March 4, 2009

Mr. Jude R. Rolfes, P.E.
Senior Vice President
Medicine Bow Fuel & Power, LLC
Two Riverway, Suite 1780
Houston, TX 77056

Permit No. **CT-5873**

Dear Mr. Rolfes:

The Division of Air Quality of the Wyoming Department of Environmental Quality has completed final review of Medicine Bow Fuel & Power, LLC's application to construct an underground coal mine and industrial gasification and liquefaction (IGL) plant that will produce transportation fuels and other products. The underground coal mine is expected to have a maximum production rate of 8,700 tons per day (TPD) of coal or approximately 3.2 million tons per year (MMTPY) of coal as feed to the IGL Plant. The plant will gasify coal to produce synthesis gas (syngas) to produce the following products: 18,500 barrels per day (bpd) of gasoline, 42 tons per day of sulfur, 198 million standard cubic feet per day (MMscfd) of carbon dioxide (CO_2), and 712 tons per day of coarse slag. The Medicine Bow IGL Plant is located in Section 29, T21N, R79W, approximately eleven (11) miles, southwest of Medicine Bow, in Carbon County, Wyoming.

Following this agency's proposed approval of the request as published July 3, 2008 and in accordance with Chapter 6, Section 2(m) of the Wyoming Air Quality Standards and Regulations, the public was afforded a 30-day period in which to submit comments concerning the proposed new source, and an opportunity for a public hearing. Public comments have been received and a public hearing on the proposal was held August 4, 2008. Therefore, on the basis of the information provided to us, approval to construct the Medicine Bow IGL Plant as described in the application is hereby granted pursuant to Chapter 6, Section 2 and 4 of the regulations with the following conditions:

1. That authorized representatives of the Division of Air Quality be given permission to enter and inspect any property, premise or place on or at which an air pollution source is located or is being constructed or installed for the purpose of investigating actual or potential sources of air pollution and for determining compliance or non-compliance with any rules, standards, permits or orders.

2. That all substantive commitments and descriptions set forth in the application for this permit, unless superseded by a specific condition of this permit, are incorporated herein by this reference and are enforceable as conditions of this permit.

3. That Medicine Bow Fuel & Power, LLC shall obtain an operating permit in accordance with Chapter 6, Section 3 of the WAQSR.

4. That all notifications, reports and correspondences associated with this permit shall be submitted to the Stationary Source Compliance Program Manager, Air Quality Division, 122 West 25th Street, Cheyenne, WY 82002 and a copy shall be submitted to the District Engineer, Air Quality Division, 152 North Durbin Street, Suite 100, Casper, WY 82601.

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5. That written notification of the anticipated date of initial startup, in accordance with Chapter 6, Section 2(i) of the WAQSR, is required not more than 60 days or less than 30 days prior to such date. Notification of the actual date of startup is required 15 days after startup.

6. That the date of commencement of construction shall be reported to the Administrator within 30 days of commencement. In accordance with Chapter 6, Section 2(h) of the WAQSR, approval to construct or modify shall become invalid if construction is not commenced within 24 months after receipt of such approval or if construction is discontinued for a period of 24 months or more. The Administrator may extend the period based on satisfactory justification of the requested extension.

7. That performance tests be conducted, in accordance with Chapter 6, Section 2(j) of the WAQSR, within 30 days of achieving a maximum design rate but not later than 90 days following initial start-up, and a written report of the results be submitted. The operator shall provide 15 days prior notice of the test date. If a maximum design rate is not achieved within 90 days of start-up, the Administrator may require testing be done at the rate achieved and again when a maximum rate is achieved.

8. That Medicine Bow Fuel & Power, LLC shall retain, at the Medicine Bow IGL Plant, records of the daily inspections, monthly observations, preventative maintenance records, Method 22 observations, and support information as required by this permit for a period of at least five (5) years from the date such records are generated and the records shall be made available to the Division upon request.

Medicine Bow IGL Plant

9. Initial performance testing, as required by Condition 7 of this permit shall be conducted on the following sources:

   i. Combustion Turbines (CT-1, CT-2, and CT-3):

NO_x Emissions:	Testing is to be performed on a 30-day rolling average using a certified CEM and the requirements of Subpart KKKK, 40 CFR part 60.
CO Emissions:	Testing is to be performed on a 30-day rolling average using a certified CEM.
SO_2 Emissions:	Compliance tests shall consist of three (3) 1-hour tests following EPA Reference Methods 1-4 and 6.
VOC Emissions:	Compliance tests shall consist of three (3) 1-hour tests following EPA Reference Methods 1-4 and 25.
PM/PM_{10} Emissions:	Compliance tests shall consist of three (3) 1-hour tests following EPA Reference Methods 1-4, 5, and 202.

Opacity: Opacity testing shall consist of three (3) 6-minute averages of the opacity as determined by Method 9 of 40 CFR part 60, Appendix A.

Mercury Emissions: Compliance test shall consist of three (3) 1-hour tests following EPA Reference Methods 1-4 and 29 or an equivalent EPA reference method upon Division approval.

ii. Auxiliary Boiler (AB):

NO_x Emissions: Compliance tests shall consist of three (3) 1-hour tests following EPA Reference Methods 1-4 and 7E.

CO Emissions: Compliance tests shall consist of three (3) 1-hour tests following EPA Reference Methods 1-4 and 10.

iii. Catalyst Regenerator (B-1), Reactivation Heater (B-2), HGT Reactor Charge Heater (B-3):

NO_x Emissions: Compliance tests shall consist of three (3) 1-hour tests following EPA Reference Methods 1-4 and 7E.

CO Emissions: Compliance tests shall consist of three (3) 1-hour tests following EPA Reference Methods 1-4 and 10.

iv: Gasifier Preheaters (GP-1, GP-2, GP-3, GP-4, and GP-5):

NO_x and CO Emissions: Compliance testing for the first gasifier preheater tested shall consist of three (3) 1-hour tests following EPA Reference Methods 1-4, 7E and 10. Testing of subsequent gasifier preheaters shall consist of one (1) twenty-one (21) minute test following EPA Reference Methods 3, 7E, 10, and 19.

v. Black Start Generators (Gen-1, Gen-2, and Gen-3):

NO_x, CO and VOC Emissions: Black Start Generators shall be tested in accordance with the requirements of Subpart JJJJ, 40 CFR part 60.

vi. Fire Water Pump Engine (FW-Pump):

NO_x and CO Emissions: The Fire Water Pump Engine shall be tested in accordance with the requirements of Subpart IIII, 40 CFR part 60.

A test protocol shall be submitted for review and approval prior to testing. Notification of the test date shall be provided to the Division fifteen (15) days prior to testing. Results shall be submitted to this Division within 45 days of completion.

10. Emissions from the turbines (CT-1, CT-2, and CT-3) shall be limited to the following, and shall apply at all times:

Pollutant		lb/hr	tpy
NO_x	4 ppm_v @ 15% O_2 (30-day rolling)	11.6 (30-day rolling)	50.6
CO	6 ppm_v @ 15% O_2 (30-day rolling)	10.6 (30-day rolling)	46.2
SO_2	--	2.5	10.8
VOC	1.4 ppm_v @ 15% O_2	1.5	6.6
PM/PM_{10} (Filterable + Condensable)	--	10.0	43.8
Hg	0.02 $\mu g/Nm^3$	--	4.33×10^{-5} (0.087 lb/yr)

11. That the opacity from the combustion turbines (CT-1, CT-2, and CT-3) shall be limited to 20 percent opacity as determined by Method 9 of 40 CFR part 60, Appendix A.

12. Medicine Bow Fuel & Power, LLC shall use the following in-stack continuous emission monitoring (CEM) equipment on the combustion turbines (CT-1, CT-2, and CT-3) to demonstrate continuous compliance with the emission limits set forth in this permit:

i. Medicine Bow Fuel & Power, LLC shall install, calibrate, operate, and maintain a monitoring system, and record the output, for measuring NO_x emissions discharged to the atmosphere in ppm_v and lb/hr. The NO_x monitoring system shall consist of the following:

a. A continuous emission NO_x monitor located in the combustion turbine exhaust stack.

b. A continuous flow monitoring system for measuring the flow of exhaust gases discharged into the atmosphere.

c. An in-stack oxygen or carbon dioxide monitor for measuring oxygen or carbon dioxide content of the flue gas at the location NO_x emissions are monitored.

ii. Medicine Bow Fuel & Power, LLC shall install, calibrate, operate, and maintain a monitoring system, and record the output, for measuring CO emissions discharged to the atmosphere in ppm_v and lb/hr. The CO monitoring system shall consist of the following:

a. A continuous emission CO monitor located in the combustion turbine exhaust stack.

b. A continuous flow monitoring system for measuring the flow of exhaust gases discharged into the atmosphere.

c. An in-stack oxygen or carbon dioxide monitor for measuring oxygen or carbon dioxide content of the flue gas at the location CO emissions are monitored.

iii. Each continuous monitor system listed in this condition shall comply with the following:

a. 40 CFR part 60 Subpart KKKK – *Standards of Performance for Stationary Combustion Turbines.*

b. Monitoring requirements of Chapter 5, Section 2(j) of the WAQSR including the following:

1. 40 CFR part 60, Appendix B, Performance Specification 2 for NO_x, Performance Specification 4 for CO, and Performance Specification 3 for O_2 and CO_2. The monitoring systems must demonstrate linearity in accordance with Division requirements and be certified in both concentration (ppm_v) and units of the standard (lb/hr).

2. Quality Assurance requirements of Appendix F, 40 CFR part 60.

3. Medicine Bow Fuel & Power, LLC shall develop and submit for the Division's approval a Quality Assurance plan for the monitoring systems listed in this condition within 90 days of initial start-up.

13. Following the initial performance tests, as required by Condition 7 of this permit, compliance with the limits set forth in this permit shall be determined with data from the continuous monitoring systems required by Condition 12 of this permit as follows:

i. Exceedance of the limits shall be defined as follows:

a. Any 30-day rolling average calculated using valid data (output concentration and average hourly volumetric flowrate) from the CEM equipment required in Condition 12 which exceeds the ppm_v or lb/hr limits established for NO_x and CO in this permit. Valid data shall meet the requirements of WAQSR, Chapter 5, Section 2(j). The 30-day average emission rate shall be calculated at the end of each operating day as the arithmetic average of hourly emissions with valid data during the previous 30-day period.

ii. Medicine Bow Fuel & Power, LLC shall comply with all reporting and record keeping requirements as specified in Chapter 5, Section 2(g). Excess NO_x and CO emissions shall be reported in units of ppm_v and lb/hr.

14. Emissions from the auxiliary boiler and heaters shall be limited to the following, and shall apply at all times:

ID	Source	NO_x			CO		
		lb/MMBtu	lb/hr	tpy	lb/MMBtu	lb/hr	tpy
AB	Auxiliary Boiler	0.05	3.2	14.2	0.08	5.4	23.8
B-1	Catalyst Regenerator	0.05	1.1	4.6	0.08	1.8	7.8
B-2	Reactivation Heater	0.05	0.6	2.7	0.08	1.0	4.5
B-3	HGT Reactor Charge Heater	0.05	0.1	0.5	0.08	0.2	0.8
GP-1 – GP-5	Gasifier Preheaters	0.05	1.0	0.3	0.08	1.7	0.4

15a. That annually, or as otherwise specified by the Administrator, the Auxiliary Boiler (AB), Catalyst Regenerator (B-1), Reactivation Heater (B-2), and HGT Reactor Charge Heater (B-3) shall be tested to verify compliance with the NO_x and CO limits set forth in this permit. The first annual test is required the following calendar year after completion of the initial performance test. Testing for NO_x and CO shall be conducted following EPA reference Methods. Notification of the test date shall be provided to the Division fifteen (15) days prior to testing. Results of the tests shall be submitted to the Division within 45 days of completing the tests.

15b. The Air Quality Division shall be notified within 24 hours of any emission unit where the testing/monitoring required by 15(a) of this condition shows operation outside the permitted emission limits. By no later than 7 calendar days of such testing/monitoring event, the owner or operator shall repair and retest/monitor the affected emission unit to demonstrate that the emission unit has been returned to operation within the permitted emission limits. Compliance with this permit condition regarding repair and retesting/monitoring shall not be deemed to limit the authority of the Air Quality Division to cite the owner or operator for an exceedance of the permitted emission limits for any testing/monitoring required by 15(a) of this condition which shows noncompliance.

16. That emissions from the Black Start Generators shall be limited to the following:

ID	Source	NO_x			CO			VOC		
		g/hp-hr	lb/hr	tpy	g/hp-hr	lb/hr	tpy	g/hp-hr	lb/hr	tpy
Gen-1-Gen-3	Black Start Generators	1.0	6.4	0.8	2.4	15.5	1.9	0.9	5.7	0.7

17. That emissions from the Fire Water Pump Engine shall be limited to the following:

ID	Source	NO_x			CO		
		g/hp-hr	lb/hr	tpy	g/hp-hr	lb/hr	tpy
FW-Pump	Fire Water Pump Engine	4.75	6.0	1.5	0.3	0.4	0.1

18. That each Black Start Generator shall be limited to 360 hours of operation during the initial year of operation of the Medicine Bow IGL Plant, and shall be limited to 250 hours of operation per year after the initial year of operation. The Fire Water Pump shall be limited to 500 hours of operation per year. Medicine Bow Fuel & Power shall install, operate and maintain a non-resettable hour meter to determine the hours of operation of each Black Start Generator and Fire Water Pump. Records of the hours of operation shall be kept and maintained and made available to the Division upon request.

19. That Medicine Bow Fuel & Power shall submit a demonstration that fugitive HAPs emissions are as represented in the application (minor source of HAPs) based on a final equipment count (equipment as defined in 40 CFR part 60, subpart VVa) of the as-built facility prior to startup of the facility.

20. Medicine Bow Fuel & Power, LLC shall submit, on an annual basis, a report on actual fugitive HAP emissions for the facility. Actual fugitive HAP emissions shall be calculated using the methodology in the permit application, and the average measured leak detection rates for the past calendar year. The frequency of reporting fugitive HAP emissions may be revised without amending the permit, but revisions to the frequency must be approved by the Division prior to implementation. This report shall include the following:

    a. Total fugitive HAPs emissions for the facility in tons per year
    b. Speciated fugitive HAP emissions for the facility in tons per year
    c. Average leak detection rate by equipment in ppm (equipment as defined in 40 CFR part 60, subpart VVa)
    d. Documentation of fugitive HAP emission calculations

21. Medicine Bow Fuel & Power, LLC shall utilize a LDAR program in accordance with 40 CFR part 60, subpart VVa. Monitoring under the LDAR program shall be conducted a minimum of every six (6) months. Records of monitoring and repair measures shall be kept for a period of at least 5 years and shall be made available to the Division upon request.

22. Medicine Bow Fuel & Power, LLC shall monitor SO_2 emissions from the HP and LP flares. Monitoring of SO_2 emissions shall consist of installing flow monitoring equipment to the flares, and by either direct sampling of the flow to the flares or sampling of the coal. Records shall be kept for a period of at least 5 years and shall be made available to the Division upon request.

23. That the HP and LP flares shall be designed, constructed, operated and maintained to be smokeless, per Chapter 5, Section 2(m) of the WAQSR, with no visible emissions except for periods not to exceed a total of five (5) minutes during any two (2) consecutive hours as determined by Method 22 of 40 CFR part 60, Appendix A.

24. Medicine Bow Fuel & Power, LLC shall maintain and operate the HP and LP flares during all period of active operation such that the controls remain effective as viable emission control devices.

25. That the presence of a pilot flame shall be monitored using a thermocouple and continuous recording device or any other equivalent device to detect the presence of a flame on the HP and LP flares. Medicine Bow Fuel & Power, LLC shall maintain records noting the date and duration of time during active operation when the pilot flame is not present in the HP and LP flares. Records shall be kept for a period of at least 5 years and shall be made available to the Division upon request.

26. The slag storage and handling operation shall be treated with water and/or chemical dust suppressants on a schedule such that treatment remains a viable control measure.

27. The slag storage and handling operation shall be operated and maintained so the operation exhibits no visible emissions as determined by Method 22 of Appendix A, 40 CFR part 60.

28. Medicine Bow Fuel & Power, LLC shall conduct, at minimum, daily visual observations of the slag storage and handling operation to determine the presence of visible emissions. Records shall be kept documenting whether visual emissions are noted and the corrective action taken. These records shall be maintained for a period of five (5) years and shall be made available to the Division upon request.

29. That performance tests shall be conducted on the slag storage and handling operation to determine compliance with Condition 27. Method 22 of Appendix A, 40 CFR part 60, shall be used to determine fugitive particulate emissions. Performance tests shall be at least 30 minutes in duration, with observations taken from each side of the operation. Notification of the test date shall be provided to the Division fifteen (15) days prior to testing. Results shall be submitted to this Division within 45 days of completion.

30. All other sources not covered by NSPS/NESHAP regulations are subject to a 20 percent opacity limit as determined by Method 9 of 40 CFR part 60, Appendix A.

31. During periods of startup, Medicine Bow Fuel & Power, LLC shall adhere to their procedures in their Startup/Shutdown Emission Minimization Plan, attached as Appendix A. This plan may be modified as deemed necessary by Medicine Bow Fuel & Power, LLC without amending the permit, but revisions to the plan shall be approved by the Division prior to implementation.

32. That Medicine Bow Fuel & Power, LLC shall comply with the applicable requirements of 40 CFR part 60, Subpart Dc for the auxiliary boiler.

33. That Medicine Bow Fuel & Power, LLC shall comply with the applicable requirements of 40 CFR part 60, Subpart Kb for the methanol, product gasoline, and heavy gasoline tanks.

34. That Medicine Bow Fuel & Power, LLC shall comply with the applicable requirements of 40 CFR part 60, Subpart Y for the coal preparation facilities.

35. That Medicine Bow Fuel & Power, LLC shall comply with the applicable requirements of 40 CFR part 60, Subpart IIII for the firewater pump engine.

36. That Medicine Bow Fuel & Power, LLC shall comply with the applicable requirements of 40 CFR part 60, Subpart JJJJ for the black start generators.

37. That Medicine Bow Fuel & Power, LLC shall comply with the applicable requirements of 40 CFR part 60, Subpart KKKK for the combustion turbines.

38. That Medicine Bow Fuel & Power, LLC shall comply with the applicable requirements of 40 CFR part 60, Subpart VVa for the IGL Plant.

Saddleback Hills Mine

39. That performance tests shall be conducted on the passive enclosure dust control systems (PECS) and atomizer/fogger systems to determine compliance with Condition 40(a). Method 22 of 40 CFR, Part 60, Appendix A shall be used to determine fugitive particulate emissions. Performance tests shall be at least 30 minutes in duration, with observations taken from each side of the enclosure. Notification of the test date shall be provided to the Division fifteen (15) days prior to testing. Results shall be submitted to this Division within 45 days of completion.

40. That the following requirements shall be met for all passive enclosure control systems (PECS) and atomizer/foggers systems at the mine:

    a. The PECS and atomizer/foggers systems shall be operated and maintained so the system enclosure exhibits no visible emissions as determined by Method 22 of Appendix A, 40 CFR part 60.

    b. That the atomizer/fogger systems and associated monitoring equipment shall be operated during all times that the respective coal preparation facilities are in operation.

    c. Medicine Bow Fuel & Power, LLC shall conduct, at minimum, daily visual observations of the passive enclosure control systems (PECS) and atomizer/fogger systems to determine the presence of visible emissions. Records shall be kept documenting whether visual emissions are noted and the corrective action taken. These records shall be maintained for a period of five (5) years and shall be made available to the Division upon request.

    d. Medicine Bow Fuel & Power, LLC shall institute a monthly preventative maintenance plan for the atomizer/fogger systems.

41. That the coal preparation facilities are subject to 40 CFR part 60, Subpart Y. Subpart Y limits opacity from any coal processing and conveying equipment, including coal crushers and breakers, coal storage systems, and coal transfer and loading systems to less than 20 percent.

42. That Medicine Bow Fuel & Power, LLC shall submit a report detailing the impact of the final Subpart Y rule on the conditions of this permit. The report shall include an applicability determination with respect to the new Subpart Y regulations for each emission unit affected by the rule.

43. The maximum coal production by calendar year at the Saddleback Hills Mine shall not exceed a total production rate of 3.2 million tons as described in the mine plan contained in the application. Medicine Bow Fuel & Power, LLC shall keep and maintain records of annual coal production for the Saddleback Hills Mine.

44. That the dead sealed stockpile shall not exceed 300,000 tons of coal in size. Medicine Bow Fuel & Power, LLC shall keep and maintain records of the size of the stockpile, amount of sealant applied to the storage pile, and dates of when the storage pile is accessed and restored.

45. That the underground mine stockpile shall not exceed a total size of 300,000 tons of coal. Medicine Bow Fuel & Power, LLC shall keep and maintain records of the size of the storage pile and coal throughput of the pile.

46. That the underground mine stockpile shall be treated with water, to the extent necessary, to minimize fugitive emissions. Medicine Bow Fuel & Power, LLC shall keep and maintain records of water treatment on the stockpile.

47. That all unpaved portions of haul roads, access roads, and work areas shall be treated with water and/or chemical suppressants on a schedule sufficient to control fugitive dust from vehicular traffic and wind erosion.

It must be noted that this approval does not relieve you of your obligation to comply with all applicable county, state, and federal standards, regulations or ordinances. Special attention must be given to Chapter 6, Section 2 of the Wyoming Air Quality Standards and Regulations, which details the requirements for compliance with conditions 5, 6 and 7. Attention must be given to Chapter 6, Section 3 of the Wyoming Air Quality Standards and Regulations, which details the requirements for compliance with condition 3 (major sources). Any appeal of this permit as a final action of the Department must be made to the Environmental Quality Council within sixty (60) days of permit issuance per Section 16, Chapter I, General Rules of Practice and Procedure, Department of Environmental Quality.

If we may be of further assistance to you, please feel free to contact this office.

Sincerely,

David A. Finley
Administrator
Air Quality Division

John V. Corra
Director
Dept. of Environmental Quality

cc: Chris Hanify

Table I Saddleback Hills Mine Development Particulate Emissions	
Year	PM_{10} tpy
1	29.8
2	114.5
3	75.8

Table II Medicine Bow IGL Plant Emissions (tpy)						
ID	Description	NO_x	CO	VOC	SO_2	PM/PM_{10}
CT-1	Combustion Turbine	50.6	46.2	6.6	10.8	43.8
CT-2	Combustion Turbine	50.6	46.2	6.6	10.8	43.8
CT-3	Combustion Turbine	50.6	46.2	6.6	10.8	43.8
AB	Auxiliary Boiler [1]	14.2	23.8	1.6	0.2	2.2
B-1	Catalyst Regenerator [1]	4.6	7.8	0.5	0.1	0.7
B-2	Reactivation Heater	2.7	4.5	0.3	0.1	0.4
B-3	HGT Reactor Charge Heater	0.5	0.8	0.1	0.1	0.1
Tanks	Storage	--	--	102.6	--	--
EL	Equipment Leaks	--	--	59.6	--	--
CS	Coal Storage	--	--	--	--	61.1
FW-Pump	Firewater Pump Engine [2]	1.5	0.1	0.3	--	0.1
GP-1 – GP-5	Gasifier Preheaters 1-5 (Planned Maintenance)	<0.1	<0.1	<0.1	<0.1	<0.1
FL-1	HP Flare	0.5	1.0	3.0	3.6	--
FL-2	LP Flare	0.1	0.3	0.7	--	--
Totals		**175.9**	**176.9**	**188.5**	**36.6**	**196.0**

[1] Emissions from these units were estimated based on full load and 8760 hours per year.
[2] Emissions are based on 500 hours of operation per year.

Table III Medicine Bow IGL Plant HAP Emissions (tpy)		
Pollutant	Facility Wide Potential [1]	Largest Emission Source
Benzene	8.5	Equipment Leaks
Formaldehyde	0.7	Turbines
Hexane	1.3	Auxiliary Boiler
Methanol	9.2	Equipment Leaks
Toluene	1.8	Turbines
Other Haps	2.1	--
Total HAPs	23.6	--

[1] Rounded to the nearest tenth of a ton.

Appendix A
Startup/Shutdown Emission Minimization Plan

Rev 0

Startup/Shutdown Emission Minimization Plan
Medicine Bow Fuel & Power

> ***40 CFR §60.11(d): At all times, including periods of startup, shutdown, and malfunction, owners and operators shall, to the extent practicable, maintain and operate any affected facility including associated air pollution control equipment in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the Administrator which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures, and inspection of the source.***

The goal of this Plan is to provide guidelines and suggestions for steps that will minimize air emissions during startup and shutdown periods, in accordance with Clean Air Act permits and regulations, including the provisions from 40 CFR 60 as cited above.

Specific startup and shutdown operating procedures for all process units in the Plant shall incorporate the elements of this Plan to the greatest extent possible.

Flaring Associated with Startup – General Comments

- Commission all downstream equipment and prepare them for operation prior to gasifier startup. This will include preparation of the:
  1. Low Temperature Gas Cleanup (LTGC),
  2. Sour Water Stripper,
  3. Acid Gas Removal (AGR),
  4. Sulfur Recovery Unit (SRU) - Claus Plant,
  5. CO_2 compression, and
  6. Methanol synthesis loop.
- Preparation will include completion of commissioning activities and final signoff, establishment of normal operating levels for fluids, preheating of required components, and start of circulating pumps as necessary.

Flaring Associated with Startup – Activities Following Gasifier Startup

Once a gasifier is started up certain conditions must be met prior to introducing syngas to subsequent stages. These conditions include:

- Gasifier
  - One gasifier will be started at a time at 50% design flow rate. Subsequent gasifiers will not be started until the downstream equipment is ready to receive the increase in syngas volume.
  - After light off a leak check of gasifier piping and components is required.
  - A low pressure and normal operating pressure check are required.
  - Raw syngas will be diverted to flare until after checks are complete. At this stage pressure can be bled into downstream piping to equalize pressures and then the control valve can be fully opened and placed in automatic control.

- The amount of syngas sent downstream will be determined by the startup and status of downstream units.
- Start-up flaring will be at a reduced rate due to a planned slow ramp up of the plant.

- LTGC
  - Leak checks are required after pressurization, but not to delay input to the AGR system.
  - This stage includes several steam generators needed to ensure the syngas temperature is in spec for downstream components. Failure to cool down the syngas can result in a high temperature scenario requiring flare to avoid damage to downstream equipment and catalysts.
  - The syngas temperature must be monitored as the system heats up to prevent a high temperature trip. Temperature setpoints to be defined by AGR vendor and by catalyst vendors for COS and Sour Shift catalysts.

- Sour Water Stripper
  - The sour water unit will send low pressure sour gas to the Claus plant for conversion of ammonia and H_2S to N_2, H2O, and SO_2. Base case is to flare this stream during startup until the SRU is started up. The SRU can start operations at approximately 20% design conditions.

- AGR
  - The AGR will be slowly ramped up at an estimated 10%of design syngas flow per hour.
  - Syngas temperature must be maintained below AGR vendor specifications.
  - The clean high pressure syngas must be vented to flare until the total sulfur in the syngas comes into the specification of less than 0.5 ppmv.
  - Start-up flaring will be at a reduced rate due to slow ramp up of plant.

- Claus Plant
  - When the acid gas reaches approximately 40% H_2S content it can be sent from the AGR to the SRU. Prior to this we will assume the acid gas is flared.
  - Start-up flaring will be at a reduced rate due to slow ramp up of plant.

- Methanol Synthesis
  - No syngas can be sent to the Methanol synthesis loop until sulfur is in spec. Syngas sulfur content must be less than 0.5 ppmv prior to sending to methanol synthesis.
  - If CO_2 is out of spec (>2% vol) for several hours it will result in high water content in the methanol which is not acceptable.
  - Syngas flow rate must be at least 50% of design flow rate prior to being sent to methanol synthesis to prevent compressor surge. This rate will be reviewed and verified during compressor design and surge protection design.
  - After the Methanol step the effluents are primarily low sulfur fuel gases sent to the power block and liquid methanol sent to storage or MTG. No further flaring events as part of startup are expected.

Venting Associated with Startup

- CO_2 Capture
  - CO_2 produced from AGR will need to be vented until sufficient flow is produced to start the compressors. This flow rate is expected to be 25% of design flow rate assuming two compressor trains and a 50% turndown capacity. *This will require confirmation from compressor vendor during FEED engineering.*
  - Start-up venting will be at a reduced rate due to slow ramp up of plant.
  - If during startup export of CO_2 is not feasible then CO_2 will continue to be vented.

- Gasifier heaters
  - Initially all five heaters will be online. Heaters will be started shortly after the refractory is installed to cure the refractory. After refractory cure, the heaters will need to remain in operation to prevent moisture accumulation; otherwise another multiday heater dryout session will be required prior to startup.
  - Medicine Bow will attempt to startup as soon as possible after refractory cure is complete to minimize heater operations. This is the basis of the current plan to commission units from the end of the process to the beginning to ensure that as soon as the gasifiers are commissioned, the plant will be ready to startup and receive syngas. This plan is dependent on the construction and commissioning schedule and a situation may develop where light off is delayed after cure is complete. The time of this delay will determine if the heaters will remain on or be shutdown.
  - As each gasifier is prepared for startup the heaters will be turned off and removed. After full startup is complete, only one heater will be in operation on the spare gasifier.

- MTG heaters
  - These heaters will be brought on line when the unit is prepared to receive methanol and be operated per design.

- Power block
  - The ASUs, which are the major power load for the plant, will be started several days in advance of the gasifier light-off to establish required temperatures in the cold box to generate purified oxygen. Two turbines with heat recovery steam turbine power will be required to start up both ASUs. If the steam turbine is not available, then all three gas turbines at reduced load will be required to startup the ASUs.
  - During plant startup most process units will begin to draw power in preparation for gasifier light off. The main exceptions are the CO_2 Compressors, Methanol Synthesis compressor, and MTG compressor units. All three gas turbines with heat recovery steam power are required to support the plant as it is prepared for full start-up.

- Fugitive emissions
  - Fugitive emissions will be at a reduced rate until Methanol and gasoline are synthesized
  - Tank emissions will be at a reduced rate initially as storage tanks are filled.

- Aux boiler
  - The boiler will be in operation during startup. At a minimum it will be turned down and floated on the system if the heat recovery steam generators are able to support plant steam requirements. *If more steam is required as defined in the FEED, then the aux boiler may be operated at its maximum rate.* After syngas is routed to methanol and the startup steam loads are reduced and process steam is available, the auxiliary boiler can be reduced to minimum.

- Flare pilots
  - Pilots will be lit as part of preparation for gasifier light off.