version 7 (22.0.1.7021)	
	Licensed to: EPCO HOLDINGS, INC.		Page 7 of 7	
			* Specified by user.	

8
 Temperature 58.00 F
 Pressure 131.2 psig*
 Molar Flow 64.90 MMSCFD

LINDRITH WINTER

Station Inlet
 Temperature 37.35 F
 Pressure 50.00 psig*
 Molar Flow 65.94 MMSCFD

11
 Temperature 58.00 F
 Pressure 250.0 psig*
 Molar Flow 64.90 MMSCFD

Winter average
 ambient is 28°F
 This
 temperature
 period
 lasts 120 days

VAPOR
 LOSSES
 5.487 VOC
 TONS/PERIOD

Two Phase
 Hydrocarbon
 to Storage
 2041 lb/hr

Instg Liq
 1.553 USGPM

2nd
 Stg

1st Stg

Instg Cooler

Final
 Cooler

SLUG

WAT
 FIELD

Mimics inlet
 gas sample
 taken
 4/28/2010

65.0 MMSCFD
 50 PSIG
 SUCTION
 250 PSIG
 DISCHARGE

A1: Vessel Temperature 28.00

T-101 T-102 T-103 T-104 T-105 T-106 T-107 T-108

T-101 T-102 T-103 T-104 T-105 T-106 T-107 T-108

T-101 T-102 T-103 T-104 T-105 T-106 T-107 T-108

T-101 T-102 T-103 T-104 T-105 T-106 T-107 T-108

8
 Temperature 107.0 F
 Pressure 131.2 psig*
 Molar Flow 65.22 MMSCFD

LINDRITH SUMMER

Station Inlet
 Temperature 53.87 F
 Pressure 50.00 psig*
 Molar Flow 66.21 MMSCFD



65.0 MMSCFD
 50 PSIG
 SUCTION
 250 PSIG
 DISCHARGE

Mimics inlet
 gas sample
 taken
 4/28/2010

SLUG

Intstg Liq
 0.0000 USGPM

Two Phase
 Hydrocarbon
 to Storage
 0 lb/hr

TANK
 TEMP
 77.00 F

VOC
 VENTED
 TONS/PERIOD
 0.0000

Summer
 average
 ambient is 77-F
 This
 temperature
 period
 lasts 90 days

VAPOR
 LOSSES

11
 Temperature 107.0 F
 Pressure 250.0 psig*
 Molar Flow 65.22 MMSCFD

Final
 Cooler

11

2nd
 Stg

8

1st Stg

Intstg
 Cooler

Intstg Liq

0.0000 USGPM

Two Phase
 Hydrocarbon
 to Storage
 0 lb/hr

Final
 Cooler

11

Temperature 107.0 F

Pressure 250.0 psig*

Molar Flow 65.22 MMSCFD

11

2nd
 Stg

8

1st Stg

Intstg
 Cooler

Intstg Liq

0.0000 USGPM

Two Phase
 Hydrocarbon
 to Storage
 0 lb/hr

Final
 Cooler

11

Temperature 107.0 F

Pressure 250.0 psig*

Molar Flow 65.22 MMSCFD

11

2nd
 Stg

8

1st Stg

Intstg
 Cooler

Intstg Liq

0.0000 USGPM

Two Phase
 Hydrocarbon
 to Storage
 0 lb/hr

Final
 Cooler

11

Temperature 107.0 F

Pressure 250.0 psig*

Molar Flow 65.22 MMSCFD

11

2nd
 Stg

8

1st Stg

Intstg
 Cooler

Intstg Liq

0.0000 USGPM

Two Phase
 Hydrocarbon
 to Storage
 0 lb/hr

Final
 Cooler

11

Temperature 107.0 F

Pressure 250.0 psig*

Molar Flow 65.22 MMSCFD

11

2nd
 Stg

8

1st Stg

Intstg
 Cooler

Intstg Liq

0.0000 USGPM

Two Phase
 Hydrocarbon
 to Storage
 0 lb/hr

Final
 Cooler

11

Temperature 107.0 F

Pressure 250.0 psig*

Molar Flow 65.22 MMSCFD

11

2nd
 Stg

8

1st Stg

Intstg
 Cooler

Intstg Liq

0.0000 USGPM

Two Phase
 Hydrocarbon
 to Storage
 0 lb/hr

Final
 Cooler

11

Temperature 107.0 F

Pressure 250.0 psig*

Molar Flow 65.22 MMSCFD

11

2nd
 Stg

8

1st Stg

Intstg
 Cooler

Intstg Liq

0.0000 USGPM

Two Phase
 Hydrocarbon
 to Storage
 0 lb/hr

Final
 Cooler

11

Temperature 107.0 F

Pressure 250.0 psig*

Molar Flow 65.22 MMSCFD

11

2nd
 Stg

8

1st Stg

Intstg
 Cooler

Intstg Liq

0.0000 USGPM

Two Phase
 Hydrocarbon
 to Storage
 0 lb/hr

Final
 Cooler

11

Temperature 107.0 F

Pressure 250.0 psig*

Molar Flow 65.22 MMSCFD

11

2nd
 Stg

8

1st Stg

Intstg
 Cooler

Intstg Liq

0.0000 USGPM

Two Phase
 Hydrocarbon
 to Storage
 0 lb/hr

Final
 Cooler

11

Temperature 107.0 F

Pressure 250.0 psig*

Molar Flow 65.22 MMSCFD

11

2nd
 Stg

8

1st Stg

Intstg
 Cooler

Intstg Liq

0.0000 USGPM

Two Phase
 Hydrocarbon
 to Storage
 0 lb/hr

Final
 Cooler

11

Temperature 107.0 F

Pressure 250.0 psig*

Molar Flow 65.22 MMSCFD

11

2nd
 Stg

8

1st Stg

Intstg
 Cooler

Intstg Liq

0.0000 USGPM

Two Phase
 Hydrocarbon
 to Storage
 0 lb/hr

Final
 Cooler

11

Temperature 107.0 F

Pressure 250.0 psig*

Molar Flow 65.22 MMSCFD

11

2nd
 Stg

8

1st Stg

Intstg
 Cooler

Intstg Liq

0.0000 USGPM

Two Phase
 Hydrocarbon
 to Storage
 0 lb/hr

Final
 Cooler

11

Temperature 107.0 F

Pressure 250.0 psig*

Molar Flow 65.22 MMSCFD

11

2nd
 Stg

8

1st Stg

Intstg
 Cooler

Intstg Liq

0.0000 USGPM

Two Phase
 Hydrocarbon
 to Storage
 0 lb/hr

Final
 Cooler

11

Temperature 107.0 F

Pressure 250.0 psig*

Molar Flow 65.22 MMSCFD

11

2nd
 Stg

8

1st Stg

Intstg
 Cooler

Intstg Liq

0.0000 USGPM

Two Phase
 Hydrocarbon
 to Storage
 0 lb/hr

Final
 Cooler

11

Temperature 107.0 F

Pressure 250.0 psig*

Molar Flow 65.22 MMSCFD

11

2nd
 Stg

8

1st Stg

Intstg
 Cooler

Intstg Liq

0.0000 USGPM

Two Phase
 Hydrocarbon
 to Storage
 0 lb/hr

Final
 Cooler

11

Temperature 107.0 F

Pressure 250.0 psig*

Molar Flow 65.22 MMSCFD

11

2nd
 Stg

8

1st Stg

Intstg
 Cooler

Intstg Liq

0.0000 USGPM

Two Phase
 Hydrocarbon
 to Storage
 0 lb/hr

Final
 Cooler

11

Temperature 107.0 F

Pressure 250.0 psig*

Molar Flow 65.22 MMSCFD

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2nd
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1st Stg

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Two Phase
 Hydrocarbon
 to Storage
 0 lb/hr

Final
 Cooler

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Temperature 107.0 F

Pressure 250.0 psig*

Molar Flow 65.22 MMSCFD

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 Stg

8

1st Stg

Intstg
 Cooler

Intstg Liq

0.0000 USGPM

Two Phase
 Hydrocarbon
 to Storage
 0 lb/hr

Final
 Cooler

11

Temperature 107.0 F

Pressure 250.0 psig*

Molar Flow 65.22 MMSCFD

11

2nd
 Stg

8

1st Stg

Intstg
 Cooler

Intstg Liq

0.0000 USGPM

Two Phase
 Hydrocarbon
 to Storage
 0 lb/hr

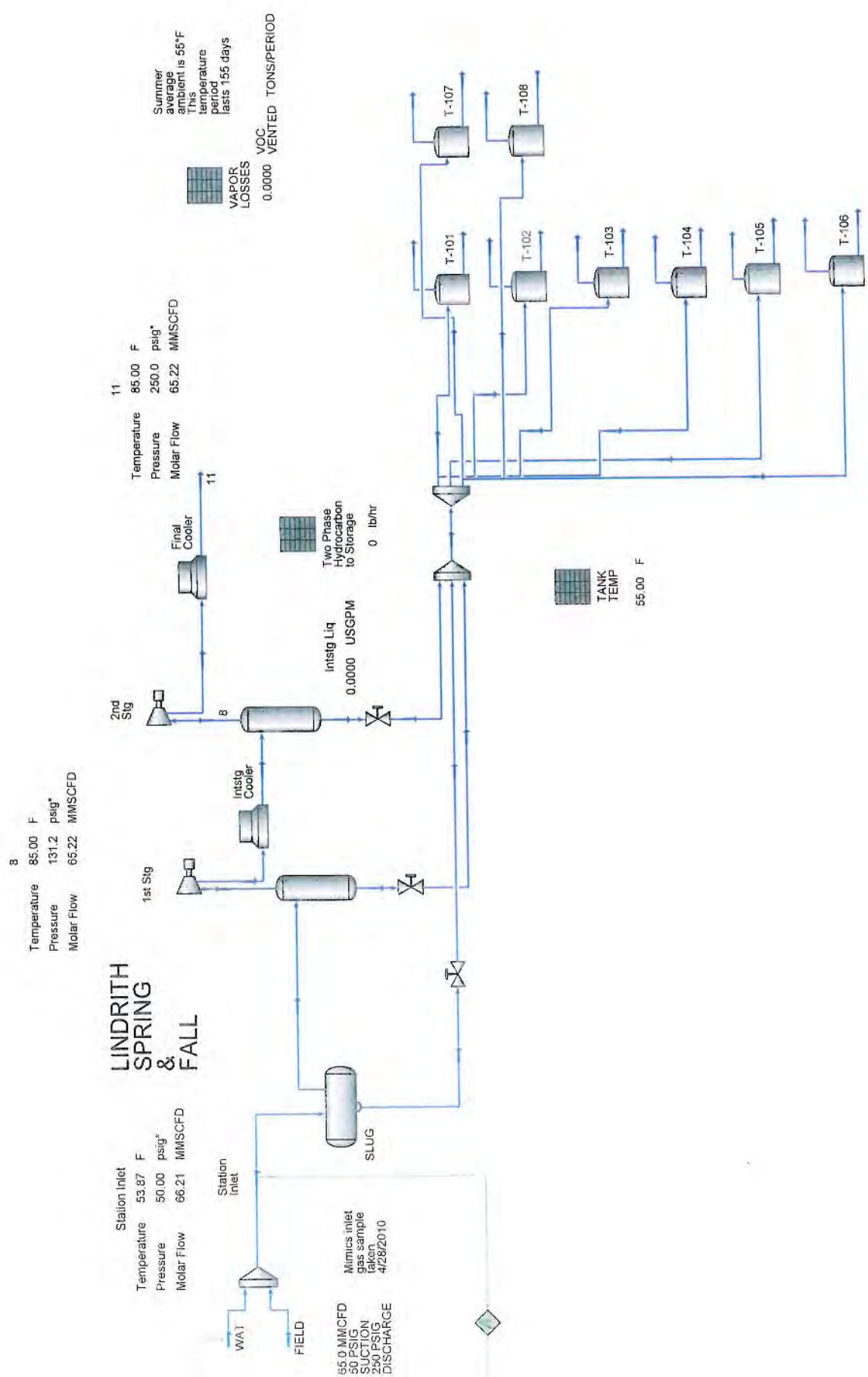
Final
 Cooler

11

Temperature 107.0 F

Pressure 250.0 psig*

Molar Flow 65.22 MMSCFD



TANKS 4.0.9d
Emissions Report - Detail Format
Tank Identification and Physical Characteristics

Identification

User Identification:	Lindrith CS
City:	
State:	NM
Company:	Enterprise
Type of Tank:	Horizontal Tank
Description:	Lindrith CS TK- / 450 bbl tank 12.75' diameter x 20' tall

Tank Dimensions

Shell Length (ft):	20.00
Diameter (ft):	12.75
Volume (gallons):	18,900.00
Turnovers:	5.56
Net Throughput(gal/yr):	105,000.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Medium
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meteorological Data used in Emissions Calculations: Albuquerque, New Mexico (Avg Atmospheric Pressure = 12.15 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

Lindrith CS - Horizontal Tank

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Vol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Gasoline (RVP 7)	Aug	67.36	53.93	80.79	59.23	4.0420	3.0751	5.2351	68.0000			92.00	Option 4: RVP#7, ASTM-Slope#3

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

Lindrith CS - Horizontal Tank

Annual Emission Calculations	
Standing Losses (lb):	4,401.0851
Vapor Space Volume (cu ft):	1,626.4495
Vapor Density (lb/cu ft):	0.0488
Vapor Space Expansion Factor:	0.9810
Vented Vapor Saturation Factor:	0.4228
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	1,626.4495
Tank Diameter (ft):	12.7500
Effective Diameter (ft):	18.0233
Vapor Space Outage (ft):	6.3750
Tank Shell Length (ft):	20.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0488
Vapor Molecular Weight (lb/lb-mole):	68.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.0400
Daily Avg. Liquid Surface Temp. (deg. R):	527.0322
Daily Average Ambient Temp. (deg. F):	96.1542
Ideal Gas Constant R (psia cu ft / (lb-mole deg R)):	10.731
Liquid Bulk Temperature (deg. R):	518.9042
Tank Paint Solar Absorptance (Shell):	0.8903
Daily Total Solar Insolation Factor (Btu/sq ft day):	1,765.3167
Vapor Space Expansion Factor:	
Vapor Space Expansion Factor:	0.9810
Daily Vapor Temperature Range (deg. R):	53.7178
Daily Vapor Pressure Range (psia):	2.1810
Breather Vent Press. Setting Range (psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.0400
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	3.0751
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	5.2361
Daily Avg. Liquid Surface Temp. (deg. R):	527.0322
Daily Min. Liquid Surface Temp. (deg. R):	513.6028
Daily Max. Liquid Surface Temp. (deg. R):	540.4617
Daily Ambient Temp. Range (deg. R):	27.9250
Vented Vapor Saturation Factor:	
Vented Vapor Saturation Factor:	0.4228
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.0400
Vapor Space Outage (ft):	6.3750
Working Losses (lb):	885.7932
Vapor Molecular Weight (lb/lb-mole):	68.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.0400
Annual Net Throughput (gal/yr.):	105,000.0000
Annual Turnovers:	5.6556
Turnover Factor:	1.0000
Tank Diameter (ft):	12.7500
Working Loss Product Factor:	1.0000
Total Losses (lb):	5,087.8783

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

Lindrith CS - Horizontal Tank

Components	Losses(lbs)		Total Emissions
	Working Loss	Breathing Loss	
Gasoline (RVP 7)	666.79	4,401.09	5,067.88

Truck Loading

Enterprise Field Services LLC

Lindrieth Compressor Station
Part 71 Renewal Application Update

Emissions Calculations
Truck Loading
Source ID No.: TLOAD

Operating Parameters

Loading Rate	20,000 bbls/yr 840,000 gallon/yr 16,800 gal/hr	(Assume one 400 tank per hour)
Vapor MW	33.76	AspenTech Condensate Analysis
Temp	85 F 544 R	Assumed Average
TVP	11.46 psia	@37.8C
Saturation factor	0.6	
Loading Loss	5.32 lb/Mgal	

AP-42 Calculation:	$L = 12.46 * S * P * M / T$
L	Loading Losses (lb/1000)
S	Saturation Factor
P	True Vapor Pressure
M	Molecular weight of vapor
T	Temperature

Estimated Emissions (NonSpeciated)

89.32 lb/hr	Gal/hr / 1000 x L
2.23 tpy	Gal/yr / 1000 x L / 2000 lb/ton

Speciated Truck Loading Emissions (Vapor Phase)

Component	Aspen Analysis	VOC	VOC	lb/hr	tpy
	Mass Fraction	Aspen Analysis	Normalized		
	Mass Fraction	Mass Fraction	Mass Fraction		
Nitrogen	0.0008				
CO2	0.0089				
Methane	0.1857				
Ethane	0.1969				
Propane	0.2589	0.2589	0.43	38.36	0.96
i-Butane	0.069	0.069	0.11	10.22	0.26
n-Butane	0.1131	0.1131	0.19	16.76	0.42
i-Pentane	0.0481	0.0481	0.08	7.13	0.18
n-Pentane	0.0376	0.0376	0.06	5.57	0.14
n-Hexane	0.0135	0.0135	0.02	2.00	0.05
n-Heptane	0.0142	0.0142	0.02	2.10	0.05
n-Octane	0.0027	0.0027	0.00	0.40	0.01
Cyclopentane	0.0031	0.0031	0.01	0.46	0.01
Benzene	0.002	0.002	0.00	0.30	0.01
Cyclohexane	0.0064	0.0064	0.01	0.95	0.02
2-Mhexane	0.0297	0.0297	0.05	4.40	0.11
25-Mhexane	0.0028	0.0028	0.00	0.41	0.01
Toluene	0.0017	0.0017	0.00	0.25	0.01
H2O	0.0047				
Total	1.00	0.60	1.00	89.32	2.23
Total VOC	0.60	0.60	1.00	89.32	2.23
Total HAP	0.02	0.02	0.04	3.50	0.09

Notes:

- The speciated truck emissions are based on the AspenTech Condensate analysis (vapor phase) mass fractions.
The vapor mass fraction analysis was normalized by deleting all non-VOC components.

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/10³ 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 Figure 7.1-5, Figure 7.1-6, and Table 7.1-2)

M = molecular weight of vapors, pounds per pound-mole (lb/lb-mole) (see Table 7.1-2)

T = temperature of bulk liquid loaded, °R (°F + 460)

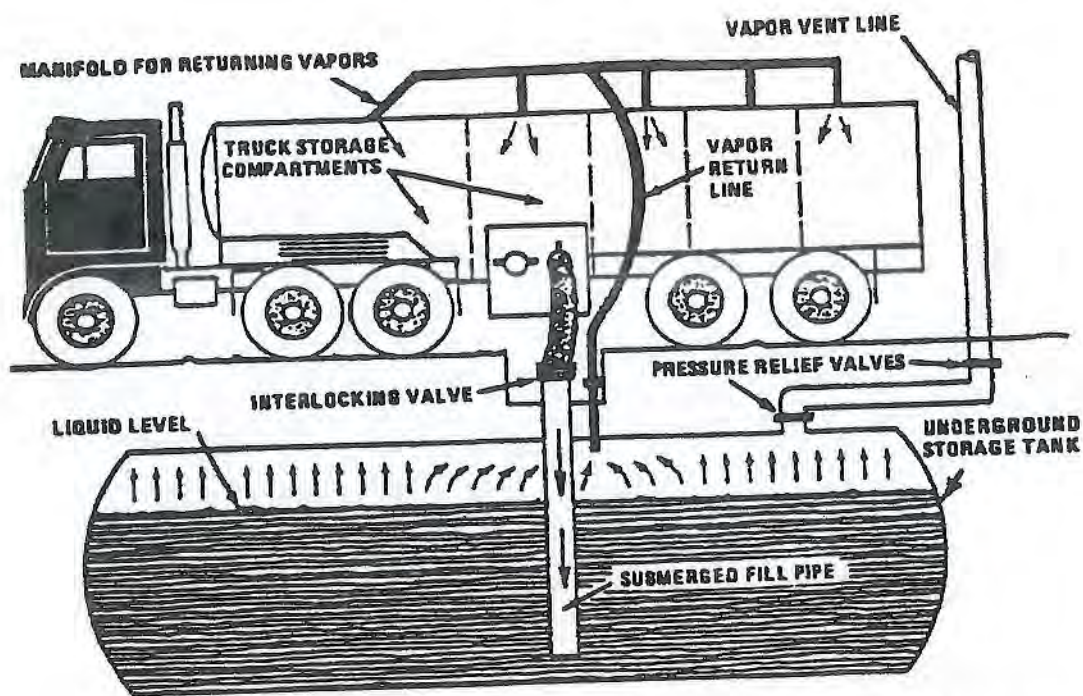


Figure 5.2-5. Tank truck unloading into a service station underground storage tank and practicing "vapor balance" form of emission control.

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.

Fugitives

May 2010

Operating Parameters

Annual Operation: 8,760 hrs/yr

Pollutant	CAS No.	Stream Composition (Wt%)		Emissions	
		Gas	Light Oil	Average ⁽¹⁾ (lbs/hr)	Annual ⁽²⁾ (tons/yr)
Volatile Organic Compounds (VOC)		21.71%	100.00%	0.756	3.310
Benzene	00071-43-2	0.065%		0.001	0.004
n-Hexane	00110-54-3	0.498%		0.007	0.031

(1) Calculated as:

$$\text{Gas Comp. (wt\%)} \times \text{Total Gas Service Emissions (lbs/hr)} + \text{Lt Oil Composition (wt\%)} \times \text{Total Lt Oil Service Emissions (lbs/hr)}$$

(2) Calculated as: Average Emissions (lbs/hr) X Annual Operation (hrs/yr) ÷ 2,000 lbs/ton

Component Type	Service	Number of Components ⁽¹⁾	Emission Factors ⁽²⁾		Hourly Emissions ⁽³⁾ (lbs/hr)
			(kg/hr/source)	(lbs/hr/source)	
Valves	Gas	100	4.5E-03	9.9E-03	0.992
	Light Oil	50	2.5E-03	5.5E-03	0.276
Pump Seals	Gas	0	2.4E-03	5.3E-03	0.000
	Light Oil	2	1.3E-02	2.9E-02	0.057
Other Equipment	Gas	10	8.8E-03	1.9E-02	0.194
	Light Oil	5	7.5E-03	1.7E-02	0.083
Connectors	Gas	50	2.0E-04	4.4E-04	0.022
	Light Oil	25	2.1E-04	4.6E-04	0.012
Flanges	Gas	200	3.9E-04	8.6E-04	0.172
	Light Oil	100	1.1E-04	2.4E-04	0.024
Open-Ended Lines	Gas	5	2.0E-03	4.4E-03	0.022
	Light Oil	0	1.4E-03	3.1E-03	0.000
Totals	Gas	365			1.40
	Light Oil	182			0.45

(1) Number of components is a conservative estimate based on similar installations.

(2) Source: 1995 Protocol for Equipment Leak Emission Estimates (EPA-453/R-95-017); Table 2-4. Oil and Gas Production Operations
Average Emission Factors (kg/hr/source factors converted to lbs/hr/source by multiplying by 2.20462 lbs/kg)

(3) Calculated as: Number of components X Emission Factor (lbs/hr/source)

Enterprise Field Services LLC

Lindrith Compressor Station

Part 71 Renewal Application Update

April 2010 Gas Analysis

Meter Number: --
Meter Name: Lindrith Inlet
Location:
Sample Date: 4/28/2010
File name, TCD: Lindrith Inlet.run
File name, FID: Lindrith Inlet.run

Flow Pressure: 57
Flow Temp: 57
H2O, Lb/MMCF: --
H2S, ppmol: --
Type: Spot
Pulled by: Dennis Bird

Component	Mol%	MolWt	Mol% x MW	Wt%
Carbon Dioxide	0.4879	44.0	0.21	1.03%
Hydrogen Sulfide	0.0000	34.0	0.00	0.00%
Nitrogen	0.6416	28.0	0.18	0.86%
Methane	80.7843	16.0	12.96	62.25%
Ethane	9.7943	30.1	2.95	14.15%
Propane	4.6660	44.1	2.06	9.88%
Isobutane	0.8009	58.1	0.47	2.24%
n-Butane	1.2840	58.1	0.75	3.58%
Isopentane	0.4379	72.2	0.32	1.52%
n-Pentane	0.3499	72.2	0.25	1.21%
Cyclopentane	0.0259	70.1	0.02	0.09%
n-Hexane	0.1203	86.2	0.10	0.50%
Cyclohexane	0.0564	84.2	0.05	0.23%
Other Hexanes	0.2785	86.2000	0.24	1.15%
Heptanes	0.1469	100.2000	0.15	0.71%
Methylcyclohexane	0.0415	98.2	0.04	0.20%
2,2,4 Trimethylpentar	0.0000	114.2	0.00	0.00%
Benzene	0.0172	78.1	0.01	0.06%
Toluene	0.0199	92.1	0.02	0.09%
Ethylbenzene	0.0007	106.2	0.00	0.00%
Xylenes	0.0009	106.2	0.00	0.00%
C8+ Heavies	0.0450	114.2300	0.05	0.25%
Total	100.0000		20.82	100.00%

VOC Wt%

21.71%

Maintenance, Startup, and Shutdown

Maintenance, Startup, and Shutdown Emissions

Pollutant	CAS No.	Stream Composition (Wt%)	Emissions	
		Gas	Hourly (lb/hr)	Annual (tons/yr)
Volatile Organic Compounds (VOC)		21.71%	119.25	23.85
Benzene	00071-43-2	0.06%	0.35	0.07
n-Hexane	00110-54-3	0.50%	2.74	0.55

Gas Molecular Weight:

20.82 lb/lb-mol

Gas Constant

379 scf/lb-mol

Component Type	Blowdown		Hourly lb/hr	Annual tpy
	scf/hr	MMscf/yr		
Total Natural Gas Blown Down for MSS	10,000	4.0	549.26	109.85

Notes

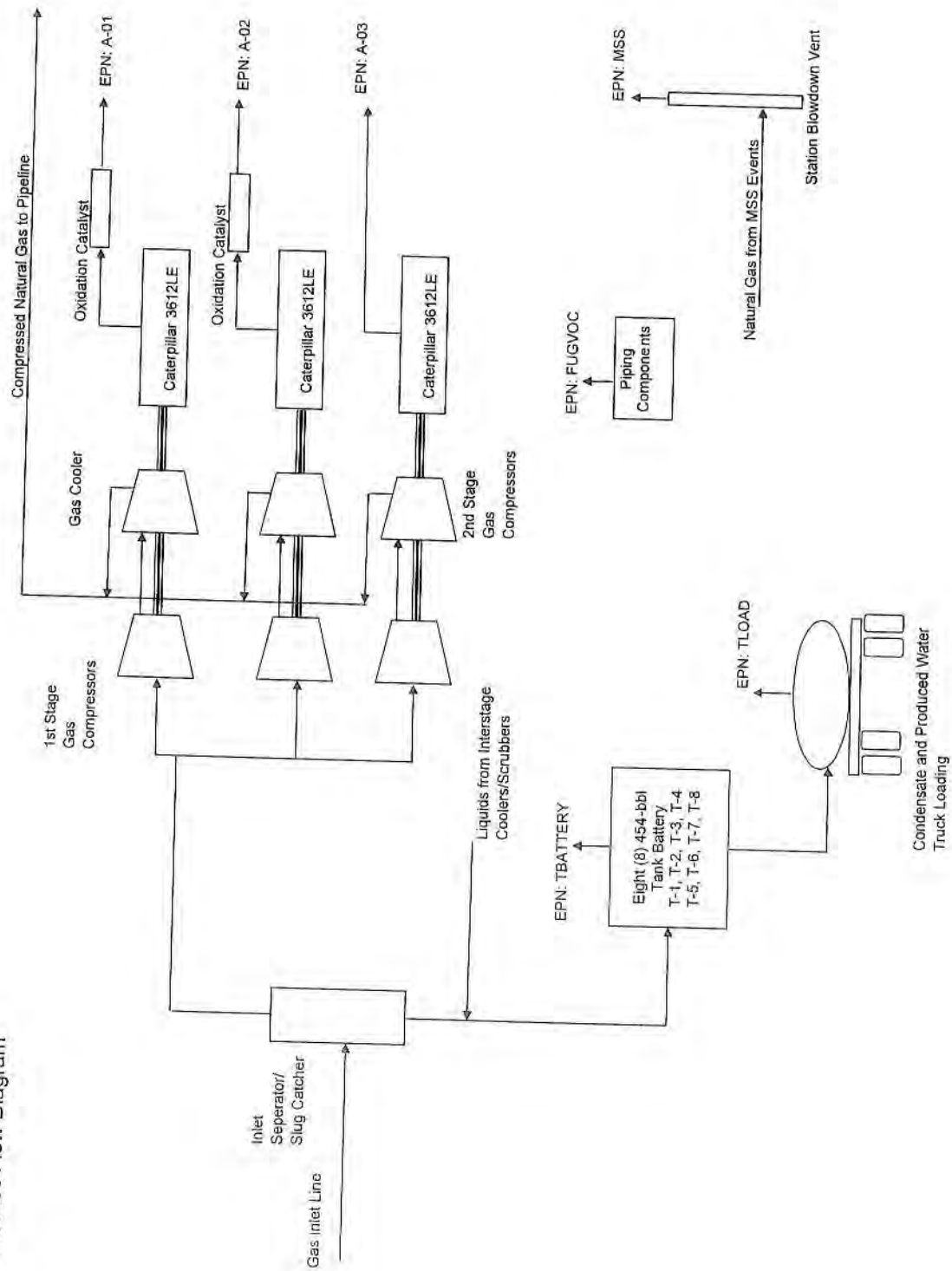
(1) MSS emissions include gas blowdown for maintenance, startups, and shutdowns.

APPENDIX B

Process Flow Diagram

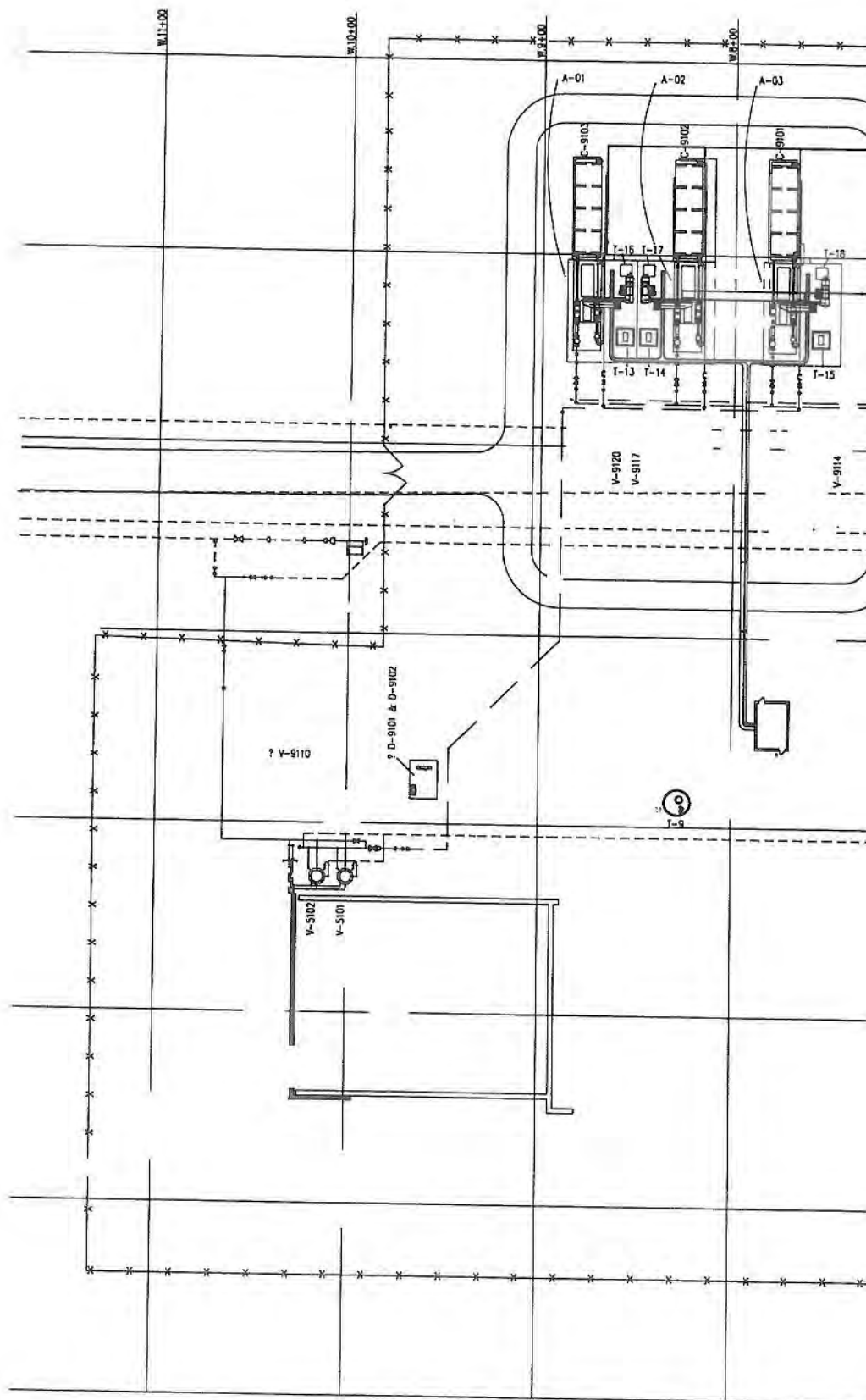
Enterprise Field Services
 Lincirith Compressor Station
 Part 71 Renewal Application Update

Process Flow Diagram



APPENDIX C

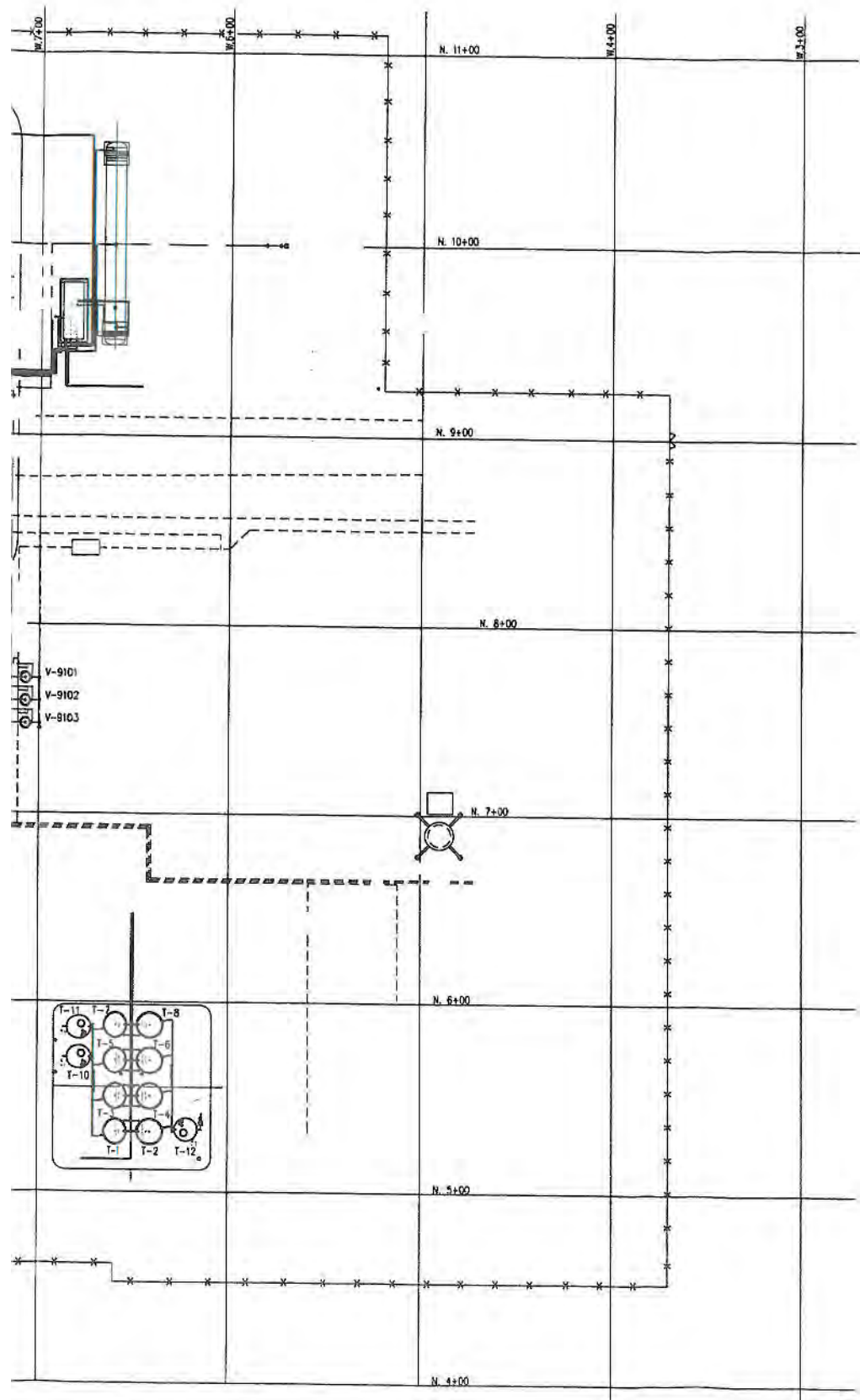
Plot Plan

NOTES:

Lindrith Compressor Station

Equipment Environmental Identification

Permit ID	Optional ID	Description	Size	Emission Controls
A-01	Unit 9103	Caterpillar 3612	3267 hp	Catalytic Oxidation System
A-02	Unit 9102	Caterpillar 3612	3267 hp	Catalytic Oxidation System
A-03	Unit 9101	Caterpillar 3612	3267 hp	None
T-1	T-1	Water Storage	454 bbl	None
T-2	T-2	Water Storage	454 bbl	None
T-3	T-3	Water Storage	454 bbl	None
T-4	T-4	Condensate / Produced Water Storage	454 bbl	None
T-5	T-5	Produced Water Storage	454 bbl	None
T-6	T-6	Produced Water Storage	454 bbl	None
T-7	T-7	Produced Water Storage	454 bbl	None
T-8	T-8	Produced Water Storage	454 bbl	None
T-9	T-9	Compressor Skid Drain Sump Tank	120 bbl	None
T-10	T-10	Water Separation Tank	120 bbl	None
T-11	T-11	Water Separation Tank	120 bbl	None
T-12	T-12	Water Separation Tank	120 bbl	None
T-13	T-13	Lube Oil Storage	500 gal	None
T-14	T-14	Lube Oil Storage	500 gal	None
T-15	T-15	Lube Oil Storage	500 gal	None
T-16	T-16	Ambitrol Storage	500 gal	None
T-17	T-17	Ambitrol Storage	500 gal	None
T-18	T-18	Ambitrol Storage	500 gal	None



ENTERPRISE
FIELD
SERVICES LLC

LINDRITH STATION PLOT PLAN

LINDRITH STATION

DRAWN: JMF

RIO ARRIBA, NM

DATE: 08/17/94

JA NO. 2357.04R FILE NAME LD-01-P0011

AFE NO. SCALE 1"=40'

BASE NO. 15403

DWG. NO. LD-01-P0011