



June 15, 2020

Ken Parker, Vice President, Facilities Engineering and Operations
Crusoe Energy Systems, Inc. – Eagle 4-9 CTB
1660 17th Street, Suite 350
Denver, Colorado 80202

Dear Mr. Parker:

Montana Air Quality Permit #5243-00 is deemed final as of June 13, 2020, by the Department of Environmental Quality (Department). This permit is for natural gas-fired engines. All conditions of the Department's Decision remain the same. Enclosed is a copy of your permit with the final date indicated.

For the Department,

A handwritten signature in black ink that reads "Julie A. Merkel".

Julie A. Merkel
Permitting Services Section Supervisor
Air Quality Bureau
(406) 444-3626

A handwritten signature in black ink that reads "Ed Warner".

Ed Warner
Lead Engineer – Permitting Services Section
Air Quality Bureau
(406) 444-2467

JM:EW
Enclosure

Montana Department of Environmental Quality
Air, Energy & Mining Division

Montana Air Quality Permit #5243-00

Crusoe Energy Systems, Inc. – Eagle 4-9 CTB
1660 17th Street, Suite 350
Denver, Colorado 80202

June 13, 2020



MONTANA AIR QUALITY PERMIT

Issued To: Crusoe Energy Systems Inc.
Eagle 4-9 CTB
1660 17th Street, Suite 350
Denver, CO 80202

MAQP: #5243-00
Application Complete: 3/31/2020
Preliminary Determination Issued: 5/08/2020
Department's Decision Issued: 5/28/2020
Permit Final: 6/13/2020

A Montana Air Quality Permit (MAQP), with conditions, is hereby granted to Crusoe Energy Systems Inc. (Crusoe) for the Eagle 4-9 CTB facility, pursuant to Sections 75-2-204 and 211 of the Montana Code Annotated (MCA), as amended, and Administrative Rules of Montana (ARM) 17.8.740, *et seq.*, as amended, for the following:

Section I: Permitted Facilities

A. Permitted Equipment

Crusoe proposes to install and operate multiple Waukesha 9394GSI engines with a combined brake horsepower (bhp) not to exceed 5,500 (Emission Unit 1 (EU01)) and multiple Doosan engines with a combined bhp not to exceed 4,000 (EU02) at the Eagle 4-9 CTB facility. The permit is written in a de minimis friendly format so that the limitation is on the total horsepower permitted for each emission unit and not the exact number of engines on site, as long as the resulting engines meet the appropriate emission factors. The engines would be used to generate electricity through the combustion of gas that would otherwise be flared from an existing oil and gas facility. All engines combust gas from a nearby oil and gas facility, and each engine utilizes an air fuel ratio controller and a three-way catalyst to reduce emissions.

B. Plant Location

This facility is to be located approximately 6.3 miles southwest of Buford, Montana, in Section 4, Township 25 North, Range 59 East, in Richland County, 47.952861°N, latitude and -104.108639°W, longitude.

Section II: Conditions and Limitations

A. Conditions

1. Crusoe may operate the following engines (ARM 17.8.749):
 - a. Waukesha 9394GSI engines (EU01) with a combined maximum rated bhp not to exceed 5,500 bhp.
 - b. Doosan engines (EU02) with a combined maximum rated bhp not to exceed 4,000 bhp.
2. Crusoe shall not cause or authorize emissions to be discharged into the outdoor atmosphere from any sources installed after November 23, 1968,

that exhibit an opacity of 20% or greater averaged over 6 consecutive minutes (ARM 17.8.304).

3. Crusoe shall not cause or authorize the use of any street, road, or parking lot without taking reasonable precautions to control emissions of airborne particulate matter (ARM 17.8.308).
4. Crusoe shall not exceed the following limits for oxides of nitrogen (NO_x), carbon monoxide (CO) and volatile organic compounds (VOC) for individual engines in EU01 (ARM 17.8.752).

EU01

NO_x – 0.15 grams per brake horsepower hour (g/bhp-hr)

CO – 0.30 g/bhp-hr

VOC – 0.010 g/bhp-hr

5. Crusoe shall not exceed the following limits for NO_x, CO and VOC for individual engines in EU02 (ARM 17.8.752).

EU02

NO_x – 1.0 g/bhp-hr

CO – 2.0 g/bhp-hr

VOC – 0.7 g/bhp-hr

6. Crusoe shall operate each engine on site as a four-stroke rich-burn design with an Air Fuel Ratio Controller (AFR) and shall utilize a 3-way catalyst to simultaneously control NO_x, CO and VOCs and operate following best combustion practices (ARM 17.8.752).
7. Crusoe shall comply with all applicable standards, limitations, and testing, reporting, recordkeeping and notification requirements contained in Title 40 CFR 60 Subpart A and 40 CFR 60 Subpart JJJJ (ARM 17.8.749, ARM 17.8.340, and 40 CFR 60, Subparts A and JJJJ).
8. Crusoe shall meet the applicable requirements of 40 CFR 63 Subpart ZZZZ through compliance with 40 CFR 60 Subpart JJJJ. If 40 CFR 63 Subpart ZZZZ undergoes revision and specifies new or different requirements for the applicable engines, then Crusoe shall comply with those new requirements (ARM 17.8.749, ARM 17.8.342, and 40 CFR 63 Subpart ZZZZ).

B. Testing Requirements

1. For engines in EU01, Crusoe shall demonstrate compliance with the permit limits in Section II.A.4 via source testing within 180 days after equipment commencement. Source testing shall be conducted for NO_x, CO, and VOCs simultaneously. Compliance test results are determined by the average of three 1-hour or longer runs. Results shall be submitted to the Department to demonstrate compliance with the emission limitations in Section II.A.4 (ARM 17.8.105 and ARM 17.8.749).
2. For engines in EU02, compliance with the emission limitations in Section II.A.5 may be demonstrated by maintaining certification with 40 CFR Subpart JJJJ. If Subpart JJJJ certification is lost on any engine, Crusoe shall demonstrate compliance with the permit limits in Section II.A.5 via source testing of each model of engine that certification is lost within 180 days after losing certification. Source testing shall be conducted for NO_x, CO, and VOCs simultaneously in accordance with 40 CFR 60 Subpart JJJJ. Results shall be submitted to the Department to demonstrate compliance with the emission limitations in Section II.A.5. If there are multiple duplicate models of engines on site, only one of the same model engines needs to be tested (ARM 17.8.105, ARM 17.8.749, ARM 17.8.340 and 40 CFR 60 Subpart JJJJ).
3. Following the calendar date of the initial compliance demonstration for engines in EU01, compliance with the emissions limits in Section II.A.4 shall be demonstrated via source testing for NO_x, CO and VOCs simultaneously within 8,760 engine operating hours or 3 years, whichever comes first. Source testing shall follow the methods defined in 40 CFR 60 Subpart JJJJ or equivalent methods approved by the Department. Future compliance demonstration shall be required at this same frequency for each model of engine on site from the date of the last compliance demonstration (ARM 17.8.105, ARM 17.8.749, ARM 17.8.340 and 40 CFR 60 Subpart JJJJ).
4. Following the calendar date of the initial compliance demonstration for engines in EU02 that have lost 40 CFR 60 Subpart JJJJ certification, compliance with the emissions limits in Section II.A.5 shall be demonstrated via source testing for NO_x, CO and VOCs simultaneously within 8,760 engine operating hours or 3 years, whichever comes first. Source testing shall follow the methods defined in 40 CFR 60 Subpart JJJJ or equivalent methods approved by the Department. Future compliance demonstration shall be required at this same frequency for each model of uncertified engine on site from the date of the last compliance demonstration (ARM 17.8.105, ARM 17.8.749, ARM 17.8.340 and 40 CFR 60 Subpart JJJJ).
5. All compliance source tests shall conform to the requirements of the Montana Source Test Protocol and Procedures Manual (ARM 17.8.106).
6. The Department may require further testing (ARM 17.8.105).

C. Operational Reporting Requirements

1. Crusoe shall supply the Department with annual production information for all emission points, as required by the Department in the annual emission inventory request. The request will include, but is not limited to, all sources of emissions identified in the emission inventory contained in the permit analysis.

Production information shall be gathered on a calendar-year basis and submitted to the Department by the date required in the emission inventory request. Information shall be in the units required by the Department. This information may be used to calculate operating fees, based on actual emissions from the facility, and/or to verify compliance with permit limitations (ARM 17.8.505).

2. Crusoe shall notify the Department of any construction or improvement project conducted, pursuant to ARM 17.8.745, that would include the addition of a new emissions unit, change in control equipment, stack height, stack diameter, stack flow, stack gas temperature, source location, or fuel specifications, or would result in an increase in source capacity above its permitted operation. The notice must be submitted to the Department, in writing, 10 days prior to startup or use of the proposed de minimis change, or as soon as reasonably practicable in the event of an unanticipated circumstance causing the de minimis change, and must include the information requested in ARM 17.8.745(l)(d) (ARM 17.8.745).
3. All records compiled in accordance with this permit must be maintained by Crusoe as a permanent business record for at least 5 years following the date of the measurement, must be available at the plant site for inspection by the Department, and must be submitted to the Department upon request. These records may be stored at a location other than the plant site upon approval by the Department (ARM 17.8.749).

D. Notification

1. Crusoe shall notify the Department in writing of the date of commencement of operation of the engines within 30-days following the date of commencement and confirm the number and type of engines placed into service.

Section III: General Conditions

- A. Inspection – Crusoe shall allow the Department’s representatives access to the source at all reasonable times for the purpose of making inspections or surveys, collecting samples, obtaining data, auditing any monitoring equipment such as Continuous Emission Monitoring Systems (CEMS) or Continuous Emission Rate Monitoring Systems (CERMS), or observing any monitoring or testing, and otherwise conducting all necessary functions related to this permit.

- B. Waiver – The permit and the terms, conditions, and matters stated herein shall be deemed accepted if Crusoe fails to appeal as indicated below.
- C. Compliance with Statutes and Regulations – Nothing in this permit shall be construed as relieving Crusoe of the responsibility for complying with any applicable federal or Montana statute, rule, or standard, except as specifically provided in ARM 17.8.740, *et seq.* (ARM 17.8.756).
- D. Enforcement – Violations of limitations, conditions and requirements contained herein may constitute grounds for permit revocation, penalties, or other enforcement action as specified in Section 75-2-401, *et seq.*, MCA.
- E. Appeals – Any person or persons jointly or severally adversely affected by the Department’s decision may request, within 15 days after the Department renders its decision, upon affidavit setting forth the grounds therefor, a hearing before the Board of Environmental Review (Board). A hearing shall be held under the provisions of the Montana Administrative Procedures Act. The filing of a request for a hearing does not stay the Department’s decision, unless the Board issues a stay upon receipt of a petition and a finding that a stay is appropriate under Section 75-2-211(11)(b), MCA. The issuance of a stay on a permit by the Board postpones the effective date of the Department’s decision until conclusion of the hearing and issuance of a final decision by the Board. If a stay is not issued by the Board, the Department’s decision on the application is final 16 days after the Department’s decision is made.
- F. Permit Inspection – As required by ARM 17.8.755, Inspection of Permit, a copy of the air quality permit shall be made available for inspection by the Department at the location of the source.
- G. Permit Fee – Pursuant to Section 75-2-220, MCA, failure to pay the annual operation fee by Crusoe may be grounds for revocation of this permit, as required by that section and rules adopted thereunder by the Board.
- H. Duration of Permit – Construction or installation must begin or contractual obligations entered into that would constitute substantial loss within 3 years of permit issuance and proceed with due diligence until the project is complete or the permit shall expire (ARM 17.8.762).

Montana Air Quality Permit (MAQP) Analysis
 Crusoe Energy Systems Inc. – Eagle 4-9 CTB
 MAQP #5243-00

I. Introduction/Process Description

A. Permitted Equipment

Crusoe proposes to install and operate multiple Waukesha 9394GSI engines with a combined brake horsepower (bhp) not to exceed 5,500 (Emission Unit 1 (EU01)) and multiple Doosan engines with a combined bhp not to exceed 4,000 (EU02) at the Eagle 4-9 CTB facility. The permit is written in a de minimis friendly format so that the limitation is on the total horsepower permitted for each emission unit and not the exact number of engines on site, as long as the resulting engines meet the appropriate emission factors. The engines would be used to generate electricity through the combustion of gas that would otherwise be flared from an existing oil and gas facility. Other oil and gas extraction equipment located at the site is operated under a different permittee than the engines operated by Crusoe.

B. Source Description

All engines combust gas from a nearby oil and gas facility, and each engine utilizes an air fuel ratio controller and a three-way catalyst to reduce emissions.

This facility is to be located approximately 6.3 miles southwest of Buford, Montana, in Section 4, Township 25 North, Range 59 East, in Richland County, 47.952861°N, latitude and -104.108639°W, longitude.

C. Response to Public Comments

Person/Group Commenting	Draft Permit Reference	Comment	Department Response
No comments received			

II. Applicable Rules and Regulations

The following are partial explanations of some applicable rules and regulations that apply to the facility. The complete rules are stated in the Administrative Rules of Montana (ARM) and are available, upon request, from the Department of Environmental Quality (Department). Upon request, the Department will provide references for location of complete copies of all applicable rules and regulations or copies where appropriate.

A. ARM 17.8, Subchapter 1 – General Provisions, including but not limited to:

1. ARM 17.8.101 Definitions. This rule includes a list of applicable definitions used in this chapter, unless indicated otherwise in a specific subchapter.
2. ARM 17.8.105 Testing Requirements. Any person or persons responsible for the emission of any air contaminant into the outdoor atmosphere shall, upon written request of the Department, provide the facilities and necessary equipment (including instruments and sensing devices) and shall conduct

tests, emission or ambient, for such periods of time as may be necessary using methods approved by the Department.

3. ARM 17.8.106 Source Testing Protocol. The requirements of this rule apply to any emission source testing conducted by the Department, any source or other entity as required by any rule in this chapter, or any permit or order issued pursuant to this chapter, or the provisions of the Clean Air Act of Montana, 75-2-101, *et seq.*, Montana Code Annotated (MCA).

Crusoe shall comply with the requirements contained in the Montana Source Test Protocol and Procedures Manual, including, but not limited to, using the proper test methods and supplying the required reports. A copy of the Montana Source Test Protocol and Procedures Manual is available from the Department upon request.

4. ARM 17.8.110 Malfunctions. (2) The Department must be notified promptly by telephone whenever a malfunction occurs that can be expected to create emissions in excess of any applicable emission limitation or to continue for a period greater than 4 hours.
5. ARM 17.8.111 Circumvention. (1) No person shall cause or permit the installation or use of any device or any means that, without resulting in reduction of the total amount of air contaminant emitted, conceals or dilutes an emission of air contaminant that would otherwise violate an air pollution control regulation. (2) No equipment that may produce emissions shall be operated or maintained in such a manner as to create a public nuisance.

B. ARM 17.8, Subchapter 2 – Ambient Air Quality, including, but not limited to the following:

1. ARM 17.8.204 Ambient Air Monitoring
2. ARM 17.8.210 Ambient Air Quality Standards for Sulfur Dioxide
3. ARM 17.8.211 Ambient Air Quality Standards for Nitrogen Dioxide
4. ARM 17.8.212 Ambient Air Quality Standards for Carbon Monoxide
5. ARM 17.8.213 Ambient Air Quality Standard for Ozone
6. ARM 17.8.214 Ambient Air Quality Standard for Hydrogen Sulfide
7. ARM 17.8.220 Ambient Air Quality Standard for Settled Particulate Matter
8. ARM 17.8.221 Ambient Air Quality Standard for Visibility
9. ARM 17.8.222 Ambient Air Quality Standard for Lead
10. ARM 17.8.223 Ambient Air Quality Standard for PM₁₀

Crusoe must not cause or contribute to a violation of any ambient air quality standard.

C. ARM 17.8, Subchapter 3 – Emission Standards, including, but not limited to:

1. ARM 17.8.304 Visible Air Contaminants. This rule requires that no person may cause or authorize emissions to be discharged into the outdoor atmosphere from any source installed after November 23, 1968, that exhibit an opacity of 20% or greater averaged over 6 consecutive minutes.

2. ARM 17.8.308 Particulate Matter, Airborne. (1) This rule requires an opacity limitation of less than 20% for all fugitive emission sources and that reasonable precautions be taken to control emissions of airborne particulate matter. (2) Under this rule, Crusoe shall not cause or authorize the use of any street, road, or parking lot without taking reasonable precautions to control emissions of airborne particulate matter.
3. ARM 17.8.309 Particulate Matter, Fuel Burning Equipment. This rule requires that no person shall cause, allow, or permit to be discharged into the atmosphere particulate matter caused by the combustion of fuel in excess of the amount determined by this rule.
4. ARM 17.8.310 Particulate Matter, Industrial Process. This rule requires that no person shall cause, allow, or permit to be discharged into the atmosphere particulate matter in excess of the amount set forth in this rule.
5. ARM 17.8.322 Sulfur Oxide Emissions--Sulfur in Fuel. This rule requires that no person shall burn liquid, solid, or gaseous fuel in excess of the amount set forth in this rule.
6. ARM 17.8.324 Hydrocarbon Emissions--Petroleum Products. (3) No person shall load or permit the loading of gasoline into any stationary tank with a capacity of 250 gallons or more from any tank truck or trailer, except through a permanent submerged fill pipe, unless such tank is equipped with a vapor loss control device as described in (1) of this rule.
7. ARM 17.8.340 Standard of Performance for New Stationary Sources and Emission Guidelines for Existing Sources. This rule incorporates, by reference, Title 40 Code of Federal Regulations (40 CFR) Part 60, Standards of Performance for New Stationary Sources (NSPS). Crusoe shall comply with any applicable NSPS.
 - a. 40 CFR 60, Subpart A. This facility is subject to Subpart A because it is also subject to Subpart 40 CFR 60 Subpart JJJJ.
 - b. 40 CFR 60, Subpart JJJJ Standards of Performance for Stationary Spark Ignition Internal Combustion Engines. The proposed engines will be ordered after June 12, 2006, and manufactured after either July 1, 2007 and July 2, 2008, as applicable based on horsepower. Therefore, the engines operated at this facility are subject to this regulation.
8. ARM 17.8.341 Emission Standards for Hazardous Air Pollutants. This source shall comply with the standards and provisions of 40 CFR Part 61, as appropriate. The Department is not aware of any subpart of 40 CFR 61 currently applicable to this facility.
9. ARM 17.8.342 Emission Standards for Hazardous Air Pollutants for Source Categories. This rule incorporates, by reference, 40 CFR Part 63, Emission Standards for Hazardous Air Pollutants.

- a. 40 CFR 63, Subpart A. This facility is subject to Subpart A because it is also subject to Subpart 40 CFR 63 Subpart ZZZZ.
- b. 40 CFR 63, Subpart ZZZZ National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines. Subpart ZZZZ applies to the new reciprocating engines but compliance with Subpart ZZZZ is demonstrated by compliance with 40 CFR 60 Subpart JJJJ. If 40 CFR 63 Subpart ZZZZ undergoes revision and specifies new or different requirements for the applicable engines, then Crusoe shall comply with those new requirements.

D. ARM 17.8, Subchapter 5 – Air Quality Permit Application, Operation, and Open Burning Fees, including, but not limited to:

1. ARM 17.8.504 Air Quality Permit Application Fees. This rule requires that an applicant submit an air quality permit application fee concurrent with the submittal of an air quality permit application. A permit application is incomplete until the proper application fee is paid to the Department. Crusoe submitted the appropriate permit application fee for the current permit action.
2. ARM 17.8.505 Air Quality Operation Fees. An annual air quality operation fee must, as a condition of continued operation, be submitted to the Department by each source of air contaminants holding an air quality permit (excluding an open burning permit) issued by the Department. The air quality operation fee is based on the actual or estimated actual amount of air pollutants emitted during the previous calendar year.

An air quality operation fee is separate and distinct from an air quality permit application fee. The annual assessment and collection of the air quality operation fee, described above, shall take place on a calendar-year basis. The Department may insert into any final permit issued after the effective date of these rules, such conditions as may be necessary to require the payment of an air quality operation fee on a calendar-year basis, including provisions that prorate the required fee amount.

E. ARM 17.8, Subchapter 7 – Permit, Construction, and Operation of Air Contaminant Sources, including, but not limited to:

1. ARM 17.8.740 Definitions. This rule is a list of applicable definitions used in this chapter, unless indicated otherwise in a specific subchapter.
2. ARM 17.8.743 Montana Air Quality Permits--When Required. This rule requires a person to obtain an air quality permit or permit modification to construct, modify, or use any air contaminant sources that have the potential to emit (PTE) greater than 25 tons per year of any pollutant. Crusoe has a PTE greater than 25 tons per year of uncontrolled oxides of nitrogen (NO_x) and carbon monoxide (CO); therefore, an air quality permit is required.

3. ARM 17.8.744 Montana Air Quality Permits--General Exclusions. This rule identifies the activities that are not subject to the Montana Air Quality Permit program.
4. ARM 17.8.745 Montana Air Quality Permits--Exclusion for De Minimis Changes. This rule identifies the de minimis changes at permitted facilities that do not require a permit under the Montana Air Quality Permit Program.
5. ARM 17.8.748 New or Modified Emitting Units--Permit Application Requirements. (1) This rule requires that a permit application be submitted prior to installation, modification, or use of a source. Crusoe submitted the required permit application for the current permit action. (7) This rule requires that the applicant notify the public by means of legal publication in a newspaper of general circulation in the area affected by the application for a permit. Crusoe submitted an affidavit of publication of public notice for the April 1, 2020 issue of the *Sidney Herald*, a newspaper of general circulation in the Town of Sidney in Richland County, as proof of compliance with the public notice requirements.
6. ARM 17.8.749 Conditions for Issuance or Denial of Permit. This rule requires that the permits issued by the Department must authorize the construction and operation of the facility or emitting unit subject to the conditions in the permit and the requirements of this subchapter. This rule also requires that the permit must contain any conditions necessary to assure compliance with the Federal Clean Air Act (FCAA), the Clean Air Act of Montana, and rules adopted under those acts.
7. ARM 17.8.752 Emission Control Requirements. This rule requires a source to install the maximum air pollution control capability that is technically practicable and economically feasible, except that BACT shall be utilized. The required BACT analysis is included in Section III of this permit analysis.
8. ARM 17.8.755 Inspection of Permit. This rule requires that air quality permits shall be made available for inspection by the Department at the location of the source.
9. ARM 17.8.756 Compliance with Other Requirements. This rule states that nothing in the permit shall be construed as relieving Crusoe of the responsibility for complying with any applicable federal or Montana statute, rule, or standard, except as specifically provided in ARM 17.8.740, *et seq.*
10. ARM 17.8.759 Review of Permit Applications. This rule describes the Department's responsibilities for processing permit applications and making permit decisions on those permit applications that do not require the preparation of an environmental impact statement.
11. ARM 17.8.760 Additional Review of Permit Applications. This rule describes the Department's responsibilities for processing permit applications and making permit decisions on those applications that require an environmental impact statement.

12. ARM 17.8.762 Duration of Permit. An air quality permit shall be valid until revoked or modified, as provided in this subchapter, except that a permit issued prior to construction of a new or modified source may contain a condition providing that the permit will expire unless construction is commenced within the time specified in the permit, which in no event may be less than 1 year after the permit is issued.
13. ARM 17.8.763 Revocation of Permit. An air quality permit may be revoked upon written request of the permittee, or for violations of any requirement of the Clean Air Act of Montana, rules adopted under the Clean Air Act of Montana, the FCAA, rules adopted under the FCAA, or any applicable requirement contained in the Montana State Implementation Plan (SIP).
14. ARM 17.8.764 Administrative Amendment to Permit. An air quality permit may be amended for changes in any applicable rules and standards adopted by the Board of Environmental Review (Board) or changed conditions of operation at a source or stack that do not result in an increase of emissions as a result of those changed conditions. The owner or operator of a facility may not increase the facility's emissions beyond permit limits unless the increase meets the criteria in ARM 17.8.745 for a de minimis change not requiring a permit, or unless the owner or operator applies for and receives another permit in accordance with ARM 17.8.748, ARM 17.8.749, ARM 17.8.752, ARM 17.8.755, and ARM 17.8.756, and with all applicable requirements in ARM Title 17, Chapter 8, Subchapters 8, 9, and 10.
15. ARM 17.8.765 Transfer of Permit. This rule states that an air quality permit may be transferred from one person to another if written notice of intent to transfer, including the names of the transferor and the transferee, is sent to the Department.
16. ARM 17.8.770 Additional Requirements for Incinerators. This rule specifies the additional information that must be submitted to the Department for incineration facilities subject to 75-2-215, Montana Code Annotated.

There are no incinerators associated with the proposed engines.

- F. ARM 17.8, Subchapter 8 – Prevention of Significant Deterioration of Air Quality, including, but not limited to:
1. ARM 17.8.801 Definitions. This rule is a list of applicable definitions used in this subchapter.
 2. ARM 17.8.818 Review of Major Stationary Sources and Major Modifications-Source Applicability and Exemptions. The requirements contained in ARM 17.8.819 through ARM 17.8.827 shall apply to any major stationary source and any major modification, with respect to each pollutant subject to regulation under the FCAA that it would emit, except as this subchapter would otherwise allow.

This facility is not a major stationary source because this facility is not a listed source and the facility's PTE is below 250 tons per year of any conventional pollutant.

G. ARM 17.8, Subchapter 12 – Operating Permit Program Applicability:

1. ARM 17.8.1201 Definitions. (23) Major Source under Section 7412 of the FCAA is defined as any source having:
 - a. PTE > 100 tons/year of any pollutant;
 - b. PTE > 10 tons/year of any one hazardous air pollutant (HAP), PTE > 25 tons/year of a combination of all HAPs, or lesser quantity as the Department may establish by rule; or
 - c. PTE > 70 tons/year of particulate matter with an aerodynamic diameter of 10 microns or less (PM₁₀) in a serious PM₁₀ nonattainment area.
2. ARM 17.8.1204 Air Quality Operating Permit Program. (1) Title V of the FCAA amendments of 1990 requires that all sources, as defined in ARM 17.8.1204(1), obtain a Title V Operating Permit. In reviewing and issuing MAQP #5243-00 for Crusoe, the following conclusions were made:
 - a. The facility's PTE is less than 100 tons/year for any pollutant.
 - b. The facility's PTE is less than 10 tons/year for any one HAP and less than 25 tons/year for all HAPs.
 - c. This source is not located in a serious PM₁₀ nonattainment area.
 - d. This facility is subject to 40 CFR 60, Subparts A and Subpart JJJJ.
 - e. This facility is subject to 40 CFR 63, Subparts A and ZZZZ.
 - f. This source is not a Title IV affected source, or a solid waste combustion unit.
 - g. This source is not an EPA designated Title V source.

Based on these facts, the Department determined that Crusoe will be a minor source of emissions as defined under Title V. However, if minor sources subject to NSPS are required to obtain a Title V Operating Permit, Crusoe will be required to obtain a Title V Operating Permit.

III. BACT Determination

A BACT determination is required for each new or modified source. Crusoe shall install on the new or modified source the maximum air pollution control capability which is technically practicable and economically feasible, except that BACT shall be utilized.

A BACT analysis was submitted by Crusoe in permit application #5243-00, addressing available methods of controlling the combustion emissions from the engines. The Department reviewed these methods, as well as previous BACT determinations. The following control options have been reviewed by the Department in order to make the following BACT determination. As all of the proposed engines are rich burn engines, the different engine models are summarized under one BACT analysis since the resulting control technologies for each were identical.

NO_x

The following options were reviewed for NO_x control.

Water/steam injection
Dry low NO_x combustion
Selective catalytic reduction (SCR)
Selective non-catalytic reduction (SNCR)
Non-selective catalytic reduction (NSCR)
Oxidation catalyst
EMx catalyst system

Both the water/steam injection and the dry low NO_x combustion are technologies that would require modifications to the existing engines and are considered technically infeasible for the proposed engines. SCR and SNCR require specific exhaust temperatures for optimal destruction and the exhaust temperatures for the proposed engines are not within the required range for either SCR or SNCR. They are deemed technically infeasible since the exhaust temperature from the proposed engines would be below the recommended ranges. Oxidation catalyst is best suited for lean burn engines and therefore is also eliminated from consideration.

The two remaining identified technologies include NSCR and EMx catalyst. Each of these are considered feasible. EMx is able to operate at the exhaust temperature from the proposed engines, but the costs associated with EMx are more than the costs associated with a non-selective catalyst. The NSCR is estimated to provide up to 90 percent emission reduction. Therefore, NSCR with air fuel ratio controller (AFR) is selected as BACT for NO_x.

VOC and CO Emissions

VOC and CO emissions primarily occur as the result of incomplete combustion. Similar to NO_x control, catalysts that react with CO and VOC's can be used to convert these pollutants to CO₂. Therefore, employing NSCR which uses a 3-way catalyst to treat CO, VOC's and NO_x is selected as BACT. Finding the optimum point in a slightly rich environment can produce very high destruction efficiencies for both CO and VOC's and NO_x at the same time. Just as for NO_x, the use of an AFR is necessary to control the concentration in a slightly rich environment.

Emission levels associated with NSCR and an AFR for the proposed engine models for each pollutant are proposed as follows:

Waukesha 9394GSI Engine or equivalent

NO_x – 0.15 g/bhp-hr
CO – 0.30 g/bhp-hr
VOC – 0.010 g/bhp-hr

Doosan Engine or equivalent

NO_x – 1.0 g/bhp-hr
CO – 2.0 g/bhp-hr
VOC – 0.7 g/bhp-hr

The control options selected have controls and control costs comparable to other recently permitted similar sources and are capable of achieving the appropriate emission standards.

IV. Emission Inventory

Crusoe provided an emissions inventory with the application for MAQP #5243-00. A copy of that inventory is provided here.

Emissions Summary

Source	NO _x ton/yr	CO ton/yr	VOC ton/yr	SO ₂ ton/yr	PM/PM ₁₀ /PM _{2.5} ton/yr	HAPs ton/yr
Engines						
EU01 (total of 5,500 hp)	7.97	15.93	0.53	5.97	3.65	2.30
EU02 (total of 4,000 hp)	38.62	77.25	27.04	3.86	2.36	3.95
Total Facility PTE =	46.59	93.18	27.57	9.83	6.02	6.24

NO_x = oxides of nitrogen
CO = carbon monoxide
VOC = volatile organic compounds
SO₂ = sulfur dioxide
PM = particulate matter (PM)
PM₁₀ = PM with an aerodynamic diameter of 10 microns or less
PM_{2.5} = PM with an aerodynamic diameter of 2.5 microns or less
HAPs = hazardous air pollutants
ton/yr = tons per year
hp = horsepower
PTE = Potential to Emit

Engine Emissions

Source Information

Emission Unit ID:	EU01	
Engine Make/Model	Waukesha 9394 GSI	
Service	Power Generation	
Controls - Y or N / Type	Y	
Horsepower Rating ¹	5,500	horsepower
Fuel Consumption (BSFC) ¹	7,814	Btu/(hp-hr)
Heat Rating ²	42.98	MMBtu/hr
Fuel Consumption ²	250.99	MMscf/yr
Fuel Consumption ²	28,651	scf/hr
Fuel Heating Value ³	1,500	Btu/scf
Operating Hours	8,760	hrs/yr

Pollutant	Total Engines				Source of Emissions Factors
	Emission Factor lb/MMBtu	Emission Factor g/hp-hr	Annual Emissions lb/hr	Annual Emissions ton/yr	
NO _x	-	0.15	1.82	7.97	Manufacturer Specifications
CO	-	0.30	3.64	15.93	Manufacturer Specifications
VOC	-	0.01	0.12	0.53	Manufacturer Specifications
SO ₂	3.17E-02	-	1.36	5.97	AP-42, Chapter 3.2, Table 3.2-3 assuming 10 grains/ 100 scf of H ₂ S in the gas based on footnote (e)
PM ₁₀	1.94E-02	-	0.83	3.65	AP-42, Chapter 3.2, Table 3.2-3
PM _{2.5}	1.94E-02	-	0.83	3.65	AP-42, Chapter 3.2, Table 3.2-3
1,1,2,2-Tetrachloroethane	2.53E-05	-	1.09E-03	4.76E-03	AP-42, Chapter 3.2, Table 3.2-3
1,3-Butadiene	6.63E-04	-	2.85E-02	1.25E-01	AP-42, Chapter 3.2, Table 3.2-3
Acetaldehyde	2.79E-03	-	1.20E-01	5.25E-01	AP-42, Chapter 3.2, Table 3.2-3
Acrolein	2.63E-03	-	1.13E-01	4.95E-01	AP-42, Chapter 3.2, Table 3.2-3
Benzene	1.58E-03	-	6.79E-02	2.97E-01	AP-42, Chapter 3.2, Table 3.2-3
Ethylbenzene	2.48E-05	-	1.07E-03	4.67E-03	AP-42, Chapter 3.2, Table 3.2-3
Formaldehyde	-	0.001	1.21E-02	5.31E-02	Manufacturer Specifications
Methanol	3.06E-03	-	1.32E-01	5.76E-01	AP-42, Chapter 3.2, Table 3.2-3
Methylene Chloride	4.12E-05	-	1.77E-03	7.76E-03	AP-42, Chapter 3.2, Table 3.2-3
PAH	1.41E-04	-	6.06E-03	2.65E-02	AP-42, Chapter 3.2, Table 3.2-3
Toluene	5.58E-04	-	2.40E-02	1.05E-01	AP-42, Chapter 3.2, Table 3.2-3
Xylenes	1.95E-04	-	8.38E-03	3.67E-02	AP-42, Chapter 3.2, Table 3.2-3
Other HAPs ⁴	2.10E-04	-	9.02E-03	3.95E-02	AP-42, Chapter 3.2, Table 3.2-3
Total HAPS	1.19E-02		0.52	2.30	

Notes:

1. Manufacturer specifications.
2. Calculated values.
3. Estimated heating value of the fuel gas.
4. Other HAPs include those HAPs listed in AP-42 below the detection thresholds.

Engine Emissions

Source Information

Emission Unit ID:	EU02	
Engine Make/Model	Doosan 21.9L and 14.6L	
Service	Power Generation	
Controls - Y or N / Type	Y	EPA-Certified
Horsepower Rating	4,000	horsepower
Fuel Consumption (BSFC) ¹	6,948	Btu/(hp-hr)
Heat Rating ²	27.79	MMBtu/hr
Fuel Consumption ²	162.31	MMscf/yr
Fuel Consumption ²	18,528	scf/hr
Fuel Heating Value ³	1,500	Btu/scf
Operating Hours	8,760	hrs/yr

Pollutant	Emission Factor		Annual Emissions		Source of Emissions Factors
	lb/MMBtu	g/hp-hr	lb/hr	ton/yr	
NOx	-	1.00	8.82	38.62	Emissions certification
CO	-	2.00	17.64	77.25	Emissions certification
VOC	-	0.70	6.17	27.04	Emissions certification
SO ₂	3.17E-02	-	0.88	3.86	AP-42, Chapter 3.2, Table 3.2-3 assuming 10 grains/ 100 scf of H ₂ S in the gas based on footnote (e)
PM ₁₀	1.94E-02	-	0.54	2.36	AP-42, Chapter 3.2, Table 3.2-3
PM _{2.5}	1.94E-02	-	0.54	2.36	AP-42, Chapter 3.2, Table 3.2-3
1,1,2,2-Tetrachloroethane	2.53E-05	-	7.03E-04	3.08E-03	AP-42, Chapter 3.2, Table 3.2-3
1,3-Butadiene	6.63E-04	-	1.84E-02	8.07E-02	AP-42, Chapter 3.2, Table 3.2-3
Acetaldehyde	2.79E-03	-	7.75E-02	3.40E-01	AP-42, Chapter 3.2, Table 3.2-3
Acrolein	2.63E-03	-	7.31E-02	3.20E-01	AP-42, Chapter 3.2, Table 3.2-3
Benzene	1.58E-03	-	4.39E-02	1.92E-01	AP-42, Chapter 3.2, Table 3.2-3
Ethylbenzene	2.48E-05	-	6.89E-04	3.02E-03	AP-42, Chapter 3.2, Table 3.2-3
Formaldehyde	2.05E-02	-	5.70E-01	2.50E+00	AP-42, Chapter 3.2, Table 3.2-3
Methanol	3.06E-03	-	8.50E-02	3.72E-01	AP-42, Chapter 3.2, Table 3.2-3
Methylene Chloride	4.12E-05	-	1.15E-03	5.02E-03	AP-42, Chapter 3.2, Table 3.2-3
PAH	1.41E-04	-	3.92E-03	1.72E-02	AP-42, Chapter 3.2, Table 3.2-3
Toluene	5.58E-04	-	1.55E-02	6.79E-02	AP-42, Chapter 3.2, Table 3.2-3
Xylenes	1.95E-04	-	5.42E-03	2.37E-02	AP-42, Chapter 3.2, Table 3.2-3
Other HAPs ⁴	2.10E-04	-	5.83E-03	2.55E-02	AP-42, Chapter 3.2, Table 3.2-3
Total HAPS	3.24E-02		0.90	3.95	

Notes:

1. Manufacturer specification - maximum horsepower using combination of 21.9L and 14.6L units.
2. Calculated values.
3. Estimated heating value of the fuel gas.
4. Other HAPs include those HAPs listed in AP-42 below the detection thresholds.

V. Existing Air Quality

Richland County is currently designated as attainment/unclassifiable for all pollutants.

VI. Ambient Air Impact Analysis

The Department determined, based on the amount of allowable emissions, that the impacts from this permitting action will be minor. The Department believes it will not cause or contribute to a violation of any ambient air quality standard.

VII. Taking or Damaging Implication Analysis

As required by 2-10-105, MCA, the Department conducted the following private property taking and damaging assessment.

YES	NO	
X		1. Does the action pertain to land or water management or environmental regulation affecting private real property or water rights?
	X	2. Does the action result in either a permanent or indefinite physical occupation of private property?
	X	3. Does the action deny a fundamental attribute of ownership? (ex.: right to exclude others, disposal of property)
	X	4. Does the action deprive the owner of all economically viable uses of the property?
	X	5. Does the action require a property owner to dedicate a portion of property or to grant an easement? [If no, go to (6)].
		5a. Is there a reasonable, specific connection between the government requirement and legitimate state interests?
		5b. Is the government requirement roughly proportional to the impact of the proposed use of the property?
	X	6. Does the action have a severe impact on the value of the property? (consider economic impact, investment-backed expectations, character of government action)
	X	7. Does the action damage the property by causing some physical disturbance with respect to the property in excess of that sustained by the public generally?
	X	7a. Is the impact of government action direct, peculiar, and significant?
	X	7b. Has government action resulted in the property becoming practically inaccessible, waterlogged or flooded?
	X	7c. Has government action lowered property values by more than 30% and necessitated the physical taking of adjacent property or property across a public way from the property in question?
	X	Takings or damaging implications? (Taking or damaging implications exist if YES is checked in response to question 1 and also to any one or more of the following questions: 2, 3, 4, 6, 7a, 7b, 7c; or if NO is checked in response to questions 5a or 5b; the shaded areas)

Based on this analysis, the Department determined there are no taking or damaging implications associated with this permit action.

VIII. Environmental Assessment

An environmental assessment, required by the Montana Environmental Policy Act, was completed for this project. A copy is attached.

DEPARTMENT OF ENVIRONMENTAL QUALITY
Air, Energy & Mining Division
Air Quality Bureau
P.O. Box 200901, Helena, Montana 59620
(406) 444-3490

ENVIRONMENTAL ASSESSMENT (EA)

Issued To: Crusoe Energy Systems Inc.
Eagle 4-9 CTB
1660 17th Street, Suite 350
Denver, CO 80202

Montana Air Quality Permit number (MAQP): 5243-00

EA Draft: 5/08/2020

EA Final: 5/28/2020

Permit Final: 6/13/2020

1. *Legal Description of Site:* Section 4, Township 25 North, Range 59 East, in Richland County, 47.952861°N, latitude and -104.108639°W, longitude.
2. *Description of Project:* Construction of an electrical generation facility which would use gas that would otherwise be flared from an existing oil and gas facility which is identified as Eagle 4-9 CTB. Multiple engines are proposed for the site although the Montana Air Quality Permit (MAQP) is written de minimis friendly so if the total horsepower and controls are consistent with the application, there is no restriction on the actual number of engines. No limitation in annual operating hours was required to stay below major permit thresholds.
3. *Objectives of Project:* Provide electrical generation for the oil and gas equipment facility nearby (Eagle 4-9 CTB).
4. *Alternatives Considered:* In addition to the proposed action, the Department also considered the “no-action” alternative. Crusoe has complied with all applicable requirements in obtaining a Montana Air Quality Permit, therefore, the “no-action” alternative was eliminated from further consideration. Other alternatives considered were discussed in the BACT analysis of the permit.
5. *A Listing of Mitigation, Stipulations, and Other Controls:* A list of enforceable conditions, including a BACT analysis, would be included in MAQP #5243-00.

As required under the Sage Grouse Executive Order (EO), the proposed project was reviewed relative to Sage Grouse habitat and the location is not in Sage Grouse habitat as defined under the EO.

6. *Regulatory Effects on Private Property:* The Department considered alternatives to the conditions imposed in this permit as part of the permit development. The Department determined that the permit conditions are reasonably necessary to ensure compliance with applicable requirements and demonstrate compliance with those requirements and do not unduly restrict private property rights.

7. *SUMMARY OF COMMENTS ON POTENTIAL PHYSICAL AND BIOLOGICAL EFFECTS*: The following comments have been prepared by the Department.

A. *Terrestrial and Aquatic Life and Habitats*

The amount of allowable emissions which would be permitted in MAQP #5243-00 would be small on an industrial scale. The amount of allowable emissions after application of control technology would make Crusoe a minor source of emissions under Montana's air quality permitting program. The Department would not expect any significant impact to terrestrial and aquatic life and habitats from the amount of emissions which would be permitted.

The location is not located within designated Sage Grouse Habitat.

B. *Water Quality, Quantity and Distribution*

No discharges into surface waters is expected. Existing drainage patterns would not be changed. No significant water usage is expected as a part of normal operations of the site. No significant impacts would be expected to water quality, quantity, or distribution.

C. *Geology and Soil Quality, Stability and Moisture*

The project site for the Crusoe site has been developed for oil and gas infrastructure. Impacts to geology, soil quality, stability, and moisture from the proposed project would not be expected to be significant.

D. *Vegetation Cover, Quantity, and Quality*

The project site is an oil and gas infrastructure site. Emissions from normal operations at the site would be mostly combustion pollutants including NO_x, and CO with some additional small fraction of VOC and particulate matter. Impacts to vegetation cover, quantity, and quality, would not be expected to be significant.

E. *Aesthetics*

The post-project emissions would not be visible. Some noise would be present near the facility, however, significant noise well beyond the boundaries would not be expected.

Construction activity would be present short term. The overall project size is relatively small. Impacts to aesthetics would not be expected to be significant. The area is rural in nature and the proposed equipment is consistent with other developed oil and gas infrastructure sites.

F. *Air Quality*

No significant impacts are expected to air quality.

G. *Unique Endangered, Fragile, or Limited Environmental Resources*

The amount of allowable emissions which would be permitted by MAQP #5243-00 would be small on an industrial scale. The site location is an existing oil and gas development site. No significant impacts to unique endangered, fragile, or limited environmental resources would be expected from the normal operations emissions from the facility.

In an effort to identify any unique endangered, fragile, or limited environmental resources in the area, the Department contacted the Montana Natural Heritage Program, Natural Resource Information System (NRIS) on the original permit application. The area was defined by the section, township, and range of the proposed location with an additional 1 mile buffer zone. The Species of Concern Data Report include one species occurrence of Whooping Crane, along with other observed species of Hayden's Shrew, Baird's Sparrow, Swift Fox, Sharp-tailed Grouse, Blue Sucker, Brook Stickleback, Burbot, Creek Chub, Iowa Darter, Northern Redbelly Dace, Paddlefish, Pallid Sturgeon, Sauger, Sicklefin Chub, and Sturgeon Chub. There were numerous other potential species identified which match the type of habitat in the selected area.

H. *Sage Grouse Executive Order*

The location is not located within Sage Grouse Habitat as identified under the EO.

I. *Demands on Environmental Resource of Water, Air and Energy*

As discussed in Sections 7.B and 7.F above, no significant impacts to water or air quality is expected. Demand for energy in the form of electricity would be reduced by the generation of electricity from the proposed engines. Demands on water, air, and energy is not expected to be significant.

J. *Historical and Archaeological Sites*

The Department requested a search of the cultural resource information system from the State Historic Preservation Office. According to those records there has not been any previously recorded historical sites within the approximate designated search area. The absence of cultural properties in the area does not mean that they do not exist but rather may reflect the absence of any previous cultural resource inventory in the area.

It is SHPO's position that any structure over fifty years of age is considered historic and is potentially eligible for listing on the National Register of Historic Places. If any structures are to be altered and are over fifty years old, standard recommendations are that they be recorded, and a determination of their eligibility be made.

K. *Cumulative and Secondary Impacts*

This project will support existing oil and gas facilities in the area. MAQP #5243-00 would require control of these emissions, with the resulting amount of allowable emissions being minor on an industrial scale. Any impacts as a result of air emissions

which would be authorized in MAQP #5243-00 would be expected to be minor, if any discernable amount at all.

8. *SUMMARY OF COMMENTS ON POTENTIAL ECONOMIC AND SOCIAL EFFECTS:* The following comments have been prepared by the Department.

A. *Social Structures and Mores*

The project location is rural. No increase in employees is expected to be required as a result of this project. Impacts to social structures and mores, if any, would be expected to be minor.

B. *Cultural Uniqueness and Diversity*

The project location is rural. No increase in employees is expected to be required as a result of this project. Impacts to cultural uniqueness and diversity, if any, would be expected to be minor.

C. *Local and State Tax Base and Tax Revenue*

This project would provide electrical generation. It is unclear whether the resulting electricity would provide an impact on the tax base and tax revenue.

D. *Agricultural or Industrial Production*

Impacts to agricultural or industrial production at the project location would be expected to be minor, if any at all.

E. *Human Health*

MAQP #5243-00 would be written in accordance with rules designed to protect human health. The amount of allowable emissions contained in MAQP #5243-00 would be small on an industrial scale. No significant impact to human health would be expected.

F. *Access to and Quality of Recreational and Wilderness Activities*

The project is not located at or nearby wilderness or recreational access route. Normal operation emissions would not be visible and would be in amounts that are minor on an industrial scale. Noise at the site would exist only at close range. Impacts to access of or quality of recreational and wilderness activities would be expected to be minor, if any.

G. *Quantity and Distribution of Employment*

No increase in the permanent number of people employed by Crusoe would be expected as the result of this project. Temporary construction would be required. Impacts to quantity and distribution of employment, if any, would be expected to be minor.

H. *Distribution of Population*

No increase in the number of people employed by Crusoe would be expected as the result of this project. Temporary construction would be required. Impacts to distribution of population, if any, would be expected to be minor.

I. *Demands for Government Services*

The project would require a Montana Air Quality Permit and the associated administration of that permit. The project would consist of a minor source of emissions. Minor impacts would be expected.

J. *Industrial and Commercial Activity*

Short term construction activities would occur. Once construction would be complete, any impacts to industrial or commercial activity would be expected to be minor, if any at all.

K. *Locally Adopted Environmental Plans and Goals*

The Department is not aware of any other locally adopted environmental plans and goals which this project would affect. MAQP #5243-00 would be issued in accordance with applicable state rules which are designed to protect public health.

L. *Cumulative and Secondary Impacts*

This project supports electrical generation which will be used by area oil and gas infrastructure sites. Using locally produced electricity may mitigate other impacts which might have been caused by getting fuel and electricity to the site.

Recommendation: No Environmental Impact Statement (EIS) is required.

If an EIS is not required, explain why the EA is an appropriate level of analysis: The current permitting action is for the construction and operation of an electrical generation facility using gas which would otherwise be flared from the associated Eagle 4-9 CTB site. MAQP #5243-00 includes conditions and limitations to ensure the facility will operate in compliance with all applicable rules and regulations. In addition, there are no significant impacts associated with this proposal.

Other groups or agencies contacted or which may have overlapping jurisdiction: Montana Historical Society – State Historic Preservation Office, Natural Resource Information System – Montana Natural Heritage Program – Montana Sage Grouse Conservation Program

Individuals or groups contributing to this EA: Department of Environmental Quality – Air Quality Bureau, Montana Historical Society – State Historic Preservation Office, Natural Resource Information System – Montana Natural Heritage Program

EA prepared by: Ed Warner

Date: 4/21/2020