REDACTED APPLICATION

REGULATION 13 PERMIT APPLICATION FOR THE CONSTRUCTION OF A COAL TO GASOLINE PLANT IN MINGO COUNTY, WEST VIRGINIA

Prepared for:

TransGas Development Systems, LLC
630 First Avenue, Suite 30G
New York, New York 10013-3799

Prepared by:

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Project No. 0101-08-0324

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Attachments not applicable to this submission: Attachment R, Authority Forms and Attachment S, Title V Permit Revision Information.

SECTION I - III

GENERAL APPLICANT INFORMATION

WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION **DIVISION OF AIR QUALITY** 601 57th Street, SE Charleston, WV 25304 (304) 926-0475 www.wvdep.org/daq	***APPLICATION FOR NSR PERMIT*** ***AND*** ***TITLE V PERMIT REVISION*** ***(OPTIONAL)***
PLEASE CHECK ALL THAT APPLY TO **NSR (45CSR13)** (IF KNOWN): ☒ **CONSTRUCTION** ☐ **MODIFICATION** ☐ **RELOCATION** ☐ **CLASS I ADMINISTRATIVE UPDATE** ☐ **TEMPORARY** ☐ **CLASS II ADMINISTRATIVE UPDATE** ☐ **AFTER-THE-FACT**	PLEASE CHECK TYPE OF **45CSR30 (TITLE V)** REVISION (IF ANY): ☐ **ADMINISTRATIVE AMENDMENT** ☐ **MINOR MODIFICATION** ☐ **SIGNIFICANT MODIFICATION** IF ANY BOX ABOVE IS CHECKED, INCLUDE TITLE V REVISION INFORMATION AS **ATTACHMENT S** TO THIS APPLICATION

FOR TITLE V FACILITIES ONLY: Please refer to "Title V Revision Guidance" in order to determine your Title V Revision options (Appendix A, "Title V Permit Revision Flowchart") and ability to operate with the changes requested in this Permit Application.

Section I. General

1. Name of applicant *(as registered with the WV Secretary of State's Office):* TransGas Development Systems, LLC	2. Federal Employer ID No. ***(FEIN):*** 20343110
3. Name of facility *(if different from above):* TransGas Coal to Gasoline Plant	4. The applicant is the: ☐ **OWNER** ☐**OPERATOR** ☒ **BOTH**
5A. Applicant's mailing address: 630 First Avenue, Suite 30G New York, New York 10016-3799	5B. Facility's present physical address: New Facility Mingo County, West Virginia

6. **West Virginia Business Registration.** Is the applicant a resident of the State of West Virginia? ☒ **YES** ☐ **NO**

⇨ If **YES,** provide a copy of the **Certificate of Incorporation/Organization/Limited Partnership** (one page) including any name change amendments or other Business Registration Certificate as **Attachment A.**

⇨ If **NO,** provide a copy of the **Certificate of Authority/Authority of L.L.C./Registration** (one page) including any name change amendments or other Business Certificate as **Attachment A.**

7. If applicant is a subsidiary corporation, please provide the name of parent corporation: No

8. Does the applicant own, lease, have an option to buy or otherwise have control of the *proposed site?* ☒ **YES** ☐ **NO**

⇨ If **YES,** please explain: Applicant has an option on the site with the Mingo County Development Authority

⇨ If **NO,** you are not eligible for a permit for this source.

9. Type of plant or facility (stationary source) to be **constructed, modified, relocated, administratively updated** or **temporarily permitted** (e.g., coal preparation plant, primary crusher, etc.): Coal to Gasoline Plant	10. Standard Industrial Classification **(SIC)** code for the facility: 2999
11A. DAQ Plant ID No. (for existing facilities only): New Facility	11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only): New Facility

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

12A.

- ➪ For **Modifications, Administrative Updates** or **Temporary permits** at an existing facility, please provide directions to the *present location* of the facility from the nearest state road;
- ➪ For **Construction** or **Relocation permits,** please provide directions to the *proposed new site location* from the nearest state road. Include a **MAP** as **Attachment B**.

The facility will be located within the proposed Mingo County Development Authority Industrial Park in Mingo County off of WV Route 52 on the proposed connector road between WV Route 52 and the King Coal Highway (under construction). Current directions to the site from Charleston, West Virginia are provided with Attachment B.

12.B. New site address (if applicable): Not Applicable	12C. Nearest city or town: Wharncliffe	12D. County: Mingo
12.E. UTM Northing (KM): 4,162.9517	12F. UTM Easting (KM): 417.917	12G. UTM Zone: 17

13. Briefly describe the proposed change(s) at the facility:
This application is for construction of a new facility.

14A. Provide the date of anticipated installation or change: After receipt of Construction Permit from the WVDEP and other necessary regulatory approvals (2010 anticipated). ➪ If this is an **After-The-Fact** permit application, provide the date upon which the proposed change did happen: / /	14B. Date of anticipated Start-Up if a permit is granted: Operations will commence approximately 42 months after beginning of actual construction.

14C. Provide a **Schedule** of the planned **Installation** of/**Change** to and **Start-Up** of each of the units proposed in this permit application as **Attachment C** (if more than one unit is involved).

15. Provide maximum projected **Operating Schedule** of activity/activities outlined in this application:
Hours Per Day 24 Days Per Week 7 Weeks Per Year 52

16. Is demolition or physical renovation at an existing facility involved? ☐ **YES** ☒ **NO**

17. **Risk Management Plans.** If this facility is subject to 112(r) of the 1990 CAAA, or will become subject due to proposed changes (for applicability help see www.epa.gov/ceppo), submit your **Risk Management Plan (RMP)** to U. S. EPA Region III.

18. **Regulatory Discussion.** List all Federal and State air pollution control regulations that you believe are applicable to the proposed process *(if known)*. A list of possible applicable requirements is also included in Attachment S of this application (Title V Permit Revision Information). Discuss applicability and proposed demonstration(s) of compliance *(if known)*. Provide this information as **Attachment D.**

Section II. Additional attachments and supporting documents.

19. Include a check payable to WVDEP – Division of Air Quality with the appropriate **application fee** (per 45CSR22 and 45CSR13).

20. Include a **Table of Contents** as the first page of your application package.

21. Provide a **Plot Plan,** e.g. scaled map(s) and/or sketch(es) showing the location of the property on which the stationary source(s) is or is to be located as **Attachment E** (Refer to ***Plot Plan Guidance***) .
➪ Indicate the location of the nearest occupied structure (e.g. church, school, business, residence).

22. Provide a **Detailed Process Flow Diagram(s)** showing each proposed or modified emissions unit, emission point and control device as **Attachment F.**

23. Provide a **Process Description** as **Attachment G.**
➪ Also describe and quantify to the extent possible all changes made to the facility since the last permit review (if applicable).

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

24. Provide **Material Safety Data Sheets (MSDS)** for all materials processed, used or produced as **Attachment H.**

➪ For chemical processes, provide a MSDS for each compound emitted to the air.

25. Fill out the **Emission Units Table** and provide it as **Attachment I.**

26. Fill out the **Emission Points Data Summary Sheet (Table 1 and Table 2)** and provide it as **Attachment J.**

27. Fill out the **Fugitive Emissions Data Summary Sheet** and provide it as **Attachment K.**

28. Check all applicable **Emissions Unit Data Sheets** listed below:

☒ Bulk Liquid Transfer Operations
☐ Chemical Processes
☐ Concrete Batch Plant
☐ Grey Iron and Steel Foundry
☒ General Emission Unit, specify Process Units (See Section L)
☒ Haul Road Emissions
☐ Hot Mix Asphalt Plant
☐ Incinerator
☒ Indirect Heat Exchanger
☐ Quarry
☒ Solid Materials Sizing, Handling and Storage Facilities
☒ Storage Tanks

Fill out and provide the **Emissions Unit Data Sheet(s)** as **Attachment L.**

29. Check all applicable **Air Pollution Control Device Sheets** listed below:

☐ Absorption Systems
☐ Adsorption Systems
☐ Afterburner
☐ Other Collectors, specify
☒ Baghouse
☐ Condenser
☐ Electrostatic Precipitator
☒ Flare
☐ Mechanical Collector
☐ Wet Collecting System

NOTE: This section does not include process units which are part of a process design and are not add on control devices.

Fill out and provide the **Air Pollution Control Device Sheet(s)** as **Attachment M.**

30. Provide all **Supporting Emissions Calculations** as **Attachment N,** or attach the calculations directly to the forms listed in Items 28 through 31.

31. **Monitoring, Recordkeeping, Reporting and Testing Plans.** Attach proposed monitoring, recordkeeping, reporting and testing plans in order to demonstrate compliance with the proposed emissions limits and operating parameters in this permit application. Provide this information as **Attachment O.**

➢ Please be aware that all permits must be practically enforceable whether or not the applicant chooses to propose such measures. Additionally, the DAQ may not be able to accept all measures proposed by the applicant. If none of these plans are proposed by the applicant, DAQ will develop such plans and include them in the permit.

32. **Public Notice.** At the time that the application is submitted, place a **Class I Legal Advertisement** in a newspaper of general circulation in the area where the source is or will be located (See 45CSR§13-8.3 through 45CSR§13-8.5 and ***Example Legal Advertisement*** for details). Please submit the **Affidavit of Publication** as **Attachment P** immediately upon receipt.

33. **Business Confidentiality Claims.** Does this application include confidential information (per 45CSR31)?

☒ **YES** ☐ **NO**

➢ If **YES,** identify each segment of information on each page that is submitted as confidential and provide justification for each segment claimed confidential, including the criteria under 45CSR§31-4.1, and in accordance with the DAQ's ***"Precautionary Notice – Claims of Confidentiality"*** guidance found in the ***General Instructions*** as **Attachment Q.**

Section III. Certification of Information

34. **Authority/Delegation of Authority.** Only required when someone other than the responsible official signs the application. Check applicable **Authority Form** below: Not Applicable – Person signing below is a Responsible Official

☐ Authority of Corporation or Other Business Entity
☐ Authority of Governmental Agency
☐ Authority of Partnership
☐ Authority of Limited Partnership

Submit completed and signed **Authority Form** as **Attachment R.**

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

35A. **Certification of Information.** To certify this permit application, a Responsible Official (per 45CSR§13-2.22 and 45CSR§30-2.28) or Authorized Representative shall check the appropriate box and sign below.

Certification of Truth, Accuracy, and Completeness

I, the undersigned ☒ **Responsible Official** / ☐ **Authorized Representative,** hereby certify that all information contained in this application and any supporting documents appended hereto, is true, accurate, and complete based on information and belief after reasonable inquiry I further agree to assume responsibility for the construction, modification and/or relocation and operation of the stationary source described herein in accordance with this application and any amendments thereto, as well as the Department of Environmental Protection, Division of Air Quality permit issued in accordance with this application, along with all applicable rules and regulations of the West Virginia Division of Air Quality and W.Va. Code § 22-5-1 et seq. (State Air Pollution Control Act). If the business or agency changes its Responsible Official or Authorized Representative, the Director of the Division of Air Quality will be notified in writing within 30 days of the official change.

Compliance Certification

Except for requirements identified in the Title V Application for which compliance is not achieved, I, the undersigned hereby certify that, based on information and belief formed after reasonable inquiry, all air contaminant sources identified in this application are in compliance with all applicable requirements.

SIGNATURE ______________ *(Please use blue ink)* DATE: 12/17/08 *(Please use blue ink)*

35B. Printed name of signee: Adam Victor		35C. Title: President
35D. E-mail: adamvictor@transgasenergy.com	36E. Phone: (212) 828-0001	36F. FAX: (212) 828-0002
36A. Printed name of contact person (if different from above): Aaron Daley		36B. Title: Manager of Development
36C. E-mail: aarondaley@ transgasenergy.com	36D. Phone: (212) 725-1956	36E. FAX: (212) 828-0002

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

☒ **Attachment A: Business Certificate**
☒ **Attachment B: Map(s)**
☒ **Attachment C: Installation and Start Up Schedule**
☒ **Attachment D: Regulatory Discussion**
☒ **Attachment E: Plot Plan**
☒ **Attachment F: Detailed Process Flow Diagram(s)**
☒ **Attachment G: Process Description**
☒ **Attachment H: Material Safety Data Sheets (MSDS)**
☒ **Attachment I: Emission Units Table**
☒ **Attachment J: Emission Points Data Summary Sheet**
☒ **Attachment K: Fugitive Emissions Data Summary Sheet**
☒ **Attachment L: Emissions Unit Data Sheet(s)**
☒ **Attachment M: Air Pollution Control Device Sheet(s)**
☒ **Attachment N: Supporting Emissions Calculations**
☒ **Attachment O: Monitoring/Recordkeeping/Reporting/Testing Plans**
☒ **Attachment P: Public Notice**
☒ **Attachment Q: Business Confidential Claims**
☐ **Attachment R: Authority Forms**
☐ **Attachment S: Title V Permit Revision Information**
☒ **Application Fee**

Please mail an original and three (3) copies of the complete permit application with the signature(s) to the DAQ, Permitting Section, at the address listed on the first page of this application. Please DO NOT fax permit applications.

FOR AGENCY USE ONLY – IF THIS IS A TITLE V SOURCE:
☐ ***Forward 1 copy of the application to the Title V Permitting Group and:***
☐ ***For Title V Administrative Amendments:***
  ☐ ***NSR permit writer should notify Title V permit writer of draft permit,***
☐ ***For Title V Minor Modifications:***
  ☐ ***Title V permit writer should send appropriate notification to EPA and affected states within 5 days of receipt,***
  ☐ ***NSR permit writer should notify Title V permit writer of draft permit.***
☐ ***For Title V Significant Modifications processed in parallel with NSR Permit revision:***
  ☐ ***NSR permit writer should notify a Title V permit writer of draft permit,***
  ☐ ***Public notice should reference both 45CSR13 and Title V permits,***
  ☐ ***EPA has 45 day review period of a draft permit.***

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

ATTACHMENT A

BUSINESS CERTIFICATE

2008	WEST VIRGINIA STATE TAX DEPARTMENT	2010

BUSINESS REGISTRATION CERTIFICATE

ISSUED TO:

TRANSGAS DEVELOPMENT SYSTEMS, LLC
630 1ST AVE STE 30G
NEW YORK, NY 10016-3799

BUSINESS REGISTRATION ACCOUNT NUMBER: **2218-0756**

This certificate is issued for the registration period beginning: **July 1, 2008**

This certificate is valid until: **June 30, 2010**

This business registration certificate is issued by the West Virginia State Tax Commissioner in accordance with Chapter 11, Article 12 of the West Virginia Code.

The person or organization identified on this certificate is registered to conduct business in the State of West Virginia at the location above.

This certificate is not transferrable and must be displayed at the location for which issued.

ENGAGING IN BUSINESS WITHOUT CONSPICUOUSLY POSTING A WEST VIRGINIA BUSINESS REGISTRATION CERTIFICATE IN THE PLACE OF BUSINESS IS A CRIME AND MAY SUBJECT YOU TO FINES PER W. VA. CODE § 11-9.

TRAVELING/STREET VENDORS: Must carry a copy of this certificate in every vehicle operated by them.
CONTRACTORS, DRILLING OPERATORS, TIMBER/LOGGING OPERATIONS: Must have a copy of this certificate displayed at every job site within West Virginia.

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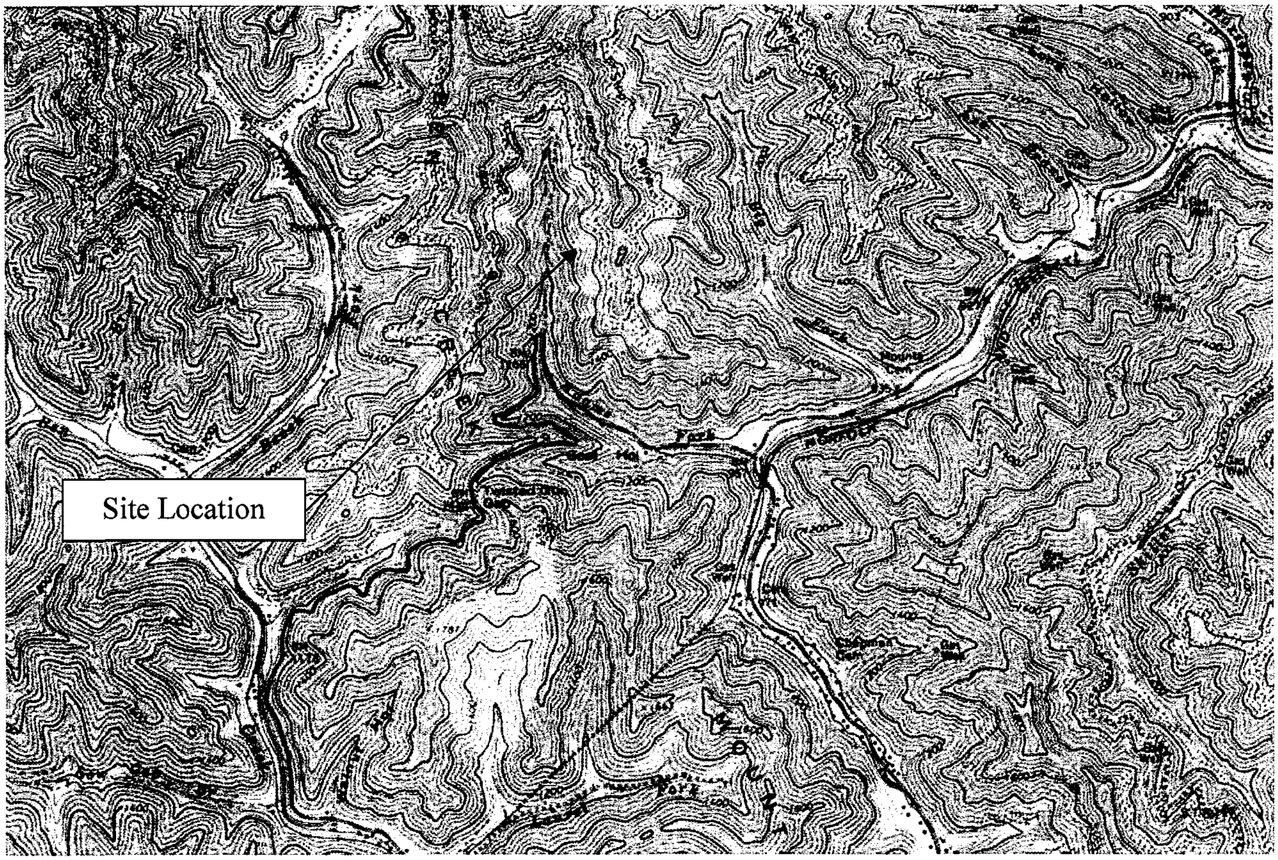
ATTACHMENT B

AREA MAP



Reference: Wharncliffe, West Virginia Quadrangle

Potesta & Associates, Inc.
7012 MacCorkle Avenue, SE, Charleston, WV 25304
Phone: (304) 342-1400 Fax: (304) 343-9031
E-Mail: potesta@potesta.com

Transgas Development Systems, LLC
Coal to Gasoline Plant
Wharncliffe, West Virginia
Project No. 0101-08-0324

Driving Directions from Charleston, West Virginia to Site

- Take US Route 119 South (Corridor G) toward Logan, West Virginia (approximately 50 miles).
- Veer right onto the Logan exit (Route 73).
- At the end of the exit ramp, turn left at the stop light onto Route 73 toward Logan.
- Go approximately 2 miles to the Logan Boulevard until Route 44 South is directly in front of you at the stop light.
- Go through the stop light and travel approximately 17 miles on Route 44 South to the intersection of Route 44 and Route 52 (the top of Horsepen Mountain).
- Turn left onto 52 South toward Gilbert. Stay straight approximately 8 miles.
- Turn right onto Gilbert Creek (County Route 13). From Gilbert Creek, follow the signs that say "Twisted Gun Golf Course".
- Turn right onto Ben Creek (County Route 10), still following signs to Twisted Gun Golf Course.
- Stop at the Cobra Natural Resources' guard shack at the top of the mountain. Site visits need to be coordinated with Cobra's as this is an active mining site.

ATTACHMENT C

INSTALLATION AND START UP SCHEDULE

ATTACHMENT C

INSTALLATION AND START UP SCHEDULE

Construction of the facility will begin after receipt of Construction Permit from WVDEP and other necessary regulatory approvals (2010 anticipated). Operations will commence approximately 42 months after the beginning of construction.

ATTACHMENT D

REGULATORY DISCUSSION

ATTACHMENT D

REGULATORY DISCUSSION

The facility proposed herein, or portions of the facility, may be subject to the following state and federal rules and regulations based on a review of potential air quality regulations. This facility is being designed as a minor source of emissions; therefore, is not subject to Prevention of Significant Deterioration (PSD) or National Emissions Standards for Hazardous Air Pollutants (NESHAPS). Additionally, there is discussion concerning the major process emissions points and the applicable requirements.

1. STATE REGULATIONS

A. 45CSR2 – "To Prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers"

Sets emission limits on particulate matter mass and opacity from indirect heat exchangers such as the proposed startup boiler. Opacity is generally restricted to no more than 10% while the mass limit is set by a multiplier and the unit's total design heat input (BTU/hr). The start-up boiler will be subject to this rule.

B. 45CSR2A – "Testing, Monitoring, Recordkeeping and Reporting Requirements Under 45CSR2"

Provides guidance for complying with the requirements of 45CSR2.

C. 45CSR4 – "To Prevent and Control the Discharge of Air Pollutants into the Open Air Which Causes or Contributes to an Objectionable Odor or Odors"

The proposed facility will control the discharge of objectionable odors.

D. 45CSR5 - "To Prevent and Control Air Pollution from the Operation of Coal Preparation Plants, Coal Handling Operations and Coal Refuse Disposal Areas"

45CSR5 requires the facility to maintain fugitive dust control systems on coal processing equipment. Controls are proposed herein for the coal system.

E. 45CSR7 – "To Prevent and Control Particulate Matter Air Pollution from Manufacturing Processes and Associated Operations"

Sets emission limits on particulate matter mass and opacity from manufacturing processes. Opacity is generally restricted to no more than 20% while the mass limit is a function of source type and process weight rate as established in Table 45-7A of the rule. Proposed manufacturing process units are defined as type "a" and type "d" units in accordance with 45CSR7. Rule 7 will apply to the limestone handling as a type "a" source and ash handling and process heaters as a type "d" source.

F. 45CSR7A – "Compliance Test Procedures for 45CSR7 – To Prevent and Control Particulate Matter Air Pollution from Manufacturing Process Operations"

Provides guidance for complying with the requirements of 45CSR7.

G. 45CSR10 – "To Prevent and Control Air Pollution from the Emission of Sulfur Oxides"

Sets emission limits on sulfur dioxide from fuel burning units, manufacturing processes, and combustion of process gas streams. The rule establishes emission limits based on a multiplier and the total design heat input (BTU/hr) for combustion sources. Manufacturing process units generating sulfur dioxide emissions are restricted to an in-stack sulfur dioxide concentration of no more than 2,000 ppm.

H. 45CSR10A – "Testing, Monitoring, Recordkeeping and Reporting Requirements Under 45CSR10"

Provides guidance for complying with the requirements of 45CSR10.

I. 45CSR13 – "Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Temporary Permits, General Permits, and Procedures for Evaluation"

The applicant of the proposed facility is required to obtain a permit prior to the start of construction. This application is being submitted based on the requirements of 45CSR13 to obtain said permit.

J. 45CSR16 – "Standards of Performance for New Stationary Sources"

45CSR16 formally adopts NSPS of 45CFR60 which are the federal standards discussed below.

K. 45CSR20 – "Good Engineering Practice as Applies to Stack Heights"

Facility stack heights will meet the requirements 45CSR20.

L. 45SCR30 – "Requirements for Operation Permits"

Requires permitting under Title V of the Clean Air Act as needed. This facility is designed to be a minor source under Title V and is deferred from obtaining a Title V Permit at this time. The facility will pay operating fees under Title V since it is subject to NSPS Standards.

M. 45CSR31 – "Confidential Information"

This application contains confidential information. This claim of confidentiality is made in accordance with the requirements of 45CSR31.

2. FEDERAL REGULATIONS

A. 40CFR60 Subpart Y – "Standards of Performance for Coal Preparation Plants"

Requires written notification of construction and startup, operation of air pollution control equipment, and performance testing and recordkeeping. The proposed coal processing equipment up to the feed hoppers is subject to Subpart Y.

B. 40CFR60 Subpart OOO – "Standards of Performance for Nonmetallic Mineral Processing Plants"

Requires written notification of construction and startup, operation of air pollution control equipment, and performance testing and recordkeeping. The proposed limestone processing equipment up to the feed hoppers is subject to Subpart OOO.

C. 40CFR60 Subpart RRR – "Standards of Performance for Volatile Organic Compounds Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes"

This facility makes methanol as an intermediate product which is then formed into the final products. Methanol is listed as a material in the regulation.

D. Subpart NNN - "Standards of Performance for Volatile Organic Compound (VOC) Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations"

This facility makes methanol as an intermediate product which is then formed into the final products. Methanol is listed as a material in the regulation.

E. Subpart Kb—Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984

There are three (3) gasoline tanks and one (1) methanol tank proposed for the site each with two (2) million gallon capacity.

The storage tanks will be subject to this rule. The engineering design for the tanks will incorporate the requirements as stated in Section 60.112b and will include a fixed roof tank with an internal floating roof. The tanks will also be subject to the monitoring, recordkeeping, reporting, and testing requirements as stated in sections 60.113b., 60.115b., and 60.116b.

F. Subpart Dc—Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units

The start-up boiler will be subject to this rule.

G. Subpart VVa—Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006

The fugitive emissions of volatile organic compounds occur at several sections of the facility. This facility makes methanol and other products as an intermediate product or within the final product which are listed in the rule.

This regulation applies to pumps, compressors, pressure relief devised, sampling connections, open-ended valves or lines, and flanges or other connectors that operate in VOC service at synthetic organic chemical manufacturing facilities. This facility meets the definition of a SOCMI facility and the portions of the facility in VOC service are subject to the rule. The rule establishes leak definitions for the sources and sets requirements for leak detection and repair.

H. 40CFR60, Subpart XX - Standards of Performance for Bulk Gasoline Terminals

There are two (2) gasoline loading racks at the facility for loading gasoline to either tank trucks or tank rail cars for shipping to market. The following regulation has been identified as being applicable to this source when loading trucks.

40CFR60, Subpart XX—Standards of Performance for Bulk Gasoline Terminals

Sets emission standards for that apply to the loading racks at a bulk gasoline terminal which deliver liquid product into gasoline tank trucks. The proposed system is to be designed to meet the requirements of MACT level control as stated in AP-42, 5.2 Transportation And Marketing Of Petroleum Liquids. The loading and control of the system shall be designed to meet the applicable requirements contained in 60.502, and monitoring, recordkeeping, reporting, and testing as required in sections 60.502, 60.503, and 60.505.

The limit set by section 60.502(b) is a not to exceed of 35 milligrams of total organic compounds per liter of gasoline loaded. The system will be designed to meet this requirement.

I. Part 60 – Standards of Performance for New Stationary Sources Subpart A – General Provisions Part 60.18-General Control Device Requirements.

The flare will be subject to this section. The engineering design for the flare will incorporate these requirements.

3. SPECIFIC POINTS OF INTEREST

A. MTG Start-Up/Regeneration Gas Heater Operation (E1)

The emissions from the operation of the MTG Start-up/Regeneration Gas Heater are emitted through emission point E1. This unit is fired by syngas produced within the plant and the unit is not used to destroy a waste stream from the process. The unit is not in continuous operation as it only operates during process start-up and regeneration of the catalysts.

45CSR2 – "To Prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers"

The purpose of the rule is to prevent and control particulate matter air pollution from indirect heat exchangers. Process heaters are excluded from the definition of indirect heat exchangers.

45CSR4 – "To Prevent and Control the Discharge of Air Pollutants into the Open Air Which Causes or Contributes to an Objectionable Odor or Odors"

There are no anticipated objectionable odors from the operation of this source.

45CSR7 – "To Prevent and Control Particulate Matter Air Pollution from Manufacturing Processes and Associated Operations"

This rule establishes emissions limitations for smoke and particulate matter which are discharged from process heaters. This heater (30.0 MM Btu/hr) is in the process of the MTG unit within the facility and is part of the chemical change manufacturing facility classified as Type "d".

For Type "d" operations the allowable particulate emissions rate from the total operation is based on the process weight rate in pounds per hour and Table 45-7A. The process weight rate is the methanol charged to the system which is 526,000 pound per hour. Table 47-7A provides a maximum allowable of 21.2 pounds per hour for the sources. The proposed emission rate of 0.223 pounds per hour meets the requirements under this rule.

45CSR10 – "To Prevent and Control Air Pollution from the Emission of Sulfur Oxides"

The purpose of this rule is to prevent and control air pollution from the emissions of sulfur dioxides. By definition, the process heater is considered Type "b" fuel burning unit (45CSR10-2.8.b.).

For Type 'b' fuel burning units the emission limit is the product of 3.2 and the total design heat inputs for such units in million B.T.U.'s per hour (45CSR10-3.1.e.). Therefore, the allowable sulfur dioxide emissions rate from the total maximum heat input (30 MM Btu/hr) is 96.0 pounds per hour. The syngas fuel used in this system is sulfur-free; therefore, there are no anticipated emissions of sulfur from the combustion of syngas in the system.

40 CFR 60, Subpart Dc: Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units

This is a process heater and is not a steam generating unit; therefore, the unit is not subject to 40CFR60, Subpart Dc.

40 CFR 60, Subpart RRR: Standards of Performance for Volatile Organic Compound Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Process.

The unit burns syngas from the front end of the plant and is not a control device for destruction of volatile organic compounds or total organic compounds; therefore, is not subject to 40CFR60, Subpart RRR.

40 CFR 60, Subpart NNN: Standards of Performance for Volatile Organic Compound Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Process.

The unit burns syngas from the front end of the plant and is not a control device for destruction of volatile organic compounds or total organic compounds; therefore, is not subject to 40CFR60, Subpart NNN.

B. MTG Start-Up/Regeneration Gas Heater Operation (E2)

The emissions from the operation of the MTG Start-up/Regeneration Gas Heater are emitted through emission point E2. This unit is fired by syngas produced within the plant and the unit is not used to destroy a waste stream from the process. The unit is not in continuous operations as it only operates during start-up and regeneration of the catalysts.

45CSR2 – "To Prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers"

The purpose of the rule is to prevent and control particulate matter air pollution from indirect heat exchangers. Process heaters are excluded from the definition of indirect heat exchangers.

45CSR4 – "To Prevent and Control the Discharge of Air Pollutants into the Open Air Which Causes or Contributes to an Objectionable Odor or Odors"

There are no anticipated objectionable odors from the operation of this source.

45CSR7 – "To Prevent and Control Particulate Matter Air Pollution from Manufacturing Processes and Associated Operations"

This rule establishes emissions limitations for smoke and particulate matter which are discharged from process heaters. This heater (120 MM Btu/hr) is in the process of the MTG unit within the facility and is part of the chemical change manufacturing facility classified as Type "d".

For Type "d" operations the allowable particulate emissions rate from the total operation is based on the process weight rate in pounds per hour and Table 45-7A. The process weight rate is the methanol charged to the system which is 526,000 pound per hour. Table 47-7A provides a maximum allowable of 21.2 pounds per hour for the sources. The proposed emission rate of 0.89 pounds per hour meets the requirements under this rule.

45CSR10 – "To Prevent and Control Air Pollution from the Emission of Sulfur Oxides"

The purpose of this rule is to prevent and control air pollution from the emissions of sulfur dioxides. By definition, the heater is considered Type "b" fuel burning unit (45CSR10-2.8.b.).

For Type 'b' fuel burning units the emission limit is the product of 3.2 and the total design heat inputs for such units in million B.T.U.'s per hour (45CSR10-3.1.e.). Therefore, the allowable sulfur dioxide emissions rate from the total maximum heat input (120 MM Btu/hr) is 384.0 pounds per hour. The syngas fuel used in this system is sulfur-free; therefore, there are no anticipated emissions of sulfur from the combustion of syngas in the system.

40 CFR 60, Subpart Dc: Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units

This is a process heater and is not a steam generating unit; therefore, the unit is not subject to 40CFR60, Subpart Dc.

40 CFR 60, Subpart RRR: Standards of Performance for Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Process.

The unit burns syngas from the front end of the plant and is not a control device for destruction of volatile organic compounds or total organic compounds; therefore, is not subject to 40CFR60, Subpart RRR.

40 CFR 60, Subpart NNN: Standards of Performance for Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Process.

The unit burns syngas from the front end of the plant and is not a control device for destruction of volatile organic compounds or total organic compounds; therefore, is not subject to 40CFR60, Subpart NNN.

C. MTG Start-Up/Regeneration Gas Heater Operation (E3)

The emissions from the operation of the MTG Start-up/Regeneration Gas Heater are emitted through emission point E3. This is a continuous operating unit, is a process heater, and is fueled with syngas from the process. This is not a control device or a unit which is used to destroy a waste product from the plant. This unit heats an intermediate product prior to further processing.

45CSR2 – "To Prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers"

The purpose of the rule is to prevent and control particulate matter air pollution from indirect heat exchangers. Process heaters are excluded from the definition of indirect heat exchangers.

45CSR4 – "To Prevent and Control the Discharge of Air Pollutants into the Open Air Which Causes or Contributes to an Objectionable Odor or Odors"

There are no anticipated objectionable odors from the operation of this source.

45CSR7 – "To Prevent and Control Particulate Matter Air Pollution from Manufacturing Processes and Associated Operations"

This rule establishes emissions limitations for smoke and particulate matter which are discharged from process heaters. This heater (4.0 MM Btu/hr) is in the process of the MTG unit within the facility and is part of the chemical change manufacturing facility classified as Type "d".

For Type "d" operations the allowable particulate emissions rate from the total operation is based on the process weight rate in pounds per hour and Table 45-7A. The process weight rate is the methanol charged to the system which is 526,000 pound per hour. Table 47-7A provides a maximum allowable of 21.2 pounds per hour for the sources. The proposed emission rate of 0.03 pounds per hour meets the requirements under this rule.

45CSR10 – "To Prevent and Control Air Pollution from the Emission of Sulfur Oxides"

The purpose of this rule is to prevent and control air pollution from the emissions of sulfur dioxides. By definition, the process heater is considered Type "b" fuel burning unit (45CSR10-2.8.b.).

For Type 'b' fuel burning units the emission limit is the product of 3.2 and the total design heat inputs for such units in million B.T.U.'s per hour (45CSR10-3.1.e.). Therefore, the allowable sulfur dioxide emissions rate from the total maximum heat input (4.0 MM Btu/hr) is 12.8 pounds per hour. The syngas fuel used in this system is sulfur-free; therefore, there are no anticipated emissions of sulfur from the combustion of syngas in the system.

The rule exempts fuel burning units having a design heat input under ten (10) million BTU's per hour from section 3 (Sulfur Dioxide Weight Emission Standards for Fuel Burning Units), and sections 6 (Registration), 7 (Permits) and 8 (Testing, Monitoring, Recordkeeping and Reporting).

40 CFR 60, Subpart Dc: Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units

This is a process heater and is not a steam generating unit; therefore, the unit is not subject to 40CFR60, Subpart Dc.

40 CFR 60, Subpart RRR: Standards of Performance for Volatile Organic Compound Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Process.

The unit burns syngas from the front end of the plant and is not a control device for destruction of volatile organic compounds or total organic compounds; therefore, is not subject to 40CFR60, Subpart RRR.

40 CFR 60, Subpart NNN: Standards of Performance for Volatile Organic Compound Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Process.

The unit burns syngas from the front end of the plant and is not a control device for destruction of volatile organic compounds or total organic compounds; therefore, is not subject to 40CFR60, Subpart NNN.

D. CO2 Purification System Operation (C1)

The CO2 Purification System prepares CO2 by catalytic stripping for use as blanket gas for the process. The process streams are from the AGR and the gasses from the regeneration of the MTG catalysts. The AGR vents to the CO2 Purification System on a continual basis under normal operations and during startup once that portion of the facility has been started. The MTG catalysts regeneration is a discontinuous operation and only discharges to the CO2 Purification System during regeneration of the catalysts.

45CSR4 – "To Prevent and Control the Discharge of Air Pollutants into the Open Air Which Causes or Contributes to an Objectionable Odor or Odors"

There are no anticipated objectionable odors from the operation of this source.

45CSR7 – "To Prevent and Control Particulate Matter Air Pollution from Manufacturing Processes and Associated Operations"

The purpose of the rule is to prevent and control particulate matter air pollution from manufacturing processes and associated operations. Emission point C1 is not anticipated to contain particulate matter.

45CSR10 – "To Prevent and Control Air Pollution from the Emission of Sulfur Oxides"

The purpose of this rule is to prevent and control air pollution from the emissions of sulfur dioxides. Section 10-4, Standards for Manufacturing Process Source Operations contains limits for sulfur dioxide from the manufacturing process in section 4.1 at a limit of an in-stack sulfur dioxide concentration exceeding 2,000 parts per million by volume (ppmv).

The conservative estimate of SOx contained in the C1 is estimated at 10 ppmv which is the resulting SOx from the Acid Gas Removal operation. There is no sulfur coming from the regeneration of the catalysts. This facility will meet the requirement contained in this rule.

E. Flare Operation (B2, C2, E5, and G)

The flare is the control device for emissions during start-up and normal operation. The flare controls emissions from several sources throughout the process of start-up and normal operation: B2 (raw syngas during startup); C2 (raw syngas during startup); and E5 (tailgas flaring). The largest flow of material to the flare is during startup of the process when the raw syngas is being flared to allow the facility to build up to the proper operating temperatures and pressures. These include emissions points identified as B2 and C2. After the start-up is completed neither B2 nor C2 are venting to the flare. E5 is a discontinuous emission under normal operations when the front end of the plant is down and the tailgas cannot be recycled. Emissions identified as G are for the pilot flame only. These emissions (B2, C2, and E5) occur at the same emissions point (the flare); however, they are not additive in the fact that they do not occur at the same time in the process sequence. B2, C2 and E5 cannot vent to the flare at the same time. G is additive as it occurs on a continual basis to keep the flare operational to allow destruction of materials which would vent to it either during startup or normal operation.

45CSR6 - "Control of Air Pollution from Combustion of Refuse"

45CSR6 set particulate emission standards and opacity requirements for the operation of activities involving incineration of refuse which includes the operation of a flare. This facility employs the use of a flare at start-up of operation and during normal operations. The flare is typically being used to flare syngas which results from gasification or MTG off gas which occurs when the front end of the plant is down and the MTG process is in operation.

The rule sets the allowable emissions standard based on a formula:

Emissions (lb/hr) = F x Incinerator Capacity (tons/hr)

Where, the factor, F, is as indicated in Table I below:

Table I

Factor F, for Determining Maximum Allowable Particulate Emissions.

Incinerator Capacity	Factor F
A. Less than 15,000 lbs/hr	5.43
B. 15,000 lbs/hr or greater	2.72

The feed to the flare varies depending on the operation of the plant. The maximum anticipated flow to the flare is during start-up of the facility. Flare feed at startup is anticipated to be 140 tons per hour (280,000 lbs/hr) which would yield an allowable emission value of 380.8 pounds per hour. The feed is syngas that is being produced but cannot be processed further down the line into methanol and therefore it is sent to the flare. The anticipated emissions value at this time is 0.223 lbs per hour which meets the requirement of this rule.

Emissions points which are considered flared emissions either during startup or normal operations along with the respective emissions values during operation are as follows:

Emission Point	Particulate Emission Value (lb/hr)
B2 (Gasification to Flare during Start-up)	Flaring is expected to be smokeless.
C2 (Acid Gas Removal to Flared during Start-up)	Flaring is expected to be smokeless.
E5 (Flare of MTG Tailgas when Front End Plant is down)	Tailgas flaring is expected to be smokeless.
G (Flare Pilot Flame)	0.0071

The rule establishes an opacity limit under sections 4.3 at 20% with exceptions under 4.4 where 4.3 shall not apply to smoke which is less than forty percent (40%) opacity, for a period or periods aggregating no more than eight (8) minutes per start-up, or six (6) minutes in any sixty (60)-minute period for stoking operations periods of and 4.4.

There are no anticipated opacity issues with the operation of the flare. The flare will be specifically designed for the process and will meet the requirements for particulate matter emissions and opacity as stated within 45CSR6.

40 CFR 60, Subpart RRR: Standards of Performance for Volatile Organic Compound Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Process.

The process is a synthetic organic chemical manufacturing facility and is subject to 40CFR60, Subpart RRR. The emissions from the process during startup of the gasifiers and the operations of the regeneration system are controlled by the flare. The flare must meet: Section 60.702(b) standards; Section 60.703, monitoring of emissions and operations under section 60.703.(b); Section 60.704(c) for test methods and procedures the flare must meet the requirements of 40CFR60, Subpart A, General Provisions, Section 60.18; and Section 60.705(a), (b), (b).(3) for reporting and recordkeeping requirements. The flare will be designed to meet the requirements for this section. This includes the requirement for no visible emissions except for a period of 5 minutes during any 2 consecutive hours. This visible emissions requirement is more stringent than the requirement in 45CRS6.

40 CFR 60, Subpart NNN: Standards of Performance for Volatile Organic Compound Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Process.

The process is a synthetic organic chemical manufacturing facility and is subject to 40CFR60, Subpart NNN. The emissions from the process during startup of the gasifiers and the operations of the regeneration system are controlled by the flare. The flare must meet: Section 60.662(b) standards; Section 60.663, monitoring of emissions and operations under section 60.663(b); Section 60.664(d) for test methods and procedures the flare must meet the requirements of 40CFR60, Subpart A, General Provisions, Section 60.18; and Section 60.665(a), (b), (b)(3) for reporting and recordkeeping requirements. The flare will be designed to meet the requirements for this section.

F. Startup Boiler Operation (F)

The emissions from the operation of the startup boiler are emitted through emission point F.

45CSR2 – "To Prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers"

This rule establishes emissions limitations for smoke and particulate matter which are discharged from fuel burning units. By definition of this rule the natural gas fueled startup boiler is classified as Type b fuel burning unit (45CSR2-2.10.b.).

For Type 'b' fuel burning units the emission limit is the product of 0.09 and the total design heat inputs for such units in million B.T.U.'s per hour, provided however that no more than six hundred (600) pounds per hour of particulate matter shall be discharged into the open air from all such units. Therefore, the allowable particulate emissions rate from the total maximum heat input (81.84 MM Btu/hr) is 7.36 pounds per hour. The proposed emissions of 0.61 pounds per hour meet the requirements under this rule.

45CSR4 – "To Prevent and Control the Discharge of Air Pollutants into the Open Air Which Causes or Contributes to an Objectionable Odor or Odors"

There are no anticipated objectionable odors from the boiler as the boiler is fueled by natural gas.

45CSR7 – "To Prevent and Control Particulate Matter Air Pollution from Manufacturing Processes and Associated Operations"

The purpose of the rule is to prevent and control particulate matter air pollution from manufacturing processes and associated operations. The startup boiler (fuel burning unit) is exempt from the requirements of this rule.

45CSR10 – "To Prevent and Control Air Pollution from the Emission of Sulfur Oxides"

The purpose of this rule is to prevent and control air pollution from the emissions of sulfur dioxides. By definition, the startup boiler is considered Type b fuel burning unit (45CSR10-2.8.b.).

For Type 'b' fuel burning units the emission limit is the product of 3.1 and the total design heat inputs for such units in million B.T.U.'s per hour (45CSR10-3.1.e.). Therefore, the allowable sulfur dioxide emissions rate from the total maximum heat input (81.84 MM Btu/hr) is 253.7 pounds per hour. The proposed emissions of 0.31 pounds per hour meet the requirements under this rule.

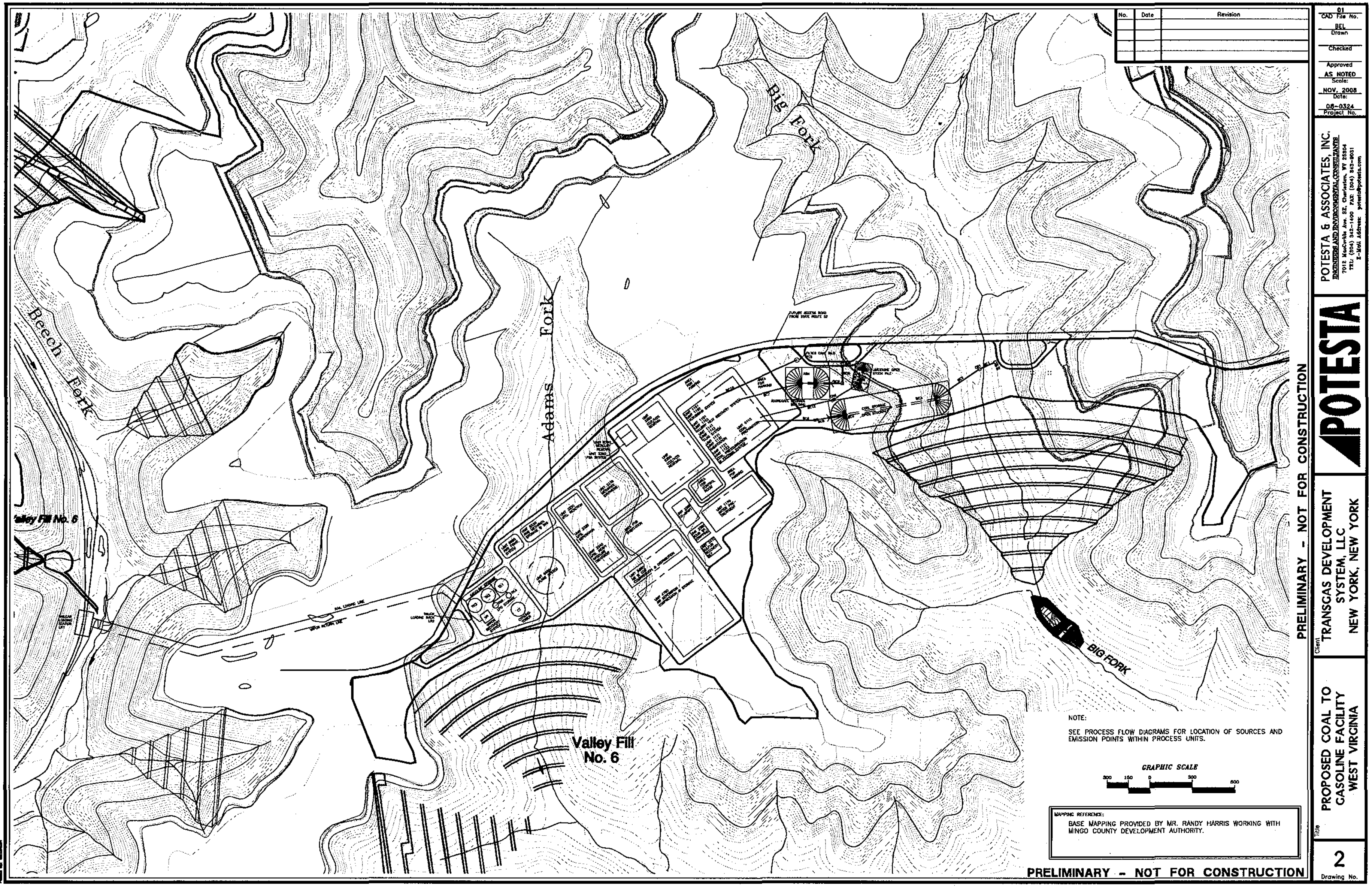
As stated under 45CSR10-10.3., the owner or operator of a fuel burning unit(s) which combusts natural gas, wood or distillate oil, alone or in combination, shall be exempt from the requirements of Section 8. The startup boiler is exempt from 45CSR10-8. Testing, Monitoring, Recordkeeping and Reporting.

40 CFR 60, Subpart Dc: Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units

The startup boiler is subject to 40 CFR 60, Subpart Dc under the applicability requirements of §60.40c(a). Subpart Dc does not have an emission standard for combusting natural gas and there are no monitoring requirements for boilers combusting natural gas. The startup boiler is subject to the Reporting and Recordkeeping requirements of §60.48c(a), (a)(1), (a)(3), (g) and (i).

ATTACHMENT E

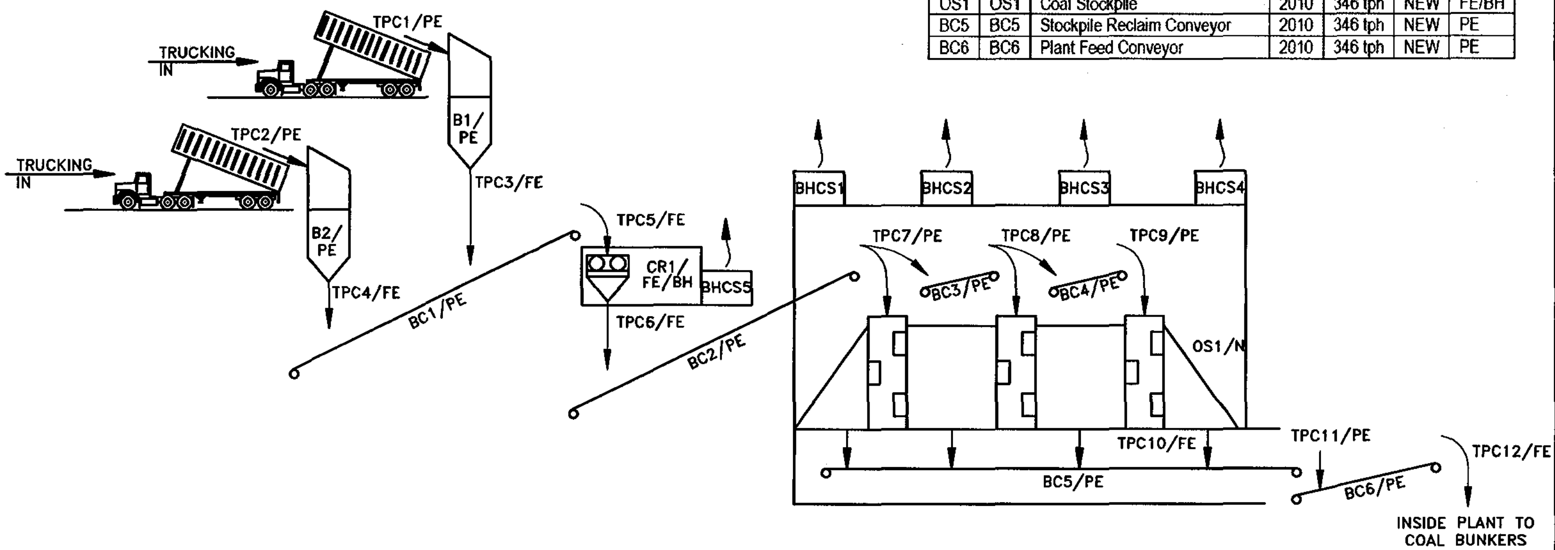
PLOT PLAN


Big Fork
Beech Fork
Adams Fork
Valley Fill No. 6
Valley Fill
No. 6
BIG FORK
NOTE:
SEE PROCESS FLOW DIAGRAMS FOR LOCATION OF SOURCES AND EMISSION POINTS WITHIN PROCESS UNITS.
GRAPHIC SCALE
300 150 0 300 600
MAPPING REFERENCE:
BASE MAPPING PROVIDED BY MR. RANDY HARRIS WORKING WITH MINGO COUNTY DEVELOPMENT AUTHORITY.
PRELIMINARY - NOT FOR CONSTRUCTION
PRELIMINARY - NOT FOR CONSTRUCTION
No.
Date
Revision
01
CAD File No.
BEL
Drawn
Checked
Approved
AS NOTED
Scale:
NOV. 2008
Date:
08-0324
Project No.
POTESTA & ASSOCIATES, INC.
ENGINEERS AND ENVIRONMENTAL CONSULTANTS
7012 MacCorkle Ave. SE, Charleston, WV 25304
TEL: (304) 342-1400 FAX: (304) 343-9031
E-Mail Address: potesta@potesta.com
POTESTA
Client
TRANSGAS DEVELOPMENT SYSTEM, LLC
NEW YORK, NEW YORK
Title
PROPOSED COAL TO GASOLINE FACILITY
WEST VIRGINIA
2
Drawing No.

ATTACHMENT F

PROCESS FLOW DIAGRAM

Coal Facilities						
B1	B1	Truck Dump Bin No. 1	2010	346 tph	NEW	PE
B2	B2	Truck Dump Bin No. 2	2010	346 tph	NEW	PE
BC1	BC1	Primary Crusher Feed Conveyor	2010	346 tph	NEW	PE
CR1	CR1	Primary Crusher	2010	346 tph	NEW	FE/BH
BC2	BC2	Stockpile Feed Conveyor	2010	346 tph	NEW	PE
BC3	BC3	Stockpile Transfer Conveyor	2010	346 tph	NEW	PE
BC4	BC4	Stockpile Transfer Conveyor	2010	346 tph	NEW	PE
OS1	OS1	Coal Stockpile	2010	346 tph	NEW	FE/BH
BC5	BC5	Stockpile Reclaim Conveyor	2010	346 tph	NEW	PE
BC6	BC6	Plant Feed Conveyor	2010	346 tph	NEW	PE



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Project

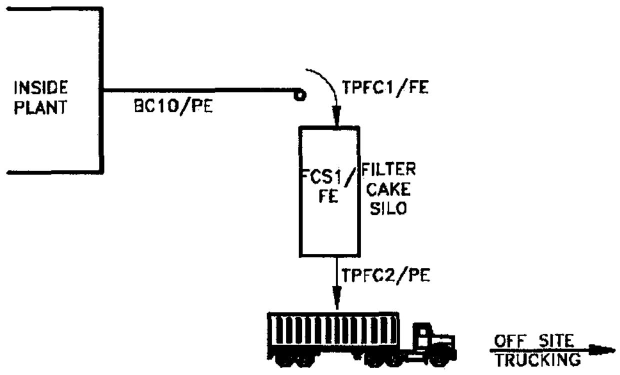
PROCESS FLOW DIAGRAM
COAL FACILITIES

Scale NOT TO SCALE

Date NOV. 2008

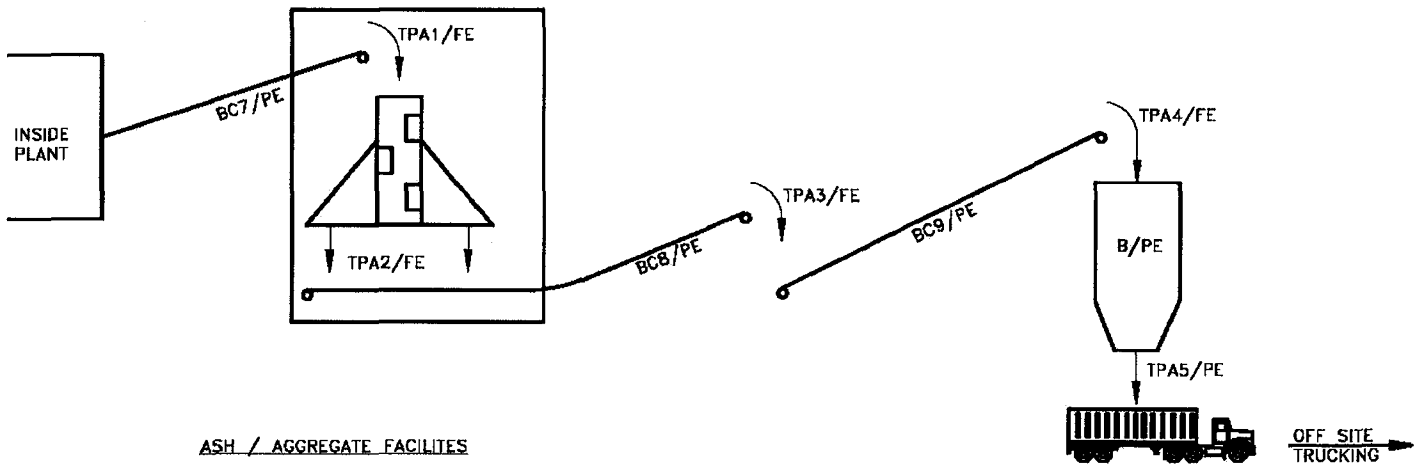
Dwg. No. FIGURE 1

XREF Files: IMAGE Files:
File: S:\C3D-Projects\08-0324 - TRANSGAS\A08-0324-02.dwg
Plot Date/Time: May 28, 2009 - 10:01am
Plotted By: MBSankoff



FILTER CAKE FACILITIES

Ash Handling (ASH)						
SLCR	NA	Slag Crusher	2010	7 tph out of plant and 100 tph loading	NEW	WET
SLH	NA	Slag Lock Hopper	2010		NEW	WET
SLE	NA	Slag Extractor	2010		NEW	WET
BC7	BC7	Slag Conveyor	2010		NEW	PE
SSP	SSP	Slag Stockpile	2010		NEW	WET
BC8	BC8	Slag Reclaim Conveyor	2010		NEW	PE
BC9	BC9	Slag Bin Feed Conveyor	2010		NEW	PE
SB	SB	Slag Truck Loadout Bin	2010		NEW	PE
CL	NA	Clarifier	2010		NEW	WET
SSB	NA	Sludge Storage Buffer	2010		NEW	WET
BFP	NA	Belt Filter Press	2010		NEW	WET
BC10	BC10	Filter Cake Transport Belt	2010		NEW	PE
FCS	FCS	Filter Cake Storage/Loadout Silo	2010		NEW	FE



ASH / AGGREGATE FACILITES

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Project

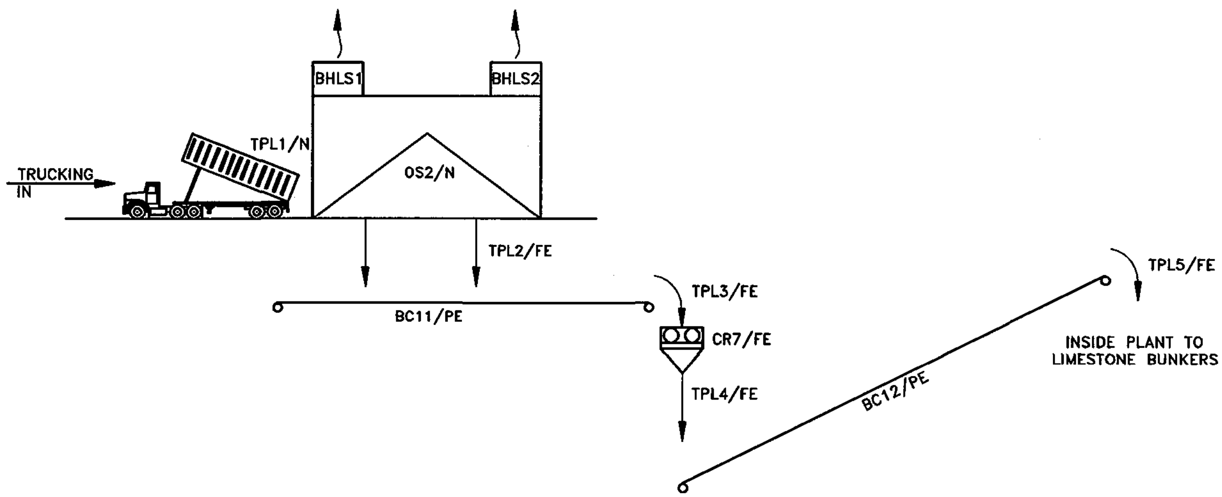
PROCESS FLOW DIAGRAM
ASH FACILITIES

Scale NOT TO SCALE

Date NOV. 2008

Dwg. No. FIGURE 2

Limestone Facilities						
OS2	OS2	Limestone Stockpile	2010	100 tph	NEW	FE/BH
BC11	BC11	Reclaim Conveyor	2010	100 tph	NEW	PE
CR7	CR7	Limestone Crusher	2010	100 tph	NEW	FE
BC12	BC12	Plant Feed Conveyor	2010	100 tph	NEW	PE



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Project

PROCESS FLOW DIAGRAM
LIMESTONE FACILITIES

Scale NOT TO SCALE

Date NOV. 2008

Dwg. No. FIGURE 3

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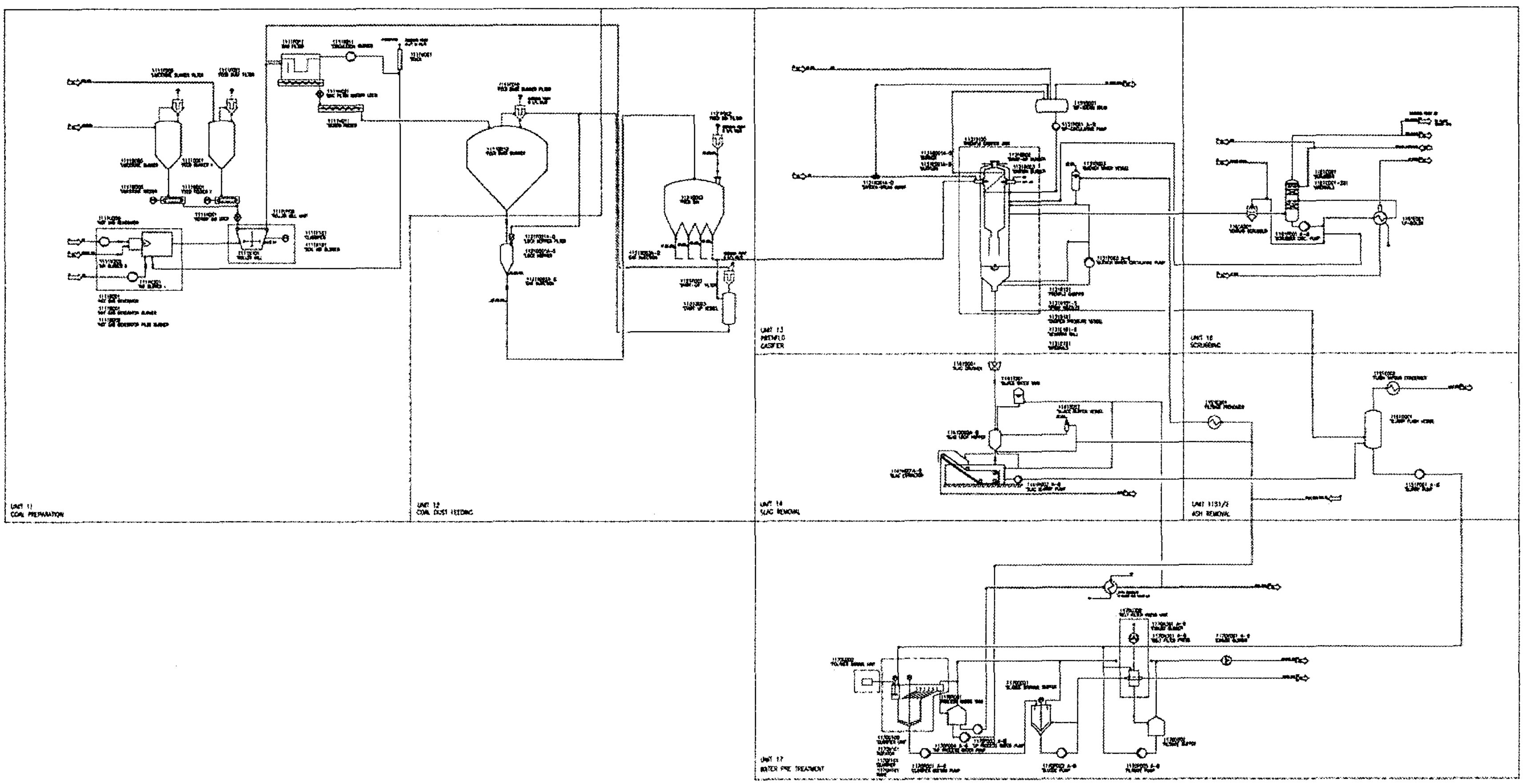


NOTES:

UNIT 111X : COAL PREPARATION
UNIT 112X : COAL DUST FEEDING
UNIT 113X : PRENFLO GASIFIER AND DIRECT QUENCH
UNIT 114X : SLAG REMOVAL
UNIT 115X : SLAG FINES REMOVAL
UNIT 116X : SCRUBBING
UNIT 1170 : WATER PRETREATMENT
UNIT 1180 : INERT SYSTEM

Rev.	Date	Name	Date	Name	Date	Name	Description	Acc. Code
	Drawn/Prepared		Checked		Approved			

Code: UAN | Document ID | Part | Group | Rev. 00

Store Location: Server/Share | Document-ID-BAR-Code

Store Location: Folder

Share Name
Standard_Vorlauf_PDG_dwg Model

Prg. Unit | Con. Unit | TON | Type of Document | Order No. | Tot. Sheets

TGDS CTL PROJECT

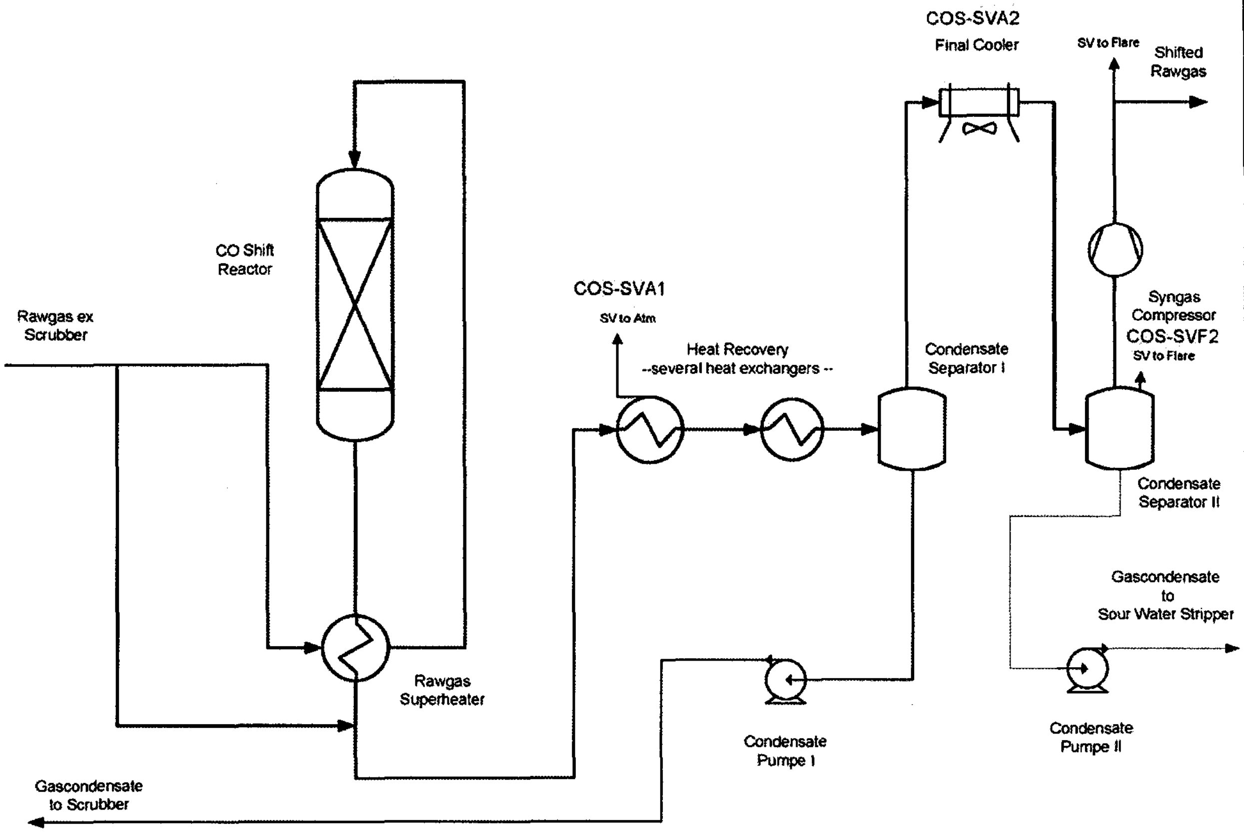
PRENFLO DIRECT QUENCH

Uhde

	Date	Name
Drawn		
Prepared		
Checked		
Approved		

Designation
BASIC PROCESS FLOW DIAGRAMM 1-1
PDQ GASIFICATION

Scale 1:5 | Cat. Code | Acc. Code | Status



NOTES

GENERAL

PRELIMINARY

Uhde

PROCESS FLOW DIAGRAM

233 CO Shift

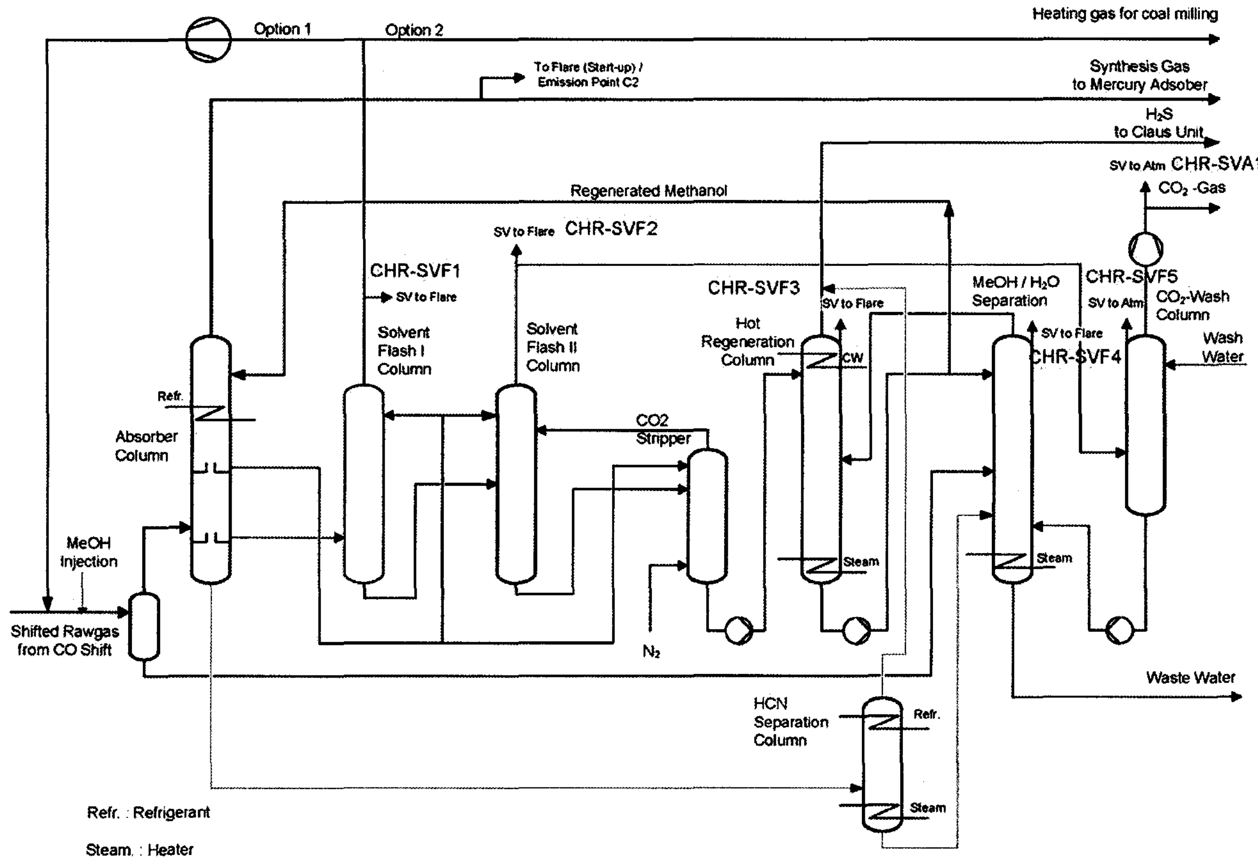
Sheet of

Job Name CTL COMPLEX

Job No | Doc No | Rev. 5

Rev	Name	Date	Name	Name	Date	Status	Kind of Revision
	Prepared/Changes		Checked	Approved			

CO2/H2S Removal (CHR)						
AC	NA	Absorber Column	2010	See Section L, Page L18	NEW	NA
SF1	NA	Solvent Flash I Column	2010		NEW	NA
LSV1	CHR-SVF1	Line Safety Vent No. 1	2010		NEW	NA
SF2	NA	Solvent Flash II Column	2010		NEW	NA
LSV2	CHR-SVF2	Line Safety Vent No. 2	2010		NEW	NA
ST	NA	CO2 Stripper	2010		NEW	NA
HRC	CHR-SVF3	Hot Regeneration Column (W/SV)	2010		NEW	NA
MWS	CHR-SVF4	MEOH/H2O Separation (W/SV)	2010		NEW	NA
CWC	CHR-SVF5	CO2 Wash Column (W/SV)	2010		NEW	NA
LSV3	CHR-SVA1	Line Safety Vent	2010		NEW	NA



Refr. : Refrigerant

Steam. : Heater

CW : Cooling Water

NOTES

GENERAL

PRELIMINARY

Rev	Name	Date	Name	Name	Date	Status	Kind of Revision
	Prepared/Changed		Checked	Approved			

Uhde

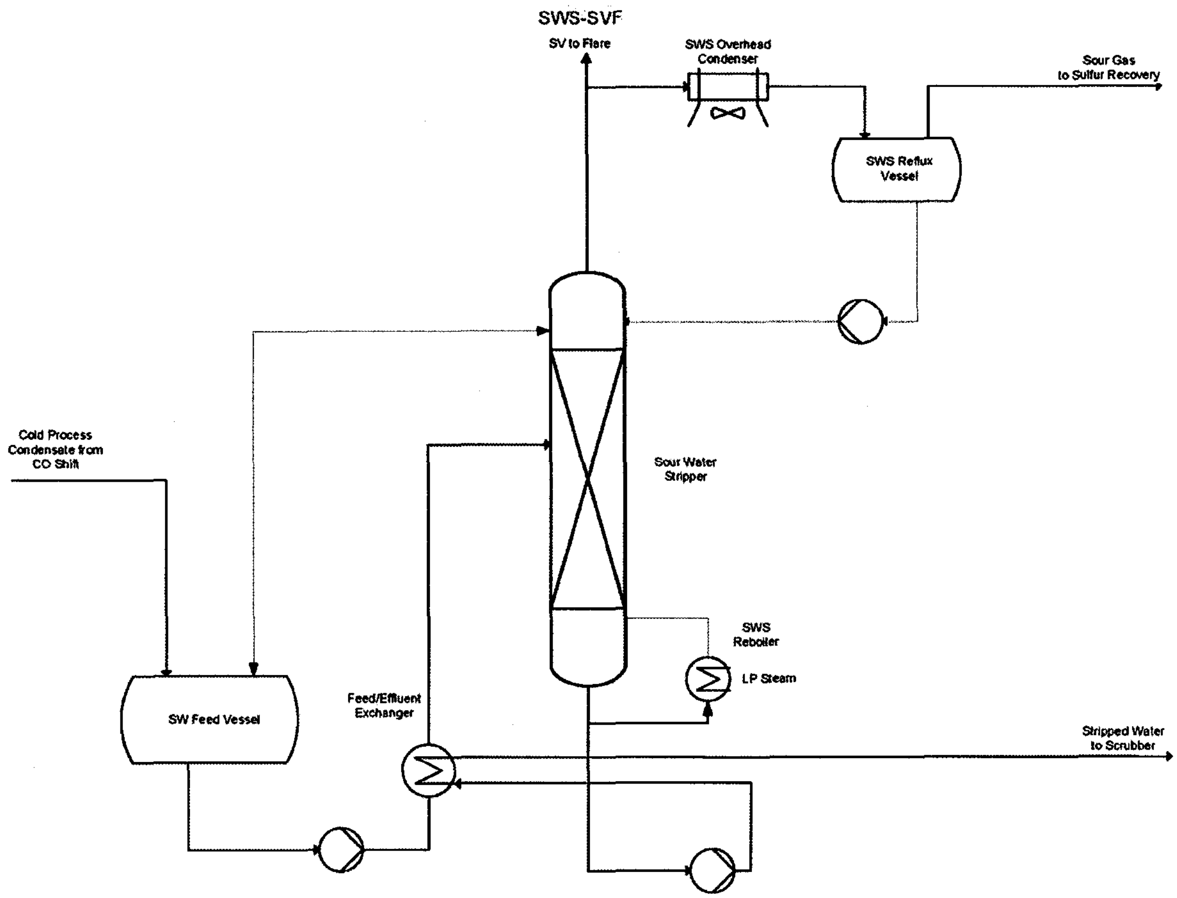
Title/Characteristic Features

PROCESS FLOW DIAGRAM
235 CO2 / H2S Removal

Sheet of

Job Name CTL COMPLEX

Job No 08-98-20810 Doc. No CTL_ar_Unit_PFD_1.vsd Rev. 0



NOTES

GENERAL

PRELIMINARY

Sour Water Stripper (SWS)						
SWSFV	NA	SW Feed Vessel	2010	See Section L, Page L22	NEW	NA
FEHE	NA	Feed/Effluent Heat	2010		NEW	NA
SWS	NA	Sour Water Stripper	2010		NEW	NA
SWSLSV	SWS-	Line Safety Vent	2010		NEW	NA
SWSOC	NA	SWS Overhead Condenser	2010		NEW	NA
SWSRB	NA	SWS Reboiler (Steam)	2010		NEW	NA

Rev	Name	Date	Name	Name	Date	Status	Kind of Revision
	Prepared/Changed		Checked	Approved			

Uhde

Text/Characteristic Features

PROCESS FLOW DIAGRAM

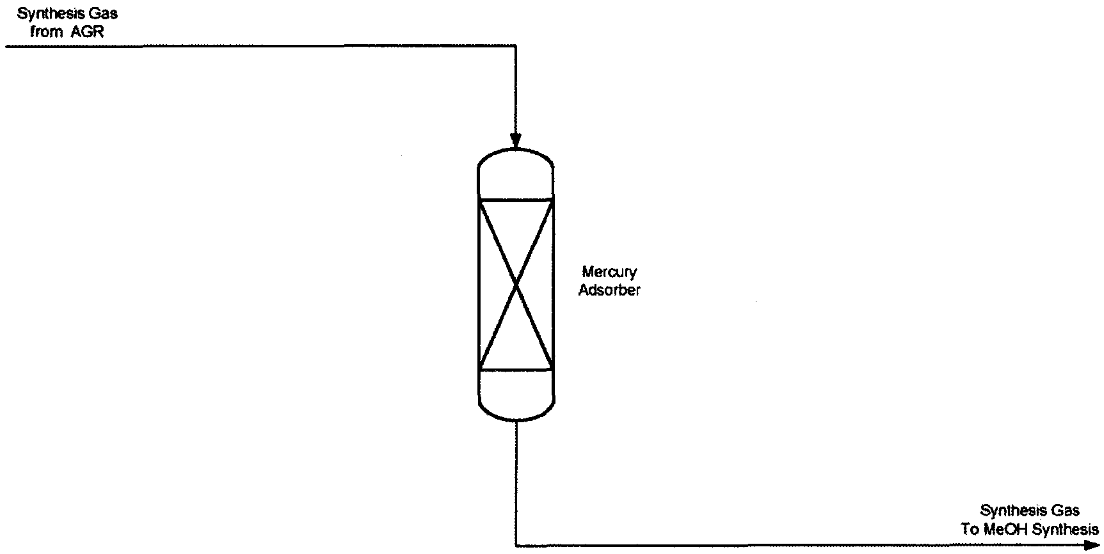
238 Sour Water Stripping

Sheet of

Job Name CTL COMPLEX

Job No 08-96-30510 Doc No CTL_el_Uhl_PFD_1.vsd Rev 0

Mercury Removal (MR)						
MA	NA	Mercury Absorber	2010	See Section L, Page L26	NEW	NA



NOTES

GENERAL

PRELIMINARY

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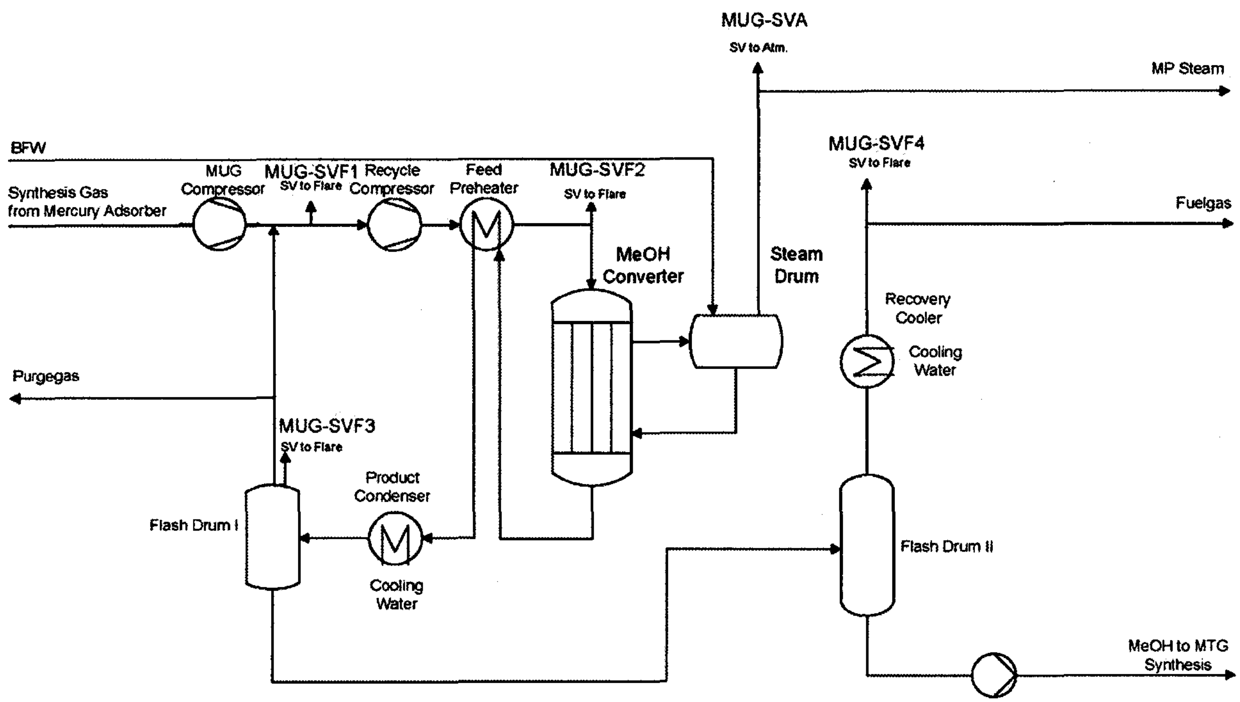
PROCESS FLOW DIAGRAM

239 Mercury Removal

Sheet of

Job Name CTL COMPLEX

Job No 08-08-30810 Doc. No CTL_all_Unit_PFD_1.vsd Rev. 5



NOTES

GENERAL

PRELIMINARY

Methanol Synthesis (MS)						
COMP	NA	MUG Compressor	2010	See Section L, Page L30	NEW	NA
LSV1	MUG-SVF1	Line Safety Vent No. 1	2010		NEW	NA
RCOMP	NA	Recycle Compressor	2010		NEW	NA
FPH	NA	Feed Preheater	2010		NEW	NA
LSV2	MUG-SVF2	Line Safety Vent No. 2	2010		NEW	NA
MEOHC	NA	MeOH Converter	2010		NEW	NA
PC	NA	Product Condenser	2010		NEW	NA
FLD1	MUG-SVF3	Flash Drum I (W/SV)	2010		NEW	NA
SD	NA	Steam Drum	2010		NEW	NA
LSV2	MUG-SVA	Line Safety Vent No. 4	2010		NEW	NA
FLD2	NA	Flash Drum II	2010		NEW	NA
RC	NA	Recovery Cooler	2010		NEW	NA
LSV3	MUG-SVF4	Line Safety Vent No. 5	2010		NEW	NA

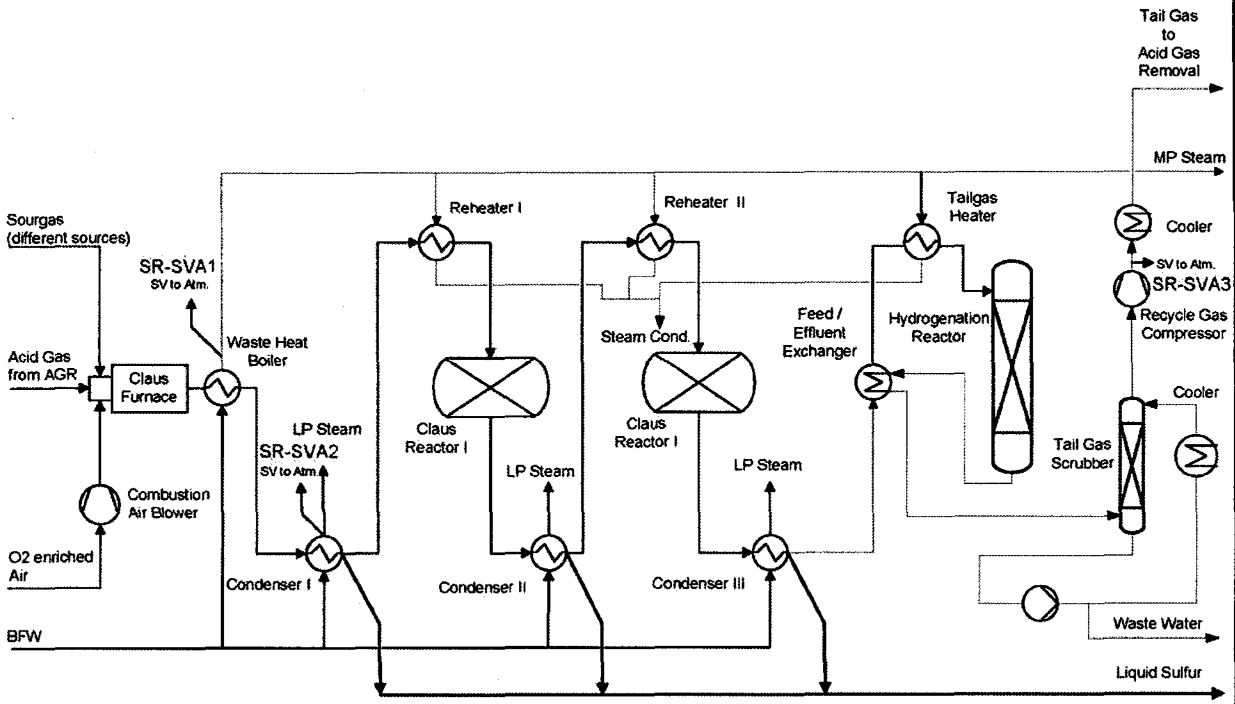
Rev	Name	Date	Name	Name	Date	Status	Kind of Revision
	Prepared/Changed		Checked	Approved			

Uhde

Title/Characteristic Features
PROCESS FLOW DIAGRAM
331 Methanol Synthesis

Sheet of

Job Name CTL COMPLEX
Job No 96-96-33310 Doc. No. CTL_a6_Und_PFD_1.vsd Rev 0



Sulfur Recovery (SR)						
CF	NA	Claus Furnace	2010	See Section L, Page L34	NEW	NA
WHB	NA	Waste Heat Boiler	2010		NEW	NA
SRLSF1	SR-SVA1	Line Safety Vent No. 1	2010		NEW	NA
SRCD1	SR-SVA2	Condenser I (W/SV)	2010		NEW	NA
RH1	NA	Reheater I	2010		NEW	NA
CLR1	NA	Claus Reactor I	2010		NEW	NA
SRCD2	NA	Condenser II	2010		NEW	NA
RH2	NA	Reheater II	2010		NEW	NA
CLR2	NA	Claus Reactor II	2010		NEW	NA
SRCD3	NA	Condenser III	2010		NEW	NA
FEHESR	NA	Feed/Effluent Heat Exchanger	2010		NEW	NA
TGH	NA	Tailgas Heater	2010		NEW	NA
HR	NA	Hydrogenation Reactor	2010		NEW	NA
TGS	NA	Tail Gas Scrubber	2010		NEW	NA
RGC	NA	Recycle Gas Compressor	2010		NEW	NA
SRLSF3	SR-SVA3	Line Safety Vent No. 2	2010		NEW	NA
CL1	NA	Cooler No. 1	2010		NEW	NA
CL2	NA	Cooler No. 2	2010		NEW	NA
STK	NA	Sulfur Storage Tank	2010		NEW	NA

NOTES

GENERAL

PRELIMINARY

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PROCESS FLOW DIAGRAM

241 Sulfur Recovery

Rev	Name	Date	Name	Name	Date	Status	Kind of Revision
	Prepared/Changed		Checked	Approved			

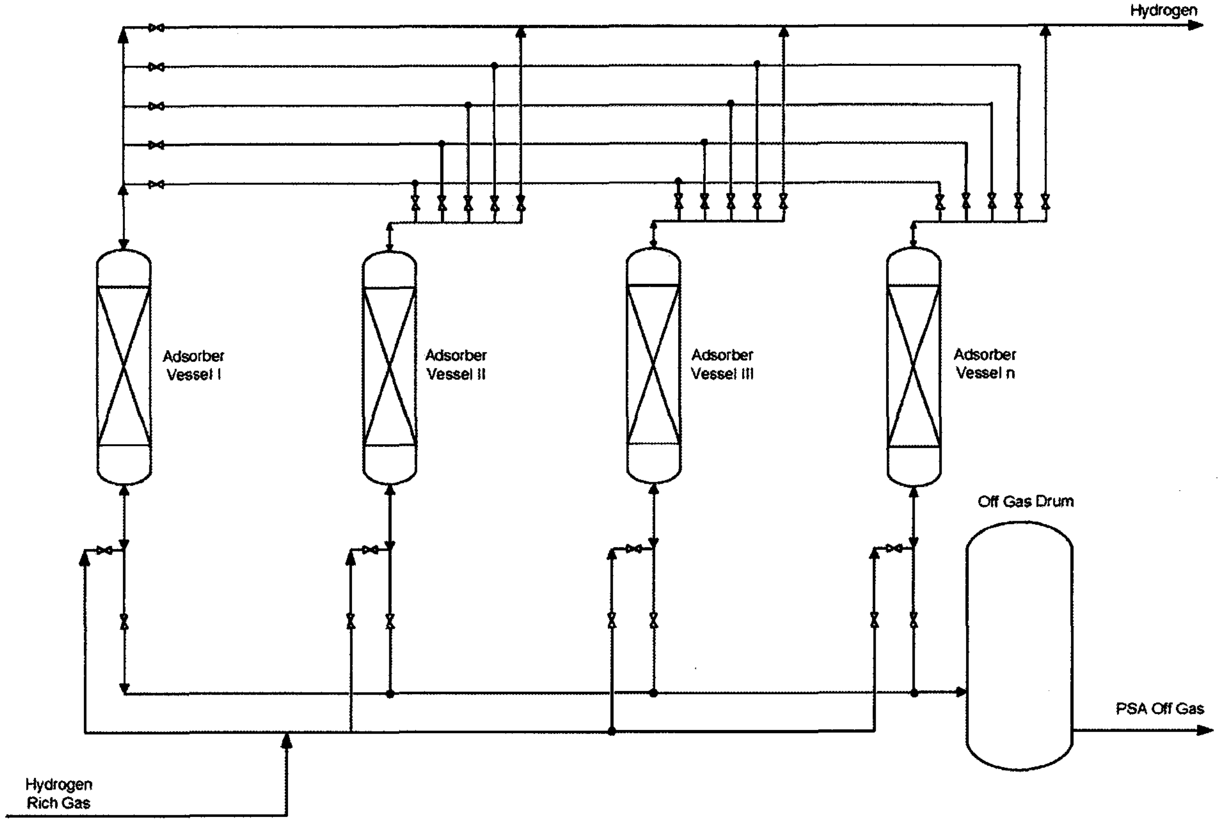
Sheet of

Job Name CTL COMPLEX

Job No 06-06-30810 Doc. No CTL_all_Unit_PFD_1.vsd Rev. 5

CO Purification						
COP	C1	CO Purification	2010	See Section L, Page L42	NEW	NA

PSA System (PSA)						
AV1	NA	Adsorber Vessel I	2010	See Section L, Page L38	NEW	NA
AV2	NA	Adsorber Vessel II	2010		NEW	NA
AV3	NA	Adsorber Vessel III	2010		NEW	NA
AVN	NA	Adsorber Vessel N	2010		NEW	NA
OGD	NA	Off Gas Drum	2010		NEW	NA



NOTES

Number of adsorber vessels to be determined during basic engineering

GENERAL

PRELIMINARY

Uhde

Title/Characteristic Features

PROCESS FLOW DIAGRAM

335 PSA System

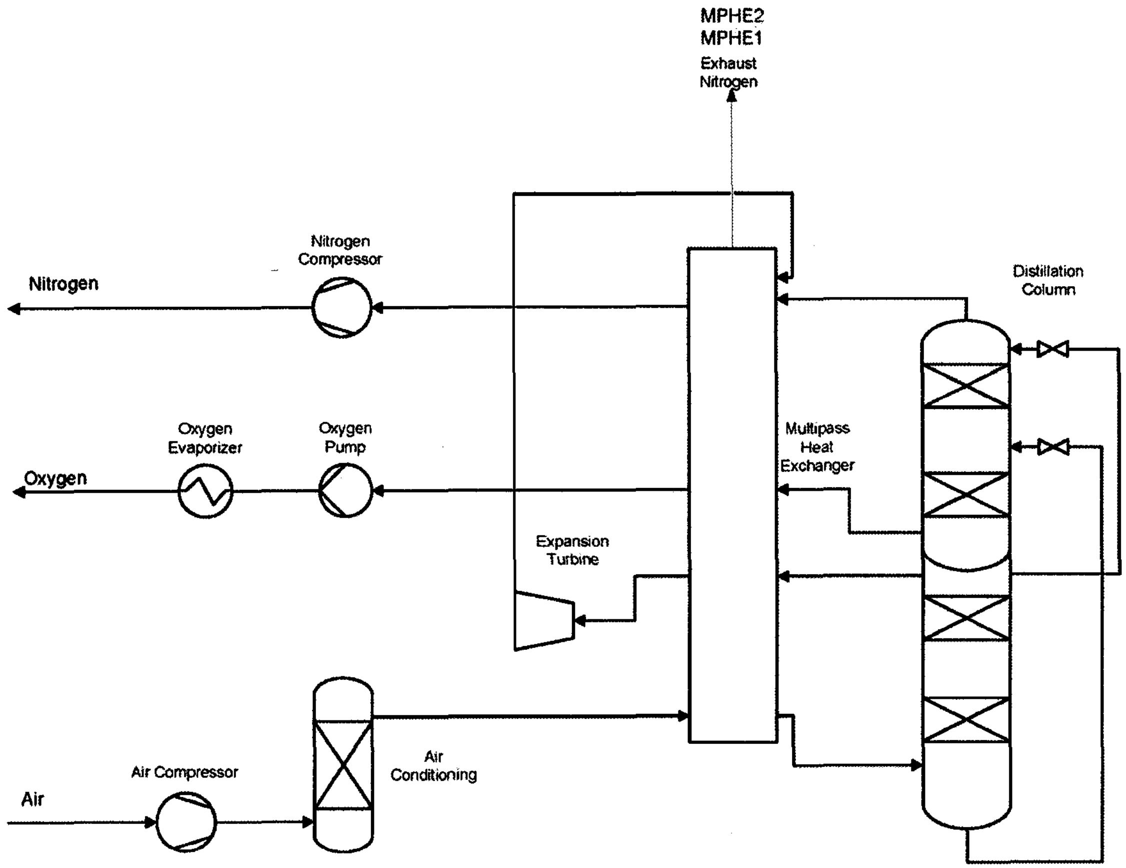
Sheet of

Rev	Name	Date	Name	Name	Date	Status	Kind of Revision
	Prepared/Changed		Checked	Approved			

Job Name CTL COMPLEX

Job No 08-08-30810 Doc. No CTL_all_Uhd_PFD_1.vsd Rev 0

THERE ARE TWO IDENTICAL AIR SEPARATION UNITS



Air Separation Units (ASU)						
ACOMP1	NA	Air Compressor 1	2010	See Section L, Page L46	NEW	NA
AC1	NA	Air Conditioner 1	2010		NEW	NA
MPHE1	NA	Multipass Heat Exchanger 1	2010		NEW	NA
DC1	NA	Distillation Column 1	2010		NEW	NA
ETRB1	NA	Expansion Turbine 1	2010		NEW	NA
OP1	NA	Oxygen Pump 1	2010		NEW	NA
OEVAP1	NA	Oxygen Evaporizer 1	2010		NEW	NA
NCOMP1	NA	Nitrogen Compressor 1	2010		NEW	NA
ACOMP2	NA	Air Compressor 2	2010		NEW	NA
AC2	NA	Air Conditioner 2	2010		NEW	NA
MPHE2	NA	Multipass Heat Exchanger 2	2010		NEW	NA
DC2	NA	Distillation Column 2	2010		NEW	NA
ETRB2	NA	Expansion Turbine 2	2010		NEW	NA
OP2	NA	Oxygen Pump 2	2010		NEW	NA
OEVAP2	NA	Oxygen Evaporizer 2	2010		NEW	NA
NCOMP2	NA	Nitrogen Compressor 2	2010		NEW	NA

NOTES

GENERAL

PRELIMINARY

Rev	Name	Date	Name	Name	Date	Status	Kind of Revision
	Prepared/Changed		Checked	Approved			

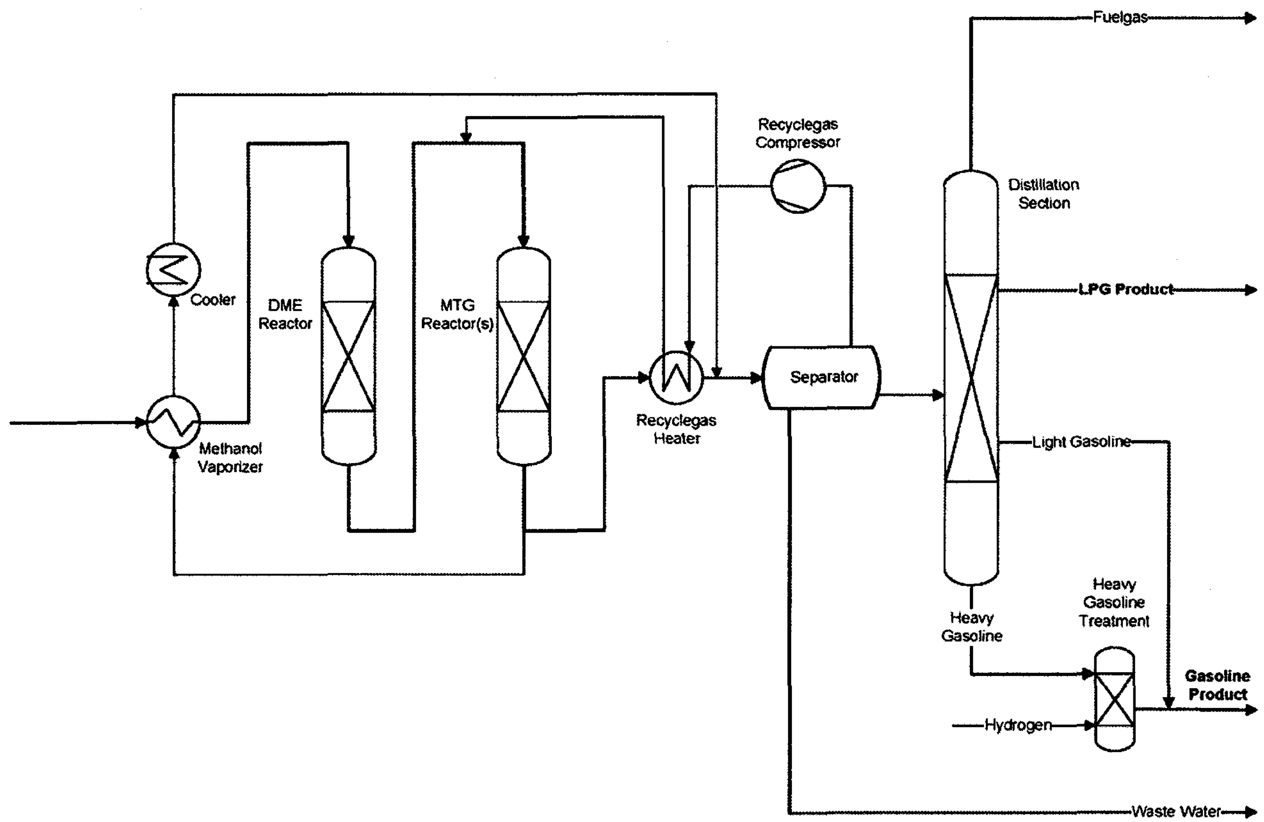
Uhde

Title/Characteristic Features
PROCESS FLOW DIAGRAM
478 Air Separation Unit

Sheet of

Job Name CTL COMPLEX

Job No 08-98-30810 Doc. No CTL_air_Unit_PFD_1.vsd Rev 0



NOTES

GENERAL

PRELIMINARY

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Title/Characteristic Features

PROCESS FLOW DIAGRAM

332 MTG Reaction Section
333 MTG Separation Section
334 MTG HGT Section

Sheet of

Rev	Name	Date	Name	Name	Date	Status	Kind of Revision
	Prepared/Changed		Checked	Approved			

Job Name CTL COMPLEX

Job No 06-26-30810 Doc. No CTL_en_Uhd_PFD_1.vsd Rev 0

ATTACHMENT G

PROCESS DESCRIPTION

Attachment G
General Process Description

The proposed facility will produce gasoline and LPG from coal through the processes of gasification of the coal to produce a syngas, modify the syngas to methanol and then unitize the methanol as the feed to the methanol to gas process. The following is a description of the start-up and operation of the process. A more detailed version of this information is provided for additional detail for the agency review and understanding of the process in preparing the permit for the facility.

Start-up of the Plant

Start-up of the operation will sequence through the following steps:

PDQ Start-up Overall Sequence

The start-up overall sequence gives a summary of the overall operating procedures, for the gasification (one stream), water treatment unit and the raw gas treatment units (one stream). The start-up will be described from "cold, air-filled" to "fully operational". Prior to start the PDQ-Gasifier with feedstock the water/steam system has to be filled with boiler feed and the quench water system with fresh water. Both systems are to be warmed up. The downstream Units as Sour Shift and Gas Cooling, Sulfur Removal and Sulfur Recovery/Tail gas Treatment are to be transferred into hot /cold condition ready to receive washed and water saturated raw gas and Sour Gas. The consumers of the treated syngas are ready for syngas take over. All Utilities as Cooling Water, HP and LP Nitrogen systems, Oxygen system, Instrument Air and Chemical Dosing Stations are in operation, The Start-up Boiler is started and the steam system is ready for take over. The Startup Boiler operation is scheduled approx. 4 times /year, each 96 hours. For emissions see Emission Point F. Waste Water Treatment, Condensate System and Boiler Feed Water Preparation are in operation.

The Coal Milling and Drying system consists of five identical 100 % process lines, four in operation, one in stand by, feeding two Coal Pressurization and Feeding lines. In this description only one mill is described. In case 2 Gasifiers are in operation 4 Coal Milling & Drying Units are in operation. In this case for Coal Milling & drying the Emission Points A1/1 & A1/2 & A1/3 & A1/4 are active.

Main start-up steps are as followed: starting of the auxiliary systems, filling of raw coal and lime-stone bunkers; Inertizing of the mill and the gas circulating system; adjusting the oxygen concentration; if necessary supplying N2 to the system to reduce the oxygen content below 8% on volume; pre-heating the system, if necessary the start-up burner of the inert gas generator can be ignited to support the tracing of the pulverized coal bag house. In this situation the emissions at Emission Point A1/x are similar as for stand by operation (emission values approx. 10% of operation emissions); and start-up of the mill and the coal feeders.

The shutdown procedure basically follows the reversed order of the start-up procedure. It is possible to operate each line on hot or inerted stand-by.

Coal Pressurization and Feeding

The coal pressurization and feeding units are started through the following sequence: Checking that all manholes, blinds, etc. are securely placed, block valves are in correct position, instrument isolation valves are opened, instrument air is turned on, nitrogen purges are started, and radioactive level instruments are unblocked. The main start-up steps are listed below: Start operation of the Blow Back System of Feed Dust Bunker Filter; Feed Dust Bunker is filled with specified coal dust; Start supply of CO_2 or N_2 to the aeration cones of Feed Dust Bunker; Start supply of CO_2 or N_2 to the Aeration cones of Feed Vessel, Start-up; Vessel and Lock Hoppers are in operation; The Start-up Vessel for coal dust recycle is inert and ready for use; Adjust the differential pressure controller between Feed Vessel and Gasifier; and Transfer Coal Dust Feed Stock via Lock Hoppers into the Feed Bin.

These systems feed to the gasifier section of the plant.

Gasifier Section

For startup to occur the pre-conditions must be met: liquid carrying tanks and vessels are filled with water/boiler feed water; all water circulations, the chemical dosing system and the vacuum pump are to be started; the waste water treatment unit is ready to receive process water; the oxygen system is tightness tested and under operation pressure with oxygen; and the flare system is ready for use.

Warming-up of the Sour CO-Shift Catalyst

The sour CO-Shift catalysts achieve the maximum activity in the sulphided state. Therefore, prior to the first start-up, they are to be treated with sulfur. Normal preheating of the catalyst is carried out in a dry inert gas (nitrogen) which is recycled via the start-up compressor and preheated by MP-Steam and the electrical Start-up Heater. The shift reaction will start at a temperature of around 200°C. The catalyst normally operates between 230°C and 500°C. Temperatures up to 550°C are acceptable.

Preparation of the Sour Water Stripping

The Stripper has to be pressurized by nitrogen and warmed up by steam. It is in hot stand-by condition under total reflux.

Start-up of the H_2S/CO_2 Removal Unit

The aim of the start-up operation of the Acid Gas Removal Unit is to cool down the methanol solvent inventory to a level of about -35 °C for absorption of the acid gas components H_2S and CO_2. Before any gas enters the Unit, absorption section has to be pressurized with nitrogen. The normal gas path to the downstream synthesis unit is closed and the gas path to the flare is opened. The pressure in the absorption section will be controlled on flow control to the flare (Emission Point C2). Once the normal operating temperatures are established, levels have stabilized and the operating pressures in the vessels of the regeneration section are set, the unit is ready for take over of feed gas. The H2S stripped off from the solvent in the thermal desorber is sent as acid gas to the Sulfur Recovery Unit, the CO2 produced in the flash regeneration section of the Acid Gas Removal Unit is sent to the CO2 purification section before it can be pressurized and re-used as carrier or sluicing gas in the gasification unit or sent to the atmosphere (Emission Point C1).

Preparation of the Sulfur Recovery Unit

The SRU represents a typical Claus unit comprising one thermal and two catalytic stages. The SRU can be operated by air and/or by O2 enriched air. Feedstock is acid gas generated in the H2S/CO2 removal plant, a small stream of sour gases of the sour water stripping unit and flash gases yielded in the slurry flash vessels and different other venting points. The thermal and the two catalytic stages have to be warmed up to operation temperature. All sulfur carrying lines and vessels are to be carefully warmed up by steam tracing. The unit can remain in hot stand-by position until sour gas is available.

Preparation of the Tail Gas Treatment Section

The Tail Gas Treatment Section has to be heated up to 200°C by using nitrogen and the electrical tail gas heater. The unit is now ready for Claus tail gas intake.

Warming-up/Start-up of PDQ Gasification

Warming up of the PDQ Gasification has to be carried out in the following sequence: Warming-up of the Gasifier Steam system has to be carried out; The water quench part of the Gasifier, the water circulation of the Venturi Scrubber and the Wash Column and the Slurry Expansion and Filtrate Preheating will be warmed-up; Ignition of the Start-up Burner; Pressurizing of the Gasifier up to start-up pressure for the first Coal Dust Burner; Line up the raw gas route; Start coal dust recycle of the first burner to the start-up vessel. For emissions and duration of emissions at the start-up vessel filter 1121-F004 see Emission Point A2/1; A2/2; Start Coal Sluicing and Feeding to keep sufficient coal in the Feed Vessel. For emission during expansion of the sluice vessels see Emission Point B1/1;B1/2; Start the Coal Dust Burners with the required coal dust quantity; Retract the Start-up burner; Increase the gasifier pressure to normal operating pressure. The produced gas is routed via the Scrubber 1161-C001 to the flare. For gasifier start-up emissions see Emission Point B2; Start sending raw gas to the cooling train of the CO Shift Conversion, the CO2/H2S Removal and the pressure controller downstream of the CO2/H2S Removal to the flare; Start slag sluicing program, (Slag cooling, slag sluice support pump, slag extractor and slag disposal.) Adjust Slurry Expansion flow and keep Gasifier base level constant via the level control valve; Start the Belt Filter Press; Start filter cake disposal; Adjust the CO2/H2S Wash Unit. Route the yielded sour gas to the sour gas flare first, until the sour gas quality (H2S content) is suitable to be used in the Sulfur recovery Unit;

Start sending raw gas stepwise via the CO Shift Reactor; Start-up the Sulfur Recovery Unit with sour gas; Start-up the Tail Gas Treatment Section with tail gas.

Shut Down Depressurization of the PDQ Unit

After tripping of the coal dust burner depressurization of the PDQ unit can be initialized. The depressurization time is related to the cooling-down time of the quench water circulation and the water circulation around the venture scrubber / wet scrubber to prevent excess of water evaporation. Forced temperature reduction can be reached by cooling of the expanded quench water to the clarification unit in the cooling water cooler down-steam of the third expansion vessel. The clarified cooled quench water has to be routed back to the PDQ quench circuit bypassing the pre-heater of the first quench Vessel.

Start-up Methanol Plant

Clean synthesis gas must be available for the start-up downstream of the acid gas removal. The synthesis gas is fed via the make up gas (MUG) compressor. The steam pressure will be adjusted to the required temperature profile of the methanol reaction. Above 10 bar methanol will start to condense in the HP methanol separator and so synthesis gas will be removed from the system by the reaction. The feed rate from the MUG compressor has to be increased to compensate the losses of H2 and CO. If the liquid level in the HP methanol separator is sufficient high then commission the let down system to the methanol flash drum. If the concentration of Nitrogen and /or CH4 in the loop reaches the flow sheet values start the purge from the synthesis loop. The purge is routed to the hydrogen recovery unit.

Start-up Methanol to Gasoline Plant

Start-up of the MTG unit from cold conditions requires that the system be nearly oxygen free. During start-up of the methanol to gasoline section there are flue gas emissions from the fired heaters (Emission Points E1 and E2) used during heating up the DME Reactor and the MTG Reactor. The columns and reflux accumulators of the product fractionation section will be filled with pre-stored gasoline. For pressurizing of the Stabilizer prior to feed in, fuel gas will be used. During Start-up of the product fractionation section no emissions are expected. Fuel gas produced in the Stabilizer will be routed to the fuel gas system (OSBL).

During Start-up of the heavy gasoline treatment section emissions due to use of the HGT Charge Heater (Emission Point E3) appear. Gas purged from the HGT Section during take over of heavy gasoline from product fractionation section and stabilization of the heavy gasoline section will be routed to the fuel gas system (OSBL).

Normal Operation of the Plant

Once the start-up sequence is completed the process operations are continued with the entire process being active. The coal feed and limestone are sent to the preparation facilities from the coal and limestone yard, the material is then fed through the preparation/grinding facilities and fed to the PDQ gasification systems. The products of the gasification system are the syngas and the ash material. The gasification system is basically a high temperature partial oxidation process for converting the coal into a syngas of carbon monoxide and hydrogen. The ash material is mostly a slag/aggregate and a smaller fraction of fly ash. The ash materials are stored in the storage building (slag/aggregate) or in the storage silo (fly ash). The ash materials will be shipped off site.

The syngas passes through the remaining part of the syngas treatment units which include the CO Shift (enriches the syngas into a hydrogen rich stream), the Acid Gas Removal (removes the acid gases CO2, H2S, COS, mercury, and HCN), Mercury Removal Systems (removal of remaining mercury with the majority of mercury removed in the Acid Gas Removal System), CO Purification (purifies the CO stream), Sulfur Recovery Unit (processes H2S, CO2 and NH3 containing sour gas from stripping of process condensates, H2S, COS, CO2 and HCN containing acid gas, NH3 and HCN are decomposed to sulfur containing components are converted to elemental sulfur which is a product of the plant), Sour Water Stripping (removal of H2S, CO2, NH3 and HCN), and then to the Methanol Production Unit which transfers the syngas to methanol which is the intermediate product of the plant. Air separation units are required to provide nitrogen and oxygen for the process steps. Each step of the process is necessary to take the original produced syngas and transfer it to the next process at the grade required to continue down the line for further processing to maximize production of methanol. Differing temperatures and pressures are required throughout the processes for proper operation of each step of the system.

The methanol is then sent to the Methanol to Gasoline Treatment (MGT) unit to be converted to gasoline and LPG products and the remainder of the material is converted to water.

Portions of the process also produce steam (high pressure and low pressure). The steam is used in the processes to provide heat as needed, to provide steam for steam driven sections of the process, or converted into electrical power as needed to drive electrical system. There will be a cooling tower to allow for the process water to be cooled and reentered into the process. Electric power, as produced, will be utilized at the facility. Additional needs for electric will be supplied by utility connections. There are no sales of electric power.

The plant will feed approximately 346 tons per hour, 8,304 tons per day, and 3,030,960 tons per year into the system and produce 18,000 barrels of gasoline per day and 6,570,000 barrels per year with a barrel being 42 gallons. Raw materials for the plant will be trucked into the site. Product gasoline and LPG will be removed from the site via the preferred method of loading to railcar and some allowance is made for trucking for the delivery to markets.

ATTACHMENT H

MATERIAL SAFETY DATA SHEETS

International Chemical Safety Cards

METHANOL

ICSC: 0057

Methyl alcohol
Carbinol
Wood alcohol
CH_4O / CH_3OH
Molecular mass: 32.0

ICSC # 0057
CAS # 67-56-1
RTECS # PC1400000
UN # 1230
EC # 603-001-00-X
April 11, 2000 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable. See Notes.	NO open flames, NO sparks, and NO smoking. NO contact with oxidants.	Powder, alcohol-resistant foam, water in large amounts, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling. Use non-sparking handtools.	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		AVOID EXPOSURE OF ADOLESCENTS AND CHILDREN!	
•INHALATION	Cough. Dizziness. Headache. Nausea. Weakness. Visual disturbance.	Ventilation. Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	MAY BE ABSORBED! Dry skin. Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.
•EYES	Redness. Pain.	Safety goggles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Shortness of breath. Vomiting. Convulsions. Unconsciousness. (Further see Inhalation).	Do not eat, drink, or smoke during work. Wash hands before eating.	Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Ventilation. Collect leaking liquid in sealable containers. Wash away remainder with plenty of water. Remove vapour with fine water spray. Chemical protection suit including self-contained breathing apparatus.	Fireproof. Separated from strong oxidants, food and feedstuffs Cool.	Do not transport with food and feedstuffs. F symbol T symbol R: 11-23/24/25-39/23/24/25 S: 1/2-7-16-36/37-45 UN Hazard Class: 3 UN Subsidiary Risks: 6.1 UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

International Chemical Safety Cards

METHANOL

ICSC: 0057

I M P O R T A N T D A T A	**PHYSICAL STATE; APPEARANCE:** COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR. **PHYSICAL DANGERS:** The vapour mixes well with air, explosive mixtures are easily formed. **CHEMICAL DANGERS:** Reacts violently with oxidants causing fire and explosion hazard. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: 200 ppm as TWA 250 ppm as STEL (skin) BEI issued (ACGIH 2004). MAK: 200 ppm 270 mg/m³ Peak limitation category: II(4); skin absorption (H); Pregnancy risk group: C (DFG 2004). OSHA PEL‡: TWA 200 ppm (260 mg/m³) NIOSH REL: TWA 200 ppm (260 mg/m³) ST 250 ppm (325 mg/m³) skin NIOSH IDLH: 6000 ppm See: 67561	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation and through the skin and by ingestion. **INHALATION RISK:** A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C. **EFFECTS OF SHORT-TERM EXPOSURE:** The substance is irritating to the eyes the skin and the respiratory tract The substance may cause effects on the central nervous system , resulting in loss of consciousness.Exposure may result in blindness and death.The effects may be delayed.Medical observation is indicated. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the central nervous system , resulting in persistent or recurring headaches and impaired vision.
PHYSICAL PROPERTIES	Boiling point: 65°C Melting point: -98°C Relative density (water = 1): 0.79 Solubility in water: miscible Vapour pressure, kPa at 20°C: 12.3	Relative vapour density (air = 1): 1.1 Relative density of the vapour/air-mixture at 20°C (air = 1): 1.01 Flash point: 12°C c.c. Auto-ignition temperature: 464°C Explosive limits, vol% in air: 5.5-44 Octanol/water partition coefficient as log Pow: -0.82/-0.66
ENVIRONMENTAL DATA		

NOTES

Burns with nonluminous bluish flame. Depending on the degree of exposure, periodic medical examination is suggested.

Transport Emergency Card: TEC (R)-30S1230
NFPA Code: H 1; F 3; R 0;

ADDITIONAL INFORMATION

ICSC: 0057 **METHANOL**

International Chemical Safety Cards

SODIUM HYDROXIDE

ICSC: 0360

Caustic soda
Sodium hydrate
Soda lye
NaOH
Molecular mass: 40.0

ICSC # 0360
CAS # 1310-73-2
RTECS # WB4900000
UN # 1823
EC # 011-002-00-6
October 02, 2000 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Contact with moisture or water may generate sufficient heat to ignite combustible substances.		In case of fire in the surroundings: use appropriate extinguishing media.
EXPLOSION			
EXPOSURE		AVOID ALL CONTACT!	IN ALL CASES CONSULT A DOCTOR!
•INHALATION	Corrosive. Burning sensation. Sore throat. Cough. Laboured breathing. Shortness of breath. Symptoms may be delayed (see Notes).	Local exhaust or breathing protection.	Fresh air, rest. Half-upright position. Artificial respiration may be needed. Refer for medical attention.
•SKIN	Corrosive. Redness. Pain. Serious skin burns. Blisters.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.
•EYES	Corrosive. Redness. Pain. Blurred vision. Severe deep burns.	Face shield or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Corrosive. Burning sensation. Abdominal pain. Shock or collapse.	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Give plenty of water to drink. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Sweep spilled substance into suitable containers. Wash away remainder with plenty of water. Personal protection: complete protective clothing including self-contained breathing apparatus.	Separated from strong acids, metals food and feedstuffs Dry. Well closed. Store in an area having corrosion resistant concrete floor.	Unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs. C symbol R: 35 S: 1/2-26-37/39-45 UN Hazard Class: 8 UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0360

International Chemical Safety Cards

SODIUM HYDROXIDE

ICSC: 0360

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
WHITE DELIQUESCENT SOLID IN VARIOUS FORMS , WITH NO ODOUR.

PHYSICAL DANGERS:

CHEMICAL DANGERS:
The substance is a strong base, it reacts violently with acid and is corrosive in moist air to metals like zinc, aluminium, tin and lead forming a combustible/explosive gas (hydrogen - see ICSC 0001). Reacts with to produce ammonia causing fire hazard. Attacks some forms of plastics, rubber or coatings. Rapidly absorbs carbon dioxide and water from air. Contact with moisture or water may generate heat (see Notes).

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 2 mg/m^3 (Ceiling value) (ACGIH 2004).
MAK: IIb (not established but data is available) (DFG 2004).
OSHA PEL‡: TWA 2 mg/m^3
NIOSH REL: C 2 mg/m^3
NIOSH IDLH: 10 mg/m^3 See: 1310732

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly.

EFFECTS OF SHORT-TERM EXPOSURE:
Corrosive. The substance is very corrosive to the eyes, the skin and the respiratory tract. Corrosive on ingestion. Inhalation of an aerosol of the substance may cause lung oedema (see Notes).

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis.

PHYSICAL PROPERTIES

Boiling point: 1390°C
Melting point: 318°C
Density: 2.1 g/cm^3
Solubility in water, g/100 ml at 20°C: 109

ENVIRONMENTAL DATA

This substance may be hazardous to the environment; special attention should be given to water organisms.

NOTES

The occupational exposure limit value should not be exceeded during any part of the working exposure. The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. NEVER pour water into this substance; when dissolving or diluting always add it slowly to the water. Other UN number: UN1824 Sodium hydroxide solution, Hazard class 8.

Transport Emergency Card: TEC (R)-80GC6-II+III
NFPA Code: H 3; F 0; R 1;

ADDITIONAL INFORMATION

ICSC: 0360 **SODIUM HYDROXIDE**

IMPORTANT LEGAL NOTICE:

International Chemical Safety Cards

METHANE

ICSC: 0291

Methyl hydride
CH_4
Molecular mass: 16.0
(cylinder)

ICSC # 0291
CAS # 74-82-8
RTECS # PA1490000
UN # 1971
EC # 601-001-00-4
February 10, 2000 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Extremely flammable.	NO open flames, NO sparks, and NO smoking.	Shut off supply; if not possible and no risk to surroundings, let the fire burn itself out; in other cases extinguish with water spray, powder, carbon dioxide.
EXPLOSION	Gas/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Use non-sparking handtools.	In case of fire: keep cylinder cool by spraying with water. Combat fire from a sheltered position.
EXPOSURE			
•INHALATION	Suffocation. See Notes.	Ventilation. Breathing protection if high concentration.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
•SKIN	ON CONTACT WITH LIQUID: FROSTBITE.	Cold-insulating gloves.	ON FROSTBITE: rinse with plenty of water, do NOT remove clothes. Refer for medical attention.
•EYES		Safety goggles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION			

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Consult an expert! Ventilation. Remove all ignition sources. Personal protection: self-contained breathing apparatus. NEVER direct water jet on liquid.	Fireproof. Cool. Ventilation along the floor and ceiling.	F+ symbol R: 12 S: 2-9-16-33 UN Hazard Class: 2.1

SEE IMPORTANT INFORMATION ON BACK

International Chemical Safety Cards

METHANE

ICSC: 0291

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** COLOURLESS, COMPRESSED OR LIQUEFIED GAS , WITH NO ODOUR. **PHYSICAL DANGERS:** The gas is lighter than air. **CHEMICAL DANGERS:** **OCCUPATIONAL EXPOSURE LIMITS:** TLV: (aliphatic hydrocarbons gases, Alkane C1-C4) 1000 ppm (as TWA) (ACGIH 2005). MAK not established.	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation. **INHALATION RISK:** On loss of containment this gas can cause suffocation by lowering the oxygen content of the air in confined areas. **EFFECTS OF SHORT-TERM EXPOSURE:** Rapid evaporation of the liquid may cause frostbite. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
PHYSICAL PROPERTIES	Boiling point: -161°C Melting point: -183°C Solubility in water, ml/100 ml at 20°C: 3.3 Relative vapour density (air = 1): 0.6	Flash point: Flammable Gas Auto-ignition temperature: 537°C Explosive limits, vol% in air: 5-15 Octanol/water partition coefficient as log Pow: 1.09
ENVIRONMENTAL DATA		

NOTES

Density of the liquid at boiling point: 0.42 kg/l. High concentrations in the air cause a deficiency of oxygen with the risk of unconsciousness or death. Check oxygen content before entering area. Turn leaking cylinder with the leak up to prevent escape of gas in liquid state. After use for welding, turn valve off; regularly check tubing, etc., and test for leaks with soap and water. The measures mentioned in section PREVENTION are applicable to production, filling of cylinders, and storage of the gas. Other UN number: 1972 (refridgerated liquid), Hazard class: 2.1.

Transport Emergency Card: TEC (R)-20G1F
NFPA Code: H 1; F 4; R 0;

ADDITIONAL INFORMATION

ICSC: 0291 **METHANE**

International Chemical Safety Cards

ETHANE

ICSC: 0266

C_2H_6 / CH_3CH_3
Molecular mass: 30.1
(cylinder)

ICSC # 0266
CAS # 74-84-0
RTECS # KH3800000
UN # 1035
EC # 601-002-00-X
April 03, 2006 Validated

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Extremely flammable.	NO open flames, NO sparks, and NO smoking.	Shut off supply; if not possible and no risk to surroundings, let the fire burn itself out; in other cases extinguish with water spray, powder
EXPLOSION	Gas/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding) if in liquid state. Use non-sparking handtools.	In case of fire: keep cylinder cool by spraying with water. Combat fire from a sheltered position.
EXPOSURE			
•INHALATION	Suffocation. See Notes.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
•SKIN	ON CONTACT WITH LIQUID: FROSTBITE.	Cold-insulating gloves. Protective clothing.	ON FROSTBITE: rinse with plenty of water, do NOT remove clothes. Refer for medical attention.
•EYES	ON CONTACT WITH LIQUID: FROSTBITE.	Face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION			

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Personal protection: self-contained breathing apparatus. Evacuate danger area! Consult an expert! Remove all ignition sources. Ventilation. NEVER direct water jet on liquid.	Fireproof. Cool. Separated from strong oxidants and halogens.	F+ symbol R: 12 S: 2-9-16-33 UN Hazard Class: 2.1 Signal: Danger
		Flam Flammable gas Contains gas under pressure; may explode if heated

SEE IMPORTANT INFORMATION ON BACK

International Chemical Safety Cards

ETHANE

ICSC: 0266

I M P O R T A N T D A T A	**PHYSICAL STATE; APPEARANCE:** COLOURLESS COMPRESSED LIQUEFIED GAS, ODOURLESS WHEN PURE. **PHYSICAL DANGERS:** The gas mixes well with air, explosive mixtures are easily formed. As a result of flow, agitation, etc., electrostatic charges can be generated. **CHEMICAL DANGERS:** Reacts violently with halogens strong oxidants causing fire and explosion hazard. **OCCUPATIONAL EXPOSURE LIMITS:** TLV (as Aliphatic Hydrocarbon Gases : Alkanes (C1-C4)) : 1000 ppm; mg/m³ (ACGIH 2006).	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation. **INHALATION RISK:** On loss of containment this liquid evaporates very quickly displacing the air and causing a serious risk of suffocation when in confined areas. **EFFECTS OF SHORT-TERM EXPOSURE:** Rapid evaporation of the liquid may cause frostbite. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
PHYSICAL PROPERTIES	Boiling point: -89°C Melting point: -183°C Solubility in water, ml/100 ml at 20°C: (very poor) Vapour pressure, kPa at 20°C: 3850 Relative vapour density (air = 1): 1.05	Flash point: flammable gas Auto-ignition temperature: 472°C Explosive limits, vol% in air: 3.0-12.5 Octanol/water partition coefficient as log Pow: 1.81
ENVIRONMENTAL DATA		

NOTES

High concentrations in the air cause a deficiency of oxygen with the risk of unconsciousness or death. Check oxygen content before entering area. Turn leaking cylinder with the leak up to prevent escape of gas in liquid state. Other UN number : 1961 (refrigerated liquid), Hazard class : 2.1.

Transport Emergency Card: TEC (R)-20S1035
NFPA Code: H1; F4; R0

ADDITIONAL INFORMATION

ICSC: 0266 **ETHANE**

Please note: This MSDS current at publication date below. This site does not undertake to keep most recent version.

Source: Energy Safety Handbook - LP Gas Edition
MATERIAL SAFETY DATA SHEET *This material safety data sheet (MSDS) .*

1. Is produced by Australian Liquefied Petroleum Gas Association Ltd. Pty. for use by its members.

2. Has been produced following the principles and recommendations outlined in the Worksafe Australia Guidance Note for completion of a material Safety Data Sheet, Second Edition, Sydney, February 1990.

MSDS No: 0000/1

Date issued: December 1991

IDENTIFICATION	
PRODUCT NAME:	LIQUEFIED PETROLEUM GAS
UN Number:	1075
Other Names:	LP GAS ; LPG ; Propane/Butane Mix
Hazchem Code:	2WE
Dangerous Goods Class:	2.1
Subsidiary Risk:	None
Emergency Procedures Guide:	2A2
Poisons Schedule:	none allocated
USE: A flammable gas used as a fuel or propellant, normally stored under pressure in liquid form.	
PHYSICAL DESCRIPTION/PROPERTIES:	
Appearance:	Rapidly evaporating liquid or gas with rotten cabbage - like smell.
Initial Boiling Point:	- 42 to 0 deg C.
Melting Point:	Not applicable
Specific Gravity:	0.49 to 0.57 (liquid)
Solubility in Water:	Very slight

Vapour Pressure at 20 Deg C:	107 to 730 kpag
Flash Point:	-104 to 60 deg C
Lower Flammability Limit:	1.9 % in air
Upper Flammability Limit:	9.5 % in air
Vapour density:	1.5 to 2.0 air = 1
% Volatiles:	100 %

OTHER PROPERTIES:	
Evaporation Rate:	Rapid
Auto ignition Point:	482 to 5820 deg C

INGREDIENTS:

Chemical Entity	Other Names	CAS Number	Proportion
Propane	-	74-98-6	0 to 100%
Butane	-	106-97-8	0 to 100 %
Propene	Propylene	115-07-1	0 to 100 %
Butene	Butylene	106-98-9	0 to 100 %

LP Gas may be stored and transported as a mixture of ingredients.

LP Gas contains odourant ethyl mercaptan unless otherwise authorised. (recommended 25 mg/kg)

This is detectable to 20 % of its lower flammability limit.

HEALTH HAZARD INFORMATION

HEALTH HAZARDS

Inhaled:	May cause irritation of the respiratory tract. May also cause headaches or dizziness at moderate exposures. Asphyxiant. Causes unconsciousness and respiratory arrest at elevated exposures.
Eye:	Irritating if the liquid gets into the eyes, with a possible hazard from freezing due to rapid evaporation. Vapours in high concentration may also be irritating.
Skin:	Excessive prolonged contact to the liquid can cause skin irritation and frostbite due to rapid evaporation.
Swallowed:	Unlikely to be a problem, owing to high evaporation rate.
Chronic:	No effects reported from long term industrial exposure to this product.

FIRST AID

Inhaled:	Avoid breathing vapours and fumes as much as possible. If someone is overcome by fumes, remove them to fresh air immediately. However, rescuers should avoid becoming a casualty by wearing suitable respiratory protection. If the affected individual is not breathing, administer artificial respiration. Seek medical advice promptly in serious cases of over-exposure.
Eye:	Avoid eye contact with the product. Remove any contact lenses carefully. Hold eyelids open and flush eyes with fresh tepid water for 15 minutes. Seek medical advice immediately for all eye contact. Where significant splashing of LP Gas liquid may occur, eyewash Facilities stations Should be installed.

Skin:	Avoid skin contact with the liquid. Remove contaminated clothing and wash the exposed areas with plenty of soap and water. Seek medical advice if irritation or frostbite (see below) occurs.
Swallowed:	Unlikely to be a problem, owing to high evaporation rate.
Frostbite:	Obtain medical assistance. If medical advice is not available immediately, place casualty in a warm area as soon as possible and allow the injured area to warm gradually (further damage may occur if the area of injury warms too rapidly). DO NOT EXPOSE THE INJURED AREA TO EXCESS HEAT OR COLD (such as heat lamps, hot water, snow or ice). Gently cover or drape the injured area with clean material, such as a dressing or sheet. To relieve pain, immerse the injured area in water which is near or at body temperature (35-40 deg C). If possible, get the casualty to exercise the injured area gradually. Give them something warm to drink, BUT NO ALCOHOL. Seek medical advice as soon as possible.
ADVICE TO DOCTOR	No specific treatment recommended. Treat symptomatically. Show a copy of this material safety data sheet to medical personnel dealing with cases of over-exposure.

PRECAUTIONS FOR USE

EXPOSURE STANDARDS

Worksafe Australia has established comments and exposure standards for the following ingredients of this product:

Propane: simple asphyxiant

Butane: 800 ppm (1900 mg/m^3) as an 8-hour Time Weighted Average.

Most LP Gas is odourised before transport handling and is detectable to 20% of its LEL. If no stenching agent has been added, LP Gas has a high odour threshold (in the order of 10 - 25 times the exposure standard). Therefore, unodourised LP Gas does not have good warning properties.

ENGINEERING CONTROLS

Ensure there is good ventilation of the area in which the product is used to keep concentrations below the exposure standard or lower explosive limit. While dilution by air may be sufficient in most cases, mechanical exhaust ventilation may be required. In such cases, use sparkproof equipment if possible. A ventilation velocity of at least 0.3 m/s is recommended.

PERSONAL PROTECTION

Avoid contact with eyes and skin. Overalls or a long sleeved shirt and closed-in shoes or safety footwear should be worn as a general precaution.

Eye Protection:	Eye protection is required (faceshield, chemical safety glasses or side shield glasses) where splashing is likely. Eye protection should comply with AS 1336/1337.
Gloves:	Impervious oil and cold resistant gloves should be worn when using this product. Gloves made of PVC are preferred, though gloves made of nitrite and chloroprene should also be satisfactory. Any such gloves should comply with AS 2161.
Respiratory Protection:	If ventilation of the area is not sufficient, respiratory protection may be required. This should be at least approved air supplied or self-contained breathing apparatus where the exposure standard is likely to be exceeded or if work is required close to large gas leaks. Respiratory protection should comply with AS 1715/ 1716.

FLAMMABILITY
LP Gas is gaseous and highly flammable at normal temperatures and pressures. The gas is normally stored under pressure in the liquid form. Release of pressure is associated with rapid cooling, the intensity of which is dependent on the rate of release. Containers of LP Gas are explosive hazards, when exposed to excessive heat.

SAFE HANDLING	
STORAGE AND TRANSPORT	
LP Gas is classified under the Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code) as a FLAMMABLE GAS (Class 2.1).	
Storage:	LP Gas should be stored in approved areas only. Minimum conditions of storage include dry, cool,secure storage away from heat, sources of ignition and oxidising substances. Keep containers closed and upright when not in use.
Transport:	LP Gas must be transported in accordance with the latest edition of ADG Code (April 1987). Large volumes must be transported in approved tankers, and smaller volumes in approved pressure containers.
SPILLS AND DISPOSAL	
Spills:	Cut off source of leak. If the release is large, cut off all ignition sources and evacuate all non-essential personnel from the area. If possible, ventilate the area. If the incident is significant, seek immediate assistance from local fire authorities and police. If possible, monitor the vapour concentration until dissipated.
Disposal:	If possible, allow to evaporate. Large volumes should be removed by tanker or by controlled burning. LP Gas can be disposed by approved incineration methods. Contact local supplier or fire brigade for further advice on disposal.
FIRE/EXPLOSION HAZARD	
Hazchem Code:	2WE
Extinguishers:	Water spray or BC fire extinguisher.
Procedures:	Stay out of gas or vapour. Use water to disperse unignited gas or vapour. Allow to burn out, if possible.
Special Precautions:	Fire-fighters should wear full protection and breathing apparatus. LP Gas is heavier than air, and vapours will tend to flow downwards and accumulate in low-lying areas such as drains and pits at ground level.
Containers:	Cool fire exposed containers with water spray. If ignition has occurred and water is not available, tank metal may weaken from overheating.
Reactivity:	Stable
Incompatibilities:	Oxidisers
Combustion Products:	Hazardous combustion products of carbon dioxide (carbon monoxide under poor conditions of combustion) and smoke may be produced. Hazardous polymerisation will not occur.
US NFPA Classification:	
Health:	1
Flammability:	3

Reactivity:	0

International Chemical Safety Cards

GASOLINE

ICSC: 1400

National Institute for Occupational Safety and Health
NIOSH

UNEP

Benzin

ICSC # 1400
CAS # 86290-81-5
RTECS # DE3550000
UN # 1203
EC # 649-378-00-4
October 18, 2001 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Powder, AFFF, foam, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding).	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE			
•INHALATION	Confusion. Cough. Dizziness. Drowsiness. Dullness. Headache.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	MAY BE ABSORBED! Dry skin. Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety spectacles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Nausea. Vomiting. (See Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Give plenty of water to drink. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Consult an expert! Remove all ignition sources. Cover the spilled material with dry earth, sand or non-combustible material. Do NOT wash away into sewer. Do NOT let this chemical enter the environment. Personal protection: self-contained breathing apparatus.	Fireproof.	Marine pollutant. Note: H, P T symbol R: 45-65 S: 53-45 UN Hazard Class: 3 UN Packing Group: I

SEE IMPORTANT INFORMATION ON BACK

International Chemical Safety Cards

GASOLINE

ICSC: 1400

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** MOBILE LIQUID **PHYSICAL DANGERS:** The vapour is heavier than air and may travel along the ground; distant ignition possible. The vapour mixes well with air, explosive mixtures are easily formed. As a result of flow, agitation, etc., electrostatic charges can be generated. **CHEMICAL DANGERS:** **OCCUPATIONAL EXPOSURE LIMITS:** TLV: 300 ppm as TWA 500 ppm as STEL A3 (confirmed animal carcinogen with unknown relevance to humans); (ACGIH 2004).	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its vapour, through the skin and by ingestion. **INHALATION RISK:** A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20°C. **EFFECTS OF SHORT-TERM EXPOSURE:** The substance is irritating to the eyes the skin and the respiratory tract If this liquid is swallowed, aspiration into the lungs may result in chemical pneumonitis. The substance may cause effects on the central nervous system **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** The liquid defats the skin. The substance may have effects on the central nervous system liver This substance is possibly carcinogenic to humans.
PHYSICAL PROPERTIES	Boiling point: 20-200°C Relative density (water = 1): 0.70 - 0.80 *Solubility in water, g/100 ml:* none Relative vapour density (air = 1): 3 - 4	Flash point: <-21°C Auto-ignition temperature: about 250°C Explosive limits, vol% in air: 1.3-7.1 Octanol/water partition coefficient as log Pow: 2-7
ENVIRONMENTAL DATA	The substance is harmful to aquatic organisms.	

NOTES

Depending on the degree of exposure, periodic medical examination is suggested.

NFPA Code: H1; F3; R0;
Transport Emergency Card: TEC (R)-30S1203

ADDITIONAL INFORMATION

ICSC: 1400 **GASOLINE**

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

HYDROGEN

ICSC: 0001

National Institute for Occupational Safety and Health
NIOSH

UNEP

H_2
Molecular mass: 2.0
(cylinder)

ICSC # 0001
CAS # 1333-74-0
RTECS # MW8900000
UN # 1049
EC # 001-001-00-9
March 06, 2002 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Extremely flammable. Many reactions may cause fire or explosion.	NO open flames, NO sparks, and NO smoking.	Shut off supply; if not possible and no risk to surroundings, let the fire burn itself out; in other cases extinguish with water spray, powder, carbon dioxide.
EXPLOSION	Gas/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Use non-sparking handtools. Do not handle cylinders with oily hands.	In case of fire: keep cylinder cool by spraying with water. Combat fire from a sheltered position.
EXPOSURE			
•INHALATION	Suffocation.	Closed system and ventilation.	Fresh air, rest. Artificial respiration may be needed. Refer for medical attention.
•SKIN	Serious frostbite.	Cold-insulating gloves.	Refer for medical attention.
•EYES		Safety spectacles.	
•INGESTION			

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Remove all ignition sources. Evacuate danger area! Consult an expert! Ventilation. Remove vapour with fine water spray.	Fireproof. Cool.	F+ symbol R: 12 S: 2-9-16-33 UN Hazard Class: 2.1

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0001

International Chemical Safety Cards

HYDROGEN

ICSC: 0001

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** ODOURLESS COLOURLESS COMPRESSED GAS **PHYSICAL DANGERS:** The gas mixes well with air, explosive mixtures are easily formed. The gas is lighter than air. **CHEMICAL DANGERS:** Heating may cause violent combustion or explosion. Reacts violently with oxygen halogens strong oxidants causing fire and explosion hazard. Metal catalysts, such as platinum and nickel, greatly enhance these reactions. **OCCUPATIONAL EXPOSURE LIMITS:** TLV: Simple asphyxiant (ACGIH 2002).	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation. **INHALATION RISK:** On loss of containment, a harmful concentration of this gas in the air will be reached very quickly. **EFFECTS OF SHORT-TERM EXPOSURE:** Simple asphyxiant. See Notes. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
PHYSICAL PROPERTIES	Boiling point: -253°C Relative vapour density (air = 1): 0.07 Flash point: flammable gas	Auto-ignition temperature: 500-571°C Explosive limits, vol% in air: 4-76
ENVIRONMENTAL DATA		

NOTES

High concentrations in the air cause a deficiency of oxygen with the risk of unconsciousness or death. Check oxygen content before entering area. No odour warning if toxic concentrations are present. Measure hydrogen concentrations with suitable gas detector (a normal flammable gas detector is not suited for the purpose).

Transport Emergency Card: TEC (R)-20S1049
NFPA Code: H0; F4; R0;

ADDITIONAL INFORMATION

ICSC: 0001 **HYDROGEN**

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

DIMETHYL DISULFIDE

ICSC: 1586

Methyl disulfide
Disulfide, dimethyl-
$C_2H_6S_2$
Molecular mass: 94.2

ICSC # 1586
CAS # 624-92-0
RTECS # JO1927500
UN # 2381
April 21, 2005 Peer reviewed

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames, NO sparks, and NO smoking.	Powder, water spray, foam, carbon dioxide.
EXPLOSION	Above 24°C explosive vapour/air mixtures may be formed.	Above 24°C use a closed system, ventilation, and explosion-proof electrical equipment.	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE			
•INHALATION	Headache. Nausea. Dizziness. Drowsiness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	Redness.	Protective gloves.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
•EYES	Redness. Pain.	Safety goggles	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	(See Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Give a slurry of activated charcoal in water to drink. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Consult an expert! Personal protection: filter respirator for organic gases and vapours. Ventilation. Remove all ignition sources. Collect leaking liquid in sealable containers. Do NOT wash away into sewer.	Fireproof. Store in an area without drain or sewer access.	R: S: UN Hazard Class: 3 UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1994. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

DIMETHYL DISULFIDE

ICSC: 1586

I M P O R T A N T D A T A	**PHYSICAL STATE; APPEARANCE:** LIQUID , WITH CHARACTERISTIC ODOUR. **PHYSICAL DANGERS:** **CHEMICAL DANGERS:** The substance decomposes on burning producing toxic and corrosive fumes including sulfur oxides Reacts violently with oxidants **OCCUPATIONAL EXPOSURE LIMITS:** TLV not established. MAK not established.	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation and by ingestion. **INHALATION RISK:** No indication can be given about the rate in which a harmful concentration in the air is reached on evaporation of this substance at 20°C. **EFFECTS OF SHORT-TERM EXPOSURE:** The substance is mildly irritating to the skin and is irritating to the eyes and the respiratory tract The substance may cause effects on the central nervous system. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:**
PHYSICAL PROPERTIES	Boiling point: 110°C Melting point: -85°C Relative density (water = 1): 1.06 Solubility in water, g/100 ml at 20°C: 0.25 (very poor) Vapour pressure, kPa at 25°C: 3.8	Relative density of the vapour/air-mixture at 20°C (air = 1): 1.08 Flash point: 24°C c.c. Auto-ignition temperature: >300°C Explosive limits, vol% in air: 1.1-16 Octanol/water partition coefficient as log Pow: 1.77
ENVIRONMENTAL DATA		

NOTES

Transport Emergency Card: TEC (R)-30GF1-I-II

ADDITIONAL INFORMATION

ICSC: 1586 **DIMETHYL DISULFIDE**

International Chemical Safety Cards

HYDROGEN SULFIDE

ICSC: 0165

National Institute for Occupational Safety and Health

NIOSH

UNEP

Sulfur hydride
H_2S
Molecular mass: 34.1
(cylinder)

ICSC # 0165
CAS # 7783-06-4
RTECS # MX1225000
UN # 1053
EC # 016-001-00-4

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Extremely flammable.	NO open flames, NO sparks, and NO smoking.	Shut off supply; if not possible and no risk to surroundings, let the fire burn itself out; in other cases extinguish with water spray, powder, carbon dioxide.
EXPLOSION	Gas/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding) if in liquid state. Do NOT use compressed air for filling, discharging, or handling.	In case of fire: keep cylinder cool by spraying with water.
EXPOSURE		AVOID ALL CONTACT!	IN ALL CASES CONSULT A DOCTOR!
•INHALATION	Headache. Dizziness. Cough. Sore throat. Nausea. Laboured breathing. Unconsciousness. Symptoms may be delayed (see Notes).	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Half-upright position. Artificial respiration if indicated. No mouth-to-mouth artificial respiration. Refer for medical attention.
•SKIN	ON CONTACT WITH LIQUID: FROSTBITE.	Cold-insulating gloves.	ON FROSTBITE: rinse with plenty of water, do NOT remove clothes. Refer for medical attention.
•EYES	Redness. Pain. Severe deep burns.	Safety goggles, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Consult an expert! Remove all ignition sources. Ventilation.	Fireproof. Separated from strong oxidants. Cool. Keep in a well-ventilated room.	F+ symbol
Remove gas with fine water spray. (Extra personal protection: gas-tight chemical protection suit including self-contained breathing apparatus).	Install continous monitoring system with alarm.	T+ symbol N symbol R: 12-26-50 S: 1/2-9-16-28-36/37-45-61 UN Hazard Class: 2.3 UN Subsidiary Risks: 2.1

International Chemical Safety Cards

HYDROGEN SULFIDE

ICSC: 0165

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
COLOURLESS COMPRESSED LIQUEFIED GAS , WITH CHARACTERISTIC ODOUR OF ROTTEN EGGS.

PHYSICAL DANGERS:
The gas is heavier than air and may travel along the ground; distant ignition possible. As a result of flow, agitation, etc., electrostatic charges can be generated.

CHEMICAL DANGERS:
Heating may cause violent combustion or explosion. The substance decomposes on burning producing toxic gas (sulfur oxides). Reacts violently with strong oxidants, causing fire and explosion hazard. Attacks many metals and some plastics.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 10 ppm (as TWA) (ACGIH 2000).
TLV: 15 ppm (STEL) (ACGIH 2000).
MAK: 10 ppm; 15 mg/m^3; (1999)
OSHA PEL: C 20 ppm 50 ppm 10-minute maximum peak
NIOSH REL: C 10 ppm (15 mg/m^3) 10-minute
NIOSH IDLH: 100 ppm

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation.

INHALATION RISK:
A harmful concentration of this gas in the air will be reached very quickly on loss of containment.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance irritates the eyes and the respiratory tract. The substance may cause effects on the central nervous system Exposure may result in unconsciousness. Exposure may result in death. Inhalation of gas may cause lung oedema (see Notes). The effects may be delayed. Medical observation is indicated. Rapid evaporation of the liquid may cause frostbite.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:

PHYSICAL PROPERTIES

Boiling point: -60°C
Melting point: -85°C
Solubility in water, g/100 ml at 20°C: 0.5
Relative vapour density (air = 1): 1.19
Flash point: Flammable Gas
Auto-ignition temperature: 260°C
Explosive limits, vol% in air: 4.3-46

ENVIRONMENTAL DATA

The substance is very toxic to aquatic organisms.

NOTES

The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Specific treatment is necessary in case of poisoning with this substance; the appropriate means with instructions must be available. The odour warning when the exposure limit value is exceeded is insufficient.

Transport Emergency Card: TEC (R)-20G43
NFPA Code: H4; F4; R0;

ADDITIONAL INFORMATION

ICSC: 0165 HYDROGEN SULFIDE

ATTACHMENT I

EMISSION UNIT TABLE

Attachment I

Emission Units Table

(includes all emission units and air pollution control devices that will be part of this permit application review, regardless of permitting status)

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type[3] and Date of Change	Control Device[4]
Coal and Limestone Handling Sizing, Storage, & Preparation						
Various	TP(s)	Transfer Points (TP) and Conveyors (BC)	2010	See L3-7	New	Various
CR1	CR1	Coal Crusher	2010		New	FE/BH
CR7	CR7	Limestone Crusher	2010		New	FE
FH1,3,5,7,9	VF1,3,5,7,9	Coal Feed Bunkers	2010		New	VF1,3,5,7,9
FH2,4,6,8,10	VF2,4,6,8,10	Limestone Feed Bunkers	2010		New	VF2,4,6,8,10
OS	OS	Stockpiles	2010		New	Various
HR	HR	Haulroads	2010	NA	New	WT/WC
Gasifier Feed and PDQ Gasifier Units						
CR2	A1/1	Mill and Heater	2010	See L3-7	New	BH1
CR3	A1/2	Mill and Heater	2010		New	BH2
CR4	A1/3	Mill and Heater	2010		New	BH3
CR5	A1/4	Mill and Heater	2010		New	BH4
CR6	A1/5	Mill and Heater	2010		New	BH5
CR2-CR6	A1/1-5	Mill and Heater Cold Start	2010		New	BH1-5
SUV1	A2/1	SUV1	2010	See L10	New	VF12
SUV2	A2/2	SUV2	2010		New	VF14
LH1-LH6	B1/1	LH1-LH6, FDB1	2010		New	BH6-BH12
LH7-LH12	B1/2	LH7-LH12, FDB2	2010		New	BH13-BH19

[1] For Emission Units (or Sources) use the following numbering system:1S, 2S, 3S,... or other appropriate designation.
[2] For Emission Points use the following numbering system:1E, 2E, 3E, ... or other appropriate designation.
[3] New, modification, removal
[4] For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.

Attachment I

Emission Units Table

(includes all emission units and air pollution control devices that will be part of this permit application review, regardless of permitting status)

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type[3] and Date of Change	Control Device[4]
Gasifier Feed and PDQ Gasifier Units (Continued)						
FL-ST	B2	FL-ST	2010	See L10	New	NA
GFB1	B3/1	GFB1	2010		New	VF11
GFB2	B3/2	GFB2	2010		New	VF13
CO Shift - Not an Emission Source Except for Fugitive Leaks (COS) - See L14						
CO2/H2S Removal (Acid Gas Removal) (CO2/H2SR) See L18						
CO2/H2SR	C2	CO2/H2SR	2010	See L18	New	NA
Sour Water Stripper – Not an Emissions Source Except for Fugitive Leaks - See L22						
Mercury Removal – Not an Emissions Source Except for Fugitive Leaks - See L26						
Methanol Synthesis Unit – Not an Emissions Source Except for Fugitive Leaks - See L30						
Sulfur Recovery – Not an Emissions Source Except for Fugitive Leaks - See L34						
PSA System – Not an Emissions Source Except for Fugitive Leaks- See L38						
CO_2Purification - See L42						
CO_2P	C1	CO_2P	2010	See L42	New	NA
Air Separation Units – Not an Emissions Source - See L46						
Methanol to Gasoline (MTG) - See L50-65						
SURGH	E1	SURGH	2010	See L54	New	NA
SURH	E2	SURH	2010	See L58	New	NA

[1] For Emission Units (or Sources) use the following numbering system:1S, 2S, 3S,... or other appropriate designation.
[2] For Emission Points use the following numbering system:1E, 2E, 3E, ... or other appropriate designation.
[3] New, modification, removal
[4] For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.

Attachment I

Emission Units Table

(includes all emission units and air pollution control devices that will be part of this permit application review, regardless of permitting status)

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type[3] and Date of Change	Control Device[4]
Methanol to Gasoline (MTG) (Continued)						
RCH	E3	RCH	2010	See L62	New	NA
RGSI	E4 (1)	RGSI	2010	See L50	New	NA
FL	E5	FL	2010	See L50	New	NA
CT	CT	Cooling Tower	2010	See L70	New	NA
TK1-3	TK1-3	Gasoline Storage	2010	See L74	New	NA
TK4-5	TK4-5	LPG Storage Tanks	2010	See L90	New	NA
TK6	TK6	Methanol Storage Tank (with fugitives)	2010	See L79	New	NA
TK7	TK7	Sulfur Storage Tank (with loading)	2010	See L95	New	NA
LR1-2	LR1-2	Loading Racks with Vapor Recovery	2010	See L84-87	New	NA
GF	NA	Gasoline Fugitives (GF)	2010	See N17	New	NA
F	F	SUSB	2010	See L66	New	NA
G	G	Flare Pilot Flame Only (FPF)	2010	See M1	New	NA

Note 1: E4 is now sent to CO_2 Purification which emits to atmosphere at point C1.

[1] For Emission Units (or Sources) use the following numbering system:1S, 2S, 3S,... or other appropriate designation.
[2] For Emission Points use the following numbering system:1E, 2E, 3E, ... or other appropriate designation.
[3] New, modification, removal
[4] For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.

ATTACHMENT J

EMISSION POINTS DATA SUMMARY SHEET

Attachment J

EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions [4]		Maximum Potential Controlled Emissions [5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used [6]	Emission Concentration [7] (ppmv or mg/m[4])
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
Coal and Limestone Handling Sizing, Storage, and Preparation															
Transfer Points and Conveyors	Point Source No Stack	Various	Transfer Points and Conveyors	See Attachment N		NA	NA	PM PM10	14.64 7.52	36.02 17.47	4.92 2.60	11.09 5.39	Solid	AP-42	NA
CR1	Point	CR1	Coal Crusher	FE/BH		NA	NA	PM PM10	20.76 9.89	90.93 43.30	0.21 0.10	0.91 0.43	Solid	AP-42/EE	NA
CR7	Point	CR7	Limestone Crushers	FE		NA	NA	PM PM10	0.54 0.24	0.45 0.20	0.11 0.05	0.09 0.04	Solid	AP-42	NA
VF1,3,5,7,9	Vertical	FH1,3,5,7,9	Coal Feed Bunkers	VF1,3,5,7,9	Vent Filter	NA	NA	PM PM10	0.35 0.18	1.52 0.73	0.07 0.04	0.30 0.15	Solid	AP-42	NA
VF2,4,6,8,10	Vertical	FH2,4,6,8,10	Limestone Feed Bunkers	VF2,4,6,8,10	Vent Filter	NA	NA	PM PM10	0.97 0.46	0.81 0.39	0.19 0.09	0.16 0.08	Solid	AP-42	NA
Stockpiles	Vertical /Fugitive	Various	Stockpiles	N		NA	NA	PM PM10	7.20 7.20	31.20 31.20	0.36 0.36	1.56 1.56	Solid	AP-42/EE	NA
Haulroads	Fugitive	Various	Haulroads	WT/WC		NA	NA	PM PM10	35.86 6.99	96.25 18.77	5.37 1.04	14.44 2.81	Solid	AP-42	NA
Gasifier Feed and PDQ Gasifier Units															
A1/1 (for A1/1 through A1/5, one unit is in standby and not operating and the other four units, two units per gasifier, are operating when the full plant is in operation)	Vertical	CR2	Mill and Heater	BH1	Bag-house	NA	NA	NOx CO VOC PM PM10	1.41 1.14 0.46 0.56 0.56	6.17 5.00 2.0 2.45 2.45	1.41 1.14 0.46 0.56 0.56	6.17 5.00 2.0 2.45 2.45	Gas Gas Gas Solid Solid	EE	NA

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Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions [4]		Maximum Potential Controlled Emissions [5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used [6]	Emission Concentration [7] (ppmv or mg/m^4)
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
A1/2	Vertical	CR3	Mill and Heater	BH2	Bag-house	NA	NA	NOx	1.41	6.17	1.41	6.17	Gas	EE	NA
								CO	1.14	5.00	1.14	5.00	Gas		
								VOC	0.46	2.0	0.46	2.0	Gas		
								PM	0.56	2.45	0.56	2.45	Gas		
								PM10	0.56	2.45	0.56	2.45	Solid		
													Solid		
A1/3	Vertical	CR4	Mill and Heater	BH3	Bag-house	NA	NA	NOx	1.41	6.17	1.41	6.17	Gas	EE	NA
								CO	1.14	5.00	1.14	5.00	Gas		
								VOC	0.46	2.0	0.46	2.0	Gas		
								PM	0.56	2.45	0.56	2.45	Gas		
								PM10	0.56	2.45	0.56	2.45	Solid		
													Solid		
A1/4	Vertical	CR5	Mill and Heater	BH4	Bag-house	NA	NA	NOx	1.41	6.17	1.41	6.17	Gas	EE	NA
								CO	1.14	5.00	1.14	5.00	Gas		
								VOC	0.46	2.0	0.46	2.0	Gas		
								PM	0.56	2.45	0.56	2.45	Gas		
								PM10	0.56	2.45	0.56	2.45	Solid		
													Solid		
A1/5	Vertical	CR6	Mill and Heater	BH5	Bag-house	NA	NA	NOx	1.41	6.17	1.41	6.17	Gas	EE	NA
								CO	1.14	5.00	1.14	5.00	Gas		
								VOC	0.46	2.0	0.46	2.0	Gas		
								PM	0.56	2.45	0.56	2.45	Gas		
								PM10	0.56	2.45	0.56	2.45	Solid		

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EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions [4]		Maximum Potential Controlled Emissions [5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used [6]	Emission Concentration [7] (ppmv or mg/m[4])
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
A1/1 through A1/5 Cold Startup (only one source is used for coals startup with natural gas when hydrogen is not available for fuel, remaining units are started on hydrogen)	Vertical	CR2 through CR6	Mill and Heater	BH1 thru BH5	Bag-houses	NA	NA	NOx	7.25	0.58	7.25	0.58	Gas	EE	NA
								SO2	3.00	0.24	3.00	0.24	Gas		
								CO	5.375	0.43	5.375	0.43	Gas		
								VOC	0.46	0.0096	0.46	0.0096	Gas		
								PM	2.55	0.204	2.55	0.204	Solid		
								PM10	2.55	0.204	2.55	0.204	Solid		
A2/1	Vertical	SUV1	SUV1	VF12	Vent Filter	NA	NA	SO2	0.67	0.03	0.67	0.03	Gas	EE	NA
								CO	1.11	0.05	1.11	0.05	Gas		
								PM	1.11	0.05	1.11	0.05	Solid		
								PM10	1.11	0.05	1.11	0.05	Solid		
A2/2	Vertical	SUV1	SUV2	VF14	Vent Filter	NA	NA	SO2	0.67	0.03	0.67	0.03	Gas	EE	NA
								CO	1.11	0.05	1.11	0.05	Gas		
								PM	1.11	0.05	1.11	0.05	Solid		
								PM10	1.11	0.05	1.11	0.05	Solid		
B1/1	Vertical	LH1-LH6, FDB1	LH1-LH6, FDB1	BH6-BH12	Bag-house	NA	NA	SO2	1.435	6.28	1.435	6.28	Gas	EE	NA
								CO	0.065	0.275	0.065	0.275	Gas		
								PM	0.25	1.10	0.25	1.10	Solid		
								PM10	0.25	1.10	0.25	1.10	Solid		
B1/2	Vertical	LH7-LH12, FDB2	LH7-LH12, FDB2	BH13-BH19	Bag-house	NA	NA	SO2	1.435	6.28	1.435	6.28	Gas	EE	NA
								CO	0.065	0.275	0.065	0.275	Gas		
								PM	0.25	1.10	0.25	1.10	Solid		
								PM10	0.25	1.10	0.25	1.10	Solid		

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EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions [4]		Maximum Potential Controlled Emissions [5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used [6]	Emission Concentration [7] (ppmv or mg/m[4])
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
B2/1	Vertical	FL ST	FL ST	NA	NA	NA	NA	NOx	333	5.0	333	5.0	Gas	EE	NA
								SO2	1,066	16.0	1,066	16.0	Gas		
								CO	827	12.4	827	12.4	Gas		
								VOC	0.084	0.00125	0.084	0.00125	Gas		
								COS	9.9	0.3	9.9	0.3	Gas		
								H2S	51.3	0.7	51.3	0.7	Gas		
								Ni(CO)4	1.237	0.037	1.237	0.037	Gas		
								HCN	2.27	0.07	2.27	0.07	Gas		
								HCL	2.29	0.07	2.29	0.07	Gas		
								Hg	3.42	0.11	3.42	0.11	Liquid/Solid		
B2/2 (See B2/1 for Total HAPS from the sources which occur during startup for B2/1 and B2/2)	Vertical	FL ST	FL ST	NA	NA	NA	NA	NOx	333	5.0	333	5.0	Gas	EE	NA
								SO2	1,066	16.0	1,066	16.0	Gas		
								CO	827	12.4	827	12.4	Gas		
								VOC	0.084	0.00125	0.084	0.00125	Gas		
B3/1 (emergency release only)	Vertical	GFB1	GFB1	VF11	Vent Filter	NA	NA	SO2	0.135	Emergency Only	0.135	Emergency Only	Gas	EE	NA
								CO	0.0115		0.0115		Gas		
								PM	0.05		0.05		Solid		
								PM10	0.05		0.05		Solid		
B3/2 (emergency release only)	Vertical	GFB2	GFB2	VF13	Vent Filter	NA	NA	SO2	0.135	Emergency Only	0.135	Emergency Only	Gas	EE	NA
								CO	0.0115		0.0115		Gas		
								PM	0.05		0.05		Solid		
								PM10	0.05		0.05		Solid		
Gasification Fugitives	Leaks Etc.	NA	NA	NA	NA	NA	NA	CO	See Note	8.8	See Note	1.009	Gas	EE	NA
								H2S/		0.061/		0.006/	Gas		
								SO2 eq		0.115		0.011	Gas		

NOTE: Maximum hourly emissions form source (leaks, etc.) cannot be quantified.

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EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions [4]		Maximum Potential Controlled Emissions [5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used [6]	Emission Concentration [7] (ppmv or mg/m[4])
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
CO Shift - Not an Emission Source except for fugitive leaks															
Upstream including reactors	Leaks Etc.	NA	NA	NA	NA	NA	NA	CO H2S/ SO2 eq	See Note	2.65 0.025/ 0.047	See Note	0.35 0.004/ 0.008	Gas Gas Gas	EE	NA
Downstream reactors	Leaks Etc.	NA	NA	NA	NA	NA	NA	CO	See Note	2.17	See Note	0.276	Gas	EE	NA
CO2/H2S Removal (Acid Gas Removal)															
C2	Vertical	CO2/H2SR	CO2/H2S Removal	NA	NA	NA	NA	NOx SO2 CO VOC Hg MEOH	957.6 168.1 2,375 5.81 See B2/1 5.73	0.96 0.17 2.40 0.006 See B2/1 0.006	957.6 168.1 2,375 5.81 See B2/1 5.73	0.96 0.17 2.40 0.006 See B2/1 0.006	Gas Gas Gas Gas Gas Gas	EE	NA
Fugitive Leaks	Leaks Etc.	NA	NA	NA	NA	NA	NA	CO H2S/ SO2 eq VOC/MEOH	See Note	9.33 0.066/ 0.124 32.83	See Note	0.99 0.005/ 0.01 1.029	Gas Gas Gas Gas	EE	NA
Sour Water Stripper – Not an Emissions Source except for fugitives															
Sour Gas Fugitives (all units with sour gas)	Leaks Etc.	NA	NA	NA	NA	NA	NA	H2S/ SO2 eq	See Note	0.684/ 1.288	See Note	0.085/ 0.160	Gas Gas	EE	NA
Mercury Removal – Not an Emissions Source															
Methanol Synthesis Unit – Not an Emissions Source except for fugitive leaks															
Fugitive Leaks	Leaks Etc.	NA	NA	NA	NA	NA	NA	CO VOC/MEOH	See Note	18.53 6.26	See Note	1.71 0.299	Gas Gas	EE	NA
Sulfur Recovery – Not an Emissions Source except for fugitive leaks															
Fugitive Leaks	Leaks Etc.	NA	NA	NA	NA	NA	NA	H2S/ SO2 eq	See Note	1.73/ 3.26	See Note	0.297/ 0.560	Gas	EE	NA

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		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
PSA System – Not an Emissions Source except for fugitive leaks															
Fugitive Leaks	Leaks Etc.	NA	NA	NA	NA	NA	NA	CO	See Note	19.05	See Note	2.39	Gas	EE	NA
CO_2Purification															
C1	Vertical	CO Purification	CO Purification	NA	NA	NA	NA	SO2	11.56	46.25	11.56	46.25	Gas	EE	NA
								CO	0.504	1.974	0.504	1.974	Gas		
Air Separation Units – Not an Emissions Source															
Methanol to Gasoline (MTG)															
E1	Vertical	SURGH	SURGH	NA	NA	NA	NA	NOx	4.01	1.69	4.01	1.69	Gas	EE	NA
								CO	1.93	1.24	1.93	1.24	Gas		
								VOC	0.162	0.07	0.162	0.07	Gas		
								PM	0.223	0.10	0.223	0.10	Solid		
								PM10	0.223	0.10	0.223	0.10	Solid		
E2	Vertical	SURH	SURH	NA	NA	NA	NA	NOx	15.64	4.4	15.64	4.4	Gas	EE	NA
								CO	11.44	3.22	11.44	3.22	Gas		
								VOC	0.65	0.18	0.65	0.18	Gas		
								PM	0.89	0.25	0.89	0.25	Solid		
								PM10	0.89	0.25	0.89	0.25	Solid		
E3	Vertical	RCH	RCH	NA	NA	NA	NA	NOx	0.55	1.65	0.55	1.65	Gas	EE	NA
								CO	0.381	1.20	0.381	1.20	Gas		
								VOC	0.022	0.07	0.022	0.07	Gas		
								PM	0.03	0.09	0.03	0.09	Solid		
								PM10	0.03	0.09	0.03	0.09	Solid		
E4 (now sent to CO2 Purification and part of emissions point C1)															

NOTE: Maximum hourly emissions form source (leaks, etc.) cannot be quantified.

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EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions [4]		Maximum Potential Controlled Emissions [5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used [6]	Emission Concentration [7] (ppmv or mg/m[4])
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
E5	Vertical	FL	FL	NA	NA	NA	NA	NOx CO VOC	21.3 51.88 19.96	0.43 1.04 0.4	21.3 51.88 19.96	0.43 1.04 0.4	Gas Gas Gas	EE	NA
Fugitive Leaks	Leaks Etc.	NA	NA	NA	NA	NA	NA	VOC VOC/MEOH	See Note	117.73 34.77	See Note	11.74 0.725	Gas Gas	EE	NA
Cooling Tower															
CL	Vertical	CL	Cooling Tower	NA	NA	NA	NA	PM PM10	7.71 7.71	33.77 33.77	7.71 7.71	33.77 33.77	Solid Solid	AP-42	NA
Gasoline Storage															
TK1, 2, and 3 (See N19 for Individual HAPS)	Vertical	TK1-3	TK1, 2, and 3	IFL	IFL	NA	NA	VOC HAPS	1.61 0.0390	7.053 0.1710	1.61 0.0390	7.053 0.1710	Gas	TANKS	NA
Gasoline Fugitives (See N19 for Individual HAPS)	Fugitive	Gasoline Fugitives	Gasoline Fugitives	NA	NA	NA	NA	VOC HAPS	1.573 0.593	6.891 2.618	0.101 0.0381	0.440 0.162	Gas	AP-42 EE	NA
TK4 and 5 (LPG storage pressure tanks which are not a source)															
TK6 (with fugitives)	Vertical	TK6	Methanol Tank	IFL	IFL	NA	NA	VOC/MEOH	1.563	6.848	0.235	1.023	Gas	TANKS/ AP42	NA
TK7 (with loading)	Vertical	TK7	Sulfur Storage	NA	NA	NA	NA	H2S	0.006	0.026	0.006	0.026	Gas	EE	NA

NOTE: Maximum hourly emissions form source (leaks, etc.) cannot be quantified.

Attachment J

EMISSION POINTS DATA SUMMARY SHEET

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table & Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(chemical processes only)*		All Regulated Pollutants - Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions [4]		Maximum Potential Controlled Emissions [5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used [6]	Emission Concentration [7] (ppmv or mg/m[4])
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
Loading Racks with Vapor Recovery															
LR1 and LR2 (including fugitives) (See N19 for Individual HAPS)	Vertical	LR1 and LR2	Loading Racks	VR	VR	NA	NA	VOC	267.68	1,172	4.82	21.10	Gas	AP-42	NA
								HAPS	12.06	52.92	0.1169	0.5119		EE	
F	Vertical	SUSB	SUSB	NA	NA	NA	NA	NOx	13.92	2.67	13.92	2.67	Gas	EE	NA
								SO2	0.31	0.06	0.31	0.06	Gas		
								CO	10.11	1.94	10.11	1.94	Gas		
								VOC	0.44	0.09	0.44	0.09	Gas		
								PM	0.61	0.12	0.61	0.12	Solid		
								PM10	0.61	0.12	0.61	0.12	Solid		
G	Vertical	Varies depending on operational mode.		Flare - Pilot Flame Only				NOx	0.36	1.58	0.36	1.58	Gas	EE	NA
								SO2	0.0033	0.015	0.0033	0.015	Gas		
								CO	0.35	1.54	0.35	1.54	Gas		
								VOC	0.0051	0.022	0.0051	0.022	Gas		
								PM	0.0071	0.031	0.0071	0.031	Solid		
								PM10	0.0071	0.031	0.0071	0.031	Solid		

The EMISSION POINTS DATA SUMMARY SHEET provides a summation of emissions by emission unit. Note that uncaptured process emission unit emissions are not typically considered to be fugitive and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET. Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions). Please complete the FUGITIVE EMISSIONS DATA SUMMARY SHEET for fugitive emission activities.

1 Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.

2 Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (ie., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).

3 List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS_2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, etc. **DO NOT LIST** CO_2, H_2, H_2O, N_2, O_2, and Noble Gases.

4 Give maximum potential emission rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

5 Give maximum potential emission rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

6 Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

7 Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmv) are used. If the emission is a mineral acid (sulfuric, nitric, hydrochloric or phosphoric) use units of milligram per dry cubic meter (mg/m^3) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO_2, use units of ppmv (See 45CSR10).

Attachment J

EMISSION POINTS DATA SUMMARY SHEET

Table 2: Release Parameter Data

Emission Point ID No. *(Must match Emission Units Table)*	Inner Diameter (ft.)	Exit Gas			Emission Point Elevation (ft)		UTM Coordinates (km)	
		Temp. (°F)	Volumetric Flow [1] (acfm) *at operating conditions*	Velocity (fps)	Ground Level *(Height above mean sea level)*	Stack Height [2] *(Release height of emissions above ground level)*	Northing	Easting
						Facility Coordinates =	4,162.9517	417.917
Coal and Limestone Handling Sizing, Storage, and Preparation								
Transfer Points and Conveyors	Not Applicable							
Crushers	Not Applicable							
Stockpiles	Not Applicable							
VF1,3,5,7,9	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
VF2,4,6,8,10	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Haulroads	Not Applicable							
Gasifier Feed and PDQ Gasifier Units								
A1/1	TBD	TBD	Est: 20,010	TBD	TBD	TBD	TBD	TBD
A1/2	TBD	TBD	Est: 20,010	TBD	TBD	TBD	TBD	TBD
A1/3	TBD	TBD	Est: 20,010	TBD	TBD	TBD	TBD	TBD
A1/4	TBD	TBD	Est: 20,010	TBD	TBD	TBD	TBD	TBD
A1/5	TBD	TBD	Est: 20,010	TBD	TBD	TBD	TBD	TBD
A1/1 Cold Startup	TBD	TBD	Est: 20,010	TBD	TBD	TBD	TBD	TBD
A1/2 Cold Startup	TBD	TBD	Est: 20,010	TBD	TBD	TBD	TBD	TBD
A1/3 Cold Startup	TBD	TBD	Est: 20,010	TBD	TBD	TBD	TBD	TBD
A1/4 Cold Startup	TBD	TBD	Est: 20,010	TBD	TBD	TBD	TBD	TBD
A1/5 Cold Startup	TBD	TBD	Est: 20,010	TBD	TBD	TBD	TBD	TBD
A2/1	TBD	TBD	Est: 8,870	TBD	TBD	TBD	TBD	TBD
A2/2	TBD	TBD	Est: 8,870	TBD	TBD	TBD	TBD	TBD
B1/1	TBD	TBD	Est: 8,870	TBD	TBD	TBD	TBD	TBD
B1/2	TBD	TBD	Est: 8,870	TBD	TBD	TBD	TBD	TBD

Attachment J

EMISSION POINTS DATA SUMMARY SHEET

Table 2: Release Parameter Data

Emission Point ID No. *(Must match Emission Units Table)*	Inner Diameter (ft.)	Exit Gas			Emission Point Elevation (ft)		UTM Coordinates (km)	
		Temp. (°F)	Volumetric Flow [1] (acfm) *at operating conditions*	Velocity (fps)	Ground Level *(Height above mean sea level)*	Stack Height [2] *(Release height of emissions above ground level)*	Northing	Easting
						Facility Coordinates =	4,162.9517	417.917
B2	TBD	TBD	Est: 8,870	TBD	TBD	TBD	TBD	TBD
B3/1	TBD	TBD	Est: 8,870	TBD	TBD	TBD	TBD	TBD
B3/2	TBD	TBD	Est: 8,870	TBD	TBD	TBD	TBD	TBD
CO Shift - Not an Emission Source	Not Applicable							
CO2/H2S Removal (Acid Gas Removal)								
C2	TBD	TBD	Est: 508,100	TBD	TBD	TBD	TBD	TBD
Sour Water Stripper – Not an Emissions Source	Not Applicable							
Mercury Removal – Not an Emissions Source	Not Applicable							
Methanol Synthesis Unit – Not an Emissions Source	Not Applicable							
Sulfur Recovery – Not an Emissions Source	Not Applicable							
PSA System – Not an Emissions Source	Not Applicable							
CO_2Purification								
C1	TBD	TBD	Est: 508,100	TBD	TBD	TBD	TBD	TBD
Air Separation Unit – Not an Emissions Source								
Methanol to Gasoline (MTG)								
E1	TBD	TBD	Est: 748	TBD	TBD	TBD	TBD	TBD
E2	TBD	TBD	Est: 17,930	TBD	TBD	TBD	TBD	TBD
E3	TBD	TBD	Est: 537	TBD	TBD	TBD	TBD	TBD
E4 (now sent to CO_2 Purification and part of emissions point C1)								
E5	TBD	TBD	Est: 11,100	TBD	TBD	TBD	TBD	TBD
Cooling Tower								
CT	TBD	TBD	Drift	TBD	TBD	TBD	TBD	TBD
Gasoline Storage								
TK1	TBD	TBD	NA	TBD	TBD	TBD	TBD	TBD
TK2	TBD	TBD	NA	TBD	TBD	TBD	TBD	TBD
TK3	TBD	TBD	NA	TBD	TBD	TBD	TBD	TBD

Attachment J

EMISSION POINTS DATA SUMMARY SHEET

Table 2: Release Parameter Data

Emission Point ID No. *(Must match Emission Units Table)*	Inner Diameter (ft.)	Exit Gas			Emission Point Elevation (ft)		UTM Coordinates (km)	
		Temp. (°F)	Volumetric Flow[1] (acfm) *at operating conditions*	Velocity (fps)	Ground Level *(Height above mean sea level)*	Stack Height[2] *(Release height of emissions above ground level)*	Northing	Easting
						Facility Coordinates =	4,162.9517	417.917
Loading Racks with Vapor Recovery								
LR1 and LR2	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
F	TBD	Est. 320	Est: 18,030	TBD	TBD	TBD	TBD	TBD
G	TBD	Pilot Flame Only		TBD	TBD	TBD	TBD	TBD

[1] Give at operating conditions. Include inerts.
[2] Release height of emissions above ground level.

ATTACHMENT K

FUGITIVE EMISSIONS DATA SUMMARY SHEET

FUGITIVE EMISSIONS DATA SUMMARY SHEET

The FUGITIVE EMISSIONS SUMMARY SHEET provides a summation of fugitive emissions. Fugitive emissions are those emissions, which could not reasonably pass through a stack, chimney, vent or other functionally equivalent opening. Note that uncaptured process emissions are not typically considered to be fugitive, and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET.

Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions).

APPLICATION FORMS CHECKLIST - FUGITIVE EMISSIONS
1.) Will there be haul road activities? ☒ Yes ☐ No ☒ If YES, then complete the HAUL ROAD EMISSIONS UNIT DATA SHEET.
2.) Will there be Storage Piles? ☒ Yes ☐ No See Section L ☒ If YES, complete Table 1 of the NONMETALLIC MINERALS PROCESSING EMISSIONS UNIT DATA SHEET.
3.) Will there be Liquid Loading/Unloading Operations? ☒ Yes ☐ No ☐ If YES, complete the BULK LIQUID TRANSFER OPERATIONS EMISSIONS UNIT DATA SHEET.
4.) Will there be emissions of air pollutants from Wastewater Treatment Evaporation? ☐ Yes ☒ No ☐ If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.
5.) Will there be Equipment Leaks (e.g. leaks from pumps, compressors, in-line process valves, pressure relief devices, open-ended valves, sampling connections, flanges, agitators, cooling towers, etc.)? ☒ Yes ☐ No ☐ If YES, complete the LEAK SOURCE DATA SHEET section of the CHEMICAL PROCESSES EMISSIONS UNIT DATA SHEET. Leak information for emissions are in Attachment J and Information is in Uhde Attachment 3 in Attachment N.
6.) Will there be General Clean-up VOC Operations? ☐ Yes ☒ No ☐ If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.
7.) Will there be any other activities that generate fugitive emissions? ☐ Yes ☒ No ☐ If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET or the most appropriate form.
If you answered "NO" to all of the items above, it is not necessary to complete the following table, "Fugitive Emissions Summary."

FUGITIVE EMISSIONS SUMMARY	All Regulated Pollutants Chemical Name/CAS [1]	Maximum Potential Uncontrolled Emissions [2]		Maximum Potential Controlled Emissions [3]		Est. Method Used [4]
		lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions Paved Haul Roads	TSP PM_{10}	35.86 6.99	96.25 18.77	5.37 1.04	14.44 2.81	AP-42
Unpaved Haul Roads	Not Applicable					
Storage Pile Emissions	TSP PM_{10}	7.20 7.20	31.20 31.20	0.36 0.36	1.56 1.56	EE
Loading/Unloading Operations	VOC	See Attachment J and Attachment N for Speciated VOC/HAPS				
Wastewater Treatment Evaporation & Operations	Not Applicable					
Equipment Leaks	VOC	See Attachment J and Attachment N for Speciated VOC/HAPS				
General Clean-up VOC Emissions	Not Applicable					
Other	Not Applicable					

[1] List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS_2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, etc. DO NOT LIST CO_2, H_2, H_2O, N_2, O_2, and Noble Gases.
[2] Give rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).
[3] Give rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).
[4] Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

ATTACHMENT L

EMISSIONS UNIT DATA SHEET(S)

Affected Source Sheet

Source Specific Emissions Data: Solid Materials Sizing, Handling and Storage Facilities

Required Information Regarding Dust Control Equipment Measures

1. If water or chemical sprays are to be used on conveyors, transfer points, stockpiles, etc... for dust control, the location of all spray bars or spray systems should be shown on the plot plans and/or line drawings. The following information should be provided for each spray system:

    a. Design water flow through spray bar
    b. Type and amount of chemicals used and the mix ratio of chemical to water used at the sprays.
    c. Methods employed to winterize sprays (e.g. keep sprays from freezing and becoming inoperable during cold weather)

2. A detailed written description should be submitted of dust control measures/programs that will be employed on haul roads and in areas of vehicle activity around material stockpiled. The haulways and areas to be treated should be shown by shading or similar description on the plant plan. The following points should be specifically addressed:

    a. Equipment (e.g. water trucks, fixed spray bars, wheel and truck underbody washers, etc...) that will be used in this dust control program.
    b. Frequency of application of water and chemical to roads and stockpile areas during dry periods.
    c. Amount of chemical suppressants to be used, if applicable, in pounds or gallons per square yard of surface to be treated.
    d. Type of haulroad or haulway surface(s) that will be maintained (e.g. coarse gravel, reddog, etc...)
    e. Approximate maximum length of haulroads (miles or feet).
    f. Maximum daily truck traffic on haulroads (number of trucks).

3. If full or partial enclosures are to be used to minimize dust entrainment, a drawing of each such enclosure should be submitted (for example at truck dump bins, breakers, conveyor transfer points).

4. If particulate control devices such as baghouses or scrubbers are to be used, complete an appropriate Air Pollution Control Device Sheet and furnish a drawing showing details of enclosures and ductwork associated with these control systems.

AFFECTED SOURCE SHEET

Source Specific Emissions Data: Solid Materials Sizing, Handling, and Storage Facilities

Plot Plan(s) and Line Drawing(s)

a. Finish the plot plan(s) of the plant area which contains sufficient detail to show the scaled layout of the equipment involved in each materials handling system (e.g. conveyors, transfer points, crushers, screens, bins, stockpiles, truck dump bins, etc...). Show equipment or buildings described in other sections of this application on the plot plan as appropriate. The guidelines for Plot Plans should be followed to the extent possible.

b. Furnish the line drawing(s) or schematic(s) showing each component or facet of each materials handling system (e.g. conveyors, transfer points, stockpiles, crushers, screens, bins etc...). Show process equipment described in other sections of this application as needed for clarity.

c. On the line drawing(s) or schematic(s) furnished in accordance with item (b) assign an ID number to each conveyor, transfer point (including truck, barge and rail car loading/unloading etc...), storage structure, stockpile, crusher, and screening unit. If any equipment is shown on the line drawing(s) which was described in other sections of this application, use the ID numbers assigned to the equipment in those other sections and indicate equipment name or type (e.g. rotary dryer, vertical kiln etc...)

d. To the extent possible, note the numbers assigned for equipment and storage facilities as per item (c) on the Plot Plans(s).

e. The assigned ID numbers for equipment and transfer points must be used to complete Tables 1, 2, and 3 following.

Table 1: Affected Storage Activity

ID Number	OS1	B1 & B2	FH1,3,5,7,9			
Affected Source Name	OS1	B1 & B2	FH1,3,5,7,9			
Type Storage[1]	OS	B	B			
Material Stored	Coal	Coal	Coal			
Typical Moisture Content (%)	5	5	5			
Avg % of material passing 200 mesh sieve	5	5	5			
Maximum Total Yearly Throughput in storage (tons)	3,030,960	3,030,960	3,030,960			
Maximum Quantity of Material in Storage[2] (tons)	40,000	50 each	50			
Maximum Stockpile Base Area (sq. ft.)	196,020	NA	NA			
Maximum Stockpile height (ft)	90	NA	NA			
Type dust controls during storage[3]	FE/BH	PE	FE			
Method of material load-in to bin or stockpile[4]	ST	TD	SS			
Type dust controls during load-in[5]	FE/BH	PE	VF			
Method of material load-out to bin or stockpile[4]	UC	UC	Feeder to Roller Mill			
Type dust controls during load-out[5]	FE	FE	FE			

Table 1: Affected Storage Activity (Continued)

ID Number	OS2	FH2,4,6,8,10	FCS	SSP	SB
Affected Source Name	OS2	FH2,4,6,8,10	FCS	SSP	SB
Type Storage[1]	OS	B	B	Enclosed Pile	B
Material Stored	Limeston e	Limestone	Fly Ash	Aggregate/Slag	
Typical Moisture Content (%)	1	1	1	1	1
Avg % of material passing 200 mesh sieve	5	5	100	5	5
Maximum Total Yearly Throughput in storage (tons)	166,440	166,440	61,320	604,440	604,440
Maximum Quantity of Material in Storage[2] (tons)	20,000	50 Each	200	200,000	100
Maximum Stockpile Base Area (sq. ft.)	87,120	NA	NA	Building	NA
Maximum Stockpile height (ft)	25	NA	NA	NA	NA
Type dust controls during storage[3]	BH	PE	FE	FE	FE
Method of material load-in to bin or stockpile[4]	TD	SS	SS	SS	SS
Type dust controls during load-in[5]	N	VF	FE	FE	FE
Method of material load-out to bin or stockpile[4]	UC	Feeder to Roller Mill	FC	UC	FC
Type dust controls during load-out[5]	FE	FE	PE	FE	PE

(material.wpd)
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Table 2: Conveying and Transfer

ID Number	Type Conveyor or Transfer Point[6]	Material Handled [(Note nominal size of material transferred][7]	Material Conveying or Transfer Rate		Type Dust Control Measures[5]	Approximate Material Moisture Content (%)
			Max. TPH	Max. TPY		
Coal Conveyors						
BC1	BC	+1½"	346	3,030,960	PE	5
BC2	BC	+1½"	346	3,030,960	PE	5
BC3	BC	+1½"	346	3,030,960	PE	5
BC4	BC	+1½"	346	3,030,960	PE	5
BC5	BC	+1½"	346	3,030,960	PE	5
BC6	BC	+1½"	346	3,030,960	PE	5
Ash/Aggregate Conveyors						
BC7	BC	+1½"	69	604,440	PE	1
BC8	BC	+1½"	100	604,440	PE	1
BC9	BC	+1½"	100	604,440	PE	1
Filter Cake Conveyor						
BC10	BC	+1½"	100	604,440	PE	1
Limestone Conveyors						
BC11	BC	+1½"	100	166,440	PE	1
BC12	BC	+1½"	100	166,440	PE	1
Coal Transfer Points						
TPC1	07	+1½"	346	3,030,960	PE	5
TPC2	07	+1½"	346	3,030,960	PE	5
TPC3	OTH3	+1½"	346	3,030,960	FE	5
TPC4	OTH3	+1½"	346	3,030,960	FE	5
TPC5	01/OTH4	+1½"	346	3,030,960	FE	5
TPC6	01/OTH4	+1½"	346	3,030,960	FE	5
TPC7	01/OTH5	+1½"	346	3,030,960	PE	5
TPC8	01/OTH5	+1½"	346	3,030,960	PE	5
TPC9	OTH5	+1½"	346	3,030,960	PE	5
TPC10	OTH7	+1½"	346	3,030,960	FE	5

ID Number	Type Conveyor or Transfer Point[6]	Material Handled [(Note nominal size of material transferred][7]	Material Conveying or Transfer Rate		Type Dust Control Measures[5]	Approximate Material Moisture Content (%)
			Max. TPH	Max. TPY		
TPC11	01	+1½"	346	3,030,960	FE	5
TPC12	03	+1½"	346	3,030,960	FE	5
Limestone Transfer Points						
TPL1	06	+1½"	100	166,440	N	1
TPL2	OTH7	+1½"	100	166,440	FE	1
TPL3	OTH4	+1½"	100	166,440	FE	1
TPL4	OTH4	+1½"	100	166,440	FE	1
TPL5	03	+1½"	100	166,440	FE	1
Ash/Aggregate Transfer Points						
TPA1	OTH5	+1½"	69	604,440	FE	1
TPA2	OTH7	+1½"	100	604,440	FE	1
TPA3	01	+1½"	100	604,440	FE	1
TPA4	03	+1½"	100	604,440	FE	1
TPA5	08	+1½"	100	604,440	PE	1
Filter Cake Transfer Points						
TPFC1	03	Fine	7	61,320	FE	1
TPFC2	08	Fine	100	61,320	PE	1

OTH1: Endloader loading from stockpile	OTH7: Stockpile to underpile reclaim conveyor
OTH2: Endloader to bin	OTH8: Overflow Chute
OTH3: Bin to conveyor	
OTH4: Conveyor to/from crusher or	
OTH5: Crusher or conveyor to stockpile	
OTH6: Screen to crusher	

Table 3: Crushing and Screening

ID Number		CR1	CR7	CR2-CR6		
Type Crusher or Screen[8]		Coal Crusher/Sizer	Limestone Crusher	Roller Mills		
Material Sized		Coal	Limestone	Coal/Limestone		
Maximum Material Throughput	Tons/hour	346	100	360		
	Tons/year	3,030,960	166,440	3,197,500		
Material sized from/to:[9]		+1½" -1½" x ½"	+1½" 1½" x ½"	+1½" 1½" x ½" to Fine		
Typical moisture content as crushed or screened (%)		5.0	1.0	1.0		
Type dust control		FE/BH	FE	BAG		
Stack Parameters	height (ft)	N/A	N/A	N/A		
	diameter (ft)	N/A	N/A	N/A		
	Volume (ACFM)	N/A	N/A	N/A		
	Temp (°F)	N/A	N/A	N/A		
Maximum Operating Schedule	hour/day	24	24	24		
	day/year	365	365	365		
	hour/year	8,760	8,760	8,760		
Approximate Percentage of Operation from:	Jan-Mar	25	25	25		
	April-June	25	25	25		
	July-Sept	25	25	25		
	Oct-Dec	25	25	25		
Maximum Particulate Emissions	lb/hour	20.76 Uncontrolled PM	0.54 Uncontrolled PM	0.57 Controlled Each		
	Ton/year	90.93 Uncontrolled PM	0.45 Uncontrolled PM	2.48 Controlled Each		

Describe method of determining emissions and dust control efficiencies (if by test on a similar unit provide report, if by emission factor reference emission factors):

Emissions from crushing operations were estimated using factors from General Permit G10-B or AP-42. Control efficiencies were obtained from an DAQ guidance document included with the 1993 Title V Certified Emission Statement.

1 Type Storage - Code as follows: (Note capacity of each bin, building or enclosure)

- OS - Open Stockpile
- B - Bin or Storage Silo (full enclosure)
- SB - Storage Building (full enclosure)
- E- Enclosure (walls but no top)
- SWF- Stockpiles with wind fences
- OTH- Other - Specify in footnote or attachment

2. Give maximum and average quantity of material in storage at any given time (e.g. silo capacity, stockpile size, etc...)

3. TYPE DUST CONTROLS DURING STORAGE
If storage is by other than by bin or full enclosure Code as follows:

- N - None
- WS- Water Sprays
- C- Spraying with chemical surfactant
- OTH- Other - Specify in footnote or attachment

4. METHOD OF PLACING MATERIAL ONTO STOCKPILE OR INTO BINS OR LOADING OUT FROM STOCKPILES OR BINS - Code as follows:

- C- Clamshell
- TD- Truck Dumping
- FE- Front Endloader
- ST- Stacking Tubes
- MS- Mobile Conveyor - Stacker
- SS- Stationary Conveyor - Stacker
- P- Pneumatic Conveyor - Stacker
- FC- Fixed Height Chute from bins
- TC- Telescoping Chute from bins
- UC- Under-pole or under-bin reclaim conveyor
- RC- Reclaim Conveyor (rake or bucket reclaim conveyor reclaiming from surface of stockpile)
- OTH- Other - Describe in a footnote or attachment

5. TYPE DUST CONTROLS - Code as follows:

- N-- None
- WS- Water Sprays
- WSA- Water Sprays with Wetting Agents
- CS- Chemical Dust Suppressant (sprays, etc...)
- FE- Full Enclosures
- PE- Partial Enclosures
- MD- Minimization of material drop height
- EM- Enclosure and evacuation to mechanical collector
- EB- Enclosure and evacuation to baghouse

ES- Enclosure and evacuation to scrubber
OTH- Other - describe in footnote or attachment

6. TYPE CONVEYOR OR TRANSFER POINT - Code as follows:

<u>Conveyors</u>

BC- Belt Conveyor
VC- Vibrating Conveyor
SC- Screw Conveyor
DL- Drag-link conveyor
BE- Bucket Elevator
PS- Pneumatic System
OTH- Other describe in footnote or attachment

<u>Transfer Points</u>

01- Conveyor to Conveyor
02- Conveyor to Bucket Elevator
03- Conveyor to Hopper or Bin
04- Bucket Elevator to Hopper or Bin
05- Pneumatic conveyor to bin
06- Truck Dumping onto ground
07- Truck Dumping into hopper
08- Loading trucks through stationary chute
09- Loading trucks through telescoping chute
10- Loading Trucks by endloader
11- Railcar unloading-side or bottom dumping
12- Railcar unloading-rotary unloader
13- Railcar loading /unloading by pneumatic system
14- Railcar loading through stationary source
15- Railcar loading through telescopic chute
16- Railcar loading by front end-loader
17- Railcar loading by railcar
18- Barge loading/unloading by clamshell
19- Barge unloading - bucket ladder unloader
20- Barge unloading - from a fixed-height conveyor or stationary chute
21- Barge loading - variable height conveyor or telescoping chute
22- Other - describe in footnote or attachment

7. If more than one material is handled by the listed conveyor or transfer point list each material and furnish the requested data in the table for each material.

8. Describe type of unit such as hammermill, ball mill, double-deck (DD) screen, double roll (DR) crusher, etc...

9. Describe nominal size reduction, example +2"/ -⅜

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*):Gasifier Feed and PDQ Gasifier Units

1. Name or type and model of proposed affected source:

The Gasifier Feed and PDQ Gasifier Unit includes the feed dust bunkers (FDB1 and 2) the Lock Hopper System (Lock Hopper No. 1 (LH1) through No. 12 (LH12)), the Gasifier Feed Bin (GFB1 and 2), the Start Up Vessel (SUV1 and 2), and the PDQ Gasifier Unit (PDQ1 and 2). These units are specifically designed for each process and the final design has not been completed. There are two identical sets of units for this facility. The process information for them follows.

2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.

See the Process Flow Diagram

3. Name(s) and maximum amount of proposed process material(s) charged per hour:

Gasifiers In	Process Line	kg/hr	tons/hr
Coal	2	309,868.00	342
[redacted]			
Oxygen from ASU	29	230,439.00	255
[redacted]			
Water from MTG	20	135,273.00	150
Recycle Water	19	445,730.00	492
[redacted]			

4. Name(s) and maximum amount of proposed material(s) produced per hour:

Gasifiers Out	Process Line	kg/hr	tons/hr
Syngas ex Scrubber	3	1,121,958.00	1,237
Sour Gas from PDQ	10	1,214.32	2
[redacted]			

5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:

Controlled combustion of coal.

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):

(a) Type and amount in appropriate units of fuel(s) to be burned:

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

Coal with approximately 18% ash and 0.84% sulfur.

(c) Theoretical combustion air requirement (ACF/unit of fuel): See above combustion requirements in No. 3.

@ 2,000 °F and 40 bars = psia.

(d) Percent excess air: See above combustion requirements in No. 3.

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

NA

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

Various seams will be used upon determination that the seams are appropriate for the source operation.

(g) Proposed maximum design heat input: NA $\times 10^6$ BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

@ °F and psia

		B1(1) Lock Hoppers	B2(2) Flare at Start Up	B3(3) Feed Bin			
a.	NO_X	NA NA	333 5.0	NA NA	lb/hr tpy	NA	grains/ACF
b.	SO_2	1.435 6.28	1,066 16.0	0.135 Emergency Only	lb/hr tpy	NA	grains/ACF
c.	CO	0.065 0.275	827 12.4	0.0115 Emergency Only	lb/hr tpy	NA	grains/ACF
d.	PM_{10}	0.25 2.2	NA NA	0.05 Emergency Only	lb/hr tpy	NA	grains/ACF
e.	Hydrocarbons	NA	NA	NA	lb/hr and tpy	NA	grains/ACF
f.	VOCs	NA	0.084 0.00125	NA	lb/hr and tpy	NA	grains/ACF
g.	Pb	NA	NA	NA	lb/hr and tpy	NA	grains/ACF

1. There are two emission points identified as B1/1 and B1/2 which have the same emissions estimate. The above information is for one point. B1/1 is for gasifier train No. 1 and B1/2 is for gasifier train No. 2. This is a continuous emissions point.
2. Start ups are estimated at 30 starts per year at one hour per each start up of the gasifiers. This is a worst case estimate for the process starts and includes both gasifiers. There are two emission points B2/1 and B2/2. The above emission is for one point.
3. There are two emission points identified as B3/1 and B3/2 which have the same emissions estimate. The above information is for one point. B3/1 is for gasifier train No. 1 and B3/2 is for gasifier train No. 2. This is an emergency

h. Specify other(s)

NA		lb/hr	grains/ACF
		lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
Assure the flare is in operation when material is being vented from this source to the flare. Monitor the lock hopper and feed bin discharge for opacity under Method 22 or Method 9.	Maintain records of Method 22 or Method 9 monitoring. Maintain a log of the coal and limestone fed to the system.
REPORTING	**TESTING**
None Proposed	Monitor the lock hopper and feed bin discharge for opacity under Method 22 or Method 9.

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

These units are specifically designed for each process and the final design has not been completed. Operating ranges and maintenance procedures will be identified during final design of each unit within the system. The procedures as identified will be followed.

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): CO Shift

1. Name or type and model of proposed affected source:

   The CO Shift Unit includes the Raw Gas Superheater (RGS), CO Shift Reactor (COS), Heat Recovery Exchangers No. 1 and No. 2 (HR1 and HR2), Condensate Separators No. 1 and No. 2 (CD1 and CD2), Final Cooler (FC), Syngas Compressor (SGC), and a Safety Vent on Line to the Flare (COS-SVA1). There is only one (1) CO Shift unit and the final design has not been completed.

2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.

   See the process flow diagram.

3. Name(s) and maximum amount of proposed process material(s) charged per hour:

CO Shift In	Process Line	kg/hr	tons/hr
Syngas exiting Scrubber	3	1,121,958.00	1,237
Tail Gas from PSA	15	18,635.38	21
		Total =	1,258

4. Name(s) and maximum amount of proposed material(s) produced per hour:

CO Shift Out	Process Line	kg/hr	tons/hr
Syngas ex CO Shift	4	702,352.70	775
Sour Water	18	447,886.00	494
		Total =	1,269

5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:

   See Attachment G – Process Description

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form.*

6. Combustion Data (if applicable): NOT APPLICABLE

(a) Type and amount in appropriate units of fuel(s) to be burned:

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

(c) Theoretical combustion air requirement (ACF/unit of fuel):

@ °F and psia.

(d) Percent excess air:

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

(g) Proposed maximum design heat input: $\times 10^6$ BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

<u>This unit does not vent except during upset conditions when venting will occur through the safety vent in the line to the flare.</u>

@ °F and psia

a. NO_X	lb/hr	grains/ACF
b. SO_2	lb/hr	grains/ACF
c. CO	lb/hr	grains/ACF
d. PM_{10}	lb/hr	grains/ACF
e. Hydrocarbons	lb/hr	grains/ACF
f. VOCs	lb/hr	grains/ACF
g. Pb	lb/hr	grains/ACF
h. Specify other(s)		
	lb/hr	grains/ACF
	lb/hr	grains/ACF
	lb/hr	grains/ACF
	lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
None Proposed	None Proposed
REPORTING	TESTING
None Proposed	None Proposed

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty
This unit is specifically designed for each process and the final design has not been completed. Operating ranges and maintenance procedures will be identified during final design of each unit within the system. The procedures as identified will be followed.

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): CO2/H2S Removal

1. Name or type and model of proposed affected source:

The CO2/H2S Removal Unit includes the Absorber Column (AC), Solvent Flash I and II Columns (SF1 and SF2), CO2 Stripper (ST), Hot Regeneration Column (HRC), MEOH/H2O Separation (MWS), CO2 Wash Column (CWC) and Line Safety Vents (LSV1, LSV2, and LSV3). There is only one (1) CO2/H2S Removal Unit and the final design has not been completed. The emission point from this source is C2 which is on the line from the Absorber Column headed to the Mercury Scrubber and vents to the flare during start up.

2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.

See the process flow diagram.

3. Name(s) and maximum amount of proposed process material(s) charged per hour:

CO2/H2S Removal System In	Process Line	kg/hr	tons/hr
Syngas ex CO Shift	4	702,352.70	775
Claus Tail Gas	30	6277	7
		Total =	782

4. Name(s) and maximum amount of proposed material(s) produced per hour:

CO2/H2S Removal System Out	Process Line	kg/hr	tons/hr
CO2 to Purification	16	462,593.08	511
Acid Gas From AGR	9	7252.294	8
Syngas to MEOH	5	255200	282
		Total =	801

5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:

See Attachment G – Process Description

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable): NOT APPLICABLE

(a) Type and amount in appropriate units of fuel(s) to be burned:

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

(c) Theoretical combustion air requirement (ACF/unit of fuel):

@ °F and psia.

(d) Percent excess air:

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

(g) Proposed maximum design heat input: $\times 10^6$ BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

@ °F and psia

		C2[1]			
a.	NO_X	957.6 0.96	lb/hr tpy	NA	grains/ACF
b.	SO_2	168.1 0.17	lb/hr	NA	grains/ACF
c.	CO	2,375 2.40	lb/hr tpy	NA	grains/ACF
d.	PM_{10}	NA	lb/hr	NA	grains/ACF
e.	Hydrocarbons	NA	lb/hr	NA	grains/ACF
f.	VOCs	5.81 0.006	lb/hr tpy	NA	grains/ACF
g.	Pb	NA	lb/hr	NA	grains/ACF

1. This is a start up emission only and is estimated at four (4) starts per year and 0.5 hours per start.

h. Specify other(s)

NA		lb/hr		grains/ACF
		lb/hr		grains/ACF
		lb/hr		grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
None Proposed	None Proposed
REPORTING	**TESTING**
None Proposed	None Proposed

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

This unit is specifically designed for each process and the final design has not been completed. Operating ranges and maintenance procedures will be identified during final design of each unit within the system. The procedures as identified will be followed.

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): Sour Water Stripper

1. Name or type and model of proposed affected source:

The Sour Water Stripper includes the SW Feed Vessel (SWSFV), the Feed/Effluent Heat Exchanger (FEHE), the Sour Water Stripper (SWS), Line Safety Vent (SWSLSV), SWS Overhead Condenser (SWSOC) and the SWS Reboiler (SWSRB). These units are sepecifically designed for each process and the final design has not been completed. There is one (1) sour water stripper unit for this facility.

2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.

3. Name(s) and maximum amount of proposed process material(s) charged per hour:

Sour Water Stipper In	Process Line	kg/hr	tons/hr
Sour Water	18	447,886	494
		Total =	494

4. Name(s) and maximum amount of proposed material(s) produced per hour:

Sour Water Stipper Out	Process Line	kg/hr	tons/hr
Recycle Water	19	445,730	492
Sour Gas to SRU	25	2,156	3
		Total =	495

5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:

See Attachment G – Process Description

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable): NOT APPLICABLE

(a) Type and amount in appropriate units of fuel(s) to be burned:

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

(c) Theoretical combustion air requirement (ACF/unit of fuel):

@ °F and psia.

(d) Percent excess air:

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

(g) Proposed maximum design heat input: $\times 10^6$ BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

This unit does not vent except during upset conditions when venting will occur through the safety vent in the line to the to the SWS Overhead Condenser and the venting is sent to the flare.

@ °F and psia

a.	NO_X	lb/hr	grains/ACF
b.	SO_2	lb/hr	grains/ACF
c.	CO	lb/hr	grains/ACF
d.	PM_{10}	lb/hr	grains/ACF
e.	Hydrocarbons	lb/hr	grains/ACF
f.	VOCs	lb/hr	grains/ACF
g.	Pb	lb/hr	grains/ACF
h.	Specify other(s)		
		lb/hr	grains/ACF
		lb/hr	grains/ACF
		lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
None Proposed	None Proposed
REPORTING	**TESTING**
None Proposed	None Proposed

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

This unit is specifically designed for each process and the final design has not been completed. Operating ranges and maintenance procedures will be identified during final design of each unit within the system. The procedures as identified will be followed.

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.
Identification Number (as assigned on *Equipment List Form*): Mercury Removal

1. Name or type and model of proposed affected source:

This is a mercury removal adsorber (MA). The Syngas from the AGR system passes through this process. There is one (1) for the facility.

2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.

3. Name(s) and maximum amount of proposed process material(s) charged per hour:

Mercury Removal In	Process Line	kg/hr	tons/hr
Syngas to MeOH	5	255,200	282

Note: Mercury weight is not included in the syngas weight.

4. Name(s) and maximum amount of proposed material(s) produced per hour:

Mercury Removal Out	Process Line	kg/hr	tons/hr
Syngas to MeOH	5	255,200	282

Note: Mercury weight is not included in the syngas weight.

5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:

Adsorption of Mercury

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable): NOT APPLICABLE

(a) Type and amount in appropriate units of fuel(s) to be burned:

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

(c) Theoretical combustion air requirement (ACF/unit of fuel):

@ °F and psia.

(d) Percent excess air:

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

(g) Proposed maximum design heat input: $\times 10^6$ BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

This unit does not vent.

@ °F and psia

a.	NO_X	lb/hr	grains/ACF
b.	SO_2	lb/hr	grains/ACF
c.	CO	lb/hr	grains/ACF
d.	PM_{10}	lb/hr	grains/ACF
e.	Hydrocarbons	lb/hr	grains/ACF
f.	VOCs	lb/hr	grains/ACF
g.	Pb	lb/hr	grains/ACF
h.	Specify other(s)		
		lb/hr	grains/ACF
		lb/hr	grains/ACF
		lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
None Proposed	None Proposed
REPORTING	**TESTING**
None Proposed	None Proposed

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

This unit is specifically designed for each process and the final design has not been completed. Operating ranges and maintenance procedures will be identified during final design of each unit within the system. The procedures as identified will be followed.

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): Methanol Synthesis Unit

1. Name or type and model of proposed affected source:

The Methanol Synthesis Unit includes the MUG Compressor (COMP), the Recycle Compressor (RCOMP), Feed Preheater (FPH), MeOH Converter (MEOHC), Product Condenser (PC), Flash Drum I and II (FLD1 and FLD2), Steam Drum (SD), Recovery Cooler (RC), and Line Safety Vents No. 1 through No. 3 (LSV1 through LSV3). These units are specifically designed for each process unit and the final design has not been completed. There is one (1) Methanol Synthesis Unit.

2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.

See the process flow diagram.

3. Name(s) and maximum amount of proposed process material(s) charged per hour:

Methanol Synthesis Unit In	Process Line	kg/hr	tons/hr
Syngas to MeOH	5	255,200	282

4. Name(s) and maximum amount of proposed material(s) produced per hour:

Methanol Synthesis Unit Out	Process Line	kg/hr	tons/hr
Methanol	6	238,395.60	263
Gas to PSA	12	19,518.54	22
		Total =	285

5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:

See Attachment G – Process Description

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable): NOT APPLICABLE

(a) Type and amount in appropriate units of fuel(s) to be burned:

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

(c) Theoretical combustion air requirement (ACF/unit of fuel):

@ °F and psia.

(d) Percent excess air:

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

(g) Proposed maximum design heat input: $\times 10^6$ BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

This unit does not vent except during upset conditions when venting will occur through the safety vent to the flare and steam will release to atmosphere.

@ °F and psia

a. NO_X	lb/hr	grains/ACF
b. SO_2	lb/hr	grains/ACF
c. CO	lb/hr	grains/ACF
d. PM_{10}	lb/hr	grains/ACF
e. Hydrocarbons	lb/hr	grains/ACF
f. VOCs	lb/hr	grains/ACF
g. Pb	lb/hr	grains/ACF
h. Specify other(s)		
	lb/hr	grains/ACF
	lb/hr	grains/ACF
	lb/hr	grains/ACF
	lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
None Proposed	None Proposed
REPORTING	**TESTING**
None Proposed	None Proposed

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

This unit is specifically designed for each process and the final design has not been completed. Operating ranges and maintenance procedures will be identified during final design of each unit within the system. The procedures as identified will be followed.

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): Sulfur Recovery

1. Name or type and model of proposed affected source:

The Sulfur Recovery Unit includes the Claus Furnace (CF), Waste Heat Boiler (WHB), Condenser I through III (SRCD1 through SRCD3), Reheater I and II (RH1and RH2), Claus Reactor I and II (CLR1 and CLR2), Feed /Effluent Heat Exchanger (FEHESR), Tailgas Heater (TGH), Hydrogenation Reactor (HR), Tail Gas Scrubber (TGS), Recycle Gas Compressor (RGC), Cooler No. 1 and No. 2 (CL1 and CL2), Sulfur Storage Tank (STK), and Line/Safety Vents No. 1 through No. 3 (SRLSF1 through SRLSF3). These units are specifically designed for each process unit and the final design has not been completed. There is one (1) Sulfur Recovery Unit.

2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.

See the process flow diagram.

3. Name(s) and maximum amount of proposed process material(s) charged per hour:

Sulfur Recovery In	Process Line	kg/hr	tons/hr
Acid Gas From AGR	9	7,252.29	8
Sour Gas to SRU	25	2,156	3
Sour Gas from PDQ	10	1,214.32	2
		Total =	13

4. Name(s) and maximum amount of proposed material(s) produced per hour:

Sulfur Recovery Out	Process Line	kg/hr	tons/hr
Claus Tail Gas	30	6,277	7
Solid Sulfur	11	2,669.53	3
		Total =	10

5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:

See Attachment G – Process Description

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):

(a) Type and amount in appropriate units of fuel(s) to be burned:

The Acid Gas is combusted to allow removal of Sulfur. The material is combustible.

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

Mole percent is shown on the mass balance sheet in the calculations.

(c) Theoretical combustion air requirement (ACF/unit of fuel):

@ °F and psia.

(d) Percent excess air: NA

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

Claus Furnace

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

NA

(g) Proposed maximum design heat input: NA $\times 10^6$ BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

<u>This unit does not vent except during upset conditions when venting will occur through the safety vent to the flare and steam will release to atmosphere.</u>

@ °F and psia

a. NO_X	lb/hr	grains/ACF
b. SO_2	lb/hr	grains/ACF
c. CO	lb/hr	grains/ACF
d. PM_{10}	lb/hr	grains/ACF
e. Hydrocarbons	lb/hr	grains/ACF
f. VOCs	lb/hr	grains/ACF
g. Pb	lb/hr	grains/ACF
h. Specify other(s)		
	lb/hr	grains/ACF
	lb/hr	grains/ACF
	lb/hr	grains/ACF
	lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
None Proposed	Track the amount of sulfur produced.

REPORTING	TESTING
None Proposed	None Proposed

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

This unit is specifically designed for each process and the final design has not been completed. Operating ranges and maintenance procedures will be identified during final design of each unit within the system. The procedures as identified will be followed.

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): PSA System

1. Name or type and model of proposed affected source:

The PSA System includes the Adsorber Vessel I thought IV (AV1 through AV4) and an Off Gas Drum (OGD). This system produces purified hydrogen from hydrogen rich gas. These units are specifically designed for each process unit and the final design has not been completed. There is one (1) PSA System.

2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.

See the process flow diagram.

3. Name(s) and maximum amount of proposed process material(s) charged per hour:

PSA System In	Process Line	kg/hr	tons/hr
Gas to PSA	12	19,518.54	22

4. Name(s) and maximum amount of proposed material(s) produced per hour:

PSA System Out	Process Line	kg/hr	tons/hr
[redacted]			
Tail Gas from PSA	15	18,635.38	21
		[redacted]	

5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:

See Attachment G – Process Description

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable): NOT APPLICABLE

(a) Type and amount in appropriate units of fuel(s) to be burned:

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

(c) Theoretical combustion air requirement (ACF/unit of fuel):

@ °F and psia.

(d) Percent excess air:

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

(g) Proposed maximum design heat input: $\times 10^6$ BTU/hr.

7. Projected operating schedule:

Hours/Day 24	Days/Week 7	Weeks/Year 52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

This unit does not vent and does not have safety vents in the lines.

@ °F and psia

a.	NO_X	lb/hr	grains/ACF
b.	SO_2	lb/hr	grains/ACF
c.	CO	lb/hr	grains/ACF
d.	PM_{10}	lb/hr	grains/ACF
e.	Hydrocarbons	lb/hr	grains/ACF
f.	VOCs	lb/hr	grains/ACF
g.	Pb	lb/hr	grains/ACF
h.	Specify other(s)		
		lb/hr	grains/ACF
		lb/hr	grains/ACF
		lb/hr	grains/ACF
		lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
None Proposed	None Proposed
REPORTING	**TESTING**
None Proposed	None Proposed

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

This unit is specifically designed for each process and the final design has not been completed. Operating ranges and maintenance procedures will be identified during final design of each unit within the system. The procedures as identified will be followed.

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): CO_2 Purification (CO_2P)

1. Name or type and model of proposed affected source:

The CO_2Purification Unit (CO_2P) refines CO2 for the process and sends CO_2 back to the Coal Preparation units for blanket gas and vents to emission point C1. This process will be either CO2 Stripping or Catalytic Purification. This unit is specifically designed for each process and the final design has not been completed. There is one (1) CO_2 Purification unit.

2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.

There is no preliminary design for this unit.

3. Name(s) and maximum amount of proposed process material(s) charged per hour:

CO_2 Purification In	Process Line	kg/hr	tons/hr
CO_2 to Purification	16	462,593.08	511
E4	31	9,597	11
		Total =	522

4. Name(s) and maximum amount of proposed material(s) produced per hour:

CO_2 Purification Out	Process Line	kg/hr	tons/hr
CO_2 to Atmosphere	17	346873.89	383
CO_2 to Coal Preparation	26	115719.1873	128
		Total =	511

5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:

CO2 Purification

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

Revision 03/2007

6. Combustion Data (if applicable): NOT APPLICABLE

(a) Type and amount in appropriate units of fuel(s) to be burned:

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

(c) Theoretical combustion air requirement (ACF/unit of fuel):

@ °F and psia.

(d) Percent excess air:

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

(g) Proposed maximum design heat input: $\times 10^6$ BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

This unit does not vent except during upset conditions when venting will occur through the safety vent in the line to the flare.

@ °F and psia

		C1			grains/ACF
a.	NO_X	NA	lb/hr	NA	
b.	SO_2	11.56 46.25	lb/hr tpy	NA	grains/ACF
c.	CO	0.5093 1.974	lb/hr tpy	NA	grains/ACF
d.	PM_{10}	NA	lb/hr	NA	grains/ACF
e.	Hydrocarbons	NA	lb/hr	NA	grains/ACF
f.	VOCs	NA	lb/hr	NA	grains/ACF
g.	Pb	NA	lb/hr	NA	grains/ACF
h.	Specify other(s)				
	NA		lb/hr		grains/ACF
			lb/hr		grains/ACF
			lb/hr		grains/ACF
			lb/hr		grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
None Proposed	None Proposed
REPORTING	**TESTING**
None Proposed	None Proposed

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

This unit is specifically designed for each process and the final design has not been completed. Operating ranges and maintenance procedures will be identified during final design of each unit within the system. The procedures as identified will be followed.

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): Air Separation Units

1. Name or type and model of proposed affected source:

The Air Separation Units include Air Compressor 1 and 2 (ACOMP1 and ACOPM2), Air Conditioner 1 and 2 (AC1 and AC2), Multipass Heat Exchanger 1 and 2 (MPHE1 and MPHE2), Distillation Column 1 and 2 (DC1 and DC2), Expansion Turbine 1 and 2 (ETRB1 and ETRB2), Oxygen Pump 1 and 2 (OP1 and OP2), Oxygen Evaporizer 1 and 2 (OEVAP1 and OEVAP2), and Nitrogen Compressor 1 and 2 (NCOMP1 and NCOMP2). These units are specifically designed for each process unit and the final design has not been completed. There are two (2) Air Separation Units and each one feeds one of the gasifiers.

2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.

See the process flow diagram.

3. Name(s) and maximum amount of proposed process material(s) charged per hour:

Ambient Air for Separation

4. Name(s) and maximum amount of proposed material(s) produced per hour:

Air Separation Out	Process Line	kg/hr	tons/hr
Oxygen from ASU	29	230,439.00	255

This is per each ASU.

5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:

NA

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

Revision 03/2007

6. Combustion Data (if applicable): NOT APPLICABLE

(a) Type and amount in appropriate units of fuel(s) to be burned:

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

(c) Theoretical combustion air requirement (ACF/unit of fuel):

@ °F and psia.

(d) Percent excess air:

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

(g) Proposed maximum design heat input: $\times 10^6$ BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

<u>These units do not release regulated air pollutants.</u>

@ °F and psia

a.	NO_X	lb/hr	grains/ACF
b.	SO_2	lb/hr	grains/ACF
c.	CO	lb/hr	grains/ACF
d.	PM_{10}	lb/hr	grains/ACF
e.	Hydrocarbons	lb/hr	grains/ACF
f.	VOCs	lb/hr	grains/ACF
g.	Pb	lb/hr	grains/ACF
h.	Specify other(s)		
		lb/hr	grains/ACF
		lb/hr	grains/ACF
		lb/hr	grains/ACF
		lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
None Proposed	None Proposed
REPORTING	**TESTING**
None Proposed	None Proposed

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

These units are specifically designed for each process and the final design has not been completed. Operating ranges and maintenance procedures will be identified during final design of each unit within the system. The procedures as identified will be followed.

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): Methanol to Gasoline (MTG)

1. Name or type and model of proposed affected source:

The Methanol to Gasoline Unit includes the MTG Reaction Unit: Separation, Methanol Recovery (SMR); Methanol Vaporization/HP Steam Generation (MVS);DME Reactor and MTG Reactors (DMR); MTG Reactors Regeneration Systems (MTGRS); GasLiquid /Liquid Separationm (GLS); Deethanizer (DE); Stabilizer (STB); Methanol Recovery(MR); Absorber (AB); HGT Reactors (HGT); HGT Product Stripper(PS). These units are specifically designed for each process unit and the final design has not been completed. The units in each grouping above are detailed in Attachment I on Pages I11 thought I18. The units include Emission Points E1 through E5. E1 is the Regeneration Heater (SURGH), E2 is the Reactivation Heater (SURH), E3 is the HGT Heater (RCH), E4 is Process Waste Regeneration Gas Silencer (RGSL), and E5 is the flaring of the tail gas when both no process use available.

2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.

See MGT process flow diagrams.

3. Name(s) and maximum amount of proposed process material(s) charged per hour:

MTG In	Process Line	kg/hr	tons/hr
[redacted]			
Methanol	6	238,395.60	263
		[redacted]	

4. Name(s) and maximum amount of proposed material(s) produced per hour:

MTG Out	Process Line	kg/hr	tons/hr
LPG	7	10,759	12
Gasoline	8	87,400	97
Tail Gas from MTG	28	3,257	4
Water from MTG	20	135,273	150
		Total =	263

5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:

See Attachment G – Process Description

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable): Combustion on Other Sheets

(a) Type and amount in appropriate units of fuel(s) to be burned:

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

(c) Theoretical combustion air requirement (ACF/unit of fuel):

@ °F and psia.

(d) Percent excess air:

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

(g) Proposed maximum design heat input: $\times 10^6$ BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

This unit does not vent except during upset conditions and regeneration when venting will occur through the safety vent to the flare and to atmosphere. See Following Sheets for Emission Points E1 through E3.

@ °F and psia

See Following Sheets for E1, E2, and E3	E4[(1)]	E5[(2)]			
a. NO_X	NA	21.3 0.43	lb/hr tpy	NA	grains/ACF
b. SO_2	NA	NA	lb/hr	NA	grains/ACF
c. CO	NA	51.88 1.04	lb/hr tpy	NA	grains/ACF
d. PM_{10}	NA	NA	lb/hr	NA	grains/ACF
e. Hydrocarbons	NA	NA	lb/hr	NA	grains/ACF
f. VOCs	NA	19.96 0.4	lb/hr tpy	NA	grains/ACF
g. Pb	NA	NA	lb/hr	NA	grains/ACF

1. E4 is sent to the CO_2 Purifier and is now part of C1.
2. E5 emissions occur and estimated four (4) times a year at 10 hours each.

h. Specify other(s)

	lb/hr	grains/ACF
	lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
None Proposed	Amount of LPG and Gasoline Produced
REPORTING	**TESTING**
None Proposed	None Proposed

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

These units are specifically designed for each process and the final design has not been completed. Operating ranges and maintenance procedures will be identified during final design of each unit within the system. The procedures as identified will be followed.

Attachment L
Emission Unit Data Sheet
(INDIRECT HEAT EXCHANGER)

Control Device ID No. (must match List Form): NA

Equipment Information

Manufacturer: MTG Start-Up/Regeneration Gas Heater(SURGH) (E1) - Manufacturer Not Selected	2. Model No. Manufacturer Not Selected Serial No.
3. Number of units: 1	4. Use Used in the start up of the process and in regeneration of the MTG catalysist
5. Rated Boiler Horsepower: NA hp	6. Boiler Serial No.: Manufacturer Not Selected
7. Date constructed: 2010	8. Date of last modification and explain: NA
9. Maximum design heat input per unit: Main Burn 30 $\times 10^6$ BTU/hr	10. Peak heat input per unit: Regeneration 30 $\times 10^6$ BTU/hr
11. Steam produced at maximum design output: NA LB/hr NA psig	12. Projected Operating Schedule: Hours/Day NA Days/Week NA Weeks/Year NA
13. Type of firing equipment to be used: ☐ Pulverized coal ☐ Spreader stoker ☐ Oil burners ☐ Natural Gas Burner ☒ Others, specify Syngas	14. Proposed type of burners and orientation: ☐ Vertical ☐ Front Wall ☐ Opposed ☒ Tangential ☐ Others, specify
15. Type of draft: ☒ Forced ☐ Induced	16. Percent of ash retained in furnace: NA %
17. Will flyash be reinjected? ☐ Yes ☒ No	18. Percent of carbon in flyash: NA %

Stack or Vent Data Manufacturer Not Selected

19. Inside diameter or dimensions: NA ft.	20. Gas exit temperature: NA °F
21. Height: NA ft.	22. Stack serves: ☒ This equipment only ☐ Other equipment also (submit type and rating of all other equipment exhausted through this stack or vent)
23. Gas flow rate: NA ft^3/min	
24. Estimated percent of moisture: Na %	

Fuel Requirements Manufacturer Not Selected

25. Type	Fuel Oil No.	Natural Gas	Gas (other, specify)	Coal, Type:	Syngas:
Quantity (at Design Output)	gph@60°F	ft^3/hr	ft^3/hr	TPH	101,351 ft^3/hr
Annually	$\times 10^3$ gal	$\times 10^6$ ft^3/hr	$\times 10^6$ ft^3/hr	tons	87.46 $\times 10^6$ ft^3/hr
Sulfur	Maximum: wt. % Average: wt. %	gr/100 ft^3	gr/100 ft^3	Maximum: wt. %	None
Ash (%)				Maximum	Trace
BTU Content	BTU/Gal. Lbs/Gal.@60°F	BTU/ft^3	BTU/ft^3	BTU/lb	296 BTU/ft^3
Source					Process
Supplier					NA
Halogens (Yes/No)					NA
List and Identify Metals					NA

26. Gas burner mode of control:
☐ Manual ☐ Automatic hi-low
☐ Automatic full modulation ☐ Automatic on-off

27. Gas burner manufacture:

28. Oil burner manufacture:

29. If fuel oil is used, how is it atomized? ☐ Oil Pressure ☐ Steam Pressure ☐ Compressed Air ☐ Rotary Cup ☐ Other, specify

30. Fuel oil preheated: ☐ Yes ☐ No

31. If yes, indicate temperature: °F

32. Specify the calculated theoretical air requirements for combustion of the fuel or mixture of fuels described above actual cubic feet (ACF) per unit of fuel:
@ °F, PSIA, % moisture

33. Emission rate at rated capacity: lb/hr

34. Percent excess air actually required for combustion of the fuel described: %

Coal Characteristics NAP

35. Seams:

36. Proximate analysis (dry basis): % of Fixed Carbon: % of Sulfur: % of Moisture: % of Volatile Matter: % of Ash:

Emissions Stream

37. What quantities of pollutants will be emitted from the boiler before controls?

Pollutant	Pounds per Hour lb/hr/tpy			
CO	1.93/1.24			
Hydrocarbons	NA			
NO_x	4.01/1.69			
Pb	NA			
PM_{10}	0.223/0.10			
SO_2	NA			
VOCs	0.162/0.07			
Other (specify)				

38. What quantities of pollutants will be emitted from the boiler after controls?

Pollutant	Pounds per Hour lb/hr/tpy			
CO	1.93/1.24			
Hydrocarbons	NA			
NO_x	4.01/1.69			
Pb	NA			
PM_{10}	0.223/0.10			
SO_2	NA			
VOCs	0.162/0.07			
Other (specify)				

39. How will waste material from the process and control equipment be disposed of?
NA

40. Have you completed an *Air Pollution Control Device Sheet(s)* for the control(s) used on this Emission Unit. NA

41. Have you included the ***air pollution rates*** on the Emissions Points Data Summary Sheet? Yes

42. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING PLAN: Please list (1) describe the process parameters and how they were chosen (2) the ranges and how they were established for monitoring to demonstrate compliance with the operation of this process equipment operation or air pollution control device.

Monitor the emission point for opacity via Method 9 and Method 22.

TESTING PLAN: Please describe any proposed emissions testing for this process equipment or air pollution control device.

Testing will be conducted as required by DAQ.

RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring.

Record hours of operation for the unit.

REPORTING: Please describe the proposed frequency of reporting of the recordkeeping.

None proposed.

43. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.

The manufacturer has not been selected for this unit. Operating ranges and maintenance procedures identified by the manufacturer will be followed.

Attachment L

Emission Unit Data Sheet
(INDIRECT HEAT EXCHANGER)

Control Device ID No. (must match List Form): NA

Equipment Information

Manufacturer: MTG Start-Up/Reactivation Heater (SURH) (E2) - Manufacturer Not Selected	2. Model No. Manufacturer Not Selected Serial No.
3. Number of units: 1	4. Use Used in the start up of the process and in regeneration of the MTG catalysist
5. Rated Boiler Horsepower: NA hp	6. Boiler Serial No.: Manufacturer Not Selected
7. Date constructed: 2010	8. Date of last modification and explain: NA
9. Maximum design heat input per unit: Main Burn 120 $\times 10^6$ BTU/hr	10. Peak heat input per unit: Regeneration 120 $\times 10^6$ BTU/hr
11. Steam produced at maximum design output: NA LB/hr NA psig	12. Projected Operating Schedule: Hours/Day NA Days/Week NA Weeks/Year NA
13. Type of firing equipment to be used: ☐ Pulverized coal ☐ Spreader stoker ☐ Oil burners ☐ Natural Gas Burner ☒ Others, specify Syngas	14. Proposed type of burners and orientation: ☐ Vertical ☐ Front Wall ☐ Opposed ☒ Tangential ☐ Others, specify
15. Type of draft: ☒ Forced ☐ Induced	16. Percent of ash retained in furnace: NA %
17. Will flyash be reinjected? ☐ Yes ☒ No	18. Percent of carbon in flyash: NA %

Stack or Vent Data Manufacturer Not Selected

19. Inside diameter or dimensions: NA ft.	20. Gas exit temperature: NA °F
21. Height: NA ft.	22. Stack serves: ☒ This equipment only ☐ Other equipment also (submit type and rating of all other equipment exhausted through this stack or vent)
23. Gas flow rate: NA ft^3/min	
24. Estimated percent of moisture: Na %	

 Revision 03/2007

Fuel Requirements Manufacturer Not Selected

25. Type	Fuel Oil No.	Natural Gas	Gas (other, specify)	Coal, Type:	Syngas:
Quantity (at Design Output)	gph@60°F	ft^3/hr	ft^3/hr	TPH	405,405 ft^3/hr
Annually	$\times 10^3$ gal	$\times 10^6$ ft^3/hr	$\times 10^6$ ft^3/hr	tons	227.9 $\times 10^6$ ft^3/hr
Sulfur	Maximum: wt. % Average: wt. %	gr/100 ft^3	gr/100 ft^3	Maximum: wt. %	None
Ash (%)				Maximum	Trace
BTU Content	BTU/Gal. Lbs/Gal.@60°F	BTU/ft^3	BTU/ft^3	BTU/lb	296 BTU/ft^3
Source					Process
Supplier					NA
Halogens (Yes/No)					NA
List and Identify Metals					NA

26. Gas burner mode of control:
☐ Manual ☐ Automatic hi-low
☐ Automatic full modulation ☐ Automatic on-off

27. Gas burner manufacture:

28. Oil burner manufacture:

29. If fuel oil is used, how is it atomized? ☐ Oil Pressure ☐ Steam Pressure ☐ Compressed Air ☐ Rotary Cup ☐ Other, specify

30. Fuel oil preheated: ☐ Yes ☐ No

31. If yes, indicate temperature: °F

32. Specify the calculated theoretical air requirements for combustion of the fuel or mixture of fuels described above actual cubic feet (ACF) per unit of fuel:
@ °F, PSIA, % moisture

33. Emission rate at rated capacity: lb/hr

34. Percent excess air actually required for combustion of the fuel described: %

Coal Characteristics NAP

35. Seams:

36. Proximate analysis (dry basis): % of Fixed Carbon: % of Sulfur: % of Moisture: % of Volatile Matter: % of Ash:

Emissions Stream

37. What quantities of pollutants will be emitted from the boiler before controls?

Pollutant	Pounds per Hour lb/hr/tpy			
CO	11.44/3.22			
Hydrocarbons	NA			
NO_x	15.64/4.4			
Pb	NA			
PM_{10}	0.89/0.25			
SO_2	NA			
VOCs	0.65/0.18			
Other (specify)				

38. What quantities of pollutants will be emitted from the boiler after controls?

Pollutant	Pounds per Hour lb/hr/tpy			
CO	11.44/3.22			
Hydrocarbons	NA			
NO_x	15.64/4.4			
Pb	NA			
PM_{10}	0.89/0.25			
SO_2	NA			
VOCs	0.65/0.18			
Other (specify)				

39. How will waste material from the process and control equipment be disposed of?
NA

40. Have you completed an *Air Pollution Control Device Sheet(s)* for the control(s) used on this Emission Unit. NA

41. Have you included the ***air pollution rates*** on the Emissions Points Data Summary Sheet? Yes

42. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING PLAN: Please list (1) describe the process parameters and how they were chosen (2) the ranges and how they were established for monitoring to demonstrate compliance with the operation of this process equipment operation or air pollution control device.

Monitor the emission point for opacity via Method 9 and Method 22.

TESTING PLAN: Please describe any proposed emissions testing for this process equipment or air pollution control device.

Testing will be conducted as required by DAQ.

RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring.

Record hours of operation for the unit.

REPORTING: Please describe the proposed frequency of reporting of the recordkeeping.

None proposed.

43. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.
The manufacturer has not been selected for this unit. Operating ranges and maintenance procedures identified by the manufacturer will be followed.

Attachment L
Emission Unit Data Sheet
(INDIRECT HEAT EXCHANGER)

Control Device ID No. (must match List Form): NA

Equipment Information

Manufacturer: HGT Reactor Charge Heater (RCH) (E3) - Manufacturer Not Selected	2. Model No. Manufacturer Not Selected Serial No.
3. Number of units: 1	4. Use Used in the start up of the process and in regeneration of the MTG catalysist
5. Rated Boiler Horsepower: NA hp	6. Boiler Serial No.: Manufacturer Not Selected
7. Date constructed: 2010	8. Date of last modification and explain: NA
9. Maximum design heat input per unit: Main Burn 4.0 $\times 10^6$ BTU/hr	10. Peak heat input per unit: Regeneration 4.0 $\times 10^6$ BTU/hr
11. Steam produced at maximum design output: NA LB/hr NA psig	12. Projected Operating Schedule: Hours/Day 24 Days/Week 7 Weeks/Year 52
13. Type of firing equipment to be used: ☐ Pulverized coal ☐ Spreader stoker ☐ Oil burners ☐ Natural Gas Burner ☒ Others, specify Syngas	14. Proposed type of burners and orientation: ☐ Vertical ☐ Front Wall ☐ Opposed ☒ Tangential ☐ Others, specify
15. Type of draft: ☒ Forced ☐ Induced	16. Percent of ash retained in furnace: NA %
17. Will flyash be reinjected? ☐ Yes ☒ No	18. Percent of carbon in flyash: NA %

Stack or Vent Data Manufacturer Not Selected

19. Inside diameter or dimensions: NA ft.	20. Gas exit temperature: NA °F
21. Height: NA ft.	22. Stack serves: ☒ This equipment only ☐ Other equipment also (submit type and rating of all other equipment exhausted through this stack or vent)
23. Gas flow rate: NA ft^3/min	
24. Estimated percent of moisture: Na %	

Fuel Requirements Manufacturer Not Selected

25. Type	Fuel Oil No.	Natural Gas	Gas (other, specify)	Coal, Type:	Syngas:
Quantity (at Design Output)	gph@60°F	ft^3/hr	ft^3/hr	TPH	13,514 ft^3/hr
Annually	$\times 10^3$ gal	$\times 10^6$ ft^3/hr	$\times 10^6$ ft^3/hr	tons	85.41 $\times 10^6$ ft^3/hr
Sulfur	Maximum: wt. % Average: wt. %	gr/100 ft^3	gr/100 ft^3	Maximum: wt. %	None
Ash (%)				Maximum	Trace
BTU Content	BTU/Gal. Lbs/Gal.@60°F	BTU/ft^3	BTU/ft^3	BTU/lb	296 BTU/ft^3
Source					Process
Supplier					NA
Halogens (Yes/No)					NA
List and Identify Metals					NA

26. Gas burner mode of control:
☐ Manual ☐ Automatic hi-low
☐ Automatic full modulation ☐ Automatic on-off

27. Gas burner manufacture:

28. Oil burner manufacture:

29. If fuel oil is used, how is it atomized? ☐ Oil Pressure ☐ Steam Pressure
☐ Compressed Air ☐ Rotary Cup
☐ Other, specify

30. Fuel oil preheated: ☐ Yes ☐ No

31. If yes, indicate temperature: °F

32. Specify the calculated theoretical air requirements for combustion of the fuel or mixture of fuels described above actual cubic feet (ACF) per unit of fuel:
@ °F, PSIA, % moisture

33. Emission rate at rated capacity: lb/hr

34. Percent excess air actually required for combustion of the fuel described: %

Coal Characteristics NAP

35. Seams:

36. Proximate analysis (dry basis): % of Fixed Carbon: % of Sulfur:
% of Moisture: % of Volatile Matter:
% of Ash:

Emissions Stream

37. What quantities of pollutants will be emitted from the boiler before controls?

Pollutant	Pounds per Hour lb/hr/tpy			
CO	0.381/1.20			
Hydrocarbons	NA			
NO_x	0.55/1.65			
Pb	NA			
PM_{10}	0.03/0.09			
SO_2	NA			
VOCs	0.022/0.07			
Other (specify)				

1. Estimated to operate 8,000 hours per year total.

38. What quantities of pollutants will be emitted from the boiler after controls?

Pollutant	Pounds per Hour lb/hr/tpy			
CO	0.381/1.20			
Hydrocarbons	NA			
NO_x	0.55/1.65			
Pb	NA			
PM_{10}	0.03/0.09			
SO_2	NA			
VOCs	0.022/0.07			
Other (specify)	NA			

39. How will waste material from the process and control equipment be disposed of?
NA

40. Have you completed an *Air Pollution Control Device Sheet(s)* for the control(s) used on this Emission Unit. NA

41. Have you included the ***air pollution rates*** on the Emissions Points Data Summary Sheet? Yes

42. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING PLAN: Please list (1) describe the process parameters and how they were chosen (2) the ranges and how they were established for monitoring to demonstrate compliance with the operation of this process equipment operation or air pollution control device.

Monitor the emission point for opacity via Method 9 and Method 22.

TESTING PLAN: Please describe any proposed emissions testing for this process equipment or air pollution control device.

Testing will be conducted as required by DAQ.

RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring.

Record hours of operation for the unit.

REPORTING: Please describe the proposed frequency of reporting of the recordkeeping.

None proposed.

43. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.

The manufacturer has not been selected for this unit. Operating ranges and maintenance procedures identified by the manufacturer will be followed.

Attachment L
Emission Unit Data Sheet
(INDIRECT HEAT EXCHANGER)

Control Device ID No. (must match List Form): NA

Equipment Information

Manufacturer: Start Up Steam Boiler (SUSB) (F) - Manufacturer Not Selected	2. Model No. Manufacturer Not Selected Serial No.
3. Number of units: 1	4. Use Used in the start up of the process
5. Rated Boiler Horsepower: NA hp	6. Boiler Serial No.: Manufacturer Not Selected
7. Date constructed: 2010	8. Date of last modification and explain: NA
9. Maximum design heat input per unit: Main Burn 81.84 ×10^6 BTU/hr	10. Peak heat input per unit: Regeneration 81.84 ×10^6 BTU/hr
11. Steam produced at maximum design output: NA LB/hr NA psig	12. Projected Operating Schedule: Hours/Day 24 Days/Week 96 Hours Per Startup Weeks/Year 4 Startups and Week
13. Type of firing equipment to be used: ☐ Pulverized coal ☐ Spreader stoker ☐ Oil burners ☒ Natural Gas Burner ☐ Others, specify Syngas	14. Proposed type of burners and orientation: ☐ Vertical ☐ Front Wall ☐ Opposed ☒ Tangential ☐ Others, specify
15. Type of draft: ☒ Forced ☐ Induced	16. Percent of ash retained in furnace: NA %
17. Will flyash be reinjected? ☐ Yes ☒ No	18. Percent of carbon in flyash: NA %

Stack or Vent Data Manufacturer Not Selected

19. Inside diameter or dimensions: NA ft.	20. Gas exit temperature: NA °F
21. Height: NA ft.	22. Stack serves: ☒ This equipment only ☐ Other equipment also (submit type and rating of all other equipment exhausted through this stack or vent)
23. Gas flow rate: NA ft^3/min	
24. Estimated percent of moisture: Na %	

Fuel Requirements Manufacturer Not Selected

25. Type	Fuel Oil No.	Natural Gas	Gas (other, specify)	Coal, Type:	Other:
Quantity (at Design Output)	gph@60°F	83,890 ft^3/hr	ft^3/hr	TPH	
Annually	$\times 10^3$ gal	32.22$\times 10^6$ ft^3/hr	$\times 10^6$ ft^3/hr	tons	
Sulfur	Maximum: wt. % Average: wt. %	20 ppmv	gr/100 ft^3	Maximum: wt. %	
Ash (%)		Trace		Maximum	
BTU Content	BTU/Gal. Lbs/Gal.@60°F	1,020 BTU/ft^3	BTU/ft^3	BTU/lb	
Source		Pipeline			
Supplier		Not Selected			
Halogens (Yes/No)		NA			
List and Identify Metals		NA			

26. Gas burner mode of control:
☐ Manual ☐ Automatic hi-low
☐ Automatic full modulation ☐ Automatic on-off

27. Gas burner manufacture:

28. Oil burner manufacture:

29. If fuel oil is used, how is it atomized? ☐ Oil Pressure ☐ Steam Pressure
☐ Compressed Air ☐ Rotary Cup
☐ Other, specify

30. Fuel oil preheated: ☐ Yes ☐ No

31. If yes, indicate temperature: °F

32. Specify the calculated theoretical air requirements for combustion of the fuel or mixture of fuels described above actual cubic feet (ACF) per unit of fuel:
@ °F, PSIA, % moisture

33. Emission rate at rated capacity: lb/hr

34. Percent excess air actually required for combustion of the fuel described: %

Coal Characteristics NAP

35. Seams:

36. Proximate analysis (dry basis): % of Fixed Carbon: % of Sulfur:
% of Moisture: % of Volatile Matter:
% of Ash:

Emissions Stream

37. What quantities of pollutants will be emitted from the boiler before controls?

Pollutant	Pounds per Hour lb/hr/tpy			
CO	10.11/1.94			
Hydrocarbons	NA			
NO_x	13.92/2.67			
Pb	NA			
PM_{10}	0.61/0.12			
SO_2	0.31/0.06			
VOCs	0.44/0.09			
Other (specify)				

1. 4 times per year, each 96 hours

38. What quantities of pollutants will be emitted from the boiler after controls?

Pollutant	Pounds per Hour lb/hr/tpy			
CO	10.11/1.94			
Hydrocarbons	NA			
NO_x	13.92/2.67			
Pb	NA			
PM_{10}	0.61/0.12			
SO_2	0.31/0.06			
VOCs	0.44/0.09			
Other (specify)				

39. How will waste material from the process and control equipment be disposed of?
NA

40. Have you completed an *Air Pollution Control Device Sheet(s)* for the control(s) used on this Emission Unit. NA

41. Have you included the ***air pollution rates*** on the Emissions Points Data Summary Sheet? Yes

42. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING PLAN: Please list (1) describe the process parameters and how they were chosen (2) the ranges and how they were established for monitoring to demonstrate compliance with the operation of this process equipment operation or air pollution control device.

Monitor the emission point for opacity via Method 9 and Method 22.

TESTING PLAN: Please describe any proposed emissions testing for this process equipment or air pollution control device.

Testing will be conducted as required by DAQ.

RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring.

Record hours of operation for the unit.

REPORTING: Please describe the proposed frequency of reporting of the recordkeeping.

None proposed.

43. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.

The manufacturer has not been selected for this unit. Operating ranges and maintenance procedures identified by the manufacturer will be followed.

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): Cooling Tower (CT)

1. Name or type and model of proposed affected source: The Induced Draft Cooling Tower supplies cooling for all process water in the system. The unit is specifically designed for each process unit and the final design has not been completed. There is one (1) Cooling Tower.
2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants. No process flow diagram for cooling tower.
3. Name(s) and maximum amount of proposed process material(s) charged per hour: Hot water at an anticipated 308,167 gallons per minute.
4. Name(s) and maximum amount of proposed material(s) produced per hour: Cooled water.
5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants: Not Applicable

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable): NOT APPLICABLE

(a) Type and amount in appropriate units of fuel(s) to be burned:

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

(c) Theoretical combustion air requirement (ACF/unit of fuel):

@ °F and psia.

(d) Percent excess air:

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

(g) Proposed maximum design heat input: $\times 10^6$ BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:

@ °F and psia

a.	NO_X	NA	lb/hr	NA	grains/ACF
b.	SO_2	NA	lb/hr	NA	grains/ACF
c.	CO	NA	lb/hr	NA	grains/ACF
d.	PM_{10}	7.71 33.77	lb/hr tpy	NA	grains/ACF
e.	Hydrocarbons	NA	lb/hr	NA	grains/ACF
f.	VOCs	NA	lb/hr	NA	grains/ACF
g.	Pb	NA	lb/hr	NA	grains/ACF
h.	Specify other(s)				
	NA		lb/hr		grains/ACF
			lb/hr		grains/ACF
			lb/hr		grains/ACF
			lb/hr		grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
None Proposed	None Proposed
REPORTING	**TESTING**
None Proposed	None Proposed

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

This unit is specifically designed for each process and the final design has not been completed. Operating ranges and maintenance procedures will be identified during final design of each unit within the system. The procedures as identified will be followed.

EMISSIONS UNIT DATA SHEET
STORAGE TANKS

Provide the following information for <u>each</u> new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT **www.epa.gov/tnn/tanks.html**), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (**http://www.epa.gov/tnn/chief/**).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name Gasoline Storage Area	2. Tank Name TK1 throught TK3 (3 identical tanks)
3. Tank Equipment Identification No. (as assigned on *Equipment List Form*) TK1 throught TK3 (3 identical tanks)	4. Emission Point Identification No. (as assigned on *Equipment List Form*) TK1 throught TK3 (3 identical tanks)

5. Date of Commencement of Construction (for existing tanks) 2010

6. Type of change ☒ New Construction ☐ New Stored Material ☐ Other Tank Modification

7. Description of Tank Modification (if applicable)

NA

7A. Does the tank have more than one mode of operation? ☐ Yes ☒ No
(e.g. Is there more than one product stored in the tank?)

7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode).

NA

7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.):

NA

II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height.

2,000,000 gallons per tank (3 identical tanks)

9A. Tank Internal Diameter (ft) 100	9B. Tank Internal Height (or Length) (ft) 35
10A. Maximum Liquid Height (ft) 35	10B. Average Liquid Height (ft) 17.5
11A. Maximum Vapor Space Height (ft) NA	11B. Average Vapor Space Height (ft) 17.5

12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights.

13A. Maximum annual throughput (gal/yr) 91,980,000	13B. Maximum daily throughput (gal/day) N/A
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume) 45.99	
15. Maximum tank fill rate (gal/min) NA	
16. Tank fill method ☐ Submerged ☐ Splash ☒ Bottom Loading	
17. Complete 17A and 17B for Variable Vapor Space Tank Systems ☒ Does Not Apply	
17A. Volume Expansion Capacity of System (gal) N/A	17B. Number of transfers into system per year

18. Type of tank (check all that apply):

☐ Fixed Roof ___ vertical ___ horizontal ___ flat roof ___ cone roof ___ dome roof ___ other (describe)

☐ External Floating Roof ___ pontoon roof ___ double deck roof

☐ Domed External (or Covered) Floating Roof

☒ Internal Floating Roof ___ vertical column support ___ self-supporting

☐ Variable Vapor Space ___ lifter roof ___ diaphragm

☐ Pressurized ___ spherical ___ cylindrical

☐ Underground

☐ Other (describe)

III. TANK CONSTRUCTION & OPERATION INFORMATION (optional if providing TANKS Summary Sheets)

19. Tank Shell Construction: ☐ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☐ Other (describe)		
20A. Shell Color	20B. Roof Color	20C. Year Last Painted
21. Shell Condition (if metal and unlined): ☐ No Rust ☐ Light Rust ☐ Dense Rust ☐ Not applicable		
22A. Is the tank heated? ☐ YES ☐ NO		
22B. If YES, provide the operating temperature (°F)		
22C. If YES, please describe how heat is provided to tank.		
23. Operating Pressure Range (psig): to		
24. Complete the following section for **Vertical Fixed Roof Tanks** ☐ Does Not Apply		
24A. For dome roof, provide roof radius (ft)		
24B. For cone roof, provide slope (ft/ft)		
25. Complete the following section for **Floating Roof Tanks** ☐ Does Not Apply		
25A. Year Internal Floaters Installed:		
25B. Primary Seal Type: (check one) ☐ Metallic (Mechanical) Shoe Seal ☐ Liquid Mounted Resilient Seal ☐ Vapor Mounted Resilient Seal ☐ Other (describe):		
25C. Is the Floating Roof equipped with a Secondary Seal? ☐ YES ☐ NO		
25D. If YES, how is the secondary seal mounted? (check one) ☐ Shoe ☐ Rim ☐ Other (describe):		
25E. Is the Floating Roof equipped with a weather shield? ☐ YES ☐ NO		

25F. Describe deck fittings; indicate the number of each type of fitting:

ACCESS HATCH		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:

AUTOMATIC GAUGE FLOAT WELL		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:

COLUMN WELL		
BUILT-UP COLUMN – SLIDING COVER, GASKETED:	BUILT-UP COLUMN – SLIDING COVER, UNGASKETED:	PIPE COLUMN – FLEXIBLE FABRIC SLEEVE SEAL:

LADDER WELL	
PIP COLUMN – SLIDING COVER, GASKETED:	PIPE COLUMN – SLIDING COVER, UNGASKETED:

GAUGE-HATCH/SAMPLE PORT	
SLIDING COVER, GASKETED:	SLIDING COVER, UNGASKETED:

ROOF LEG OR HANGER WELL		
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	SAMPLE WELL-SLIT FABRIC SEAL (10% OPEN AREA)

VACUUM BREAKER	
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:

RIM VENT	
WEIGHTED MECHANICAL ACTUATION GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:

DECK DRAIN (3-INCH DIAMETER)	
OPEN:	90% CLOSED:

STUB DRAIN
1-INCH DIAMETER:

OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY)

26. Complete the following section for Internal Floating Roof Tanks ☐ Does Not Apply	
26A. Deck Type: ☐ Bolted ☐ Welded	
26B. For Bolted decks, provide deck construction:	
26C. Deck seam: ☐ Continuous sheet construction 5 feet wide ☐ Continuous sheet construction 6 feet wide ☐ Continuous sheet construction 7 feet wide ☐ Continuous sheet construction 5 × 7.5 feet wide ☐ Continuous sheet construction 5 × 12 feet wide ☐ Other (describe)	
26D. Deck seam length (ft)	26E. Area of deck (ft^2)
For column supported tanks: 26F. Number of columns:	26G. Diameter of each column:

IV. SITE INFORMANTION (optional if providing TANKS Summary Sheets)

27. Provide the city and state on which the data in this section are based.
28. Daily Average Ambient Temperature (°F)
29. Annual Average Maximum Temperature (°F)
30. Annual Average Minimum Temperature (°F)
31. Average Wind Speed (miles/hr)
32. Annual Average Solar Insulation Factor (BTU/(ft^2·day))
33. Atmospheric Pressure (psia)

V. LIQUID INFORMATION (optional if providing TANKS Summary Sheets)

34. Average daily temperature range of bulk liquid:	
34A. Minimum (°F)	34B. Maximum (°F)
35. Average operating pressure range of tank:	
35A. Minimum (psig)	35B. Maximum (psig)
36A. Minimum Liquid Surface Temperature (°F)	36B. Corresponding Vapor Pressure (psia)
37A. Average Liquid Surface Temperature (°F)	37B. Corresponding Vapor Pressure (psia)
38A. Maximum Liquid Surface Temperature (°F)	38B. Corresponding Vapor Pressure (psia)

39. Provide the following for each liquid or gas to be stored in tank. Add additional pages if necessary.			
39A. Material Name or Composition			
39B. CAS Number			
39C. Liquid Density (lb/gal)			
39D. Liquid Molecular Weight (lb/lb-mole)			
39E. Vapor Molecular Weight (lb/lb-mole)			

Maximum Vapor Pressure 39F. True (psia) 39G. Reid (psia)			
Months Storage per Year 39H. From 39I. To			

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply): ☐ Does Not Apply

- ☐ Carbon Adsorption[1]
- ☐ Condenser[1]
- ☐ Conservation Vent (psig)
  - Vacuum Setting — Pressure Setting
- ☒ Emergency Relief Valve (psig)
- ☐ Inert Gas Blanket of
- ☐ Insulation of Tank with
- ☐ Liquid Absorption (scrubber)[1]
- ☐ Refrigeration of Tank
- ☐ Rupture Disc (psig)
- ☐ Vent to Incinerator[1]
- ☐ Other[1] (describe):

[1] Complete appropriate Air Pollution Control Device Sheet.

41. Expected Emission Rate (submit Test Data or Calculations here or elsewhere in the application).

Material Name & CAS No.	Breathing Loss (lb/hr)	Working Loss		Annual Loss (lb/yr)	Estimation Method[1]
		Amount	Units		
Gasoline	See Attachment N				EE

[1] EPA = EPA Emission Factor, MB = Material Balance, SS = Similar Source, ST = Similar Source Test, Throughput Data, O = Other (specify)

☐ Remember to attach emissions calculations, including TANKS Summary Sheets if applicable.

EMISSIONS UNIT DATA SHEET
STORAGE TANKS

Provide the following information for <u>each</u> new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT **www.epa.gov/tnn/tanks.html**), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (**http://www.epa.gov/tnn/chief/**).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name Methanol Storage Tank	2. Tank Name TK6
3. Tank Equipment Identification No. (as assigned on *Equipment List Form*) TK6	4. Emission Point Identification No. (as assigned on *Equipment List Form*) TK6
5. Date of Commencement of Construction (for existing tanks) 2010	
6. Type of change ☒ New Construction ☐ New Stored Material ☐ Other Tank Modification	
7. Description of Tank Modification (if applicable) NA	
7A. Does the tank have more than one mode of operation? (e.g. Is there more than one product stored in the tank?) ☐ Yes ☒ No	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode). NA	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): NA	

II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. 2,000,000 gallons	
9A. Tank Internal Diameter (ft) 100	9B. Tank Internal Height (or Length) (ft) 35
10A. Maximum Liquid Height (ft) 35	10B. Average Liquid Height (ft) 17.5
11A. Maximum Vapor Space Height (ft) NA	11B. Average Vapor Space Height (ft) 17.5
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights.	

13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
700 Million	1,917,808

14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume)
Approximately 350

15. Maximum tank fill rate (gal/min) NA

16. Tank fill method ☐ Submerged ☐ Splash ☒ Bottom Loading

17. Complete 17A and 17B for Variable Vapor Space Tank Systems ☒ Does Not Apply

17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year

18. Type of tank (check all that apply):
- ☐ Fixed Roof ___ vertical ___ horizontal ___ flat roof ___ cone roof ___ dome roof ___ other (describe)
- ☐ External Floating Roof ___ pontoon roof ___ double deck roof
- ☐ Domed External (or Covered) Floating Roof
- ☒ Internal Floating Roof ___ vertical column support X self-supporting
- ☐ Variable Vapor Space ___ lifter roof ___ diaphragm
- ☐ Pressurized ___ spherical ___ cylindrical
- ☐ Underground
- ☐ Other (describe)

III. TANK CONSTRUCTION & OPERATION INFORMATION (optional if providing TANKS Summary Sheets)

19. Tank Shell Construction:
☐ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☐ Other (describe)

20A. Shell Color	20B. Roof Color	20C. Year Last Painted

21. Shell Condition (if metal and unlined):
☐ No Rust ☐ Light Rust ☐ Dense Rust ☐ Not applicable

22A. Is the tank heated? ☐ YES ☐ NO

22B. If YES, provide the operating temperature (°F)

22C. If YES, please describe how heat is provided to tank.

23. Operating Pressure Range (psig): to

24. Complete the following section for **Vertical Fixed Roof Tanks** ☐ Does Not Apply

24A. For dome roof, provide roof radius (ft)

24B. For cone roof, provide slope (ft/ft)

25. Complete the following section for **Floating Roof Tanks** ☐ Does Not Apply

25A. Year Internal Floaters Installed:

25B. Primary Seal Type: (check one) ☐ Metallic (Mechanical) Shoe Seal ☐ Liquid Mounted Resilient Seal ☐ Vapor Mounted Resilient Seal ☐ Other (describe):

25C. Is the Floating Roof equipped with a Secondary Seal? ☐ YES ☐ NO

25D. If YES, how is the secondary seal mounted? (check one) ☐ Shoe ☐ Rim ☐ Other (describe):

25E. Is the Floating Roof equipped with a weather shield? ☐ YES ☐ NO

25F. Describe deck fittings; indicate the number of each type of fitting:

ACCESS HATCH		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:
AUTOMATIC GAUGE FLOAT WELL		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:
COLUMN WELL		
BUILT-UP COLUMN – SLIDING COVER, GASKETED:	BUILT-UP COLUMN – SLIDING COVER, UNGASKETED:	PIPE COLUMN – FLEXIBLE FABRIC SLEEVE SEAL:
LADDER WELL		
PIP COLUMN – SLIDING COVER, GASKETED:	PIPE COLUMN – SLIDING COVER, UNGASKETED:	
GAUGE-HATCH/SAMPLE PORT		
SLIDING COVER, GASKETED:	SLIDING COVER, UNGASKETED:	
ROOF LEG OR HANGER WELL		
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	SAMPLE WELL-SLIT FABRIC SEAL (10% OPEN AREA)
VACUUM BREAKER		
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	
RIM VENT		
WEIGHTED MECHANICAL ACTUATION GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	
DECK DRAIN (3-INCH DIAMETER)		
OPEN:	90% CLOSED:	
STUB DRAIN		
1-INCH DIAMETER:		
OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY)		

26. Complete the following section for Internal Floating Roof Tanks ☐ Does Not Apply	
26A. Deck Type: ☐ Bolted ☐ Welded	
26B. For Bolted decks, provide deck construction:	
26C. Deck seam: ☐ Continuous sheet construction 5 feet wide ☐ Continuous sheet construction 6 feet wide ☐ Continuous sheet construction 7 feet wide ☐ Continuous sheet construction 5 × 7.5 feet wide ☐ Continuous sheet construction 5 × 12 feet wide ☐ Other (describe)	
26D. Deck seam length (ft)	26E. Area of deck (ft^2)
For column supported tanks: 26F. Number of columns:	26G. Diameter of each column:

IV. SITE INFORMANTION (optional if providing TANKS Summary Sheets)

27. Provide the city and state on which the data in this section are based.
28. Daily Average Ambient Temperature (°F)
29. Annual Average Maximum Temperature (°F)
30. Annual Average Minimum Temperature (°F)
31. Average Wind Speed (miles/hr)
32. Annual Average Solar Insulation Factor (BTU/(ft^2·day))
33. Atmospheric Pressure (psia)

V. LIQUID INFORMATION (optional if providing TANKS Summary Sheets)

34. Average daily temperature range of bulk liquid:	
34A. Minimum (°F)	34B. Maximum (°F)
35. Average operating pressure range of tank:	
35A. Minimum (psig)	35B. Maximum (psig)
36A. Minimum Liquid Surface Temperature (°F)	36B. Corresponding Vapor Pressure (psia)
37A. Average Liquid Surface Temperature (°F)	37B. Corresponding Vapor Pressure (psia)
38A. Maximum Liquid Surface Temperature (°F)	38B. Corresponding Vapor Pressure (psia)

39. Provide the following for each liquid or gas to be stored in tank. Add additional pages if necessary.

39A. Material Name or Composition			
39B. CAS Number			
39C. Liquid Density (lb/gal)			
39D. Liquid Molecular Weight (lb/lb-mole)			
39E. Vapor Molecular Weight (lb/lb-mole)			

Maximum Vapor Pressure 39F. True (psia) 39G. Reid (psia)			
Months Storage per Year 39H. From 39I. To			

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply): ☐ Does Not Apply

- ☐ Carbon Adsorption[1]
- ☐ Condenser[1]
- ☐ Conservation Vent (psig)
  Vacuum Setting Pressure Setting
- ☐ Emergency Relief Valve (psig)
- ☐ Inert Gas Blanket of
- ☐ Insulation of Tank with
- ☐ Liquid Absorption (scrubber)[1]
- ☐ Refrigeration of Tank
- ☐ Rupture Disc (psig)
- ☐ Vent to Incinerator[1]
- ☐ Other[1] (describe):

[1] Complete appropriate Air Pollution Control Device Sheet.

41. Expected Emission Rate (submit Test Data or Calculations here or elsewhere in the application).

Material Name & CAS No.	Breathing Loss (lb/hr)	Working Loss		Annual Loss (lb/yr)	Estimation Method[1]
		Amount	Units		
Methanol	See Attachment N Tanks 4.0 Report				Tanks 4.0

[1] EPA = EPA Emission Factor, MB = Material Balance, SS = Similar Source, ST = Similar Source Test, Throughput Data, O = Other (specify)

☐ Remember to attach emissions calculations, including TANKS Summary Sheets if applicable.

Attachment L
EMISSIONS UNIT DATA SHEET
BULK LIQUID TRANSFER OPERATIONS

Furnish the following information for each new or modified bulk liquid transfer area or loading rack, as shown on the *Equipment List Form* and other parts of this application. This form is to be used for bulk liquid transfer operations such as to and from drums, marine vessels, rail tank cars, and tank trucks.

Identification Number (as assigned on *Equipment List Form*): LR1

1. Loading Area Name: Rail Loading Rack

2. Type of cargo vessels accommodated at this rack or transfer point (check as many as apply):
☐ Drums ☐ Marine Vessels ☒ Rail Tank Cars ☐ Tank Trucks

3. Loading Rack or Transfer Point Data:

Number of pumps	Gravity Feed
Number of liquids loaded	2
Maximum number of marine vessels, tank trucks, tank cars, and/or drums loading at one time	5

4. Does ballasting of marine vessels occur at this loading area?
☐ Yes ☐ No ☒ Does not apply

5. Describe cleaning location, compounds and procedure for cargo vessels using this transfer point:
Tanks are cleaned at a remote service location and/or are dedicated to fuel service.

6. Are cargo vessels pressure tested for leaks at this or any other location?
☒ Yes ☐ No
If YES, describe: Pressure tests that are required would be conducted at a remote service location.

7. Projected Maximum Operating Schedule (for rack or transfer point as a whole):

Maximum	Jan. - Mar.	Apr. - June	July - Sept.	Oct. - Dec.
hours/day	24	24	24	24
days/week	7	7	7	7
weeks/quarter	13	13	13	13

8. Bulk Liquid Data *(add pages as necessary):*							
Pump ID No.		Gravity feed is anticipated to load rail cars.					
Liquid Name		Gasoline	LPG(2)				
Max. daily throughput (1000 gal/day)		756	5,760 (1,000 lbs/hr)				
Max. annual throughput (1000 gal/yr)		275,940	210,240.0 (1,000 lbs/hr)				
Loading Method [1]		SUB	SUB				
Max. Fill Rate (gal/min)		2,000	2,000				
Average Fill Time (min/loading)		15	15				
Max. Bulk Liquid Temperature (^{o}F)		80	NA				
True Vapor Pressure [2]		9.9 psia	NA				
Cargo Vessel Condition [3]		U	U				
Control Equipment or Method [4]		VR	VB				
Minimum control efficiency (%)		99	NA				
Maximum Emission Rate	Loading (lb/hr)	4.82	N A				
	Annual (tpy)	21.10	NA				
Estimation Method [5]		AP-42	NA				
[1] BF = Bottom Fill SP = Splash Fill SUB = Submerged Fill							
[2] At maximum bulk liquid temperature							
[3] B = Ballasted Vessel, C = Cleaned, U = Uncleaned (dedicated service), O = other (describe)							
[4] List as many as apply (complete and submit appropriate *Air Pollution Control Device Sheets*):CA = Carbon Adsorption LOA = Lean Oil Adsorption CO = Condensation SC = Scrubber (Absorption) CRA = Compressor-Refrigeration-Absorption TO = Thermal Oxidation or Incineration CRC = Compression-Refrigeration-Condensation VB = Dedicated Vapor Balance (closed system) VR = Vapor Recovery O = other (descibe)							
[5] EPA = EPA Emission Factor as stated in AP-42 MB = Material Balance TM = Test Measurement based upon test data submittal O = other (describe)							

(1) Total of Railcar and Tank Truck Loading
(2) Vapor balance system with pressure, no anticipated emissions.

9. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**

Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING None Proposed	RECORDKEEPING Track Daily and Yearly Throughput
REPORTING None Proposed	TESTING None Proposed

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

This is a loading rack system which has not been selected. Manufacturer's operating ranges and maintenance procedures will be followed as recommended.

Attachment L
EMISSIONS UNIT DATA SHEET
BULK LIQUID TRANSFER OPERATIONS

Furnish the following information for each new or modified bulk liquid transfer area or loading rack, as shown on the *Equipment List Form* and other parts of this application. This form is to be used for bulk liquid transfer operations such as to and from drums, marine vessels, rail tank cars, and tank trucks.

Identification Number (as assigned on *Equipment List Form*): LR2

1. Loading Area Name: Truck Loading Rack

2. Type of cargo vessels accommodated at this rack or transfer point (check as many as apply):
☐ Drums ☐ Marine Vessels ☐ Rail Tank Cars ☒ Tank Trucks

3. Loading Rack or Transfer Point Data:

Number of pumps	1
Number of liquids loaded	2
Maximum number of marine vessels, tank trucks, tank cars, and/or drums loading at one time	1

4. Does ballasting of marine vessels occur at this loading area?
☐ Yes ☐ No ☒ Does not apply

5. Describe cleaning location, compounds and procedure for cargo vessels using this transfer point:
Tanks are cleaned at a remote service location and/or are dedicated to fuel service.

6. Are cargo vessels pressure tested for leaks at this or any other location?
☒ Yes ☐ No
If YES, describe: Pressure tests that are required would be conducted at a remote service location.

7. Projected Maximum Operating Schedule (for rack or transfer point as a whole):

Maximum	Jan. - Mar.	Apr. - June	July - Sept.	Oct. - Dec.
hours/day	24	24	24	24
days/week	7	7	7	7
weeks/quarter	13	13	13	13

8. Bulk Liquid Data *(add pages as necessary)*:							
Pump ID No.		Gravity feed is anticipated to load tank trucks.					
Liquid Name		Gasoline	LPG				
Max. daily throughput (1000 gal/day)		See Page L85					
Max. annual throughput (1000 gal/yr)		See Page L85					
Loading Method [1]		SUB	SUB				
Max. Fill Rate (gal/min)		2,000	2,000				
Average Fill Time (min/loading)		15	15				
Max. Bulk Liquid Temperature (^{o}F)		65	NA				
True Vapor Pressure [2]		6.37	NA				
Cargo Vessel Condition [3]		U	U				
Control Equipment or Method [4]		VR	VB				
Minimum control efficiency (%)		99	99				
Maximum Emission Rate	Loading (lb/hr)	See Page L85					
	Annual (tpy)	See Page L85					
Estimation Method [5]		See Page L85					

[1] BF = Bottom Fill SP = Splash Fill SUB = Submerged Fill

[2] At maximum bulk liquid temperature

[3] B = Ballasted Vessel, C = Cleaned, U = Uncleaned (dedicated service), O = other (describe)

[4] List as many as apply (complete and submit appropriate *Air Pollution Control Device Sheets*):CA = Carbon Adsorption LOA = Lean Oil Adsorption CO = Condensation SC = Scrubber (Absorption) CRA = Compressor-Refrigeration-Absorption TO = Thermal Oxidation or Incineration CRC = Compression-Refrigeration-Condensation VB = Dedicated Vapor Balance (closed system) VR = Vapor Recovery O = other (descibe)

[5] EPA = EPA Emission Factor as stated in AP-42
MB = Material Balance
TM = Test Measurement based upon test data submittal
O = other (describe)

9. **Proposed Monitoring, Recordkeeping, Reporting, and Testing** Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.	
MONITORING None Proposed	RECORDKEEPING Track Daily and Yearly Throughput
REPORTING None Proposed	TESTING None Proposed

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

This is a loading rack system which has not been selected. Manufacturer's operating ranges and maintenance procedures will be followed as recommended.

EMISSIONS UNIT DATA SHEET
STORAGE TANKS

Provide the following information for each new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT **www.epa.gov/tnn/tanks.html**), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (**http://www.epa.gov/tnn/chief/**).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name LPG Storage Area	2. Tank Name TK4 and TK5 (2 identical tanks)
3. Tank Equipment Identification No. (as assigned on *Equipment List Form*) TK4 and TK5 (2 identical tanks)	4. Emission Point Identification No. (as assigned on *Equipment List Form*) TK4 and TK5 (2 identical tanks)
5. Date of Commencement of Construction (for existing tanks) 2010	
6. Type of change ☒ New Construction ☐ New Stored Material ☐ Other Tank Modification	
7. Description of Tank Modification (if applicable) NA	
7A. Does the tank have more than one mode of operation? (e.g. Is there more than one product stored in the tank?) ☐ Yes ☒ No	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode). NA	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.): NA	

II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. 400 Tons LPG Spherical Tank (Ball Tank)	
9A. Tank Internal Diameter (ft) 36.75	9B. Tank Internal Height (or Length) (ft) 26.25
10A. Maximum Liquid Height (ft) 36.75	10B. Average Liquid Height (ft) 18
11A. Maximum Vapor Space Height (ft) NA	11B. Average Vapor Space Height (ft) 18
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights.	

13A. Maximum annual throughput (gal/yr)	13B. Maximum daily throughput (gal/day)
14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume)	
15. Maximum tank fill rate (gal/min) NA	
16. Tank fill method ☐ Submerged ☐ Splash ☒ Bottom Loading	
17. Complete 17A and 17B for Variable Vapor Space Tank Systems ☒ Does Not Apply	
17A. Volume Expansion Capacity of System (gal)	17B. Number of transfers into system per year

18. Type of tank (check all that apply):

☐ Fixed Roof ___ vertical ___ horizontal ___ flat roof ___ cone roof ___ dome roof ___ other (describe)

☐ External Floating Roof ___ pontoon roof ___ double deck roof

☐ Domed External (or Covered) Floating Roof

☐ Internal Floating Roof ___ vertical column support ___ self-supporting

☐ Variable Vapor Space ___ lifter roof ___ diaphragm

☒ Pressurized ☒ spherical ___ cylindrical

☐ Underground

☐ Other (describe)

III. TANK CONSTRUCTION & OPERATION INFORMATION (optional if providing TANKS Summary Sheets)

19. Tank Shell Construction: **(PRESURE TANK FOR LPG - NO EMISSIONS)**

☐ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☒ Other (describe) Welded

20A. Shell Color White	20B. Roof Color White	20C. Year Last Painted New

21. Shell Condition (if metal and unlined):

☒ No Rust ☐ Light Rust ☐ Dense Rust ☐ Not applicable

22A. Is the tank heated? ☐ YES ☒ NO

22B. If YES, provide the operating temperature (°F)

22C. If YES, please describe how heat is provided to tank.

23. Operating Pressure Range (psig): Not Selected to

24. Complete the following section for **Vertical Fixed Roof Tanks** ☐ Does Not Apply

24A. For dome roof, provide roof radius (ft)

24B. For cone roof, provide slope (ft/ft)

25. Complete the following section for **Floating Roof Tanks** ☐ Does Not Apply

25A. Year Internal Floaters Installed:

25B. Primary Seal Type: (check one) ☐ Metallic (Mechanical) Shoe Seal ☐ Liquid Mounted Resilient Seal ☐ Vapor Mounted Resilient Seal ☐ Other (describe):

25C. Is the Floating Roof equipped with a Secondary Seal? ☐ YES ☐ NO

25D. If YES, how is the secondary seal mounted? (check one) ☐ Shoe ☐ Rim ☐ Other (describe):

25E. Is the Floating Roof equipped with a weather shield? ☐ YES ☐ NO

25F. Describe deck fittings; indicate the number of each type of fitting: Tank Not Selected		
ACCESS HATCH		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:
AUTOMATIC GAUGE FLOAT WELL		
BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:
COLUMN WELL		
BUILT-UP COLUMN – SLIDING COVER, GASKETED:	BUILT-UP COLUMN – SLIDING COVER, UNGASKETED:	PIPE COLUMN – FLEXIBLE FABRIC SLEEVE SEAL:
LADDER WELL		
PIP COLUMN – SLIDING COVER, GASKETED:	PIPE COLUMN – SLIDING COVER, UNGASKETED:	
GAUGE-HATCH/SAMPLE PORT		
SLIDING COVER, GASKETED:	SLIDING COVER, UNGASKETED:	
ROOF LEG OR HANGER WELL		
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	SAMPLE WELL-SLIT FABRIC SEAL (10% OPEN AREA)
VACUUM BREAKER		
WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	
RIM VENT		
WEIGHTED MECHANICAL ACTUATION GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	
DECK DRAIN (3-INCH DIAMETER)		
OPEN:	90% CLOSED:	
STUB DRAIN		
1-INCH DIAMETER:		
OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY)		

26. Complete the following section for Internal Floating Roof Tanks ☒ Does Not Apply			
26A. Deck Type: ☐ Bolted ☐ Welded			
26B. For Bolted decks, provide deck construction:			
26C. Deck seam: ☐ Continuous sheet construction 5 feet wide ☐ Continuous sheet construction 6 feet wide ☐ Continuous sheet construction 7 feet wide ☐ Continuous sheet construction 5 × 7.5 feet wide ☐ Continuous sheet construction 5 × 12 feet wide ☐ Other (describe)			
26D. Deck seam length (ft)		26E. Area of deck (ft^2)	
For column supported tanks: 26F. Number of columns:		26G. Diameter of each column:	

IV. SITE INFORMANTION (optional if providing TANKS Summary Sheets)

27. Provide the city and state on which the data in this section are based.
28. Daily Average Ambient Temperature (°F)
29. Annual Average Maximum Temperature (°F)
30. Annual Average Minimum Temperature (°F)
31. Average Wind Speed (miles/hr)
32. Annual Average Solar Insulation Factor (BTU/(ft^2·day))
33. Atmospheric Pressure (psia)

V. LIQUID INFORMATION (optional if providing TANKS Summary Sheets)

34. Average daily temperature range of bulk liquid:	
34A. Minimum (°F)	34B. Maximum (°F)
35. Average operating pressure range of tank:	
35A. Minimum (psig)	35B. Maximum (psig)
36A. Minimum Liquid Surface Temperature (°F)	36B. Corresponding Vapor Pressure (psia)
37A. Average Liquid Surface Temperature (°F)	37B. Corresponding Vapor Pressure (psia)
38A. Maximum Liquid Surface Temperature (°F)	38B. Corresponding Vapor Pressure (psia)

39. Provide the following for each liquid or gas to be stored in tank. Add additional pages if necessary.

39A. Material Name or Composition	LPG		
39B. CAS Number			
39C. Liquid Density (lb/gal)			
39D. Liquid Molecular Weight (lb/lb-mole)			
39E. Vapor Molecular Weight (lb/lb-mole)			

Maximum Vapor Pressure 39F. True (psia) 39G. Reid (psia)			
Months Storage per Year 39H. From 39I. To			

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply): ☐ Does Not Apply

- ☐ Carbon Adsorption[1]
- ☐ Condenser[1]
- ☐ Conservation Vent (psig)
  - Vacuum Setting　　Pressure Setting
- ☒ Emergency Relief Valve (psig)
- ☐ Inert Gas Blanket of
- ☐ Insulation of Tank with
- ☐ Liquid Absorption (scrubber)[1]
- ☐ Refrigeration of Tank
- ☐ Rupture Disc (psig)
- ☐ Vent to Incinerator[1]
- ☐ Other[1] (describe):

[1] Complete appropriate Air Pollution Control Device Sheet.

41. Expected Emission Rate (submit Test Data or Calculations here or elsewhere in the application).

Material Name & CAS No.	Breathing Loss (lb/hr)	Working Loss		Annual Loss (lb/yr)	Estimation Method[1]
		Amount	Units		
LPG	Pressure tank with no emissions anticipated.				

[1] EPA = EPA Emission Factor, MB = Material Balance, SS = Similar Source, ST = Similar Source Test, Throughput Data, O = Other (specify)

☐ Remember to attach emissions calculations, including TANKS Summary Sheets if applicable.

EMISSIONS UNIT DATA SHEET
STORAGE TANKS

Provide the following information for <u>each</u> new or modified bulk liquid storage tank as shown on the *Equipment List Form* and other parts of this application. A tank is considered modified if the material to be stored in the tank is different from the existing stored liquid.

IF USING US EPA'S TANKS EMISSION ESTIMATION PROGRAM (AVAILABLE AT **www.epa.gov/tnn/tanks.html**), APPLICANT MAY ATTACH THE SUMMARY SHEETS IN LIEU OF COMPLETING SECTIONS III, IV, & V OF THIS FORM. HOWEVER, SECTIONS I, II, AND VI OF THIS FORM MUST BE COMPLETED. US EPA'S AP-42, SECTION 7.1, "ORGANIC LIQUID STORAGE TANKS," MAY ALSO BE USED TO ESTIMATE VOC AND HAP EMISSIONS (**http://www.epa.gov/tnn/chief/**).

I. GENERAL INFORMATION (required)

1. Bulk Storage Area Name Sulfure Storage Tank	2. Tank Name Liquid Sulfur Storage Tank
3. Tank Equipment Identification No. (as assigned on *Equipment List Form*) TK7	4. Emission Point Identification No. (as assigned on *Equipment List Form*) TK7
5. Date of Commencement of Construction (for existing tanks)	
6. Type of change ☒ New Construction ☐ New Stored Material ☐ Other Tank Modification	
7. Description of Tank Modification (if applicable) NA	
7A. Does the tank have more than one mode of operation? (e.g. Is there more than one product stored in the tank?) ☐ Yes ☒ No	
7B. If YES, explain and identify which mode is covered by this application (Note: A separate form must be completed for each mode).	
7C. Provide any limitations on source operation affecting emissions, any work practice standards (e.g. production variation, etc.):	

II. TANK INFORMATION (required)

8. Design Capacity (specify barrels or gallons). Use the internal cross-sectional area multiplied by internal height. SPECIFICATIONS FOR THIS TANK ARE NOT FINALIZED.	
9A. Tank Internal Diameter (ft)	9B. Tank Internal Height (or Length) (ft)
10A. Maximum Liquid Height (ft)	10B. Average Liquid Height (ft)
11A. Maximum Vapor Space Height (ft)	11B. Average Vapor Space Height (ft)
12. Nominal Capacity (specify barrels or gallons). This is also known as "working volume" and considers design liquid levels and overflow valve heights. 128,475 gallons.	

13A. Maximum annual throughput (gal/yr) 3,416,400	13B. Maximum daily throughput (gal/day) 9,360

14. Number of Turnovers per year (annual net throughput/maximum tank liquid volume) 25

15. Maximum tank fill rate (gal/min)

16. Tank fill method ☐ Submerged ☐ Splash ☒ Bottom Loading

17. Complete 17A and 17B for Variable Vapor Space Tank Systems ☐ Does Not Apply

17A. Volume Expansion Capacity of System (gal) NA	17B. Number of transfers into system per year NA

18. Type of tank (check all that apply):

☒ Fixed Roof X vertical ___ horizontal ___ flat roof ___ cone roof ___ dome roof ___ other (describe)

☐ External Floating Roof ___ pontoon roof ___ double deck roof

☐ Domed External (or Covered) Floating Roof

☐ Internal Floating Roof ___ vertical column support ___ self-supporting

☐ Variable Vapor Space ___ lifter roof ___ diaphragm

☐ Pressurized ___ spherical ___ cylindrical

☐ Underground

☐ Other (describe)

III. TANK CONSTRUCTION & OPERATION INFORMATION (optional if providing TANKS Summary Sheets)

19. Tank Shell Construction: Tank construction will be appropriate for liquid sulfur storage.

☐ Riveted ☐ Gunite lined ☐ Epoxy-coated rivets ☐ Other (describe)

20A. Shell Color	20B. Roof Color	20C. Year Last Painted

21. Shell Condition (if metal and unlined): New tank.

☐ No Rust ☐ Light Rust ☐ Dense Rust ☐ Not applicable

22A. Is the tank heated? ☒ YES ☐ NO

22B. If YES, provide the operating temperature (°F) ~250

22C. If YES, please describe how heat is provided to tank. Electrical or steam.

23. Operating Pressure Range (psig): Ambient

24. Complete the following section for **Vertical Fixed Roof Tanks** ☐ Does Not Apply

24A. For dome roof, provide roof radius (ft) NA

24B. For cone roof, provide slope (ft/ft) NA

25. Complete the following section for **Floating Roof Tanks** ☒ Does Not Apply

25A. Year Internal Floaters Installed:

25B. Primary Seal Type: (check one) ☐ Metallic (Mechanical) Shoe Seal ☐ Liquid Mounted Resilient Seal ☐ Vapor Mounted Resilient Seal ☐ Other (describe):

25C. Is the Floating Roof equipped with a Secondary Seal? ☐ YES ☐ NO

25D. If YES, how is the secondary seal mounted? (check one) ☐ Shoe ☐ Rim ☐ Other (describe):

25E. Is the Floating Roof equipped with a weather shield? ☐ YES ☐ NO

25F. Describe deck fittings; indicate the number of each type of fitting:

ACCESS HATCH

BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:

AUTOMATIC GAUGE FLOAT WELL

BOLT COVER, GASKETED:	UNBOLTED COVER, GASKETED:	UNBOLTED COVER, UNGASKETED:

COLUMN WELL

BUILT-UP COLUMN – SLIDING COVER, GASKETED:	BUILT-UP COLUMN – SLIDING COVER, UNGASKETED:	PIPE COLUMN – FLEXIBLE FABRIC SLEEVE SEAL:

LADDER WELL

PIP COLUMN – SLIDING COVER, GASKETED:	PIPE COLUMN – SLIDING COVER, UNGASKETED:

GAUGE-HATCH/SAMPLE PORT

SLIDING COVER, GASKETED:	SLIDING COVER, UNGASKETED:

ROOF LEG OR HANGER WELL

WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:	SAMPLE WELL-SLIT FABRIC SEAL (10% OPEN AREA)

VACUUM BREAKER

WEIGHTED MECHANICAL ACTUATION, GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:

RIM VENT

WEIGHTED MECHANICAL ACTUATION GASKETED:	WEIGHTED MECHANICAL ACTUATION, UNGASKETED:

DECK DRAIN (3-INCH DIAMETER)

OPEN:	90% CLOSED:

STUB DRAIN

1-INCH DIAMETER:

OTHER (DESCRIBE, ATTACH ADDITIONAL PAGES IF NECESSARY)

26. Complete the following section for Internal Floating Roof Tanks ☐ Does Not Apply	
26A. Deck Type: ☐ Bolted ☐ Welded	
26B. For Bolted decks, provide deck construction:	
26C. Deck seam: ☐ Continuous sheet construction 5 feet wide ☐ Continuous sheet construction 6 feet wide ☐ Continuous sheet construction 7 feet wide ☐ Continuous sheet construction 5 × 7.5 feet wide ☐ Continuous sheet construction 5 × 12 feet wide ☐ Other (describe)	
26D. Deck seam length (ft)	26E. Area of deck (ft^2)
For column supported tanks: 26F. Number of columns:	26G. Diameter of each column:

IV. SITE INFORMANTION (optional if providing TANKS Summary Sheets)

27. Provide the city and state on which the data in this section are based. Charleston, West Virginia	
28. Daily Average Ambient Temperature (°F)	54.9
29. Annual Average Maximum Temperature (°F)	65.8
30. Annual Average Minimum Temperature (°F)	44.1
31. Average Wind Speed (miles/hr)	6.0
32. Annual Average Solar Insulation Factor (BTU/(ft^2·day))	
33. Atmospheric Pressure (psia)	

V. LIQUID INFORMATION (optional if providing TANKS Summary Sheets)

34. Average daily temperature range of bulk liquid: 260F controlled heated tank.	
34A. Minimum (°F) 260	34B. Maximum (°F) 260
35. Average operating pressure range of tank: Ambient	
35A. Minimum (psig)	35B. Maximum (psig)
36A. Minimum Liquid Surface Temperature (°F)	36B. Corresponding Vapor Pressure (psia)
37A. Average Liquid Surface Temperature (°F)	37B. Corresponding Vapor Pressure (psia)
38A. Maximum Liquid Surface Temperature (°F)	38B. Corresponding Vapor Pressure (psia)

39. Provide the following for <u>each</u> liquid or gas to be stored in tank. Add additional pages if necessary.

39A. Material Name or Composition	Molten Sulfur		
39B. CAS Number	7704-34-9		
39C. Liquid Density (lb/gal)	17.16		
39D. Liquid Molecular Weight (lb/lb-mole)	32 (Sulfur)		
39E. Vapor Molecular Weight (lb/lb-mole)	34 (H_2S)		

Maximum Vapor Pressure 39F. True (psia) 39G. Reid (psia)	1mm Hg @ 362°F		
Months Storage per Year 39H. From 39I. To	Stored Year Round		

VI. EMISSIONS AND CONTROL DEVICE DATA (required)

40. Emission Control Devices (check as many as apply): ☒ Does Not Apply

- ☐ Carbon Adsorption[1]
- ☐ Condenser[1]
- ☒ Conservation Vent (psig)

  Vacuum Setting NA Pressure Setting NA
- ☐ Emergency Relief Valve (psig)
- ☐ Inert Gas Blanket of
- ☐ Insulation of Tank with
- ☐ Liquid Absorption (scrubber)[1]
- ☐ Refrigeration of Tank
- ☐ Rupture Disc (psig)
- ☐ Vent to Incinerator[1]
- ☐ Other[1] (describe):

[1] Complete appropriate Air Pollution Control Device Sheet

41. Expected Emission Rate (submit Test Data or Calculations here or elsewhere in the application).

Material Name & CAS No.	Breathing Loss (lb/hr)	Working Loss		Annual Loss (lb/yr)	Estimation Method[1]
		Amount	Units		
Hydrogen Sulfide 7783-06-4	0.017 lbs/ hour			145.05	EE

[1] EPA = EPA Emission Factor, MB = Material Balance, SS = Similar Source, ST = Similar Source Test, Throughput Data, O = Other (specify)

☐ Remember to attach emissions calculations, including TANKS Summary Sheets if applicable.

FUGITIVE EMISSIONS FROM PAVED HAULROADS

INDUSTRIAL PAVED HAULROADS (including all equipment traffic involved in process, haul trucks, endloaders, etc.)

I =	Industrial augmentation factor (dimensionless)	See Emissions Estimates in Section N
n =	Number of traffic lanes	
s =	Surface material silt content (%)	
L =	Surface dust loading (lb/mile)	

Item Number	Description	Mean Vehicle Weight (tons)	Miles per Trip	Maximum Trips per Hour	Maximum Trips per Year	Control Device ID Number	Control Efficiency (%)
1	Coal In	40	0.11	15	126,290	WC/85	70
2	Limestone In	40	0.11	5	6,935	WC/85	70
3	Ash Out	40	0.11	9	27,740	WC/85	70
4	Sulfur Out/Misc. Trucking (in and out)	40	0.45	2	9,428	WC/85	70
5							
6							
7							
8							

Source: *AP-42 Fifth Edition – 11.2.6 Industrial Paved Roads*

$E = 0.077 \times I \times (4 \div n) \times (s \div 10) \times (L \div 1000) \times (W \div 3)^{0.7} =$ lb/Vehicle Mile Traveled (VMT)

Where:

I =	Industrial augmentation factor (dimensionless)	See Emissions Estimates in Section N
n =	Number of traffic lanes	
s =	Surface meterial silt content (%)	
L =	Surface dust loading (lb/mile)	
W =	Average vehicle weight (tons)	

For lb/hr: [lb ÷ VMT] × [VMT ÷ trip] × [Trips ÷ Hour] = lb/hr

For TPY: [lb ÷ VMT] × [VMT ÷ trip] × [Trips ÷ Hour] × [Ton ÷ 2000 lb] = Tons/year

SUMMARY OF PAVED HAULROAD EMISSIONS

Item No.	Uncontrolled (PM/PM10) lb/hr	Uncontrolled (PM/PM10) TPY	Controlled (PM/PM10) lb/hr	Controlled (PM/PM10) TPY
1	14.47/2.82	60.92/11.88	2.17/0.42	9.14/1.78
2	4.82/0.94	3.35/0.65	0.72/0.14	0.50/0.10
3	8.68/1.69	13.38/2.61	1.30/0.25	2.01/0.39
4	7.89/1.54	18.60/3.63	1.18/0.23	2.79/0.54
5				
6				
7				
8				
TOTALS	35.86/6.99	96.25/18.77	5.37/1.04	14.44/2.81

ATTACHMENT M

AIR POLLUTION CONTROL DEVICE(S)

Attachment M
Air Pollution Control Device Sheet
(FLARE SYSTEM)

Control Device ID No. (must match Emission Units Table): FL

Equipment Information

1. Manufacturer: Manufacturer Not Selected (G) Model No.	2. Method: ☒ Elevated flare ☐ Ground flare ☐ Other Describe
3. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency. Manufacturer Not Selected	
4. Method of system used: ☐ Steam-assisted ☐ Air-assisted ☐ Pressure-assisted ☒ Non-assisted	
5. Maximum capacity of flare: NA scf/min scf/hr	6. Dimensions of stack: NA Diameter ft. Height ft.
7. Estimated combustion efficiency: (Waste gas destruction efficiency) Estimated: 98 % Minimum guaranteed: 98 %	8. Fuel used in burners: ☒ Natural Gas ☐ Fuel Oil, Number ☐ Other, Specify:
9. Number of burners: Rating: BTU/hr	11. Describe method of controlling flame:
10. Will preheat be used? ☐ Yes ☒ No	
12. Flare height: ft	14. Natural gas flow rate to flare pilot flame per pilot light: scf/min scf/hr
13. Flare tip inside diameter: ft	
15. Number of pilot lights: Total BTU/hr	16. Will automatic re-ignition be used? ☐ Yes ☐ No
17. If automatic re-ignition will be used, describe the method:	
18. Is pilot flame equipped with a monitor? ☒ Yes ☐ No If yes, what type? ☒ Thermocouple ☐ Infra-Red ☐ Ultra Violet ☐ Camera with monitoring control room ☐ Other, Describe:	
19. Hours of unit operation per year: 8,760	

Steam Injection

20. Will steam injection be used? ☐ Yes ☐ No	21. Steam pressure PSIG Minimum Expected: Design Maximum:
22. Total Steam flow rate: LB/hr	23. Temperature: °F
24. Velocity ft/sec	25. Number of jet streams
26. Diameter of steam jets: in	27. Design basis for steam injected: LB steam/LB hydrocarbon
28. How will steam flow be controlled if steam injection is used?	

Characteristics of the Waste Gas Stream to be Burned

29. Name	Quantity Grains of $H_2S/100\ ft^3$	Quantity (LB/hr, ft^3/hr, etc)	Source of Material

30. Estimate total combustible to flare: LB/hr or ACF/hr (Maximum mass flow rate of waste gas) scfm	
31. Estimated total flow rate to flare including materials to be burned, carrier gases, auxiliary fuel, etc.: LB/hr or ACF/hr	
32. Give composition of carrier gases:	
33. Temperature of emission stream: °F Heating value of emission stream: BTU/ft^3 Mean molecular weight of emission stream: MW = lb/lb-mole	34. Identify and describe all auxiliary fuels to be burned. BTU/scf BTU/scf BTU/scf BTU/scf
35. Temperature of flare gas: °F	36. Flare gas flow rate: scf/min
37. Flare gas heat content: BTU/ft^3	38. Flare gas exit velocity: scf/min
39. Maximum rate during emergency for one major piece of equipment or process unit: scf/min	
40. Maximum rate during emergency for one major piece of equipment or process unit: BTU/min	
41. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):	
42. Describe the collection material disposal system:	
43. Have you included ***Flare Control Device*** in the Emissions Points Data Summary Sheet?	

44. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING:	RECORDKEEPING:
Monitor the emission point for opacity via Method 9 and Method 22.	Recordkeeping as required in 60.18.
REPORTING: None Proposed	TESTING: None Proposed

MONITORING:	Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.

45. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.
Capture efficiency is based on facility design and is anticipated to be 100% for vents and emission sources that are vented to the flare.

46. Manufacturer's Guaranteed Control Efficiency for each air pollutant.
98%

47. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.
This unit is specifically designed for each process and the final design has not been completed. Operating ranges and maintenance procedures will be identified during final design or purchase of the flare system. The procedures as identified will be followed.

Attachment M
Air Pollution Control Device Sheet
(CONDENSER SYSTEM)

Control Device ID No. (must match Emission Units Table): _LR1 and LR2

Equipment Information and Filter Characteristics

1. Manufacturer: Not Selected Model No.	2. Method: ☐ Pressure condensation ☐ Temperature condensation ☐ Surface ☐ Contact ☐ Other, specify
3. Control Device Name: VR	
4. Provide diagram of condenser: Manufacturer not Selected	
5. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
6. Heat exchanger area: NA (Not Available) ft^3	7. Reported removal efficiency: 99 %
8. Coolant Used: NA	9. Refrigeration capacity: Ref. NA tons
10. Composition of coolant: NA	11. Internal operating temperature: NA °F
12. Specific heat of coolant: NA BTU/lb.°F, at 77°F	13. Temperature of condensation: NA °F
Average Operation:	**Maximum Operation:**
14. Coolant Temperature: NA Inlet: °F Outlet: °F	15. Coolant Temperature: NA Inlet: °F Outlet: °F
16. Gas Temperature: NA Inlet: °F Outlet: °F	17. Gas Temperature: NA Inlet: °F Outlet: °F
18. Gas flow rate: NA ft^3/min	19. Gas flow rate: ft^3/min
20. Coolant flow rate per condenser: NA Type: Water: gal/min Air: ft^3/min Other: lb/hour	21. Coolant flow rate per condenser: NA Type: Water: gal/min Air: ft^3/min Other: lb/hour
22. Efficiency of condenser: 99 %	23. Efficiency of condenser: 99 %
24. Condenser surface area: NA ft^2	25. Condenser surface area: NA ft^2

26. Pollutant	Guaranteed Minimum Control Efficiency %	Concentration ppmv	Specific Heat BTU/lb-mol °F	Heat of Vaporation BTU/lb-mol
A VOC	99	NA	NA	NA
B				
C				
D				
E				
F				
G				
Total Concentration in ppmv				

Emission Gas (Vapor) Stream

27. Before Condenser NA

Inlet vapor flow rate: ft^3/min

Influent vapor temperature: °F

Effluent vapor temperature: °F

28. After Condenser NA

Inlet vapor flow rate: ft^3/min

Influent vapor temperature: °F

Effluent vapor temperature: °F

29. Pollutant	INLET			OUTLET		
	Vapor Pressure	Condensation Temperature	Rate lb/hr	Rate lb/hr	Vapor Pressure	Condensation Temperature
A VOC	6.347	65	NA	NA	6.347	NA
B						
C						
D						
E						
F						
G						
Total of the POLLUTANT lb/hr						

30. Moisture content: NA%

31. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):
Manufacturer not Selected

32. Describe the collection material disposal system:
Material will be returned to tanks.

33. Have you included ***Condenser Control Device*** in the Emissions Points Data Summary Sheet?

34. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING: None Proposed	RECORDKEEPING: Record operating times.
REPORTING: None Proposed	TESTING: None Proposed

MONITORING: Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.

RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring.

REPORTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.

TESTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.

35. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.
Manufacturer not Selected, Estimated at 99% for VOC

36. Manufacturer's Guaranteed Control Efficiency for each air pollutant.
Manufacturer not Selected, Estimated at 99% for VOC

37. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.
Manufacturer not Selected. Manufacturer operating ranges and maintenance procedures will be followed are required by manufacturer.

Attachment M
Air Pollution Control Device Sheet
(BAGHOUSE)

Control Device ID No. (must match Emission Units Table): BH1 through BH5 (For Roller Mills with Heating) Baghouse design/selection will be made to meet the controlled emissions requirements. The information contained within this form is yet to be determined.

Equipment Information and Filter Characteristics

1. Manufacturer: Manufacturer Not Selected Model No.	2. Total number of compartments: NA 3. Number of compartment online for normal operation: NA
4. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
5. Baghouse Configuration: (check one) ☐ Open Pressure ☐ Closed Pressure ☐ Closed Suction ☐ Electrostatically Enhanced Fabric ☐ Other, Specify	
6. Filter Fabric Bag Material: ☐ Nomex nylon ☐ Wool ☐ Polyester ☐ Polypropylene ☐ Acrylics ☐ Ceramics ☐ Fiber Glass ☐ Cotton Weight oz./sq.yd ☐ Teflon Thickness in ☐ Others, specify	7. Bag Dimension: Diameter in. Length ft. 8. Total cloth area: ft^2 9. Number of bags: 10. Operating air to cloth ratio: ft/min
11. Baghouse Operation: ☐ Continuous ☐ Automatic ☐ Intermittent	
12. Method used to clean bags: ☐ Mechanical Shaker ☐ Sonic Cleaning ☐ Reverse Air Jet ☐ Pneumatic Shaker ☐ Reverse Air Flow ☐ Other: ☐ Bag Collapse ☐ Pulse Jet ☐ Manual Cleaning ☐ Reverse Jet	
13. Cleaning initiated by: ☐ Timer ☐ Frequency if timer actuated ☐ Expected pressure drop range in. of water ☐ Other	
14. Operation Hours: Max. per day: Max. per yr:	15. Collection efficiency: Rating: % Guaranteed minimum: %

Gas Stream Characteristics

16. Gas flow rate into the collector: ACFM at °F and PSIA ACFM: Design: PSIA Maximum: PSIA Average Expected: PSIA	
17. Water Vapor Content of Effluent Stream: lb. Water/lb. Dry Air	
18. Gas Stream Temperature: °F	19. Fan Requirements: hp OR ft^3/min
20. Stabilized static pressure loss across baghouse. Pressure Drop: High in. H_2O Low in. H_2O	
21. Particulate Loading: Inlet: grain/scf Outlet: grain/scf	

22. Type of Pollutant(s) to be collected (if particulate give specific type):

23. Is there any SO_3 in the emission stream? ☐ No ☐ Yes SO_3 content: ppmv

24. Emission rate of pollutant (specify) into and out of collector at maximum design operating conditions:

Pollutant	IN		OUT	
	lb/hr	**grains/acf**	**lb/hr**	**grains/acf**

25. Complete the table:

Particulate Size Range (microns)	**Particle Size Distribution at Inlet to Collector** **Weight % for Size Range**	**Fraction Efficiency of Collector** **Weight % for Size Range**
0 – 2		
2 – 4		
4 – 6		
6 – 8		
8 – 10		
10 – 12		
12 – 16		
16 – 20		
20 – 30		
30 – 40		
40 – 50		
50 – 60		
60 – 70		
70 – 80		
80 – 90		
90 – 100		
>100		

26. How is filter monitored for indications of deterioration (e.g., broken bags)? ☐ Continuous Opacity ☐ Pressure Drop ☐ Alarms-Audible to Process Operator ☐ Visual opacity readings, Frequency: ☐ Other, specify:
27. Describe any recording device and frequency of log entries:
28. Describe any filter seeding being performed:
29. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):
30. Describe the collection material disposal system:
31. Have you included ***Baghouse Control Device*** in the Emissions Points Data Summary Sheet?

32. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING:	RECORDKEEPING:
REPORTING:	TESTING:

MONITORING: Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.

RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring.

REPORTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.

TESTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.

33. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.

34. Manufacturer's Guaranteed Control Efficiency for each air pollutant.

35. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.

Attachment M
Air Pollution Control Device Sheet
(BAGHOUSE)

Control Device ID No. (must match Emission Units Table): BH6 and BH13 (For Feed Dust Bunkers) Baghouse design/selection will be made to meet the controlled emissions requirements. The information contained within this form is yet to be determined.

Equipment Information and Filter Characteristics

1. Manufacturer: Manufacturer Not Selected Model No.	2. Total number of compartments: NA 3. Number of compartment online for normal operation: NA
4. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
5. Baghouse Configuration: (check one) ☐ Open Pressure ☐ Closed Pressure ☐ Closed Suction ☐ Electrostatically Enhanced Fabric ☐ Other, Specify	
6. Filter Fabric Bag Material: ☐ Nomex nylon ☐ Wool ☐ Polyester ☐ Polypropylene ☐ Acrylics ☐ Ceramics ☐ Fiber Glass ☐ Cotton Weight oz./sq.yd ☐ Teflon Thickness in ☐ Others, specify	7. Bag Dimension: Diameter in. Length ft. 8. Total cloth area: ft^2 9. Number of bags: 10. Operating air to cloth ratio: ft/min
11. Baghouse Operation: ☐ Continuous ☐ Automatic ☐ Intermittent	
12. Method used to clean bags: ☐ Mechanical Shaker ☐ Sonic Cleaning ☐ Reverse Air Jet ☐ Pneumatic Shaker ☐ Reverse Air Flow ☐ Other: ☐ Bag Collapse ☐ Pulse Jet ☐ Manual Cleaning ☐ Reverse Jet	
13. Cleaning initiated by: ☐ Timer ☐ Frequency if timer actuated ☐ Expected pressure drop range in. of water ☐ Other	
14. Operation Hours: Max. per day: Max. per yr:	15. Collection efficiency: Rating: % Guaranteed minimum: %

Gas Stream Characteristics

16. Gas flow rate into the collector: ACFM at °F and PSIA ACFM: Design: PSIA Maximum: PSIA Average Expected: PSIA	
17. Water Vapor Content of Effluent Stream: lb. Water/lb. Dry Air	
18. Gas Stream Temperature: °F	19. Fan Requirements: hp OR ft^3/min
20. Stabilized static pressure loss across baghouse. Pressure Drop: High in. H_2O Low in. H_2O	
21. Particulate Loading: Inlet: grain/scf Outlet: grain/scf	

22. Type of Pollutant(s) to be collected (if particulate give specific type):

23. Is there any SO_3 in the emission stream? ☐ No ☐ Yes SO_3 content: ppmv

24. Emission rate of pollutant (specify) into and out of collector at maximum design operating conditions:

Pollutant	IN		OUT	
	lb/hr	grains/acf	lb/hr	grains/acf

25. Complete the table:

Particulate Size Range (microns)	Particle Size Distribution at Inlet to Collector Weight % for Size Range	Fraction Efficiency of Collector Weight % for Size Range
0 – 2		
2 – 4		
4 – 6		
6 – 8		
8 – 10		
10 – 12		
12 – 16		
16 – 20		
20 – 30		
30 – 40		
40 – 50		
50 – 60		
60 – 70		
70 – 80		
80 – 90		
90 – 100		
>100		

26. How is filter monitored for indications of deterioration (e.g., broken bags)? ☐ Continuous Opacity ☐ Pressure Drop ☐ Alarms-Audible to Process Operator ☐ Visual opacity readings, Frequency: ☐ Other, specify:
27. Describe any recording device and frequency of log entries:
28. Describe any filter seeding being performed:
29. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):
30. Describe the collection material disposal system:
31. Have you included ***Baghouse Control Device*** in the Emissions Points Data Summary Sheet?

32. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING:	RECORDKEEPING:
REPORTING:	TESTING:

MONITORING: Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.

RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring.

REPORTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.

TESTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.

33. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.

34. Manufacturer's Guaranteed Control Efficiency for each air pollutant.

35. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.

Attachment M
Air Pollution Control Device Sheet
(BAGHOUSE)

Control Device ID No. (must match Emission Units Table): BH7-12 and BH14-19 (For Lock Hoppers) Baghouse design/selection will be made to meet the controlled emissions requirements. The information contained within this form is yet to be determined.

Equipment Information and Filter Characteristics

1. Manufacturer: Manufacturer Not Selected Model No.	2. Total number of compartments: NA 3. Number of compartment online for normal operation: NA
4. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
5. Baghouse Configuration: (check one) ☐ Open Pressure ☐ Closed Pressure ☐ Closed Suction ☐ Electrostatically Enhanced Fabric ☐ Other, Specify	
6. Filter Fabric Bag Material: ☐ Nomex nylon ☐ Wool ☐ Polyester ☐ Polypropylene ☐ Acrylics ☐ Ceramics ☐ Fiber Glass ☐ Cotton Weight oz./sq.yd ☐ Teflon Thickness in ☐ Others, specify	7. Bag Dimension: Diameter in. Length ft. 8. Total cloth area: ft^2 9. Number of bags: 10. Operating air to cloth ratio: ft/min
11. Baghouse Operation: ☐ Continuous ☐ Automatic ☐ Intermittent	
12. Method used to clean bags: ☐ Mechanical Shaker ☐ Sonic Cleaning ☐ Reverse Air Jet ☐ Pneumatic Shaker ☐ Reverse Air Flow ☐ Other: ☐ Bag Collapse ☐ Pulse Jet ☐ Manual Cleaning ☐ Reverse Jet	
13. Cleaning initiated by: ☐ Timer ☐ Frequency if timer actuated ☐ Expected pressure drop range in. of water ☐ Other	
14. Operation Hours: Max. per day: Max. per yr:	15. Collection efficiency: Rating: % Guaranteed minimum: %

Gas Stream Characteristics

16. Gas flow rate into the collector: ACFM at °F and PSIA ACFM: Design: PSIA Maximum: PSIA Average Expected: PSIA	
17. Water Vapor Content of Effluent Stream: lb. Water/lb. Dry Air	
18. Gas Stream Temperature: °F	19. Fan Requirements: hp OR ft^3/min
20. Stabilized static pressure loss across baghouse. Pressure Drop: High in. H_2O Low in. H_2O	
21. Particulate Loading: Inlet: grain/scf Outlet: grain/scf	

22. Type of Pollutant(s) to be collected (if particulate give specific type):

23. Is there any SO_3 in the emission stream? ☐ No ☐ Yes SO_3 content: ppmv

24. Emission rate of pollutant (specify) into and out of collector at maximum design operating conditions:

Pollutant	IN		OUT	
	lb/hr	grains/acf	lb/hr	grains/acf

25. Complete the table:

	Particle Size Distribution at Inlet to Collector	Fraction Efficiency of Collector
Particulate Size Range (microns)	Weight % for Size Range	Weight % for Size Range
0 – 2		
2 – 4		
4 – 6		
6 – 8		
8 – 10		
10 – 12		
12 – 16		
16 – 20		
20 – 30		
30 – 40		
40 – 50		
50 – 60		
60 – 70		
70 – 80		
80 – 90		
90 – 100		
>100		

26. How is filter monitored for indications of deterioration (e.g., broken bags)? ☐ Continuous Opacity ☐ Pressure Drop ☐ Alarms-Audible to Process Operator ☐ Visual opacity readings, Frequency: ☐ Other, specify:
27. Describe any recording device and frequency of log entries:
28. Describe any filter seeding being performed:
29. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):
30. Describe the collection material disposal system:
31. Have you included ***Baghouse Control Device*** in the Emissions Points Data Summary Sheet?

32. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING:	RECORDKEEPING:
REPORTING:	TESTING:

MONITORING:	Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.

33. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.

34. Manufacturer's Guaranteed Control Efficiency for each air pollutant.

35. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.

Attachment M
Air Pollution Control Device Sheet
(BAGHOUSE)

Control Device ID No. (must match Emission Units Table): VF1-10 (For Feed Bunkers) Baghouse design/selection will be made to meet the controlled emissions requirements. The information contained within this form is yet to be determined.

Equipment Information and Filter Characteristics

1. Manufacturer: Manufacturer Not Selected Model No.	2. Total number of compartments: NA 3. Number of compartment online for normal operation: NA
4. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
5. Baghouse Configuration: (check one) ☐ Open Pressure ☐ Closed Pressure ☐ Closed Suction ☐ Electrostatically Enhanced Fabric ☐ Other, Specify	
6. Filter Fabric Bag Material: ☐ Nomex nylon ☐ Wool ☐ Polyester ☐ Polypropylene ☐ Acrylics ☐ Ceramics ☐ Fiber Glass ☐ Cotton Weight oz./sq.yd ☐ Teflon Thickness in ☐ Others, specify	7. Bag Dimension: Diameter in. Length ft. 8. Total cloth area: ft^2 9. Number of bags: 10. Operating air to cloth ratio: ft/min
11. Baghouse Operation: ☐ Continuous ☐ Automatic ☐ Intermittent	
12. Method used to clean bags: ☐ Mechanical Shaker ☐ Sonic Cleaning ☐ Reverse Air Jet ☐ Pneumatic Shaker ☐ Reverse Air Flow ☐ Other: ☐ Bag Collapse ☐ Pulse Jet ☐ Manual Cleaning ☐ Reverse Jet	
13. Cleaning initiated by: ☐ Timer ☐ Frequency if timer actuated ☐ Expected pressure drop range in. of water ☐ Other	
14. Operation Hours: Max. per day: Max. per yr:	15. Collection efficiency: Rating: % Guaranteed minimum: %

Gas Stream Characteristics

16. Gas flow rate into the collector: ACFM at °F and PSIA ACFM: Design: PSIA Maximum: PSIA Average Expected: PSIA	
17. Water Vapor Content of Effluent Stream: lb. Water/lb. Dry Air	
18. Gas Stream Temperature: °F	19. Fan Requirements: hp OR ft^3/min
20. Stabilized static pressure loss across baghouse. Pressure Drop: High in. H_2O Low in. H_2O	
21. Particulate Loading: Inlet: grain/scf Outlet: grain/scf	

22. Type of Pollutant(s) to be collected (if particulate give specific type):

23. Is there any SO_3 in the emission stream? ☐ No ☐ Yes SO_3 content: ppmv

24. Emission rate of pollutant (specify) into and out of collector at maximum design operating conditions:

Pollutant	IN		OUT	
	lb/hr	grains/acf	lb/hr	grains/acf

25. Complete the table:

Particulate Size Range (microns)	Particle Size Distribution at Inlet to Collector Weight % for Size Range	Fraction Efficiency of Collector Weight % for Size Range
0 – 2		
2 – 4		
4 – 6		
6 – 8		
8 – 10		
10 – 12		
12 – 16		
16 – 20		
20 – 30		
30 – 40		
40 – 50		
50 – 60		
60 – 70		
70 – 80		
80 – 90		
90 – 100		
>100		

26. How is filter monitored for indications of deterioration (e.g., broken bags)? ☐ Continuous Opacity ☐ Pressure Drop ☐ Alarms-Audible to Process Operator ☐ Visual opacity readings, Frequency: ☐ Other, specify:
27. Describe any recording device and frequency of log entries:
28. Describe any filter seeding being performed:
29. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):
30. Describe the collection material disposal system:
31. Have you included ***Baghouse Control Device*** in the Emissions Points Data Summary Sheet?

32. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING:	RECORDKEEPING:
REPORTING:	TESTING:

MONITORING:	Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.

33. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.

34. Manufacturer's Guaranteed Control Efficiency for each air pollutant.

35. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.

Attachment M
Air Pollution Control Device Sheet
(BAGHOUSE)

Control Device ID No. (must match Emission Units Table): VF11-12 and VF13-14 (For Feed Bins and Startup Vessels) Baghouse design/selection will be made to meet the controlled emissions requirements. The information contained within this form is yet to be determined.

Equipment Information and Filter Characteristics

1. Manufacturer: Manufacturer Not Selected Model No.	2. Total number of compartments: NA 3. Number of compartment online for normal operation: NA
4. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
5. Baghouse Configuration: (check one) ☐ Open Pressure ☐ Closed Pressure ☐ Closed Suction ☐ Electrostatically Enhanced Fabric ☐ Other, Specify	
6. Filter Fabric Bag Material: ☐ Nomex nylon ☐ Wool ☐ Polyester ☐ Polypropylene ☐ Acrylics ☐ Ceramics ☐ Fiber Glass ☐ Cotton Weight oz./sq.yd ☐ Teflon Thickness in ☐ Others, specify	7. Bag Dimension: Diameter in. Length ft. 8. Total cloth area: ft^2 9. Number of bags: 10. Operating air to cloth ratio: ft/min
11. Baghouse Operation: ☐ Continuous ☐ Automatic ☐ Intermittent	
12. Method used to clean bags: ☐ Mechanical Shaker ☐ Sonic Cleaning ☐ Reverse Air Jet ☐ Pneumatic Shaker ☐ Reverse Air Flow ☐ Other: ☐ Bag Collapse ☐ Pulse Jet ☐ Manual Cleaning ☐ Reverse Jet	
13. Cleaning initiated by: ☐ Timer ☐ Frequency if timer actuated ☐ Expected pressure drop range in. of water ☐ Other	
14. Operation Hours: Max. per day: Max. per yr:	15. Collection efficiency: Rating: % Guaranteed minimum: %

Gas Stream Characteristics

16. Gas flow rate into the collector: ACFM at °F and PSIA ACFM: Design: PSIA Maximum: PSIA Average Expected: PSIA	
17. Water Vapor Content of Effluent Stream: lb. Water/lb. Dry Air	
18. Gas Stream Temperature: °F	19. Fan Requirements: hp OR ft^3/min
20. Stabilized static pressure loss across baghouse. Pressure Drop: High in. H_2O Low in. H_2O	
21. Particulate Loading: Inlet: grain/scf Outlet: grain/scf	

22. Type of Pollutant(s) to be collected (if particulate give specific type):

23. Is there any SO_3 in the emission stream?	☐ No	☐ Yes	SO_3 content: ppmv

24. Emission rate of pollutant (specify) into and out of collector at maximum design operating conditions:

Pollutant	IN		OUT	
	lb/hr	grains/acf	lb/hr	grains/acf

25. Complete the table:

Particulate Size Range (microns)	Particle Size Distribution at Inlet to Collector Weight % for Size Range	Fraction Efficiency of Collector Weight % for Size Range
0 – 2		
2 – 4		
4 – 6		
6 – 8		
8 – 10		
10 – 12		
12 – 16		
16 – 20		
20 – 30		
30 – 40		
40 – 50		
50 – 60		
60 – 70		
70 – 80		
80 – 90		
90 – 100		
>100		

26. How is filter monitored for indications of deterioration (e.g., broken bags)? ☐ Continuous Opacity ☐ Pressure Drop ☐ Alarms-Audible to Process Operator ☐ Visual opacity readings, Frequency: ☐ Other, specify:
27. Describe any recording device and frequency of log entries:
28. Describe any filter seeding being performed:
29. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):
30. Describe the collection material disposal system:
31. Have you included ***Baghouse Control Device*** in the Emissions Points Data Summary Sheet?

32. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING:	RECORDKEEPING:
REPORTING:	TESTING:

MONITORING:	Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.
RECORDKEEPING:	Please describe the proposed recordkeeping that will accompany the monitoring.
REPORTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.
TESTING:	Please describe any proposed emissions testing for this process equipment on air pollution control device.

33. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.

34. Manufacturer's Guaranteed Control Efficiency for each air pollutant.

35. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.

Attachment M
Air Pollution Control Device Sheet
(BAGHOUSE)

Control Device ID No. (must match Emission Units Table): BHCS1-5 and BHLS1-2 (Stockpiles) Baghouse design/selection will be made to meet the controlled emissions requirements. The information contained within this form is yet to be determined.

Equipment Information and Filter Characteristics

1. Manufacturer: Manufacturer Not Selected Model No.	2. Total number of compartments: NA 3. Number of compartment online for normal operation: NA
4. Provide diagram(s) of unit describing capture system with duct arrangement and size of duct, air volume, capacity, horsepower of movers. If applicable, state hood face velocity and hood collection efficiency.	
5. Baghouse Configuration: (check one) ☐ Open Pressure ☐ Closed Pressure ☐ Closed Suction ☐ Electrostatically Enhanced Fabric ☐ Other, Specify	
6. Filter Fabric Bag Material: ☐ Nomex nylon ☐ Wool ☐ Polyester ☐ Polypropylene ☐ Acrylics ☐ Ceramics ☐ Fiber Glass ☐ Cotton Weight oz./sq.yd ☐ Teflon Thickness in ☐ Others, specify	7. Bag Dimension: Diameter in. Length ft. 8. Total cloth area: ft^2 9. Number of bags: 10. Operating air to cloth ratio: ft/min
11. Baghouse Operation: ☐ Continuous ☐ Automatic ☐ Intermittent	
12. Method used to clean bags: ☐ Mechanical Shaker ☐ Sonic Cleaning ☐ Reverse Air Jet ☐ Pneumatic Shaker ☐ Reverse Air Flow ☐ Other: ☐ Bag Collapse ☐ Pulse Jet ☐ Manual Cleaning ☐ Reverse Jet	
13. Cleaning initiated by: ☐ Timer ☐ Frequency if timer actuated ☐ Expected pressure drop range in. of water ☐ Other	
14. Operation Hours: Max. per day: Max. per yr:	15. Collection efficiency: Rating: % Guaranteed minimum: %

Gas Stream Characteristics

16. Gas flow rate into the collector: ACFM at °F and PSIA ACFM: Design: PSIA Maximum: PSIA Average Expected: PSIA	
17. Water Vapor Content of Effluent Stream: lb. Water/lb. Dry Air	
18. Gas Stream Temperature: °F	19. Fan Requirements: hp OR ft^3/min
20. Stabilized static pressure loss across baghouse. Pressure Drop: High in. H_2O Low in. H_2O	
21. Particulate Loading: Inlet: grain/scf Outlet: grain/scf	

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22. Type of Pollutant(s) to be collected (if particulate give specific type):

23. Is there any SO_3 in the emission stream? ☐ No ☐ Yes SO_3 content: ppmv

24. Emission rate of pollutant (specify) into and out of collector at maximum design operating conditions:

Pollutant	IN		OUT	
	lb/hr	grains/acf	lb/hr	grains/acf

25. Complete the table:

Particulate Size Range (microns)	Particle Size Distribution at Inlet to Collector Weight % for Size Range	Fraction Efficiency of Collector Weight % for Size Range
0 – 2		
2 – 4		
4 – 6		
6 – 8		
8 – 10		
10 – 12		
12 – 16		
16 – 20		
20 – 30		
30 – 40		
40 – 50		
50 – 60		
60 – 70		
70 – 80		
80 – 90		
90 – 100		
>100		

26. How is filter monitored for indications of deterioration (e.g., broken bags)? ☐ Continuous Opacity ☐ Pressure Drop ☐ Alarms-Audible to Process Operator ☐ Visual opacity readings, Frequency: ☐ Other, specify:
27. Describe any recording device and frequency of log entries:
28. Describe any filter seeding being performed:
29. Describe any air pollution control device inlet and outlet gas conditioning processes (e.g., gas cooling, gas reheating, gas humidification):
30. Describe the collection material disposal system:
31. Have you included ***Baghouse Control Device*** in the Emissions Points Data Summary Sheet?

32. **Proposed Monitoring, Recordkeeping, Reporting, and Testing**
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING:	RECORDKEEPING:
REPORTING:	TESTING:

MONITORING: Please list and describe the process parameters and ranges that are proposed to be monitored in order to demonstrate compliance with the operation of this process equipment or air control device.

RECORDKEEPING: Please describe the proposed recordkeeping that will accompany the monitoring.

REPORTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.

TESTING: Please describe any proposed emissions testing for this process equipment on air pollution control device.

33. Manufacturer's Guaranteed Capture Efficiency for each air pollutant.

34. Manufacturer's Guaranteed Control Efficiency for each air pollutant.

35. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty.

ATTACHMENT N

SUPPORTING EMISSIONS CALCULATIONS

	Maximum Potential *Controlled* Emissions																															
	NO_x		SO_2		CO		PM		PM_{10}		VOC		HAPS		H_2S		COS		$Ni(CO)_4$		HCN		HCl		Hg		MEOH	
Emission Point	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
Transfer Points and Conveyors							4.92	11.19	2.6	5.39																		
CR1							0.21	0.91	0.1	0.43																		
CR7							0.11	0.09	0.05	0.04																		
VF 1, 3, 5, 7, 9							0.07	0.3	0.04	0.15																		
VF 2, 3, 6, 8, 10							0.19	0.16	0.09	0.08																		
Stockpiles							0.36	1.56	0.36	1.56																		
Haulroads							5.37	4.44	1.04	2.81																		
A1/1	1.41	6.17			1.14	5	0.56	2.45	0.56	2.45	0.46	2																
A1/2	1.41	6.17			1.14	5	0.56	2.45	0.56	2.45	0.46	2																
A1/3	1.41	6.17			1.14	5	0.56	2.45	0.56	2.45	0.46	2																
A1/4	1.41	6.17			1.14	5	0.56	2.45	0.56	2.45	0.46	2																
A1/5	1.41	6.17			1.14	5	0.56	2.45	0.56	2.45	0.46	2																
A1/1 through A1/5 Cold Startup	7.26	0.58	[illegible]	0.24	5.375	0.43	2.55	0.204	2.55	0.204	0.46	0.0096																
A2/1			0.67	0.03	1.11	0.05	1.11	0.05	1.11	0.05																		
A2/2			0.67	0.03	1.11	0.05	1.11	0.05	1.11	0.05																		
B1/1			1.435	6.28	0.065	0.275	0.25	1.1	0.25	1.1																		
B1/2			1.435	6.28	0.065	0.275	0.25	1.1	0.25	1.1																		
B2/1	333	5	1066	16	827	12.4					0.084	0.00125		0.587	51.3	0.7	9.9	0.3	1.237	0.037	2.27	0.07	2.29	0.07	3.42	0.11		
B2/2	333	5	1066	16	827	12.4					0.084	0.00125																
B3/1			0.135		0.0115		0.05		0.05																			
B3/2			0.135		0.0115		0.05		0.05																			
Gasification Fugitives (1) (2)				0.011		1.009										0.006												
Upstream Including Reactors (1) (2)				0.008		0.35										0.004												
Downstream Reactors (2)						0.276																						
O2	957.6	0.96	168.1	0.17	2376	2.4					5.61	0.006		0.006													5.73	0.006
CO_2/H_2S Removal Fugitive Leaks (1) (2)				0.01		0.99						1.029		1.029		0.005												1.029
Sour Gas Fugitives (2)				0.16												0.085												
MEOH Fugitive Leaks (2)						1.71						0.299		0.299														0.299
S Recovery Fugitive Leaks (1) (2)				0.56												0.297												
PSA System Fugitive Leaks (2)						2.39																						
C1			11.56	46.25	0.504	1.974																						
E1	4.01	1.69			1.93	1.24	0.223	0.1	0.223	0.1	0.162	0.07																
E2	15.64	4.4			11.34	3.22	0.89	0.25	0.89	0.25	0.65	0.18																
E3	0.55	1.65			0.381	1.2	0.03	0.09	0.03	0.09	0.022	0.07																
E4 (now sent to C1)																												
E5	21.3	0.43			51.88	1.04					19.96	0.4																
MTG Fugitive Leaks (2)												11.74		0.725													[illegible]	0.725
CL							7.71	33.77	7.71	33.77																		
TK-1, 2 and 3											1.61	7.053	0.039	0.171														
Gasoline Fugitives											0.101	0.44	0.0381	0.162														
TK6 (with fugitives)											0.235	1.023															0.235	1.023
TK7 (with loading)			0.006	0.026									0.006	0.026	0.006	0.026												
LR1 and LR2 (including fugitives)											4.82	21.1	0.1169	0.5119														
F (Loading Rack)	13.92	2.67	0.31	0.06	10.11	1.94	0.61	0.12	0.61	0.12	0.44	0.09																
G (Loading Rack)	0.36	1.58	0.0033	0.015	0.35	1.54	0.0071	0.031	0.0071	0.031	0.0051	0.022																
TOTAL PTE		48.64		92.13		67.159		75.215		57.125		51.5341		3.5169		1.123		0.3		0.037		0.07		0.07		0.11		3.082

(1) SO2 measurement was calculated from H2S emissions as an SO2 equivalent.
(2) Maximum hourly emissions from source (leaks, etc) cannot be quantified.

By: PEW
Date: November 17, 2008 - Revised May 2009

Checked By: CCS
Date: December 3, 2008 - Revised May 2009

Coal Summary of Emissions

Source Description	Regulated Air Pollutant	Potential (Uncontrolled) Emissions		Actual (Controlled) Emissions	
		lb/hour	tpy	lb/hour	tpy
Transfer Points	TSP	4.20	16.72	1.50	5.60
	PM10	2.00	7.96	0.71	2.67
Crusher	TSP	20.76	90.93	0.21	0.91
	PM10	9.89	43.30	0.10	0.43
	PTE TSP =	**24.96**	**107.65**	**1.71**	**6.51**
	PTE PM10 =	**11.89**	**51.26**	**0.81**	**3.10**
Stockpiles	TSP	4.80	20.80	0.24	1.04
	PM10	4.80	20.80	0.24	1.04
Haulroads	TSP	14.47	60.92	2.17	9.14
	PM10	2.82	11.88	0.42	1.78
	Total TSP =	**19.27**	**81.72**	**2.41**	**10.18**
	Total PM10 =	**7.62**	**32.68**	**0.66**	**2.82**

Total TSP =	**44.23**	**189.37**	**4.12**	**16.69**
Total PM10 =	**19.51**	**83.94**	**1.47**	**5.92**

By: PEW
Date: November 17, 2008 - Revised May 2009

Checked By: CCS
Date: December 3, 2008 - Revised May 2009

Batch or Continuous Drops

AP-42 Section 11.2.3 (9/88) emission factor equation: $e = k * 0.0032 * [(U/5)^{1.3} / (M/2)^{1.4}]$ lb/ton

Defining transfer point empirical expression variables, where:

e =	?	lb/ton
k =	0.74	dimensionless
U =	7	mph (mean wind speed in WV)
M =	5.0	% Moisture Content

Calculating transfer point emission factor using above equation:

e = 0.0010 lb/ton

Througput	
KG/H	313,750
TPH =	346
TPD =	8,304
TPY =	3,030,960

Rounding to = 2

ID	Transfer Capacities (1)		e	Control		Emissions			
				Device		Uncontrolled		Controlled	
	tons/hour	tons/year	lb/T	Type	Effic(%)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
TPC1	346	3,030,960	0.0010	PE	50	0.35	1.52	0.18	0.76
TPC2	346	0	0.0010	PE	50	0.35	0.00	0.18	0.00
TPC3	346	3,030,960	0.0010	FE	80	0.35	1.52	0.07	0.30
TPC4	346	3,030,960	0.0010	FE	80	0.35	1.52	0.07	0.30
TPC5	346	3,030,960	0.0010	FE	80	0.35	1.52	0.07	0.30
TPC6	346	3,030,960	0.0010	FE	80	0.35	1.52	0.07	0.30
TPC7	346	3,030,960	0.0010	PE	50	0.35	1.52	0.18	0.76
TPC8	346	3,030,960	0.0010	PE	50	0.35	1.52	0.18	0.76
TPC9	346	3,030,960	0.0010	PE	50	0.35	1.52	0.18	0.76
TPC10	346	3,030,960	0.0010	FE	80	0.35	1.52	0.07	0.30
TPC11	346	3,030,960	0.0010	PE	50	0.35	1.52	0.18	0.76
TPC12	346	3,030,960	0.0010	FE	80	0.35	1.52	0.07	0.30
					TSP =	**4.20**	**16.72**	**1.50**	**5.60**
					$PM10^{(2)}$ =	**2.00**	**7.96**	**0.71**	**2.67**

NOTES:

1. Emissions are calculated for worst case scenario. If a zero has been entered, the transfer point is not part of the worst case scenario.
2. PM10=PM/2.1.

Crusher

Rounding to = 2

ID	Capacity		e	Control		Emissions			
				Device		Uncontrolled		Controlled	
	tons/hour	tons/year	$lb/T^{(1)}$	Type	Effic(%)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
CR1	346	3,030,960	0.06	BH	99	20.76	90.93	0.21	0.91
					TSP =	**20.76**	**90.93**	**0.21**	**0.91**
					$PM10^{(2)}$ =	**9.89**	**43.30**	**0.10**	**0.43**

1. Secondary crushing factor 0.06 lb/ton from DAQ General Permit G10-C.
2. PM10=PM/2.1.
3. Control efficiency from DAQ General Permit G10-C Refernce Document.

Conversions	
lbs/kg	2.205
lbs/ton	2,000

By: PEW
Date: November 17, 2008 - Revised May 2009

Checked By: CCS
Date: December 3, 2008 - Revised May 2009

Vehicular Activity
Paved Haulroads

Source	Number of Trucks/Hour	Number of Trucks/Year	Miles Per Trip	Emission Factor (1) (lb/VMT)	Uncontrolled TSP (lb/hr)	Uncontrolled TSP (tpy)	Control Device	Control Efficiency (%)	Controlled TSP (lb/hr)	Controlled TSP (tpy)
PR	15	126,290	0.11	8.77	14.47	60.92	WT/WC	85	2.17	9.14
				Total	14.47	60.92		**Total**	2.17	9.14

Source	Number of Trucks/Hour	Number of Trucks/Year	Miles Per Trip	Emission Factor (1) (lb/VMT)	Uncontrolled PM_{10} (lb/hr)	Uncontrolled PM_{10} (tpy)	Control Device	Control Efficiency (%)	Controlled PM_{10} (lb/hr)	Controlled PM_{10} (tpy)
PR	15	126,290	0.11	1.71	2.82	11.88	WT/WC	85	0.42	1.78
				Total	2.82	11.88		**Total**	0.42	1.78

Emission Factors(1)

	TSP	PM_{10}	
k =	0.082	0.016	dimensionless, particle size multiplier
sL =	8	8	surface material silt content (g/m^2)
W_{truck} =	40	40	tons, mean vehicle weight
P =	157	157	no. days/year with 0.01 in of rain
N =	365	365	days/year
C=	0.00047	0.00047	factor for exhaust, brake wear and tire wear
e =	**8.77**	**1.71**	**lb/VMT truck**

	Road
Length In (ft) =	600
Length (mi) =	0.11
Total Hauled (tpy) =	3,030,960
Load Weight (tons) =	24
Trucks Per Year =	126,290
Total Hauled (tph) =	346
Load Weight (tons) =	24
Trucks Per Hour =	15
Empty Truck Weight (tons) =	28
Loaded Truck Weight (tons) =	52
Average Truck Weight (tons) =	40

E = [k * (sL/2)^0.65 * (W/3)^1.5 - C] * (1 - (P/4*N) = lb / Vehicle Mile Traveled (VMT)
1. AP42, 13.2.1.

By: PEW
Date: November 17, 2008 - Revised May 2009

Checked By: CCS
Date: December 3, 2008 - Revised May 2009

Stockpile

Stockpile is enclosed in a building and the building is vented through baghouses.

Concentation =	5	mg/m3	Industry Standard
Flow Rate =	5,664	m3/hr	Calculated
	200,000	ft3/hr	Estimated
Emissions =	28,320	mg/hr	Calculated
	0.06	lb/hr	Calculated
	0.26	tpy	Calculated
Estimated Maximum Units =	4	No.	Estimated
Total Emissions =	0.24	lb/hr	Calculated
	1.04	tpy	Calculated
Baghouse Control Efficiency (2) =	95	%	Estimated

Round to = 2

Source/Emission Point	Emissions			
	Uncontrolled(2)		Controlled	
	(lb/hr)	(tpy)	(lb/hr)	(tpy)
Baghouse No. CS1	1.20	5.20	0.06	0.26
Baghouse No. CS2	1.20	5.20	0.06	0.26
Baghouse No. CS3	1.20	5.20	0.06	0.26
Baghouse No. CS4	1.20	5.20	0.06	0.26
PM	**4.80**	**20.80**	**0.24**	**1.04**
PM10	**4.80**	**20.80**	**0.24**	**1.04**

1. PM (TSP) = PM10
2. Back calculated and assumes indicated control efficiency.

Conversions Factors	
1 lb =	453,600 mg
1 ft3	0.02832 m3
1 ton =	2,000 lbs
1 yr =	8,760 hrs

By: PEW
Date: November 17, 2008 - Revised May 2009

Checked By: CCS
Date: December 3, 2008 - Revised May 2009

Limestone Summary of Emissions

Source	Regulated	Potential (Uncontrolled)		Actual (Controlled)	
Description	Air Pollutant	Emissions		Emissions	
		lb/hour	tpy	lb/hour	tpy
Transfer Points	TSP	4.85	4.05	1.73	1.45
	PM10	2.31	1.93	0.82	0.69
Crusher	TSP	0.54	0.45	0.11	0.09
	PM10	0.24	0.20	0.05	0.04
	PTE TSP =	**5.39**	**4.50**	**1.84**	**1.54**
	PTE PM10 =	**2.55**	**2.13**	**0.87**	**0.73**
Stockpiles	TSP	2.40	10.40	0.12	0.52
	PM10	2.40	10.40	0.12	0.52
Haulroads	TSP	4.82	3.35	0.72	0.50
	PM10	0.94	0.65	0.14	0.10
	Total TSP =	**7.22**	**13.75**	**0.84**	**1.02**
	Total PM10 =	**3.34**	**11.05**	**0.26**	**0.62**

Total TSP =	**12.61**	**18.25**	**2.68**	**2.56**
Total PM10 =	**5.89**	**13.18**	**1.13**	**1.35**

By: PEW
Date: November 17, 2008 - Revised May 2009

Checked By: CCS
Date: December 3, 2008 - Revised May 2009

Batch or Continuous Drops

AP-42 Section 11.2.3 (9/88) emission factor equation: $e = k * 0.0032 * [(U/5)^{1.3} / (M/2)^{1.4}]$ lb/ton

Defining transfer point empirical expression variables, where:

e =	?	lb/ton
k =	0.74	dimensionless
U =	7	mph (mean wind speed in WV)
M =	1.0	% Moisture Content

Calculating transfer point emission factor using above equation:
e = 0.0097 lb/ton

Througput	
KG/H	16,919.65
TPH[(2)]	19
TPD =	456
TPY =	166,440

Rounding to = 2

ID	Transfer Capacities [(1)]		e	Control		Emissions			
				Device		Uncontrolled		Controlled	
	tons/hour [(2)]	tons/year	lb/T	Type	Effic(%)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
TPL1	100	166,440	0.0097	N	0	0.97	0.81	0.97	0.81
TPL2	100	166,440	0.0097	FE	80	0.97	0.81	0.19	0.16
TPL3	100	166,440	0.0097	FE	80	0.97	0.81	0.19	0.16
TPL4	100	166,440	0.0097	FE	80	0.97	0.81	0.19	0.16
TPL5	100	166,440	0.0097	FE	80	0.97	0.81	0.19	0.16
					TSP =	**4.85**	**4.05**	**1.73**	**1.45**
					PM10[(3)] =	**2.31**	**1.93**	**0.82**	**0.69**

NOTES:

1. Emissions are calculated for worst case scenario. If a zero has been entered, the transfer point is not part of the worst case scenario.
2. Actual feed rate to the plant system is 19 tons per hour. Estimated filling rate of bin is 100 tons per hour.
3. PM10=PM/2.1.

Crusher

Rounding to = 2

ID	Capacity		e	Control		Emissions			
				Device		Uncontrolled		Controlled	
	tons/hour	tons/year	lb/T[(1)]	Type	Effic(%)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
CR7									
PM	100	166,440	0.0054	FE	80	0.54	0.45	0.11	0.09
PM10			0.0024	FE	80	0.24	0.20	0.05	0.04
					TSP =	**0.54**	**0.45**	**0.11**	**0.09**
					PM10[(2)] =	**0.24**	**0.20**	**0.05**	**0.04**

1. Tertiary crushing factos (PM 0.0054 lb/ton and PM10 0.0024 lb/ton) from AP-42, Section 11.19.2, Table 11.19.2-2.

Conversions	
lbs/kg	2.205
lbs/ton	2,000

By: PEW
Date: November 17, 2008 - Revised May 2009

Checked By: CCS
Date: December 3, 2008 - Revised May 2009

Vehicular Activity
Paved Haulroads

Source	Number of Trucks/Hour	Number of Trucks/Year	Miles Per Trip	Emission Factor [1] (lb/VMT)	Uncontrolled TSP (lb/hr)	Uncontrolled TSP (tpy)	Control Device	Control Efficiency (%)	Controlled TSP (lb/hr)	Controlled TSP (tpy)
PR	5	6,935	0.11	8.77	4.82	3.35	WT/WC	85	0.72	0.50
				Total	4.82	3.35		**Total**	0.72	0.50

Source	Number of Trucks/Hour	Number of Trucks/Year	Miles Per Trip	Emission Factor [1] (lb/VMT)	Uncontrolled PM_{10} (lb/hr)	Uncontrolled PM_{10} (tpy)	Control Device	Control Efficiency (%)	Controlled PM_{10} (lb/hr)	Controlled PM_{10} (tpy)
PR	5	6,935	0.11	1.71	0.94	0.65	WT/WC	85	0.14	0.10
				Total	0.94	0.65		**Total**	0.14	0.10

Emission Factors[1]

	TSP	PM_{10}	
k =	0.082	0.016	dimensionless, particle size multiplier
sL =	8	8	surface material silt content (g/m^2)
W_{truck} =	40	40	tons, mean vehicle weight
P =	157	157	no. days/year with 0.01 in of rain
N =	365	365	days/year
C=	0.00047	0.00047	factor for exhaust, brake wear and tire wear
e =	***8.77***	***1.71***	***lb/VMT truck***

	Road
Length In (ft) =	600
Length (mi) =	0.11
Total Hauled (tpy) =	166,440
Load Weight (tons) =	24
Trucks Per Year =	6,935
Total Hauled (tph) =	100
Load Weight (tons) =	24
Trucks Per Hour =	5
Empty Truck Weight (tons) =	28
Loaded Truck Weight (tons) =	52
Average Truck Weight (tons) =	40

E = [k * (sL/2)^0.65 * (W/3)^1.5 - C] * (1 - (P/4*N) = lb / Vehicle Mile Traveled (VMT)
1. AP42, 13.2.1.

By: PEW
Date: November 17, 2008 - Revised May 2009

Checked By: CCS
Date: December 3, 2008 - Revised May 2009

Stockpile

Stockpile is enclosed in a building and the building is vented through baghouses.

Concentation =	5	mg/m3	Industry Standard
Flow Rate =	5,664	m3/hr	Calculated
	200,000	ft3/hr	Estimated
Emissions =	28,320	mg/hr	Calculated
	0.06	lb/hr	Calculated
	0.26	tpy	Calculated
Estimated Maximum Units =	2	No.	Estimated
Total Emissions =	0.12	lb/hr	Calculated
	0.52	tpy	Calculated
Baghouse Control Efficiency (2) =	95	%	Estimated
Round to =	2		

Source/Emission Point	**Emissions**			
	Uncontrolled(2)		**Controlled**	
	(lb/hr)	**(tpy)**	**(lb/hr)**	**(tpy)**
Baghouse No. LS1	1.20	5.20	0.06	0.26
Baghouse No. LS2	1.20	5.20	0.06	0.26
PM	**2.40**	**10.40**	**0.12**	**0.52**
PM10	**2.40**	**10.40**	**0.12**	**0.52**

1. PM (TSP) = PM10
2. Back calculated and assumes indicated control efficiency.

Conversions Factors	
1 lb =	453,600 mg
1 ft3	0.02832 m3
1 ton =	2,000 lbs
1 yr =	8,760 hrs

By: PEW
Date: November 17, 2008 - Revised May 2009

Checked By: CCS
Date: December 3, 2008 - Revised May 2009

Ash Summary of Emissions

Source	Regulated	Potential (Uncontrolled)		Actual (Controlled)	
Description	Air Pollutant	Emissions		Emissions	
		lb/hour	tpy	lb/hour	tpy
Transfer Points	TSP	5.59	15.25	1.69	4.04
	PM10	3.21	7.58	1.07	2.03
	PTE TSP =	**5.59**	**15.25**	**1.69**	**4.04**
	PTE PM10 =	**3.21**	**7.58**	**1.07**	**2.03**
Haulroads	TSP	8.68	13.38	1.30	2.01
	PM10	1.69	2.61	0.25	0.39
	Total TSP =	**8.68**	**13.38**	**1.30**	**2.01**
	Total PM10 =	**1.69**	**2.61**	**0.25**	**0.39**

Total TSP =	**14.27**	**28.63**	**2.99**	**6.05**
Total PM10 =	**4.90**	**10.19**	**1.32**	**2.42**

By: PEW
Date: November 17, 2008 - Revised May 2009

Checked By: CCS
Date: December 3, 2008 - Revised May 2009

Batch or Continuous Drops: Ash/Aggregate

AP-42 Section 11.2.3 (9/88) emission factor equation: $e = k * 0.0032 * [(U/5)^{1.3} / (M/2)^{1.4}]$ lb/ton

Defining transfer point empirical expression variables, where:

e =	?	lb/ton
k =	0.74	dimensionless
U =	7	mph (mean wind speed in WV)
M =	1.0	% Moisture Content

Calculating transfer point emission factor using above equation:

e = 0.0097 lb/ton

Througput	
KG/H	62,500
TPH	69
TPD =	1,656
TPY =	604,440

Rounding to = 2

ID	Transfer Capacities (1)		e	Control		Emissions			
				Device		Uncontrolled		Controlled	
	tons/hour	tons/year	lb/T	Type	Effic(%)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
TPA1	69	604,440	0.0097	FE	80	0.67	2.93	0.13	0.59
TPA2	100	604,440	0.0097	FE	80	0.97	2.93	0.19	0.59
TPA3	100	604,440	0.0097	FE	80	0.97	2.93	0.19	0.59
TPA4	100	604,440	0.0097	FE	80	0.97	2.93	0.19	0.59
TPA5	100	604,440	0.0097	PE	50	0.97	2.93	0.49	1.47
					TSP =	**4.55**	**14.65**	**1.19**	**3.83**
					PM10 =	**2.17**	**6.98**	**0.57**	**1.82**

Batch or Continuous Drops: Filter Cake (Estimated at 10% of Ash/Aggregate)

AP-42 Section 11.2.3 (9/88) emission factor equation: $e = k * 0.0032 * [(U/5)^{1.3} / (M/2)^{1.4}]$ lb/ton

Defining transfer point empirical expression variables, where:

e =	?	lb/ton
k =	0.74	dimensionless
U =	7	mph (mean wind speed in WV)
M =	1.0	% Moisture Content

Calculating transfer point emission factor using above equation:

e = 0.0097 lb/ton

Througput	
KG/H	6,250
TPH	7
TPD =	168
TPY =	61,320

Rounding to = 2

ID	Transfer Capacities (1)		e	Control		Emissions			
				Device		Uncontrolled		Controlled	
	tons/hour	tons/year	lb/T	Type	Effic(%)	(lb/hr)	(tpy)	(lb/hr)	(tpy)
TPFC1	7	61,320	0.0097	FE	80	0.07	0.30	0.01	0.06
TPFC2	100	61,320	0.0097	PE	50	0.97	0.30	0.49	0.15
					TSP =	**1.04**	**0.60**	**0.50**	**0.21**
PM10 and TSP assumed equal in this case.					**PM10 =**	**1.04**	**0.60**	**0.50**	**0.21**

Conversions	
lbs/kg	2.205
lbs/ton	2,000

Totals for Ash and Aggregate				
TSP =	**5.59**	**15.25**	**1.69**	**4.04**
PM10 =	**3.21**	**7.58**	**1.07**	**2.03**

Vehicular Activity
Paved Haulroads

Source	Number of Trucks/Hour	Number of Trucks/Year	Miles Per Trip	Emission Factor (1) (lb/VMT)	Uncontrolled TSP (lb/hr)	Uncontrolled TSP (tpy)	Control Device	Control Efficiency (%)	Controlled TSP (lb/hr)	Controlled TSP (tpy)
PR	9	27,740	0.11	8.77	8.68	13.38	WT/WC	85	1.30	2.01
				Total	8.68	13.38		**Total**	1.30	2.01

Source	Number of Trucks/Hour	Number of Trucks/Year	Miles Per Trip	Emission Factor (1) (lb/VMT)	Uncontrolled PM_{10} (lb/hr)	Uncontrolled PM_{10} (tpy)	Control Device	Control Efficiency (%)	Controlled PM_{10} (lb/hr)	Controlled PM_{10} (tpy)
PR	9	27,740	0.11	1.71	1.69	2.61	WT/WC	85	0.25	0.39
				Total	1.69	2.61		**Total**	0.25	0.39

Emission Factors(1)

	TSP	PM_{10}	
k =	0.082	0.016	dimensionless, particle size multiplier
sL =	8	8	surface material silt content (g/m^2)
W_{truck} =	40	40	tons, mean vehicle weight
P =	157	157	no. days/year with 0.01 in of rain
N =	365	365	days/year
C=	0.00047	0.00047	factor for exhaust, brake wear and tire wear
e =	**8.77**	**1.71**	**lb/VMT truck**

	Road
Length In (ft) =	600
Length (mi) =	0.11
Total Hauled (tpy) =	665,760
Load Weight (tons) =	24
Trucks Per Year =	27,740
Total Hauled (tph) =	200
Load Weight (tons) =	24
Trucks Per Hour =	9
Empty Truck Weight (tons) =	28
Loaded Truck Weight (tons) =	52
Average Truck Weight (tons) =	40

E = [k * (sL/2)^0.65 * (W/3)^1.5 - C] * (1 - (P/4*N) = lb / Vehicle Mile Traveled (VMT)
1. AP42, 13.2.1.

By: PEW
Date: November 17, 2008 - Revised May 2009

Checked By: CCS
Date: December 3, 2008 - Revised May 2009

Sulfur and Misc Trucking Summary of Emissions

Source Description	Regulated Air Pollutant	Potential (Uncontrolled) Emissions		Actual (Controlled) Emissions	
		lb/hour	tpy	lb/hour	tpy
Haulroads	TSP	7.89	18.60	1.18	2.79
	PM10	1.54	3.63	0.23	0.54
	Total TSP =	**7.89**	**18.60**	**1.18**	**2.79**
	Total PM10 =	**1.54**	**3.63**	**0.23**	**0.54**

Total TSP =	**7.89**	**18.60**	**1.18**	**2.79**
Total PM10 =	**1.54**	**3.63**	**0.23**	**0.54**

By: PEW
Date: November 17, 2008 - Revised May 2009

Checked By: CCS
Date: December 3, 2008 - Revised May 2009

Vehicular Activity
Paved Haulroads

Source	Number of Trucks/Hour	Number of Trucks/Year	Miles Per Trip	Emission Factor (1) (lb/VMT)	Uncontrolled TSP (lb/hr)	Uncontrolled TSP (tpy)	Control Device	Control Efficiency (%)	Controlled TSP (lb/hr)	Controlled TSP (tpy)
PR	2	9,428	0.45	8.77	7.89	18.60	WT/WC	85	1.18	2.79
				Total	7.89	18.60		**Total**	1.18	2.79

Source	Number of Trucks/Hour	Number of Trucks/Year	Miles Per Trip	Emission Factor (1) (lb/VMT)	Uncontrolled PM_{10} (lb/hr)	Uncontrolled PM_{10} (tpy)	Control Device	Control Efficiency (%)	Controlled PM_{10} (lb/hr)	Controlled PM_{10} (tpy)
PR	2	9,428	0.45	1.71	1.54	3.63	WT/WC	85	0.23	0.54
				Total	1.54	3.63		**Total**	0.23	0.54

Emission Factors(1)

	TSP	PM_{10}	
k =	0.082	0.016	dimensionless, particle size multiplier
sL =	8	8	surface material silt content (g/m^2)
W_{truck} =	40	40	tons, mean vehicle weight
P =	157	157	no. days/year with 0.01 in of rain
C=	0.00047	0.00047	factor for exhaust, brake wear and tire wear
e =	**8.77**	**1.71**	**lb/VMT truck**

	Road
Length In (ft) =	2,400
Length (mi) =	0.45
Total Hauled (tpy) =	226,271
Load Weight (tons) =	24
Trucks Per Year =	9,428
Total Hauled (tph) =	26
Load Weight (tons) =	24
Trucks Per Hour =	2
Empty Truck Weight (tons) =	28
Loaded Truck Weight (tons) =	52
Average Truck Weight (tons) =	40

Throughput	
KG/H (Sulfur)	2,669.53
KG/H (LPG)	10,759
KG/H (MISC)	10,000
TPH	25.83
TPD =	620
TPY =	226,271

Conversions	
lbs/kg	2.205
lbs/ton	2,000

E = [k * (sL/2)^0.65 * (W/3)^1.5 - C] * (1 - (P/4*N) = lb / Vehicle Mile Traveled (VMT)
1. AP42, 13.2.1.

Cooling Tower Emissions

Liquid drift is assumed to be PM10 and will be added to PM and PM10 totals.
Emissions estimated by AP-42 Section 13.4, Wet Cooling Towers.

Water Flow =	18,490,000	gallon per hour (Uhde 70,000 m3/hr)
	308,167	gallons per minute
Circulating Water TDS =	5,000	ppm (estimated)
Design Drift Rate =	0.001	% Drift (estimated)
Operating Hours =	8,760	hrs/year
Liquid Drift =	7.71	lbs/hr
	33.77	tpy

Rounding to = 2

Methanol System (Vapor Sources)

					POTENTIAL		ACTUAL	
Source Type	Number of Sources	Emission Factor(1) (kg/hr/source)	TOC Emissions (lb/hr)	TOC Emissions (ton/yr)	VOC Emissions (lb/hr)	VOC Emissions (ton/yr)	VOC Emissions (lb/hr)	VOC Emissions (ton/yr)
Valves	20	5.97E-03	0.263	1.152	0.263	1.152	0.032	0.138
Pressure Relief Valves	5	1.04E-01	1.146	5.019	1.146	5.019	0.138	0.602
Connectors	20	1.83E-03	0.081	0.355	0.081	0.355	0.006	0.025
Compressor Seals	4	1.83E-03	0.016	0.070	0.016	0.070	0.002	0.007
				Total VOC = TOC Emissions	1.506	6.596	0.178	0.772
lb/kg = 2.2046						Round to =	3	

1. Table 5-1 and 5-2 (Reduction by LDAR) of Protocol for Equipment Leak Emissions Estimate (EPA-453/R-95-017) dated November 1995.

Valves	88	% Reduction	Table 5-2
Connectors	93	% Reduction	Table 5-2
Compressor Seals	90	% Reduction	Table 5-1

Methanol Tank

TANKS 4.0 Output						Total Emissions	
	Losses(lbs/yr)						
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions	lb/hr(1)	tpy
Methyl alcohol	122.31	133.97	245.39	0	501.68	0.057	0.251
					Round to =	3	3

1. Based on 8,760 hours per year.

Total			
POTENTIAL		ACTUAL	
VOC and HAP		**VOC and HAP**	
lb/hr	**tpy**	**lb/hr**	**tpy**
1.563	**6.847**	**0.235**	**1.023**

Gasoline Emissions (Fugitive, Tanks, and Loading Racks)

Gasoline System Fugitives

1. AP42,Chapter 5, Protocol for Equipment Leak Emission Estimates, Table 2-2.

Fugitives for All Sources with Gasoline								
					POTENTIAL		ACTUAL	
Source Type	**Number of Sources**	**Emission Factor(1) (kg/hr/source)**	**TOC Emissions (lb/hr)**	**TOC Emissions (ton/yr)**	**VOC Emissions (lb/hr)**	**VOC Emissions (ton/yr)**	VOC Emissions (lb/hr)	VOC Emissions (ton/yr)
Valves	12	2.68E-02	0.71	3.11	0.709	3.105	0.085	0.373
Pump Seals (Sealless Design)	3	1.14E-01	0.75	3.30	0.754	3.302	0.008	0.033
Connectors	200	2.50E-04	0.11	0.48	0.110	0.483	0.008	0.034
				Total VOC = TOC Emissions =	1.573	6.891	0.101	0.440
	Total Uncontrolled HAPS (Prorated on TANKS Output)=				0.593	2.618	Round to =	3

1. Table 5-1 and 5-2 (Reduction by LDAR) of Protocol for Equipment Leak Emissions Estimate (EPA-453/R-95-017) dated November 1995.

Valves	88	% Reduction	Table 5-2
Pump Seals (Sealless Design)	99	% Reduction	Table 5-1
Connectors	93	% Reduction	Table 5-2

Gasoline Tanks

TANKS 4.0 Output (for one tank)						One Tank Calculated Total Emissions		Three Tanks		
	Losses(lbs)									
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions	lb/hr[1]	tpy	lb/hr	tpy	lb/yr
Gasoline (RVP 13)	1,506.60	173.47	3,022.61	0	4,702.69	0.53684	2.351	1.61	7.053	14,106
Unidentified Components	1,483.37	129.34	2,976.02	0	4,588.73	0.52383	2.294	NA	NA	NA
Benzene	6.56	3.12	13.16	0	22.85	0.00261	0.011	0.0078	0.033	66
Isooctane	0	6.94	0	0	6.94	0.00079	0.003	0.0024	0.009	18
Toluene	7.13	12.14	14.31	0	33.58	0.00383	0.017	0.0115	0.051	102
Ethylbenzene	0.46	2.43	0.93	0	3.82	0.00044	0.002	0.0013	0.006	12
Xylene (-m)	1.93	12.14	3.86	0	17.93	0.00205	0.009	0.0062	0.027	54
Isopropyl benzene	0.07	0.87	0.15	0	1.09	0.00012	0.001	0.0004	0.003	6
1,2,4-Trimethylbenzene	0.15	4.34	0.31	0	4.8	0.00055	0.002	0.0017	0.006	12
Cyclohexane	0.91	0.42	1.82	0	3.15	0.00036	0.002	0.0011	0.006	12
Hexane (-n)	6.01	1.73	12.05	0	19.79	0.00226	0.01	0.0068	0.03	60
					Rounding to =	5	3			

1. Based on 8,760 hours per year.

Gasoline Loading Racks (LR1 and LR2)

VOC losses from loading gasoline to truck or railcar with the control of the vapor recovery system. AP-42, Section 5.2, Transportation and Marketing of Petroleum Liquids.

L =	12.46	SPM/T lb/1,000 gallons
S=	0.6	Saturation Factor (5.2.1)
P=	9.9	psia (Vapor Pressure RVP13 AP-42 Table 7.1-2)
M=	62	MW lb/lb-mole
T=	80	Degrees F
T=	540	Degrees R (f + 460)

L uncontrolled =	8.50	lb/1,000 gallons
Total Gallons Per Hour =	31,500	gph
Total Gallons Per Year =	275,940,000	gpy
Collection Efficiency =	99.2	% (MACT Level)
Vapor Losses =	2.14	lbs/hr
	9.38	tpy
Control Efficiency =	99	%
L controlled =	0.08	lb/1,000 gallons
Total Gallons Per Hour =	31,500	gph
Total Gallons Per Year =	275,940,000	gpy
L uncontrolled =	267.68	lbs/hr
	1172.43	tpy
L controlled =	2.68	lbs/hr
	11.72	tpy
Total (point and fugitive) =	4.82	lbs/hr
	21.10	tpy

Uncontrolled (VOC)	
267.68	lbs/hr
1172	tpy
Uncotrolled HAPS	
(Prorated based on TANKS)	
12.06	lbs/hr
52.92	tpy

By: PEW
Date: November 17, 2008 - Revised May 2009

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Gasoline Emissions (Fugitive, Tanks, and Loading Racks)

Summary of Gasoline Fugitives and Tanks Emissions

Components	Speciation from Tanks 4.0	Decimal Percentage to Use Speciating Fugitives	Gasoline Tank (Fugitive)			Gaslone Tanks			Loading Racks (Fugitive)			Loading Racks (Controlled)		
	lb/yr	NA	lb/hr	lb/yr	tpy	lb/hr	lb/yr	tpy	lb/hr	lb/yr	tpy	lb/hr	lb/yr	tpy
Gasoline (RVP 13)	14,106	1	0.1010	880.00	0.4400	1.6105	14,106	7.05	2.1400	18,760	9.380	2.6768	23,449	11.724
Benzene	66	0.00468	0.0074	64.40	0.0322	0.0078	66	0.033	0.0100	87.80	0.0439	0.0125	109.80	0.0549
Isooctane	18	0.00128	0.0020	17.60	0.0088	0.0024	18	0.009	0.0027	24.00	0.0120	0.0034	30.00	0.0150
Toluene	102	0.00723	0.0114	99.60	0.0498	0.0115	102	0.051	0.0155	135.60	0.0678	0.0194	169.60	0.0848
Ethylbenzene	12	0.00085	0.0013	11.80	0.0059	0.0013	12	0.006	0.0018	16.00	0.0080	0.0023	20.00	0.0100
Xylene (-m)	54	0.00383	0.0060	52.80	0.0264	0.0062	54	0.027	0.0082	71.80	0.0359	0.0103	89.80	0.0449
Isopropyl benzene	6	0.00043	0.0007	6.00	0.0030	0.0004	6	0.003	0.0009	8.00	0.0040	0.0012	10.00	0.0050
1,2,4-Trimethylbenzene	12	0.00085	0.0013	11.80	0.0059	0.0017	12	0.006	0.0018	16.00	0.0080	0.0023	20.00	0.0100
Cyclohexane	12	0.00085	0.0013	11.80	0.0059	0.0011	12	0.006	0.0018	16.00	0.0080	0.0023	20.00	0.0100
Hexane (-n)	60	0.00425	0.0067	58.60	0.0293	0.0068	60.000	0.030	0.0091	79.80	0.0399	0.0114	99.60	0.0498
Total HAPS			0.0381	334.40	0.1672	0.0390	342.00	0.1710	0.0518	455.00	0.2275	0.0651	568.80	0.2844
	Rounding Column to =	5	4	2	4									

Components	Total Gasoline Tanks		
	lb/hr	lb/yr	tpy
Gasoline (RVP 13)	1.7115	14986.0000	7.4930
Benzene	0.0152	130.4000	0.0652
Isooctane	0.0044	35.6000	0.0178
Toluene	0.0229	201.6000	0.1008
Ethylbenzene	0.0026	23.8000	0.0119
Xylene (-m)	0.0122	106.8000	0.0534
Isopropyl benzene	0.0011	12.0000	0.0060
1,2,4-Trimethylbenzene	0.0030	23.8000	0.0119
Cyclohexane	0.0024	23.8000	0.0119
Hexane (-n)	0.0135	118.6000	0.0593
Total HAPS	0.0771	676.4000	0.3382

Components	Total		
	lb/hr	lb/yr	tpy
Gasoline (RVP 13)	6.5283	57194.6086	28.5973
Benzene	0.0377	328.0000	0.1640
Isooctane	0.0105	89.6000	0.0448
Toluene	0.0578	506.8000	0.2534
Ethylbenzene	0.0067	59.8000	0.0299
Xylene (-m)	0.0307	268.4000	0.1342
Isopropyl benzene	0.0032	30.0000	0.0150
1,2,4-Trimethylbenzene	0.0071	59.8000	0.0299
Cyclohexane	0.0065	59.8000	0.0299
Hexane (-n)	0.0340	298.0000	0.1490
Total HAPS	0.1940	1700.2000	0.8501

Components	Total Loading		
	lb/hr	lb/yr	tpy
Gasoline (RVP 13)	4.8168	42208.6086	21.1043
Benzene	0.0225	197.6000	0.0988
Isooctane	0.0061	54.0000	0.0270
Toluene	0.0349	305.2000	0.1526
Ethylbenzene	0.0041	36.0000	0.0180
Xylene (-m)	0.0185	161.6000	0.0808
Isopropyl benzene	0.0021	18.0000	0.0090
1,2,4-Trimethylbenzene	0.0041	36.0000	0.0180
Cyclohexane	0.0041	36.0000	0.0180
Hexane (-n)	0.0205	179.4000	0.0897
Total HAPS	0.1169	1023.8000	0.5119

Sulfur Tank Filling

Assume =	5 % H2S is lost to vapor		
	10 ppm H2S in Sulfur		
Throughput =	2669.53 kg/hr		
	5886.314 lb/hr	51,564,110.64	lbs/yr
H2S Emisions =	0.003 lb/hr	51,564,200.00	say (lbs/yr)
	8,760 hrs/yr	141,271.78	lbs/day
	26.280 lbs/yr		
	0.0130 tpy		

Sulfur Vehicle Filling (Assume same loss as filling tank)

	0.003 lb/hr
	0.013 tpy
Total H2S Losses =	0.006 lb/hr
	0.026 tpy
Round to =	3
Conversions =	2.205 lbs/kg
	2000 lbs/tons

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By: PEW
Checked By: CCS

Date: November 17, 2008 - Revised May 2009
Date: December 3, 2008 - Revised May 2009

This is a mass balance conversion of the Emission Unit Data Sheets in Section L

Round to = 0

		2.205	lbs/kg
		2000	lbs/tons
Gasifier In	Process Line	kg/hr	tons/hr
Coal	2	309,868.00	342
[redacted]			
Oxygen from ASU	29	230,439.00	255
[redacted]			
Water from MTG	20	135,273.00	150
Recycle Water	19	445,730.00	492
[redacted]			
Gasifier Out	Process Line	kg/hr	tons/hr
Syngas ex Scrubber	3	1,121,958.00	1,237
Sour Gas from PDQ	10	1,214.32	2
[redacted]			
CO Shift In	Process Line	kg/hr	tons/hr
Syngas ex Scrubber	3	1,121,958.00	1,237
Tail Gas from PSA	15	18,635.38	21
		Total =	1,258
CO Shift Out	Process Line	kg/hr	tons/hr
Syngas ex CO Shift	4	702,352.70	775
Sour Water	18	447,886.00	494
		Total =	1,269
CO2/H2S Removal System			
CO2/H2S Removal System In	Process Line	kg/hr	tons/hr
Syngas ex CO Shift	4	702,352.70	775
Claus Tail Gas	30	6,277	7
		Total =	782
CO2/H2S Removal System Out	Process Line	kg/hr	tons/hr
CO2 to Purification	16	462,593.08	511
Acid Gas From AGR	9	7,252.29	8
Syngas to MEOH	5	255,200	282

		Total =	801
Sour Water Stripper In	Process Line	kg/hr	tons/hr
Sour Water	18	447,886.00	494
		Total =	494
Sour Water Stripper Out	Process Line	kg/hr	tons/hr
Recycle Water	19	445,730.00	492
Sour Gas to SRU	25	2,156	3
		Total =	495
Mercury Removal In	Process Line	kg/hr	tons/hr
Syngas to MEOH	5	255,200	282
Mercury Removal Out	Process Line	kg/hr	tons/hr
Syngas to MEOH	5	255,200	282
Methanol Synthesis Unit In	Process Line	kg/hr	tons/hr
Syngas to MEOH	5	255,200	282
Methanol Synthesis Unit Out	Process Line	kg/hr	tons/hr
Methanol	6	238,395.60	263
Gas to PSA	12	19,518.54	22
		Total =	285
Sulfur Recovery In	Process Line	kg/hr	tons/hr
Acid Gas From AGR	9	7,252.29	8
Sour Gas to SRU	25	2,156	3
Sour Gas from PDQ	10	1,214.32	2
		Total =	13
Sulfur Recovery Out	Process Line	kg/hr	tons/hr
Claus Tail Gas	30	6,277	7
Solid Sulfur	11	2,669.53	3
		Total =	10
PSA System In	Process Line	kg/hr	tons/hr
Gas to PSA	12	19,518.54	22
PSA System Out	Process Line	kg/hr	tons/hr
[redacted]			

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Tail Gas from PSA	15	18,635.38	21
		[redacted]	
CO Purification In	Process Line	kg/hr	tons/hr
CO2 to Purification	16	462,593.08	511
MTG Regen Offgas to Purification	31	9,597.00	11
		Total =	522
CO Purification Out	Process Line	kg/hr	tons/hr
CO2 to Atmoshere	17	346,873.89	383
CO2 to Coal Preparation	26	115,719.1873	128
		Total =	511
Air Separation Out	Process Line	kg/hr	tons/hr
Oxygen from ASU	29	230,439.00	255
MTG In	Process Line	kg/hr	tons/hr
[redacted]			
Methanol	6	238,395.60	263
		[redacted]	
MTG Out	Process Line	kg/hr	tons/hr
LPG	7	10,759	12
Gasoline	8	87,400	97
Tail Gas from MTG	28	3,257	4
Water from MTG	20	135,273	150
		Total =	263

Gasoline Estimated Production =	18,000	bbl/d
	42	gal/bbl
	756,000	gal/d
	31,500	gal/hr
	275,940,000	gal/yr
No. of Tanks =	3	
Througput of Each Tank =	91,980,000	gal/yr
Tank Size =	2,000,000	gal
Turnovers =	45.99	No.

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

Identification

User Identification:	TK-1 Through TK-3
City:	Charleston
State:	West Virginia
Company:	TransGas
Type of Tank:	Internal Floating Roof Tank
Description:	Gasoline Storage Tanks Emissions Per Each Tank

Tank Dimensions

Diameter (ft):	100.00
Volume (gallons):	2,000,000.00
Turnovers:	45.99
Self Supp. Roof? (y/n):	Y
No. of Columns:	0.00
Eff. Col. Diam. (ft):	0.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Rim-Seal System

Primary Seal:	Mechanical Shoe
Secondary Seal	Shoe-mounted

Deck Characteristics

Deck Fitting Category:	Typical
Deck Type:	Welded

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1
Roof Leg or Hanger Well/Adjustable	32
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: Charleston, West Virginia (Avg Atmospheric Pressure = 14.25 psia)

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

TK-1 Through TK-3 - Internal Floating Roof Tank
Charleston, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (RVP 13)	All	56.67	51.31	62.04	55.00	6.5261	N/A	N/A	62.0000			92.00	Option 4: RVP=13, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0179	N/A	N/A	120.1900	0.0250	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						1.0642	N/A	N/A	78.1100	0.0180	0.0044	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.1063	N/A	N/A	84.1600	0.0024	0.0006	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0966	N/A	N/A	106.1700	0.0140	0.0003	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.7536	N/A	N/A	86.1700	0.0100	0.0040	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isooctane							N/A	N/A	114.2200	0.0400	0.0000	114.22	
Isopropyl benzene						0.0424	N/A	N/A	120.2000	0.0050	0.0000	120.20	Option 2: A=6.93666, B=1460.793, C=207.78
Toluene						0.2974	N/A	N/A	92.1300	0.0700	0.0047	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						8.4085	N/A	N/A	61.7207	0.7456	0.9846	89.36	
Xylene (-m)						0.0803	N/A	N/A	106.1700	0.0700	0.0013	106.17	Option 2: A=7.009, B=1462.266, C=215.11

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

TK-1 Through TK-3 - Internal Floating Roof Tank
Charleston, West Virginia

Annual Emission Calcaulations	
Rim Seal Losses (lb):	1,506.5991
Seal Factor A (lb-mole/ft-yr):	1.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.3000
Value of Vapor Pressure Function:	0.1519
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	6.5261
Tank Diameter (ft):	100.0000
Vapor Molecular Weight (lb/lb-mole):	62.0000
Product Factor:	1.0000
Withdrawal Losses (lb):	173.4743
Number of Columns:	0.0000
Effective Column Diameter (ft):	0.0000
Annual Net Throughput (gal/yr.):	91,980,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015
Average Organic Liquid Density (lb/gal):	5.6000
Tank Diameter (ft):	100.0000
Deck Fitting Losses (lb):	3,022.6144
Value of Vapor Pressure Function:	0.1519
Vapor Molecular Weight (lb/lb-mole):	62.0000
Product Factor:	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	321.0000
Deck Seam Losses (lb):	0.0000
Deck Seam Length (ft):	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000
Tank Diameter (ft):	100.0000
Vapor Molecular Weight (lb/lb-mole):	62.0000
Product Factor:	1.0000
Total Losses (lb):	4,702.6878

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1	36.00	5.90	1.20	338.9848
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1	14.00	5.40	1.10	131.6274
Roof Leg or Hanger Well/Adjustable	32	7.90	0.00	0.00	2,380.4266
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1	12.00	0.00	0.00	112.9949
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	58.3807

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

Emissions Report for: Annual

TK-1 Through TK-3 - Internal Floating Roof Tank
Charleston, West Virginia

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Gasoline (RVP 13)	1,506.60	173.47	3,022.61	0.00	4,702.69
Hexane (-n)	6.01	1.73	12.05	0.00	19.79
Benzene	6.56	3.12	13.16	0.00	22.85
Isooctane	0.00	6.94	0.00	0.00	6.94
Toluene	7.13	12.14	14.31	0.00	33.58
Ethylbenzene	0.46	2.43	0.93	0.00	3.82
Xylene (-m)	1.93	12.14	3.86	0.00	17.93
Isopropyl benzene	0.07	0.87	0.15	0.00	1.09
1,2,4-Trimethylbenzene	0.15	4.34	0.31	0.00	4.80
Cyclohexane	0.91	0.42	1.82	0.00	3.15
Unidentified Components	1,483.37	129.34	2,976.02	0.00	4,588.73

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

Identification

User Identification:	IFR Methanol Tank
City:	Charleston
State:	West Virginia
Company:	TransGas
Type of Tank:	Internal Floating Roof Tank
Description:	

Tank Dimensions

Diameter (ft):	100.00
Volume (gallons):	2,000,000.00
Turnovers:	30.00
Self Supp. Roof? (y/n):	Y
No. of Columns:	0.00
Eff. Col. Diam. (ft):	0.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Rim-Seal System

Primary Seal:	Mechanical Shoe
Secondary Seal	Shoe-mounted

Deck Characteristics

Deck Fitting Category:	Typical
Deck Type:	Welded

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1
Roof Leg or Hanger Well/Adjustable	32
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: Charleston, West Virginia (Avg Atmospheric Pressure = 14.25 psia)

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

IFR Methanol Tank - Internal Floating Roof Tank
Charleston, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Methyl alcohol	All	56.67	51.31	62.04	55.00	1.2977	N/A	N/A	32.0400			32.04	Option 2: A=7.897, B=1474.08, C=229.13

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

IFR Methanol Tank - Internal Floating Roof Tank
Charleston, West Virginia

Annual Emission Calcaulations	
Rim Seal Losses (lb):	122.3130
Seal Factor A (lb-mole/ft-yr):	1.6000
Seal Factor B (lb-mole/ft-yr (mph)^n):	0.3000
Value of Vapor Pressure Function:	0.0239
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	1.2977
Tank Diameter (ft):	100.0000
Vapor Molecular Weight (lb/lb-mole):	32.0400
Product Factor:	1.0000
Withdrawal Losses (lb):	133.9734
Number of Columns:	0.0000
Effective Column Diameter (ft):	0.0000
Annual Net Throughput (gal/yr.):	60,000,000.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015
Average Organic Liquid Density (lb/gal):	6.6300
Tank Diameter (ft):	100.0000
Deck Fitting Losses (lb):	245.3905
Value of Vapor Pressure Function:	0.0239
Vapor Molecular Weight (lb/lb-mole):	32.0400
Product Factor:	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	321.0000
Deck Seam Losses (lb):	0.0000
Deck Seam Length (ft):	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000
Tank Diameter (ft):	100.0000
Vapor Molecular Weight (lb/lb-mole):	32.0400
Product Factor:	1.0000
Total Losses (lb):	501.6769

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors KFa(lb-mole/yr)	KFb(lb-mole/(yr mph^n))	m	Losses(lb)
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1	36.00	5.90	1.20	27.5204
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1	14.00	5.40	1.10	10.7024
Roof Leg or Hanger Well/Adjustable	32	7.90	0.00	0.00	193.2546
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1	12.00	0.00	0.00	9.1735
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	4.7396

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

Emissions Report for: Annual

IFR Methanol Tank - Internal Floating Roof Tank
Charleston, West Virginia

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Methyl alcohol	122.31	133.97	245.39	0.00	501.68

Uhde

GT-PR
A. Alke
23/09/2009

Transgas Development Systems

Task Order 1 under

Services Agreement for Construction Permitting Support

Response on DEP Questions

Prepared by

Uhde

Table of Content

1 Introduction

1.1 General

Additional to the Information contained in the permit application, the West Virginia DEP requested more detailed data for the valuation of hazardous air pollutions emissions and explanatory discussion on the information basis for the calculation of the emissions of the CTL plant (questions 2 and 5 of the letter from DEP to TGDS, dated January 8th 2009).

Further, to visualize the emissions points, a block flow diagram showing the emissions points separately as well as all lines (including safety valves) going to flare have been requested (question 3 of mentioned letter).

Uhde has been commissioned by TGDS with task order No. 1 under the Services Agreement for Construction Services Support to supply response on above mentioned questions.

1.2 Basis for Emission Calculation

All emission calculations have to the maximum extent possible been based on commercial operating experience for the technologies applied in the TGDS CTL plant, especially the Puertollano IGCC applying the PRENFLO gasification process, which has more than 10 years operational experience up to date as well as the New Zealand Synfuel Plant applying the MTG process, which was operated for more than 10 years from the mid 1980's up to the mid 1990's.

All base values for the emissions and the calculation methods applied have been developed specifically for the TGDS CTL plant utilizing proprietary in-house modeling and calculation tools based on project specific design basis data, such as coal and fuel gas specifications, and applying the experience and know-how from operating data and proven start-up and operating procedures from the mentioned commercial plants.

2 Discussion on Hazardous Air Pollutants

General

- The discussion on Hazardous Air Pollutants (HAPS) hereafter reflects the current status of engineering work done for the TGDS CTL facility
- The list HAPS from the EPA website (http://www.epa.gov/ttn/atw/188polls.html) was compared with the material balance of the individual process Units.
- Concentration of the HAPS are taken from the material balance. If not available from the material balance, values are estimated according experience from existing plants (e.g. Puertollano).
- In addition to the identification and, where possible, quantification of HAPS in the CTL facility, the mechanism of formation as well as possible emission of HAPS and emission control is shortly described.
- References for emission points given relate to the Block Flow Diagram under chapter 4 hereof.
- Flare emission for emergency cases not considered in maximum emission calculations. Start-up and continuous emissions basis explained in chapter 3.
- For all HAPS (except HCl) a flare destruction efficiency from 98% is assumed, e.g. under chapter 2.1.4 during start-up 98% of the COS will be converted to SOx in the flame, etc.
- For leak HAPS emission refer to section 3.16

2.1 Carbonyl sulfide (COS)

2.1.1 Place of formation / use

Gasification Reactor
In the Gasification Reactor a part of the sulfur, coming with the coal into the reactor, reacts to COS.

2.1.2 Mechanism of formation

S + CO -> COS

2.1.3 Balance

2.1.3.1 Production Rate

Stream Number		3	4a	4	9	10
Concentration	mol%	0.01310	0.01295	0.02240	4.35124	0.00020
Flowrate	mol/h	7.47	7.47	7.47	7.85	0.01
	kg/h	448.2	448.2	448.2	471	0.6

2.1.4 Emissions to atmosphere and emission control

There will be no continuous emission:

- Process closed to atmosphere
- Relief to flare during start-up (B2/1 and B2/2) Pressure relief to flare (emergency relief; c1, c2); conversion of COS to SOx in flare.
  Maximum COS emission during start-up (relief periods and flow rates see chapter 3.5):
  Flow rate during start-up: 224.1 kg/h (one gasifier)
  Destruction rate: 98%
  Hourly emission: 224.1 kg/h x 0.02 = 4.482 kg/h (9.9 lb/hr)
  Yearly emission: 60 starts per yr x 1 hr/start x 9.9 lb/hr / 2000 lb/ton = 0.3 tons/yr.
- During normal operation a part of COS is hydrolysed on COS Shift section to H2S; remaining COS is converted in sulfur recovery (Claus) plant to pure sulfur and CO2

2.2 Hydrogen Sulfide (H2S)

2.2.1 Place of formation / use

Gasification Reactor
In the Gasification Reactor most of the sulfur, coming with the coal into the reactor, reacts to H2S.

2.2.2 Mechanism of formation

S + H2 -> H2S

2.2.3 Balance

2.2.3.1 Production Rate

Stream Number		3	4a	4	9	10	25
Concentration	mol%	0.12	0.12	0.2	39.29	1.46	3.93
Flowrate	mol/h	68.44	69.22	66.72	70.88	0.81	2.39
	kg/h	2327.0	2353.5	2268.5	2410.0	27.5	81.3

2.2.4 Emissions to atmosphere and emission control

There will be no continuous emission

- Process closed to atmosphere
- Relief to flare during start-up (B2/1 and B2/2) Pressure relief to flare (emergency relief; c1, c2); conversion of H2S in SOx in flare
  Maximum H2S emission during start-up (relief periods and flow rates see chapter 3.5):
  Flow rate during start-up: 1163.5 kg/h (one gasifier)
  Destruction rate: 98%
  Hourly emission: 1163.5 kg/h x 0.02 = 23.27 kg/h (51.3 lb/hr)
  Yearly emission: 60 starts per yr x 1 hr/start x 51.3 lb/hr / 2000 lb/ton = 0.7 tons/yr.
- During normal operation H2S is converted in sulfur recovery (Claus) plant to pure sulfur and water

2.3 Nickel Carbonyl

2.3.1 Place of formation / use

Gasification Reactor

Stainless steel pipes
Under certain pressure and temperature conditions Nickel from stainless steel pipes (or SS internals from e.g. vessel) reacts with the CO of the syngas.

2.3.2 Mechanism of formation

$Ni + 4\ CO \rightarrow Ni(CO)_4$

2.3.3 Balance

2.3.3.1 Production Rate

Hold (order of magnitude: ppm only)

2.3.4 Emissions to atmosphere and emission control

There will be no continuous emission

- Process closed to atmosphere
- Relief to flare during start-up (B2/1, B2/2) and pressure relief (emergency relief; c1) to flare will cause nickel emissions (destruction from nickel carbonyl to nickel and CO_2 in the flame of the flare).
- Nickel emission not quantifiable, but conservative estimated significantly lower than 0.1 ton/yr.
  Maximum Nickel emission (based on measurement in commercial gasification plant) during start-up (relief periods and flow rates see chapter 3.5):
  Flowrate of the syngas (one gasifier): 560979 kg/h
  Concentration of Nickel in syngas: max. 0.8 ppmwt (measured value in commercial gasification plant)
  Hourly emission (one gasifier): 560979 kg/h x 0.8 ppm = 0.561 kg/h (1.237 lb/hr)
  Yearly emission: 60 starts per yr x 1 hr/start x 1.237 lb/hr / 2000 lb/ton = 0.037 tons/yr
- Nickel carbonyl is converted in sulfur recovery (Claus) plant to pure nickel and CO_2. Nickel will be adsorbed by the sulfur catalyst

2.4 Hydrogen Cyanide (HCN)

2.4.1 Place of formation / use

Gasification Reactor

2.4.2 Mechanism of formation

N + C + H -> HCN

2.4.3 Balance

2.4.3.1 Production Rate

Stream Number		3	4a	4	9	10	25
Concentration	mol%	0.0067	0.0066	0.001	0.1943	0.5774	0.64
Flowrate	mol/h	3.82	3.81	0.334	0.351	0.320	0.389
	kg/h	103.2	102.8	9.01	9.46	8.64	10.49

2.4.4 Emissions to atmosphere and emission control

There will be no continuous emission

- Process closed to atmosphere
- Relief to flare during start-up (B2/1, B2/2) and emergency pressure relief;(c1) will convert HCN to NOx
  Maximum HCN emission during start-up (relief periods and flow rates see chapter 3.5):
  Flow rate during start-up: 51.6 kg/h (one gasifier)
  Destruction rate: 98%
  Hourly emission: 51.6 kg/h x 0.02 = 1.03 kg/h (2.27 lb/hr)
  Yearly emission: 60 starts per yr x 1 hr/start x 2.27 lb/hr / 2000 lb/ton = 0.07 tons/yr
- During normal operation the main part of HCN is converted in CO-Shift to H_2O, N_2 and CO_2
- HCN not converted in the CO-Shift is converted in sulfur recovery (Claus) plant to pure H_2O, N_2 and CO_2

2.5 Hydrochloric Acid (HCl)

2.5.1 Place of formation / use

Gasification Reactor

2.5.2 Mechanism of formation

$Cl_2 + H_2 \rightarrow 2\ HCl$

2.5.3 Balance

2.5.3.1 Production Rate

Formed in the gasification reactor the concentration in syngas before quench: 0.0068 mol% (68 ppm) Flowrate 60.5 kg/h (1.67 kmol/h). After quench of the syngas maximum concentration 1 ppm

2.5.4 Emissions to atmosphere and emission control

There will be no continuous emission

- Process closed to atmosphere
- Relief to flare during start-up (B2/1, B2/2 after quench) and emergency pressure relief (b3/1; b3/2).
- Maximum HCl emission during start-up (relief periods and flow rates see chapter 3.5):
  Flowrate of the syngas (one gasifier): 28516.8 kmol/hr
  Concentration of HCl after quench: 1 ppm
  Hourly emission (one gasifier): 28516.8 kmol/hr x 1ppm x 36.45 kg/kmol = 1.04 kg/h (2.29 lb/hr)
  Yearly emission: 60 starts per yr x 1 hr/start x 2.29 lb/hr / 2000 lb/ton = 0.07 tons/yr
  (no HCl destruction in flare)
- During normal operation the quench of the PDQ gasifier and the scrubber wash out the gaseous HCl from the syngas, then HCl will be neutralized with caustic soda.

2.6 Mercury

2.6.1 Place of formation / use

Gasification Reactor (Component of the feed coal)

2.6.2 Mechanism of formation

Released from coal during gasification.

2.6.3 Balance

2.6.3.1 Production Rate

Depending on mercury in the feed coal (none specified in design coal).

2.6.4 Emissions to atmosphere and emission control

There will be no continuous emission

- Process closed to atmosphere
- Relief to flare during start-up (B2/1, B2/2 and C2) and pressure relief (emergency relief; c1) to flare will cause mercury emissions.
- Maximum Mercury emission during start-up (relief periods see chapter 3.5 and 3.7):
  Average Mercury concentration in typical hard coal: 0.1 ppm (maximum: 1 ppm)
  Feed stream of hard coal (one gasifier): 154934 kg/h
  Concentration of Mercury: 0.1 ppm (maximum: 1 ppm)
  Hourly emission: 154934 kg/h x 0.1 ppm = 0.155 kg/h (0.342 lb/hr) [Maximum: 1.55 kg/h (3.42 lb/hr)]
  Yearly emission: (60 starts per yr x 1 hr/start + 4 starts per yr * 0.5 hr/start) x 0.342 lb/hr / 2000 lb/ton = 0.011 tons/yr (Maximum: 0.11 tons/yr)
- During normal operation mercury is adsorbed from the syngas in a fixed bed adsorber behind the acid gas removal.

2.7 Trace Components of Coal

2.7.1 Place of formation / use

The ash from coal can typically contain several trace components listed as HAPS:

- Antimony
- Arsenic
- Beryllium
- Chromium
- Cobalt
- Lead
- Manganese
- Mercury
- Nickel
- Selenium

2.7.2 Mechanism of formation

During gasification of the coal, these components will be enclosed in the slag.

2.7.3 Balance

2.7.3.1 Production Rate

Depending on trace components in the feed coal (none specified in design coal).

2.7.4 Emissions to atmosphere and emission control

There will be no emission

- HAPS are enclosed from slag.
- Solid material will be kept wet, to avoid particle emissions
- During pressure relief (emergency relief; b3/1, b3/2) to flare the slag will be held in the Knock-Out Drum.

2.8 Methanol

2.8.1 Place of formation / use

Methanol Reactor
Rectisol Gas cleaning

2.8.2 Mechanism of formation

$CO + 2 H_2 \rightarrow CH_3OH$
Methanol is used as solvent in Rectisol plant

2.8.3 Balance

Acc. vendor Information methanol concentration in Syngas downstream acid gas removal is 0.0036 mol% (0.05 wt%). Flow rate stream 5 (ex acid gas removal) @ 100% load: 130 kg/h.

2.8.3.1 Production Rate

- Stream 6:
  7671.00 kmol/h total with 93.38 mol% Methanol
  7163 kmol/h (229 216 kg/h) pure Methanol
- Circulation rate Rectisol: hold kg/h

2.8.4 Emissions to atmosphere and emission control

There will be no continuous emissions
- Process closed to atmosphere
- Relief to flare during start-up (C2) and pressure relief to flare (emergency relief c3, d1)
- Maximum Methanol emission during start-up (relief periods and flow rates see chapter 3.7):
  Flow rate during start-up: 130 kg/h
  Destruction rate: 98%
  Hourly emission: 130 kg/h x 0.02 = 2.6 kg/h (5.73 lb/hr)
  Yearly emission: 4 starts per yr x 0.5 hr/start x 5.73 lb/hr / 2000 lb/ton = 0.006 tons/yr).
- Pressure less vessels and tanks are equipped with appropriate emission control (e.g. inert gas blanketing)
- Methanol formed in methanol reactor will be converted to gasoline

2.9 MTG Gasoline

2.9.1 Place of formation

DME and MTG Reactor

2.9.2 Mechanism of formation

2 CH3OH -> CH3OCH3 + H2O (DME Reactor)
n CH3OCH3 -> HC + H2O (MTG Reactor)

2.9.3 Balance

2.9.3.1 Production Rate

Certain HAPS are formed during the MTG reaction process (Ex MTG Reactor) and are contained in the Raw MTG Gasoline. Some HAPS are degraded in the Heavy Gasoline Treatment (HGT) and show a lower concentration in the Final Gasoline product (Balance Stream 8).

Name	CAS Number	Concentration	
		Raw MTG Gasoline	Final Gasoline product (Stream 8)
Methanol	67-56-1	25 ppm	32 ppm
N-Hexane	110-54-3	0.541 mol%	0.735 mol%
Benzene	71-43-2	0.355 mol%	0.486 mol%
Toluene	108-88-3	1.02 mol%	1.61 mol%
Ethyl benzene	100-41-4	0.245 mol%	0.371 mol%
o-Xylene	95-47-6	1.13 mol%	1.93 mol%
m-Xylene	108-36-3	1.08 mol%	2.11 mol%
p-Xylene	106-42-3	2.87 mol%	4.51 mol%
Durene (Isopropyl benzene)	98-82-8	0.025 mol% (250ppm)	0.05 mol% (500 ppm)
Naphthalene	91-20-3	0.011 mol% (110 ppm)	> 1 ppm
1-Methylnaphthalene	90-12-0	0.539 mol%	> 1 ppm
Acetaldehyde	75-07-7	35 ppm	26 ppm
Metyl-Ethyl-Ketone MEK [1)]	78-93-3	0.0375 mol% (375 ppm)	0.05 mol% (500 ppm)
Total Flow Rate		**102325 kg/h**	**87400 kg/h**

1) Delisted

2.9.4 Emissions to atmosphere and emission control

There will be no emissions

- Process closed to atmosphere
- Emergency pressure relief to flare (emergency relief e1)
- Pressure less vessels and tanks are equipped with appropriate emission control (e.g vapor recovery)
- Gasoline is the product of the plant and has to be handled with the usual care similar to crude oil based gasoline

3 Explanation on Emission Points

General:

- For more details of emission points A1, A2, B1, B2 and B3 please refer to Attachment 2.

- Hydrogen supplied to the MTG plant is no direct source of emission (a higher or lower hydrogen supply from the PSA to the MTG respectively doesn't lead to change in the overall plant emission)
- PSA Tailgas is recirculated inside the CTL facility and therefore is no direct source for emissions
- MTG Tailgas during normal plant operation is recirculated inside the CTL facility and therefore is no direct source for emissions; only when both gasifiers are down at the same time (i.e. the coal to methanol plant is shutdown) and the MTG plant is continued to operate using methanol feed from the storage, MTG Tailgas is flared (Emission Point E5)
- Emission calculations have been based on available data and information according to current status of engineering work done for the TGDS CTL project
- Data not calculable at the time being has been estimated based on previous experience (backed up by commercial experience, where possible)
- Start-up emissions have been considered as far as possible
- Emissions by emergency relief have not been considered (refer to emergency relief points as identified in section 4)
- For VOC emission in flare during start-up of gasifier (Emission Point B2) only the methane concentration of the syngas is considered, as syngas contain no other hydrocarbons. AP-42 values are based on a mixture of propane and propylene and do not represent flaring of syngas.
- For VOC emission in flare during start-up of acid gas removal (Emission Point C2), additionally to the methane contained in syngas, methanol entrained in syngas from the Absorber has been considered (as per section 2.8.4).

3.1 A1 Coal Preparation Vent Mill

Continuous emission originates from hot gas generator as well as from coal; gas circulation (and venting rates) in the coal preparation is calculated based on Design Coal data from TGDS; Coal Preparation is a commercially proven design. During normal operation fired with hydrogen, during start-up fired with natural gas.

- CO
Hydrogen is used as heating medium for the drying step; CO comes only from coal devolatilization; specific CO from coal devolatilization has been estimated based on tests that Uhde has performed for other coal.

- NOx
Specific NOx acc. coal preparation vendor (100 ppmv)

- SOx
Only during cold start-up (Heating medium natural gas); Calculated acc. max. sulfur content of natural gas specified by TGDS

- PM
Particle emissions from baghouse filter: industrial standard

- VOC
Value has been calculated based on specific VOC from tests that UHDE has performed for other coal.

3.2 B3 Dry Dust Feeding

Release of overpressure of Feed Bin via pressure control valve – normally no flow to atmosphere (no emission). Gas release only during malfunction of pressure control of the Feed Bin (Gas composition like emission point A2).

3.3 A2 Dry Dust Feeding

Emission only during start-up; Flow rate is determined based on design for feeding cycle, which is derived from the design as commercially demonstrated in the PRENFLO plant in Puertollano, Spain (30 starts per year per gasifier;. i.e. overall 60 gasifier start per year).

- CO
CO residual content in CO2 carrier gas is reduced to less than 1 ppm by CO2 purification step; This can be achieved by state-of-the-art catalytic purification or CO2 stripping;

- NOx
Not applicable (The CO2 contains no NOx)

- SOx
Residual sulfur content specified by AGR vendor (performance demonstrated in commercial plants); the number given is a conservative approach, as the CO2 purification step would further reduce sulfur content.

- PM
Particle emissions from baghouse filter: industrial standard

- VOC
Not applicable (The CO2 contains no VOCs)

3.4 B1 Dry Dust Feeding

In the coal feeding; CO2 (used as carrier gas) is vented during the depressurization of the coal lock hoppers; vent rates are determined by the design of the feeding cycle, which is derived from design as commercially proven in the PRENFLO plant in Puertollano; Calculation is based on 8760 hours operating time per year at full capacity, which is a very conservative approach (real operating hours will be less).

- CO
CO residual content in CO2 carrier gas (some of which is vented during feeding process) is reduced to less than 1 ppm by CO2 purification step; This can be achieved by state-of-the-art catalytic purification or CO2 stripping;

NOx
Not applicable (The CO2 contains no NOx)

- SOx
Residual sulfur content specified by AGR vendor (performance demonstrated in commercial plant); the number given is a conservative approach, as the CO2 purification step would further reduce sulfur content.

- PM
Particle emissions from baghouse filter: industrial standard

- VOC
Not applicable (The CO_2 contains no VOCs)

3.5 B2 Raw Syngas

Emissions are from flaring of raw syngas during start-up of the gasifier; Flaring rate and time is calculated based on commercially proven start-up procedure in PRENFLO plant in Puertollano; Number of start-ups per year has been estimated from commercial experience in Puertollano and other gasification plants, modified by adjustments made in current design such as integration of redundancies, inclusion of lessons learnt etc (30 start per gasifier per year; per start 1hr; max. 620 tons/hr syngas per gasifier).

- CO
Specific CO concentration in flare offgas: assumption acc. flare vendor information (1000 ppmv)

- NOx
Specific NOx concentration in flare offgas: assumption acc. flare vendor information (250ppmv)

- SOx
Calculated acc. conservative assumption of max. sulphur (H_2S) content of syngas based on coal sulfur content; to reduce SOx emission, low sulfur start-up coal has to used during start-ups rather than design coal (e.g. PRB coal). This is readily available from the market. A typical PRB coal composition has been used for calculation of the sulfur concentration;

- PM
Not applicable (smokeless flare acc. table 13.5-1 of AP42)

- VOC
Not applicable (only small methane content in syngas causes some HC emissions)

3.6 C1 CO2 Offgas

Through C1 emissions originating from the CO_2 removed in the AGR as well as from the Regeneration Off-gas of the MTG plant are release, as further explained in the following.

CO2 from AGR
Continuous emission of CO_2 produced during the CO Shift of syngas for adjusting the required H_2 : CO ratio for downstream MeOH synthesis, which is selectively removed in the AGR (total flow rate: 382.4 tons/hr);

- CO
CO residual content is reduced to less than 1 ppmv by CO_2 purification step; This can be achieved by state-of-the-art catalytic purification or CO_2 stripping;
Flow rate offgas: 7883.5 kmol/h
CO concentration offgas: 1 ppmv
CO flow rate: 7883.5 kmol/h x 1 ppmv / 10^6 = 0.00788 kmol/h
Molecular weight CO: 28 kg/kmol
CO flow rate: 0.00788 kmol/h x 28 kg/kmol = 0.22 kg/h
Conversion factor: 1 lb = 0.454 kg
Hourly CO flow rate: 0.22 kg/h / 0.454 kg/lb = 0.49 lb/h
Yearly CO flow rate: 0.49 lb/h x 8000 h / 2000 lb/ton = 1.96 tons/yr

- NOx
Not applicable (The CO_2 offgas contains no NOx)

- SOx
Residual sulfur content specified by AGR vendor (performance demonstrated in commercial plant); the number given is a conservative approach, as the CO2 purification step would further reduce sulfur content.
Flow rate offgas: 7883.5 kmol/h
SOx concentration offgas: 10 ppmv
SOx flow rate: 7883.5 kmol/h x 10 ppmv / 10^6 = 0.0788 kmol/h
Molecular weight SOx: 66 kg/kmol
SOx flow rate: 0.0788 kmol/h x 66 kg/kmol = 5.20 kg/h
Conversion factor: 1 lb = 0.454 kg
Hourly SOx flow rate: 5.20 kg/h / 0.454 kg/lb = 11.56 lb/h
Yearly SOx flow rate: 11.56 lb/h x 8000 h / 2000 lb/ton = 46.25 tons/yr

- PM
Not applicable (The CO2 offgas contains no PM)

- VOC
Not applicable (The CO2 offgas contains no VOCs)

Regeneration Off-Gas
Emission is caused by venting of regeneration Off-gas from the MTG plant (regeneration of catalyst). Calculation of flow rates and emission periods based on actual design and commercial plant experience

- CO
Calculation of emissions based on maximum specific CO concentration of regeneration offgas emitted to atmosphere; regeneration offgas will be routed to CO2 purification section to remove any CO contained down to less than 1 ppm prior to emitting to atmosphere

CO concentration of regeneration offgas emitted: 1 ppmv

Yearly Emission:
Yearly Regen Offgas Flowrate: 10088680 m3n/yr = 356.3 MMscf/yr
CO flow: 10088680 m^3n/yr x 1 ppmv / 10^6 = 10.1 m^3n/hr
Molecular weight CO: 28 kg/mol
Molar volume: 22.414 m^3/kmol
CO flow: 10.1 m^3n/yr / 22.414 m^3/kmol x 28 kg/kmol =12.6 kg/yr
Conversion factor: 1 lb = 0.454 kg
Yearly CO flow rate: 25206 kg/yr / 0.454 kg/lb = 27.76 lb/yr
55519.8 lb/yr / 2000 lb/ton = 0.014 tons/yr

Max. Hourly Emission:
Max Hourly Regen Offgas Flowrate: 7000 m3n/hr = 247 203 scf/hr
CO flow: 7000 m^3n/hr x 2000 ppmv / 10^6 = 0.007 m^3n/hr
Molecular weight CO: 28 kg/mol
Molar volume: 22.414 m^3/kmol
CO flow: 0.007 m^3n/hr / 22.414 m^3/kmol x 28 kg/kmol =0.0087 kg/hr
Conversion factor: 1 lb = 0.454 kg
Maximum Hourly CO flow rate: 17.5 kg/hr / 0.454 kg/lb = 0.0193 lb/hr

- NOx
Not applicable (Regeneration temperatures too low for NOx formation)

- SOx
Not applicable (No sulfur in regeneration gas or catalyst)

- PM

Not applicable (Regeneration gas does not contain any particle matter)

- VOC
Not applicable (Regeneration gas used is nitrogen / air and does not contain VOC)

Total
- CO
Yearly Emission
AGR CO2 + Regeneration Off-Gas = Total
1.96 tons/yr + 0.014 tons/yr = 1.974 tons/yr

Max. Hourly Emission
AGR CO2 + Regeneration Off-Gas = Total
0.49 lb/hr + 0.0193 lb/hr = 0.5093 lb/hr

- NOx
Not applicable

- SOx
Yearly Emission
AGR CO2 + Regeneration Off-Gas = Total
46.25 tons/yr + 0.0 tons/yr = 46.25 tons/yr

Max. Hourly Emission
AGR CO2 + Regeneration Off-Gas = Total
11.56 lb/hr + 0.0 lb/hr = 11.56 lb/hr

- PM
Not applicable

- VOC
Not applicable

3.7 C2 Acid Gas Removal

Emissions are from flaring of clean syngas during start-up. Flaring rate and times has been based on a typical start-up sequence as demonstrated in commercial plants. Number of start-ups has been estimated based on availability figures drawn from commercial experience, the specific TGDS plant design (e.g. parallel trains etc.) and modified by adjustments made such as integration of redundancies, inclusion of lessons learnt etc (4 starts per year; 0.5 hr per start, with 50% load; i.e. max. 140 tons/hr syngas)).

- CO
Specific CO concentration in flare offgas: assumption acc. flare vendor information (1000 ppmv)
Syngas rate to flare: 140 tons/hr
Flue gas rate: 863207 m³n/h
CO concentration flue gas: 1000 ppmv
CO flow: 863207 m³n/h x 1000 ppmv / 10^6 = 863.207 m³n/h
Molecular weight CO: 28 kg/mol
Molar volume: 22.414 m³/kmol
CO flow: 863.207 m³n/h / 22.414 m³/kmol x 28 kg/kmol = 1079 kg/h
Conversion factor: 1 lb = 0.454 kg
Hourly CO flow rate: 1079 kg/h / 0.454 kg/lb = 2375 lb/h
Yearly CO flow rate: 2375 lb/h x 4 starts per year x 0.5 h / 2000 lb/ton = 2.4 tons/yr

- NOx
Specific NOx concentration in flare offgas: assumption acc. flare vendor information (250 ppmv)

Syngas rate to flare: 140 tons/hr
Flue gas rate: 863207 m^3n/h
NOx concentration flue gas: 250 ppmv
NOx flow: 863207 m^3n/h x 250 ppmv / 10^6 = 215.80 m^3n/h
Molecular weight NO2: 46 kg/mol
Molar volume: 22.414 $m^3/kmol$
NOx flow: 215.80 m^3n/h / 22.414 $m^3/kmol$ x 46 kg/kmol = 442.9 kg/h
Conversion factor: 1 lb = 0.454 kg
Hourly NOx flow rate: 481.4 kg/h / 0.454 kg/lb = 957.6 lb/h
Yearly NOX flow rate: 957.6 lb/h x 4 starts per year x 0.5 h / 2000 lb/ton = 0.96 tons/yr

- SOx
Calculated based on conservative assumed average sulfur content of syngas flared of 100 ppmv during start-up. Conservative estimate, as normally the physical solvent process applied in the AGR achieves design specification for sulfur (less than 1 ppm) very quickly.
Syngas rate to flare: 140 tons/hr
Syngas rate to flare: 11561 kmol/h
SOx concentration syngas gas: 100 ppmv
Molecular weight SOx: 66 kg/mol
SOx flow: 11561 kmol/h x 100 ppm x 66 kg/kmol / 10^6 = 76.3 kg/h
Conversion factor: 1 lb = 0.454 kg
Hourly SOx flow rate: 76.3 kg/h / 0.454 kg/lb = 168.1 lb/h
Yearly SOx flow rate: 168.1 lb/h x 4 starts per year x 0.5 h / 2000 lb/ton = 0.17 tons/yr

- PM
Not applicable (smokeless flare acc. table 13.5-1 of AP42)

- VOC

Total flow rate to flare: 11561.1 kmol/h (50% load)
Methane (HC) concentration: 0.006 mol%
Methane (HC) flow: 11561.1 kmol/h x 0.006 mol% / 100 mol% = 0.695 kmol/h
Heating value methane 890000 kJ/kmol
Methane heat flow: 0.695 kmol/h x 890000 kJ/koml / 3600 s/h / 1000 kJ/MJ = 0.172 MW
Conversions factor: 1 MMBTU/hr = 0.29308 MW
Methane heat flow: 0.172 MW / 0.29308 MW/MMBTU/hr = 0.585 MMBTU/hr
Emission factor Total Hydrocarbons acc. table 13.5-1 of AP 42: 0.14 lb/10^6BTU
Hourly HC emission: 0.585 MMBTU/hr x 0.14 lb/10^6BTU = 0.082 lb/hr methane
Hourly VOC emission: 0.082 lb/hr + 5.73 lb/hr MeOH (refer to section 2.8.4) = 5.81
Yearly HC emission: 0.082 lb/hr x 4 starts/yr x 0.5 hr/starts / 2000 lb/tons = 0.000082 tons/yr
Yearly VOC emission: 0.000082 tons/yr + 0.006 tons/yr MeOH (refer to section 2.8.4) = 0.006 tons/yr

3.8 E1 MTG Reaction

Emissions from flue gas of fired heater used during start-up and regeneration of MTG catalyst; Calculation of flow rates and emission periods based on actual design and commercial plant experience (Average 25887.5 MMBTU/yr; Max. 30 MMBTU/hr). During normal operation heater is fired with syngas, during front end shut down (i.e. operation of MTG plant from storage, no syngas available) no regeneration of catalyst will be performed, i.e. heater will not be operated. Syngas (used as fuelgas) has a lower heating value (LHV) of 296 BTU/scf. Therefore average fuelgas flowrate is 87.46 MMscf/yr (max. 101351 scf/hr). Flue Gas Flow rate can be derived from fuelgas flowrate (for syngas fuelgas) by multiplying with a factor of 3.02.

- CO
CO specific concentration based on industrial standard for fired heaters (120 ppmv)

Yearly Emission:
Flue gas rate: 7475169 m^3n/yr = 264 MMscf/hr

CO concentration flue gas: 120 ppmv
CO flow: 7475169 m^3n/yr x 120 ppmv / 10^6 = 897.02 m^3n/yr
Molecular weight CO: 28 kg/mol
Molar volume: 22.414 $m^3/kmol$
CO flow: 897.02 m^3n/yr / 22.414 $m^3/kmol$ x 28 kg/kmol = 1120.6 kg/yr
Conversion factor: 1 lb = 0.454 kg
Yearly CO flow rate: 1120.6 kg/yr / 0.454 kg/lb = 2468.2 lb/yr
Yearly CO flow rate: 2468.2 lb/yr / 2000 lb/ton = 1.24 tons/yr

Max. Hourly Emissions:
Max. flue gas rate: 8862 m^3n/hr = 306080 scf/hr
CO concentration flue gas: 120 ppmv
CO flow: 8862 m^3n/hr x 120 ppmv / 10^6 = 1.063 m^3n/hr
Molecular weight CO: 28 kg/mol
Molar volume: 22.414 $m^3/kmol$
CO flow: 1.063 m^3n/hr / 22.414 $m^3/kmol$ x 28 kg/kmol =1.33 kg/hr
Conversion factor: 1 lb = 0.454 kg
Maximum Hourly CO flow rate: 1.33 kg/hr / 0.454 kg/lb = 1.93 lb/hr

- NOx
NOx specific concentration based on industrial standard for fired heaters (100 ppmv)

Yearly Emission:
Flue gas rate: 7475169 m^3n/yr = 264 MMscf/hr
NOx concentration flue gas: 100 ppmv
NOx flow: 7475169 m^3n/yr x 100 ppmv / 10^6 = 747.5 m^3n/yr
Molecular weight NO2: 46 kg/mol
Molar volume: 22.414 $m^3/kmol$
NOx flow: 747.5 m^3n/yr / 22.414 $m^3/kmol$ x 46 kg/kmol = 1534.1 kg/yr
Conversion factor: 1 lb = 0.454 kg
Yearly NOx flow rate: 1534.1.1 kg/yr / 0.454 kg/lb = 3379 lb/yr
Yearly NOx flow rate: 3679 lb/yr / 2000 lb/ton = 1.69 tons/yr

Max. Hourly Emissions:
Max. flue gas rate: 8862 m^3n/hr = 306080 scf/hr
NOx concentration flue gas: 100 ppmv
NOx flow: 8862 m^3n/hr x 100 ppmv / 10^6 = 0.886 m^3n/hr
Molecular weight NOx: 46 kg/mol
Molar volume: 22.414 $m^3/kmol$
NOx flow: 0.886 m^3n/hr / 22.414 $m^3/kmol$ x 46 kg/kmol =1.82 kg/hr
Conversion factor: 1 lb = 0.454 kg
Maximum Hourly NOx flow rate: 1.82 kg/hr / 0.454 kg/lb = 4.01 lb/hr

- SOx
Not applicable (Heated with sulfur-free syngas)

- PM

Based on natural gas estimated PMs (since syngas is used as fuel gas (main components CO and H2) the real values will be significantly lower, as soot formation from syngas is lower than from natural gas):

Yearly Emission
Heat Requirement 25887.5 MMBTU/yr

Emission factor acc. Table 1.4-2 of AP 42 (PM total): 7.6 lb/10^6 scf
Average heating value of natural gas: 1020 BTU/scf
Yearly PM emission: 25887.5 MMBTU/yr x 7.6 lb/10^6 scf / (1020 MMBTU/ 10^6 scf) = 192.9 lb/yr
192.9 lb/yr / 2000 lb/ton = 0.10 tons/yr

Max. Hourly Emission:
Max. Heat Requirement 30 MMBTU/hr
Emission factor acc. Table 1.4-2 of AP 42 (PM total): 7.6 lb/10^6 scf
Average heating value of natural gas: 1020 BTU/scf
Max. Hourly PM emission: 30 MMBTU/hr x 7.6 lb/10^6 scf / (1020 MMBTU/ 10^6 scf) = 0.223 lb/hr

- VOC
Based on natural gas estimated VOC (since syngas is used as fuel gas (main components CO and H2) the real values will be significantly lower since syngas has no source VOC):

Yearly Emissions:
Heat Requirement 25887.5 MMBTU/yr
Emission factor acc. Table 1.4-2 of AP 42 (VOC): 5.5 lb/10^6 scf
Average heating value of natural gas: 1020 BTU/scf
Yearly VOC emission: 25887.5 MMBTU/yr x 5.5 lb/10^6 scf / 1020 MMBTU/yr /10^6 scf = 139.6 lb/yr
139.6 lb/yr / 2000 lb/ton = 0.07 tons/yr

Max. Hourly Emissions
Max. Heat Requirement 30 MMBTU/hr
Emission factor acc. Table 1.4-2 of AP 42 (VOC): 5.5 lb/10^6 scf
Average heating value of natural gas: 1020 BTU/scf
Max. Hourly VOC emission: 30 MMBTU/yr x 5.5 lb/10^6 scf / (1020 MMBTU /10^6 scf) = 0.162 lb/hr

3.9 E2 MTG Reaction

Emissions from flue gas of fired heater used during start-up and regeneration /reactivation of MTG catalyst; Calculation of flow rates and emission periods based on actual design and commercial plant experience (67466.4 MMBTU/yr; Max. 120 MMBTU/hr). During normal operation heater is fired with syngas, during front end shut down (i.e. operation of MTG plant from storage, no syngas available) no regeneration of catalyst will be performed, i.e. heater will not be operated. Syngas (used as fuelgas) has a lower heating value (LHV) of 296 BTU/scf. Therefore average fuelgas flowrate is 227.9 MMscf/yr (max. 405405 scf/hr). Flue Gas Flow rate can be derived from fuelgas flowrate (for syngas fuelgas) by multiplying with a factor of 3.02.

- CO
CO specific concentration based on industrial standard for fired heaters (120 ppmv)

Yearly Emission:
Flue gas rate: 19479418 m^{3}n/yr = 687.9 MMscf/yr
CO concentration flue gas: 120 ppmv
CO flow: 19479418 m^{3}n/yr x 120 ppmv / 10^6 = 2337.5 m^{3}n/yr
Molecular weight CO: 28 kg/mol
Molar volume: 22.414 m^3/kmol
CO flow: 2337.5 m^{3}n/yr / 22.414 m^3/kmol x 28 kg/kmol = 2920 kg/yr
Conversion factor: 1 lb = 0.454 kg

Yearly CO flow rate: 2920 kg/yr / 0.454 kg/lb = 6432 lb/yr
Yearly CO flow rate: 6432 lb/yr / 2000 lb/ton = 3.22 tons/yr

Max. Hourly Emission:
Max. flue gas rate: 34647 m^3n/hr = 1223547 scf/hr
CO concentration flue gas: 120 ppmv
CO flow: 34647 m^3n/hr x 120 ppmv / 10^6 = 4.16 m^3n/hr
Molecular weight CO: 28 kg/mol
Molar volume: 22.414 $m^3/kmol$
CO flow: 4.16 m^3n/hr / 22.414 $m^3/kmol$ x 28 kg/kmol =5.19 kg/hr
Conversion factor: 1 lb = 0.454 kg
Maximum Hourly CO flow rate: 5.19 kg/hr / 0.454 kg/lb = 11.44 lb/hr

-NOx
NOx specific concentration based on industrial standard for fired heaters (100 ppmv)

Yearly Emission:
Flue gas rate: 19479418 m^3n/yr = 687.9 MMscf/yr
NOx concentration flue gas: 100 ppmv
NOx flow: 19479418 m^3n/yr x 100 ppmv / 10^6 = 1948 m^3n/yr
Molecular weight NO2: 46 kg/mol
Molar volume: 22.414 $m^3/kmol$
NOx flow: 1948 m^3n/yr / 22.414 $m^3/kmol$ x 46 kg/kmol = 3997.9 kg/yr
Conversion factor: 1 lb = 0.454 kg
Yearly NOx flow rate: 3997.9 kg/yr / 0.454 kg/lb = 8806 lb/yr
Yearly NOx flow rate: 8806 lb/yr / 2000 lb/ton = 4.4 tons/yr

Max. Hourly Emissions:
Max. flue gas rate: 34647 m^3n/hr= 1223547 scf/hr
NOx concentration flue gas: 100 ppmv
NOx flow: 34647 m^3n/hr x 100 ppmv / 10^6 = 3.46 m^3n/hr
Molecular weight NO2: 46 kg/mol
Molar volume: 22.414 $m^3/kmol$
NOx flow: 3.46 m^3n/hr / 22.414 $m^3/kmol$ x 46 kg/kmol =7.1 kg/hr
Conversion factor: 1 lb = 0.454 kg
Maximum Hourly NOx flow rate: 7.1 kg/hr / 0.454 kg/lb = 15.64 lb/hr

- SOx
Not applicable (Heated with sulfur-free syngas)

- PM
Based on natural gas estimated PMs (since syngas is used as fuel gas (main components CO and H2) the real values will be significantly lower, as soot formation from syngas is lower than from natural gas):

Yearly Emission:
Heat Requirement 67466.4 MMBTU/yr
Emission factor acc. Table 1.4-2 of AP 42 (PM total): 7.6 lb/10^6 scf
Average heating value of natural gas: 1020 BTU/scf
Yearly PM emission: 67466.4 MMBTU/yr x 7.6 lb/10^6 scf / 1020 MMBTU/yr /10^6 scf = 502.7 lb/yr
502.7 lb/yr / 2000 lb/ton = 0.25 tons/yr

Max. Hourly Emission:
Max. Heat Requirement 120 MMBTU/hr
Emission factor acc. Table 1.4-2 of AP 42 (PM total): 7.6 lb/10^6 scf
Average heating value of natural gas: 1020 BTU/scf

Max. Hourly PM emission: 120 MMBTU/hr x 7.6 lb/10^6 scf / (1020 MMBTU/ 10^6 scf) = 0.89 lb/hr

- VOC
Based on natural gas estimated VOC (since syngas is used as fuel gas (main components CO and H2) the real values will be significantly lower since syngas has no source VOC)::

Yearly Emission
Heat Requirement 67466.4 MMBTU/yr
Emission factor acc. Table 1.4-2 of AP 42 (VOC): 5.5 lb/10^6 scf
Average heating value of natural gas: 1020 BTU/scf
Yearly VOC emission: 67466.4 MMBTU/yr x 5.5 lb/10^6 scf / 1020 MMBTU/yr /10^6 scf = 363.8 lb/yr
363.8 lb/yr / 2000 lb/ton = 0.18 tons/yr

Max. Hourly Emission:
Max. Heat Requirement 120 MMBTU/hr
Emission factor acc. Table 1.4-2 of AP 42 (VOC): 5.5 lb/10^6 scf
Average heating value of natural gas: 1020 BTU/scf
Max. Hourly VOC emission: 120 MMBTU/yr x 5.5 lb/10^6 scf / (1020 MMBTU /10^6 scf) = 0.65 lb/hr

3.10 E3 MTG HGT

Emissions from flue gas of fired heater used as pre-heater for the heavy gasoline treatment step in the MTG plant. Calculation of flow rates based on actual design and commercial plant experience (25280 MMBTU/yr; Max. 4 MMBTU/hr). During normal operation heater is fired with syngas, during front end shut down (i.e. operation of MTG plant from storage, no syngas available), operation with MTG fuel gas (this will be 4 times a year, each 10 hours, refer also to Emission Point E5). Syngas (used as fuelgas) has a lower heating value (LHV) of 296 BTU/scf. Therefore average fuelgas flowrate is 85.41 MMscf/yr (max. 13514 scf/hr). Flue Gas Flow rate can be derived from fuelgas flowrate (for syngas fuelgas) by multiplying with a factor of 3.02.

- CO
CO specific concentration based on industrial standard for fired heaters (120 ppmv)

Yearly Emission:
Flue gas rate: 7296000 m^3n/yr = 258 MMscf/yr
CO concentration flue gas: 120 ppmv
CO flow: 7296000 m^3n/yr x 120 ppmv / 10^6 = 875.5 m^3n/yr
Molecular weight CO: 28 kg/mol
Molar volume: 22.414 $m^3/kmol$
CO flow: 875.5 m^3n/yr / 22.414 $m^3/kmol$ x 28 kg/kmol = 1094 kg/yr
Conversion factor: 1 lb = 0.454 kg
Yearly CO flow rate: 1094 kg/yr / 0.454 kg/lb = 2409 lb/yr
Yearly CO flow rate: 2409 lb/yr / 2000 lb/ton = 1.20 tons/yr

Max. Hourly Emission:
Max. flue gas rate: 1155 m^3n/hr = 40812 scf/hr
CO concentration flue gas: 120 ppmv
CO flow: 1155 m^3n/hr x 120 ppmv / 10^6 = 0.14 m^3n/hr
Molecular weight CO: 28 kg/mol
Molar volume: 22.414 $m^3/kmol$
CO flow: 0.14 m^3n/hr / 22.414 $m^3/kmol$ x 28 kg/kmol =0.17 kg/hr
Conversion factor: 1 lb = 0.454 kg

Maximum Hourly CO flow rate: 0.17 kg/hr / 0.454 kg/lb = 0.381 lb/hr

- NOx

NOx specific concentration based on industrial standard for fired heaters (100 ppmv)

Yearly Emission:
Flue gas rate: 7296000 m^3n/yr = 258 MMscf/yr
NOx concentration flue gas: 100 ppmv
NOx flow: 7296000 m^3n/yr x 100 ppmv / 10^6 = 729.6 m^3n/yr
Molecular weight NO2: 46 kg/mol
Molar volume: 22.414 m^3/kmol
NOx flow: 729.6 m^3n/yr / 22.414 m^3/kmol x 46 kg/kmol = 1497.4 kg/yr
Conversion factor: 1 lb = 0.454 kg
Yearly NOx flow rate: 1497.4 kg/yr / 0.454 kg/lb = 3298.2 lb/yr
Yearly NOx flow rate: 3298.2 lb/yr / 2000 lb/ton = 1.65 tons/yr

Max. Hourly Emissions:
Max. flue gas rate: 1155 m^3n/hr = 40812 scf/hr
NOx concentration flue gas: 100 ppmv
NOx flow: 1155 m^3n/hr x 100 ppmv / 10^6 = 0.12 m^3n/hr
Molecular weight NO2: 46 kg/mol
Molar volume: 22.414 m^3/kmol
NOx flow: 0.12 m^3n/hr / 22.414 m^3/kmol x 46 kg/kmol =0.25 kg/hr
Conversion factor: 1 lb = 0.454 kg
Maximum Hourly NOx flow rate: 0.26 kg/hr / 0.454 kg/lb = 0.55 lb/hr

- SOx

Not applicable (Heated with sulfur free syngas)

- PM

Based on natural gas estimated PMs (since syngas is used as fuel gas (main components CO and H2) the real values will be significantly lower, as soot formation from syngas is lower than from natural gas):

Yearly Emission:
Heat Requirement 25280 MMBTU/yr
Emission factor acc. Table 1.4-2 of AP 42 (PM total): 7.6 lb/10^6 scf
Average heating value of natural gas: 1020 BTU/scf
Yearly PM emission: 25280 MMBTU/yr x 7.6 lb/10^6 scf / 1020 MMBTU/yr /10^6 scf = 188.4 lb/yr
188.4 lb/yr / 2000 lb/ton = 0.09 tons/yr

Max. Hourly Emission:
Max. Heat Requirement 4 MMBTU/hr
Emission factor acc. Table 1.4-2 of AP 42 (PM total): 7.6 lb/10^6 scf
Average heating value of natural gas: 1020 BTU/scf
Max. Hourly PM emission: 4 MMBTU/hr x 7.6 lb/10^6 scf / (1020 MMBTU/ 10^6 scf) = 0.03 lb/hr

- VOC

Based on natural gas estimated VOC (since syngas is used as fuel gas (main components CO and H2) the real values will be significantly lower since syngas has no source VOC):

Yearly Emission:
Heat Requirement 25280 MMBTU/yr
Emission factor acc. Table 1.4-2 of AP 42 (VOC): 5.5 lb/10^6 scf

Average heating value of natural gas: 1020 BTU/scf
Yearly VOC emission: 25280 MMBTU/yr x 5.5 lb/10^6 scf / 1020 MMBTU/yr /10^6 scf = 163.3 lb/yr
163.3 lb/yr / 2000 lb/ton = 0.07 tons/yr

Max. Hourly Emission:
Max. Heat Requirement 4 MMBTU/hr
Emission factor acc. Table 1.4-2 of AP 42 (VOC): 5.5 lb/10^6 scf
Average heating value of natural gas: 1020 BTU/scf
Max. Hourly VOC emission: 4 MMBTU/yr x 5.5 lb/10^6 scf / (1020 MMBTU /10^6 scf) = 0.022 lb/hr

3.11 E4 MTG Reaction

MTG Regeneration Off-Gas is routed to the CO2 purification (Stream 31). All emissions of the Regeneration Off-Gas is added to Emission Point C1.

3.12 E5 MTG Separation

Emission is caused by flaring of MTG tail gas, when MTG plant is in operation (using MeOH feed from storage) and entire front end plant is down – in this case tailgas cannot be recycled to front end plant as normally. Flaring rate is based on actual design and commercial plant experience. Flaring periods are derived from availability data of commercial plants for different plant sections, as well as current design and modification such as lessons learnt etc. (4 times per year, each 10 hr, total flow rate 3.89 tons/h); The approach to calculate emissions based on complete flaring MTG tailgas is conservative, because actually part of the tail gas could also be utilized as fuel gas in fired heaters of the MTG process. This will further reduce the emissions.

- CO
Specific CO concentration in flare offgas: assumption acc. flare vendor information (1000 ppmv)
Flowrate to flare: 7780 lb/hr
Flue gas rate: 18853 m^3n/h = 665781 scf/hr
CO concentration flue gas: 1000 ppmv
CO flow: 18853 m^3n/h x 1000 ppmv / 10^6 = 18.85 m^3n/h
Molecular weight CO: 28 kg/mol
Molar volume: 22.414 m^3/kmol
CO flow: 18.85 m^3n/h / 22.414 m^3/kmol x 28 kg/kmol = 23.55 kg/h
Conversion factor: 1 lb = 0.454 kg
Hourly CO flow rate: 23.55 kg/h / 0.454 kg/lb = 51.88 lb/h
Yearly CO flow rate: 51.88 lb/h x 4 times per year x 10 h / 2000 lb/ton = 1.04 tons/yr

- NOx
Specific NOx concentration in flare offgas: assumption acc. flare vendor information (250 ppm)
Flowrate to flare: 7780 lb/hr
Flue gas rate: 18853 m^3n/h = 665781 scf/hr
NOx concentration flue gas: 250 ppmv
NOx flow: 18853 m^3n/h x 250 ppmv / 10^6 = 4.71 m^3n/h
Molecular weight NO2: 46 kg/mol
Molar volume: 22.414 m^3/kmol
NOx flow: 4.71 m^3n/h / 22.414 m^3/kmol x 46 kg/kmol = 9.67 kg/h
Conversion factor: 1 lb = 0.454 kg
Hourly NOx flow rate: 9.67 kg/h / 0.454 kg/lb = 21.3 lb/h
Yearly NOX flow rate: 21.3 lb/h x 4 times per year x 10 h / 2000 lb/ton = 0.43 tons/yr

- SOx
Not applicable (no sulfur in tailgas)

- PM
Not applicable (smokeless flare acc. table 13.5-1 of AP42)

- VOC
Flow rate to flare: 7780 lb/hr
Heating value: 18325 BTU/lb
Heat input to flare: 7780 lb/hr x 18325 BTU/lb = 142 600 000 BTU/hr = 142.6 MMBTU/hr
Emission factor Total Hydrocarbons acc. table 13.5-1 of AP 42: 0.14 lb/MMBTU
Total Hydrocarbons emission: 142.6 MMBTU/hr x 0.14 lb/MMBTU = 19.96 lb/hr
Yearly HC emission: 19.96 lb/hr x 4 times per yr x 10 hr/times per yr = 798.4 lb/yr
798.4 lb/yr / 2000 lb/tons = 0.4 tons/yr

3.13 F Start-up Steam Boiler

Emission results from firing of natural gas in a start-up steam boiler (81.84 MMBTU/hr) during cold start-up of the plant; Flow rates and periods for fuel gas are derived from calculation based on assumed steam requirements and start-up time for CTL plant start-up as per other design studies for CTL plants (4 starts per year, each 96 hr); Operation with natural gas, which has an heating value of 1020 BTU/scf. Fuelgas flow rate is 83890 scf/hr. Flue gas rate can be derived from fuel gas flowrate (for natural gas) by multiplying with a factor of approx. 12.9.

- CO
CO specific concentration based on industrial standard for fired heaters (120 ppmv)
Flue gas rate: 30631 m³n/h = 1081724 scf/hr
CO concentration flue gas: 120 ppmv
CO flow: 30631 m³n/h x 120 ppmv / 10^6 = 3.68 m³n/h
Molecular weight CO: 28 kg/mol
Molar volume: 22.414 m³/kmol
CO flow: 3.68 m³n/h / 22.414 m³/kmol x 28 kg/kmol = 4.59 kg/h
Conversion factor: 1 lb = 0.454 kg
Hourly CO flow rate: 4.59 kg/h / 0.454 kg/lb = 10.11 lb/h
Yearly CO flow rate: 10.11 lb/h x 4 starts per year x 96 h per start / 2000 lb/ton = 1.94 tons/yr

- NOx
NOx specific concentration based on industrial standard for fired heaters (100 ppmv)
Flue gas rate: 30631 m³n/h = 1081724 scf/hr
NOx concentration flue gas: 100 ppmv
NOx flow: 30831 m³n/h x 100 ppmv / 10^6 = 3.08 m³n/h
Molecular weight NO2: 46 kg/mol
Molar volume: 22.414 m³/kmol
NOx flow: 3.08 m³n/h / 22.414 m³/kmol x 46 kg/kmol = 6.32 kg/h
Conversion factor: 1 lb = 0.454 kg
Hourly NOx flow rate: 6.32 kg/h / 0.454 kg/lb = 13.92 lb/h
Yearly NOX flow rate: 13.92 lb/h x 4 starts per year x 96 h per start / 2000 lb/ton = 2.67 tons/yr

- SOx
Calculated acc. max. sulfur content of natural gas specified by TGDS
Fuel gas rate: 2380 m³n/h = 83890 scf/hr
Molar volume: 22.414 m³/kmol
Fuel gas rate: 2380 m³n/h / 22.414 = 106 kmol/h
Sulfur concentration syngas gas: 20 ppmv
Molecular weight sulfur: 66 kg/mol
SOx flow: 106 kmol/h x 20 ppm x 66 kg/kmol / 10^6 = 0.14 kg/h
Conversion factor: 1 lb = 0.454 kg
Hourly SOx flow rate: 0.14 kg/h / 0.454 kg/lb = 0.31 lb/h
Yearly SOx flow rate: 0.31 lb/h x 4 starts per year x 0.5 h / 2000 lb/ton = 0.06 tons/yr

- PM
Based on natural gas estimated PMs:
Heat Requirement 81.84 MMBTU/hr
Average heating value of natural gas: 1020 BTU/scf
Emission factor acc. Table 1.4-2 of AP 42 (PM total): 7.6 lb/10^6 scf
Hourly PM emission: 81.84 MMBTU/yr x 7.6 lb/10^6 scf / 1020 MMBTU/yr /10^6 scf = 0.61 lb/hr
Yearly PM emission: 0.61 lb/yr / 2000 lb/ton x 4 start/yr x 96 hr/start = 0.12 tons/yr

- VOC
Based on natural gas estimated VOC (since syngas is used as fuel gas (main components CO and H2) the real values will be lower):
Heat Requirement 81.84 MMBTU/hr
Emission factor acc. Table 1.4-2 of AP 42 (VOC): 5.5 lb/10^6 scf
Average heating value of natural gas: 1020 BTU/scf
Hourly VOC emission: 81.84 MMBTU/hr x 5.5 lb/10^6 scf / 1020 MMBTU/yr /10^6 scf = 0.44 lb/yr
Yearly VOC emission: 0.44 lb/yr / 2000 lb/ton x 4 start/yr x 96 hr/start = 0.09 tons/yr

3.14 G Flare

Emission result from pilot flame operation of the flare (operating with natural gas); Flow rates and number of pilot burners are based on typical flare data; Flare Flue gas flow can be derived from natural gas feed to pilot burners multiplied with factor of approx. 12.7

- CO
Specific CO concentration in flare offgas: assumption based on conversion rate of 99.5 (typical value for natural gas burning in flare)
Natural gas flow rate to flare: 25 m³n/h = 880 scf/hr
Natural gas conversion rate: 99.5 %
Molecular weight CO: 28 kg/mol
Molar volume: 22.414 m³/kmol
CO flow: (1-0.995) x 25 m³n/h / 22.414 m³/kmol x 28 kg/kmol = 0.16 kg/h
Conversion factor: 1 lb = 0.454 kg
Hourly CO flow rate: 0.15 kg/h / 0.454 kg/lb = 0.35 lb/h
Yearly CO flow rate: 0.35 lb/h x 8760 h / 2000 lb/ton = 1.54 tons/yr

- NOx
Specific NOx concentration in flare offgas: assumption acc. flare vendor information (250 ppmv)
Natural gas flow rate to flare: 25 m³n/h = 880 scf/hr
Flue gas rate: 317.5 m³n/h = 11176 scf/hr
NOx concentration flue gas: 250 ppmv
NOx flow: 317.5 x 250 ppmv / 10^6 = 0.08 m³n/h
Molecular weight NO2: 46 kg/mol
Molar volume: 22.414 m³/kmol
NOx flow: 0.08 m³n/h / 22.414 m³/kmol x 46 kg/kmol = 0.164 kg/h
Conversion factor: 1 lb = 0.454 kg
Hourly NOx flow rate: 0.164 kg/h / 0.454 kg/lb = 0.36 lb/h
Yearly NOX flow rate: 0.36 lb/h x 8760 h / 2000 lb/ton = 1.58 tons/yr

- SOx
Calculated acc. max. sulfur content of natural gas specified by TGDS
Natural gas flow rate to flare: 25 m³n/h = 880 scf/hr
Molar volume: 22.414 m³/kmol
Natural gas flow rate to flare: 25 m³n/h / 22.414 m³/kmol = 1.12 kmol/h
SOx concentration natural gas: 20 ppmv
Molecular weight SOx: 66 kg/mol
SOx flow: 1.12 kmol/h x 20 ppm x 66 kg/kmol / 10^6 = 0.0015 kg/h

Conversion factor: 1 lb = 0.454 kg
Hourly SOx flow rate: 0.0015 kg/h / 0.454 kg/lb = 0.0033 lb/h
Yearly SO flow rate: 0.0033 lb/h x 8760 h / 2000 lb/ton = 0.015 tons/yr

- PM
Flow rate to flare for pilot burners: 25 m^3n/h = 880 scf/hr
Conversions factor: 1 scf = 0.02686 m^3n
Flow rate: 25 m^3n/h / 0.02686 m^3n/scf = 931 scf/hr
Emission factor total PM acc. table 1.4-2 of AP 42: 7.6 lb/10^6scf
Hourly PM emission: 931 scf/hr x 7.6 lb/10^6scf / 10^6 = 0.0071 lb/hr
Yearly PM emission: 0.0071 lb/hr x 8760 hr/yr = 62.2 lb/yr
62.2 lb/yr / 2000 lb/tons = 0.031 tons/yr

- VOC
Flow rate to flare for pilot burners: 25 m^3n/h = 880 scf/hr
Conversions factor: 1 scf = 0.02686 m^3n
Flow rate: 25 m^3n/h / 0.02686 m^3n/scf = 931 scf/hr
Emission factor VOC acc. table 1.4-2 of AP 42: 5.5 lb/10^6scf
Hourly VOC emission: 931 scf/hr x 5.5 lb/10^6scf / 10^6 = 0.0051 lb/hr
Yearly VOC emission: 0.0051 lb/hr x 8760 hr/yr = 44.9 lb/yr
44.5 lb/yr / 2000 lb/tons = 0.022 tons/yr

3.15 Safety Valves

All safety relieve valves or rupture discs open only in case of emergencies or malfunctions.
Typical relief cases are for example:

§ Fire / Explosion
§ Power failure
§ Utility (e.g. cooling water, stream) failure
§ Operator failure
§ Etc.

List of main safety valves

Safety Valve Number	Operation	Blow of	Remark
a1/1 to a1/5	Coal Preparation	to atm	
b1/1 and b1/2	Coal Dust Feeding	to atm	
b2/1 and b2/2	Gasification/Scrubbing	to flare	
b3/1 and b3/2	Slag Removal	to flare	
c1	CO Shift	to flare	
c2	Sour Water Stripping	to flare	
c3	Acid Gas Removal	to flare	
c4	CO2 Offgas	to atm	
c5	CO Shift Steam Boiler	to atm	
c6	Sulfur Recovery	to atm	
c7	Sulfur Recovery Tail Gas	to atm	
d1	Methanol Reaction	to flare	
d2	Methanol Reaction	to atm	
e1	MTG	to flare	
e2	MTG	to atm	

3.16 Leak emissions estimate

The calculation of the fugitive emissions are based on the report EPA-453/R-95-017 (1995 Protocol for Equipment Leak Emission Estimates). Potential emission calculation is based on table 2-1, emission control is based on table 5-1 and 5-2.

For Detail calculation refer to attachment 3.

Leak emission overview CO

Unit	Potential	Actual
	ton/yr	ton/yr
Gasification incl. scrubbing	8.80	1.01
CO-Shift	4.82	0.63
Acid Gas Removal	9.33	0.99
Methanol Synthesis	18.53	1.71
PSA	19.05	2.39
	Total	6.73

Leak emission overview SOx (H2S as SOx equivalent)

Unit	Potential	Actual
	ton/yr	ton/yr
Gasification incl. scrubbing	0.115	0.011
CO-Shift	0.047	0.008
Acid Gas Removal	0.124	0.01
Slurry & Sour Water Stripping, Sulfur Recovery (Sour Gas)	1.288	0.16
Sulfur Recovery (Acid Gas)	3.26	0.560
	Total	0.749

Leak emission overview H2S (HAP)

Unit	Potential	Actual
	ton/yr	ton/yr
Gasification incl. scrubbing	0.061	0.006
CO-Shift	0.025	0.004
Acid Gas Removal	0.066	0.005
Slurry & Sour Water Stripping, Sulfur Recovery (Sour Gas)	0.684	0.085
Sulfur Recovery (Acid Gas)	1.73	0.297
	Total	0.397

Leak emission overview VOC

Unit	Potential	Actual
	ton/yr	ton/yr
Acid Gas Removal	32.83	1.03
Methanol Synthesis	6.26	0.30
MTG	117.73	11.74
	Total	13.07

Leak emission overview Methanol (HAP)

Unit	Potential	Actual
	ton/yr	ton/yr
Acid Gas Removal	32.83	1.03
Methanol Synthesis	6.26	0.30
MTG	34.77	0.73
	Total	2.06

4 Block Flow Diagram

Please find requested Block Flow Diagram as Attachment 1 hereto.

The points a1, b1, b2, b3, c1, c2, c3, c4, c5, c6, c6, d1, d2, e1 and e2 indicate emergency relieve points (safety valve or rupture disk) and therefore are not considered for overall emission calculation.

4.1 Stream Numbers and designations

Following hereafter is a short description of each stream shown in the Block Flow Diagram

Stream No.	Stream Description	Remark
1	Coal as received from Coal Stockpile to Coal Preparation	
2	Coal Dust (dried) from Coal Preparation to Gasification	
3	Raw Syngas from Gasification to CO Shift	Flared during start-up of gasification (Emission Point B2)
4	Shifted Syngas from CO Shift to Acid Gas Removal	
5	Clean Syngas from Acid Gas Removal to Methanol	Flared during start-up of Acid Gas Removal; Used also as fuel gas for fired heaters in the MTG plant (Emission Points E1, E2, E3)
6	Crude Methanol from Methanol Plant to MTG Plant	
7	LPG Product	
8	Gasoline Product	
9	Acid Gas from Acid Gas Removal to Sulfur Recovery Plant	
10	Sour Gas from Gasification to Sulfur Recovery Plant	
11	Elementary Sulfur Product	
12	Hydrogen Rich Gas to PSA	
14	Hydrogen to MTG Plant	
15	PSA Tail Gas from PSA to CO Shift	
16	CO2 from Acid Gas Removal to CO2 Purification	
17	CO2 from CO2 Purification to Atmosphere	Emission Point C1; originating from Stream 16 and Stream 31
18	CO Shift Condensate to Sour Water Stripper	
19	Stripped Condensate from Sour Water Stripper to Gasification	
20	MTG Condensate from MTG Plant to	

	Gasification	
21	Water from Gasification to Water Treatment	
22	Make-up water from Water Treatment to Gasification	
23a	Slag from Gasification to Battery Limit	
23b	Filter Cake from Gasification to Battery Limits	
24	Lime from Lime Stockpile to Coal Preparation	
25	Sour Gas from Sour Gas Stripper to Sulfur Recovery Plant	
26	CO2 from CO2 purification to Coal Preparation and Gasification	Used for pressurizing and carrier gas in coal feeding (Source for Emission Point A2, B1, B3)
27	CO2 released from coal feeding (gasification plant) to atmosphere during pressurization and feeding cycle	Emission Point B1
29	Oxygen from Air Separation to Gasification	
30	Tail Gas Recycle from Sulfur Recovery Plant to Acid Gas Removal	
31	MTG Regeneration Off-Gas	New stream

5 Emission Summary

In the "Remarks" columns the letters C, D and S have following meaning:

C: Continuous during normal operation
D: Discontinuous during normal operation
S: Occurs during start-up

CO:

Emission Point	Yearly Emission (as short tons / year)	Max. Emissions (as lbs/hr)	Remarks
A1	20.43	5.375	C + S
A2	<<0.1	<< 1.1	S
B1	0.55	0.13	C + S
B2	24.8	827	S
B3	-	-	Emergency relief only
C1	1.974	0.51	C + S
C2	2.4	2375	S
E1	1.24	1.93	D + S
E2	3.22	11.44	D + S
E3	1.2	0.381	C + S
E5	1.04	51.88	D
F	1.94	10.11	S
G	1.54	0.35	C
Leaks	6.73	n.a. [1]	C
Total TPY	68.06		

Note 1: Max. Emissions from leaks cannot be quantified

NOx

Emission Point	Yearly Emission (as short tons / year)	Max. Emissions (as lbs/hr)	Remarks
A1	25.26	7.25	C + S
A2	-	-	S
B1	-	-	C + S
B2	10	333	S
B3	-	-	Emergency relief only
C1	-	-	C + S
C2	0.96	957.6	S
E1	1.69	4.01	D + S
E2	4.4	15.64	D + S
E3	1.65	0.55	C + S
E5	0.43	21.3	D
F	2.67	13.92	S
G	1.58	0.36	C
Total TPY	48.7		

SOx

Emission Point	Yearly Emission (as short tons / year)	Max. Emissions (as lbs/hr)	Remarks
A1	0.24	3	C + S
A2	0.06	0.67	S
B1	12.56	2.87	C + S
B2	32	1066	S
B3	-	-	Emergency relief only
C1	46.25	11.56	C + S
C2	0.17	168.1	S
E1	-	-	D + S
E2	-	-	D + S
E3	-	-	C + S
E5	-	-	D
F	0.06	0.31	S
G	0.015	0.0033	C
Leaks	0.749	n.a. [1]	C
Total TPY	92.104		

Note 1: Max. Emissions from leaks cannot be quantified

PM

Emission Point	Yearly Emission (as short tons / year)	Max. Emissions (as lbs/hr)	Remarks
A1	10.004	2.55	C + S
A2	<<0.1	<<1.1	S
B1	2.2	0.5	C + S
B2	-	-	S
B3	-	-	Emergency relief only
C1	-	-	C + S
C2	-	-	S
E1	0.1	0.223	D + S (figures based on natural gas firing => however Syngas firing will be applied)
E2	0.25	0.89	D + S (figures based on natural gas firing => however Syngas firing will be applied)
E3	0.09	0.03	C + S (figures based on natural gas firing => however Syngas firing will be applied)
E5	-	-	D
F	0.12	0.61	S
G	0.031	0.0071	C
Total TPY	12.895		

VOC

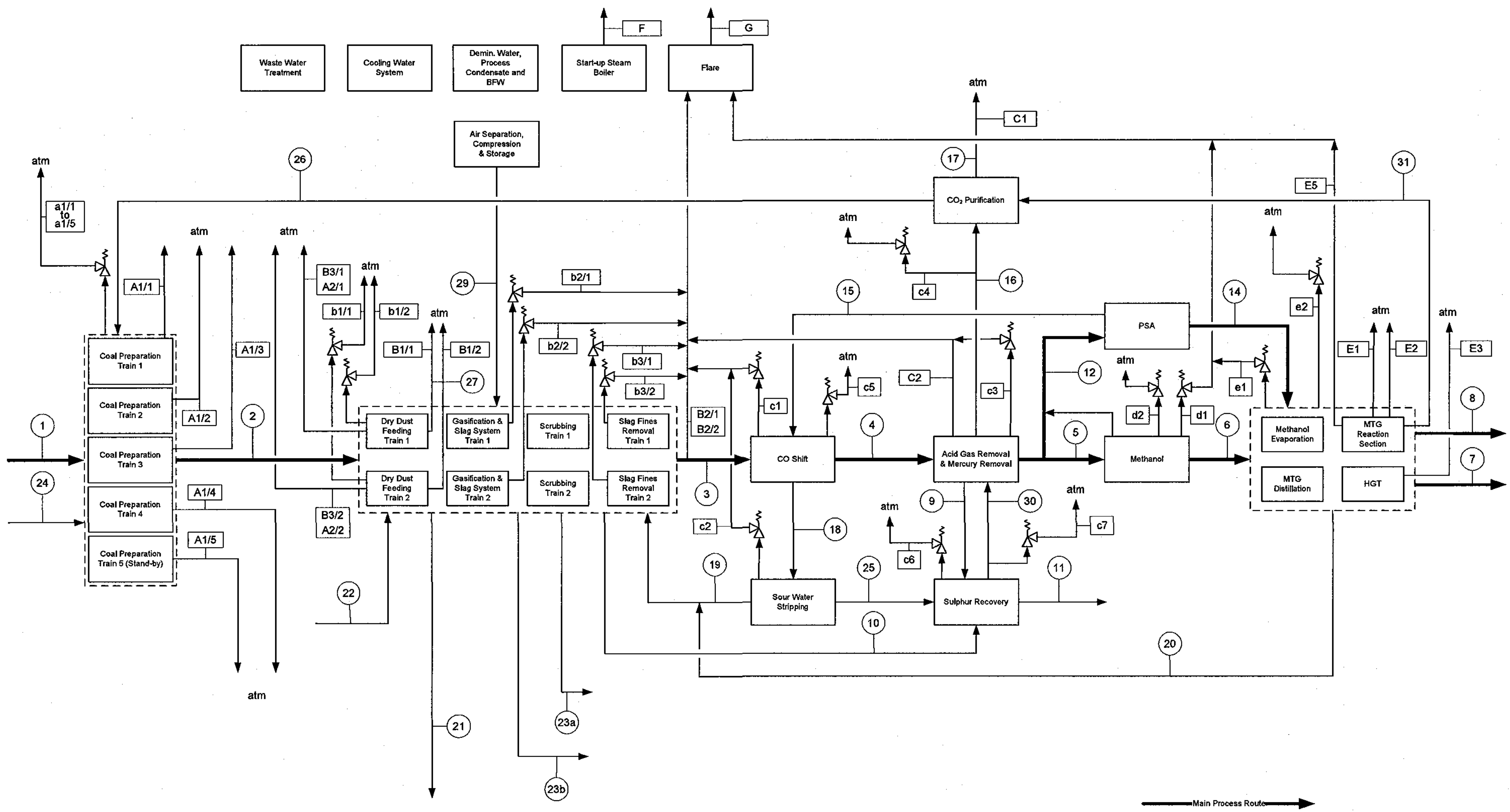
Emission Point	Yearly Emission (as short tons / year)	Max. Emissions (as lbs/hr)	Remarks
A1	8	1.83	C + S
A2	-	-	S
B1	-	-	C + S
B2	0.0025	0.084	S (methane)
B3	-	-	Emergency relief only
C1	-	-	C + S
C2	<<0.1	5.81	S
E1	0.07	0.162	D + S (figures based on natural gas firing => however Syngas firing will be applied)
E2	0.18	0.65	D + S (figures based on natural gas firing => however Syngas firing will be applied)
E3	0.07	0.022	C + S (figures based on natural gas firing => however Syngas firing will be applied)
E5	0.4	19.96	D
F	0.09	0.44	S
G	0.022	0.0051	C
Leaks	13.07	n.a. [1]	C
Total TPY	22.005		

Note 1: Max. Emissions from leaks cannot be quantified

HAPS:

Component	Yearly Emission (as short tons / year)	Max. Emissions (as lbs/hr)	Emission Point	Remark
COS	0.3	9.9	B2	S
H2S	1.097	51.3 [1]	B2	S / C
Nickel Carbonyl	0.037	1.237	B2	S
HCN	0.07	2.27	B2	S
HCl	0.07	2.29	B2	S
Mercury	0.11	3.42	B2, C2	S
Methanol	2.066	5.73 [1]	C2	S / C
Total TPY	3.75			

Note 1: Figure excluding leak emissions, as max. emissions from leaks cannot be quantified



Main Process Route

Process Medium

UDO-VT-FB-00001

Uhde

Titel/Characteristic Features:

BLOCK FLOW DIAGRAM
Coal to Liquid Complex
PRENFLO™ with Direct Quench (PDQ)

Sheet 1

Rev.	Name	Date	Name	Name	Date	Status	Kind of Revision
0	AI	02/27/2008	RA	Hz	02/27/2008		First Issue
	Prepared/Changed		Checked	Approved			

Job Name: CTL TransGas Development Systems

Job No.: 06-96-30810 Doc. No.: BFD_TGDS_rev4.vsd Rev.: 0

PRELIMINARY

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ATTACHMENT 2

TO TASK ORDER 1

RESPONSE ON DEP QUESTIONS

TRANSGAS DEVELOPMENT SYSTEMS, LLC

CTL PROJECT

Description of Emission Sources and Calculation in the Coal Preparation and Gasification

PREPARED BY

UHDE

TABLE OF CONTENTS

CTL Plant, Short Description of Emission Sources

1 Coal Preparation (Unit 111)

During the normal operation several process trains pulverize and dry the feed for the gasification. The feed is heated up to 80 – 110°C in an inert atmosphere and the most of the moisture vaporizes. Fuel gas and steam are used for heat generation.

The water vapor containing gas is filtered in bag filters and discharged into the atmosphere – Emission Points A1. This gas contains following impurities:

§ Particulate matter – the concentration is below 10 mg/m3 (wet basis), 5 mg/m3 is applied for TGDS CTL, which is industrial standard.

§ Sulfur oxides - the concentration of SOx depends on concentration of sulfur compounds in the fuel gas and in other gases supplied to the gas burner. For TGDS plant set-up pure hydrogen will be used as fuel gas; SOx emission only occurs during start-ups, when entire plant is down, i.e. when no hydrogen is available

§ Carbon monoxide and NOx from the gas burner – typical concentrations for nature gas combustion are 120 ppmv CO and 100 ppmv NOx @3% O_2. To reduce this emissions a gas with high hydrogen content can be used as fuel gas and the fuel gas based heating can be partly replaced by steam heating.
If the fuel gas and other gases fed to burner contain such nitrogen compounds as NH3 or HCN, these components are an additional source of NOx.
For TGDS CTL pure hydrogen will be applied as fuel gas with the exception of start-up, when entire plant is down, i.e. when no hydrogen is available; Therefore CO from fuel gas only occurs during those events.

§ Gases and vapors releases from the feed during milling and heating, mainly CO and VOC. The concentration depends on feedstock. For unknown feedstocks Uhde carry out milling and drying tests to determine these emissions.

Emission Points A1 for the whole plant:

§ NO_x

Normal Operation:

- 100 ppmvd NO_x @3% O_2 (industrial standard)
- hot gas generation, dry basis @3% O_2 7 967 $m^3{}_n$/h for each gasifier train on the basis of 100% heat required being generated by combustion;
  TGDS design: 78.1% of required heat is generated by combustion and 21.9% by steam condensation
- resulting NO_x emission, calculated as NO_2:

7 967 m3n/hr x 100 ppmv NOx x 2 gasifiers x 25 tons/y x 78.1% (heat required by fuel gas) / 22,4 kmol / m3n x 46 kg/kmole (molecular weight of NO2) x 8760 h / year = 22.645 metric ton / year;

=> 24.68 tons/year (1 short ton = 0.9072 metric ton)

There are four (4) A1 points operating at a time with a total of five points (A1/1, A1/2, A1/3, A1/4, & A1/5) so the maximum emission rate from an individual A1 emission point is 24.68 tons/year ÷ 4 = 6.17 tons/year

Start-up:

- Natural Gas used during start-up of coal preparation, when no hydrogen available
- 100 ppmv NOx in Offgas
- hot gas generation, 32 218 m3n/hr with Start-up coal
- resulting NO_x emission:

32 218 m3n/hr x 100 ppmv NOx x 2 gasifiers x 4 (times per year) x 10 hours (start-up time) / 22,4 kmol / m3n x 46 kg/kmole (molecular weight of NOx) = 0.53 metric ton / year;

=> 0.58 tons/year (1 short ton = 0.9072 metric ton)

Overall: 25.26 tons/year

Hourly emission:

=> 24.68 ton/year * 2000 lb/ton / 8760 h/y = 5.63 lb/h

There are four (4) A1 points operating at a time with a total of five points (A1/1, A1/2, A1/3, A1/4, & A1/5) so the maximum emission rate from an individual A1 emission point is 5.63 lb/h ÷ 4 = 1.41 lb/h

Hourly emission during start-up:

=> 0.58 ton/year * 2000 lb/ton / 10h/y / 4 times per y / 4 coal preparation trains = 7.25 lb/h

Only one of total five emissions point is in operation during start-up

§ Particulate mater

Normal Operation:

- 5 mg/m3 PM concentration (industrial standard)
- 204 000 m3/h offgas from baghouse filter
- resulting emission:

5 mg/m3 x 204 000 m3/h x 8760 hr /year = 8.9 metric tons / year

=> 9.8 tons/year (1 short ton = 0.9072 metric ton)

There are four (4) A1 points operating at a time with a total of five points (A1/1, A1/2, A1/3, A1/4, & A1/5) so the maximum emission rate from an individual A1 emission point is 9.8 tons/year ÷ 4 = 2.45 tons/year

Start-up:

- 5 mg/m3 PM concentration (industrial standard)
- 463 000 m3/h offgas from baghouse filter with start-up coal
- resulting emission:

5 mg/m3 x 463 000 m3/h x 2 gasifier x 4 x 10hr /year = 0.185 metric tons / year

=> 0.204 tons/year (1 short ton = 0.9072 metric ton)

Overall: 10.004 tons/year

Hourly Emission:

=> 9.8 ton/year * 2000 lb/ton / 8760 h/y = 2.24 lb/h

There are four (4) A1 points operating at a time with a total of five points (A1/1, A1/2, A1/3, A1/4, & A1/5) so the maximum emission rate from an individual A1 emission point is 2.24 lb/h ÷ 4 = 0.56 lb/h

Hourly emission during start-up:

=> 0.204 tons/year * 2000 lb/ton / 10h/y / 4 times per y / 4 coal preparation trains = 2.55 lb/h

Only one of total five emissions point is operation during start-up

§ VOC from the feedstock (normal operation and start-up)

- o 3.5 mg VOC/kg (dry ash free) coal based on investigation of other coal
- o coal throughput, daf 260 tons/h
- o resulting emission:

3.5 mg VOC/kg (daf) x 260 tons/h x 8760 hours/yr = 8 tons/y

=> 8 ton/year * 2000 lb/ton / 8760 h/y = 1.83 lb/h

There are four (4) A1 points operating at a time with a total of five points (A1/1, A1/2, A1/3, A1/4, & A1/5) so the maximum emission rate from an individual A1 emission point is 8.0 tons/year ÷ 4 = 2.0 tons/year and 1.83 lb/h ÷ 4 = 0.4575 lb/h

§ CO from the feedstock

Normal Operation: Coal only from devolatilization

- o 7.1 mg/kg coal dry based on investigation of a previous coal
- o coal throughput 291 metric tons/h coal dry
- o resulting emission:

7.1 mg/kg coal dry x 290 000 kg/hr coal dry * 8760 hours / year = 18095 kg/yr CO => 20 tons / yr (1 short ton = 0.9072 metric ton)

There are four (4) A1 points operating at a time with a total of five points (A1/1, A1/2, A1/3, A1/4, & A1/5) so the maximum emission rate from an individual A1 emission point is 20.0 tons/year ÷ 4 = 5.0 tons/year

Start-up:

- Natural Gas used during start-up of coal preparation, when no hydrogen available
- 120 ppmv CO in Offgas
- hot gas generation, 32 218 m3n/hr with Start-up coal
- resulting CO emission:

32 218 m3n/hr x 120 ppmv CO x 2 gasifiers x 4 (times per year) x 10 hours (start-up time) / 22,4 kmol / m3n x 28 kg/kmole (molecular weight of CO) = 0.39 metric ton / year;

=> 0.43 tons/year (1 short ton = 0.9072 metric ton)

Overall: 20.43 tons/year

Hourly Emission:

=> 20 ton/year * 2000 lb/ton / 8760 h/y = 4.57 lb/h

There are four (4) A1 points operating at a time with a total of five points (A1/1, A1/2, A1/3, A1/4, & A1/5) so the maximum emission rate from an individual A1 emission point is 4.57 lb/h ÷ 4 = 1.1425 lb/h

Hourly Emission during start-up:

=> 0.43 * 2000 lb/ton / 10h/y / 4 times per y / 4 coal preparation trains = 5.375 lb/h

Only one of total five emissions point is operation during start-up

§ SO_x

Only during start-up:

- Natural Gas used during start-up of coal preparation, when no hydrogen available
- 20 ppmv H2S in Natural Gas
- hot gas generation, 47 968 m3n/hr with Start-up coal
- resulting SO_x emission:

47 968 m3n/hr x 20 ppmv H2S x 2 gasifiers x 4 (times per year) x 10 hours (start-up time) / 22,4 kmol / m3n x 64 kg/kmole (molecular weight of SOx) = 0.22 metric ton / year;

=> 0.24 tons/year (1 short ton = 0.9072 metric ton)

=> 0.24 ton/year * 2000 lb/ton / 40 h/y / 4 coal preparation trains = 3 lb/h (Note: only one coal train started at a time, i.e. one gasifier at 50% load)

2 Coal Dust Feeding (Unit 112)

The feedstock from the coal preparation enters the feed dust bunker via the cyclone filter, from where it flows by gravity to the lock hoppers.

Once a lock hopper is filled with feed dust, the lock hopper is pressurized from atmospheric pressure to about 1 to 2 bar above the feed bin working pressure with an inert gas (N2 or CO2). The selection of inert gas depends on the field of application of the product gas (Syngas) of the gasification process.

The pressurized feed dust from one or more lock hoppers is continuously supplied via a dense phase conveying system to the feed feed bin and the empty lock hopper is depressurized. The gas from lock hoppers is preliminary filtered in dust filter, expanded, filtered again in a filter placed above the feed dust bunker and discharged into the atmosphere (Emission Points B1).

The released lock hopper gas contains particulate mater. If the inert gas contains any impurities, e.g. CO, these impurities are discharded into the atmosphere.

The pressure in Feed Bin is about 5 bar higher than the gasifier pressure and it is controlled and kept on the right level by injection of a inert gas into the feed bin or recycle of a relative small amount of gas. In case of failure of the gas recycle the relieved gas is discharged into the atmosphere (Emission Points B3). This gas contains the inert gas impurities and additional a small amount of particulate mater.

Before start-up of a Gasifier the dense phase conveying system is taken into operation and a specified steady feeding stream in pipes downstream lock hoppers has to be adjusted. However, the feed is not routed into the Gasifier but into the start-up vessel, where the dust is settled down and the gas is dedusted and discharged into the atmosphere (Emission Points A2).

If a low sulfur start up feedstock is used, the feed bin has to be emptied first. The feed bin content - normal sulfur feedstock - has to be recycled pneumatically via Start-up Vessel to the Feed Dust Bunker. The transport gas is dedusted and released into the atmosphere (Emission Points A2).

Emission Points B1:

- Particulate mater
  - 5 mg/m3 PM (industrial standard from baghouse)
  - discharge from lock hoppers 45 300 m3/h @ 0.9 bar, 90°C
  - feedstock change 30 times/year/train
    32.000 m^3_n /feed change
  - resulting emission:

    45 300 m3n/h x 5 mg/m3 x 8760 h/yr + 30 starts/yr/train x 32 000 m3n/h * 5 mg/m3 * 2 trains = 1.99 metric tons / yr => 2.2 tons/y (1 short ton = 0.9072 metric ton)

    => 2.2 ton/year * 2000 lb/ton / 8760 h/y = 0.50 lb/h

    There are two (2) B1 points (B1/1 & B1/2) operating at a time so the maximum emission rate from an individual B1 emission point is 2.2 tons/year ÷ 2 = 1.1 tons/year and 0.50 lb/h ÷ 2 = 0.25 lb/h

- CO
  - 1 ppmv CO in the CO_2 stream
  - discharge from lock hoppers 45 300 m^3_n/h
  - feedstock change 30 times/year/train
    32.000 m^3_n/feed change
  - resulting emission:

    (1 ppmv CO * 45 300 m3n/h x 8760 h/yr + 32 000 m3n/feed change * 30 starts/year/train * 2 trains * 1ppmv CO) / 22.4 kmol /m3n * 28 kg/kmole (molecular weight of CO) = 0.5 metric tons => 0.55 tons/y (1 short ton = 0.9072 metric ton)

    => 0.55 ton/year * 2000 lb/ton / 8760 h/y = 0.13 lb/h

    There are two (2) B1 points (B1/1 & B1/2) operating at a time so the maximum emission rate from an individual B1 emission point is 0.55 tons/year ÷ 2 = 0.275 tons/year and 0.13 lb/h ÷ 2 = 0.065 lb/h

- SOx

- o 10 ppmv SOx in the CO_2 stream
- o discharge from lock hoppers 45 300 m^3_n/h
- o feedstock change 30 times/year/train
  32.000 m^3_n/feed change
- o resulting emission:

(10 ppmv x 45300 m3n/h x 8760 h/yr + 32 000 m3n/feed change * 30 starts/year/train * 2 trains * 10 ppmv SOx)/ 22.4 kmol/m3n * 64 kg/kmole (molecular weight of SOx) = 11.4 metric tons => 12.56 tons/y (1 short ton = 0.9072 metric ton)

=> 12.56 ton/year * 2000 lb/ton / 8760 h/y = 2.87 lb/h

There are two (2) B1 points (B1/1 & B1/2) operating at a time so the maximum emission rate from an individual B1 emission point is 12.56 tons/year ÷ 2 = 6.28 tons/year and 2.87 lb/h ÷ 2 = 1.435 lb/h

<u>Emission Points B3: (failure of feed bin gas recycle)</u>

Emergency release only (doesn't typically occur) => not considered

<u>Emission Points A2 (start-up feeding):</u>

- § fuel change and start-up each gasifier 30 times/y
- § start-up time is approximately 3 hours
- § gas discharge 30 000 m^3_n/start-up
- § CO
  - o content 1 ppmv
  - o CO emission:

30 000 m3n/start-up x 30 starts/yr/train x 2 trains x 1 ppmv CO / 22.4 kmol/m3n x 28 kg/kmole (mol. Wt. CO) << 0.1 tons/y (1 short ton = 0.9072 metric ton)

=> 0.1 ton/y * 2000 lb/ton * 1/60 Starts/yr => << 3.33 lb/Start

=> 3.33 lb/Start / 3 hr/Start = 1.11lb/hr (maximum emission)

- Particulate mater
  - content 5 mg/m3 (industrial standard baghouse)
  - emission

  30 000 m3n/start-up x 30 starts/yr/train x 2 trains x 5 mg/m3 PM << 0.1 tons/y (1 short ton = 0.9072 metric ton)

  => 0.1 ton/y * 2000 lb/ton * 1/60 Starts/y => << 3.33 lb/Start

  => 3.33 lb/Start / 3 hr/Start = 1.11 lb/hr (maximum emission)

§ SOx
  - content 10 ppmv
  - SOx emission:

  30 000 m3n/start-up x 30 starts/yr/train x 2 trains x 10 ppmv SOx / 22.4 kmol/m3n x 64 kg/kmole (mol. Wt. SOx) = 0.06 tons/y (1 short ton = 0.9072 metric ton)

  => 0.06 ton/y * 2000 lb/ton * 1/60 Starts/y = 2 lb/Start

  => 2 lb/Start / 3 hr/Strart = 0.67 lb/hr (maximum emission)

3 Gasification (Unit 113)

In the PRENFLO™ gasifier the feed particles are partially oxidized with oxygen to be supplied from an air separation unit. Liquid slag is flowing down the cooled wall of the gasifier and falls through the quench zone into the slag pool. From there it is discharged via the slag removal.

The generated raw gas and fly ash are also conducted downwards and leave the gasifier though the opening at the bottom into the quench zone. Here the raw gas is quenched by a free down flow water film and additionally cooled and saturated by water spray nozzles. The remaining fly ash is removed from the gas by scrubbing. The dedusted gas is routed to the CO-Shift.

There is no emission source during the normal operation.

During the start-up the main burners are started one after the other at a reduced pressure, e.g. at 15 bar. The generated gas cannot be forwarded to the CO-Shift, as long as the required specification – composition and pressure - is not achieved. The gas generated by all burners would cause a quick pressure increase in the closed gas space. However, the pressure increase rate is limited. To reduce the pressure increase rate a part of the generated gas is sent to the flare (Emission Source B2), where the combustible gases are almost completely burned. However, a small part of CO remains unburned (typical 0.5%), H2S and COS are converted to SOx and NOx are formed. Also during the gasifier shutdown the pressure in the Gasification has to be reduced, therefore the gas is sent to the Flare. At decreasing pressure, the efficiency of sulfur removal decreases, therefore, a part of the sulfur is emitted via Flare as SOx.

Emission Source B2, gas from Gasification, discharge through Flare:

- Gas production during start-up of one Gasifier: 100 000 m^3_n /start-up
- Number of starts: 30 per year per gasifier
- Start-up with PRB-coal or other low sulfur coal (used as start-up coal for SOx emission reduction)
  - Sulfur emission
    - H2S- content in raw gas based on 0.5%S in coal: 0.17%
    - SOx emission:

    100 000 m3n/start-up x 30 starts x 2 gasifiers x 0.17% / 22.4 kmol/m3n x 64 kg/kmole (mol. Weight SO2) = 29 metric tons/ yr => 32 tons/y (1 short ton = 0.9072 metric ton)

    => 32 ton/y * 1/(30 hr/y) / 2 gasifiers * 2000 lb/ton = 1066 lb/hr

    There are two (2) B2 points (B2/1 & B2/2) operating at a time so the maximum emission rate from an individual B2 emission point is 32.0 tons/year ÷ 2 = 16.0 tons/year and 1066 lb/hr

  - CO emission
    - CO- content in gas 60%
    - CO combustion rate in flare 99.5%
    - CO emission:

    100 000 m3n/start-up x 30 starts x 2 gasifiers x 60% (CO concentration in syngas) x 0.5% (CO remaining after combustion) / 22.4 kmol/m3n x 28 (molecular wt. CO) = 22.5 metric tons/yr => 24.8 tons tons/y (1 short ton = 0.9072 metric ton)

    => 24.8 ton/y * 1/(30 hr/y) / 2 gasifiers * 2000 lb/ton = 827 lb/h

    There are two (2) B2 points (B2/1 & B2/2) operating at a time so the maximum emission rate from an individual B2 emission point is 24.8 tons/year ÷ 2 = 12.4 tons/year and 827 lb/h

  - NOx emission

- NO_x in flare offgas 250 ppmv (industrial standard)
- Flare offgas during start-up: 296 000 m3n/start-up
- NO_x emission

296 000 m3n/start-up x 30 starts x 2 gasifiers x 250 ppmv / 22.4 kmol/m3n x 46 kg/kmole(molecular wt. NO2) = 9.1 metric tons/yr => 10 tons/y (1 short ton = 0.9072 metric ton)

=> 10 ton/y * 1/(30 hr/y) / 2 gasifiers * 2000 lb/ton = 333 lb/h

There are two (2) B2 points (B2/1 & B2/2) operating at a time so the maximum emission rate from an individual B2 emission point is 10.0 tons/year ÷ 2 = 5.0 tons/year and 333 lb/h

- VOC emission
  - Total flow rate to flare: 28516.8 kmol/h (one gasifier)
  - Methane (HC) concentration: 0.0025 mol%
  - Methane (HC) flow: 28516.8 kmol/h x 0.0025 mol% / 100 mol% = 0.713 kmol/h
  - Heating value methane 890000 kJ/kmol
  - Methane heat flow: 0.713 kmol/h x 890000 kJ/koml / 3600 s/h / 1000 kJ/MJ = 0.176 MW
  - Conversions factor: 1 MMBTU/hr = 0.29308 MW
  - Methane heat flow: 0.172 MW / 0.29308 MW/MMBTU/hr = 0.601 MMBTU/hr
  - Emission factor Total Hydrocarbons acc. table 13.5-1 of AP 42: 0.14 lb/10^6BTU
  - Hourly HC emission: 0.601 MMBTU/hr x 0.14 lb/10^6BTU = 0.084 lb/hr
  - Yearly HC emission: 0.084 lb/hr x 30 starts/yr x 2 gasifier x 1 hr/starts / 2000 lb/tons = 0.0025 tons/yr
  - There are two (2) B2 points (B2/1 & B2/2) operating at a time so the maximum emission rate from an individual B2

emission point is 0.0025 tons/year ÷ 2 = 0.00125 tons/year and 0.084 lb/h

ATTACHMENT 3

TO TASK ORDER 1

RESPONSE ON DEP QUESTIONS

TRANSGAS DEVELOPMENT SYSTEMS, LLC

CTL PROJECT

FUGITIVE EMISSIONS

PREPARED BY

UHDE

Fugitive emissions CO

Gasification

All available literature describes fugitive emission of VOCs for Refinery or organic chemical industry. The calculations of CO fugitive emissions is based on the current status of engineering work.

All calculation are based on the report EPA-453/R-95-017 (1995 Protocol for Equipment Leak Emission Estimates).

The fugitive emissions are calculated based on the EPA's average emission factor approach:

Emission = Factor x W_f x # components

The weight fraction (W_f) of CO in the Syngas is approx. 30%.

Used Control efficiencies for the calculation of the actual fugitive emissions:
Connectors 69%
Pressure Relief Valves 90%
Others 99%

Table 1 CO Leak Emission Estimate for gasification incl. scrubbing

Component	Quantity	Emission Factor acc. Table 2-1	Potential			Actual		
		(kg/hr/source)	kg/h	lb/h	ton/yr[22]	kg/h	lb/h	ton/yr[22]
Valves	200	0.00597	0.358	0.789	3.5	0.0036	0.008	0.035
Compressor	0	0.228	0	0	0	0	0	0
Pressure Relief Valve	4	0.104	0.125	0.28	1.2	0.0125	0.028	0.12
Connectors [11]	500	0.00183	0.275	0.61	2.7	0.085	0.189	0.84
Open-ended lines	200	0.0017	0.102	0.22	1.0	0.001	0.0022	0.01
Sampling connections	10	0.0150	0.045	0.10	0.4	0.0005	0.001	0.004
		Total			8.8			1.009

11 Acc. Tab 5-2 (Reduction by LDAR)
22 Based on 8760 hr/yr

CO-Shift

All available literature describes fugitive emission of VOCs for Refinery or organic chemical industry. The calculations of CO fugitive emissions is based on the current status of engineering work.

All calculation are based on the report EPA-453/R-95-017 (1995 Protocol for Equipment Leak Emission Estimates).

The fugitive emissions are calculated based on the EPA's average emission factor approach:

Emission = Factor x Wf x # components

The weight fraction (Wf) of CO in the Syngas (incl. Reactors) is estimated with 36%.
The weight fraction (Wf) of CO in the Syngas (from Reactors) is estimated with 29%.

Used Control efficiencies for the calculation of the actual fugitive emissions:
Connectors 69%
Pressure Relief Valves 90%
Others 99%

Table 1: CO Leak Emission Estimate for CO-Shift up-stream & incl. reactors

Component	Quantity	Emission Factor acc. Table 2-1	Potential			Actual		
		(kg/hr/source)	kg/h	lb/h	ton/yr[22]	kg/h	lb/h	ton/yr[22]
Valves	50	0.00597	0.107	0.236	1.03	0.001	0.002	0.01
Compressor	0	0.228	0	0	0	0	0	0
Pressure Relief Valve	1	0.104	0.037	0.082	0.36	0.004	0.009	0.04
Connectors [11]	150	0.00183	0.099	0.218	0.96	0.031	0.068	0.30
Open-ended lines	50	0.0017	0.031	0.068	0.30	0.0003	0.0007	0.003
Sampling connections	0	0.0150	0	0	0	0	0	0
		Total			2.65			0.35

Table 2: CO Leak Emission Estimate for CO-Shift downstream reactors

Component	Quantity	Emission Factor acc. Table 2-1	Potential			Actual		
		(kg/hr/source)	kg/h	lb/h	ton/yr[22]	kg/h	lb/h	ton/yr[22]
Valves	50	0.00597	0.087	0.019	0.84	0.0009	0.002	0.008
Compressor	0	0.228	0	0	0	0	0	0
Pressure Relief Valve	1	0.104	0.030	0.066	0.29	0.003	0.0066	0.029
Connectors [11]	150	0.00183	0.079	0.174	0.76	0.024	0.054	0.236
Open-ended lines	50	0.0017	0.025	0.055	0.24	0.0003	0.0006	0.003
Sampling connections	1	0.0150	0.004	0.009	0.04	0	0	0
		Total			2.17			0.276

11 Acc. Tab 5-2 (Reduction by LDAR)
22 Based on 8760 hr/yr

Acid Gas Removal

All available literature describes fugitive emission of VOCs for Refinery or organic chemical industry. The calculations of CO fugitive emissions is based on the current status of engineering work.

All calculation are based on the report EPA-453/R-95-017 (1995 Protocol for Equipment Leak Emission Estimates).

The fugitive emissions are calculated based on the EPA's average emission factor approach:

$$\text{Emission} = \text{Factor} \times W_f \times \# \text{ components}$$

The weight fraction (W_f) of CO in the Syngas is estimated with 29%.

Used Control efficiencies for the calculation of the actual fugitive emissions:
Connectors 69%
Pressure Relief Valves 90%
Others 99%

Table 1 CO Leak Emission Estimate for Acid Gas Removal

Component	Quantity	Emission Factor acc. Table 2-1	Potential			Actual		
		(kg/hr/source)	kg/h	lb/h	ton/yr[22]	kg/h	lb/h	ton/yr[22]
Valves	200	0.00597	0.346	0.763	3.34	0.003	0.0066	0.033
Compressor	2	0.228	0.132	0.291	1.28	0.001	0.0022	0.013
Pressure Relief Valve	5	0.104	0.151	0.333	1.46	0.015	0.0331	0.146
Connectors [11]	500	0.00183	0.265	0.584	2.56	0.082	0.1808	0.794
Open-ended lines	100	0.0017	0.049	0.108	0.48	0.0005	0.0011	0.005
Sampling connections	5	0.0150	0.022	0.049	0.21	0.0002	0.0004	0.002
		Total			9.33			0.99

11 Acc. Tab 5-2 (Reduction by LDAR)
22 Based on 8760 hr/yr

<u>Methanol Synthesis</u>

All available literature describes fugitive emission of VOCs for Refinery or organic chemical industry. The calculations of CO fugitive emissions is based on the current status of engineering work.

All calculation are based on the report EPA-453/R-95-017 (1995 Protocol for Equipment Leak Emission Estimates).

The fugitive emissions are calculated based on the EPA's average emission factor approach:

Emission = Factor x W_f x # components

The weight fraction (W_f) of CO in the Syngas is estimated with 86%.

Used Control efficiencies for the calculation of the actual fugitive emissions:
Connectors 69%
Pressure Relief Valves 90%
Others 99%

Table 1 CO Leak Emission Estimate for Methanol Synthesis

Component	Quantity	Emission Factor acc. Table 2-1	Potential			Actual		
		(kg/hr/source)	kg/h	lb/h	ton/yr[22]	kg/h	lb/h	ton/yr[22]
Valves	100	0.00597	0.513	1.131	4.96	0.005	0.0110	0.049
Compressor	2	0.228	0.392	0.864	3.79	0.004	0.0088	0.039
Pressure Relief Valve	5	0.104	0.447	0.985	4.32	0.045	0.0992	0.43
Connectors [11]	250	0.00183	0.393	0.866	3.80	0.122	0.2690	1.178
Open-ended lines	100	0.0017	0.146	0.322	1.41	0.0014	0.0031	0.014
Sampling connections	2	0.0150	0.026	0.057	0.25	0.0003	0.0007	0.003
		Total			18.53			1.71

11 Acc. Tab 5-2 (Reduction by LDAR)
22 Based on 8760 hr/yr

<u>PSA</u>

All available literature describes fugitive emission of VOCs for Refinery or organic chemical industry. The calculations of CO fugitive emissions is based on the current status of engineering work.

All calculation are based on the report EPA-453/R-95-017 (1995 Protocol for Equipment Leak Emission Estimates).

The fugitive emissions are calculated based on the EPA's average emission factor approach:

Emission = Factor x W_f x # components

The weight fraction (W_f) of CO in the Syngas is estimated with 86%.

Used Control efficiencies for the calculation of the actual fugitive emissions:
Connectors 69%
Pressure Relief Valves 90%
Others 99%

Table 1 CO Leak Emission Estimate for PSA

Component	Quantity	Emission Factor acc. Table 2-1	Potential			Actual		
		(kg/hr/source)	kg/h	lb/h	ton/yr[2]	kg/h	lb/h	ton/yr[22]
Valves	200	0.00597	1.027	2.264	9.92	0.010	0.022	0.01
Compressor	0	0.228	0	0	0	0	0	0
Pressure Relief Valve	0	0.104	0	0	0	0	0	0
Connectors [11]	500	0.00183	0.787	1.735	7.60	0.244	0.538	2.36
Open-ended lines	100	0.0017	0.146	0.322	1.41	0.001	0.0022	0.014
Sampling connections	1	0.0150	0.013	0.029	0.12	0.00001	0.00002	0.001
		Total			19.05			2.39

11 Acc. Tab 5-2 (Reduction by LDAR)
22 Based on 8760 hr/yr

Fugitive Emissions H2S

Gasification

All available literature describes fugitive emission of VOCs for Refinery or organic chemical industry. The calculations of H2S fugitive emissions is based on the current status of engineering work.

All calculation are based on the report EPA-453/R-95-017 (1995 Protocol for Equipment Leak Emission Estimates).

The fugitive emissions are calculated based on the EPA's average emission factor approach:

Emission = Factor x Wf x # components

The weight fraction (Wf) of H2S in the Syngas is approx. 0.21%.

Used Control efficiencies for the calculation of the actual fugitive emissions:
Connectors 69%
Pressure Relief Valves 90%
Others 99%

Table 1 H2S Leak Emission Estimate for gasification incl. scrubbing

Component	Quantity	Emission Factor acc. Table 2-1	Potential			Actual		
		(kg/hr/source)	kg/h	lb/h	ton/yr[22]	kg/h	lb/h	ton/yr[22]
Valves	200	0.00597	0.0025	0.0055	0.024	2.5E-5	5.5E-5	2.2E-4
Compressor	0	0.228	0	0	0	0	0	0
Pressure Relief Valve	4	0.104	0.0009	0.0020	0.009	9.0E-6	2.0E-5	8.7E-5
Connectors [11]	500	0.00183	0.0019	0.0042	0.018	5.9E-4	1.3E-3	5.6E-3
Open-ended lines	200	0.0017	0.0007	0.0015	0.007	7.0E-6	1.6E-5	6.7E-5
Sampling connections	10	0.0150	0.0003	0.0006	0.003	3.0E-6	6.6E-6	2.8E-5
		Total			0.061			0.006
		SO2 Equivalent			0.115			0.011

11 Acc. Tab 5-2 (Reduction by LDAR)
22 Based on 8760 hr/yr

CO-Shift

All available literature describes fugitive emission of VOCs for Refinery or organic chemical industry. The calculations of H_2S fugitive emissions is based on the current status of engineering work.

All calculation are based on the report EPA-453/R-95-017 (1995 Protocol for Equipment Leak Emission Estimates).

The fugitive emissions are calculated based on the EPA's average emission factor approach:

Emission = Factor x Wf x # components

The weight fraction (Wf) of H_2S in the Syngas is approx. 0.32%.

Used Control efficiencies for the calculation of the actual fugitive emissions:
Connectors 69%
Pressure Relief Valves 90%
Others 99%

Table 1 H2S Leak Emission Estimate for CO-Shift

Component	Quantity	Emission Factor acc. Table 2-1	Potential			Actual		
		(kg/hr/source)	kg/h	lb/h	ton/yr[22]	kg/h	lb/h	ton/yr[22]
Valves	50	0.00597	0.0010	0.0022	0.010	1.0E-5	2.2E-5	1.0E-3
Compressor	0	0.228	0	0	0	0	0	0
Pressure Relief Valve	1	0.104	0.0003	0.0007	0.003	3.0E-5	6.6E-5	3.0E-4
Connectors [11]	150	0.00183	0.0009	0.0020	0.009	2.8E-4	6.2E-4	2.8E-3
Open-ended lines	50	0.0017	0.0003	0.0007	0.003	3.0E-6	6.6E-6	3.0E-5
Sampling connections	0	0.0150	0	0	0	0	0	0
		Total			0.025			0.004
		SO2 Equivalent			0.047			0.008

11 Acc. Tab 5-2 (Reduction by LDAR)
22 Based on 8760 hr/yr

Sour Gas

Units: Slurry Stripping, Sour Water Stripping, Sulfur Recovery

All available literature describes fugitive emission of VOCs for Refinery or organic chemical industry. The calculations of H_2S fugitive emissions is based on the current status of engineering work.

All calculation are based on the report EPA-453/R-95-017 (1995 Protocol for Equipment Leak Emission Estimates).

The fugitive emissions are calculated based on the EPA's average emission factor approach:

Emission = Factor x Wf x # components

The weight fraction (Wf) of H_2S in the acid gas is approx. 2%.

Used Control efficiencies for the calculation of the actual fugitive emissions:
Connectors 69%
Pressure Relief Valves 90%
Others 99%

Table 1 H2S Leak Emission Estimate for all unit with sour gas

Component	Quantity	Emission Factor acc. Table 2-1	Potential			Actual		
		(kg/hr/source)	kg/h	lb/h	ton/yr[22]	kg/h	lb/h	ton/yr[22]
Valves	200	0.00597	0.0239	0.053	0.231	0.0002	0.0004	0.002
Compressor	0	0.228	0	0	0	0	0	0
Pressure Relief Valve	8	0.104	0.0166	0.037	0.160	0.0017	0.0037	0.016
Connectors [11]	600	0.00183	0.0220	0.0485	0.212	0.0068	0.0150	0.066
Open-ended lines	200	0.0017	0.0068	0.0150	0.066	0.00007	0.0002	0.0007
Sampling connections	5	0.0150	0.0015	0.0033	0.015	0.00002	0.00004	0.0002
		Total			0.684			0.085
		SO2 Equivalent			1.288			0.160

11 Acc. Tab 5-2 (Reduction by LDAR)
22 Based on 8760 hr/yr

Acid Gas Removal

All available literature describes fugitive emission of VOCs for Refinery or organic chemical industry. The calculations of H2S fugitive emissions is based on the current status of engineering work.

All calculation are based on the report EPA-453/R-95-017 (1995 Protocol for Equipment Leak Emission Estimates).

The fugitive emissions are calculated based on the EPA's average emission factor approach:

$$\text{Emission} = \text{Factor} \times W_f \times \# \text{ components}$$

The weight fraction (W_f) of CO in the Syngas is estimated with 0.32%.

Used Control efficiencies for the calculation of the actual fugitive emissions:
Connectors 69%
Pressure Relief Valves 90%
Others 99%

Table 1 H2S Leak Emission Estimate for Acid Gas Removal

Component	Quantity	Emission Factor acc. Table 2-1	Potential			Actual		
		(kg/hr/source)	kg/h	lb/h	ton/yr[22]	kg/h	lb/h	ton/yr[22]
Valves	100	0.00597	0.002	0.0044	0.020	0.00002	0.00004	0.0002
Compressor	2	0.228	0.0015	0.0033	0.014	0.00001	0.00003	0.0001
Pressure Relief Valve	2	0.104	0.0007	0.0015	0.006	0.00007	0.00015	0.0006
Connectors [11]	250	0.00183	0.0015	0.0033	0.014	0.0005	0.0011	0.004
Open-ended lines	50	0.0017	0.0003	0.0007	0.003	3.0E-6	6.6E-6	0.00003
Sampling connections	2	0.0150	0.001	0.0022	0.009	0.00001	0.00002	0.00009
		Total			0.066			0.005
		SO2 Equivalent			0.124			0.01

11 Acc. Tab 5-2 (Reduction by LDAR)
22 Based on 8760 hr/yr

Acid Gas in Sulfur Recovery Unit (one recovery train)

All available literature describes fugitive emission of VOCs for Refinery or organic chemical industry. The calculations of H2S fugitive emissions is based on the current status of engineering work.

All calculation are based on the report EPA-453/R-95-017 (1995 Protocol for Equipment Leak Emission Estimates).

The fugitive emissions are calculated based on the EPA's average emission factor approach:

Emission = Factor x Wf x # components

The weight fraction (Wf) of H2S in the acid gas is approx. 40%.

Used Control efficiencies for the calculation of the actual fugitive emissions:
Connectors 69%
Pressure Relief Valves 90%
Others 99%

Table 1 H2S Leak Emission Estimate for sulfur recovery

Component	Quantity	Emission Factor acc. Table 2-1	Potential			Actual		
		(kg/hr/source)	kg/h	lb/h	ton/yr[22]	kg/h	lb/h	ton/yr[22]
Valves	25	0.00597	0.060	0.132	0.58	0.0006	0.0013	0.006
Compressor	0	0.228	0	0	0	0	0	0
Pressure Relief Valve	1	0.104	0.042	0.092	0.40	0.0042	0.0093	0.124
Connectors [11]	75	0.00183	0.055	0.121	0.53	0.0170	0.0375	0.164
Open-ended lines	25	0.0017	0.017	0.037	0.16	0.0002	0.0004	0.002
Sampling connections	1	0.0150	0.006	0.013	0.06	0.00006	0.0001	0.0006
		Total			1.73			0.297
		SO2 Equivalent			3.26			0.560

11 Acc. Tab 5-2 (Reduction by LDAR)
22 Based on 8760 hr/yr

Fugitive emissions VOC

Acid gas removal

All available literature describes fugitive emission of VOCs for Refinery or organic chemical industry. The calculations of VOC fugitive emissions is based on the current status of engineering work.

All calculation are based on the report EPA-453/R-95-017 (1995 Protocol for Equipment Leak Emission Estimates).

The fugitive emissions are calculated based on the EPA's average emission factor approach:

Emission = Factor x W_f x # components

The weight fraction (W_f) of Methanol in liquid steams is estimated with 100%.
The weight fraction (W_f) of Methanol in gaseous steams is estimated with 100%.

Used Control efficiencies for the calculation of the actual fugitive emissions:
Connectors 69%
Pressure Relief Valves 90%
Others 99%

Table 1 VOC (Methanol) Leak Emission Estimate for acid gas removal

Component	Quantity	Emission Factor acc. Table 2-1	Potential			Actual		
		(kg/hr/source)	kg/h	lb/h	ton/yr[22]	kg/h	lb/h	ton/yr[22]
Valves gas	25	0.00597	0.149	0.328	1.44	0.0015	0.0033	0.014
Valves light liquid	250	0.00403	1.008	2.222	9.73	0.0101	0.0222	0.097
Compressor	0	0.228	0	0	0	0	0	0
Pump seals light liquid	10	0.0199	0.199	0.439	1.92	0.0020	0.0044	0.019
Pressure Relief Valve	2	0.104	0.208	0.459	2.01	0.021	0.0463	0.201
Connectors [11] Gas	(75) / 20 [33]	0.00183	0.137	0.302	1.33	0.0113	0.0249	0.110
Connectors [11] light liquid	(700)/ 100 [33]	0.00183	1.281	2.824	12.37	0.0567	0.1250	0.548
Open-ended lines Gas	25	0.0017	0.043	0.095	0.41	0.0004	0.0009	0.004
Open-ended lines LL	150	0.0017	0.255	0.562	2.46	0.0026	0.0057	0.024
Sampling connections Gas	4	0.0150	0.006	0.013	0.58	0.00006	0.0001	0.006
Sampling connections LL	4	0.0150	0.006	0.013	0.58	0.00006	0.0001	0.006
		Total			32.83			1.029

11 Acc. Tab 5-2 (Reduction by LDAR)
22 Based on 8760 hr/yr
33 Number in parenthesis represents total number; second number (not in parenthesis) remaining number of connectors not welded; weld control efficiency 100% acc. Table 5-1
LL Light Liquid

<u>MeOH Synthesis</u>

All available literature describes fugitive emission of VOCs for Refinery or organic chemical industry. The calculations of VOC fugitive emissions is based on the current status of engineering work.

All calculation are based on the report EPA-453/R-95-017 (1995 Protocol for Equipment Leak Emission Estimates).

The fugitive emissions are calculated based on the EPA's average emission factor approach:

Emission = Factor x W_f x # components

The weight fraction (W_f) of Methanol in liquid steams is estimated with 96%.
The weight fraction (W_f) of Methanol in gaseous steams is estimated with 15%.

Used Control efficiencies for the calculation of the actual fugitive emissions:
Connectors 69%
Pressure Relief Valves 90%
Others 99%

Table 1 VOC (Methanol) Leak Emission Estimate for Methanol Synthesis

Component	Quantity	Emission Factor acc. Table 2-1	Potential			Actual		
		(kg/hr/source)	kg/h	lb/h	ton/yr[22]	kg/h	lb/h	ton/yr[22]
Valves gas	25	0.00597	0.022	0.049	0.21	0.0002	0.0004	0.0021
Valves light liquid	40	0.00403	0.155	0.342	1.50	0.0016	0.0035	0.015
Compressor	0	0.228	0	0	0	0	0	0
Pump seals light liquid	1	0.0199	0.019	0.042	0.18	0.0019	0.0042	0.0018
Pressure Relief Valve	1	0.104	0.016	0.035	0.15	0.0016	0.0035	0.0015
Connectors [11] Gas	(75) / 20 [33]	0.00183	0.137	0.302	1.33	0.0113	0.0249	0.110
Connectors [11] light liquid	(120) /30 [33]	0.00183	0.211	0.465	2.04	0.0170	0.0374	0.164
Open-ended lines Gas	25	0.0017	0.006	0.013	0.06	0.00006	0.0001	0.0006
Open-ended lines LL	40	0.0017	0.065	0.143	0.63	0.0007	0.0015	0.0063
Sampling connections Gas	1	0.0150	0.002	0.004	0.02	0.00002	0.00004	0.0002
Sampling connections LL	1	0.0150	0.014	0.031	0.14	0.0001	0.0002	0.0014
		Total			6.26			0.299

11 Acc. Tab 5-2 (Reduction by LDAR)
22 Based on 8760 hr/yr
33 Number in parenthesis represents total number; second number (not in parenthesis) remaining number of connectors not welded; weld control efficiency 100% acc. Table 5-1
LL Light Liquid

<u>MTG</u>

All available literature describes fugitive emission of VOCs for Refinery or organic chemical industry. The calculations of VOC fugitive emissions is based on the current status of engineering work.

All calculation are based on the report EPA-453/R-95-017 (1995 Protocol for Equipment Leak Emission Estimates).

The fugitive emissions are calculated based on the EPA's average emission factor approach:

Emission = Factor x W_f x # components

The weight fraction (W_f) of Methanol in liquid steams is estimated with 96%.
The weight fraction (W_f) of Methanol in gaseous steams is estimated with 96%.

Used Control efficiencies for the calculation of the actual fugitive emissions:
Connectors 69%
Pressure Relief Valves 90%
Others 99%

Table 1 VOC (Methanol) Leak Emission Estimate for MTG

Component	Quantity	Emission Factor acc. Table 2-1	Potential			Actual		
		(kg/hr/source)	kg/h	lb/h	ton/yr[22]	kg/h	lb/h	ton/yr[22]
Valves gas	250	0.00597	1.433	3.159	13.84	0.014	0.0309	0.14
Valves light liquid	40	0.00403	0.155	0.342	1.49	0.002	0.0044	0.015
Compressor	0	0.228	0	0	0	0	0	0
Pump seals light liquid	1	0.0199	0.019	0.042	0.18	0.0002	0.0004	0.002
Pressure Relief Valve	1	0.104	0.100	0.220	0.96	0.01	0.0220	0.096
Connectors [11] Gas	(750) /70 [33]	0.00183	1.37	3.020	13.26	0.0397	0.0875	0.383
Connectors [11] light liquid	(100) /10 [33]	0.00183	0.183	0.403	1.77	0.0057	0.0126	0.055
Open-ended lines Gas	150	0.0017	0.245	0.540	2.36	0.0025	0.0055	0.024
Open-ended lines LL	40	0.0017	0.065	0.143	0.63	0.0007	0.0015	0.006
Sampling connections Gas	0	0.0150	0	0	0	0	0	0
Sampling connections LL	2	0.0150	0.029	0.064	0.28	0.0003	0.0007	0.003
		Total			34.77			0.725

1 Acc. Tab 5-2 (Reduction by LDAR)
2 Based on 8760 hr/yr
3 Number in parenthesis represents total number; second number (not in parenthesis) remaining number of connectors not welded; weld control efficiency 100% acc. Table 5-1
LL Light Liquid

Fugitive emissions VOC (Methanol free)

All available literature describes fugitive emission of VOCs for Refinery or organic chemical industry. So all calculations of VOC fugitive emissions will be in the accuracy of a rough estimate.

All calculation are based on the report EPA-453/R-95-017 (1995 Protocol for Equipment Leak Emission Estimates).

The fugitive emissions are calculated based on the EPA's average emission factor approach:

$$\text{Emission} = \text{Factor} \times W_f \times \#\ \text{components}$$

The weight fraction (W_f) of VOC in liquid steams is estimated with 100%.
The weight fraction (W_f) of VOC in gaseous steams is estimated with 50%.

Used Control efficiencies for the calculation of the actual fugitive emissions:
Connectors 69%
Pressure Relief Valves 90%
Others 99%

Table 2 VOC Leak Emission Estimate for MTG

Component	Quantity	Emission Factor acc. Table 2-1	Potential			Actual		
		(kg/hr/source)	kg/h	lb/h	ton/yr[22]	kg/h	lb/h	ton/yr[22]
Valves gas	200	0.00597	0.597	1.316	5.76	0.006	0.013	0.058
Valves light liquid	650	0.00403	2.620	5.776	25.29	0.026	0.057	0.253
Compressor	2	0.228	0.228	0.503	2.20	0.002	0.004	0.022
Pump seals light liquid	7	0.0199	0.139	0.306	1.35	0.001	0.001	0.014
Pressure Relief Valve	20	0.104	1.04	2.293	10.04	0.104	0.229	1.004
Connectors [11] Gas	500	0.00183	0.458	1.010	4.42	0.142	0.313	1.37
Connectors [11] light liquid	1500	0.00183	2.745	6.052	26.51	0.851	1.876	8.22
Open-ended lines Gas	100	0.0017	0.085	0.187	0.82	0.001	0.002	0.0008
Open-ended lines LL	250	0.0017	0.425	0.937	4.10	0.004	0.009	0.041
Sampling connections Gas	4	0.0150	0.03	0.066	0.30	0.0003	0.0007	0.003
Sampling connections LL	15	0.0150	0.225	0.496	2.17	0.002	0.004	0.022
		Total			82.96			11.01

11 Acc. Tab 5-2 (Reduction by LDAR)
22 Based on 8760 hr/yr
LL Light Liquid

Table 3 Total VOC Leak Emission Estimate for MTG

	Potential	Actual
	ton/yr	ton/
VOC(MeOH)	34.77	0.725
VOC (MeOH Free)	82.96	11.01
Total VOC	117.73	11.74

ATTACHMENT O

MONITORING, RECORDKEEPING, REPORTING, AND TESTING PLANS

ATTACHMENT O

MONITORING, RECORDKEEPING, REPORTING, AND TESTING PLANS

Transgas Development Systems, LLC will work with DAQ to identify and address Monitoring, Recordkeeping, Reporting, and Testing Plans. See Section L for proposed Monitoring, Recordkeeping, Reporting, and Testing Plans.

ATTACHMENT P

PUBLIC NOTICE

EXAMPLE LEGAL ADVERTISEMENT

Publication of a proper Class I legal advertisement is a requirement of the application process. In the event the applicant's legal advertisement fails to follow the requirements of 45CSR 13 (45-13-8) or the requirements of Chapter 59, Article 3, of the West Virginia Code, the application will be considered incomplete and no further review of the application will occur.

The applicant, utilizing the format for the Class I legal advertisement appearing below, shall cause such legal advertisement to appear a minimum of one (1) day in the newspaper most commonly read in the area where the facility exists or will be constructed. The notice must be published no earlier than five (5) working days of receipt by this office of your application. The original affidavit of publication must be received by this office no later than the last day of the public comment period.

The advertisement shall contain, at a minimum, the name of the applicant, the type and location of the source, the type and amount of air pollutants that will be discharged, the nature of the permit being sought, the proposed start-up date for the source and a contact telephone number for more information.

The location of the source should be as specific as possible starting with: 1.) the street address of the source; 2.) the nearest street or road; 3.) the nearest town or unincorporated area, and 4.) the county.

Types and amounts of pollutants discharged must include all regulated pollutants (PM, PM_{10}, VOC, SO_2, Xylene, etc.) and their potential to emit or the permit level being sought in units of tons per year (including fugitive emissions).

In the event the 30th day is a Saturday, Sunday, or legal holiday, the comment period will be extended until 5:00 p.m. on the following regularly scheduled business day.

AIR QUALITY PERMIT NOTICE
Notice of Application

Notice is given that TransGas Development Systems, LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a Regulation 13 Construction Permit for a coal to gasoline plant to be located off of West Virginia State Route 52 near Wharncliffe, in Mingo County, West Virginia.

The applicant estimates the potential to discharge the following Regulated Air Pollutants will be: NOx, of 50 tons per year (tpy), SOx of 84 tpy, CO of 90 tpy, VOC of 40.52 tpy, HAPS of 7.47, PM of 95.76 tpy of which 29.81 tpy is fugitive, and PM10 of 67.19 tpy of which 10.13 tpy is fugitive.

Startup of operation is planned to begin on or about the 1st day of May, 2013. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice.

Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, extension 1227, during normal business hours.

Dated this the (Insert Date) day of December, 2008.

By: TransGas Development Systems, LLC
Adam Victor
President
630 First Avenue, Suite 30G
New York, New York 10013-3799

ATTACHMENT Q

BUSINESS CONFIDENTIAL CLAIMS

Precautionary Notice — Claims of Confidentiality

The person submitting this information may assert that some or all of the information submitted is entitled to confidential treatment as provided by West Virginia Legislative Rule 45CSR31, entitled "Confidential Information." Information covered by such a claim will be disclosed by the Division of Air Quality (DAQ) only to the extent, and by means of the procedures, set forth in 45CSR31. Please contact the West Virginia Secretary of State's Office at 304/558-6000 to obtain a copy of 45CSR31 in order to ensure that all required procedures are followed.

Information concerning the "types and amounts of air pollutants discharged," as that term is defined in WVCSR §45-31-2.4, shall not be claimed as confidential.

Any claim of confidentiality shall be made in accordance with the requirements of 45CSR31 and must accompany the information at the time it is submitted to the DAQ. **If no claim of confidentiality is made at the time of submission or is not made in accordance with the requirements of 45CSR31, the DAQ may make the information available to the public without further notice.**

Included below are procedures to be followed in submitting information claimed as confidential. This information is intended to assist a person with claiming confidential information and is not meant to relieve a person of his/her obligation to review the provisions of 45CSR31 and to comply with such rule. The procedures are as follows:

1. Indicate clearly the items of information claimed confidential by marking each page with the term "Claimed Confidential," with the date of such claim of confidentiality. With the exception of documents of a size greater than 8½" x 14", information claimed confidential must be submitted on colored paper.

2. Include a cover document which justifies the claim of confidentiality in accordance with the specific criteria under WVCSR §45-31-4.1. A sample cover document is attached for your information and use. The cover document will be available for public disclosure and must include the following information:

   (a) The identity of the person making the submission of information claimed confidential;

   (b) The reason for the submission of information;

   (c) The name, an address in the State of West Virginia and telephone number of the designee who shall be contacted in accordance with 45CSR31;

   (d) Identification of each segment of information within each page that is submitted as confidential and the justification for each segment claimed confidential, including the criteria under WVCSR §45-31-4.1;

(e) The period of time for which confidential treatment is desired (e.g., until a certain date, until the occurrence of a specified event or permanently); and,

(f) Signature of a responsible official or an authorized representative of such person.

3. At the same time as the information claimed confidential is submitted to the DAQ on colored paper, a complete set of the information, including the cover document previously required under paragraph 2, must be submitted on white paper with the information claimed to be confidential blacked or whited out and the words "Redacted Copy — Claim of Confidentiality" marked clearly on each such page, so that the information is suitable for public disclosure. In the case of drawings and blueprints, mark each page with the words "Redacted Copy — Claim of Confidentiality," include the title or legend of the drawing, and black or white out the information claimed confidential. The redacted page may be 8½" x 11" in size.

4. In the case of a permit application or supplemental information to an application, DAQ requires an applicant to submit three (3) copies of the application. Of those three (3) copies, one (1) must be a complete set of the application containing the information claimed confidential on colored paper and two (2) must be redacted copies. The DAQ reserves the right, however, to request additional copies of the information containing the confidential material.

Attachment

Attachment Q
Business Confidential Claim

This form contains each of the required elements for the cover document required under 45CSR31. The person submitting this form may wish to attach an additional page(s) to provide adequate justification under the ARationale@ section of the form.

<table>
<tr><td>Company Name</td><td>TransGas Development Systems, LLC</td><td colspan="3">Responsible Official
Adam Victor, President</td></tr>
<tr><td>Company Address</td><td>630 First Avenue</td><td rowspan="7">Confidential Information Designee in State of WV</td><td>Name</td><td>Patrick Ward</td></tr>
<tr><td></td><td>Suite 30G</td><td>Title</td><td>Senior Engineer</td></tr>
<tr><td></td><td>New York, NY 10016-3799</td><td>Address</td><td>7012 MacCorkle Avenue, S.E.</td></tr>
<tr><td rowspan="4">Person/Title Submitting Confidential Information</td><td>Adam Victor</td><td></td><td>Charleston, WV 25304</td></tr>
<tr><td rowspan="3">President</td><td>Phone</td><td>(304) 342-1400</td></tr>
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</table>

Reason for Submittal of Confidential Information: Allow review of information pertaining to DAQ issuing a Regulation 13 Permit Application.

Identification of Confidential Information	**Rationale for Confidential Claim**	**Confidential Treatment Time Period**
All Marked Confidential Information	Provide justification that the criteria set forth in ' 45CSR31-4.1.a - e have been met. The information contained within the application is fully protected under non-disclosure and confidentiality agreements by all parities involved in the application process and design of the facility. See Page Q2 of Q2.	This information is to be maintained confidential; there is no timeframe for expiration of confidential treatment.

Responsible Official Name:	
Responsible Official Title:	President
Date Signed:	12/3/08

NOTE: Must be signed and dated in **BLUE INK**.

Provide justification that the criteria set forth in § 45CSR31-4.1.a - e have been met.

4.1.a. The claim of confidentiality has not expired by its terms, nor been waived or withdrawn;

The confidentially agreements do not have an expiration date due to the nature of the information contained in the application.

4.1.b. The person asserting the claim of confidentiality has satisfactorily shown that it has taken reasonable measures to protect the confidentiality of the information, and that it intends to continue to take such measures;

The information contained within the application is fully protected under non-disclosure and confidentiality agreements by all parities involved in the original development of the processes, the design of the facility, and the permit application process.

4.1.c. The information claimed confidential is not, and has not been, reasonably obtainable without the person's consent by other persons (other than governmental bodies) by use of legitimate means (other than discovery based on a showing of special need in a judicial or quasi-judicial proceeding);

The information available herein is not available and is not to be made available to outside parties.

4.1.d. No statute specifically requires disclosure of the information; and

TransGas Development Systems, LLC believes there are no statutes that require disclosure of the information.

4.1.e. Either--

4.1.e.1. The person has satisfactorily shown that disclosure of the information is likely to cause substantial harm to the business's competitive position; or

This is a unique facility with many parties involved in preparing and providing information on the systems. Release of this information could cause substantial harm to TransGas Development Systems, LLC competitive position in the coal to gasoline market.

4.1.e.2. The information is voluntarily submitted information, and its disclosure would likely to impair the State's ability to obtain necessary information in the future.

The State should not disclose this information to anyone.

Attachment Q - Addendum		
Item/Information	**Reason for Confidential Status**	**Timeframe**
Attachment L		
Gasifier Feed and PDQ Gasifier Units - Item 3 and 4 (Page L10)	Provides information on unique interlinks and operating parameters between units in PDQ Process.	No Expiration of Confidential Status
PSA System - Item 4 (Page L38)	Provides unique process information.	No Expiration of Confidential Status
Attachment N		
Mass Balance (N20,21, and 22)	Provides information on unique interlinks and operating parameters between units.	No Expiration of Confidential Status
Appendix - Supplemental Information		
Start-Up Description (Page 3 through Page 23)	Provides unique start-up sequence and unique interlinks between units.	No Expiration of Confidential Status
Process Description (Page 5 through Page 12)	Provides confidential design criteria/information.	No Expiration of Confidential Status
Process Description (Page 27 through Page 35)	Provides information on unique interlinks between units in the MTG Process.	No Expiration of Confidential Status
Basic Process Flow Diagram 1-1, PDQ Gasification	Provides information on unique process configuration.	No Expiration of Confidential Status
MTG Process Flow Diagrams		
Process Flow Diagram, MTG Reaction Unit, Separation, Methanol Recovery	Provides information on unique process configuration.	No Expiration of Confidential Status
Process Flow Diagram, MTG Reaction Unit, Methanol Vaporization/HP Steam Generation	Provides information on unique process configuration.	No Expiration of Confidential Status
Process Flow Diagram, MTG Reaction Unit, DME Reactor, MTG Reactors	Provides information on unique process configuration.	No Expiration of Confidential Status
Process Flow Diagram, MTG Reaction Unit, MTG Reactors Regeneration System	Provides information on unique process configuration.	No Expiration of Confidential Status
Process Flow Diagram, MTG Reaction Unit, Gas/Liquid/Liquid Separation	Provides information on unique process configuration.	No Expiration of Confidential Status
Process Flow Diagram, MTG Reaction Unit, Methanol Vaporization/HP Steam Generation	Provides information on unique process configuration.	No Expiration of Confidential Status
Process Flow Diagram, MTG Separation Unit, Deethanizer	Provides information on unique process configuration.	No Expiration of Confidential Status
Process Flow Diagram, MTG Separation Unit, Stabilizer	Provides information on unique process configuration.	No Expiration of Confidential Status
Process Flow Diagram, MTG Separation Unit, Methanol Recovery	Provides information on unique process configuration.	No Expiration of Confidential Status
Process Flow Diagram, MTG Separation Unit, Absorber	Provides information on unique process configuration.	No Expiration of Confidential Status
Process Flow Diagram, Heavy Gasoline Treatment Unit, HGT Reactors	Provides information on unique process configuration.	No Expiration of Confidential Status
Process Flow Diagram, Heavy Gasoline Treatment Unit, HGT Product Stripper	Provides information on unique process configuration.	No Expiration of Confidential Status
Process Flow Diagram-Mass Balance	Provides information on unique interlinks and operating parameters.	No Expiration of Confidential Status

APPENDIX

SUPPLEMENTAL INFORMATION

START-UP DESCRIPTION COAL TO LIQUIDS PLANT

OVERALL SEQUENCE

00	17.10.08	Hg			
Rev.	Date	Prepared	Checked	Approved	Description

Table of contents

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Form: EISPETHE.dot / 01.09.1999 / Word 97

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[redacted]

[redacted]

[redacted]

TRANSGAS DEVELOPMENT SYSTEMS, LLC

CTL PROJECT

Process Description

CTL Plant

PREPARED BY

UHDE

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1) All information and/ or data provided by Uhde shall not be deemed as a commercial or technical proposal and in particular do not contain any definite "not-to-exceed prices".

(2) All information and/ or data have to be reviewed on the basis of more sufficient and detailed initial data to be provided by Transgas Development Systems, LLC and in consequence the information and/ or data provided by Uhde may differ considerably from such reviewed data.

(3) Uhde, however, makes no representations or warranties, express or implied, as to the quality, accuracy and completeness of the information and/ or data provided hereunder. The receiving party accepts all risk of use of and reliance on the provided information and/ or data.

(4) Uhde shall in no event be liable to the receiving party for loss of profit, loss of assets, loss of business opportunities, loss of use, loss of production, or any financial or economic loss, or for any indirect, incidental, special or consequential loss or damages, irrespective whether such liability should be based on contract, warranty, tort (including negligence), strict liability or otherwise.

TABLE OF CONTENTS

CTL Plant, Process Description

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1 Coal Preparation and Gasification

1.1 Introduction

The PRENFLO^{TM} Direct Quench (PDQ) process is an innovative coal gasification process and an alternative design of the proven PRENFLO^{TM} technology, which has been successfully installed in its PSG (PRENFLO^{TM} Steam Generation) version in the world's largest IGCC in Puertollano, Spain.

The PDQ process has been developed specifically for the hydrogen and chemical applications.

The "slagging" gasifier set-up features a cylindrical, cooled (membrane-wall) reactor cage provided with protrusions (muffles) for [redacted] coal burners arranged horizontally in an opposed-firing configuration. By installing the burners with a small angle to the radial, a swirling motion is imposed upon the gas flow pattern inside the reactor cage, which will impose a centrifugal movement of the liquid slag formed during gasification towards the cylindrical cage wall. The syngas produced during gasification is led down to the slagbath surface, diverted upwards and quenched with water (direct quench).

The liquid slag flows downward along the vertical cylindrical wall through a (slag) tap in the conical bottom of the cage into a water bath (slagbath) where it solidifies and scatters into small granules. The arrangement thereby ensures a simple and effective segregation between the syngas (product) on the one hand and the bulk of the slag/ash on the other. Fly ash will partially be washed out by quench water, partially be entrained with the syngas.

The membrane-wall reactor cage is installed inside a vessel providing the pressurised containment. The membrane-wall tubes are cooled by raising [redacted] steam.

The gasification consists of several parallel trains. Only one train is described exemplary for all.

The gasification comprises a number of subsystems, which will be described individually:

1.2 Coal Preparation (Unit 111)

The Coal Milling and Drying Unit consists of several identical process trains. During normal operation one train provides the feed for one gasification train.

The system configuration has been selected to satisfy the following two major requirements:

- safe operation of dried, pulverized coal, i.e. an inert atmosphere
- minimize energy consumption, i.e. use a recycle of conveying and drying gas.

Coal from the coal bunker is transported by weighing belts to the mill. Each mill is equipped with its own bunker.

The bunkers are vented with the bunker vent fans through the bunker filters [redacted]

The coal feeder controls the mill capacity. The total feed stream is gravity-dropped straight into the mill [redacted]

In the coal (roller) mills the raw coal is milled and dried under a slight under-pressure and under inert conditions (low oxygen concentration). Potential hazards of self-ignition and dust explosions are thereby excluded [redacted]

The inert gas flow transports the pulverized coal to the rotary classifier, from which the coarse particles are returned to the mill.

[redacted]

The inert gas loaded with fine particles is sent to the bag house filter, a fabric type filter, for separation. [redacted]

The pulverized coal is transported from the bag house filter to the pulverized coal storage vessel (Unit 121/2) using transportation screws and rotary feeders.

[redacted]

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1.3 Coal Dust Feeding (Unit 112)

The coal from the coal preparation enters the coal dust bunker via the cyclone filter on top of the coal dust bunker, from where it is fed to the Plant. The coal flows by gravity to the lock hoppers placed under the coal dust bunker. Each lock hopper [redacted] is connected to one outlet cone of the coal dust bunker.

Once a lock hopper is filled with coal dust, the lock hopper is disconnected and pressurized from atmospheric pressure to about 1 to 2 bar above the coal feed bin working pressure. This is done by connecting the lock hopper to an inert gas system (N_2 or CO_2). The selection of inert gas depends on the field of application of the product gas (Syngas) of the gasification process.

After opening the valve at the outlet of the lock hopper the pressurized coal dust from one or more lock hopper is continuously supplied via a dense phase conveying system to the coal feed bin. The transport medium of the conveying system is also an inert gas system (N_2 or CO_2).[redacted] The working pressure of the coal feed bin is about 5 bar higher than the gasifier pressure.

Each Vessel of the coal preparation and coal dust feeding is connected to the cyclone filter placed above the coal dust bunker. [redacted] Each lock hopper is additionally equipped with a coarse filter. [redacted]

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1.4 Gasification (Unit 113)

The coal dust enters the via the burners into the PRENFLO™ gasifier. The coal particles are partially oxidized with oxygen to be supplied from an air separation unit (ASU). Liquid slag is flowing down the cooled wall of the gasifier and falls through the quench zone into the slag pool. From there it is discharged via the slag removal.

The generated raw gas and fly ash are also conducted downwards and leave the gasifier though the opening at the bottom into the first quench zone. Here the raw gas is quenched by a free down flow water film and additionally cooled and saturated by water spray nozzles further down in the quench zone.

[redacted]

The saturated raw gas leaves the pressure vessel with a temperature of about 220 °C.

Scrubbed fly ash from the raw gas is collected in the slag collecting vessel and in the surrounding water bath. The water overflow of the collecting vessel flows together with fly ash particles into the surrounding water bath. The surplus water exits the water bath and is pumped by the Quench Water Circulating Pump to the quench nozzles. Additionally a continuous water stream is withdrawn from the water bath to the Slurry Recovery System to avoid an accumulation of solids.

1.5 Slag Removal (Unit 114)

The granulated slag is discharged from the slag collecting vessel to the slag lock hoppers [redacted]

The lock hoppers are connected via a junction piece to the outlet of the slag crusher or the slag collecting vessel outlet. The lock hoppers are responsible for the discharge and cooling of the granulated slag coming from the slag collecting vessel. Cooling of slag is realized by injecting [redacted] water into the lower part of a lock hopper [redacted]

A slag extractor is placed under each of the lock hoppers for receiving the slag during emptying of the lock hopper. The coarse material is removed from the slag extractor. The remaining water, which contains the fines—a combination of slag fines and unburned coal—is pumped to the slurry recovery.

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1.6 Slag Fines Removal (Unit 115)

The key elements of the slurry recovery are the slurry flash vessels with integrated heat exchangers. The slurry flash vessel I is fed by the discharged slurry coming from the gasifier water bath. [redacted] The slurry then enters the Slurry Flash Vessel II at the bottom [redacted]. The filtrate preheaters I and II, which are integrated in the slurry flash vessels are fed in counter current flow with [redacted] process water coming from the process water tank, which is preheated with flash gas from the depressurized slurry.

The remaining slurry and the slurry coming from the slag extractor enter the slurry flash vessel 3. [redacted]

The flash gas of the three vessels are combined and sent to the sulfur recovery unit. The flashed slurry is transferred by the slurry pump to the clarifier in the slurry filtration system.

1.7 Scrubbing System (Unit 116)

The raw gas, withdrawn from the gasifier is sent to the scrubbing system consisting of the venturi scrubber and the downstream scrubber. In the scrubbing system the raw gas the remaining fly ash particles as well undesired trace components are removed. The scrubbed gas is handed over to further gas treating.

The scrubber system has a continuous water circulation. The water accumulating in the bottoms of the scrubber is circulated via the scrubber circulating pump and the LP-boiler back to the scrubber and the venturi scrubber.

[redacted]

1.8 Water Pretreatment (Unit 117)

A flocculent is added to the flashed slurry from the slurry recovery before it is fed to the clarifier. In the clarifier the flashed slurry is separated into a solid rich stream and clear overflow water stream. The overflow water is collected as process water in the process water tank[redacted]

To avoid an accumulation of chlorides in the water system a continuous blow down of [redacted] process water is send to the waste water treatment.

The solid rich underflow of the clarifier is transported via the clarifier bottoms pump to the sludge storage tank. This tank supplies the belt filter press unit continuously with sludge via the sludge pump. The processed filter cake is sent to the coal yard. The filtrate of the belt filter press is sent to the filtrate tank. From the tank the filtrate pumped via the filtrate pump back to the clarifier and also for scrubbing purpose to the belt filter.

2 Gas Treatment

2.1 CO-Shift System (Unit 233)

2.1.1 General

The raw syngas coming from the wet scrubbing (Unit 116) consists mainly of hydrogen (H_2) and carbon monoxide (CO). The amount of hydrogen in the raw syngas is too low to satisfy the required H2/CO ratio for the downstream Methanol Synthesis Unit.

Therefore additional hydrogen has to be produced by a CO-shift process. This is achieved by processing a major part of the raw syngas in the CO-Shift Unit.

As the feedgas contains sulphur components, the catalyst to be used has to be sulphur tolerant and is referred to as sour shift catalyst.

The carbon monoxide (CO) is converted catalytically with water (H_2O) into hydrogen (H_2) and carbon dioxide (CO_2).In addition the applied catalyst reduces hydrogen cyanide (HCN) and carbonyl sulphide (COS) in presence of water to ammonia (NH3) and carbon monoxide (CO) and to hydrogen sulphide (H2S) and carbon dioxide (CO2) near to equilibrium levels.

Due to the direct quench configuration in the Gasification Unit 116 the water content of the raw syngas is high enough to fulfil the water vapour needs of the CO shift reaction. The steam to dry gas ratio is sufficient to provide the required steam for the reaction as well as to moderate the temperature increase in the shift reactor.

2.1.2 Process Flow

The raw syngas coming from the wet scrubbing (Unit 116) at a temperature of approx. 218 °C is fed via Rawgas Superheater which heat up the rawgas to reaction temperatur to the Sour Shift Reactor. In order to control the H2/CO ratio at Battery Limits of the CO Shift Unit a bypass is installed across the one CO Shift Reactor 2330R001. The inlet temperature to the shift reactor is controlled by a by-pass across the Rawgas Superheater.Only one shift reactor is foreseen. This insures that a major part of raw syngas is routed across the CO shift catalyst and simultaneously treated for COS / HCN hydrolysis. This reduces the load of these components to the downstream H2S/CO2 Removal Unit 2350.

The considerable heat of reaction of this process is being used for the production of saturated HP-steam in the downstream Heat Recovery (e.g. Shift Gas Cooler, saturated LP-steam in Syngas Cooler 1 and for warming up of boiler feed water in Syngas Cooler 2).

The steam contained in the raw syngas is only partially consumed by the conversion reaction. The remaining part is condensed and separated from the gas during cooling of the syngas. The formed process condensate is separated in Condensate Separator I and directly recycled back to the gasifcation unit via Condensate Pump I.

Final cooling of the shifted gas is carried out by air cooling in the Syngas Air Cooler and by water cooling.

The process condensate from this further cooling is separated in Condensate Separators II and routed to the Sour Water Stripping Unit 328.

The cooled gas gas is pressurised further by Syngas Compressor before routing to the H2S/CO2-Removal Unit 235.

2.2 CO_2 / H_2S Removal (Unit 235)

2.2.1 General

The Rectisol Wash is a physical wash system with methanol as preferable solvent. It removes the acid gases CO2, H2S, COS and HCN from a feed gas from a gasification unit. The Rectisol Wash Unit consists of a methanol wash section, recycle gas compression, CO2 product recovery section, hot regeneration section and the methanol/water separation. In addition a small recycle feed gas from the sulphur recovery unit is treated. The process description refers to the corresponding simplified PFD

2.2.2 Process Flow

Feed Gas Precooling (not shown)

The feed gas is supplied to B.L. of the Rectisol plant from the upstream CO Shift unit. After mixing of the internal recycle gas and injection of methanol, the feed gas is cooled down against cold product gases. The mixture of the cooled down feed gas is routed to the Absorber Column (methanol wash column).

The condensed loaded methanol/water is separated in a upstream knock out drum and fed to the MeOH / H_2O Separation.

Absorber Column (methanol wash column)

In the lower section of the wash column HCN is removed by the cold methanol. H_2S and COS is washed out in the middle section, the CO_2 is removed in the upper section. The heat of solution in the CO_2 section is covered partially by warming up of the methanol, partially by a cooling stage (cooling medium evaporating refrigerant). As the solubility of CO_2 in methanol is less than the solubility of H_2S and COS, the

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methanol flow in the CO_2 removal section is greater than in the H2S removal section. The methanol surplus from the CO_2 removal section is taken off from the upper chimney tray of the column, this methanol is only loaded with CO_2 . The stream, which is drawn off from the sulfur removal section (lower chimney tray), is additionally loaded with COS and H_2S . For the HCN removal section only a very small split stream of the total solvent is required.

The small solvent stream also loaded with HCN is drawn off the bottom of the column. One part of this methanol is pumped as methanol injection into the feed gas. The other part is fed as HCN/methanol/water mixture into the HCN Separation Column after being warming up.

Solvent Flash I (Recovery of CO and H_2)

After subcooling the two main loaded methanol streams from the side draws of the Absorber Column are expanded to an intermediate pressure in order to recover dissolved hydrogen and to limit the CO content in the CO2 product and in the tailgas.

Option 1: The flashed gases are recompressed and recycled into the feed gas to the Rectisol wash unit to recover CO +H_2 .

Option 1:If there is demand on heating gas for the coal preparation (milling) this gas can also used as fuel gas.

Solvent Flash II (CO2 Production)

CO2 is recovered by warming up and expansion of loaded methanol streams into the CO2 production column. H2S is removed from the CO2 product in this column by means of a part of the sulphur free methanol from, routed to the top. The overhead of the CO2 column is sent to the CO_2 Wash Column

The flashed CO_2 warmed up in is passed through the CO_2 Wash Column for methanol removal. Wash medium is demineralised water. The wash water from the column bottom loaded with methanol is pumped and warmed-up into the MeOH/ H_2O Rectifier (methanol/water separation) for methanol recovery.

Hydrogenated tailgas from the sulfur recovery can also be fed to this column

CO_2 Stripper

The flashed solvent from the Flash Solvent II column contains to much CO_2 for the sourgas. In this column CO2 is stripped off the methanol by means of LP-Nitrogen in order to revover the CO_2 and to increase the H2S concentration in the H2S fraction. The solvent washed CO_2 top fraction is routed to the Solvent Flash II column and the bottom product which contans the H_2S is pumped to the Hot Regeneration Column.

Hot Regeneration Column

The H_2S enriched solvent is regenerated in this column. All dissolved acid gases are stripped off by means of methanol vapour, generated in a reboiler, heated by steam. The lean methanol from the bottom of the column is pumped back to the Absorber (wash) Column. Before reuse the lean solvent is cooled down. Methanol vapour is condensed from the H2S fraction leaving the top. The column overhead product is H_2S enriched sourgas which is routed to the sulfur recovery unit together with the overhead fraction of the HCN Separation Column.

HCN Separation Column

The HCN/methanol/water mixture from bottom of Absorber Column is fed to the HCN separation column, where HCN is removed by stripping. The column is heated by means of steam in a reboiler. After passing the condenser in the top of the column for methanol condensation the remaining uncondensed vapour (enriched in HCN) is mixed to the H2S fraction from the hot regeneration column.

Methanol/Water Separation

The bottom product from the HCN Separation Column and the wash water from the bottom of the CO_2 Wash Column together with condensate from the feed knock out drum is separated in the methanol/water separation column by distillation to methanol (top) and waste water (bottom). The column is heated by steam, as reflux lean

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methanol from the hot regeneration column is used. The methanol vapour from the top supports the stripping in the Hot Regeneration Column, the waste water is routed to B.L. after being cooled down. This water stream contains impurities contained in the feed gas.

CO_2 Wash Column

CO_2 , warmed up in, is passed through the CO_2 Wash Column for methanol removal. The methanol free CO_2 is compressed cooled down and used as sluicing gas in the coal gasification. Wash medium is demineralised water. The wash water from the column bottom loaded with methanol is pumped and warmed-up into the Methanol/Water Separation for methanol recovery.

2.3 Sour Water Stripping (Unit 238)

2.3.1 General

The Sour Water Stripping Unit 2380 treats process condensate from the CO Shift Unit 233 and from the tailgas treating section of Sulphur Recovery Unit 241 for removal of H2S, CO2, NH3 and HCN. The removal of this components is accomplished by stripping with water vapour in a stripper column equipped with packings.

2.3.2 Process Flow

In SWS Feed Vessel sour water from the CO Shift Unit 233 is flashed and collected in order to provide a stable continuous feed to the Sour Water Stripper.The vessel is equpped with a balance line between the vessle and the stripper top section.

The sour water is pumped from SWS Feed Vessel to the top of Sour Water Stripper via the Feed/Effluent Exchanger. In the Feed/Effluent Exchanger the sour water is heated by exchanging heat with the stripped water leaving Sour Water Stripper at the bottom.

The Sour Water Stripper can be equpped with structured packings or with Pall Rings. The packing is divided into three beds of which the top bed is used as a washing section for the sour water reflux coming from the SWS Reflux vessel. In the other packed bed sections of Sour Water Stripper, the sour water is contacted in counter current flow with steam from SWS Reboiler. The feed distributor of the Sour Water Stripper is located between the first and the second packed bed section.

LP steam is used for operation of SWS Reboiler. The major part of the vapours from the top of Sour Water Stripper is condensed in SWS Overhead Condenser. The outlet temperature of this air cooler is approx. 80°C to prevent salt formation. The remaining sour gas is separated from the formed condensate in SWS Reflux Vessel and sent to the Sulphur Recovery Unit 241.

The condensate is returned to Sour Water Stripper as reflux by SWS Reflux Pump.

The stripped water is reused and sent back to the Scrubbing Unit 116 via the Feed/Effluent Exchanger.

2.4 Mercury Removal (Unit 239)

2.4.1 General

The Mercury Removal Unit 239 is located downstream of the CO2/H2S-Removal Unit 235 which is based on the Rectisol process. Although the Rectisol unit removes the major part of mercury from the syngas due to the very low operating temperatures during absorption an additional adsorbent vessel is foreseen downstream of the CO2/H2S removal in order to assure a complete separation of an mercury that might be left over.

2.4.2 Process Flow

The Mercury Removal Unit consists of only one piece of equipment – the Mercury Adsorber. The vessel is equipped with a bed of impregnated activated carbon which is specially designed for mercury adsorption. The treated, completely dry syngas enters the vessel at the top and leaves the vessel as purified syngas at the bottom.

2.5 Sulphur Recovery (Unit 241)

2.5.1 General

The Sulphur Recovery Unit 241 processes H2S, CO2 and NH3 containing sour gas from stripping of process condensates in Sour Water Stripping Unit 238 and H2S, COS, CO2 and HCN containing acid gas from the CO2/H2S Removal Unit 235. NH3 and HCN are decomposed to less dangerous components, sulphur containing components are converted to elemental sulphur and CO2 passes this unit as inert component.

The produced liquid sulphur is collected, degassed and solidified. The residual tailgas of the sulphur recovery process is hydrogenated and recycled back to the CO2/H2S Removal Unit 2350.

The H2S contained in the combined feeds is partially combusted with oxygen coming from Unit 478, producing the intermediate product sulphur dioxide according to the reaction:

$$H_2S + 3/2\ O_2 \quad \leftrightarrow \quad SO_2 + H_2O$$
$$2\ H_2S + SO_2 \quad \leftrightarrow \quad 3/x\ S_x + 2\ H_2O$$

Both reactions can be summarised to:

$$H_2S + 1/2\ O_2 \quad \leftrightarrow \quad 1/x\ S_x + H_2O$$

Water (H2O) is a side product of all of these reactions. They are executed in one thermal and two catalytic steps in series. In all steps the gaseous sulphur species are in thermal equilibrium with liquid sulphur:

$$S_x = 12\ S_2 \leftrightarrow 4\ S_6 \leftrightarrow 3\ S_8 \leftrightarrow S_{Liquid}$$

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The vapours from Unit 115 and the vapours from Unit 238 contain ammonia. This ammonia is decomposed to nitrogen and hydrogen in this thermal step

The produced liquid sulphur is routed to the collecting and degassing system. Because the catalytic conversion is not complete, the tail gas at the outlet of the last pass of the sulphur condenser contains un-reacted H_2S and SO_2 as well as gaseous sulphur species acc. to their vapour pressures. Therefore, this tail gas is treated for hydrogenation of this sulphur components, pressurised and sent back to the CO_2 /H_2S Removal Unit.

Process Flow

Sulphur Recovery

The NH3 containing sour gases from Unit 115 and Unit 238 are combined and introduced to the unit separately from the acid gas produced by Unit 235.

Pressure control valves in the feed lines control the pressure in the tops of the columns, from which the feeds originate.

The ammonia containing sour gas and a portion of the acid, ratio controlled by the flow of feeds, are fed together with the required oxygen to the central part of the Claus Furnace Burner, while the other portion of acid gas is routed to the outer part. This burner is integrated to the combustion chamber of Claus Furnace.

Due to the low H2S content of the combined sour gas and acid gas feeds, pure oxygen is needed to reach the required temperature for ammonia destruction in the Claus furnace.

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The required oxygen is supplied directly from Unit 478. A feed forward control is setting oxygen to acid gas ratio. This feed back control ensures the correct stoichiometric conditions for the partial combustion reaction and with this, an optimum sulphur recovery.

The heat of reaction of the partial combustion of H2S is used primarily for production of saturated MP Steam in the Claus Furnace Waste Heat Boiler. The produced steam is released pressure controlled, whereas the required boiler feed water flows level controlled to the steam drum.

Further cooling of the process gas is performed in the first pass of Sulphur Condenser where elemental sulphur vapours are condensed and separated from the gas by an integrated sulphur separator. The transferred heat is used for production of LP-Steam in the outer shell of this heat exchanger.

The process gas is reheated in Reheater I and routed to the Claus Reactor I. The required inlet temperature is controlled by steam flow to the First Reheater.

In the first converter the formation of sulphur is continued resulting in an increase of gas temperature. The formed sulphur vapour is condensed again in the second pass of Sulphur Condenser. After separation of the liquid sulphur the process gas is reheated again in Reheater II, routed across Claus Reactor II for further reaction and cooled in third pass of Sulphur Condenser for sulphur condensation and separation.

The LP steam produced in Sulphur Condenser is released pressure controlled to the header. A part of the LP steam is consumed internally in the Sulphur Recovery Unit for tracing of sulphur lines and other various heating purposes.

The liquid sulphur separated from the process gas in Sulphur Condenser flows by gravity to the first compartment of the Sulphur Pit via sulphur locks.

Tailgas Treating and Compression

As the reaction of H_2S and COS to elemental sulphur is not complete the tailgas from Sulphur Condenser III has to be treated for hydrogenation before it can be recycled to the CO_2/H_2S Removal Unit 235.

The tailgas is mixed with pure hydrogen to provide the required amount of hydrogen for the catalytic reaction. The hydrogen flow is controlled by analysis of the H_2 content in the reactor effluent gas.

The tailgas is heated in the Feed/Effluent Exchanger and subsequently in the MP-steam heated Tailgas Heater to the required reaction temperature.

The heated gas passes the Hydrogenation Reactor andis cooled in the Feed / Effluent Exchanger. The tailgas is routed to the Tail Gas Scrubber to wash out any traces of unconverted sulphur and for further cooling.

The washing and cooling effect is performed by recycling the main portion of the scrubber bottom product through Recycle Water Cooler back to the top of the scrubber. The heat is removed by means of cooling water.

The formed condensate is drawn off from the cooling cycle level controlled at the bottom or Tail Gas Scrubber and sent to the Gas Condensate Drum.

The treated and cooled tailgas from the top of Tail Gas Scrubber is compressed to approx. 3 bara in the Recycle Gas Compressor and sent cooled by a water cooler to the regeneration section of the CO_2/H_2S Removal Unit 235.

Sulphur Degassing and Solidification

The sulphur separated from the process gas in the Sulphur Condenser I –III flow by gravity via Sulphur Locks to the first compartment of the Sulphur Pit.

By circulation and the intensive contact with stripping air, the total of the sulphur is degassed

Sulphur can be delivered in liquid form or in a separate working step as flakes.

3 Methanol Synthesis and MTG

3.1 Methanol Synthesis (Unit 331)

3.1.1 Synthesis Loop

The make-up gas coming from the Front-End Section is mixed with recovered hydrogen and compressed in MUG Compressor.

The synthesis loop recycle stream is mixed with the make-up gas coming from the MUG compressor and enters the circulator where it is compressed to synthesis inlet pressure.

The syngas mixture is first sent to the Feed Preheater, where it is heated to the reactor inlet temperature while cooling down the reactor product gas. The converter inlet temperature is controlled by bypassing feed shell side of the heat exchanger. The feed gas enters the MeOH converter and directly flows to the catalyst where methanol production reaction proceeds.

Crossing the isothermal zone, the reaction goes on while temperature is kept almost constant by releasing the reaction heat to heatexchanger plates in the reaction area where steam is raised.

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The product gas leaves the converter passing the gas-gas exchanger where it is cooled. The methanol formed in the product gas is condensed in the product condenser (air and water cooler); in the Flash Drum I the liquid raw product is separated from the recycle gas, which is sent to the suction of the recycle compressor.

A gas stream is purged from the synthesis loop and it is sent to the common Hydrogen Recovery Unit of the overall plant.

The raw methanol from is let down in the Flash Drum II where most of the dissolved gases are flashed and separated from the liquid.

The flash gas is sent to the B.L.'s via a pressure control valve while the raw methanol is made available at Battery Limits via a level control valve.

3.1.2 Steam Generation System

The heat exchange plates inside the MeOH Converter act as a boiler with forced circulation.

BFW is added directly to the Steam Drum. The circulation in the exchanger plates is ensured by BFW pumps.

The saturated MP steam generated by recovering the reaction heat is sent pressure controled to the Battery Limits. The steam pressures can be adjusted to control the boiling temperature in the Steam Generation System separately for external and internal plates; accordingly, the heat transfer in the catalyst is strictly controlled.

3.2 Methanol to Gasoline (MTG)

[redacted]

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[redacted]

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3.2.1 MTG Reaction Section (Unit 332)

[redacted]

Methanol Vaporizing

[redacted]

DME and MTG Reactors

[redacted]

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Regeneration System

[redacted]

[redacted]

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Gas - Liquid - Liquid Separation

[redacted]

3.2.2 Separation Section (Unit 333)

Deethanizer

[redacted]

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Stabilizer

[redacted]

Gasoline Splitter / Methanol Recovery

[redacted]

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[redacted]

3.2.3 Heavy Gasoline Treatment Section (Unit 334)

HGT Reactors

[redacted]

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[redacted]

HGT Product Stripper

[redacted]

[redacted]

4 Air Separation Unit (Unit 478), Instrument and Plant Air System (Unit 684)

For Air separation a commercially available Package Unit (ASU) will be used,. The number of parallel units will be adjusted to the total oxygen demand and ASU capacity respectively. A liquid storage for both oxygen and nitrogen will be foreseen. Medium pressure nitrogen and high pressure will be taken out of an appropriate process step of the ASU, so compression can be saved.

For Instrument and Plant Air supply two sources will be used. Part of the air required will be taken from the air compressor in the, another part will be supplied by an Instrument and Plant Air Compressor, delivered with Instrument and Plant Air System. By this it is supply of instrument and plant air is ensured even if air separation units are out of operation, e.g. to operate MTG section and utilities. Compressed air will be dried for instrument air and fed to the plant via Instrument Air Receiver. Furthermore compressed air will be fed to the plant without drying as plant via Plant Air Receiver.

5 Utilities

5.1 Nitrogen / HP Gas System (Unit 586)

The Nitrogen/ HP gas system provides nitrogen on different pressure levels, as well as HP gas on different temperature levels to all consumers within the plant. For LP Level nitrogen already pressurized is taken from the ASU. The HP gas will be CO_2 taken from the Rectisol Unit235, which is compressed by CO_2 Compressor. It can be used directly with compressor outlet temperature of 120°C in the Coal Feeding Unit 1121/2 and after further heating by Blow Back Heater in the Gasification Unit 113.

For start-up Nitrogen from ASU is fed to the CO_2 Compressor, compressed and used as HP Gas.

Medium Pressure Nitrogen is fed from ASU to Nitrogen Compressor. Pressurized Nitrogen is sent to consumers via MP Nitrogen Buffer Vessel .

5.2 Chemical Distribution (Unit 619)

A 20 wt% caustic solution is used to minimize winterising requirements. Since caustic is normally marketed at higher concentrations, the caustic is diluted with demin water from B.L. during the filling of the caustic storage tank via the caustic mixer. To unload the caustic the caustic fill pump is used. In case winterisation is required, caustic will be circulated permanently by Caustic Injection Pump via the Caustic Preheater. Supply of caustic to the plant is also done by Caustic Injection Pump.

Hydrochloric acid in a 15 wt% acid solution is used in the gasification slurry system to reach the necessary pH-concentration. Since acid is normally marketed at higher concentrations, on site dilution is foreseen with demin water. The demin water used for dilution is routed via the scrubber to the Acid Storage Tank to wash out acid traces from the vent gases leaving the tank during loading time.

To unload the acid the acid fill pump is used. In case winterisation is required, acid will be circulated permanently by Acid Injection Pump via the Acid Preheater. Supply of Acid to the plant is also done by Acid Injection Pump.

5.3 Flare System (Unit 665)

For flare gases there are foreseen separate headers in the gasification plant, MTG plant and for sour gases. For sour gas an extra flare stack is provided. The other flare gases are sent via Flare Condensate Knock Out Drum to the Flare Stack . Both flare stacks are equipped with mol sieves to prevent back flow of air into the system. Both flare stacks get nitrogen blanketing. At the top of the stacks are Pilot Burners

Condensate will be transferred by Flare Condensate Pump to waste water treatment.

5.4 Fire Fighting System (Unit 699)

Fire fighting will be done mainly by two ring headers, one for the gasifcation ring header (which needs enhanced pressure because of its height, and one for the other parts of the plant. Both ring headers are equipped with hydrants.

Fire fighting water will be held available in the Fire Water Tank. A Jockey Pump will keep the system under pressure. Fire Water Pump (electric drive and diesel engine drive) will supply the ring headers with fire fighting water. Pressure for the gasification ring header is enhanced by Fire Water Booster Pump.

Further Fire Fighting equipment such as estinguishers etc. will be considered during further engineering.

6 PSA System (Unit 335)

6.1 General

The pressure swing adsorption process is based on physical adsorption phenomena, whereby highly volatile compounds with low polarity as represented by hydrogen or helium, are practically non-adsorbable compared to molecules such as CO2, CO, N2 and hydrocarbons. Hence most impurities in a hydrogen-containing stream can be selectively adsorbed and high-purity hydrogen product is obtainable.

The pressure swing adsorption process is working between two pressure levels:

- Adsorption of impurities is carried out at high pressure to increase the partial pressure and, therefore, the loading of the impurities on the adsorbent material.
- Desorption or regeneration takes place at low pressure to reduce the residual loading of the impurities as much as possible, in order to achieve a high product purity, high delta loading adsorption I desorption and subsequently a high hydrogen recovery.

The process works at ambient temperature. There is no heat required for the regeneration. Changes in temperature are caused only by heat of adsorption and desorption and depressurization. This feature results in an extremely long lifetime of the adsorbent material as no hydrothermal effect will deactivate the adsorbent.

6.2 Adsorption and Regeneration Cycles

Adsorption

The feed gas flows through the adsorbers in upward direction. The impurities are selectively adsorbed - water, heavy hydrocarbons, light hydrocarbons, CO and nitrogen - from bottom to the top. High-purity hydrogen flows to the product line.

The adsorbers on adsorption are on staggered cycles resulting in a highly flexible purification unit which is not influenced by fluctuations of the composition, temperature and pressure of the feed gas.

The proposed PSA system allows a high performance by maximum utilization of the hydrogen stored in an adsorber at the end of adsorption for pressure equalization, re-pressurization and purging of other adsorbers.

Regeneration

After the adsorption step, the adsorber is regenerated in four basic steps:

- The adsorber is depressurized to a low-pressure level co-current to the feed flow. The co-current depressurization uses the hydrogen stored in the adsorber to repressurize and purge other adsorbers.
- The adsorber is depressurized in the counter-current direction to tail gas pressure (blow-down step) to remove the impurities from the adsorbent.
- The adsorber is purged at tail gas pressure with pure hydrogen to desorb the residual impurities from the adsorbent.
- The adsorber is re-pressurized to adsorption pressure with pure hydrogen coming from adsorbers on the depressurization step.

Pressure Equalization

In order to recover most of the hydrogen stored in an adsorber at the end of the adsorption step, several equalizations are performed.

6.3 Hydrogen Product

High purity hydrogen according to specification is discharged to the hydrogen product line from the top of the adsorber vessels presently on adsorption. Its pressure is equivalent to feed gas pressure minus pressure loss across the PSA unit.

6.4 Tail Gas

The tail gas system homogenizes variations in tail gas composition, flow and pressure. It consists of the tail gas drum(s) and appropriate control devices.

The control of the tail gas is performed as follows: The tail gas flows out of the tail gas system under flow control. The set point of the flow controller is provided by the process control system taking into account feed flow, purge gas flow and tail gas system conditions.

The tail gas stream is compressed and recycled to the CO Shift unit.

MTG Process Flow Diagrams

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Code				
06-	Document ID	Part 000	Group	Rev. 00

Pro. Unit 3320

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Designation
PROCESS FLOW DIAGRAM 3303
MTG REACTION UNIT 3320
SEPARATION, METHANOL RECOVERY

Scale X

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PROCESS FLOW DIAGRAM 3304
MTO REACTION UNIT 3320
METHANOL VAPORIZING /
HP STEAM GENERATION

[redacted]

NOTE 1

- REACTORS IN OPERATION
- REACTOR IN REGENERATION OR STW

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Part 000	Rev. 00
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Scale: X

Designation:
PROCESS FLOW DIAGRAM 3305
MTG REACTION UNIT 3320
DME REACTOR, MTG REACTORS

[redacted]

[redacted]

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PRELIMINARY

NOTE 1: SWING TYPE
ELBOW CONNECTION

Rev.	Date	Name	Date	Name	Date	Name	Description	Acc. Code
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Pro. Unit	Con. Unit	IDN	Type of Document	Order No.	Tot. Sheets
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Designation
PROCESS FLOW DIAGRAM 3306
MTG REACTION UNIT 3320
MTG REACTORS REGENERATION SYSTEM

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		PROCESS FLOW DIAGRAM 3307 MTC REACTION UNIT 3320 GAS/LIQUID/LIQUID SEPARATION

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PROCESS FLOW DIAGRAM 3308
MTO SEPARATION UNIT 3330
DEETHANIZER

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Approved		

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Designation	PROCESS FLOW DIAGRAM 3309 MTG SEPARATION UNIT 3330 STABILIZER
Scale	X

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Pro. Unit: 3320	
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Proc. Unit 3320	Con. Unit	Title	Type of Document	Order No. / Tot. Sheets

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Designation
PROCESS FLOW DIAGRAM 3313
HEAVY GASOLINE TREATMENT UNIT 3340
HGT PRODUCT STRIPPER

	Date	Name
Drawn		
Prepared		
Checked		
Approved		

Scale	Cyc. Code	Acc. Code	Status
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Rev.	Date	Name	Date	Name	Date	Name	Description	Rel. Code
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Pro. Unit	3330
Plant	000
Rev	00

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Designation: PROCESS FLOW DIAGRAM 3311 VTC SEPARATION UNIT 3330 ABSORBER

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Store Location: Folder				
Store Name				
Pro. Unit: 3340	Ser. Unit	TCN	Type of Document	Order No / Sc. Sheet
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Date / Name		Designation: PROCESS FLOW DIAGRAM 3312 HEAVY GASOLINE TREATMENT UNIT 3340 HGT REACTORS		
Scale: X	Cat. Code / Acc. Code / Status			

[redacted]

Emission Point	CO	SOx	NOx	PM	VOC	
A1						
A2						
B1						
B2						
B3						
C1						
C2						
E1 - E3						
E4						
E5						
F						
G						
Total						

Please refer to document "Task Order 1" for actual values

[redacted]

Emission Point Description

EP	Unit	Stream	Equipment	Type		
A1	Coal Prep.	Vent Mill	Vent blower	Cont.		
A2	Coal Prep.		Coal Dust Bunker Fi	Disc.		
B1	PDQ		Lock Hopper Filter	Cont.		
B2	PDQ		Flare	Disc.		
B3	PDQ		Feed Bin	Emerg.		
C1	CO2 Purific.			Cont.		
C2	AGR		Flare	Disc.		
E1	MTG	Stack Gas	Regeneration Heater	Disc.		
E2	MTG	Stack Gas	Reactivation Heater	Disc.		
E3	MTG	Stack Gas	HGT Heater	Cont.		
E4						
E5	MTG	Tail Gas	Flare	Disc.		
F	Start-up Steam Boiler	Stack Gas	Aux. Boiler	Disc.		
G	Flare		Flare	Disc.		

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