4.14 MINE LONG-TERM COAL STORAGE

The Mine will have two coal storage areas. The first is a 300,000-ton dead storage (emergency stockpile) and the second is a 300,000 ton active storage area. The emergency stockpile will be compacted and sealed to prevent wind erosion and spontaneous combustion. Since there will be no particulate emissions associated with this stockpile once it is constructed, it has not been included in this analysis.

Three scenarios were evaluated for the active coal storage. There are:

1. Stacking tubes located on the surface
2. Stacking tubes located in the pit excavated
3. Covered slot storage

The BACT analysis for the active storage for performed by IML Air Science (Sheridan, WY). The complete analysis is in Appendix F.

Identify Particulate Emission Control Technologies

The first two scenarios differ in the placement of the stacking tubes. Scenario 2 places the stacking tube on the pit floor on the previously mined surface coal, with the excavated spoils placed in a large berm on the west and north sides of the pit. This configuration is intended to reduce storage pile erosion and resulting PM_{10} emissions, by sheltering the pile from prevailing winds.

The third scenario would be to construct a covered storage area (slot storage or coal barn).

Evaluate Technical Feasibility

The control strategies described above as Scenarios 2 and 3 have been implemented in Wyoming and in other parts of the country. Therefore, both are considered technically feasible.

Rank Control Technologies

The covered storage (Scenario 3) would result is zero particulate emissions (100% control effectiveness). The sheltered stacking tubes have an estimated 23% control effectiveness on the particulate emissions resulting in annual emissions of 60 tpy (Scenario 1 was estimated to be approximately 78 tpy).

An economic analysis was conducted on the incremental control cost between Scenarios 2 and 3. The incremental control cost between the two scenarios is $6,902 per ton removed.

Evaluate Control Technologies

Although the covered storage has a greater control effectiveness, the economic analysis shows the cost for the scenario is not financially viable.

4.12 FIREWATER PUMP CONTROL TECHNOLOGY REVIEW (BACKUP OPERATIONS ONLY)

The Firewater Pump is used to support emergency operations at the proposed facility. Potential emissions from the Firewater Pump are controlled by restricting the hours of operation, using good combustion practices, and using ultra-low-sulfur-fuel. Operation of the emergency Firewater Pump will be limited to emergency operating scenarios or required testing by the manufacturer. The Firewater Pump will operate no more than 500 hours per year. The design will incorporate manufacturer specifications that maximize the combustion efficiency and minimize potential emissions. Based on the limited operating time and resultant emissions, further controls are not warranted. This diesel-fired pump will also be subject to and will comply with the NSPS for Stationary Compression Ignition Combustion Engines (Subpart IIII), as applicable. Assuming a displacement of <30 liters per cylinder, if model year is 2009 or after NSPS IIII would apply.

Additionally, ultra-low-sulfur diesel fuel containing less than or equal to 15 ppm sulfur will be used. Good combustion practices, restricted annual operations, and ultra-low-sulfur fuel are proposed as BACT. Table 4.6 shows the proposed BACT emission rates for the emergency Firewater Pump.

Table 4.6 – Emergency Firewater Pump BACT Analysis Summary

Pollutant	Proposed BACT	Proposed BACT Emission Limits
NO_x	Restricted Operation (<500 hr/yr) Low Sulfur Fuel Good Combustion Practices	NO_x Limit: 1.51 tpy
SO_2		SO_2 Limit: <0.01 tpy
CO		CO Limit: 0.09 tpy
VOC		VOC Limit: 0.34 tpy
PM		Particulate Limit: 0.02 tpy (PM_{10}-filterable)

4.13 MERCURY EMISSION REDUCTION

Syngas exiting the gasifiers contains some mercury. This mercury must be removed before the syngas enters the Methanol Synthesis Unit. Two mercury guard beds will be operated at the Plant and are expected to achieve 99.98% removal of mercury. The cost of the planned mercury removal system is estimated to be $235,164 per ton of mercury removed, as shown in Appendix G.

MBFP requests a mercury emission rate of 0.02 $\mu g/Nm^3$, which results in total facility mercury emissions of no more than 1.3×10^{-4} tpy (0.26 lb/yr). At an electrical generation rate of 66 MW per turbine (design), this results in emissions of 1.5×10^{-7} lb/MWh per turbine, which is significantly less than NSPS requirements in 40 CFR Part 60, Subpart Da mandating a mercury emission limit of 20×10^{-6} lb/MWh for affected facilities.

the tail gas incinerator. The pollutant of concern for SRUs is SO_2, although emissions of other criteria pollutants may result from the combustion process.

Identify SO_2 Emission Control Technologies

Potential control technologies for the SRU tail gas stream during times of normal operation include the following:

1. LP Flare
2. Thermal Oxidizer (Tail Gas Incinerator)
3. Re-routing Tail Gas to Process

Evaluate Technical Feasibility

The LP Flare is proposed as a low-pressure flare for the facility and will intermittently receive vent streams from various processes throughout the facility, in addition to any vents from the SRU. Control efficiency for the flare is estimated at 98%.

As mentioned earlier, a tail gas incinerator is a typical control device for SRUs and would be dedicated to the SRU tail gas, with a supplemental fuel gas or natural gas. Control efficiency is estimated between 98-99%.

Re-routing the tail gas back to the process would involve routing the tail gas to a point upstream of the H_2S absorption tower in the SELEXOL® acid gas removal process and would allow the stream to be reprocessed rather than being combusted and destroyed. This option results in no emissions during normal operation since nothing is emitted to the atmosphere, and therefore it has 100% control efficiency.

For the proposed Plant, all three possible control options are technically feasible during times of normal operation. However, during times of startup, shutdown, or malfunction (SSM), neither the thermal oxidizer nor re-routing the tail gas stream are considered technically feasible options, due to the variability of gas stream flowrate and composition during these times. The LP Flare is the only technically feasible option for SSM conditions.

Select Best Available Control Technology

Of the three technically feasible control options, re-routing the tail gas back into the process at an upstream point provides 100% control, and is therefore ranked higher than the LP Flare or tail gas incinerator options. BACT is chosen to be re-routing the tail gas stream during times of normal operation, with the LP Flare employed only as needed during times of SSM operations.

4.9 CARBON DIOXIDE VENT STACK (STARTUP OPERATIONS ONLY)

During initial startup operations and subsequent warm start operations, off-specification CO_2 will be vented to the atmosphere. This exhaust will contain some small amount of CO and VOC (primarily COS). Elements have been incorporated in the design and operating procedures to minimize the frequency and duration of venting this gas stream to the atmosphere. The facility is being designed so that this venting will not occur during load transitions during normal

4.7 PROCESS FUGITIVE EMISSIONS CONTROL TECHNOLOGY REVIEW

Fugitive VOC, HAP, and hydrogen sulfide (H_2S) emissions will be generated from potential leaking process equipment, primarily downstream of the coal preparation and gasification portions of the facility (SELEXOL acid gas removal, CO_2 recovery, sulfur recovery, methanol synthesis, gasoline synthesis, etc.). Additionally, fugitive ammonia emissions will be generated from potential equipment leaks in the ammonia storage and feed equipment used for the proposed SCR system (turbine NO_x control). Note that the number of piping components in ammonia service will be very small in comparison to the number of other potential leaking components at the proposed facility.

VOC and HAP emissions from equipment leaks were estimated using fugitive leak emission factors from EPA Document No. EPA-453/R-95-017, November 1995 ("Protocol for Equipment Leak Emission Estimates"). Control efficiencies reflecting a monthly leak detection program were used in the calculation, assuming a leak definition value of 500 ppmv for valves and connectors in VOC service and 2,000 ppmv for pumps in VOC service. Total facility estimated potential VOC emissions from equipment leaks are 60 tons per year, and total facility estimated potential HAP emissions from equipment leaks are 16 tons per year.

Identify VOC and HAP Control Technologies

The only available control technology for comprehensively addressing equipment leak fugitive emissions is a structured Leak Detection and Repair (LDAR) program in which certain piping components and equipment are routinely inspected for leaks, and components found to be leaking in excess of stated thresholds are repaired in a timely manner. The effect of a well-implemented LDAR program is reduced VOC and HAP emission rates due to improved maintenance and repair. LDAR programs are established as BACT in many recent RBLC determinations.

Select Best Available Control Technology

A formal, structured LDAR program is proposed as BACT for components in VOC service. Records will be maintained for all leak inspections and necessary repair work. Additionally, audio/visual/olfactory (AVO) detection is proposed for equipment potentially leaking hydrogen sulfide or ammonia. Both chemicals have low odor thresholds, and plant personnel should be able to easily detect any leaking components under routine plant operations. Leaking equipment discovered through AVO detection will be repaired in an expeditious manner in order to reduce emissions and remove potential safety issues.

4.8 SULFUR RECOVERY UNIT (SRU) CONTROL TECHNOLOGY REVIEW

The Sulfur Recovery Unit (SRU) is designed to process acid gas streams from the SELEXOL® acid gas removal system and Plant process into an elemental sulfur product. SRU tail gas is typically directed to a tail gas treatment unit designed to remove SO_2 from the tail gas before the tail gas is vented to atmosphere. Typical SRU design also incorporates a thermal oxidizer, also called a tail gas incinerator, to provide efficient destruction of the tail gas stream after it exits the tail gas treatment unit. In the event of a malfunction with the SRU or tail gas incinerator, or during times of cold startup, the tail gas stream may be temporarily diverted to a flare in lieu of

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3.2.6.3 Equipment Leaks

Equipment leak estimates were calculated using the average emission factor approach described in EPA's "Protocol for Equipment Leak Emission Estimates" (EPA-453/R-95-017). EPA-approved Synthetic Organic Chemical Manufacturing Industry (SOCMI) factors were used for the calculations. Although use of the Refinery emission factors was considered, use of the Refinery factors was deemed inappropriate for the following reasons.

- The Plant process is a chemical synthesis process rather than a refinery process.
- SOCMI factors are recommended for use in all industries, except refineries.
- Even within refineries, SOCMI factors are recommended for chemical processes, such as production of methyl tertiary butyl ether (MTBE).
- The refinery emission factor equation usage guidelines specifically disallow corrections for methane concentrations exceeding 10 wt% and some process streams at the Plant will contain more than 10 wt% methane.

Process streams within the Plant were grouped according to composition and service type (gas, light liquid, heavy liquid) and the number of potential equipment leak components was estimated for each process stream group. All streams were assumed to contain fluids for 8,760 hr/yr. Within Appendix B, detailed equipment leak calculations show controlled and uncontrolled emissions. Controlled emissions were calculated using control effectiveness factors for valves in gas or light liquid service and pump seals in light liquid service. The control effectiveness factors are based on implementation of a monthly Leak Detection and Repair (LDAR) program and assume a leak definition of 500 ppm for valves and connectors in VOC service and 2,000 ppm for pumps in VOC service. As discussed in the BACT analysis, the Plant will implement an LDAR program.

3.2.6.4 Flares

Flaring emission calculations are based on procedures included in "TCEQ Guidance Document for Flares and Vapor Oxidizers" (RG-109, October 2000). This document provides emission factors for NO_x and CO and advises use of 98% destruction efficiency for VOCs / HAPs and H_2S.

The HP and LP Flares will be operated with continuous pilots. Consequently, normal operations include combustion emissions based on the design heat input for each flare and assume natural gas firing. Emissions from normal operation at both flares represent pilot gas combustion only, because no process streams will be routinely directed to either flare.

Emissions from large malfunction events were estimated for the HP and LP Flares, due to the possible significant nature of a malfunction event affecting these flares. Malfunction-related emissions from the HP Flare are based on directing all syngas to the flare, which is the largest stream, by volume, that could potentially be directed to the HP Flare. Malfunction-related events affecting the LP Flare for a potential worst-case (high flow rate, high H_2S content) vent stream that could be directed to the LP Flare.

Table 3.5 – Annual Criteria Pollutant Emissions Resulting from Cold Startup

Source ID	Description	Operating Hours Fuel Gas Mixture/NG [1]	Potential Emissions (tpy) NO$_x$	CO	VOC	SO$_2$	PM$_{10}$
CT-1	Power Generation	7760 / 1000	76.68	46.61	6.64	10.90	43.80
CT-2	Power Generation	7760 / 1000	76.68	46.61	6.64	10.90	43.80
CT-3	Power Generation	7760 / 1000	76.68	46.61	6.64	10.90	43.80
Gen-1	Black-Start Generator 1	0 / 360	1.15	2.79	1.03	0.00	0.00
Gen-2	Black-Start Generator 2	0 / 360	1.15	2.79	1.03	0.00	0.00
Gen-3	Black-Start Generator 3	0 / 360	1.15	2.79	1.03	0.00	0.00
AB	Steam Generation	8000 / 760	14.17	23.81	1.56	0.17	2.15
B-1	Catalyst Regeneration	8760 / 0	4.62	7.77	0.51	0.06	0.70
B-2	Reactivation Heater	8000 / 760	2.67	4.49	0.29	0.03	0.41
B-3	HGT Reactor Charge Heater	8000 / 760	0.48	0.80	0.05	0.01	0.07
GP-1	Gasifier Preheater 1	0 / 500	0.26	0.43	0.03	0.00	0.04
GP-2	Gasifier Preheater 2	0 / 500	0.26	0.43	0.03	0.00	0.04
GP-3	Gasifier Preheater 3	0 / 500	0.26	0.43	0.03	0.00	0.04
GP-4	Gasifier Preheater 4	0 / 500	0.26	0.43	0.03	0.00	0.04
GP-5	Gasifier Preheater 5	0 / 500	0.26	0.43	0.03	0.00	0.04
Tanks	Product Storage	8760	---	---	102.62	---	---
EL	Equipment Leaks	8760	---	---	59.63	---	---
CS	Coal Storage & Processing	8760	---	---	---	---	61.08
FW-Pump	Firewater Pump Engine	500 [2]	1.51	0.09	0.34	0.00	0.02
CO_2 VS	CO_2 Vent Stack	8760	---	314.89	0.84	---	---
FL-1	HP Flare	8760 [3]	10.28	81.86	3.11	187.70	0.00
FL-2	LP Flare	8,760 [4]	0.15	0.44	0.74	36.01	0.00
Total Emissions			**268.64**	**584.48**	**192.87**	**256.69**	**196.04**

1. Operating hours shown for firing fuel gas mixture and natural gas (NG) are based on expected operations. However, emissions are conservatively calculated based on firing natural gas, which is the higher emitting fuel.
2. The Firewater Pump combusts diesel fuel.
3. Based on continuous natural gas pilot for flare; cold startup includes 50 hr/yr of vents to HP Flare.
3. Based on continuous natural gas pilot for flare; no vents to LP Flare are expected during cold startup.

3.2.4 Malfunctions and Other Events

Malfunctions and other events can cause unusual emissions during short periods of time. Table 3.6 includes four types of malfunctions. Detailed emission calculations for malfunction events are included in Appendix B.

Table 3.4 shows annual HAP emissions resulting from normal operations. The largest HAP emission sources at the Plant are listed in the following table.

Table 3.4 – Annual HAP Emissions Resulting from Normal Operations

Pollutant	Facility-Wide Potential Emissions (tpy)	Largest Emission Source at Facility
Benzene	8.54	Equipment Leaks
Formaldehyde	0.71	Turbines
Hexane	1.29	Auxiliary Boiler [1]
Methanol	10.26	Equipment Leaks
Toluene	1.81	Turbines
Other HAPs	2.11	N/A
Total Emissions	**24.71**	

1. Note that HAP PTE emissions from the auxiliary boiler are calculated at continuous, full load operation. However, the boiler will normally operate at only 25% load but within compliance with its emission commitment (lb/MMBtu basis). The second-largest emission source contributing to hexane emissions at the facility will be storage tanks.

3.2.3 Cold Start/Initial Year Operations

Annual emissions have also been calculated for the initial year of operations (plant cold start). The complete Plant startup period may last as long as 180 days, and will involve bringing equipment online in a particular order. Emissions during the cold startup period will differ from those during a normal operating year. Certain equipment, such as Black-Start Generators and Gasifier Preheaters, will operate during cold startup. Individual emission units will have much shorter startup time periods; these unit-specific time periods are shown in Appendix B in the cold startup emission summary spreadsheet. Since the Plant will not have produced adequate in-plant fuels and power generation will ramp up slowly, most combustion equipment will initially burn only natural gas fuel, rather than the fuel mixture of fuel gas, LPG, and natural gas. Table 3.5 shows the annual emissions resulting from Cold Startup.

However, emissions are based on 8,760 hr/yr operation at full load. Table 3.3 shows emissions resulting from normal operations and the maximum number of hours of operation per year. Detailed emission calculations are included in Appendix B.

Table 3.3 – Annual Criteria Pollutant Emissions Resulting from Normal Operations

Source ID	Description	Operating Hours (hr)	Potential Emissions (tpy)				
			NO_x	CO	VOC	SO_2	PM_{10}
CT-1	Power Generation	8,760	75.86	46.19	6.59	10.79	43.80
CT-2	Power Generation	8,760	75.86	46.19	6.59	10.79	43.80
CT-3	Power Generation	8,760	75.86	46.19	6.59	10.79	43.80
AB	Steam Generation[1]	8,760	14.17	23.81	1.56	0.17	2.15
B-1	Catalyst Regeneration	8,760[2]	4.62	7.77	0.51	0.06	0.70
B-2	Reactivation Heater	8,760[2]	2.67	4.49	0.29	0.03	0.41
B-3	HGT Reactor Charge Heater	8,760	0.48	0.80	0.05	0.01	0.07
Tanks	Product Storage	8,760	---	---	102.62	---	---
EL	Equipment Leaks	8,760	---	---	59.63	---	---
CS	Coal Storage & Processing	8,760	---	---	---	---	61.08
FW-Pump	Firewater Pump Engine[3]	500	1.51	0.09	0.34	0.00	0.02
FL-1	HP Flare	8,760[4]	0.49	0.98	2.97	0.00	---
FL-2	LP Flare	8,760[4]	0.12	0.25	0.74	0.00	---
Total Emissions			**251.63**	**176.75**	**200.18**	**32.65**	**195.84**

1. Boiler will normally operate at 25% load, but potential emissions are based on continuous full load operation.
2. The catalyst regeneration heater and reactivation heaters will operate less than 8,760 hr/yr, but potential emissions are based on 8,760 hr/yr of operation.
3. The Firewater Pump combusts diesel fuel.
4. Based on continuous natural gas pilot for flares.

Table 3.2 – Emission Units and Fugitive Sources

Description	Identification	Size	Use
Normally Operating Equipment and Fugitive Sources			
Combustion Turbine 1	CT-1	66 MW	Electrical and steam generation
Combustion Turbine 2	CT-2	66 MW	Electrical and steam generation
Combustion Turbine 3	CT-3	66 MW	Electrical and steam generation
Auxiliary Boiler	AB	66 MMBtu/hr	Steam generation (normal service is standby at 25% load to prevent freeze ups if there is a Plant shutdown)
Catalyst Regenerator*	B-1	21.53 MMBtu/hr	Catalyst regeneration (only during catalyst regeneration; average continuous rate is approximately 9 MMBtu/hr)
Reactivation Heater*	B-2	12.45 MMBtu/hr	Reactivation heating
HGT Reactor Charge Heater	B-3	2.22 MMBtu/hr	Reactor charge heating
HP Flare (pilot only)	FL-1	0.82 MMBtu/hr	For safety and VOC control
LP Flare (pilot only)	FL-2	0.20 MMBtu/hr	For safety and VOC control
Equipment Leaks	EL	N/A	N/A
Storage Tanks	Tanks	Various	Primarily methanol and gasoline storage
Coal Storage & Processing	CS	N/A	Coal conveyance & feedstock storage
SSM Equipment			
Gasifier Preheater 1*	GP-1	21 MMBtu/hr	Gasifier refractory preheating
Gasifier Preheater 2*	GP-2	21 MMBtu/hr	Gasifier refractory preheating
Gasifier Preheater 3*	GP-3	21 MMBtu/hr	Gasifier refractory preheating
Gasifier Preheater 4*	GP-4	21 MMBtu/hr	Gasifier refractory preheating
Gasifier Preheater 5*	GP-5	21 MMBtu/hr	Gasifier refractory preheating
Black-Start Generator 1*	Gen-1	2889 hp	Electrical generation
Black-Start Generator 2*	Gen-2	2889 hp	Electrical generation
Black-Start Generator 3*	Gen-3	2889 hp	Electrical generation
Firewater Pump Engine*	FW-Pump	575 hp	Supplies emergency firewater
CO_2 Vent Stack*	CO_2 VS	N/A	For malfunctions

* These emission units operate less than 8,760 hr/yr.

3.2.2 Normal Operations

Plant emissions are broken down into three categories (normal operation, cold startup/initial year emissions, and malfunctions). Annual emissions resulting from normal operations include emissions from equipment that operates continuously (8,760 hours per year) and equipment that operates on a regular basis. For example, the firewater pump engine may operate up to 500 hours in a typical year. Consequently, firewater pump engine emissions are included in the normal operation annual emission summary and are based on 500 hr/yr rather than 8,760 hr/yr. Note that the Auxiliary Boiler normally operates at only 25 percent load, on a hot standby basis.

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Table 1.2 – Annual HAP Emissions (tpy)

Pollutant	Emissions (tpy)
Acetaldehyde	0.38
Acrolein	0.06
Benzene	8.54
Carbonyl Sulfide	0.23
Ethyl Benzene	0.34
Formaldehyde	0.71
Hexane	10.26
Methanol	12.79
Naphthalene	0.01
PAH	0.02
Propylene Oxide	0.28
Toluene	1.81
Xylene	0.77
Other HAPs*	0.01
Total HAPs	**24.71**

*Other individual HAPs are less than 0.01 tpy each.

1.4 STANDARD INDUSTRIAL CLASSIFICATION

Two Standard Industrial Classification (SIC) Codes describe the activities associated with the MBFP Facility. These include:

1. 1222 Bituminous Coal Underground Mining
2. 1311 Crude Petroleum and Natural Gas (production of gas and hydrocarbon liquids through gasification)

Because the primary purpose, and source of revenue of the facility is to produce gasoline fuel, the main SIC code will be 1311.

complete amended permit application is being submitted. This permit application contains information describing the Mine and Plant, facility emissions, applicable regulations, best available control technology (BACT) determinations, and air quality impact analyses. Wyoming Air Quality Permit Application Forms are included in Appendix A.

1.2 FACILITY LOCATION

The Mine and Plant (collectively, the MBFP Facility) will be located approximately 7.5 miles north of Interstate 80, exit 260 (Elk Mountain) on County Road #3 in Section 29 of Township 21 north and Range 79 west in Carbon County, south-central Wyoming. Figure 1.1 shows the general location of the facility. The MBFP Facility encompasses two separate areas. The Mine's South Portal is shown in Figure 1.2. The Mine's East Portal, near where the Plant will be located, is shown in Figure 1.3. Figure 1.4 shows the Plant process equipment layout.

1.3 PREVENTION OF SIGNIFICANT DETERIORATION APPLICABILITY

The Clean Air Act (CAA) defines 28 major source categories that have a 100 ton per year (tpy) threshold for determining prevention of significant deterioration (PSD) major source status. This facility falls within the major source category of "Fuel Conversion Plant," and therefore is subject to the 100 tpy major source threshold. Annual emissions of criteria pollutant emissions are shown in Table 1.1 for normal operations without startup, shutdown, and malfunction (SSM) events. Estimates of the following pollutants are included: NO_x (nitrogen oxides, including nitrogen dioxide [NO_2]), carbon monoxide (CO), volatile organic compounds (VOC), and particulate matter with a diameter of less than 10 microns (PM_{10}). Emission calculation methods are summarized in Section 3 and detailed emission calculations are included in Appendix B.

Table 1.1 – Annual Criteria Pollutant Emissions (tpy)

NO_x	CO	VOC	SO_2	PM_{10}
251.63	176.75	188.49	32.65	195.84

Based on criteria pollutant emissions, this facility is considered to be a major source for the PSD Program (40 CFR §51.165) and the Title V Operating Permit Program (40 CFR Part 70).

Annual emissions of hazardous air pollutant (HAP) emissions from normal operations are shown in Table 1.2. HAPs with emissions greater than 0.01 tpy are included in the table. Because potential emissions of Methanol exceed 10 tpy (although total HAPs are less than 25 tpy), the facility is a major source of HAPs and is subject to some National Emission Standards for Hazardous Air Pollutants (NESHAP) in 40 CFR Parts 61 and 63.

1.1 GENERAL FACILITY DESCRIPTION

Medicine Bow Fuel & Power LLC (MBFP) is proposing to construct an underground coal mine (Mine) and industrial gasification & liquefaction (IGL) plant (Plant) that will produce transportation fuels and other products near Medicine Bow, Wyoming in Carbon County. The Mine will process approximately 8,000 tons per day (TPD) of coal (on a dry basis) to produce a variety of liquid and gaseous fuels. The Mine will be a 3.25 million ton per year (MMtpy) adjacent underground coal mine known as the Saddleback Hills Mine that will supply the coal needed for the Plant.

The Plant will utilize coal, which will be gasified to produce synthesis gas (syngas) and produce various products. In order to achieve this outcome, the Plant will use several different technologies, including: General Electric's (GE) gasification technology for the quench gasification process, UOP LLC's (UOP) SELEXOL® acid gas removal process, and Davy Process Technology's (Davy) methanol synthesis process followed by the Exxon-Mobil methanol-to-gasoline (MTG) process.

Saleable products produced at the Plant during normal operation are anticipated to include approximately:

- 18,500 barrels per day (BPD) of regular gasoline to be transferred via pipeline to a nearby refinery
- 42 TPD of sulfur
- 198 million standard cubic feet per day (MMscfd) of carbon dioxide (CO_2)
- 712 TPD of coarse slag

In addition to the salable products listed above, Plant operation will result in the production of the following fuels to be used onsite for power generation and process heating:

- Approximately 253 million British thermal units (MMBtu/hr) of fuel gas
- Approximately 400 to 500 MMBtu/hr of liquefied petroleum gas (LPG)

Efficient use of these fuels will provide much of the energy input needed to fuel an electric generation plant that will produce approximately 400 megawatts (MW) of electricity. The Plant will either import natural gas or divert syngas as necessary to support plant power needs not met by fuel gas, LPG, and process steam and is not expected to export power to the electrical grid. Three combustion turbines will be equipped with the best available pollution control technologies, which include low-NO_x burners, diluent injection, selective catalytic reduction (SCR), and oxidation catalyst to keep criteria pollutant emissions low.

Emission reduction technologies will be incorporated throughout the Plant. These controls are discussed in more detail in Sections 2 and 4. In addition, all roads and parking areas within the Plant fence will be either gravel or paved to control fugitive dust emissions.

This amended Prevention of Significant Deterioration (PSD) permit application contains fully updated information based on replacement of the previously planned Fischer-Tropsch and UOP upgrading processes with the Davy methanol synthesis unit and Exxon-Mobil MTG processes. This process change affects many process streams and emission calculations. Consequently, a

Page Numbers	Revision Date	Action	Description
Appendix J	2/12/08	Superseded	Moved and revised near field modeling discussions to Chapter 6; far field modeling description remains
Appendix N	1/18/08	Added	Added tabbed divider
Appendix O	2/13/08	Deleted	Delete Appendix O pages (see revised Appendix H)

* During a meeting on January 18, 2008, WDEQ requested emission changes to minimize recordkeeping and reporting requirements and simplify permit writing. For certain equipment, MBFP agreed to increase operating hours and base emission calculations on the highest-emitting fuel (natural gas) in order to streamline compliance. Consequently, potential emissions were increased. Notes reflecting actual equipment operations have been added to pertinent spreadsheets. WDEQ stated that BACT analyses would not be affected by these simplifying assumptions, and would instead be based on the actual operations of the equipment.

Page Numbers	Revision Date	Action	Description
6-8	4/23/08	Superseded	Added road haul volume sources to Table 6.5 and footnote.
6-9 (6-10)	4/23/08	Superseded	Replaced Figure 6.3 with updated version, showing road haul sources associated with the EMM and SBH Mine
6-19 to 6-22	4/23/08	Superseded	Updated Tables 6.10, 6.11, and Figures 6-7, 6-8 for revised 3-hr and 24-hr SO_2 modeling results
(6-23) 6-24 to 6-26	4/23/08	Superseded	Updated Tables 6.12, 6.13, and Figures 6-10, 6-11 for revised PM_{10} modeling results
6-1 to 6-48	2/12/08	Superseded	Revised chapter to reflect new AERMOD near field modeling results and incorporated relevant portions from Appendix J
6-19 to 6-30	3/3/08	Superseded	Revised near-field modeling criteria pollutant results based on revised modeling for years 2000 and 2003
6-33 to 6-36	3/3/08	Superseded	Revised near-field modeling HAP results based on revised modeling for years 2000 and 2003
7-1 (7-2)	1/18/08	Superseded	Removed first and last sentence of first paragraph after Note. Text removed was: *MBFP is proposing to construct a 13,000 barrel per day (BPD) Industrial Gasification & Liquefaction Plant near Medicine Bow, Wyoming.* *The proposed project is scheduled to start construction in the spring of 2008 with the construction being complete by December 2010.*
Appendix B	5/29/08	Superseded	Edits to pages B-1, B-2, and B-3 through B-11 to correct mercury emission rates.
Appendix B	4/23/08	Superseded, Addition	Replace pages B-1 and B-2 to reflect updated coal storage & processing emission rates Replace page B-29 (SBH Mine, coal storage emission calculations) with renumbered page B-29(1) and additional pages for coal mining emission calculations (pages B-29(2) through B-29(16)). Page B-30 reprinted, due to pagination detail.
Appendix B	2/12/08	Superseded	Emission revisions requested by WDEQ * and page numbering changes
Appendix F	1/4/08	Superseded	Updated coal storage BACT analysis
Appendix H	1/18/08	Addition	Added Incremental NO_x Removal Cost as Appendix H
Appendix I	2/12/08	Superseded	Revised to discuss far field modeling only (since near field modeling has been re-run)

Page Numbers	Revision Date	Action	Description
4-31 (4-32)	5/29/03	Superseded	Correction to mercury emission rate, to reflect flow through two mercury guard beds instead of one.
4-27 (4-28)	5/12/08	Superseded	Revised equipment leak definitions in Section 4.7 from 10,000 ppmv to 500 ppmv for valves and connectors and 2,000 ppmv for pumps following revised equipment leak emission calculations. Also corrected the VOC and HAP emission rates from equipment leaks in this section.
4-29 (4-30)	4/23/08	Superseded	Clarification to first paragraph under Section 4.10, to sate that the expected operating hours for the gasifier preheaters will be 500 hours per year, per preheater. Previously, this sentence stated the maximum would be 500 hours per year, per preheater, because PTE emission rates are based on this value. However, 500 hours per year per preheater is only an estimate of annual operating hours for the gasifier preheaters.
4-7 (4-8)	1/18/08	Superseded	Revised $/ton NOx removed based on revised emissions. (Last two sentences of 1st paragraph)
5-3 to 5-10	2/12/08	Superseded	Added discussions of: • --New 40 CFR Part 60, Subpart JJJJ regulations • --Wyoming Chapter 6, Section 5 permitting requirements Revised discussion of Subpart DDDDD NESHAP
General Note for Section 6, regarding equipment leak emission rates			Revisions were made in other sections of the application on 5/12/08 to reflect changes to equipment leak VOC and HAP emission rate calculations. However, these changes were not made in Section 6 because the HAP Modeling, discussed in Section 6.7, was not revised by the permittee. Rather, the WDEQ performed the revised HAP modeling and risk assessment using the revised equipment leak emission rates. Discussion of the revised modeling should be in the WDEQ technical analysis.
6-7 (6-8)	4/30/08	Superseded	Revised Table 6.4 to remove Source ID 'CoalStor,' and to provide clarifying footnotes based on conversations with JNall (4-30-08).
6-3	4/23/08	Superseded	Revised Table 6.1 for modeled PM_{10} emission rates
6-4	4/23/08	Superseded	Revised Table 6.2 for LP Flare model parameters and added table footnote.
6-5 to 6-6	4/23/08	Superseded	Carry-over text from page 6-3, due to edits on that page. Added footnote at bottom of Table 6.2. Deleted reference to year 2010 in Section 6.2.2.1, third paragraph.
6-7	4/23/08	Superseded	Revised Table 6.4 for coal mine area source modeling parameters and emission rates and added footnotes

Page Change History
MBFP PSD Permit Application Dated December 31, 2007

Page Numbers	Revision Date	Action	Description
	4/23/08	Superseded	Updated Table of Contents, Acronyms
(1-1) 1-2	5/12/08	Superseded	Revised VOC total following revision to equipment leak emission calculation. Also noted Methanol emissions greater than major HAP threshold, rather than total facility HAPs as trigger for NESHAP applicability.
1-7 (1-8)	5/12/08	Superseded	Revised HAP emissions following revision to equipment leak emission calculation.
1-1	4/23/08	Superseded	Revised Saddleback Hills Mine coal production rate from 3.2 MMtpy to 3.25 MMtpy
1-2	4/23/08	Superseded	Updated emissions in Table 1.1 for PM10
(1-1) 1-2	2/12/08	Superseded	Updated emissions in Table 1.1
1-7 (1-8)	2/12/08	Superseded	Updated emissions in Table 1.2
2-1 to 2-2; 2-5 (2-6)	4/23/08	Superseded	Added sentence in Section 2.1, 2nd paragraph, to explain conveyors C6-C10 will be ¾-covered, rather than fully enclosed. Resulting text carryover to page 2-5. (Note, Figures 2.1 and 2.2 are pages 2-3 and 2-4, with no changes.)
2-9 (2-10)	2/12/08	Superseded	Added sentence (bottom of page) about heating CO2 vent stream
(3-3) 3-4 to 3-6	5/12/08	Superseded	Revised VOC emissions in Tables 3.3 and 3.5 to reflect updated equipment leak values and total facility VOC emission rates and HAP emissions in Table 3.4 following revision to equipment leak calculations.
3-9 (3-10)	5/12/08	Superseded	Revised equipment leak definitions in Section 3.2.6.3 from 10,000 ppmv to 500 ppmv for valves and connectors and 2,000 ppmv for pumps following revised equipment leak emission calculations.
3-1 to 3.4; (3-5) 3-6	4/23/08	Superseded	Revised SBH Mine Section 3.1 to clarify that some conveyors will be ¾ covered, rather than fully enclosed; Revised Tables 3.1 through 3.5 by adding revised SBH Mine development and ongoing East Portal coal storage & conveying emission rates.
3-3 to 3-10	2/12/08	Superseded	Revised emissions and emission-related descriptions to address operating hour and fuel simplifications requested by WDEQ *

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rate is not expressed in scientific notation, and therefore is listed as 0.00 tons per year on the emission summary sheets.

Equipment Leak Emission Calculations

During May, the equipment leak emission calculations were revised in order to reflect lower equipment leak definitions. Previously, equipment leak emission rates were based on a 10,000 ppmv leak definition for all components in VOC service. The emissions were revised by lowering the leak definitions to 500 ppmv for valves and connectors in VOC service and 2,000 ppmv for pumps in VOC service. As a result, the overall control efficiency of the proposed Leak Detection and Repair (LDAR) program proposed as Best Available Control Technology (BACT) for this emission source increased by an average 5.8% over the previous calculations and the annual VOC emission rate decreased by 11.7 tons per year. The revised emission rates more appropriately address BACT for equipment leaks and are better aligned with recently promulgated NSPS standards and recent refinery agreements for LDAR programs. The revised emission calculation pages were electronically submitted to Mr. Andrew Keyfauver of your staff on May 12, 2008.

This submittal includes a hardcopy of the revised equipment leak calculation pages as well as various text revisions made throughout the application document reflecting the revised leak definitions and VOC and HAP emission rates. The text revisions have not been previously emailed to the WDEQ.

Conclusion

Also included in this package is one (1) CD-ROM containing an electronic version of the complete, revised permit application. If you need more copies, please let me know.

Please contact me via phone at (303) 740-2684 or email to Katrina_Winborn@URSCorp.com if you need additional information or copies of the revised application. Alternatively, you can contact Susan Bassett at (303) 740-3824 or via email to Susan_Bassett@URSCorp.com.

Sincerely,

Katrina A. Winborn

Katrina Winborn, P.E.
Sr. Air Quality Specialist

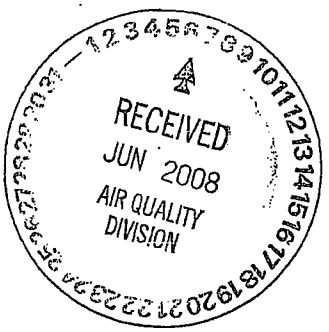
cc: Robert Moss, DKRW
Susan Bassett, URS Corp.

Enclosures Page Change History and Revised Permit Application Pages
CD-ROM

URS

URS Corporation
8181 East Tufts Avenue
Denver, CO 80237
Tel: 303.694.2770
Fax: 303.694.3946
Offices Worldwide

June 4, 2008



Chad Schlichtemeier
Wyoming Department of Environmental Quality
Air Quality Division / NSR Program Manager
Herschler Building
122 West 25th Street
Cheyenne, WY 82002

Subject: Medicine Bow Fuel & Power LLC
Proposed Integrated Gasification and Liquefaction Plant
(PSD Air Quality Permit Application AP-5873)
Updated Pages to Air Quality Permit Application (AP-5873)

Dear Mr. Schlichtemeier:

Please find enclosed eight (8) copies of revision pages for the Medicine Bow Fuel & Power PSD Air Quality Permit Application. Please replace the pages included in your copies of the December 31, 2007 revised permit application with these pages. A summary sheet detailing all the changes on a page-by-page basis is included as the first sheet in each set, so that you can easily find the revised pages and note all specific edits that were made with this revision and all revisions since the December 31, 2007 submittal.

These revision pages reflect changes to the mercury emission rate calculation, made in response to a question asked by Andrew Keyfauver in an email dated May 29, 2008, and revisions to the equipment leak calculations submitted via email on May 12, 2008. The revisions are detailed below.

Mercury Emission Rate Calculation

The turbine and total mercury emission rates calculated in Appendix B spreadsheets were increased as the result of a correction to the calculation. Previously, mercury emissions were calculated based on half the total turbine inlet flow as a result of misunderstanding the parameters specified by the mercury guard bed manufacturer. The corrected mercury emission rate is based on the total turbine inlet flow. Page 4-31 of the application document was revised accordingly to reflect the correct emission rate. Please note that page 4-31 of the application document states the total mercury emission rate, while the emission summary sheets in Appendix B detail the mercury emissions for each emission source at the proposed facility (the three combustion turbines). Unlike the individual turbine mercury emission rates, the total facility mercury emission

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Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
Emission Summary Sheet

Normal Operations (8760 hr/yr)

			Operation	Potential Emissions (tpy)					HAPs Emissions (tpy)																		
ID No.	Description	Usage	(hr/yr)	NO_x	CO	VOC	SO_2	PM_{10}	1,3-Butadiene	Acetaldehyde	Acrolein	2,2,4-Trimethylpentane	Benzene	Carbonyl Sulfide	Dichlorobenzene	Ethyl Benzene	Formaldehyde	Hexane	Mercury	Methanol	Naphthalene	PAH	Propylene Oxide	Toluene	Xylene	TOTALS
CT-1	Turbine and HRSG Train 1	General Electric, 66 MW	8,760	75.86	46.19	6.59	10.79	43.80	1.37E-03	1.27E-01	2.03E-02		3.81E-02			1.02E-01	2.25E-01		4.33E-05		4.13E-03	6.98E-03	9.21E-02	4.13E-01	2.03E-01	1.23E+00
CT-2	Turbine and HRSG Train 2	General Electric, 66 MW	8,760	75.86	46.19	6.59	10.79	43.80	1.37E-03	1.27E-01	2.03E-02		3.81E-02			1.02E-01	2.25E-01		4.33E-05		4.13E-03	6.98E-03	9.21E-02	4.13E-01	2.03E-01	1.23E+00
CT-3	Turbine and HRSG Train 3	General Electric, 66 MW	8,760	75.86	46.19	6.59	10.79	43.80	1.37E-03	1.27E-01	2.03E-02		3.81E-02			1.02E-01	2.25E-01		4.33E-05		4.13E-03	6.98E-03	9.21E-02	4.13E-01	2.03E-01	1.23E+00
AB	Auxiliary Boiler	Heater, 66 MMBtu/hr [1]	8,760	14.17	23.81	1.56	0.17	2.15					5.95E-04		3.40E-04		2.13E-02	5.10E-01			1.73E-04			9.64E-04		5.33E-01
B-1	Catalyst Regenerator Heater	Heater, 21.53 MMBtu/hr [1]	8,760	4.62	7.77	0.51	0.06	0.70					1.94E-04		1.11E-04		6.93E-03	1.66E-01			5.64E-05			3.14E-04		1.74E-01
B-2	Reactivation Heater	Heater, 12 MMBtu/hr [1]	8,760	2.57	4.49	0.29	0.03	0.41					1.12E-04		6.42E-05		4.01E-03	9.62E-02			3.26E-05			1.82E-04		1.01E-01
B-3	HOT Reactor Charge Heater	Heater, 2 MMBtu/hr [1]	8,760	0.48	0.80	0.05	0.01	0.07					2.00E-05		1.14E-05		7.15E-04	1.72E-02			5.82E-06			3.24E-05		1.79E-02
Tanks	Storage Tanks	Product Storage	8,760			102.62							5.27E-01			3.78E-02		4.95E-01		2.39E+00				5.97E-01	1.66E-01	4.17E+00
EL	Equipment Leaks	Fugitives	8,760			59.63							7.90E+00	2.34E-01						7.87E+00						1.60E+01
CS	Coal Storage & Processing	Conveyance (point) & Fugitives	8,760					61.08																		0.00E+00
FW-Pump	Firewater Pump [2]	Engine, 575 HP.	500	1.51	0.09	0.34	1.52E-03	0.02	3.77E-05	7.39E-04	8.91E-05		8.99E-04				1.14E-03				8.17E-05		2.49E-03	3.94E-04	2.75E-04	6.14E-03
FL-1	HP / Emergency Flare [3]	Flare, 0.816 MMBtu/hr	8,760	0.49	0.98	2.97	2.10E-03																			0.00E+00
FL-2	LP Flare [3]	Flare, 0.204 MMBtu/hr	8,760	0.12	0.25	0.74	0.00																			
Total Emissions				251.83	176.75	188.49	32.65	195.84	0.00	0.38	0.06	0.00	8.64	0.23	0.00	0.34	0.71	1.29	0.00	10.26	0.01	0.02	0.28	1.81	0.77	24.71

Notes:
[1] Emissions from auxiliary boiler and process heaters assume operation at full design capacity, firing natural gas; however, the equipment may not always fire at full load, and in many cases, will be firing a lower-BTU fuel gas mixture instead of
[2] SO_2 emissions from the Firewater Pump are are based on burning ultra-low sulfur diesel (15 ppm).
[3] Flare emissions include pilot emissions for 8760 hr/yr.

Malfunctions and Other Events

			Operation	Potential Emissions (tons)					HAPs Emissions (tpy)																		
ID No.	Description	Usage	(hours) [1]	NO_x	CO	VOC	SO_2	PM_{10}	1,3-Butadiene	Acetaldehyde	Acrolein	2,2,4-Trimethylpentane	Benzene	Carbonyl Sulfide	Dichlorobenzene	Ethyl Benzene	Formaldehyde	Hexane	Mercury	Methanol	Naphthalene	PAH	Propylene Oxide	Toluene	Xylene	TOTALS
CO2 VS	CO2 Vent Stack	CO2 Vent Stack	50		83.97	0.23							2.25E-01													2.25E-01
FL-1	HP / Emergency Flare	Flare, 0.816 MMBtu/hr	40	7.83	64.99	0.12	150.16																			0.00E+00
FL-2	LP Flare	Flare, 0.204 MMBtu/hr	8	1.15E-02	2.25E-04	6.79E-04	14.40																			
GP-1	Gasification Preheater	Heater, 21.00 MMBtu/hr	500	0.26	0.43	0.03	3.09E-03	0.04					1.08E-05		6.18E-06		3.86E-04	9.26E-03						1.75E-05		9.69E-03

Notes:
[1] The hours shown are annual estimates, except for the Gasification Preheater which is based on 500 hours per preheating event for one gasifier.

Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
Emission Summary Sheet

Initial Year Including Cold Startup Emissions

This sheet includes total emissions from a cold startup (second set of emissions) and from the remainder of the initial year of operations. The total emissions shown at the bottom of this sheet provide the total emissions for the initial year (or any year with a cold startup).

Normal Operations (After Startup)

				Potential Emissions (tpy)					HAPs Emissions (tpy)																		
ID No.	Description	Usage	Normal Operating Hours After Startup (hr/yr)	NO_x	CO	VOC	SO_2	PM_{10}	1,3-Butadiene	Acetaldehyde	Acrolein	2,2,4-Trimethylpentane	Benzene	Carbonyl Sulfide	Dichlorobenzene	Ethyl Benzene	Formaldehyde	Hexane	Mercury	Methanol	Naphthalene	PAH	Propylene Oxide	Toluene	Xylene	TOTALS
CT-1	Turbine and HRSG Train 1	General Electric, 66 MW	7,760	67.20	40.92	5.84	9.56	38.80	1.21E-03	1.12E-01	1.80E-02		3.37E-02			9.00E-02	2.00E-01		3.84E-05		3.66E-03	6.19E-03	8.16E-02	3.66E-01	1.80E-01	1.09E+00
CT-2	Turbine and HRSG Train 2	General Electric, 66 MW	7,760	67.20	40.92	5.84	9.56	38.80	1.21E-03	1.12E-01	1.80E-02		3.37E-02			9.00E-02	2.00E-01		3.84E-05		3.66E-03	6.19E-03	8.16E-02	3.66E-01	1.80E-01	1.09E+00
CT-3	Turbine and HRSG Train 3	General Electric, 66 MW	7,760	67.20	40.92	5.84	9.56	38.80	1.21E-03	1.12E-01	1.80E-02		3.37E-02			9.00E-02	2.00E-01		3.84E-05		3.66E-03	6.19E-03	8.16E-02	3.66E-01	1.80E-01	1.09E+00
AB	Auxiliary Boiler	Heater, 69 MMBtu/hr[1]	8,760	14.17	23.81	1.56	0.17	2.15					5.95E-04		3.40E-04		2.13E-02	5.10E-01			1.73E-04			9.64E-04		5.33E-01
B-1	Catalyst Regenerator Heater	Heater, 21.53 MMBtu/hr [1,2]	8,760	4.62	7.77	0.51	0.06	0.78					1.94E-04		1.11E-04		6.93E-03	1.66E-01			5.64E-05			3.14E-04		1.74E-01
B-2	Reactivation Heater	Heater, 12 MMBtu/hr[1]	8,760	2.57	4.49	0.29	0.03	0.41					1.12E-04		6.42E-05		4.01E-03	9.62E-02			3.26E-05			1.82E-04		1.01E-01
B-3	HGT Reactor Charge Heater	Heater, 2 MMBtu/hr[1]	8,760	0.48	0.80	0.05	0.01	0.07					2.00E-05		1.14E-05		7.15E-04	1.72E-02			5.82E-06			3.24E-05		1.79E-02
Tanks	Storage Tanks	Product Storage	8,760			102.82							5.27E-01			3.79E-02		4.95E-01		2.39E+00				5.67E-01	1.50E-01	4.17E+00
EL	Equipment Leaks	Fugitives	8,760			59.63							7.90E+00	2.34E-01						7.87E+00						1.58E+01
CS	Coal Storage &Processing	Conveyance (point) & Fugitives	8,760					61.08																		6.00E+00
FW-Pump	Firewater Pump[3]	Engine, 575 HP	500	1.51	0.99	0.34	1.52E-03	0.02	3.77E-05	7.39E-04	8.91E-05		8.99E-04				1.14E-03				8.17E-05		2.49E-03	3.94E-04	2.75E-04	6.14E-03
FL-1	HP / Emergency Flare[4]	Flare Pilot, 0.816 MMBtu/hr	8,760	0.49	0.86	2.97	2.10E-03																			0.00E+00
FL-2	LP Flare[4]	Flare Pilot, 0.204 MMBtu/hr	8,760	0.12	0.25	0.74	0.00																			
Total Emissions (Partial Year of Normal Operations)				225.65	160.94	166.13	28.65	180.84	3.67E-03	3.31E-01	5.41E-02	0.00E+00	8.53E+00	2.34E-01	5.27E-04	3.88E-01	6.33E-01	1.29E+00	1.15E-04	1.03E+01	1.13E-02	1.85E-02	2.47E-01	1.67E+00	7.09E-01	24.29

Notes:
[1] Emissions from auxiliary boiler and process heaters assume operation at full design capacity, firing natural gas; however, the equipment may not always fire at full load, and in many cases, will be firing a lower-BTU fuel gas mixture instead of natural gas.
During startup periods, the equipment will fire natural gas, and may or may not operate at full capacity. Emissions are based on operation at full load and 8,760 hrs/year as a conservative estimate.
[2] The catalyst regenerator heater (B-1) will not operate during startup conditions; it will operate only during times of normal facility operation. Therefore, in a startup year, the heater will operate less than 8,760 hrs. A full year of operation is assumed as a conservative emission estimate.
[3] SO_2 emissions from the Firewater Pump are are based on burning ultra-low sulfur diesel (15 ppm).
[4] Flare emissions include pilot emissions for 8760 hr/yr.

Cold Startup

				Potential Emissions (tpy)					HAPs Emissions (tpy)																		
ID No.	Description	Usage	Startup Operating Hours (hr/yr)	NO_x	CO	VOC	SO_2	PM_{10}	1,3-Butadiene	Acetaldehyde	Acrolein	2,2,4-Trimethylpentane	Benzene	Carbonyl Sulfide	Dichlorobenzene	Ethyl Benzene	Formaldehyde	Hexane	Mercury	Methanol	Naphthalene	PAH	Propylene Oxide	Toluene	Xylene	TOTALS
CT-1	Turbine and HRSG Train 1	General Electric, 66 MW	1,000	9.48	5.69	0.81	1.33	5.00	1.69E-04	1.57E-02	2.51E-03		4.71E-03			1.26E-02	2.79E-02		0.00E+00		5.10E-04	8.64E-04	1.14E-02	5.10E-02	2.51E-02	1.52E-01
CT-2	Turbine and HRSG Train 2	General Electric, 66 MW	1,000	9.48	5.69	0.81	1.33	5.00	1.69E-04	1.57E-02	2.51E-03		4.71E-03			1.26E-02	2.79E-02		0.00E+00		5.10E-04	8.64E-04	1.14E-02	5.10E-02	2.51E-02	1.52E-01
CT-3	Turbine and HRSG Train 3	General Electric, 66 MW	1,000	9.48	5.69	0.81	1.33	5.00	1.69E-04	1.57E-02	2.51E-03		4.71E-03			1.26E-02	2.79E-02		0.00E+00		5.10E-04	8.64E-04	1.14E-02	5.10E-02	2.51E-02	1.52E-01
Gen-1	Black-Start Generator	Caterpillar, 2889 HP	360	1.15	2.79	1.03	2.06E-03	2.71E-04	9.37E-04	2.93E-02	1.80E-02	8.77E-04	7.44E-04				1.85E-01	3.90E-04						1.43E-03	8.46E-04	2.38E-01
Gen-2	Black-Start Generator	Caterpillar, 2889 HP	360	1.15	2.79	1.03	2.06E-03	2.71E-04	9.37E-04	2.93E-02	1.80E-02	8.77E-04	7.44E-04				1.85E-01	3.90E-04						1.43E-03	8.46E-04	2.38E-01
Gen-3	Black-Start Generator	Caterpillar, 2889 HP	360	1.15	2.79	1.03	2.06E-03	2.71E-04	9.37E-04	2.93E-02	1.80E-02	8.77E-04	7.44E-04				1.85E-01	3.90E-04						1.43E-03	8.46E-04	2.38E-01
GP-1	Gasifier Preheater	Heater, 21.00 MMBtu/hr	500	0.26	0.43	0.03	3.09E-03	0.04					1.08E-05		6.18E-06		3.86E-04	9.26E-03						1.75E-05		9.69E-03
GP-2	Gasifier Preheater	Heater, 21.00 MMBtu/hr	500	0.26	0.43	0.03	3.09E-03	0.04					1.08E-05		6.18E-06		3.86E-04	9.26E-03						1.75E-05		9.69E-03
GP-3	Gasifier Preheater	Heater, 21.00 MMBtu/hr	500	0.26	0.43	0.03	3.09E-03	0.04					1.08E-05		6.18E-06		3.86E-04	9.26E-03						1.75E-05		9.69E-03
GP-4	Gasifier Preheater	Heater, 21.00 MMBtu/hr	500	0.26	0.43	0.03	3.09E-03	0.04					1.08E-05		6.18E-06		3.86E-04	9.26E-03						1.75E-05		9.69E-03
GP-5	Gasifier Preheater	Heater, 21.00 MMBtu/hr	500	0.26	0.43	0.03	3.09E-03	0.04					1.08E-05		6.18E-06		3.86E-04	9.26E-03						1.75E-05		9.69E-03
CO2 VS	CO2 Vent Stack	CO2 Vent Stack	250		314.89	0.84								8.44E-01												8.44E-01
FL-1	HP / Emergency Flare[1]	Venting to Flare, 0.816 MMBtu/hr	50	9.78	80.88	0.14	187.70																			0.00E+00
FL-2	LP Flare[1]	Venting to Flare, 0.204 MMBtu/hr	20	0.03	0.19	0.00	38.01																			0.00E+00
Total Emissions (Cold Startup Only, Partial Year)				42.99	423.56	5.64	227.74	15.20	3.31E-03	1.35E-01	6.16E-02	2.63E-03	1.64E-02	8.44E-01	3.09E-05	3.77E-02	6.41E-01	4.75E-02	0.00E+00	0.00E+00	1.53E-03	2.59E-03	3.42E-02	1.57E-01	7.73E-02	2.86

Notes:
[1] Flare operating hours include cold startup and malfunctions. Up to 50 hr/yr of venting to the HP Flare and up to 20 hr/yr of venting to the LP Flare are included. Pilot emissions are included above in the Normal Operations summary.

	Potential Emissions (tpy)					HAPs Emissions (tpy)																				
	NO_x	CO	VOC	SO_2	PM_{10}	1,3-Butadiene	Acetaldehyde	Acrolein	2,2,4-Trimethylpentane	Benzene	Carbonyl Sulfide	Dichlorobenzene	Ethyl Benzene	Formaldehyde	Hexane	Mercury	Methanol	Naphthalene	PAH	Propylene Oxide	Toluene	Xylene	TOTALS
TOTAL EMISSIONS FOR COLD STARTUP YEAR	268.64	644.46	192.87	256.49	196.04	0.01	0.47	0.12	0.00	0.54	1.08	0.00	0.35	1.27	1.33	0.00	10.26	0.01	0.02	0.28	1.82	0.78	26.35

Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
Turbine Detail Sheet - Initial Year (Cold Start and Remainder Normal Operations [Base Load])

Source ID Number	Turbine and HRSG Train 1
Equipment ID	
Turbine Usage	Power Generation
Turbine Make	GE
Turbine Model	7EA
Serial Number	TBD
Installation Date	TBD
Engine Configuration	Turbine
Emission Controls	SCR/Oxidation Catalyst
Design Output	86 MW
Site Operating Hours	7760 hr/yr
Exhaust Temperature	300 °F

	-12°F	45°F	85°F
Gas Heating Value	16399.6 Btu/lb	16399.6 Btu/lb	16399.6 Btu/lb
Gas Flow Rate	47,910 lb/hr	44,450 lb/hr	40,240 lb/hr
Gas Heat Rate	785.7 MMBtu/hr	729.0 MMBtu/hr	659.9 MMBtu/hr

Potential Emissions from Fuel Gas Mixture Operation (Normal operations, Partial year)

Pollutant	Emission Factor (ppmv, dry)	Emission Factor (lb/MMBtu)	Estimated Hourly Emissions -12°F (lb/hr)	45°F (lb/hr)	85°F (lb/hr)	Max Hourly Emissions (lb/hr)	Estimated Annual Emissions (tpy)	Source of Emission Factor
NOx	6	0.0234	18.40	17.44	16.12	18.40	67.20	Manf. Data[1]
CO	6	0.0143	11.20	10.62	9.81	11.20	40.92	Manf. Data[1]
VOC	1.4 (ppmv, wet)	0.0020	1.59	1.52	1.40	1.59	5.84	Manf. Data[1]
SO2		0.0034	2.67	2.48	2.24	2.67	9.56	AP-42[2]
PM10 Total		0.0127	10.00	10.00	10.00	10.00	38.80	Manf. Data[1]
Mercury	7.86E-07	1.34E-08	1.05E-05	9.96E-06	9.21E-06	1.05E-05	3.84E-05	Manf. Data[3]
1,3-Butadiene		4.30E-07	3.38E-04	3.13E-04	2.84E-04	3.38E-04	1.21E-03	AP-42[2]
Acetaldehyde		4.00E-05	3.14E-02	2.92E-02	2.64E-02	3.14E-02	1.12E-01	AP-42[2]
Acrolein		6.40E-06	5.03E-03	4.67E-03	4.22E-03	5.03E-03	1.80E-02	AP-42[2]
Benzene		1.20E-05	9.43E-03	8.75E-03	7.92E-03	9.43E-03	3.37E-02	AP-42[2]
Ethylbenzene		3.20E-05	2.51E-02	2.33E-02	2.11E-02	2.51E-02	9.00E-02	AP-42[2]
Formaldehyde		7.10E-05	5.58E-02	5.18E-02	4.69E-02	5.58E-02	2.00E-01	AP-42[2]
Naphthalene		1.30E-06	1.02E-03	9.48E-04	8.58E-04	1.02E-03	3.66E-03	AP-42[2]
PAH		2.20E-06	1.73E-03	1.60E-03	1.45E-03	1.73E-03	6.19E-03	AP-42[2]
Propylene Oxide		2.90E-05	2.28E-02	2.11E-02	1.91E-02	2.28E-02	8.16E-02	AP-42[2]
Toluene		1.30E-04	1.02E-01	9.48E-02	8.58E-02	1.02E-01	3.66E-01	AP-42[2]
Xylene		6.40E-05	5.03E-02	4.67E-02	4.22E-02	5.03E-02	1.80E-01	AP-42[2]

Exhaust Composition		Base Load, Temp. = -12°F		Base Load, Temp. = 45°F		Base Load, Temp. = 85°F	
Component	Mol. Wt.	Volume %	Weighted Mol Wt.	Volume %	Weighted Mol Wt.	Volume %	Weighted Mol Wt.
Argon	39.94	1.03	0.41	1.03	0.41	1.03	0.41
Nitrogen	28.02	77.34	21.67	76.82	21.52	76.61	21.47
Oxygen	32.00	12.08	3.87	12.22	3.91	12.37	3.96
Carbon Dioxide	44.01	3.32	1.46	3.23	1.42	3.17	1.40
Water	18.02	6.23	1.12	6.71	1.21	6.73	1.21
		100.0	28.5	100.0	28.5	99.9	28.4

Calculation of dry mass flow rate:	Base Load, Temp. = 0°F		Base Load, Temp. = 45°F		Base Load, Temp. = 80°F	
Mass flow of exhaust =	2.03E+06	lb/hr	1.93E+06	lb/hr	1.78E+06	lb/hr
Molar flow of exhaust = Mass flow of exhaust / Mol Wt =	71079.6	lb-mol/hr	67738.0	lb-mol/hr	62614.9	lb-mol/hr
Molar flow of water = Vol.% H_2O * Exhaust molar flow =	4428.3	lb-mol/hr	4545.2	lb-mol/hr	4214.0	lb-mol/hr
Molar Flow of O2 = Vol.% O2 * Exhaust molar flow =	8586.4	lb-mol/hr	8277.6	lb-mol/hr	7745.5	lb-mol/hr
Molar flow of Exhaust, dry = Exhaust molar flow - H20 molar flow =	66651.4	lb-mol/hr	63192.8	lb-mol/hr	58400.9	lb-mol/hr
Vol.% O2, dry = O2 molar flow / Exhaust molar flow =	12.9%		13.1%		13.3%	
total exhaust flow, acfm	499,773		476,277		440,256	

[1] Criteria pollutant emission factors provided by the manufacturer, but in some cases have been adapted from natural gas combustion. The NOx emission factor is corrected to 15% O2.

[2] EPA AP-42, Volume I, Fifth Edition - April 2000, Table 3.1-3, Emission Factors for Hazardous Air Pollutants from Natural Gas-Fired Stationary Gas Turbines. Note: These emission factors are for natural gas combustion, which is expected to produce emissions of these pollutants that are very similar to the emissions produced during fuel gas combustion, so these emission factors should provide representative emission estimates.

[3] Mercury concentration in turbine exhaust gas is based on estimated mercury emission rates, as provided by the mercury guard bed manufacturer.

Additional notes:
All gas flow rates and compositions are based on information provided by GE. (Information provided by Paul Rood of SNC Lavalin via email on 12/17/07.)
Average VOC molecular weight assumed to be 46 lb-mol/lb.
The operating hours include 500 hours for malfunction and warm start-up.

Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
Turbine Detail Sheet - SSM Emissions, Natural Gas Firing (Cold Start-up)

Source ID Number	Turbine and HRSG Train 1
Design Output	66 MW
Cold Operating Hours	6 hr/yr
Normal Operating Hours	994 hr/yr
Natural Gas Heating Value	21515 Btu/lb
Natural Gas Flow Rate	36,495 lb/hr
Natural Gas Heat Rate	785.2 MMBtu/hr
Gas Flow Rate	0.77 MMscf/hr

Potential Emissions from Natural Gas Operation (Cold Startup, Partial year)

Pollutant	Emission Factor (lb/MMBtu)	Emission Factor (ppmv, dry)	Estimated Emissions (lb/hr)	Estimated Emissions (tpy)	Source of Emission Factor
NOx (cold)		25	77.56	0.23	Manf. Data[1]
NOx (normal)		6	18.61	9.25	Manf. Data[1]
CO (cold)		10	18.89	0.06	Manf. Data[1]
CO (normal)		6	11.33	5.63	Manf. Data[1]
VOC		1.4 (ppmv, wet)	1.62	0.81	Manf. Data[1]
SO2	0.0034		2.67	1.33	AP-42[2]
PM10 Total			10.00	5.00	Manf. Data[1]
Mercury		0.000E+00	0.00E+00	0.00E+00	AP-42[2]
1,3-Butadiene	4.30E-07		3.38E-04	1.69E-04	AP-42[2]
Acetaldehyde	4.00E-05		3.14E-02	1.57E-02	AP-42[2]
Acrolein	6.40E-06		5.03E-03	2.51E-03	AP-42[2]
Benzene	1.20E-05		9.42E-03	4.71E-03	AP-42[2]
Ethylbenzene	3.20E-05		2.51E-02	1.26E-02	AP-42[2]
Formaldehyde	7.10E-05		5.57E-02	2.79E-02	AP-42[2]
Naphthalene	1.30E-06		1.02E-03	5.10E-04	AP-42[2]
PAH	2.20E-06		1.73E-03	8.64E-04	AP-42[2]
Propylene Oxide	2.90E-05		2.28E-02	1.14E-02	AP-42[2]
Toluene	1.30E-04		1.02E-01	5.10E-02	AP-42[2]
Xylene	6.40E-05		5.03E-02	2.51E-02	AP-42[2]

Exhaust Composition — Base Load, Temp. = 0°F

Component	Mol. Wt.	Volume %	Weighted Mol Wt.
Argon	39.94	0.9	0.36
Nitrogen	28.02	75.5	21.16
Oxygen	32.00	13.88	4.44
Carbon Dioxide	44.01	3.22	1.42
Water	18.02	6.5	1.17
		100.0	28.5

Calculation of dry mass flow rate:

Mass flow of exhaust =	2.06E+06	lb/hr
Molar flow of exhaust = Mass flow of exhaust / Mol Wt =	72132.9	lb-mol/hr
Molar flow of water = Vol.% H_2O * Exhaust molar flow =	4668.6	lb-mol/hr
Molar Flow of O2= Vol.% O2 * Exhaust molar flow =	10012.0	lb-mol/hr
Molar flow of Exhaust, dry = Exhaust molar flow - H20 molar flow=	67444.3	lb-mol/hr
Vol.% O2, dry = O2 molar flow / Exhaust molar flow =	14.8%	

[1] Criteria pollutant emission factors provided by the manufacturer. The NOx emission factor is corrected to 15% O2. Cold operation emissions assume that the SCR / oxidation catalyst is not operating. Nitrogen injection is assumed; however, nitrogen may not be available until the Air separation Unit is operating.

[2] EPA AP-42, Volume I, Fifth Edition - April 2000, Table 3.1-3, Emission Factors for Hazardous Air Pollutants from Natural Gas-Fired Stationary Gas Turbines. Note, no mercury emission factor is given for natural gas combustion and so is assumed as zero here.

Additional notes:

These emissions are calculated assuming an ambient temperature of -12°F, which produces the worst case emission estimate.
All natural gas heat rates, flow rates, and exhaust compositions are based on information provided by GE. (Information provided by Paul Rood of SNC Lavalin via email on 12/18/07.)

Average VOC molecular weight assumed to be 46 lb-mol/lb.

Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
Turbine Detail Sheet - Normal Operations (Base Load)

Source ID Number	Turbine and HRSG Train 1
Equipment ID	
Turbine Usage	Power Generation
Turbine Make	GE
Turbine Model	7EA
Serial Number	TBD
Installation Date	TBD
Engine Configuration	Turbine
Emission Controls	SCR/Oxidation Catalyst
Design Output	66 MW
Site Operating Hours	8760 hr/yr
Exhaust Temperature	300 °F

	-12°F	45°F	85°F
Gas Heating Value	16399.6 Btu/lb	16399.6 Btu/lb	16399.6 Btu/lb
Gas Flow Rate	47,910 lb/hr	44,450 lb/hr	40,240 lb/hr
Gas Heat Rate	785.7 MMBtu/hr	729.0 MMBtu/hr	659.9 MMBtu/hr

Potential Emissions from Fuel Gas Mixture Operation

Pollutant	Emission Factor (ppmv, dry)	Emission Factor (lb/MMBtu)	Estimated Hourly Emissions -12°F (lb/hr)	45°F (lb/hr)	85°F (lb/hr)	Max Hourly Emissions (lb/hr)	Estimated Annual Emissions (tpy)	Source of Emission Factor
NOx	6	0.0234	18.40	17.44	16.12	18.40	75.86	Manf. Data[1]
CO	6	0.0143	11.20	10.62	9.81	11.20	46.19	Manf. Data[1]
VOC	1.4 (ppmv, wet)	0.0020	1.59	1.52	1.40	1.59	6.59	Manf. Data[1]
SO2		0.0034	2.67	2.48	2.24	2.67	10.79	AP-42[2]
PM10 Total		0.0127	10.00	10.00	10.00	10.00	43.80	Manf. Data[1]
Mercury[3]	7.86E-07	1.34E-08	1.05E-05	9.96E-06	9.21E-06	1.05E-05	4.33E-05	Manf. Data[3]
1,3-Butadiene		4.30E-07	3.38E-04	3.13E-04	2.84E-04	3.38E-04	1.37E-03	AP-42[2]
Acetaldehyde		4.00E-05	3.14E-02	2.92E-02	2.64E-02	3.14E-02	1.27E-01	AP-42[2]
Acrolein		6.40E-06	5.03E-03	4.67E-03	4.22E-03	5.03E-03	2.03E-02	AP-42[2]
Benzene		1.20E-05	9.43E-03	8.75E-03	7.92E-03	9.43E-03	3.81E-02	AP-42[2]
Ethylbenzene		3.20E-05	2.51E-02	2.33E-02	2.11E-02	2.51E-02	1.02E-01	AP-42[2]
Formaldehyde		7.10E-05	5.58E-02	5.18E-02	4.69E-02	5.58E-02	2.25E-01	AP-42[2]
Naphthalene		1.30E-06	1.02E-03	9.48E-04	8.58E-04	1.02E-03	4.13E-03	AP-42[2]
PAH		2.20E-06	1.73E-03	1.60E-03	1.45E-03	1.73E-03	6.98E-03	AP-42[2]
Propylene Oxide		2.90E-05	2.28E-02	2.11E-02	1.91E-02	2.28E-02	9.21E-02	AP-42[2]
Toluene		1.30E-04	1.02E-01	9.48E-02	8.58E-02	1.02E-01	4.13E-01	AP-42[2]
Xylene		6.40E-05	5.03E-02	4.67E-02	4.22E-02	5.03E-02	2.03E-01	AP-42[2]

Exhaust Composition		Base Load, Temp. = -12°F		Base Load, Temp. = 45°F		Base Load, Temp. = 85°F	
Component	Mol. Wt.	Volume %	Weighted Mol Wt.	Volume %	Weighted Mol Wt.	Volume %	Weighted Mol Wt.
Argon	39.94	1.03	0.41	1.03	0.41	1.03	0.41
Nitrogen	28.02	77.34	21.67	76.82	21.52	76.61	21.47
Oxygen	32.00	12.08	3.87	12.22	3.91	12.37	3.96
Carbon Dioxide	44.01	3.32	1.46	3.23	1.42	3.17	1.40
Water	18.02	6.23	1.12	6.71	1.21	6.73	1.21
		100.0	28.5	100.0	28.5	99.9	28.4

Calculation of dry mass flow rate:		Base Load, Temp. = 0°F		Base Load, Temp. = 45°F		Base Load, Temp. = 80°F	
	Mass flow of exhaust =	2.03E+06	lb/hr	1.93E+06	lb/hr	1.78E+06	lb/hr
Molar flow of exhaust =	Mass flow of exhaust / Mol Wt =	71079.6	lb-mol/hr	67738.0	lb-mol/hr	62614.9	lb-mol/hr
Molar flow of water =	Vol.% H_2O * Exhaust molar flow =	4428.3	lb-mol/hr	4545.2	lb-mol/hr	4214.0	lb-mol/hr
Molar Flow of O2=	Vol.% O2 * Exhaust molar flow =	8588.4	lb-mol/hr	8277.5	lb-mol/hr	7745.5	lb-mol/hr
Molar flow of Exhaust, dry =	Exhaust molar flow - H20 molar flow=	66651.4	lb-mol/hr	63192.8	lb-mol/hr	58400.9	lb-mol/hr
Vol .% O2, dry =	O2 molar flow / Exhaust molar flow =	12.9%		13.1%		13.3%	
	total exhaust flow, acfm	499,773		476,277		440,256	

[1] Criteria pollutant emission factors provided by the manufacturer, but in some cases have been adapted from natural gas combustion. The NOx emission factor is corrected to 15% O2.

[2] EPA AP-42, Volume I, Fifth Edition - April 2000, Table 3.1-3. Emission Factors for Hazardous Air Pollutants from Natural Gas-Fired Stationary Gas Turbines. Note: These emission factors are for natural gas combustion, which is expected to produce emissions of these pollutants that are greater than or equal to the emissions produced during fuel gas combustion, so these emission factors should provide worst case emission estimates.

[3] Mercury concentration in turbine exhaust gas is based on estimated mercury emission rates, as provided by the mercury guard bed manufacturer.

Additional notes:

All gas flow rates and compositions are based on information provided by GE. (Information provided by Paul Rood of SNC Lavalin via email on 12/17/07.)

Average VOC molecular weight assumed to be 45 lb-mol/lb.

Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
Turbine Detail Sheet - Initial Year (Cold Start and Remainder Normal Operations [Base Load])

Source ID Number	Turbine and HRSG Train 2
Equipment ID	
Turbine Usage	Power Generation
Turbine Make	GE
Turbine Model	7EA
Serial Number	TBD
Installation Date	TBD
Engine Configuration	Turbine
Emission Controls	SCR/Oxidation Catalyst
Design Output	66 MW
Site Operating Hours	7760 hr/yr
Exhaust Temperature	300 °F

	-12°F	45°F	85°F
Gas Heating Value	16399.6 Btu/lb	16399.6 Btu/lb	16399.6 Btu/lb
Gas Flow Rate	47,910 lb/hr	44,450 lb/hr	40,240 lb/hr
Gas Heat Rate	785.7 MMBtu/hr	729.0 MMBtu/hr	659.9 MMBtu/hr

Potential Emissions from Fuel Gas Mixture Operation (Normal operations, Partial year)

Pollutant	Emission Factor (ppmv, dry)	Emission Factor (lb/MMBtu)	Estimated Hourly Emissions -12°F (lb/hr)	45°F (lb/hr)	85°F (lb/hr)	Max Hourly Emissions (lb/hr)	Estimated Annual Emissions (tpy)	Source of Emission Factor
NOx	6	0.0234	18.40	17.44	16.12	18.40	67.20	Manf. Data[1]
CO	6	0.0143	11.20	10.62	9.81	11.20	40.92	Manf. Data[1]
VOC	1.4 (ppmv, wet)	0.0020	1.59	1.52	1.40	1.59	5.84	Manf. Data[1]
SO2		0.0034	2.67	2.48	2.24	2.67	9.56	AP-42[2]
PM10 Total		0.0127	10.00	10.00	10.00	10.00	38.80	Manf. Data[1]
Mercury	7.86E-07	1.34E-08	1.05E-05	9.96E-06	9.21E-06	1.05E-05	3.84E-05	Manf. Data[3]
1,3-Butadiene		4.30E-07	3.38E-04	3.13E-04	2.84E-04	3.38E-04	1.21E-03	AP-42[2]
Acetaldehyde		4.00E-05	3.14E-02	2.92E-02	2.64E-02	3.14E-02	1.12E-01	AP-42[2]
Acrolein		6.40E-06	5.03E-03	4.67E-03	4.22E-03	5.03E-03	1.80E-02	AP-42[2]
Benzene		1.20E-05	9.43E-03	8.75E-03	7.92E-03	9.43E-03	3.37E-02	AP-42[2]
Ethylbenzene		3.20E-05	2.51E-02	2.33E-02	2.11E-02	2.51E-02	9.00E-02	AP-42[2]
Formaldehyde		7.10E-05	5.58E-02	5.18E-02	4.69E-02	5.58E-02	2.00E-01	AP-42[2]
Naphthalene		1.30E-06	1.02E-03	9.48E-04	8.58E-04	1.02E-03	3.66E-03	AP-42[2]
PAH		2.20E-06	1.73E-03	1.60E-03	1.45E-03	1.73E-03	6.19E-03	AP-42[2]
Propylene Oxide		2.90E-05	2.28E-02	2.11E-02	1.91E-02	2.28E-02	8.16E-02	AP-42[2]
Toluene		1.30E-04	1.02E-01	9.48E-02	8.58E-02	1.02E-01	3.66E-01	AP-42[2]
Xylene		6.40E-05	5.03E-02	4.67E-02	4.22E-02	5.03E-02	1.80E-01	AP-42[2]

Exhaust Composition		Base Load, Temp. = -12°F		Base Load, Temp. = 45°F		Base Load, Temp. = 85°F	
Component	Mol. Wt.	Volume %	Weighted Mol Wt.	Volume %	Weighted Mol Wt.	Volume %	Weighted Mol Wt.
Argon	39.94	1.03	0.41	1.03	0.41	1.03	0.41
Nitrogen	28.02	77.34	21.67	76.82	21.52	76.61	21.47
Oxygen	32.00	12.08	3.87	12.22	3.91	12.37	3.96
Carbon Dioxide	44.01	3.32	1.46	3.23	1.42	3.17	1.40
Water	18.02	6.23	1.12	6.71	1.21	6.73	1.21
		100.0	28.5	100.0	28.5	99.9	28.4

Calculation of dry mass flow rate:		Base Load, Temp. = 0°F		Base Load, Temp. = 45°F		Base Load, Temp. = 80°F	
	Mass flow of exhaust =	2.03E+06	lb/hr	1.93E+06	lb/hr	1.78E+06	lb/hr
Molar flow of exhaust =	Mass flow of exhaust / Mol Wt =	71079.6	lb-mol/hr	67738.0	lb-mol/hr	62614.9	lb-mol/hr
Molar flow of water =	Vol.% H_2O * Exhaust molar flow =	4428.3	lb-mol/hr	4545.2	lb-mol/hr	4214.0	lb-mol/hr
Molar Flow of O2=	Vol.% O2 * Exhaust molar flow =	8586.4	lb-mol/hr	8277.6	lb-mol/hr	7745.5	lb-mol/hr
Molar flow of Exhaust, dry =	Exhaust molar flow - H20 molar flow=	66651.4	lb-mol/hr	63192.8	lb-mol/hr	58400.9	lb-mol/hr
Vol.% O2, dry =	O2 molar flow / Exhaust molar flow =	12.9%		13.1%		13.3%	
	total exhaust flow, acfm	499,773		476,277		440,256	

[1] Criteria pollutant emission factors provided by the manufacturer, but in some cases have been adapted from natural gas combustion. The NOx emission factor is corrected to 15% O2.

[2] EPA AP-42, Volume I, Fifth Edition - April 2000, Table 3.1-3, Emission Factors for Hazardous Air Pollutants from Natural Gas-Fired Stationary Gas Turbines. Note: These emission factors are for natural gas combustion, which is expected to produce emissions of these pollutants that are very similar to the emissions produced during fuel gas combustion, so these emission factors should provide representative emission estimates.

[3] Mercury concentration in turbine exhaust gas is based on estimated mercury emission rates, as provided by the mercury guard bed manufacturer.

Additional notes:

All gas flow rates and compositions are based on information provided by GE. (Information provided by Paul Rood of SNC Lavalin via email on 12/17/07.)

Average VOC molecular weight assumed to be 46 lb-mol/lb.

The operating hours include 600 hours for malfunction and warm start-up.

Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
Turbine Detail Sheet - SSM Emissions, Natural Gas Firing (Cold Start-up)

Source ID Number	Turbine and HRSG Train 2
Design Output	66 MW
Cold Operating Hours	6 hr/yr
Normal Operating Hours	994 hr/yr
Natural Gas Heating Value	21515 Btu/lb
Natural Gas Flow Rate	36,495 lb/hr
Natural Gas Heat Rate	785.2 MMBtu/hr
Gas Flow Rate	0.77 MMscf/hr

Potential Emissions from Natural Gas Operation (Cold Startup, Partial year)

Pollutant	Emission Factor (lb/MMBtu)	Emission Factor (ppmv, dry)	Estimated Emissions (lb/hr)	Estimated Emissions (tpy)	Source of Emission Factor
NOx (cold)		25	77.56	0.23	Manf. Data[1]
NOx (normal)		6	18.61	9.25	Manf. Data[1]
CO (cold)		10	18.89	0.06	Manf. Data[1]
CO (normal)		6	11.33	5.63	Manf. Data[1]
VOC		1.4 (ppmv, wet)	1.62	0.81	Manf. Data[1]
SO2	0.0034		2.57	1.33	Manf. Data[1]
PM10 Total			10.00	5.00	Manf. Data[1]
Mercury		0.000E+00	0.00E+00	0.00E+00	AP-42[2]
1,3-Butadiene	4.30E-07		3.38E-04	1.69E-04	AP-42[2]
Acetaldehyde	4.00E-05		3.14E-02	1.57E-02	AP-42[2]
Acrolein	6.40E-06		5.03E-03	2.51E-03	AP-42[2]
Benzene	1.20E-05		9.42E-03	4.71E-03	AP-42[2]
Ethylbenzene	3.20E-05		2.51E-02	1.26E-02	AP-42[2]
Formaldehyde	7.10E-05		5.57E-02	2.79E-02	AP-42[2]
Naphthalene	1.30E-06		1.02E-03	5.10E-04	AP-42[2]
PAH	2.20E-06		1.73E-03	8.64E-04	AP-42[2]
Propylene Oxide	2.90E-05		2.28E-02	1.14E-02	AP-42[2]
Toluene	1.30E-04		1.02E-01	5.10E-02	AP-42[2]
Xylene	6.40E-05		5.03E-02	2.51E-02	AP-42[2]

Exhaust Composition — Base Load, Temp. = 0°F

Component	Mol. Wt.	Volume %	Weighted Mol Wt.
Argon	39.94	0.9	0.36
Nitrogen	28.02	75.5	21.16
Oxygen	32.00	13.88	4.44
Carbon Dioxide	44.01	3.22	1.42
Water	18.02	6.5	1.17
		100.0	28.5

Calculation of dry mass flow rate:

Mass flow of exhaust =	2.06E+06	lb/hr	
Molar flow of exhaust = Mass flow of exhaust / Mol Wt =		72132.9	lb-mol/hr
Molar flow of water = Vol.% H_2O * Exhaust molar flow =		4688.6	lb-mol/hr
Molar Flow of O2= Vol.% O2 * Exhaust molar flow =		10012.0	lb-mol/hr
Molar flow of Exhaust, dry = Exhaust molar flow - H20 molar flow=		67444.3	lb-mol/hr
Vol .% O2, dry = O2 molar flow / Exhaust molar flow =		14.8%	

[1] Criteria pollutant emission factors provided by the manufacturer. The NOx emission factor is corrected to 15% O2. Cold operation emissions assume that the SCR / oxidation catalyst is not operating. Nitrogen injection is assumed.

[2] EPA AP-42, Volume I, Fifth Edition - April 2000, Table 3.1-3, Emission Factors for Hazardous Air Pollutants from Natural Gas-Fired Stationary Gas Turbines. Note, no mercury emission factor is given for natural gas combustion and so is assumed as zero here.

Additional notes:

These emissions are calculated assuming an ambient temperature of -12°F, which produces the worst case emission estimate.
All natural gas heat rates, flow rates, and exhaust compositions are based on information provided by GE. (Information provided by Paul Rood of SNC Lavalin via email on 12/18/07.)

Average VOC molecular weight assumed to be 46 lb-mol/lb.

Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
Turbine Detail Sheet - Normal Operations (Base Load)

Source ID Number	Turbine and HRSG Train 2
Equipment ID	
Turbine Usage	Power Generation
Turbine Make	GE
Turbine Model	7EA
Serial Number	TBD
Installation Date	TBD
Engine Configuration	Turbine
Emission Controls	SCR/Oxidation Catalyst
Design Output	66 MW
Site Operating Hours	8760 hr/yr
Exhaust Temperature	300 °F

	-12°F	45°F	85°F
Gas Heating Value	16399.6 Btu/lb	16399.6 Btu/lb	16399.6 Btu/lb
Gas Flow Rate	47,910 lb/hr	44,450 lb/hr	40,240 lb/hr
Gas Heat Rate	785.7 MMBtu/hr	729.0 MMBtu/hr	659.9 MMBtu/hr

Potential Emissions from Fuel Gas Mixture Operation

Pollutant	Emission Factor (ppmv, dry)	Emission Factor (lb/MMBtu)	Estimated Hourly Emissions -12°F (lb/hr)	45°F (lb/hr)	85°F (lb/hr)	Max Hourly Emissions (lb/hr)	Estimated Annual Emissions (tpy)	Source of Emission Factor
NOx	6	0.0234	18.40	17.44	16.12	18.40	75.86	Manf. Data[1]
CO	6	0.0143	11.20	10.62	9.81	11.20	46.19	Manf. Data[1]
VOC	1.4 (ppmv, wet)	0.0020	1.59	1.52	1.40	1.59	6.59	Manf. Data[1]
SO2		0.0034	2.67	2.48	2.24	2.67	10.79	AP-42[2]
PM10 Total		0.0127	10.00	10.00	10.00	10.00	43.80	Manf. Data[1]
Mercury[3]	7.86E-07	1.34E-08	1.05E-05	9.96E-06	9.21E-06	1.05E-05	4.33E-05	Manf. Data[3]
1,3-Butadiene		4.30E-07	3.38E-04	3.13E-04	2.84E-04	3.38E-04	1.37E-03	AP-42[2]
Acetaldehyde		4.00E-05	3.14E-02	2.92E-02	2.64E-02	3.14E-02	1.27E-01	AP-42[2]
Acrolein		6.40E-06	5.03E-03	4.67E-03	4.22E-03	5.03E-03	2.03E-02	AP-42[2]
Benzene		1.20E-05	9.43E-03	8.75E-03	7.92E-03	9.43E-03	3.81E-02	AP-42[2]
Ethylbenzene		3.20E-05	2.51E-02	2.33E-02	2.11E-02	2.51E-02	1.02E-01	AP-42[2]
Formaldehyde		7.10E-05	5.58E-02	5.18E-02	4.69E-02	5.58E-02	2.25E-01	AP-42[2]
Naphthalene		1.30E-06	1.02E-03	9.48E-04	8.58E-04	1.02E-03	4.13E-03	AP-42[2]
PAH		2.20E-06	1.73E-03	1.60E-03	1.45E-03	1.73E-03	6.98E-03	AP-42[2]
Propylene Oxide		2.90E-05	2.28E-02	2.11E-02	1.91E-02	2.28E-02	9.21E-02	AP-42[2]
Toluene		1.30E-04	1.02E-01	9.48E-02	8.58E-02	1.02E-01	4.13E-01	AP-42[2]
Xylene		6.40E-05	5.03E-02	4.67E-02	4.22E-02	5.03E-02	2.03E-01	AP-42[2]

Exhaust Composition		Base Load, Temp. = -12°F		Base Load, Temp. = 45°F		Base Load, Temp. = 85°F	
Component	Mol. Wt.	Volume %	Weighted Mol Wt.	Volume %	Weighted Mol Wt.	Volume %	Weighted Mol Wt.
Argon	39.94	1.03	0.41	1.03	0.41	1.03	0.41
Nitrogen	28.02	77.34	21.67	76.82	21.52	76.61	21.47
Oxygen	32.00	12.08	3.87	12.22	3.91	12.37	3.96
Carbon Dioxide	44.01	3.32	1.46	3.23	1.42	3.17	1.40
Water	18.02	6.23	1.12	6.71	1.21	6.73	1.21
		100.0	28.5	100.0	28.5	99.9	28.4

Calculation of dry mass flow rate:	Base Load, Temp. = 0°F		Base Load, Temp. = 45°F		Base Load, Temp. = 80°F	
Mass flow of exhaust =	2.03E+06	lb/hr	1.93E+06	lb/hr	1.78E+06	lb/hr
Molar flow of exhaust = Mass flow of exhaust / Mol Wt =	71079.6	lb-mol/hr	67736.0	lb-mol/hr	62614.9	lb-mol/hr
Molar flow of water = Vol.% H_2O * Exhaust molar flow =	4428.3	lb-mol/hr	4545.2	lb-mol/hr	4214.0	lb-mol/hr
Molar Flow of O2= Vol.% O2 * Exhaust molar flow =	8588.4	lb-mol/hr	8277.6	lb-mol/hr	7745.5	lb-mol/hr
Molar flow of Exhaust, dry = Exhaust molar flow - H20 molar flow=	66651.4	lb-mol/hr	63192.8	lb-mol/hr	58400.9	lb-mol/hr
Vol.% O2, dry = O2 molar flow / Exhaust molar flow =	12.9%		13.1%		13.3%	
total exhaust flow, acfm	499,773		476,277		440,256	

[1] Criteria pollutant emission factors provided by the manufacturer, but in some cases have been adapted from natural gas combustion. The NOx emission factor is corrected to 15% O2.

[2] EPA AP-42, Volume I, Fifth Edition - April 2000, Table 3.1-3, Emission Factors for Hazardous Air Pollutants from Natural Gas-Fired Stationary Gas Turbines. Note: These emission factors are for natural gas combustion, which is expected to produce emissions of these pollutants that are greater than or equal to the emissions produced during fuel gas combustion, so these emission factors should provide worst case emission estimates.

[3] Mercury concentration in turbine exhaust gas is based on estimated mercury emission rates, as provided by the mercury guard bed manufacturer.

Additional notes:
All gas flow rates and compositions are based on information provided by GE. (Information provided by Paul Rood of SNC Lavalin via email on 12/17/07.)
Average VOC molecular weight assumed to be 46 lb-mol/lb.

Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
Turbine Detail Sheet - Initial Year (Cold Start and Remainder Normal Operations [Base Load])

Source ID Number	Turbine and HRSG Train 3
Equipment ID	
Turbine Usage	Power Generation
Turbine Make	GE
Turbine Model	7EA
Serial Number	TBD
Installation Date	TBD
Engine Configuration	Turbine
Emission Controls	SCR/Oxidation Catalyst
Design Output	66 MW
Site Operating Hours	7760 hr/yr
Exhaust Temperature	300 °F

	-12°F	45°F	85°F
Gas Heating Value	16399.6 Btu/lb	16399.6 Btu/lb	16399.6 Btu/lb
Gas Flow Rate	47,910 lb/hr	44,450 lb/hr	40,240 lb/hr
Gas Heat Rate	785.7 MMBtu/hr	729.0 MMBtu/hr	659.9 MMBtu/hr

Potential Emissions from Fuel Gas Mixture Operation (Normal operations, Partial year)

Pollutant	Emission Factor (ppmv, dry)	Emission Factor (lb/MMBtu)	Estimated Hourly Emissions -12°F (lb/hr)	45°F (lb/hr)	85°F (lb/hr)	Max Hourly Emissions (lb/hr)	Estimated Annual Emissions (tpy)	Source of Emission Factor
NOx	6	0.0234	18.40	17.44	16.12	18.40	67.20	Manf. Data[1]
CO	6	0.0143	11.20	10.62	9.81	11.20	40.92	Manf. Data[1]
VOC	1.4 (ppmv, wet)	0.0020	1.59	1.52	1.40	1.59	5.84	Manf. Data[1]
SO2		0.0034	2.67	2.48	2.24	2.67	9.56	AP-42[2]
PM10 Total		0.0127	10.00	10.00	10.00	10.00	38.80	Manf. Data[1]
Mercury	7.86E-07	1.34E-08	1.05E-05	9.96E-06	9.21E-06	1.05E-05	3.84E-05	Manf. Data[3]
1,3-Butadiene		4.30E-07	3.38E-04	3.13E-04	2.84E-04	3.38E-04	1.21E-03	AP-42[2]
Acetaldehyde		4.00E-05	3.14E-02	2.92E-02	2.64E-02	3.14E-02	1.12E-01	AP-42[2]
Acrolein		6.40E-06	5.03E-03	4.67E-03	4.22E-03	5.03E-03	1.80E-02	AP-42[2]
Benzene		1.20E-05	9.43E-03	8.75E-03	7.92E-03	9.43E-03	3.37E-02	AP-42[2]
Ethylbenzene		3.20E-05	2.51E-02	2.33E-02	2.11E-02	2.51E-02	9.00E-02	AP-42[2]
Formaldehyde		7.10E-05	5.58E-02	5.18E-02	4.69E-02	5.58E-02	2.00E-01	AP-42[2]
Naphthalene		1.30E-06	1.02E-03	9.48E-04	8.58E-04	1.02E-03	3.66E-03	AP-42[2]
PAH		2.20E-06	1.73E-03	1.60E-03	1.45E-03	1.73E-03	6.19E-03	AP-42[2]
Propylene Oxide		2.90E-05	2.28E-02	2.11E-02	1.91E-02	2.28E-02	8.16E-02	AP-42[2]
Toluene		1.30E-04	1.02E-01	9.48E-02	8.58E-02	1.02E-01	3.66E-01	AP-42[2]
Xylene		6.40E-05	5.03E-02	4.67E-02	4.22E-02	5.03E-02	1.80E-01	AP-42[2]

Exhaust Composition		Base Load, Temp. = -12°F		Base Load, Temp. = 45°F		Base Load, Temp. = 85°F	
Component	Mol. Wt.	Volume %	Weighted Mol Wt.	Volume %	Weighted Mol Wt.	Volume %	Weighted Mol Wt.
Argon	39.94	1.03	0.41	1.03	0.41	1.03	0.41
Nitrogen	28.02	77.34	21.67	76.82	21.52	76.61	21.47
Oxygen	32.00	12.08	3.87	12.22	3.91	12.37	3.96
Carbon Dioxide	44.01	3.32	1.46	3.23	1.42	3.17	1.40
Water	18.02	6.23	1.12	6.71	1.21	6.73	1.21
		100.0	28.5	100.0	28.5	99.9	28.4

Calculation of dry mass flow rate:	Base Load, Temp. = 0°F		Base Load, Temp. = 45°F		Base Load, Temp. = 80°F	
Mass flow of exhaust =	2.03E+06	lb/hr	1.93E+06	lb/hr	1.78E+06	lb/hr
Molar flow of exhaust = Mass flow of exhaust / Mol Wt =	71079.6	lb-mol/hr	67738.0	lb-mol/hr	62614.9	lb-mol/hr
Molar flow of water = Vol.% H_2O * Exhaust molar flow =	4428.3	lb-mol/hr	4545.2	lb-mol/hr	4214.0	lb-mol/hr
Molar Flow of O2= Vol.% O2 * Exhaust molar flow =	8586.4	lb-mol/hr	8277.6	lb-mol/hr	7745.5	lb-mol/hr
Molar flow of Exhaust, dry = Exhaust molar flow - H20 molar flow=	66651.4	lb-mol/hr	63192.8	lb-mol/hr	58400.9	lb-mol/hr
Vol.% O2, dry = O2 molar flow / Exhaust molar flow =	12.9%		13.1%		13.3%	
total exhaust flow, acfm	499,773		476,277		440,256	

[1] Criteria pollutant emission factors provided by the manufacturer, but in some cases have been adapted from natural gas combustion. The NOx emission factor is corrected to 15% O2.

[2] EPA AP-42, Volume I, Fifth Edition - April 2000, Table 3.1-3, Emission Factors for Hazardous Air Pollutants from Natural Gas-Fired Stationary Gas Turbines. Note: These emission factors are for natural gas combustion, which is expected to produce emissions of these pollutants that are greater than or equal to the emissions produced during fuel gas combustion, so these emission factors should provide worst case emission estimates.

[3] Mercury concentration in turbine exhaust gas is based on estimated mercury emission rates, as provided by the mercury guard bed manufacturer.

Additional notes:
All gas flow rates and compositions are based on information provided by GE. (Information provided by Paul Rood of SNC Lavalin via email on 12/17/07.)
Average VOC molecular weight assumed to be 46 lb-mol/lb.
The operating hours include 500 hours for malfunction and warm start-up.

Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
Turbine Detail Sheet - SSM Emissions, Natural Gas Firing (Cold Start-up)

Source ID Number	Turbine and HRSG Train 3
Design Output	66 MW
Cold Operating Hours	6 hr/yr
Normal Operating Hours	994 hr/yr
Natural Gas Heating Value	21515 Btu/lb
Natural Gas Flow Rate	36,495 lb/hr
Natural Gas Heat Rate	785.2 MMBtu/hr
Gas Flow Rate	0.77 MMscf/hr

Potential Emissions from Natural Gas Operation (Cold Startup, Partial year)

Pollutant	Emission Factor (lb/MMBtu)	Emission Factor (ppmv, dry)	Estimated Emissions (lb/hr)	Estimated Emissions (tpy)	Source of Emission Factor
NOx (cold)		25	77.56	0.23	Manf. Data[1]
NOx (normal)		6	18.61	9.25	Manf. Data[1]
CO (cold)		10	18.89	0.06	Manf. Data[1]
CO (normal)		6	11.33	5.63	Manf. Data[1]
VOC		1.4 (ppmv, wet)	1.62	0.81	Manf. Data[1]
SO2	0.0034		2.67	1.33	Manf. Data[1]
PM10 Total			10.00	5.00	Manf. Data[1]
Mercury		0.000E+00	0.00E+00	0.00E+00	AP-42[2]
1,3-Butadiene	4.30E-07		3.38E-04	1.69E-04	AP-42[2]
Acetaldehyde	4.00E-05		3.14E-02	1.57E-02	AP-42[2]
Acrolein	6.40E-06		5.03E-03	2.51E-03	AP-42[2]
Benzene	1.20E-05		9.42E-03	4.71E-03	AP-42[2]
Ethylbenzene	3.20E-05		2.51E-02	1.26E-02	AP-42[2]
Formaldehyde	7.10E-05		5.57E-02	2.79E-02	AP-42[2]
Naphthalene	1.30E-06		1.02E-03	5.10E-04	AP-42[2]
PAH	2.20E-06		1.73E-03	8.64E-04	AP-42[2]
Propylene Oxide	2.90E-05		2.28E-02	1.14E-02	AP-42[2]
Toluene	1.30E-04		1.02E-01	5.10E-02	AP-42[2]
Xylene	6.40E-05		5.03E-02	2.51E-02	AP-42[2]

Exhaust Composition — Base Load, Temp. = 0°F

Component	Mol. Wt.	Volume %	Weighted Mol Wt.
Argon	39.94	0.9	0.36
Nitrogen	28.02	75.5	21.16
Oxygen	32.00	13.88	4.44
Carbon Dioxide	44.01	3.22	1.42
Water	18.02	6.5	1.17
		100.0	28.5

Calculation of dry mass flow rate:

Mass flow of exhaust =	2.06E+06	lb/hr	
Molar flow of exhaust =	Mass flow of exhaust / Mol Wt =	72132.9	lb-mol/hr
Molar flow of water =	Vol.% H_2O * Exhaust molar flow =	4688.6	lb-mol/hr
Molar Flow of O2=	Vol.% O2 * Exhaust molar flow =	10012.0	lb-mol/hr
Molar flow of Exhaust, dry =	Exhaust molar flow - H20 molar flow=	67444.3	lb-mol/hr
Vol.% O2, dry =	O2 molar flow / Exhaust molar flow =	14.8%	

[1] Criteria pollutant emission factors provided by the manufacturer. The NOx emission factor is corrected to 15% O2. Cold operation emissions assume that the SCR / oxidation catalyst is not operating. Nitrogen injection is assumed.

[2] EPA AP-42, Volume I, Fifth Edition - April 2000, Table 3.1-3, Emission Factors for Hazardous Air Pollutants from Natural Gas-Fired Stationary Gas Turbines. Note, no mercury emission factor is given for natural gas combustion and so is assumed as zero here.

Additional notes:

These emissions are calculated assuming an ambient temperature of -12°F, which produces the worst case emission estimate.
All natural gas heat rates, flow rates, and exhaust compositions are based on information provided by GE. (Information provided by Paul Rood of SNC Lavalin via email on 12/18/07.)

Average VOC molecular weight assumed to be 46 lb-mol/lb.

Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
Turbine Detail Sheet - Normal Operations (Base Load)

Source ID Number	Turbine and HRSG Train 3
Equipment ID	
Turbine Usage	Power Generation
Turbine Make	GE
Turbine Model	7EA
Serial Number	TBD
Installation Date	TBD
Engine Configuration	Turbine
Emission Controls	SCR/Oxidation Catalyst
Design Output	66 MW
Site Operating Hours	8760 hr/yr
Exhaust Temperature	300 °F

	-12°F	45°F	85°F
Gas Heating Value	16399.6 Btu/lb	16399.6 Btu/lb	16399.6 Btu/lb
Gas Flow Rate	47,910 lb/hr	44,450 lb/hr	40,240 lb/hr
Gas Heat Rate	785.7 MMBtu/hr	729.0 MMBtu/hr	659.9 MMBtu/hr

Potential Emissions from Fuel Gas Mixture Operation

Pollutant	Emission Factor (ppmv, dry)	Emission Factor (lb/MMBtu)	Estimated Hourly Emissions -12°F (lb/hr)	45°F (lb/hr)	85°F (lb/hr)	Max Hourly Emissions (lb/hr)	Estimated Annual Emissions (tpy)	Source of Emission Factor
NOx	6	0.0234	18.40	17.44	16.12	18.40	75.86	Manf. Data[1]
CO	6	0.0143	11.20	10.62	9.81	11.20	46.19	Manf. Data[1]
VOC	1.4 (ppmv, wet)	0.0020	1.59	1.52	1.40	1.59	6.59	Manf. Data[1]
SO2		0.0034	2.67	2.48	2.24	2.67	10.79	AP-42[2]
PM10 Total		0.0127	10.00	10.00	10.00	10.00	43.80	Manf. Data[1]
Mercury[3]	7.86E-07	1.34E-08	1.05E-05	9.96E-06	9.21E-06	1.05E-05	4.33E-05	Manf. Data[3]
1,3-Butadiene		4.30E-07	3.38E-04	3.13E-04	2.84E-04	3.38E-04	1.37E-03	AP-42[2]
Acetaldehyde		4.00E-05	3.14E-02	2.92E-02	2.64E-02	3.14E-02	1.27E-01	AP-42[2]
Acrolein		6.40E-06	5.03E-03	4.67E-03	4.22E-03	5.03E-03	2.03E-02	AP-42[2]
Benzene		1.20E-05	9.43E-03	8.75E-03	7.92E-03	9.43E-03	3.81E-02	AP-42[2]
Ethylbenzene		3.20E-05	2.51E-02	2.33E-02	2.11E-02	2.51E-02	1.02E-01	AP-42[2]
Formaldehyde		7.10E-05	5.58E-02	5.18E-02	4.69E-02	5.58E-02	2.25E-01	AP-42[2]
Naphthalene		1.30E-06	1.02E-03	9.48E-04	8.58E-04	1.02E-03	4.13E-03	AP-42[2]
PAH		2.20E-06	1.73E-03	1.60E-03	1.45E-03	1.73E-03	6.98E-03	AP-42[2]
Propylene Oxide		2.90E-05	2.28E-02	2.11E-02	1.91E-02	2.28E-02	9.21E-02	AP-42[2]
Toluene		1.30E-04	1.02E-01	9.48E-02	8.58E-02	1.02E-01	4.13E-01	AP-42[2]
Xylene		6.40E-05	5.03E-02	4.67E-02	4.22E-02	5.03E-02	2.03E-01	AP-42[2]

Exhaust Composition		Base Load, Temp. = -12°F		Base Load, Temp. = 45°F		Base Load, Temp. = 85°F	
Component	Mol. Wt.	Volume %	Weighted Mol Wt.	Volume %	Weighted Mol Wt.	Volume %	Weighted Mol Wt.
Argon	39.94	1.03	0.41	1.03	0.41	1.03	0.41
Nitrogen	28.02	77.34	21.67	76.82	21.52	76.61	21.47
Oxygen	32.00	12.08	3.87	12.22	3.91	12.37	3.96
Carbon Dioxide	44.01	3.32	1.46	3.23	1.42	3.17	1.40
Water	18.02	6.23	1.12	6.71	1.21	6.73	1.21
		100.0	28.5	100.0	28.5	99.9	28.4

Calculation of dry mass flow rate:	Base Load, Temp. = 0°F		Base Load, Temp. = 45°F		Base Load, Temp. = 80°F	
Mass flow of exhaust =	2.03E+06	lb/hr	1.93E+06	lb/hr	1.78E+06	lb/hr
Molar flow of exhaust = Mass flow of exhaust / Mol Wt =	71079.6	lb-mol/hr	67738.0	lb-mol/hr	62614.9	lb-mol/hr
Molar flow of water = Vol.% H_2O * Exhaust molar flow =	4428.3	lb-mol/hr	4545.2	lb-mol/hr	4214.0	lb-mol/hr
Molar Flow of O2= Vol.% O2 * Exhaust molar flow =	8586.4	lb-mol/hr	8277.6	lb-mol/hr	7745.5	lb-mol/hr
Molar flow of Exhaust, dry = Exhaust molar flow - H20 molar flow=	66651.4	lb-mol/hr	63192.8	lb-mol/hr	58400.9	lb-mol/hr
Vol .% O2, dry = O2 molar flow / Exhaust molar flow =	12.9%		13.1%		13.3%	
total exhaust flow, acfm	499,773		476,277		440,256	

[1] Criteria pollutant emission factors provided by the manufacturer, but in some cases have been adapted from natural gas combustion. The NOx emission factor is corrected to 15% O2.

[2] EPA AP-42, Volume I, Fifth Edition - April 2000, Table 3.1-3, Emission Factors for Hazardous Air Pollutants from Natural Gas-Fired Stationary Gas Turbines. Note: These emission factors are for natural gas combustion, which is expected to produce emissions of these pollutants that are greater than or equal to the emissions produced during fuel gas combustion, so these emission factors should provide worst case emission estimates.

[3] Mercury concentration in turbine exhaust gas is based on estimated mercury emission rates, as provided by the mercury guard bed manufacturer.

Additional notes:
All gas flow rates and compositions are based on information provided by GE. (Information provided by Paul Rood of SNC Lavalin via email on 12/17/07.)
Average VOC molecular weight assumed to be 46 lb-mol/lb.

Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
Auxillary Boiler Detail Sheet

Source ID Number	
Equipment Usage	Auxillary Boiler
Equipment Make	TBD
Equipment Model	TBD
Serial Number	TBD
Installation Date	TBD
Emission Controls	Low Nox Burner
Design Heat Rate	66.00 MMBtu/hr
Operating Hours	8760 hrs/yr
Natural Gas Rates	
Note: boiler will fire natural gas during cold start (760 hours); normally, it will operate at lower (25%) load and fire a lower-Btu fuel gas mixture (vent gas).	
Fuel Heating Value	1,020 Btu/scf
NG Potential Fuel Usage	0.0647 MMscf/hr

Potential Emissions (firing natural gas at 100% load)

Pollutant	Emission Factor		Estimated Emissions		Source of Emission Factor
	(lb/MMscf)	(lb/MMBtu)	(lb/hr)	(tpy)	
NOx	50.00	0.05	3.24	14.17	AP-42[1]
CO	84.00	0.08	5.44	23.81	AP-42[1]
VOC	5.50	5.4E-03	0.36	1.56	AP-42[2]
SO2	0.60	5.9E-04	0.04	0.17	AP-42[2]
PM10	7.60	7.5E-03	0.49	2.15	AP-42[2]
Benzene	2.1E-03	2.1E-06	1.36E-04	5.95E-04	AP-42[3]
Dichlorobenzene	1.2E-03	1.2E-06	7.76E-05	3.40E-04	AP-42[3]
Formaldehyde	7.5E-02	7.4E-05	4.85E-03	2.13E-02	AP-42[3]
Hexane	1.8E+00	1.8E-03	1.16E-01	5.10E-01	AP-42[3]
Naphthalene	6.1E-04	6.0E-07	3.95E-05	1.73E-04	AP-42[3]
Toluene	3.4E-03	3.3E-06	2.20E-04	9.64E-04	AP-42[3]

1. EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-1, Emission Factors for Nitrogen Oxides (NOx) and Carbon Monoxide (CO) from Natural Gas Combustion.
2. EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-2, Emission Factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion.
3. EPA AP-42, Volume I, Fifth Edition - July 1998, Table 1.4-3, Emission Factors for Speciated Organic Compounds from Natural Gas Combustion.

Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
Equipment Leaks Emission Summary

		Controlled Emissions		*Uncontrolled Emsisions*	
		SOCMI Factors		SOCMI Factors	
Process Stream	**Service Type**	**VOC Emissions (ton/yr)**	**HAP Emissions (ton/yr)**	**VOC Emissions (ton/yr)**	**HAP Emissions (ton/yr)**
Acid Gas	Gas	0.09	0.09	0.12	0.12
Flare KO Drum Drainage	Gas	4.50	1.45	6.70	2.16
Gasifier Vent	Gas	0.14	0.14	0.22	0.22
Gasoline (Gas)	Gas	9.30	3.00	12.38	3.99
Gasoline (Light Liquid)	Light Liquid	10.42	3.36	36.22	11.67
Gasoline (Heavy Liquid)	Heavy Liquid	0.17	0.05	0.26	0.09
LPG	Light Liquid	0.77	0.00	2.21	0.00
Methanol Gas	Gas	0.99	0.99	1.28	1.28
Methanol Pure Liquid	Light Liquid	0.47	0.47	1.44	1.44
Methanol Product (MeOH 1)	Light Liquid	5.94	5.93	14.90	14.86
Methanol Product (MeOH 2)	Light Liquid	0.06	0.06	0.54	0.54
Methanol Product (MeOH 3)	Light Liquid	0.06	0.06	0.54	0.54
Methanol Product (MeOH 5)	Gas	0.35	0.35	0.50	0.50
Mixed Fuel Gas	Gas	0.40	0.01	1.77	0.06
MTG Fuel Gas	Gas	3.88	0.04	5.44	0.06
Propylene	Gas	22.11	0.00	24.36	0.00
Total		**59.63**	**16.00**	**108.86**	**37.52**

	Controlled Emissions		*Uncontrolled Emsisions*	
	SOCMI Factors		SOCMI Factors	
Individual HAPs	**HAP Emissions (lb/hr)**	**HAP Emissions (ton/yr)**	**HAP Emissions (lb/hr)**	**HAP Emissions (ton/yr)**
Carbonyl Sulfide (COS)	0.05	0.23	0.08	0.35
Methanol (MeOH)	1.80	7.87	4.39	19.22
C6 - C10 Aromatics (Assumed to be Benzene)	1.80	7.90	4.10	17.96
Total	**3.65**	**16.00**	**8.57**	**37.52**

Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
Equipment Leaks HAP Emission Summary

Controlled Emissions (SOCMI Factors)

Process Stream	COS (lb/hr)	COS (ton/yr)	MeOH (lb/hr)	MeOH (ton/yr)	Benzene* (lb/hr)	Benzene* (ton/yr)
Acid Gas	1.96E-02	8.58E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Flare KO Drum Drainage	1.16E-03	5.10E-03	0.00E+00	0.00E+00	3.30E-01	1.45E+00
Gasifier Vent	3.26E-02	1.43E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Gasoline (Gas)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.84E-01	3.00E+00
Gasoline (Light Liquid)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.67E-01	3.36E+00
Gasoline (Heavy Liquid)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.22E-02	5.33E-02
LPG	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Methanol Gas	0.00E+00	0.00E+00	2.26E-01	9.90E-01	0.00E+00	0.00E+00
Methanol Pure Liquid	0.00E+00	0.00E+00	1.08E-01	4.74E-01	0.00E+00	0.00E+00
Methanol Product (MeOH 1)	0.00E+00	0.00E+00	1.35E+00	5.93E+00	0.00E+00	0.00E+00
Methanol Product (MeOH 2)	0.00E+00	0.00E+00	1.29E-02	5.64E-02	0.00E+00	0.00E+00
Methanol Product (MeOH 3)	0.00E+00	0.00E+00	1.28E-02	5.62E-02	0.00E+00	0.00E+00
Methanol Product (MeOH 5)	0.00E+00	0.00E+00	8.02E-02	3.51E-01	0.00E+00	0.00E+00
Mixed Fuel Gas	0.00E+00	0.00E+00	3.23E-03	1.42E-02	0.00E+00	0.00E+00
MTG Fuel Gas	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E-02	4.41E-02
Propylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total	**5.33E-02**	**2.34E-01**	**1.80E+00**	**7.87E+00**	**1.80E+00**	**7.90E+00**

* Benzene is assumed from emissions of C6-C10 aromatics.

Uncontrolled HAP Summary

Uncontrolled Emissions (SOCMI Factors)

Process Stream	COS (lb/hr)	COS (ton/yr)	MeOH (lb/hr)	MeOH (ton/yr)	Benzene* (lb/hr)	Benzene* (ton/yr)
Acid Gas	2.79E-02	1.22E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Flare KO Drum Drainage	1.73E-03	7.59E-03	0.00E+00	0.00E+00	4.92E-01	2.15E+00
Gasifier Vent	4.92E-02	2.15E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Gasoline (Gas)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.10E-01	3.99E+00
Gasoline (Light Liquid)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.66E+00	1.17E+01
Gasoline (Heavy Liquid)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.94E-02	8.51E-02
LPG	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Methanol Gas	0.00E+00	0.00E+00	2.92E-01	1.28E+00	0.00E+00	0.00E+00
Methanol Pure Liquid	0.00E+00	0.00E+00	3.28E-01	1.44E+00	0.00E+00	0.00E+00
Methanol Product (MeOH 1)	0.00E+00	0.00E+00	3.39E+00	1.49E+01	0.00E+00	0.00E+00
Methanol Product (MeOH 2)	0.00E+00	0.00E+00	1.23E-01	5.40E-01	0.00E+00	0.00E+00
Methanol Product (MeOH 3)	0.00E+00	0.00E+00	1.23E-01	5.38E-01	0.00E+00	0.00E+00
Methanol Product (MeOH 5)	0.00E+00	0.00E+00	1.15E-01	5.02E-01	0.00E+00	0.00E+00
Mixed Fuel Gas	0.00E+00	0.00E+00	1.44E-02	6.32E-02	0.00E+00	0.00E+00
MTG Fuel Gas	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-02	6.18E-02
Propylene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total	**7.88E-02**	**3.45E-01**	**4.39E+00**	**1.92E+01**	**4.10E+00**	**1.80E+01**

* Benzene is assumed from emissions of C6-C10 aromatics.

Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
Equipment Leaks
Pump LDAR Control Effectiveness Calculation

Leak detection and repair (LDAR) control effectiveness factors for valves and connectors are based on "HON reg neg" factors from *Protocol for Equipment Leak Emission Estimates* (Table G-1) [EPA-453/R-95-017]. These factors assume leak definitions of 500 ppmv for valves and connectors, which equate to the leak definitions expected to be used at MBFP. However, the HON reg neg leak definition for pumps in light liquid service is 1,000 ppmv, which is more stringent than the 2,000 ppmv leak definition planned for the LDAR program to be implemented at MBFP. Consequently, the LDAR control effectiveness factor for a 2,000 ppmv pump leak definition is calculated below. All table numbers refer to the *Protocol for Equipment Leak Emission Estimates* (*Protocol*).

Values Used in Pump LDAR Control Effectiveness Calculation

Source Type	SOCMI	
Equipment Type	Pumps in Light Liquid Service	
LDAR Program	Monthly monitoring with a leak definition of 2,000 ppmv for pumps	
Initial Leak Fraction (LKFRAC)	14.9%	
Occurrence Rate (OC)	7.0%	
Recurrence Rate (R) *	0.0%	* Similar to the calculations shown in the *Protocol* for the HON reg neg
Unsuccessful Repair Rate *	0.0%	LDAR control effectiveness calculations, the recurrence rate and unsuccessful
Successful Repair Rate (FR)	100.0%	repair rates are assumed to be zero. (Table G-3, footnote a)

Initial Leak Frequency

Table 5-4

$$ALR = (0.13 \times LKFRAC) + 6.7 \times 10^{-4}$$

Where: ALR = Average SOCMI leak rate (kg/hr/source)
$ALR_{initial}$ = 0.02 kg/hr/source (from Figure 5-3)

Solving for LKFRAC

$$LKFRAC = (0.02 - 6.7 \times 10^{-4})/0.13$$
$$LKFRAC = 0.149$$

Occurrence Rate

Table G-3

$$OC = 0.47 \times LKFRAC$$
$$OC = 0.47 \times 0.149$$
$$OC = 0.070$$

Steady-State Leak Frequency

Table 5-9

$$Y_i = Z_i - (FR \times Z_i) + (FR \times Z_i \times R)$$
$$Z_{i+1} = OC \times (1 - Y_i) + Yi$$

Where: Yi = Leak frequency immediately after LDAR monitoring
Zi = Leak frequency immediately before LDAR monitoring

Monitoring Cycle	Y_i Leak Frequency After Monitoring (%)	Z_i Leak Frequency Before Monitoring (%)
1	0.0%	14.9%
2	0.0%	7.0%
3	0.0%	7.0%
4	0.0%	7.0%
5	0.0%	7.0%
6	0.0%	7.0%
Steady-State Leak Frequency	3.5%	

Average of leak frequency before and after 6th monitoring cycl

Average Steady-State Leak Rate (based on 3.5% steady-state leak frequency)

$$ALR_{ss} = (0.13 \times LKFRAC) + 6.7 \times 10^{-4}$$
$$ALR_{ss} = (0.13 \times 0.035) + 6.7 \times 10^{-4}$$
$$ALR_{ss} = 0.00522 \text{ kg/hr/source}$$

Pump LDAR Control Effectiveness

$$CE = (ALR_{initial} - ALR_{ss}) / ALR_{initial} \times 100\%$$
$$CE = (0.02 - 0.00522)/0.02 \times 100\%$$
$$CE = 73.9\%$$

Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
Acid Gas Process Stream

Stream Name: Acid Gas
Service Type: Gas
Hours of Operation: 8760
This piping is included in the LDAR program.

Chemical Name	CAS Number	VOC	HAP	Molecular Weight (lb/lb-mol)	Weight %	Mole Fraction	Mole Percent	
CO	630-08-0	N	N	28.01	0.00%	0.00E+00	0.00%	
H2	1333-74-0	N	N	2.02	0.00%	0.00E+00	0.00%	
CO2	124-38-9	N	N	44.01	55.94%	1.27E-02	47.86%	
H2O	7732-18-5	N	N	18.02	3.37%	1.87E-03	7.05%	
CH4	74-82-8	N	N	16.04	0.00%	0.00E+00	0.00%	
Ar	7440-37-1	N	N	39.95	0.00%	0.00E+00	0.00%	
N2	7727-37-9	N	N	28.01	0.00%	0.00E+00	0.00%	
H2S	7783-06-4	N	N	34.08	40.16%	1.18E-02	44.37%	
COS	463-58-1	Y	Y	60.07	0.28%	4.68E-05	0.18%	
NH3	7664-41-7	N	N	17.03	0.25%	1.45E-04	0.55%	
O2	7782-44-7	N	N	32.00	0.00%	0.00E+00	0.00%	
SO2	7446-09-5	N	N	64.06	0.00%	0.00E+00	0.00%	
Cl2	7782-50-5	N	Y	70.91	0.00%	0.00E+00	0.00%	
HCl	7647-01-0	N	Y	36.46	0.00%	0.00E+00	0.00%	
MeOH	67-56-1	Y	Y	32.04	0.00%	0.00E+00	0.00%	
Ethanol	64-17-5	Y	N	46.07	0.00%	0.00E+00	0.00%	
Dimethyl Ether	115-10-6	Y	N	46.07	0.00%	0.00E+00	0.00%	
Methyl Acetate	79-20-9	Y	N	74.08	0.00%	0.00E+00	0.00%	
Propanol	71-23-8	Y	N	60.10	0.00%	0.00E+00	0.00%	
Butanol	71-36-3	Y	N	74.12	0.00%	0.00E+00	0.00%	
Acetone	67-64-1	Y	N	58.08	0.00%	0.00E+00	0.00%	
MEK	78-93-3	Y	N	72.11	0.00%	0.00E+00	0.00%	
Ethane	74-84-0	N	N	30.07	0.00%	0.00E+00	0.00%	
Ethylene	74-85-1	Y	N	28.05	0.00%	0.00E+00	0.00%	
Propane	74-98-6	Y	N	44.10	0.00%	0.00E+00	0.00%	
Propylene	115-07-1	Y	N	42.08	0.00%	0.00E+00	0.00%	
Isobutane	75-28-5	Y	N	58.12	0.00%	0.00E+00	0.00%	
N-Butane	106-97-8	Y	N	58.12	0.00%	0.00E+00	0.00%	
Butylene	25167-67-3	Y	N	56.11	0.00%	0.00E+00	0.00%	
Isopentane	78-78-4	Y	N	72.15	0.00%	0.00E+00	0.00%	
C4 - C12 Paraffins	N/A	Y	N	114.23	0.00%	0.00E+00	0.00%	Assumed Octane
C4 - C12 Olefins	N/A	Y	N	112.21	0.00%	0.00E+00	0.00%	Assumed Octene
C6 - C10 Naphthenes	N/A	Y	N	112.21	0.00%	0.00E+00	0.00%	Assumed Cyclooctane
C6 - C10 Aromatics	N/A	Y	Y	78.11	0.00%	0.00E+00	0.00%	Assumed Benzene
TOTALS					100.00%	2.66E-02	100.00%	

Weight % TOC	0.28%
Weight % VOC	0.28%
Weight % HAP	0.28%

Fugitive Emissions - SOCMI Factors

Equipment Type	SOCMI Emission Factor[1] (kg/hr-source)	% Control With LDAR [2,3]	Source Count	Controlled Emissions: TOC Emission Rate (kg/hr)	Controlled Emissions: VOC Emission Rate (kg/hr)	Hours of Operation	Controlled Emissions: VOC Emissions (tpy)	Uncontrolled Emissions: VOC Emissions (tpy)
Valves-Gas	0.00597	92.00%	204	0.0003	0.0003	8760	2.64E-03	3.30E-02
Valves-Light Liquids	0.00403	88.00%	0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Valves-Heavy Liquids	0.00023		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Pump Seals-Light Liquids	0.01990	73.90%	0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Pump Seals-Heavy Liquids	0.00862		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Compresssor Seals-Gas	0.22800		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Relief Valves-Gas/Vapor	0.10400		27	0.0079	0.0079	8760	7.62E-02	7.62E-02
Connectors	0.00183	93.00%	130	0.0000	0.0000	8760	4.52E-04	6.45E-03
Open-ended Lines	0.00170		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Sampling Connections	0.01500		16	0.0007	0.0007	8760	6.51E-03	6.51E-03
Totals				0.01	0.01		0.09	0.12

[1] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 2-1).
[2] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table G-1). Assumes monthly monitoring with leak definition of 500 ppmv for valves and connectors.
[3] Assumes monthly monitoring with leak definition of 2,000 ppmv for pumps in light liquid service. See Pump LDAR Control Effectiveness Calculation page.

HAP Emissions - SOCMI Factors

HAP	Individual HAP Weight %	VOC Weight %	Hours of Operation	Controlled Emissions: HAP Emissions (lb/hr)	Controlled Emissions: HAP Emissions (ton/yr)	Uncontrolled Emissions: HAP Emissions (lb/hr)	Uncontrolled Emissions: HAP Emissions (ton/yr)
COS	0.28%	0.28%	8760	1.96E-02	8.58E-02	2.79E-02	1.22E-01
Cl2	0.00%	0.28%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HCl	0.00%	0.28%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MeOH	0.00%	0.28%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C6 - C10 Aromatics	0.00%	0.28%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total				0.02	0.09	0.03	0.12

Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
Flare KO Drum Drainage Process Stream

Stream Name: Flare KO Drum Drainage
Service Type: Gas
Hours of Operation: 8760
This piping is included in the LDAR program.

Chemical Name	CAS Number	VOC	HAP	Molecular Weight (lb/lb-mol)	Weight %	Mole Fraction	Mole Percent	
CO	630-08-0	N	N	28.01	22.46%	8.02E-03	29.34%	
H2	1333-74-0	N	N	2.02	1.16%	5.77E-03	21.11%	
CO2	124-38-9	N	N	44.01	18.13%	4.12E-03	15.08%	
H2O	7732-18-5	N	N	18.02	7.50%	4.16E-03	15.23%	
CH4	74-82-8	N	N	16.04	0.03%	2.05E-05	0.07%	
Ar	7440-37-1	N	N	39.95	0.37%	9.29E-05	0.34%	
N2	7727-37-9	N	N	28.01	0.12%	4.25E-05	0.16%	
H2S	7783-06-4	N	N	34.08	0.16%	4.72E-05	0.17%	
COS	463-58-1	Y	Y	60.07	0.06%	9.44E-06	0.03%	
NH3	7664-41-7	N	N	17.03	0.01%	3.15E-06	0.01%	
O2	7782-44-7	N	N	32.00	0.00%	0.00E+00	0.00%	
SO2	7446-09-5	N	N	64.06	0.00%	0.00E+00	0.00%	
Cl2	7782-50-5	N	Y	70.91	0.00%	0.00E+00	0.00%	
HCl	7647-01-0	N	Y	36.46	0.00%	0.00E+00	0.00%	
MeOH	67-56-1	Y	Y	32.04	0.00%	0.00E+00	0.00%	
Ethanol	64-17-5	Y	N	46.07	0.00%	0.00E+00	0.00%	
Dimethyl Ether	115-10-6	Y	N	46.07	0.00%	0.00E+00	0.00%	
Methyl Acetate	79-20-9	Y	N	74.08	0.00%	0.00E+00	0.00%	
Propanol	71-23-8	Y	N	60.10	0.00%	0.00E+00	0.00%	
Butanol	71-36-3	Y	N	74.12	0.00%	0.00E+00	0.00%	
Acetone	67-64-1	Y	N	58.08	0.00%	0.00E+00	0.00%	
MEK	78-93-3	Y	N	72.11	0.00%	0.00E+00	0.00%	
Ethane	74-84-0	N	N	30.07	0.00%	0.00E+00	0.00%	
Ethylene	74-85-1	Y	N	28.05	0.00%	0.00E+00	0.00%	
Propane	74-98-6	Y	N	44.10	0.00%	0.00E+00	0.00%	
Propylene	115-07-1	Y	N	42.08	0.00%	0.00E+00	0.00%	
Isobutane	75-28-5	Y	N	58.12	0.00%	0.00E+00	0.00%	
N-Butane	106-97-8	Y	N	58.12	0.00%	0.00E+00	0.00%	
Butylene	25167-67-3	Y	N	56.11	0.00%	0.00E+00	0.00%	
Isopentane	78-78-4	Y	N	72.15	0.00%	0.00E+00	0.00%	
C4 - C12 Paraffins	N/A	Y	N	114.23	23.93%	2.09E-03	7.66%	Assumed Octane
C4 - C12 Olefins	N/A	Y	N	112.21	4.20%	3.74E-04	1.37%	Assumed Octene
C6 - C10 Naphthenes	N/A	Y	N	112.21	5.77%	5.14E-04	1.88%	Assumed Cyclooctane
C6 - C10 Aromatics	N/A	Y	Y	78.11	16.11%	2.06E-03	7.54%	Assumed Benzene
TOTALS					100.00%	2.73E-02	100.00%	

Weight % TOC	50.09%
Weight % VOC	50.06%
Weight % HAP	16.16%

Fugitive Emissions - SOCMI Factors				*Controlled Emissions*				*Uncontrolled Emissions*
Equipment Type	SOCMI Emission Factor[1] (kg/hr-source)	% Control With LDAR [2,3]	Source Count	TOC Emission Rate (kg/hr)	VOC Emission Rate (kg/hr)	Hours of Operation	VOC Emissions (tpy)	VOC Emissions (tpy)
Valves-Gas	0.00597	92.00%	68	0.0163	0.0163	8760	1.57E-01	1.96E+00
Valves-Light Liquids	0.00403	88.00%	0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Valves-Heavy Liquids	0.00023		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Pump Seals-Light Liquids	0.01990	73.90%	0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Pump Seals-Heavy Liquids	0.00862		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Compresssor Seals-Gas	0.22800		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Relief Valves-Gas/Vapor	0.10400		8	0.4167	0.4165	8760	4.02E+00	4.02E+00
Connectors	0.00183	93.00%	48	0.0031	0.0031	8760	2.97E-02	4.24E-01
Open-ended Lines	0.00170		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Sampling Connections	0.01500		4	0.0301	0.0300	8760	2.90E-01	2.90E-01
Totals				0.47	0.47		4.50	6.70

[1] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 2-1).
[2] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 5-2). Assumes monthly monitoring with leak definition of 10,000 ppmv.
[3] Assumes monthly monitoring with leak definition of 2,000 ppmv for pumps in light liquid service. See Pump LDAR Control Effectiveness Calculation page.

HAP Emissions - SOCMI Factors				*Controlled Emissions*		*Uncontrolled Emissions*	
HAP	Individual HAP Weight %	VOC Weight %	Hours of Operation	HAP Emissions (lb/hr)	HAP Emissions (ton/yr)	HAP Emissions (lb/hr)	HAP Emissions (ton/yr)
COS	0.06%	50.06%	8760	1.16E-03	5.10E-03	1.73E-03	7.59E-03
Cl2	0.00%	50.06%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HCl	0.00%	50.06%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MeOH	0.00%	50.06%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C6 - C10 Aromatics	16.11%	50.06%	8760	3.30E-01	1.45E+00	4.92E-01	2.15E+00
Total				0.33	1.45	0.49	2.16

Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
Gasifier Vent Process Stream

Stream Name: Gasifier Vent
Service Type: Gas
Hours of Operation: 8760
This piping is included in the LDAR program.

Chemical Name	CAS Number	VOC	HAP	Molecular Weight (lb/lb-mol)	Weight %	Mole Fraction	Mole Percent	
CO	630-08-0	N	N	28.01	44.91%	1.60E-02	35.98%	
H2	1333-74-0	N	N	2.02	2.33%	1.15E-02	25.89%	
CO2	124-38-9	N	N	44.01	36.27%	8.24E-03	18.49%	
H2O	7732-18-5	N	N	18.02	15.00%	8.33E-03	18.68%	
CH4	74-82-8	N	N	16.04	0.07%	4.09E-05	0.09%	
Ar	7440-37-1	N	N	39.95	0.74%	1.86E-04	0.42%	
N2	7727-37-9	N	N	28.01	0.24%	8.50E-05	0.19%	
H2S	7783-06-4	N	N	34.08	0.32%	9.45E-05	0.21%	
COS	463-58-1	Y	Y	60.07	0.11%	1.89E-05	0.04%	
NH3	7664-41-7	N	N	17.03	0.01%	6.30E-06	0.01%	
O2	7782-44-7	N	N	32.00	0.00%	0.00E+00	0.00%	
SO2	7446-09-5	N	N	64.06	0.00%	0.00E+00	0.00%	
Cl2	7782-50-5	N	Y	70.91	0.00%	0.00E+00	0.00%	
HCl	7647-01-0	N	Y	36.46	0.00%	0.00E+00	0.00%	
MeOH	67-56-1	Y	Y	32.04	0.00%	0.00E+00	0.00%	
Ethanol	64-17-5	Y	N	46.07	0.00%	0.00E+00	0.00%	
Dimethyl Ether	115-10-6	Y	N	46.07	0.00%	0.00E+00	0.00%	
Methyl Acetate	79-20-9	Y	N	74.08	0.00%	0.00E+00	0.00%	
Propanol	71-23-8	Y	N	60.10	0.00%	0.00E+00	0.00%	
Butanol	71-36-3	Y	N	74.12	0.00%	0.00E+00	0.00%	
Acetone	67-64-1	Y	N	58.08	0.00%	0.00E+00	0.00%	
MEK	78-93-3	Y	N	72.11	0.00%	0.00E+00	0.00%	
Ethane	74-84-0	N	N	30.07	0.00%	0.00E+00	0.00%	
Ethylene	74-85-1	Y	N	28.05	0.00%	0.00E+00	0.00%	
Propane	74-98-6	Y	N	44.10	0.00%	0.00E+00	0.00%	
Propylene	115-07-1	Y	N	42.08	0.00%	0.00E+00	0.00%	
Isobutane	75-28-5	Y	N	58.12	0.00%	0.00E+00	0.00%	
N-Butane	106-97-8	Y	N	58.12	0.00%	0.00E+00	0.00%	
Butylene	25167-67-3	Y	N	56.11	0.00%	0.00E+00	0.00%	
Isopentane	78-78-4	Y	N	72.15	0.00%	0.00E+00	0.00%	
C4 - C12 Paraffins	N/A	Y	N	114.23	0.00%	0.00E+00	0.00%	Assumed Octane
C4 - C12 Olefins	N/A	Y	N	112.21	0.00%	0.00E+00	0.00%	Assumed Octene
C6 - C10 Naphthenes	N/A	Y	N	112.21	0.00%	0.00E+00	0.00%	Assumed Cyclooctane
C6 - C10 Aromatics	N/A	Y	Y	78.11	0.00%	0.00E+00	0.00%	Assumed Benzene
TOTALS					100.00%	4.46E-02	100.00%	

Weight % TOC	0.18%
Weight % VOC	0.11%
Weight % HAP	0.11%

Fugitive Emissions - SOCMI Factors

Equipment Type	SOCMI Emission Factor[1] (kg/hr-source)	% Control With LDAR[2,3]	Source Count	Controlled Emissions: TOC Emission Rate (kg/hr)	Controlled Emissions: VOC Emission Rate (kg/hr)	Controlled Emissions: Hours of Operation	Controlled Emissions: VOC Emissions (tpy)	Uncontrolled Emissions: VOC Emissions (tpy)
Valves-Gas	0.00597	92.00%	957	0.0008	0.0005	8760	5.01E-03	6.26E-02
Valves-Light Liquids	0.00403	88.00%	0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Valves-Heavy Liquids	0.00023		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Pump Seals-Light Liquids	0.01990	73.90%	0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Pump Seals-Heavy Liquids	0.00862		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Compresssor Seals-Gas	0.22800		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Relief Valves-Gas/Vapor	0.10400		112	0.0209	0.0132	8760	1.28E-01	1.28E-01
Connectors	0.00183	93.00%	804	0.0002	0.0001	8760	1.13E-03	1.61E-02
Open-ended Lines	0.00170		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Sampling Connections	0.01500		55	0.0015	0.0009	8760	9.04E-03	9.04E-03
Totals				0.02	0.01		0.14	0.22

[1] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 2-1).
[2] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 5-2). Assumes monthly monitoring with leak definition of 10,000 ppmv.
[3] Assumes monthly monitoring with leak definition of 2,000 ppmv for pumps in light liquid service. See Pump LDAR Control Effectiveness Calculation page.

HAP Emissions - SOCMI Factors

HAP	Individual HAP Weight %	VOC Weight %	Hours of Operation	Controlled Emissions: HAP Emissions (lb/hr)	Controlled Emissions: HAP Emissions (ton/yr)	Uncontrolled Emissions: HAP Emissions (lb/hr)	Uncontrolled Emissions: HAP Emissions (ton/yr)
COS	0.11%	0.11%	8760	3.26E-02	1.43E-01	4.92E-02	2.15E-01
Cl2	0.00%	0.11%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HCl	0.00%	0.11%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MeOH	0.00%	0.11%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C6 - C10 Aromatics	0.00%	0.11%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total				0.03	0.14	0.05	0.22

Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
Gasoline (Gas) Process Stream

Stream Name: Gasoline (Gas)
Service Type: Gas
Hours of Operation: 8760
This piping is included in the LDAR program.

Chemical Name	CAS Number	VOC	HAP	Molecular Weight (lb/lb-mol)	Weight %	Mole Fraction	Mole Percent	
CO	630-08-0	N	N	28.01	0.00%	0.00E+00	0.00%	
H2	1333-74-0	N	N	2.02	0.00%	0.00E+00	0.00%	
CO2	124-38-9	N	N	44.01	0.00%	0.00E+00	0.00%	
H2O	7732-18-5	N	N	18.02	0.00%	0.00E+00	0.00%	
CH4	74-82-8	N	N	16.04	0.00%	0.00E+00	0.00%	
Ar	7440-37-1	N	N	39.95	0.00%	0.00E+00	0.00%	
N2	7727-37-9	N	N	28.01	0.00%	0.00E+00	0.00%	
H2S	7783-06-4	N	N	34.08	0.00%	0.00E+00	0.00%	
COS	463-58-1	Y	Y	60.07	0.00%	0.00E+00	0.00%	
NH3	7664-41-7	N	N	17.03	0.00%	0.00E+00	0.00%	
O2	7782-44-7	N	N	32.00	0.00%	0.00E+00	0.00%	
SO2	7446-09-5	N	N	64.06	0.00%	0.00E+00	0.00%	
Cl2	7782-50-5	N	Y	70.91	0.00%	0.00E+00	0.00%	
HCl	7647-01-0	N	Y	36.46	0.00%	0.00E+00	0.00%	
MeOH	67-56-1	Y	Y	32.04	0.00%	0.00E+00	0.00%	
Ethanol	64-17-5	Y	N	46.07	0.00%	0.00E+00	0.00%	
Dimethyl Ether	115-10-6	Y	N	46.07	0.00%	0.00E+00	0.00%	
Methyl Acetate	79-20-9	Y	N	74.08	0.00%	0.00E+00	0.00%	
Propanol	71-23-8	Y	N	60.10	0.00%	0.00E+00	0.00%	
Butanol	71-36-3	Y	N	74.12	0.00%	0.00E+00	0.00%	
Acetone	67-64-1	Y	N	58.08	0.00%	0.00E+00	0.00%	
MEK	78-93-3	Y	N	72.11	0.00%	0.00E+00	0.00%	
Ethane	74-84-0	N	N	30.07	0.00%	0.00E+00	0.00%	
Ethylene	74-85-1	Y	N	28.05	0.00%	0.00E+00	0.00%	
Propane	74-98-6	Y	N	44.10	0.00%	0.00E+00	0.00%	
Propylene	115-07-1	Y	N	42.08	0.00%	0.00E+00	0.00%	
Isobutane	75-28-5	Y	N	58.12	0.00%	0.00E+00	0.00%	
N-Butane	106-97-8	Y	N	58.12	0.00%	0.00E+00	0.00%	
Butylene	25167-67-3	Y	N	56.11	0.00%	0.00E+00	0.00%	
Isopentane	78-78-4	Y	N	72.15	0.00%	0.00E+00	0.00%	
C4 - C12 Parafins	N/A	Y	N	114.23	47.85%	4.19E-03	41.52%	Assumed Octane
C4 - C12 Olefins	N/A	Y	N	112.21	8.39%	7.48E-04	7.41%	Assumed Octene
C6 - C10 Naphthenes	N/A	Y	N	112.21	11.54%	1.03E-03	10.19%	Assumed Cyclooctane
C6 - C10 Aromatics	N/A	Y	Y	78.11	32.21%	4.12E-03	40.87%	Assumed Benzene
TOTALS					100.00%	1.01E-02	100.00%	

Weight % TOC	100.00%
Weight % VOC	100.00%
Weight % HAP	32.21%

Fugitive Emissions - SOCMI Factors				*Controlled Emissions*				*Uncontrolled Emissions*
Equipment Type	SOCMI Emission Factor[1] (kg/hr-source)	% Control With LDAR [2,3]	Source Count	TOC Emission Rate (kg/hr)	VOC Emission Rate (kg/hr)	Hours of Operation	VOC Emissions (tpy)	VOC Emissions (tpy)
Valves-Gas	0.00597	92.00%	50	0.0239	0.0239	8760	2.31E-01	2.88E+00
Valves-Light Liquids	0.00403	88.00%	0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Valves-Heavy Liquids	0.00023		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Pump Seals-Light Liquids	0.01990	73.90%	0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Pump Seals-Heavy Liquids	0.00862		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Compresssor Seals-Gas	0.22800		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Relief Valves-Gas/Vapor	0.10400		9	0.9360	0.9360	8760	9.04E+00	9.04E+00
Connectors	0.00183	93.00%	26	0.0033	0.0033	8760	3.22E-02	4.59E-01
Open-ended Lines	0.00170		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Sampling Connections	0.01500		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Totals				0.96	0.96		9.30	12.38

[1] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 2-1).
[2] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 5-2). Assumes monthly monitoring with leak definition of 10,000 ppmv.
[3] Assumes monthly monitoring with leak definition of 2,000 ppmv for pumps in light liquid service. See Pump LDAR Control Effectiveness Calculation page.

HAP Emissions - SOCMI Factors				*Controlled Emissions*		*Uncontrolled Emissions*	
HAP	Individual HAP Weight %	VOC Weight %	Hours of Operation	HAP Emissions (lb/hr)	HAP Emissions (ton/yr)	HAP Emissions (lb/hr)	HAP Emissions (ton/yr)
COS	0.00%	100.00%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cl2	0.00%	100.00%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HCl	0.00%	100.00%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MeOH	0.00%	100.00%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C6 - C10 Aromatics	32.21%	100.00%	8760	6.84E-01	3.00E+00	9.10E-01	3.99E+00
Total				0.68	3.00	0.91	3.99

Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
Gasoline (Light Liquid) Process Stream

Stream Name: Gasoline (Light Liquid)
Service Type: Light Liquid
Hours of Operation: 8760
This piping is included in the LDAR program.

Chemical Name	CAS Number	VOC	HAP	Molecular Weight (lb/lb-mol)	Weight %	Mole Fraction	Mole Percent	
CO	630-08-0	N	N	28.01	0.00%	0.00E+00	0.00%	
H2	1333-74-0	N	N	2.02	0.00%	0.00E+00	0.00%	
CO2	124-38-9	N	N	44.01	0.00%	0.00E+00	0.00%	
H2O	7732-18-5	N	N	18.02	0.00%	0.00E+00	0.00%	
CH4	74-82-8	N	N	16.04	0.00%	0.00E+00	0.00%	
Ar	7440-37-1	N	N	39.95	0.00%	0.00E+00	0.00%	
N2	7727-37-9	N	N	28.01	0.00%	0.00E+00	0.00%	
H2S	7783-06-4	N	N	34.08	0.00%	0.00E+00	0.00%	
COS	463-58-1	Y	Y	60.07	0.00%	0.00E+00	0.00%	
NH3	7664-41-7	N	N	17.03	0.00%	0.00E+00	0.00%	
O2	7782-44-7	N	N	32.00	0.00%	0.00E+00	0.00%	
SO2	7446-09-5	N	N	64.06	0.00%	0.00E+00	0.00%	
Cl2	7782-50-5	N	Y	70.91	0.00%	0.00E+00	0.00%	
HCl	7647-01-0	N	Y	36.46	0.00%	0.00E+00	0.00%	
MeOH	67-56-1	Y	Y	32.04	0.00%	0.00E+00	0.00%	
Ethanol	64-17-5	Y	N	46.07	0.00%	0.00E+00	0.00%	
Dimethyl Ether	115-10-6	Y	N	46.07	0.00%	0.00E+00	0.00%	
Methyl Acetate	79-20-9	Y	N	74.08	0.00%	0.00E+00	0.00%	
Propanol	71-23-8	Y	N	60.10	0.00%	0.00E+00	0.00%	
Butanol	71-36-3	Y	N	74.12	0.00%	0.00E+00	0.00%	
Acetone	67-64-1	Y	N	58.08	0.00%	0.00E+00	0.00%	
MEK	78-93-3	Y	N	72.11	0.00%	0.00E+00	0.00%	
Ethane	74-84-0	N	N	30.07	0.00%	0.00E+00	0.00%	
Ethylene	74-85-1	Y	N	28.05	0.00%	0.00E+00	0.00%	
Propane	74-98-6	Y	N	44.10	0.00%	0.00E+00	0.00%	
Propylene	115-07-1	Y	N	42.08	0.00%	0.00E+00	0.00%	
Isobutane	75-28-5	Y	N	58.12	0.00%	0.00E+00	0.00%	
N-Butane	106-97-8	Y	N	58.12	0.00%	0.00E+00	0.00%	
Butylene	25167-67-3	Y	N	56.11	0.00%	0.00E+00	0.00%	
Isopentane	78-78-4	Y	N	72.15	0.00%	0.00E+00	0.00%	
C4 - C12 Paraffins	N/A	Y	N	114.23	47.85%	4.19E-03	41.52%	Assumed Octane
C4 - C12 Olefins	N/A	Y	N	112.21	8.39%	7.48E-04	7.41%	Assumed Octene
C6 - C10 Naphthenes	N/A	Y	N	112.21	11.54%	1.03E-03	10.19%	Assumed Cyclooctane
C6 - C10 Aromatics	N/A	Y	Y	78.11	32.21%	4.12E-03	40.87%	Assumed Benzene
TOTALS					100.00%	1.01E-02	100.00%	

Weight % TOC	100.00%
Weight % VOC	100.00%
Weight % HAP	32.21%

Fugitive Emissions - SOCMI Factors

Equipment Type	SOCMI Emission Factor[1] (kg/hr-source)	% Control With LDAR [2,3]	Source Count	Controlled Emissions: TOC Emission Rate (kg/hr)	Controlled Emissions: VOC Emission Rate (kg/hr)	Controlled Emissions: Hours of Operation	Controlled Emissions: VOC Emissions (tpy)	Uncontrolled Emissions: VOC Emissions (tpy)
Valves-Gas	0.00597	92.00%	0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Valves-Light Liquids	0.00403	88.00%	487	0.2355	0.2355	8760	2.27E+00	1.89E+01
Valves-Heavy Liquids	0.00023		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Pump Seals-Light Liquids	0.01990	73.90%	24	0.1247	0.1247	8760	1.20E+00	4.61E+00
Pump Seals-Heavy Liquids	0.00862		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Compresssor Seals-Gas	0.22800		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Relief Valves-Gas/Vapor	0.10400		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Connectors	0.00183	93.00%	348	0.0446	0.0446	8760	4.30E-01	6.15E+00
Open-ended Lines	0.00170		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Sampling Connections	0.01500		45	0.6750	0.6750	8760	6.52E+00	6.52E+00
Totals				1.08	1.08		10.42	36.22

[1] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 2-1).
[2] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 5-2). Assumes monthly monitoring with leak definition of 10,000 ppmv.
[3] Assumes monthly monitoring with leak definition of 2,000 ppmv for pumps in light liquid service. See Pump LDAR Control Effectiveness Calculation page.

HAP Emissions - SOCMI Factors

HAP	Individual HAP Weight %	VOC Weight %	Hours of Operation	Controlled Emissions: HAP Emissions (lb/hr)	Controlled Emissions: HAP Emissions (ton/yr)	Uncontrolled Emissions: HAP Emissions (lb/hr)	Uncontrolled Emissions: HAP Emissions (ton/yr)
COS	0.00%	100.00%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cl2	0.00%	100.00%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HCl	0.00%	100.00%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MeOH	0.00%	100.00%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C6 - C10 Aromatics	32.21%	100.00%	8760	7.67E-01	3.36E+00	2.66E+00	1.17E+01
Total				0.77	3.36	2.66	11.67

Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
Gasoline (Heavy Liquid) Process Stream

Stream Name: Gasoline (Heavy Liquid)
Service Type: Heavy Liquid
Hours of Operation: 8760
This piping is included in the LDAR program.

Chemical Name	CAS Number	VOC	HAP	Molecular Weight (lb/lb-mol)	Weight %	Mole Fraction	Mole Percent	
CO	630-08-0	N	N	28.01	0.00%	0.00E+00	0.00%	
H2	1333-74-0	N	N	2.02	0.00%	0.00E+00	0.00%	
CO2	124-38-9	N	N	44.01	0.00%	0.00E+00	0.00%	
H2O	7732-18-5	N	N	18.02	0.00%	0.00E+00	0.00%	
CH4	74-82-8	N	N	16.04	0.00%	0.00E+00	0.00%	
Ar	7440-37-1	N	N	39.95	0.00%	0.00E+00	0.00%	
N2	7727-37-9	N	N	28.01	0.00%	0.00E+00	0.00%	
H2S	7783-06-4	N	N	34.08	0.00%	0.00E+00	0.00%	
COS	463-58-1	Y	Y	60.07	0.00%	0.00E+00	0.00%	
NH3	7664-41-7	N	N	17.03	0.00%	0.00E+00	0.00%	
O2	7782-44-7	N	N	32.00	0.00%	0.00E+00	0.00%	
SO2	7446-09-5	N	N	64.06	0.00%	0.00E+00	0.00%	
Cl2	7782-50-5	N	Y	70.91	0.00%	0.00E+00	0.00%	
HCl	7647-01-0	N	Y	36.46	0.00%	0.00E+00	0.00%	
MeOH	67-56-1	Y	Y	32.04	0.00%	0.00E+00	0.00%	
Ethanol	64-17-5	Y	N	46.07	0.00%	0.00E+00	0.00%	
Dimethyl Ether	115-10-6	Y	N	46.07	0.00%	0.00E+00	0.00%	
Methyl Acetate	79-20-9	Y	N	74.08	0.00%	0.00E+00	0.00%	
Propanol	71-23-8	Y	N	60.10	0.00%	0.00E+00	0.00%	
Butanol	71-36-3	Y	N	74.12	0.00%	0.00E+00	0.00%	
Acetone	67-64-1	Y	N	58.08	0.00%	0.00E+00	0.00%	
MEK	78-93-3	Y	N	72.11	0.00%	0.00E+00	0.00%	
Ethane	74-84-0	N	N	30.07	0.00%	0.00E+00	0.00%	
Ethylene	74-85-1	Y	N	28.05	0.00%	0.00E+00	0.00%	
Propane	74-98-6	Y	N	44.10	0.00%	0.00E+00	0.00%	
Propylene	115-07-1	Y	N	42.08	0.00%	0.00E+00	0.00%	
Isobutane	75-28-5	Y	N	58.12	0.00%	0.00E+00	0.00%	
N-Butane	106-97-8	Y	N	58.12	0.00%	0.00E+00	0.00%	
Butylene	25167-67-3	Y	N	56.11	0.00%	0.00E+00	0.00%	
Isopentane	78-78-4	Y	N	72.15	0.00%	0.00E+00	0.00%	
C4 - C12 Parafins	N/A	Y	N	114.23	47.85%	4.19E-03	41.52%	Assumed Octane
C4 - C12 Olefins	N/A	Y	N	112.21	8.39%	7.48E-04	7.41%	Assumed Octene
C6 - C10 Naphthenes	N/A	Y	N	112.21	11.54%	1.03E-03	10.19%	Assumed Cyclooctane
C6 - C10 Aromatics	N/A	Y	Y	78.11	32.21%	4.12E-03	40.87%	Assumed Benzene
TOTALS					100.00%	1.01E-02	100.00%	

Weight % TOC	**100.00%**
Weight % VOC	**100.00%**
Weight % HAP	**32.21%**

Fugitive Emissions - SOCMI Factors				*Controlled Emissions*				*Uncontrolled Emissions*
Equipment Type	SOCMI Emission Factor[1] (kg/hr-source)	% Control With LDAR [2,3]	Source Count	TOC Emission Rate (kg/hr)	VOC Emission Rate (kg/hr)	Hours of Operation	VOC Emissions (tpy)	VOC Emissions (tpy)
Valves-Gas	0.00597	92.00%	0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Valves-Light Liquids	0.00403	88.00%	0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Valves-Heavy Liquids	0.00023		6	0.0014	0.0014	8760	1.33E-02	1.33E-02
Pump Seals-Light Liquids	0.01990	73.90%	0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Pump Seals-Heavy Liquids	0.00862		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Compresssor Seals-Gas	0.22800		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Relief Valves-Gas/Vapor	0.10400		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Connectors	0.00183	93.00%	6	0.0008	0.0008	8760	7.42E-03	1.06E-01
Open-ended Lines	0.00170		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Sampling Connections	0.01500		1	0.0150	0.0150	8760	1.45E-01	1.45E-01
Totals				0.02	0.02		0.17	0.26

[1] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 2-1).
[2] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 5-2). Assumes monthly monitoring with leak definition of 10,000 ppmv.
[3] Assumes monthly monitoring with leak definition of 2,000 ppmv for pumps in light liquid service. See Pump LDAR Control Effectiveness Calculation page.

HAP Emissions - SOCMI Factors				*Controlled Emissions*		*Uncontrolled Emissions*	
HAP	Individual HAP Weight %	VOC Weight %	Hours of Operation	HAP Emissions (lb/hr)	HAP Emissions (ton/yr)	HAP Emissions (lb/hr)	HAP Emissions (ton/yr)
COS	0.00%	100.00%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cl2	0.00%	100.00%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HCl	0.00%	100.00%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MeOH	0.00%	100.00%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C6 - C10 Aromatics	32.21%	100.00%	8760	1.22E-02	5.33E-02	1.94E-02	8.51E-02
Total				0.01	0.05	0.02	0.09

Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
LPG Process Stream

Stream Name: LPG
Service Type: Light Liquid
Hours of Operation: 8760
This piping is included in the LDAR program.

Chemical Name	CAS Number	VOC	HAP	Molecular Weight (lb/lb-mol)	Weight %	Mole Fraction	Mole Percent	
CO	630-08-0	N	N	28.01	8.34%	2.98E-03	13.04%	
H2	1333-74-0	N	N	2.02	0.00%	0.00E+00	0.00%	
CO2	124-38-9	N	N	44.01	0.00%	0.00E+00	0.00%	
H2O	7732-18-5	N	N	18.02	0.00%	0.00E+00	0.00%	
CH4	74-82-8	N	N	16.04	0.00%	0.00E+00	0.00%	
Ar	7440-37-1	N	N	39.95	0.00%	0.00E+00	0.00%	
N2	7727-37-9	N	N	28.01	0.00%	0.00E+00	0.00%	
H2S	7783-06-4	N	N	34.08	0.00%	0.00E+00	0.00%	
COS	463-58-1	Y	Y	60.07	0.00%	0.00E+00	0.00%	
NH3	7664-41-7	N	N	17.03	0.00%	0.00E+00	0.00%	
O2	7782-44-7	N	N	32.00	0.00%	0.00E+00	0.00%	
SO2	7446-09-5	N	N	64.06	0.00%	0.00E+00	0.00%	
Cl2	7782-50-5	N	Y	70.91	0.00%	0.00E+00	0.00%	
HCl	7647-01-0	N	Y	36.46	0.00%	0.00E+00	0.00%	
MeOH	67-56-1	Y	Y	32.04	0.00%	0.00E+00	0.00%	
Ethanol	64-17-5	Y	N	46.07	0.00%	0.00E+00	0.00%	
Dimethyl Ether	115-10-6	Y	N	46.07	0.00%	0.00E+00	0.00%	
Methyl Acetate	79-20-9	Y	N	74.08	0.00%	0.00E+00	0.00%	
Propanol	71-23-8	Y	N	60.10	0.00%	0.00E+00	0.00%	
Butanol	71-36-3	Y	N	74.12	0.00%	0.00E+00	0.00%	
Acetone	67-64-1	Y	N	58.08	0.00%	0.00E+00	0.00%	
MEK	78-93-3	Y	N	72.11	3.60%	5.00E-04	2.19%	
Ethane	74-84-0	N	N	30.07	0.00%	0.00E+00	0.00%	
Ethylene	74-85-1	Y	N	28.05	21.86%	7.79E-03	34.13%	
Propane	74-98-6	Y	N	44.10	0.00%	0.00E+00	0.00%	
Propylene	115-07-1	Y	N	42.08	0.00%	0.00E+00	0.00%	
Isobutane	75-28-5	Y	N	58.12	37.82%	6.51E-03	28.49%	
N-Butane	106-97-8	Y	N	58.12	0.00%	0.00E+00	0.00%	
Butylene	25167-67-3	Y	N	56.11	28.38%	5.06E-03	22.15%	
Isopentane	78-78-4	Y	N	72.15	0.00%	0.00E+00	0.00%	
C4 - C12 Paraffins	N/A	Y	N	114.23	0.00%	0.00E+00	0.00%	Assumed Octane
C4 - C12 Olefins	N/A	Y	N	112.21	0.00%	0.00E+00	0.00%	Assumed Octene
C6 - C10 Naphthenes	N/A	Y	N	112.21	0.00%	0.00E+00	0.00%	Assumed Cyclooctane
C6 - C10 Aromatics	N/A	Y	Y	78.11	0.00%	0.00E+00	0.00%	Assumed Benzene
TOTALS					100.00%	2.28E-02	100.00%	

Weight % TOC	91.66%
Weight % VOC	91.66%
Weight % HAP	0.00%

Fugitive Emissions - SOCMI Factors

Equipment Type	SOCMI Emission Factor[1] (kg/hr-source)	% Control With LDAR [2,3]	Source Count	Controlled Emissions: TOC Emission Rate (kg/hr)	Controlled Emissions: VOC Emission Rate (kg/hr)	Controlled Emissions: Hours of Operation	Controlled Emissions: VOC Emissions (tpy)	Uncontrolled Emissions: VOC Emissions (tpy)
Valves-Gas	0.00597	92.00%	0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Valves-Light Liquids	0.00403	88.00%	28	0.0124	0.0124	8760	1.20E-01	9.98E-01
Valves-Heavy Liquids	0.00023		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Pump Seals-Light Liquids	0.01990	73.90%	2	0.0095	0.0095	8760	9.19E-02	3.52E-01
Pump Seals-Heavy Liquids	0.00862		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Compresssor Seals-Gas	0.22800		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Relief Valves-Gas/Vapor	0.10400		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Connectors	0.00183	93.00%	20	0.0023	0.0023	8760	2.27E-02	3.24E-01
Open-ended Lines	0.00170		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Sampling Connections	0.01500		4	0.0550	0.0550	8760	5.31E-01	5.31E-01
Totals				0.08	0.08		0.77	2.21

[1] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 2-1).
[2] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 5-2). Assumes monthly monitoring with leak definition of 10,000 ppmv.
[3] Assumes monthly monitoring with leak definition of 2,000 ppmv for pumps in light liquid service. See Pump LDAR Control Effectiveness Calculation page.

HAP Emissions - SOCMI Factors

HAP	Individual HAP Weight %	VOC Weight %	Hours of Operation	Controlled Emissions: HAP Emissions (lb/hr)	Controlled Emissions: HAP Emissions (ton/yr)	Uncontrolled Emissions: HAP Emissions (lb/hr)	Uncontrolled Emissions: HAP Emissions (ton/yr)
COS	0.00%	91.66%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cl2	0.00%	91.66%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HCl	0.00%	91.66%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MeOH	0.00%	91.66%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C6 - C10 Aromatics	0.00%	91.66%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total				0.00	0.00	0.00	0.00

Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
Methanol Gas Process Stream

Stream Name: Methanol Gas
Service Type: Gas
Hours of Operation: 8760
This piping is included in the LDAR program.

Chemical Name	CAS Number	VOC	HAP	Molecular Weight (lb/lb-mol)	Weight %	Mole Fraction	Mole Percent	
CO	630-08-0	N	N	28.01	0.02%	6.44E-06	0.02%	
H2	1333-74-0	N	N	2.02	0.00%	3.19E-06	0.01%	
CO2	124-38-9	N	N	44.01	0.30%	6.92E-05	0.22%	
H2O	7732-18-5	N	N	18.02	3.16%	1.75E-03	5.49%	
CH4	74-82-8	N	N	16.04	0.03%	1.59E-05	0.05%	
Ar	7440-37-1	N	N	39.95	0.06%	1.61E-05	0.05%	
N2	7727-37-9	N	N	28.01	0.03%	1.14E-05	0.04%	
H2S	7783-06-4	N	N	34.08	0.00%	0.00E+00	0.00%	
COS	463-58-1	Y	Y	60.07	0.00%	0.00E+00	0.00%	
NH3	7664-41-7	N	N	17.03	0.00%	0.00E+00	0.00%	
O2	7782-44-7	N	N	32.00	0.00%	0.00E+00	0.00%	
SO2	7446-09-5	N	N	64.06	0.00%	0.00E+00	0.00%	
Cl2	7782-50-5	N	Y	70.91	0.00%	0.00E+00	0.00%	
HCl	7647-01-0	N	Y	36.46	0.00%	0.00E+00	0.00%	
MeOH	67-56-1	Y	Y	32.04	96.19%	3.00E-02	94.01%	
Ethanol	64-17-5	Y	N	46.07	0.05%	1.04E-05	0.03%	
Dimethyl Ether	115-10-6	Y	N	46.07	0.03%	7.31E-06	0.02%	
Methyl Acetate	79-20-9	Y	N	74.08	0.08%	1.10E-05	0.03%	
Propanol	71-23-8	Y	N	60.10	0.02%	4.00E-06	0.01%	
Butanol	71-36-3	Y	N	74.12	0.02%	2.60E-06	0.01%	
Acetone	67-64-1	Y	N	58.08	0.00%	3.31E-07	0.00%	
MEK	78-93-3	Y	N	72.11	0.00%	1.33E-07	0.00%	
Ethane	74-84-0	N	N	30.07	0.00%	0.00E+00	0.00%	
Ethylene	74-85-1	Y	N	28.05	0.00%	0.00E+00	0.00%	
Propane	74-98-6	Y	N	44.10	0.00%	0.00E+00	0.00%	
Propylene	115-07-1	Y	N	42.08	0.00%	0.00E+00	0.00%	
Isobutane	75-28-5	Y	N	58.12	0.00%	0.00E+00	0.00%	
N-Butane	106-97-8	Y	N	58.12	0.00%	0.00E+00	0.00%	
Butylene	25167-67-3	Y	N	56.11	0.00%	0.00E+00	0.00%	
Isopentane	78-78-4	Y	N	72.15	0.00%	0.00E+00	0.00%	
C4 - C12 Parafins	N/A	Y	N	114.23	0.00%	0.00E+00	0.00%	Assumed Octane
C4 - C12 Olefins	N/A	Y	N	112.21	0.00%	0.00E+00	0.00%	Assumed Octene
C6 - C10 Naphthenes	N/A	Y	N	112.21	0.00%	0.00E+00	0.00%	Assumed Cyclooctane
C6 - C10 Aromatics	N/A	Y	Y	78.11	0.00%	0.00E+00	0.00%	Assumed Benzene
TOTALS					100.00%	3.19E-02	100.00%	

Weight % TOC	96.42%
Weight % VOC	96.40%
Weight % HAP	96.19%

Fugitive Emissions - SOCMI Factors				*Controlled Emissions*				*Uncontrolled Emissions*
Equipment Type	SOCMI Emission Factor[1] (kg/hr-source)	% Control With LDAR [2,3]	Source Count	TOC Emission Rate (kg/hr)	VOC Emission Rate (kg/hr)	Hours of Operation	VOC Emissions (tpy)	VOC Emissions (tpy)
Valves-Gas	0.00597	92.00%	5	0.0023	0.0023	8760	2.22E-02	2.78E-01
Valves-Light Liquids	0.00403	88.00%	0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Valves-Heavy Liquids	0.00023		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Pump Seals-Light Liquids	0.01990	73.90%	0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Pump Seals-Heavy Liquids	0.00862		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Compresssor Seals-Gas	0.22800		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Relief Valves-Gas/Vapor	0.10400		1	0.1003	0.1003	8760	9.68E-01	9.68E-01
Connectors	0.00183	93.00%	2	0.0002	0.0002	8760	2.38E-03	3.41E-02
Open-ended Lines	0.00170		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Sampling Connections	0.01500		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Totals				0.10	0.10		0.99	1.28

[1] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 2-1).
[2] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 5-2). Assumes monthly monitoring with leak definition of 10,000 ppmv.
[3] Assumes monthly monitoring with leak definition of 2,000 ppmv for pumps in light liquid service. See Pump LDAR Control Effectiveness Calculation page.

HAP Emissions - SOCMI Factors				*Controlled Emissions*		*Uncontrolled Emissions*	
HAP	Individual HAP Weight %	VOC Weight %	Hours of Operation	HAP Emissions (lb/hr)	HAP Emissions (ton/yr)	HAP Emissions (lb/hr)	HAP Emissions (ton/yr)
COS	0.00%	96.40%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cl2	0.00%	96.40%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HCl	0.00%	96.40%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MeOH	96.19%	96.40%	8760	2.26E-01	9.90E-01	2.92E-01	1.28E+00
C6 - C10 Aromatics	0.00%	96.40%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total				0.23	0.99	0.29	1.28

Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
Methanol Pure Liquid Process Stream

Stream Name: Methanol Pure Liquid
Service Type: Light Liquid
Hours of Operation: 8760
This piping is included in the LDAR program.

Chemical Name	CAS Number	VOC	HAP	Molecular Weight (lb/lb-mol)	Weight %	Mole Fraction	Mole Percent	
CO	630-08-0	N	N	28.01	0.00%	0.00E+00	0.00%	
H2	1333-74-0	N	N	2.02	0.00%	0.00E+00	0.00%	
CO2	124-38-9	N	N	44.01	0.00%	0.00E+00	0.00%	
H2O	7732-18-5	N	N	18.02	0.00%	0.00E+00	0.00%	
CH4	74-82-8	N	N	16.04	0.00%	0.00E+00	0.00%	
Ar	7440-37-1	N	N	39.95	0.00%	0.00E+00	0.00%	
N2	7727-37-9	N	N	28.01	0.00%	0.00E+00	0.00%	
H2S	7783-06-4	N	N	34.08	0.00%	0.00E+00	0.00%	
COS	463-58-1	Y	Y	60.07	0.00%	0.00E+00	0.00%	
NH3	7664-41-7	N	N	17.03	0.00%	0.00E+00	0.00%	
O2	7782-44-7	N	N	32.00	0.00%	0.00E+00	0.00%	
SO2	7446-09-5	N	N	64.06	0.00%	0.00E+00	0.00%	
Cl2	7782-50-5	N	Y	70.91	0.00%	0.00E+00	0.00%	
HCl	7647-01-0	N	Y	36.46	0.00%	0.00E+00	0.00%	
MeOH	67-56-1	Y	Y	32.04	100.00%	3.12E-02	100.00%	
Ethanol	64-17-5	Y	N	46.07	0.00%	0.00E+00	0.00%	
Dimethyl Ether	115-10-6	Y	N	46.07	0.00%	0.00E+00	0.00%	
Methyl Acetate	79-20-9	Y	N	74.08	0.00%	0.00E+00	0.00%	
Propanol	71-23-8	Y	N	60.10	0.00%	0.00E+00	0.00%	
Butanol	71-36-3	Y	N	74.12	0.00%	0.00E+00	0.00%	
Acetone	67-64-1	Y	N	58.08	0.00%	0.00E+00	0.00%	
MEK	78-93-3	Y	N	72.11	0.00%	0.00E+00	0.00%	
Ethane	74-84-0	N	N	30.07	0.00%	0.00E+00	0.00%	
Ethylene	74-85-1	Y	N	28.05	0.00%	0.00E+00	0.00%	
Propane	74-98-6	Y	N	44.10	0.00%	0.00E+00	0.00%	
Propylene	115-07-1	Y	N	42.08	0.00%	0.00E+00	0.00%	
Isobutane	75-28-5	Y	N	58.12	0.00%	0.00E+00	0.00%	
N-Butane	106-97-8	Y	N	58.12	0.00%	0.00E+00	0.00%	
Butylene	25167-67-3	Y	N	56.11	0.00%	0.00E+00	0.00%	
Isopentane	78-78-4	Y	N	72.15	0.00%	0.00E+00	0.00%	
C4 - C12 Paraffins	N/A	Y	N	114.23	0.00%	0.00E+00	0.00%	Assumed Octane
C4 - C12 Olefins	N/A	Y	N	112.21	0.00%	0.00E+00	0.00%	Assumed Octene
C6 - C10 Naphthenes	N/A	Y	N	112.21	0.00%	0.00E+00	0.00%	Assumed Cyclooctane
C6 - C10 Aromatics	N/A	Y	Y	78.11	0.00%	0.00E+00	0.00%	Assumed Benzene
TOTALS					100.00%	3.12E-02	100.00%	

Weight % TOC	100.00%
Weight % VOC	100.00%
Weight % HAP	100.00%

Fugitive Emissions - SOCMI Factors				*Controlled Emissions*				*Uncontrolled Emissions*
Equipment Type	SOCMI Emission Factor[1] (kg/hr-source)	% Control With LDAR [2,3]	Source Count	TOC Emission Rate (kg/hr)	VOC Emission Rate (kg/hr)	Hours of Operation	VOC Emissions (tpy)	VOC Emissions (tpy)
Valves-Gas	0.00597	92.00%	0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Valves-Light Liquids	0.00403	88.00%	16	0.0077	0.0077	8760	7.47E-02	6.22E-01
Valves-Heavy Liquids	0.00023		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Pump Seals-Light Liquids	0.01990	73.90%	2	0.0104	0.0104	8760	1.00E-01	3.84E-01
Pump Seals-Heavy Liquids	0.00862		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Compresssor Seals-Gas	0.22800		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Relief Valves-Gas/Vapor	0.10400		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Connectors	0.00183	93.00%	8	0.0010	0.0010	8760	9.89E-03	1.41E-01
Open-ended Lines	0.00170		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Sampling Connections	0.01500		2	0.0300	0.0300	8760	2.90E-01	2.90E-01
Totals				0.05	0.05		0.47	1.44

[1] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 2-1).
[2] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 5-2). Assumes monthly monitoring with leak definition of 10,000 ppmv.
[3] Assumes monthly monitoring with leak definition of 2,000 ppmv for pumps in light liquid service. See Pump LDAR Control Effectiveness Calculation page.

HAP Emissions - SOCMI Factors				*Controlled Emissions*		*Uncontrolled Emissions*	
HAP	Individual HAP Weight %	VOC Weight %	Hours of Operation	HAP Emissions (lb/hr)	HAP Emissions (ton/yr)	HAP Emissions (lb/hr)	HAP Emissions (ton/yr)
COS	0.00%	100.00%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cl2	0.00%	100.00%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HCl	0.00%	100.00%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MeOH	100.00%	100.00%	8760	1.08E-01	4.74E-01	3.28E-01	1.44E+00
C6 - C10 Aromatics	0.00%	100.00%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total				0.11	0.47	0.33	1.44

Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
Methanol Product (MeOH 1) Process Stream

Stream Name: Methanol Product (MeOH 1)
Service Type: Light Liquid
Hours of Operation: 8760
This piping is included in the LDAR program.

Chemical Name	CAS Number	VOC	HAP	Molecular Weight (lb/lb-mol)	Weight %	Mole Fraction	Mole Percent	
CO	630-08-0	N	N	28.01	0.02%	6.44E-06	0.02%	
H2	1333-74-0	N	N	2.02	0.00%	3.19E-06	0.01%	
CO2	124-38-9	N	N	44.01	0.30%	6.92E-05	0.22%	
H2O	7732-18-5	N	N	18.02	3.16%	1.75E-03	5.49%	
CH4	74-82-8	N	N	16.04	0.03%	1.59E-05	0.05%	
Ar	7440-37-1	N	N	39.95	0.06%	1.61E-05	0.05%	
N2	7727-37-9	N	N	28.01	0.03%	1.14E-05	0.04%	
H2S	7783-06-4	N	N	34.08	0.00%	0.00E+00	0.00%	
COS	463-58-1	Y	Y	60.07	0.00%	0.00E+00	0.00%	
NH3	7664-41-7	N	N	17.03	0.00%	0.00E+00	0.00%	
O2	7782-44-7	N	N	32.00	0.00%	0.00E+00	0.00%	
SO2	7446-09-5	N	N	64.06	0.00%	0.00E+00	0.00%	
Cl2	7782-50-5	N	Y	70.91	0.00%	0.00E+00	0.00%	
HCl	7647-01-0	N	Y	36.46	0.00%	0.00E+00	0.00%	
MeOH	67-56-1	Y	Y	32.04	96.19%	3.00E-02	94.01%	
Ethanol	64-17-5	Y	N	46.07	0.05%	1.04E-05	0.03%	
Dimethyl Ether	115-10-6	Y	N	46.07	0.03%	7.31E-06	0.02%	
Methyl Acetate	79-20-9	Y	N	74.08	0.08%	1.10E-05	0.03%	
Propanol	71-23-8	Y	N	60.10	0.02%	4.00E-06	0.01%	
Butanol	71-36-3	Y	N	74.12	0.02%	2.60E-06	0.01%	
Acetone	67-64-1	Y	N	58.08	0.00%	3.31E-07	0.00%	
MEK	78-93-3	Y	N	72.11	0.00%	1.33E-07	0.00%	
Ethane	74-84-0	N	N	30.07	0.00%	0.00E+00	0.00%	
Ethylene	74-85-1	Y	N	28.05	0.00%	0.00E+00	0.00%	
Propane	74-98-6	Y	N	44.10	0.00%	0.00E+00	0.00%	
Propylene	115-07-1	Y	N	42.08	0.00%	0.00E+00	0.00%	
Isobutane	75-28-5	Y	N	58.12	0.00%	0.00E+00	0.00%	
N-Butane	106-97-8	Y	N	58.12	0.00%	0.00E+00	0.00%	
Butylene	25167-67-3	Y	N	56.11	0.00%	0.00E+00	0.00%	
Isopentane	78-78-4	Y	N	72.15	0.00%	0.00E+00	0.00%	
C4 - C12 Paraffins	N/A	Y	N	114.23	0.00%	0.00E+00	0.00%	Assumed Octane
C4 - C12 Olefins	N/A	Y	N	112.21	0.00%	0.00E+00	0.00%	Assumed Octene
C6 - C10 Naphthenes	N/A	Y	N	112.21	0.00%	0.00E+00	0.00%	Assumed Cyclooctane
C6 - C10 Aromatics	N/A	Y	Y	78.11	0.00%	0.00E+00	0.00%	Assumed Benzene
TOTALS					100.00%	3.19E-02	100.00%	

Weight % TOC	96.42%
Weight % VOC	96.40%
Weight % HAP	96.19%

Fugitive Emissions - SOCMI Factors

Equipment Type	SOCMI Emission Factor[1] (kg/hr-source)	% Control With LDAR [2,3]	Source Count	*Controlled Emissions* TOC Emission Rate (kg/hr)	VOC Emission Rate (kg/hr)	Hours of Operation	VOC Emissions (tpy)	*Uncontrolled Emissions* VOC Emissions (tpy)
Valves-Gas	0.00597	92.00%	0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Valves-Light Liquids	0.00403	88.00%	134	0.0625	0.0625	8760	6.03E-01	5.03E+00
Valves-Heavy Liquids	0.00023		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Pump Seals-Light Liquids	0.01990	73.90%	22	0.1102	0.1101	8760	1.06E+00	4.07E+00
Pump Seals-Heavy Liquids	0.00862		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Compresssor Seals-Gas	0.22800		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Relief Valves-Gas/Vapor	0.10400		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Connectors	0.00183	93.00%	96	0.0119	0.0119	8760	1.14E-01	1.63E+00
Open-ended Lines	0.00170		16	0.0262	0.0262	8760	2.53E-01	2.53E-01
Sampling Connections	0.01500		28	0.4050	0.4049	8760	3.91E+00	3.91E+00
Totals				0.62	0.62		5.94	14.90

[1] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 2-1).
[2] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 5-2). Assumes monthly monitoring with leak definition of 10,000 ppmv.
[3] Assumes monthly monitoring with leak definition of 2,000 ppmv for pumps in light liquid service. See Pump LDAR Control Effectiveness Calculation page.

HAP Emissions - SOCMI Factors

HAP	Individual HAP Weight %	VOC Weight %	Hours of Operation	*Controlled Emissions* HAP Emissions (lb/hr)	HAP Emissions (ton/yr)	*Uncontrolled Emissions* HAP Emissions (lb/hr)	HAP Emissions (ton/yr)
COS	0.00%	96.40%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cl2	0.00%	96.40%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HCl	0.00%	96.40%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MeOH	96.19%	96.40%	8760	1.35E+00	5.93E+00	3.39E+00	1.49E+01
C6 - C10 Aromatics	0.00%	96.40%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total				1.35	5.93	3.39	14.86

Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
Methanol Product (MeOH 2) Process Stream

Stream Name: Methanol Product (MeOH 2)
Service Type: Light Liquid
Hours of Operation: 8760
This piping is included in the LDAR program.

Chemical Name	CAS Number	VOC	HAP	Molecular Weight (lb/lb-mol)	Weight %	Mole Fraction	Mole Percent	
CO	630-08-0	N	N	28.01	0.08%	2.89E-05	0.09%	
H2	1333-74-0	N	N	2.02	0.02%	1.09E-04	0.34%	
CO2	124-38-9	N	N	44.01	0.42%	9.63E-05	0.30%	
H2O	7732-18-5	N	N	18.02	3.32%	1.84E-03	5.74%	
CH4	74-82-8	N	N	16.04	0.08%	4.81E-05	0.15%	
Ar	7440-37-1	N	N	39.95	0.44%	1.09E-04	0.34%	
N2	7727-37-9	N	N	28.01	0.18%	6.42E-05	0.20%	
H2S	7783-06-4	N	N	34.08	0.00%	0.00E+00	0.00%	
COS	463-58-1	Y	Y	60.07	0.00%	0.00E+00	0.00%	
NH3	7664-41-7	N	N	17.03	0.00%	0.00E+00	0.00%	
O2	7782-44-7	N	N	32.00	0.00%	0.00E+00	0.00%	
SO2	7446-09-5	N	N	64.06	0.00%	0.00E+00	0.00%	
Cl2	7782-50-5	N	Y	70.91	0.00%	0.00E+00	0.00%	
HCl	7647-01-0	N	Y	36.46	0.00%	0.00E+00	0.00%	
MeOH	67-56-1	Y	Y	32.04	95.46%	2.98E-02	92.84%	
Ethanol	64-17-5	Y	N	46.07	0.00%	0.00E+00	0.00%	
Dimethyl Ether	115-10-6	Y	N	46.07	0.00%	0.00E+00	0.00%	
Methyl Acetate	79-20-9	Y	N	74.08	0.00%	0.00E+00	0.00%	
Propanol	71-23-8	Y	N	60.10	0.00%	0.00E+00	0.00%	
Butanol	71-36-3	Y	N	74.12	0.00%	0.00E+00	0.00%	
Acetone	67-64-1	Y	N	58.08	0.00%	0.00E+00	0.00%	
MEK	78-93-3	Y	N	72.11	0.00%	0.00E+00	0.00%	
Ethane	74-84-0	N	N	30.07	0.00%	0.00E+00	0.00%	
Ethylene	74-85-1	Y	N	28.05	0.00%	0.00E+00	0.00%	
Propane	74-98-6	Y	N	44.10	0.00%	0.00E+00	0.00%	
Propylene	115-07-1	Y	N	42.08	0.00%	0.00E+00	0.00%	
Isobutane	75-28-5	Y	N	58.12	0.00%	0.00E+00	0.00%	
N-Butene	106-97-8	Y	N	58.12	0.00%	0.00E+00	0.00%	
Butylene	25167-67-3	Y	N	56.11	0.00%	0.00E+00	0.00%	
Isopentane	78-78-4	Y	N	72.15	0.00%	0.00E+00	0.00%	
C4 - C12 Parafins	N/A	Y	N	114.23	0.00%	0.00E+00	0.00%	Assumed Octane
C4 - C12 Olefins	N/A	Y	N	112.21	0.00%	0.00E+00	0.00%	Assumed Octene
C6 - C10 Naphthenes	N/A	Y	N	112.21	0.00%	0.00E+00	0.00%	Assumed Cyclooctane
C6 - C10 Aromatics	N/A	Y	Y	78.11	0.00%	0.00E+00	0.00%	Assumed Benzene
TOTALS					100.00%	3.21E-02	100.00%	

Weight % TOC	95.54%
Weight % VOC	95.46%
Weight % HAP	95.46%

Fugitive Emissions - SOCMI Factors

Equipment Type	SOCMI Emission Factor[1] (kg/hr-source)	% Control With LDAR[2,3]	Source Count	*Controlled Emissions* TOC Emission Rate (kg/hr)	*Controlled Emissions* VOC Emission Rate (kg/hr)	*Controlled Emissions* Hours of Operation	*Controlled Emissions* VOC Emissions (tpy)	*Uncontrolled Emissions* VOC Emissions (tpy)
Valves-Gas	0.00597	92.00%	0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Valves-Light Liquids	0.00403	88.00%	10	0.0046	0.0046	8760	4.46E-02	3.71E-01
Valves-Heavy Liquids	0.00023		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Pump Seals-Light Liquids	0.01990	73.90%	0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Pump Seals-Heavy Liquids	0.00862		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Compresssor Seals-Gas	0.22800		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Relief Valves-Gas/Vapor	0.10400		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Connectors	0.00183	93.00%	10	0.0012	0.0012	8760	1.18E-02	1.69E-01
Open-ended Lines	0.00170		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Sampling Connections	0.01500		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Totals				0.01	0.01		0.06	0.54

[1] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 2-1).
[2] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 5-2). Assumes monthly monitoring with leak definition of 10,000 ppmv.
[3] Assumes monthly monitoring with leak definition of 2,000 ppmv for pumps in light liquid service. See Pump LDAR Control Effectiveness Calculation page.

HAP Emissions - SOCMI Factors

HAP	Individual HAP Weight %	VOC Weight %	Hours of Operation	*Controlled Emissions* HAP Emissions (lb/hr)	*Controlled Emissions* HAP Emissions (ton/yr)	*Uncontrolled Emissions* HAP Emissions (lb/hr)	*Uncontrolled Emissions* HAP Emissions (ton/yr)
COS	0.00%	95.46%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cl2	0.00%	95.46%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HCl	0.00%	95.46%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MeOH	95.46%	95.46%	8760	1.29E-02	5.64E-02	1.23E-01	5.40E-01
C6 - C10 Aromatics	0.00%	95.46%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total				0.01	0.06	0.12	0.54

Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
Methanol Product (MeOH 3) Process Stream

Stream Name: Methanol Product (MeOH 3)
Service Type: Light Liquid
Hours of Operation: 8760
This piping is included in the LDAR program.

Chemical Name	CAS Number	VOC	HAP	Molecular Weight (lb/lb-mol)	Weight %	Mole Fraction	Mole Percent	
CO	630-08-0	N	N	28.01	0.07%	2.57E-05	0.08%	
H2	1333-74-0	N	N	2.02	0.02%	1.16E-04	0.36%	
CO2	124-38-9	N	N	44.01	0.42%	9.65E-05	0.30%	
H2O	7732-18-5	N	N	18.02	3.62%	2.01E-03	6.25%	
CH4	74-82-8	N	N	16.04	0.08%	5.15E-05	0.16%	
Ar	7440-37-1	N	N	39.95	0.46%	1.16E-04	0.36%	
N2	7727-37-9	N	N	28.01	0.19%	6.76E-05	0.21%	
H2S	7783-06-4	N	N	34.08	0.00%	0.00E+00	0.00%	
COS	463-58-1	Y	Y	60.07	0.00%	0.00E+00	0.00%	
NH3	7664-41-7	N	N	17.03	0.00%	0.00E+00	0.00%	
O2	7782-44-7	N	N	32.00	0.00%	0.00E+00	0.00%	
SO2	7446-09-5	N	N	64.06	0.00%	0.00E+00	0.00%	
Cl2	7782-50-5	N	Y	70.91	0.00%	0.00E+00	0.00%	
HCl	7647-01-0	N	Y	36.46	0.00%	0.00E+00	0.00%	
MeOH	67-56-1	Y	Y	32.04	95.12%	2.97E-02	92.28%	
Ethanol	64-17-5	Y	N	46.07	0.00%	0.00E+00	0.00%	
Dimethyl Ether	115-10-6	Y	N	46.07	0.00%	0.00E+00	0.00%	
Methyl Acetate	79-20-9	Y	N	74.08	0.00%	0.00E+00	0.00%	
Propanol	71-23-8	Y	N	60.10	0.00%	0.00E+00	0.00%	
Butanol	71-36-3	Y	N	74.12	0.00%	0.00E+00	0.00%	
Acetone	67-64-1	Y	N	58.08	0.00%	0.00E+00	0.00%	
MEK	78-93-3	Y	N	72.11	0.00%	0.00E+00	0.00%	
Ethane	74-84-0	N	N	30.07	0.00%	0.00E+00	0.00%	
Ethylene	74-85-1	Y	N	28.05	0.00%	0.00E+00	0.00%	
Propane	74-98-6	Y	N	44.10	0.00%	0.00E+00	0.00%	
Propylene	115-07-1	Y	N	42.08	0.00%	0.00E+00	0.00%	
Isobutane	75-28-5	Y	N	58.12	0.00%	0.00E+00	0.00%	
N-Butane	106-97-8	Y	N	58.12	0.00%	0.00E+00	0.00%	
Butylene	25167-67-3	Y	N	56.11	0.00%	0.00E+00	0.00%	
Isopentane	78-78-4	Y	N	72.15	0.00%	0.00E+00	0.00%	
C4 - C12 Parafins	N/A	Y	N	114.23	0.00%	0.00E+00	0.00%	Assumed Octane
C4 - C12 Olefins	N/A	Y	N	112.21	0.00%	0.00E+00	0.00%	Assumed Octene
C6 - C10 Naphthenes	N/A	Y	N	112.21	0.00%	0.00E+00	0.00%	Assumed Cyclooctane
C6 - C10 Aromatics	N/A	Y	Y	78.11	0.00%	0.00E+00	0.00%	Assumed Benzene
TOTALS					100.00%	3.22E-02	100.00%	

Weight % TOC	95.21%
Weight % VOC	95.12%
Weight % HAP	95.12%

Fugitive Emissions - SOCMI Factors

Equipment Type	SOCMI Emission Factor[1] (kg/hr-source)	% Control With LDAR[2,3]	Source Count	*Controlled Emissions* TOC Emission Rate (kg/hr)	*Controlled Emissions* VOC Emission Rate (kg/hr)	*Controlled Emissions* Hours of Operation	*Controlled Emissions* VOC Emissions (tpy)	*Uncontrolled Emissions* VOC Emissions (tpy)
Valves-Gas	0.00597	92.00%	0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Valves-Light Liquids	0.00403	88.00%	10	0.0046	0.0046	8760	4.44E-02	3.70E-01
Valves-Heavy Liquids	0.00023		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Pump Seals-Light Liquids	0.01990	73.90%	0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Pump Seals-Heavy Liquids	0.00862		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Compresssor Seals-Gas	0.22800		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Relief Valves-Gas/Vapor	0.10400		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Connectors	0.00183	93.00%	10	0.0012	0.0012	8760	1.18E-02	1.68E-01
Open-ended Lines	0.00170		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Sampling Connections	0.01500		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Totals				0.01	0.01		0.06	0.54

[1] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 2-1).
[2] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 5-2). Assumes monthly monitoring with leak definition of 10,000 ppmv.
[3] Assumes monthly monitoring with leak definition of 2,000 ppmv for pumps in light liquid service. See Pump LDAR Control Effectiveness Calculation page.

HAP Emissions - SOCMI Factors

HAP	Individual HAP Weight %	VOC Weight %	Hours of Operation	*Controlled Emissions* HAP Emissions (lb/hr)	*Controlled Emissions* HAP Emissions (ton/yr)	*Uncontrolled Emissions* HAP Emissions (lb/hr)	*Uncontrolled Emissions* HAP Emissions (ton/yr)
COS	0.00%	95.12%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cl2	0.00%	95.12%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HCl	0.00%	95.12%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MeOH	95.12%	95.12%	8760	1.28E-02	5.62E-02	1.23E-01	5.38E-01
C6 - C10 Aromatics	0.00%	95.12%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total				0.01	0.06	0.12	0.54

Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
Methanol Product (MeOH 5) Process Stream

Stream Name: Methanol Product (MeOH 5)
Service Type: Gas
Hours of Operation: 8760
This piping is included in the LDAR program.

Chemical Name	CAS Number	VOC	HAP	Molecular Weight (lb/lb-mol)	Weight %	Mole Fraction	Mole Percent	
CO	630-08-0	N	N	28.01	15.02%	5.36E-03	7.09%	
H2	1333-74-0	N	N	2.02	9.73%	4.83E-02	63.83%	
CO2	124-38-9	N	N	44.01	3.93%	8.92E-04	1.18%	
H2O	7732-18-5	N	N	18.02	0.05%	3.03E-05	0.04%	
CH4	74-82-8	N	N	16.04	2.78%	1.73E-03	2.29%	
Ar	7440-37-1	N	N	39.95	47.22%	1.18E-02	15.63%	
N2	7727-37-9	N	N	28.01	19.58%	6.99E-03	9.24%	
H2S	7783-06-4	N	N	34.08	0.00%	0.00E+00	0.00%	
COS	463-58-1	Y	Y	60.07	0.00%	0.00E+00	0.00%	
NH3	7664-41-7	N	N	17.03	0.00%	0.00E+00	0.00%	
O2	7782-44-7	N	N	32.00	0.00%	0.00E+00	0.00%	
SO2	7446-09-5	N	N	64.06	0.00%	0.00E+00	0.00%	
Cl2	7782-50-5	N	Y	70.91	0.00%	0.00E+00	0.00%	
HCl	7647-01-0	N	Y	36.46	0.00%	0.00E+00	0.00%	
MeOH	67-56-1	Y	Y	32.04	1.70%	5.29E-04	0.70%	
Ethanol	64-17-5	Y	N	46.07	0.00%	0.00E+00	0.00%	
Dimethyl Ether	115-10-6	Y	N	46.07	0.00%	0.00E+00	0.00%	
Methyl Acetate	79-20-9	Y	N	74.08	0.00%	0.00E+00	0.00%	
Propanol	71-23-8	Y	N	60.10	0.00%	0.00E+00	0.00%	
Butanol	71-36-3	Y	N	74.12	0.00%	0.00E+00	0.00%	
Acetone	67-64-1	Y	N	58.08	0.00%	0.00E+00	0.00%	
MEK	78-93-3	Y	N	72.11	0.00%	0.00E+00	0.00%	
Ethane	74-84-0	N	N	30.07	0.00%	0.00E+00	0.00%	
Ethylene	74-85-1	Y	N	28.05	0.00%	0.00E+00	0.00%	
Propane	74-98-6	Y	N	44.10	0.00%	0.00E+00	0.00%	
Propylene	115-07-1	Y	N	42.08	0.00%	0.00E+00	0.00%	
Isobutane	75-28-5	Y	N	58.12	0.00%	0.00E+00	0.00%	
N-Butane	106-97-8	Y	N	58.12	0.00%	0.00E+00	0.00%	
Butylene	25167-67-3	Y	N	56.11	0.00%	0.00E+00	0.00%	
Isopentane	78-78-4	Y	N	72.15	0.00%	0.00E+00	0.00%	
C4 - C12 Paraffins	N/A	Y	N	114.23	0.00%	0.00E+00	0.00%	Assumed Octane
C4 - C12 Olefins	N/A	Y	N	112.21	0.00%	0.00E+00	0.00%	Assumed Octene
C6 - C10 Naphthenes	N/A	Y	N	112.21	0.00%	0.00E+00	0.00%	Assumed Cyclooctane
C6 - C10 Aromatics	N/A	Y	Y	78.11	0.00%	0.00E+00	0.00%	Assumed Benzene
TOTALS					100.00%	7.56E-02	100.00%	

Weight % TOC	4.47%
Weight % VOC	1.70%
Weight % HAP	1.70%

Fugitive Emissions - SOCMI Factors

Equipment Type	SOCMI Emission Factor[1] (kg/hr-source)	% Control With LDAR[2,3]	Source Count	Controlled Emissions: TOC Emission Rate (kg/hr)	Controlled Emissions: VOC Emission Rate (kg/hr)	Controlled Emissions: Hours of Operation	Controlled Emissions: VOC Emissions (tpy)	Uncontrolled Emissions: VOC Emissions (tpy)
Valves-Gas	0.00597	92.00%	125	0.0027	0.0010	8760	9.78E-03	1.22E-01
Valves-Light Liquids	0.00403	88.00%	0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Valves-Heavy Liquids	0.00023		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Pump Seals-Light Liquids	0.01990	73.90%	0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Pump Seals-Heavy Liquids	0.00862		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Compresssor Seals-Gas	0.22800		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Relief Valves-Gas/Vapor	0.10400		16	0.0745	0.0282	8760	2.72E-01	2.72E-01
Connectors	0.00183	93.00%	136	0.0008	0.0003	8760	2.85E-03	4.08E-02
Open-ended Lines	0.00170		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Sampling Connections	0.01500		27	0.0181	0.0069	8760	6.63E-02	6.63E-02
Totals				0.10	0.04		0.35	0.50

[1] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 2-1).
[2] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 5-2). Assumes monthly monitoring with leak definition of 10,000 ppmv.
[3] Assumes monthly monitoring with leak definition of 2,000 ppmv for pumps in light liquid service. See Pump LDAR Control Effectiveness Calculation page.

HAP Emissions - SOCMI Factors

HAP	Individual HAP Weight %	VOC Weight %	Hours of Operation	Controlled Emissions: HAP Emissions (lb/hr)	Controlled Emissions: HAP Emissions (ton/yr)	Uncontrolled Emissions: HAP Emissions (lb/hr)	Uncontrolled Emissions: HAP Emissions (ton/yr)
COS	0.00%	1.70%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cl2	0.00%	1.70%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HCl	0.00%	1.70%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MeOH	1.70%	1.70%	8760	8.02E-02	3.51E-01	1.15E-01	5.02E-01
C6 - C10 Aromatics	0.00%	1.70%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total				0.08	0.35	0.11	0.50

Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
Mixed Fuel Gas Process Stream

Stream Name: Mixed Fuel Gas
Service Type: Gas
Hours of Operation: 8760
This piping is included in the LDAR program.

Chemical Name	CAS Number	VOC	HAP	Molecular Weight (lb/lb-mol)	Weight %	Mole Fraction	Mole Percent	
CO	630-08-0	N	N	28.01	1.88%	6.70E-04	1.36%	
H2	1333-74-0	N	N	2.02	2.06%	1.02E-02	20.76%	
CO2	124-38-9	N	N	44.01	3.38%	7.68E-04	1.56%	
H2O	7732-18-5	N	N	18.02	0.01%	7.40E-06	0.02%	
CH4	74-82-8	N	N	16.04	39.92%	2.49E-02	50.67%	
Ar	7440-37-1	N	N	39.95	15.43%	3.86E-03	7.87%	
N2	7727-37-9	N	N	28.01	7.59%	2.71E-03	5.52%	
H2S	7783-06-4	N	N	34.08	0.00%	0.00E+00	0.00%	
COS	463-58-1	Y	Y	60.07	0.00%	0.00E+00	0.00%	
NH3	7664-41-7	N	N	17.03	0.00%	0.00E+00	0.00%	
O2	7782-44-7	N	N	32.00	0.00%	0.00E+00	0.00%	
SO2	7446-09-5	N	N	64.06	0.00%	0.00E+00	0.00%	
Cl2	7782-50-5	N	Y	70.91	0.00%	0.00E+00	0.00%	
HCl	7647-01-0	N	Y	36.46	0.00%	0.00E+00	0.00%	
MeOH	67-56-1	Y	Y	32.04	0.99%	3.09E-04	0.63%	
Ethanol	64-17-5	Y	N	46.07	0.00%	0.00E+00	0.00%	
Dimethyl Ether	115-10-6	Y	N	46.07	0.00%	0.00E+00	0.00%	
Methyl Acetate	79-20-9	Y	N	74.08	0.00%	0.00E+00	0.00%	
Propanol	71-23-8	Y	N	60.10	0.00%	0.00E+00	0.00%	
Butanol	71-36-3	Y	N	74.12	0.00%	0.00E+00	0.00%	
Acetone	67-64-1	Y	N	58.08	0.00%	0.00E+00	0.00%	
MEK	78-93-3	Y	N	72.11	0.00%	0.00E+00	0.00%	
Ethane	74-84-0	N	N	30.07	2.02%	6.73E-04	1.37%	
Ethylene	74-85-1	Y	N	28.05	0.20%	6.96E-05	0.14%	
Propane	74-98-6	Y	N	44.10	7.00%	1.59E-03	3.23%	
Propylene	115-07-1	Y	N	42.08	0.36%	8.56E-05	0.17%	
Isobutane	75-28-5	Y	N	58.12	16.30%	2.80E-03	5.71%	
N-Butane	106-97-8	Y	N	58.12	0.00%	0.00E+00	0.00%	
Butylene	25167-67-3	Y	N	56.11	2.32%	4.14E-04	0.84%	
Isopentane	78-78-4	Y	N	72.15	0.47%	6.53E-05	0.13%	
C4 - C12 Paraffins	N/A	Y	N	114.23	0.08%	6.80E-06	0.01%	Assumed Octane
C4 - C12 Olefins	N/A	Y	N	112.21	0.00%	0.00E+00	0.00%	Assumed Octene
C6 - C10 Naphthenes	N/A	Y	N	112.21	0.00%	0.00E+00	0.00%	Assumed Cyclooctane
C6 - C10 Aromatics	N/A	Y	Y	78.11	0.00%	0.00E+00	0.00%	Assumed Benzene
TOTALS					100.00%	4.91E-02	100.00%	

Weight % TOC	**69.65%**
Weight % VOC	**27.71%**
Weight % HAP	**0.99%**

Fugitive Emissions - SOCMI Factors				*Controlled Emissions*				*Uncontrolled Emissions*
Equipment Type	SOCMI Emission Factor[1] (kg/hr-source)	% Control With LDAR [2,3]	Source Count	TOC Emission Rate (kg/hr)	VOC Emission Rate (kg/hr)	Hours of Operation	VOC Emissions (tpy)	VOC Emissions (tpy)
Valves-Gas	0.00597	92.00%	90	0.0299	0.0119	8760	1.15E-01	1.44E+00
Valves-Light Liquids	0.00403	88.00%	0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Valves-Heavy Liquids	0.00023		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Pump Seals-Light Liquids	0.01990	73.90%	0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Pump Seals-Heavy Liquids	0.00862		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Compresssor Seals-Gas	0.22800		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Relief Valves-Gas/Vapor	0.10400		1	0.0724	0.0288	8760	2.78E-01	2.78E-01
Connectors	0.00183	93.00%	11	0.0010	0.0004	8760	3.77E-03	5.39E-02
Open-ended Lines	0.00170		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Sampling Connections	0.01500		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Totals				0.10	0.04		0.40	1.77

[1] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 2-1).
[2] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 5-2). Assumes monthly monitoring with leak definition of 10,000 ppmv.
[3] Assumes monthly monitoring with leak definition of 2,000 ppmv for pumps in light liquid service. See Pump LDAR Control Effectiveness Calculation page.

HAP Emissions - SOCMI Factors				*Controlled Emissions*		*Uncontrolled Emissions*	
HAP	Individual HAP Weight %	VOC Weight %	Hours of Operation	HAP Emissions (lb/hr)	HAP Emissions (ton/yr)	HAP Emissions (lb/hr)	HAP Emissions (ton/yr)
COS	0.00%	27.71%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cl2	0.00%	27.71%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HCl	0.00%	27.71%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MeOH	0.99%	27.71%	8760	3.23E-03	1.42E-02	1.44E-02	6.32E-02
C6 - C10 Aromatics	0.00%	27.71%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total				0.00	0.01	0.01	0.06

Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
MTG Fuel Gas Process Stream

Stream Name: MTG Fuel Gas
Service Type: Gas
Hours of Operation: 8760
This piping is included in the LDAR program.

Chemical Name	CAS Number	VOC	HAP	Molecular Weight (lb/lb-mol)	Weight %	Mole Fraction	Mole Percent	
CO	630-08-0	N	N	28.01	34.27%	1.22E-02	34.25%	
H2	1333-74-0	N	N	2.02	0.01%	6.11E-05	0.17%	
CO2	124-38-9	N	N	44.01	0.00%	0.00E+00	0.00%	
H2O	7732-18-5	N	N	18.02	0.39%	2.17E-04	0.61%	
CH4	74-82-8	N	N	16.04	22.67%	1.41E-02	39.56%	
Ar	7440-37-1	N	N	39.95	0.00%	0.00E+00	0.00%	
N2	7727-37-9	N	N	28.01	0.00%	0.00E+00	0.00%	
H2S	7783-06-4	N	N	34.08	0.00%	0.00E+00	0.00%	
COS	463-58-1	Y	Y	60.07	0.00%	0.00E+00	0.00%	
NH3	7664-41-7	N	N	17.03	0.00%	0.00E+00	0.00%	
O2	7782-44-7	N	N	32.00	0.00%	0.00E+00	0.00%	
SO2	7446-09-5	N	N	64.06	0.00%	0.00E+00	0.00%	
Cl2	7782-50-5	N	Y	70.91	0.00%	0.00E+00	0.00%	
HCl	7647-01-0	N	Y	36.46	0.00%	0.00E+00	0.00%	
MeOH	67-56-1	Y	Y	32.04	0.00%	0.00E+00	0.00%	
Ethanol	64-17-5	Y	N	46.07	0.00%	0.00E+00	0.00%	
Dimethyl Ether	115-10-6	Y	N	46.07	0.00%	0.00E+00	0.00%	
Methyl Acetate	79-20-9	Y	N	74.08	0.00%	0.00E+00	0.00%	
Propanol	71-23-8	Y	N	60.10	0.00%	0.00E+00	0.00%	
Butanol	71-36-3	Y	N	74.12	0.00%	0.00E+00	0.00%	
Acetone	67-64-1	Y	N	58.08	0.00%	0.00E+00	0.00%	
MEK	78-93-3	Y	N	72.11	0.00%	0.00E+00	0.00%	
Ethane	74-84-0	N	N	30.07	8.92%	2.97E-03	8.31%	
Ethylene	74-85-1	Y	N	28.05	5.69%	2.03E-03	5.68%	
Propane	74-98-6	Y	N	44.10	6.95%	1.58E-03	4.41%	
Propylene	115-07-1	Y	N	42.08	0.30%	7.24E-05	0.20%	
Isobutane	75-28-5	Y	N	58.12	2.52%	4.34E-04	1.21%	
N-Butane	106-97-8	Y	N	58.12	0.43%	7.48E-05	0.21%	
Butylene	25167-67-3	Y	N	56.11	0.78%	1.39E-04	0.39%	
Isopentane	78-78-4	Y	N	72.15	5.20%	7.21E-04	2.02%	
C4 - C12 Paraffins	N/A	Y	N	114.23	7.48%	6.54E-04	1.83%	Assumed Octane
C4 - C12 Olefins	N/A	Y	N	112.21	2.69%	2.39E-04	0.67%	Assumed Octene
C6 - C10 Naphthenes	N/A	Y	N	112.21	1.31%	1.17E-04	0.33%	Assumed Cyclooctane
C6 - C10 Aromatics	N/A	Y	Y	78.11	0.38%	4.91E-05	0.14%	Assumed Benzene
TOTALS					100.00%	3.57E-02	100.00%	

Weight % TOC	65.33%
Weight % VOC	33.74%
Weight % HAP	0.38%

Fugitive Emissions - SOCMI Factors				*Controlled Emissions*				*Uncontrolled Emissions*
Equipment Type	SOCMI Emission Factor[1] (kg/hr-source)	% Control With LDAR [2,3]	Source Count	TOC Emission Rate (kg/hr)	VOC Emission Rate (kg/hr)	Hours of Operation	VOC Emissions (tpy)	VOC Emissions (tpy)
Valves-Gas	0.00597	92.00%	60	0.0187	0.0097	8760	9.33E-02	1.17E+00
Valves-Light Liquids	0.00403	88.00%	0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Valves-Heavy Liquids	0.00023		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Pump Seals-Light Liquids	0.01990	73.90%	0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Pump Seals-Heavy Liquids	0.00862		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Compresssor Seals-Gas	0.22800		4	0.5958	0.3077	8760	2.97E+00	2.97E+00
Relief Valves-Gas/Vapor	0.10400		2	0.1358	0.0702	8760	6.77E-01	6.77E-01
Connectors	0.00183	93.00%	88	0.0074	0.0038	8760	3.67E-02	5.24E-01
Open-ended Lines	0.00170		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Sampling Connections	0.01500		2	0.0196	0.0101	8760	9.77E-02	9.77E-02
Totals				0.78	0.40		3.88	5.44

[1] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 2-1).
[2] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 5-2). Assumes monthly monitoring with leak definition of 10,000 ppmv.
[3] Assumes monthly monitoring with leak definition of 2,000 ppmv for pumps in light liquid service. See Pump LDAR Control Effectiveness Calculation page.

HAP Emissions - SOCMI Factors				*Controlled Emissions*		*Uncontrolled Emissions*	
HAP	Individual HAP Weight %	VOC Weight %	Hours of Operation	HAP Emissions (lb/hr)	HAP Emissions (ton/yr)	HAP Emissions (lb/hr)	HAP Emissions (ton/yr)
COS	0.00%	33.74%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cl2	0.00%	33.74%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HCl	0.00%	33.74%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MeOH	0.00%	33.74%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C6 - C10 Aromatics	0.38%	33.74%	8760	1.01E-02	4.41E-02	1.41E-02	6.18E-02
Total				0.01	0.04	0.01	0.06

Medicine Bow Fuel & Power Industrial Gasification & Liquefaction Plant
Propylene Process Stream

Stream Name: Propylene
Service Type: Gas
Hours of Operation: 8760
This piping is included in the LDAR program.

Chemical Name	CAS Number	VOC	HAP	Molecular Weight (lb/lb-mol)	Weight %	Mole Fraction	Mole Percent	
CO	630-08-0	N	N	28.01	0.00%	0.00E+00	0.00%	
H2	1333-74-0	N	N	2.02	0.00%	0.00E+00	0.00%	
CO2	124-38-9	N	N	44.01	0.00%	0.00E+00	0.00%	
H2O	7732-18-5	N	N	18.02	0.00%	0.00E+00	0.00%	
CH4	74-82-8	N	N	16.04	0.00%	0.00E+00	0.00%	
Ar	7440-37-1	N	N	39.95	0.00%	0.00E+00	0.00%	
N2	7727-37-9	N	N	28.01	0.00%	0.00E+00	0.00%	
H2S	7783-06-4	N	N	34.08	0.00%	0.00E+00	0.00%	
COS	463-58-1	Y	Y	60.07	0.00%	0.00E+00	0.00%	
NH3	7664-41-7	N	N	17.03	0.00%	0.00E+00	0.00%	
O2	7782-44-7	N	N	32.00	0.00%	0.00E+00	0.00%	
SO2	7446-09-5	N	N	64.06	0.00%	0.00E+00	0.00%	
Cl2	7782-50-5	N	Y	70.91	0.00%	0.00E+00	0.00%	
HCl	7647-01-0	N	Y	36.46	0.00%	0.00E+00	0.00%	
MeOH	67-56-1	Y	Y	32.04	0.00%	0.00E+00	0.00%	
Ethanol	64-17-5	Y	N	46.07	0.00%	0.00E+00	0.00%	
Dimethyl Ether	115-10-6	Y	N	46.07	0.00%	0.00E+00	0.00%	
Methyl Acetate	79-20-9	Y	N	74.08	0.00%	0.00E+00	0.00%	
Propanol	71-23-8	Y	N	60.10	0.00%	0.00E+00	0.00%	
Butanol	71-36-3	Y	N	74.12	0.00%	0.00E+00	0.00%	
Acetone	67-64-1	Y	N	58.08	0.00%	0.00E+00	0.00%	
MEK	78-93-3	Y	N	72.11	0.00%	0.00E+00	0.00%	
Ethane	74-84-0	N	N	30.07	0.00%	0.00E+00	0.00%	
Ethylene	74-85-1	Y	N	28.05	0.00%	0.00E+00	0.00%	
Propane	74-98-6	Y	N	44.10	0.00%	0.00E+00	0.00%	
Propylene	115-07-1	Y	N	42.08	100.00%	2.38E-02	100.00%	
Isobutane	75-28-5	Y	N	58.12	0.00%	0.00E+00	0.00%	
N-Butane	106-97-8	Y	N	58.12	0.00%	0.00E+00	0.00%	
Butylene	25167-67-3	Y	N	56.11	0.00%	0.00E+00	0.00%	
Isopentane	78-78-4	Y	N	72.15	0.00%	0.00E+00	0.00%	
C4 - C12 Paraffins	N/A	Y	N	114.23	0.00%	0.00E+00	0.00%	Assumed Octane
C4 - C12 Olefins	N/A	Y	N	112.21	0.00%	0.00E+00	0.00%	Assumed Octene
C6 - C10 Naphthenes	N/A	Y	N	112.21	0.00%	0.00E+00	0.00%	Assumed Cyclooctane
C6 - C10 Aromatics	N/A	Y	Y	78.11	0.00%	0.00E+00	0.00%	Assumed Benzene
TOTALS					100.00%	2.38E-02	100.00%	

Weight % TOC	100.00%
Weight % VOC	100.00%
Weight % HAP	0.00%

Fugitive Emissions - SOCMI Factors

Equipment Type	SOCMI Emission Factor[1] (kg/hr-source)	% Control With LDAR [2,3]	Source Count	*Controlled Emissions* TOC Emission Rate (kg/hr)	VOC Emission Rate (kg/hr)	Hours of Operation	VOC Emissions (tpy)	*Uncontrolled Emissions* VOC Emissions (tpy)
Valves-Gas	0.00597	92.00%	40	0.0191	0.0191	8760	1.84E-01	2.31E+00
Valves-Light Liquids	0.00403	88.00%	0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Valves-Heavy Liquids	0.00023		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Pump Seals-Light Liquids	0.01990	73.90%	0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Pump Seals-Heavy Liquids	0.00862		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Compresssor Seals-Gas	0.22800		8	1.8240	1.8240	8760	1.76E+01	1.76E+01
Relief Valves-Gas/Vapor	0.10400		4	0.4160	0.4160	8760	4.02E+00	4.02E+00
Connectors	0.00183	93.00%	8	0.0010	0.0010	8760	9.89E-03	1.41E-01
Open-ended Lines	0.00170		0	0.0000	0.0000	8760	0.00E+00	0.00E+00
Sampling Connections	0.01500		2	0.0300	0.0300	8760	2.90E-01	2.90E-01
Totals				2.29	2.29		22.11	24.36

[1] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 2-1).
[2] EPA-453/R-95-017 Protocol for Equipment Leak Emission Estimates (Table 5-2). Assumes monthly monitoring with leak definition of 10,000 ppmv.
[3] Assumes monthly monitoring with leak definition of 2,000 ppmv for pumps in light liquid service. See Pump LDAR Control Effectiveness Calculation page.

HAP Emissions - SOCMI Factors

HAP	Individual HAP Weight %	VOC Weight %	Hours of Operation	*Controlled Emissions* HAP Emissions (lb/hr)	HAP Emissions (ton/yr)	*Uncontrolled Emissions* HAP Emissions (lb/hr)	HAP Emissions (ton/yr)
COS	0.00%	100.00%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cl2	0.00%	100.00%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HCl	0.00%	100.00%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MeOH	0.00%	100.00%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C6 - C10 Aromatics	0.00%	100.00%	8760	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total				0.00	0.00	0.00	0.00

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

Identification

User Identification:	Med Bow F&P Gasoline Tank
City:	Medicine Bow
State:	Wyoming
Company:	Medicine Bow Fuel & Power LLC
Type of Tank:	Internal Floating Roof Tank
Description:	Finished gasoline product tank; total 8 identical tanks.

Tank Dimensions

Diameter (ft):	150.00
Volume (gallons):	6,341,984.00
Turnovers:	5.72
Self Supp. Roof? (y/n):	N
No. of Columns:	9.00
Eff. Col. Diam. (ft):	1.00

Paint Characteristics

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

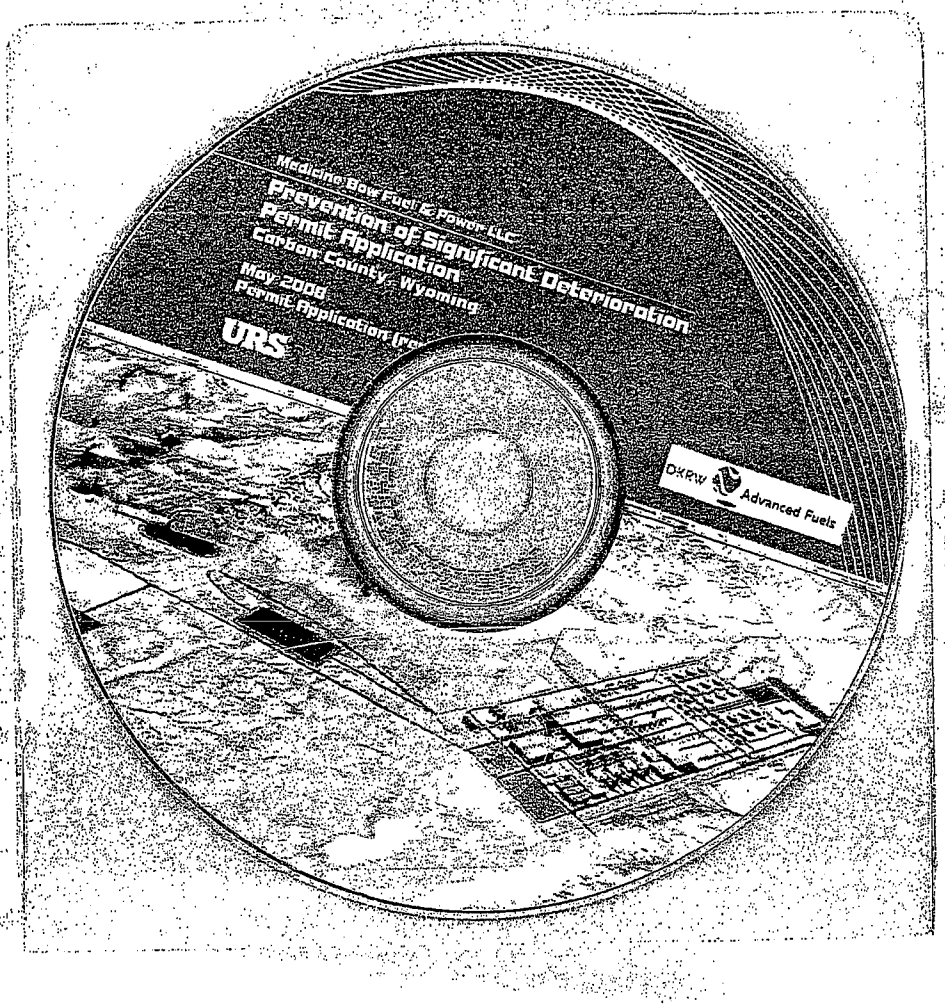
Rim-Seal System

Primary Seal:	Vapor-mounted
Secondary Seal	None

Deck Characteristics

Deck Fitting Category:	Typical
Deck Type:	Bolted
Construction:	Panel
Deck Seam:	Panel: 5 x 7.5 Ft
Deck Seam Len. (ft):	5,831.58

Deck Fitting/Status	Quantity
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1
Column Well (24-in. Diam.)/Built-Up Col.-Sliding Cover, Ungask.	9
Ladder Well (36-in. Diam.)/Sliding Cover, Ungasketed	1
Roof Leg or Hanger Well/Adjustable	58
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1
Stub Drain (1-in. Diameter)/Slit Fabric Seal 10% Open	180


Medicine Bow Fuel & Power LLC
Prevention of Significant Deterioration
Permit Application
Carbon County, Wyoming
May 2008
URS
DKRW
Advanced Fuels