DEQ
Montana Department
of Environmental Quality

December 24, 2015

Matthew Dahan
Denbury Onshore, LLC-Bell Creek Central Facility
5320 Legacy Drive
Plano, TX 75024

Dear Mr. Dahan:

Montana Air Quality Permit #4740-03 is deemed final as of December 24, 2015, by the Department of Environmental Quality (Department). This permit is for an enhanced oil recovery facility. 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,

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

Loni Patterson
Environmental Engineer
Air Quality Bureau
(406) 444-1452

JM: LP
Enclosures

Montana Department of Environmental Quality
Permitting and Compliance Division

Montana Air Quality Permit #4740-03

Denbury Onshore, LLC
Bell Creek Central Facility
5320 Legacy Drive
Plano, Texas 75024

December 24, 2015

MONTANA AIR QUALITY PERMIT

Issued To: Denbury Onshore, LLC
Bell Creek Central Facility
5320 Legacy Drive
Plano, Texas 75024

MAQP: #4740-03
Application Complete: October 1, 2015
Preliminary Determination: November 5, 2015
Department Decision: December 8, 2015
Permit Final: December 24, 2015
AFS #: 075-0005

A Montana Air Quality Permit (MAQP), with conditions, is hereby granted to Denbury Onshore, LLC (Denbury), 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. Plant Location

The Bell Creek Central Facility (Bell Creek) is located in the NW¼ NE¼ of Section 27, Township 8 South, Range 54 East, in Powder River County, Montana.

B. Current Permit Action

On October 1, 2015, the Department of Environmental Quality (Department) received a modification request to remove one heater treater (MBK-1104) and to add one heat media treater (BAP-137) and one circular heater (MBK-1107) to the permit. This permit action will complete the requests. It should be noted that these modifications occurred in March of 2012 and this permit action is reflecting those modifications.

Section II: Conditions and Limitations

A. Emission Limitations

1. Denbury shall operate a vapor recovery unit (VRU) to capture the emissions from all the oil and water storage tanks. The VRU shall inject these emissions into the subsurface (ARM 17.8.752).

2. Denbury shall operate an emergency flare (referred to as the LP Flare) as a backup emission control system for the VRU. This flare shall only be utilized during periods when the VRU is not able to inject its gas stream into the subsurface (ARM 17.8.749).

3. Denbury shall operate an emergency flare (referred to as the HP Flare) as a control device when excess pressure is relieved through the process equipment relief valves and vents. Operation of the HP flare while combusting process gas shall be limited to 500 total hours during any rolling 12-month period (ARM 17.8.749).

4. Denbury shall only burn pipeline quality natural gas in the heat media treater and circular heater (ARM 17.8.752).

5. Denbury shall burn only ultra-low-sulfur diesel (no more than 15 parts per million of sulfur) as fuel for the emergency diesel-fired generator engine (ARM 17.8.752).

6. Denbury shall operate the emergency diesel-fired generator engine for no more than 100 hours per rolling 12-month time period for non-emergency use (ARM 17.8.749).

7. Denbury shall perform the sand pit blowdown procedure for no more than 206 hours per rolling 12-month time period (ARM 17.8.749 and ARM 17.8.1204).

8. Denbury 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).

9. Denbury 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).

10. Denbury shall treat all unpaved portions of the haul roads, access roads, parking lots, or general plant area with water and/or chemical dust suppressant as necessary to maintain compliance with the reasonable precautions limitation in Section II.A.9 (ARM 17.8.752).

11. Denbury shall comply with all applicable standards and limitations, and the reporting, recordkeeping and notification requirements contained in the following:

    a. 40 CFR 60, Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines (ARM 17.8.340 and 40 CFR 60, Subpart IIII)

    b. 40 CFR 63, Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (ARM 17.8.342 and 40 CFR 63, Subpart ZZZZ)

B. Testing Requirements

1. All compliance source tests shall conform to the requirements of the Montana Source Test Protocol and Procedures Manual (ARM 17.8.106).

2. The Department may require further testing (ARM 17.8.105).

C. Operational Reporting Requirements

1. Denbury 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. Denbury 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 Denbury 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 (ARM 17.8.749).

4. Denbury shall document, by month, the emergency diesel-fired generator engine's hours of non-emergency operation. By the 25th day of each month, Denbury shall total the hours for the previous month. The monthly information will be used to verify compliance with the rolling 12-month limitation in Section II.A.6. The information for each of the previous months shall be submitted along with the annual emission inventory (ARM 17.8.749).

5. Denbury shall document, by month, the hours of sand pit blowdown. By the 25th day of each month, Denbury shall total the hours for the previous month. The monthly information will be used to verify compliance with the rolling 12-month limitation in Section II.A.7. The information for each of the previous months shall be submitted along with the annual emission inventory (ARM 17.8.749).

6. Denbury shall document by month, the hours when the HP flare is combusting process gas (when the HP flare is not just combusting pilot gas). By the 25th day of each month, Denbury shall total the hours for the previous month. The monthly information will be used to verify compliance with the rolling 12-month limitation in Section II.A.3. The information for each of the previous months shall be submitted along with the annual emission inventory (ARM 17.8.749).

7. Denbury shall annually certify that its actual emissions are less than those that would require the source to obtain an air quality operating permit as required by ARM 17.8.1204(3)(b). The annual certification shall comply with the certification requirements of ARM 17.8.1207. The annual certification shall be submitted along with the annual emission inventory information (ARM 17.8.749 and ARM 17.8.1204).

SECTION III: General Conditions

A. Inspection – Denbury 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 (CEMS, 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 Denbury fails to appeal as indicated below.

C. Compliance with Statutes and Regulations – Nothing in this permit shall be construed as relieving Denbury 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 therefore, 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. Air Quality Operation Fees – Pursuant to Section 75-2-220, MCA, failure to pay the annual operation fee by Denbury 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 Analysis
Denbury Onshore, LLC – Bell Creek Central Facility
MAQP #4740-03

I. Introduction/Process Description

Denbury Onshore, LLC (Denbury) owns and operates an enhanced oil recovery facility. The facility is located in NW¼ NE¼ of Section 27, Township 8 South, Range 54 East, in Powder River County, Montana, and known as the Bell Creek Central Facility (Bell Creek).

A. Permitted Equipment

Emitting Unit ID	Emitting Unit Description
EG	Emergency Generator – Diesel-fired engine up to 447 horsepower (hp)
MBK-1107	Circular Treater – Natural gas-fired, 2.0 MMBtu/hr)
BAP-137	Heat Media Treater- Natural gas-fired, 27.0 MMBtu/hr
ABJ-1118	Wet Oil Tank – 5,000 barrel (bbl)
ABJ-1119	Dry Oil Tank – 5,000 bbl
ABJ-2119	Dry Oil Tank – 5,000 bbl
ABJ-1108	Slop Oil Tank – 500 bbl
ABM-1120	Water Vortex Tank – 9,700 bbl
ABJ-1129	Produced Water Tank – 5,000 bbl
ABJ-2129	Produced Water Tank – 5,000 bbl
SANDPIT	Sand Pit Blowdown
FUG	Fugitive Emissions
DUST	Dust Emissions
LOAD	Loading/Unloading Emissions
LP Flare	Emergency Flare
HP Flare	Emergency Flare

B. Source Description

Denbury owns and operates the Bell Creek enhanced oil recovery facility. This facility receives carbon dioxide (CO_2) via pipeline and injects it into the subsurface to enhance the volume of oil that is extracted. The extract is returned to Bell Creek in a production stream that contains produced water, CO_2, and oil. The facility equipment separates the oil, produced water, and CO_2. The separated oil is sent offsite to sales, while recovered produced water and CO_2 is reinjected into the subsurface.

There are two planned production streams coming into the facility. Initially there would be a low pressure stream only and then over time, as the reservoir pressure increases, the facility would also utilize a high pressure stream. The low pressure stream first enters the Low Pressure Free Water Knockout. The water is separated and routed to the Water Flash Drum for the collection of flash emissions and then sent to the produced water tanks for disposal in a disposal well. The CO_2 and oil is routed to the Low Pressure Separator. The CO_2 is routed to a Low Pressure Compressor to be compressed and sent to a High Pressure Compressor for recycle back to the reservoir. The oil is routed to the

Heater Treater which separates any additional moisture and CO_2 from the oil before being sent to the oil sales tank. The high pressure stream would follow a similar process utilizing equipment specific to that stream. The process media heater heats a glycol mixture. The glycol mixture is used in the various separation units at the facility to enhance the separation process. The glycol mixture is heated at the heater and transfers through several heat exchangers and separation units before returning to the heater in a closed loop process. The mixture will be reheated and cycled back into the heat exchangers and separators.

To control emissions, Denbury utilizes a Flash Gas Compressor to pick up the emissions from the Heater Treater and Water Flash Drum. This compressor compresses the CO_2 gas and routes it to the low pressure and high pressure compressors for recycling back into the reservoir. If the Flash Gas Compressor were to shut down, the emissions would be routed to an emergency flare, (LP Flare). A Vapor Recovery Unit (VRU) compressor is utilized to capture and control the emissions from the oil and water storage tanks. These emissions are also recycled to the reservoir and in the event of VRU shutdown would be routed to the LP Flare. A second flare, the high pressure flare (HP Flare), is used to combust gases which are released through the process equipment relief valves. The production stream contains sand that has been entrained in the stream as it makes its way from the subsurface to the facility. This sand accumulates in the equipment and must be routinely cleaned out in order to maintain efficient operation. This is accomplished with a sand pit blowdown. The two produced water streams (streams 102B and 301B) are directed into a concrete pit and the system is allowed to depressurize. Both material streams are expected to flash completely and the emissions are released into the atmosphere while the accumulated sand is deposited into the pit. This procedure is expected to occur no more than 34 minutes per day and is limited to no more than 206 hours per year.

C. Permit History

On August 4, 2012, the Department of Environmental Quality – Air Resources Management Bureau (Department) issued **MAQP #4740-00** to Denbury for the Bell Creek enhanced oil extraction facility.

The Department issued MAQP #4740-00 without a necessary permit condition requiring Denbury to annually certify that the emissions from Bell Creek are less than those that would require the facility to obtain an air quality operating permit as required by (ARM 17.8.1204(3)(b)). The Department informed Denbury in an August 3, 2012 correspondence of the need to amend the MAQP to include this condition because it was inadvertently left out of MAQP #4740-00. The MAQP has a federally enforceable permit condition that limits the hours per year that the sand pit blowdown can occur, which, when complied with, ensures that the maximum potential emissions of volatile organic compounds (VOC) does not exceed the major source threshold of 100 tons per year. Therefore, Bell Creek is considered to be a synthetic minor source of emissions and must annually certify that their actual emissions do not exceed major source thresholds. The permitting action added a condition requiring this annual certification to the permit. It is an administrative action in accordance with ARM 17.8.764 because there were no increases in emissions. **MAQP #4740-01** replaced MAQP #4740-00.

On November 18, 2013, the Department received a modification request to add an additional emergency flare at the facility. The proposed new flare is associated with the higher pressure process stream and will be referred to as the HP flare. The existing flare will be referenced as the LP Flare. An incomplete letter was issued to Denbury on December 9, 2013, for missing BACT information. A response was returned to the Department on December 27, 2013, and determined to be complete as of December 27, 2013. **MAQP #4740-02** replaced MAQP #4740-01.

D. Current Permit Action

On October 1, 2015, the Department of Environmental Quality (Department) received a modification request to remove one heater treater (MBK-1104) from the permit and to add one heat media treater (BAP-137) and one circular heater (MBK-1107) to the permit. It should be noted that the modification occurred in March of 2012 and that the permit action will reflect those modifications accordingly. This permit action will complete the modifications to the permit. **MAQP #4740-03** replaces MAQP #4740-02.

E. Additional Information

Additional information, such as applicable rules and regulations, Best Available Control Technology (BACT)/Reasonably Available Control Technology (RACT) determinations, air quality impacts, and environmental assessments, is included in the analysis associated with each change to the permit.

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. 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).

Denbury 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 PM_{10}
11. ARM 17.8.230 Fluoride in Forage

Denbury must maintain compliance with the applicable ambient air quality standards.

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, Denbury 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, 40 CFR Part 60, Standards of Performance for New Stationary Sources (NSPS). Denbury is considered an NSPS affected facility under the following 40 CFR Part 60 subparts.

    a. 40 CFR 60, Subpart A – General Provisions apply to all equipment or facilities subject to an NSPS Subpart as listed below:

    b. 40 CFR 60, Subpart IIII - Standards of Performance for Stationary Compression Ignition Internal Combustion Engines (CI ICE). Owners and operators of stationary CI ICE that commence construction after July 11, 2005, where the stationary CI ICE are manufactured after April 1, 2006, and are not fire pump engines, and owners and operators of stationary CI ICE that modify or reconstruct their stationary CI ICE after July 11, 2005, are subject to this subpart. Based on the information submitted by Denbury, the emergency diesel-fired generator engine is subject to this subpart.

    c. 40 CFR 60, Subpart OOOO – Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution. This subpart has requirements that apply to storage vessels that have commenced construction, modification, or reconstruction after August 23, 2011, with potential Volatile Organic Compounds (VOC) emissions in excess of six tons per year. These affected sources must control those emissions by at least 95%. While this facility does have storage vessels that have uncontrolled VOC emissions in excess of the applicability thresholds, MAQP #4740-03 has enforceable conditions that when complied with would reduce VOC emissions from the affected tanks to levels less than the applicability thresholds. Therefore, this facility does not have storage vessels that meet the applicability requirements of this subpart.

8. ARM 17.8.342 Emission Standards for Hazardous Air Pollutants for Source Categories. The source, as defined and applied in 40 CFR Part 63, shall comply with the requirements of 40 CFR Part 63, as listed below:

   a. 40 CFR 63, Subpart A – General Provisions apply to all equipment or facilities subject to an NESHAP Subpart as listed below:

   b. 40 CFR 63, Subpart HH – National Emissions Standards for Hazardous Air Pollutants (HAPs) from Oil and Natural Gas Production Facilities. Affected units under this subpart are each storage vessel with the potential for flash emissions at major sources of HAPs. Bell Creek would have uncontrolled HAP emissions in excess of major source levels; however, MAQP #4740-02 has enforceable conditions that when complied with would reduce HAP emissions from the affected tanks to levels that bring the facility below the major source threshold. Therefore, this facility is an area source of HAPs and does not have affected sources that meet the applicability requirements of this subpart.

   c. 40 CFR 63, Subpart ZZZZ – National Emissions Standards for HAPs for Stationary Reciprocating Internal Combustion Engines (RICE). An owner or operator of a stationary reciprocating internal combustion engine (RICE) at a major or area source of HAP emissions is subject to this rule except if the stationary RICE is being tested at a stationary RICE test cell/stand. An area source of HAP emissions is a source that is not a major source. Based on the information submitted by Denbury, the emergency diesel-fired generator engine is subject to this subpart.

D. ARM 17.8, Subchapter 4 – Stack Height and Dispersion Techniques, including, but not limited to:

   1. ARM 17.8.401 Definitions. This rule includes a list of definitions used in this chapter, unless indicated otherwise in a specific subchapter.

   2. ARM 17.8.402 Requirements. Denbury must demonstrate compliance with the ambient air quality standards with a stack height that does not exceed Good Engineering Practices (GEP). The proposed height of the new or modified stack for Denbury is below the allowable 65-meter GEP stack height.

E. 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. Denbury 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.

F. 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. Denbury has a PTE greater than 25 tons per year of VOC; 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. Denbury 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. Denbury submitted an affidavit of publication of public notice for the September 23, 24, and 25, 2015 issues of the *Billings Gazette*, a newspaper of general circulation in the City of Billings in Yellowstone 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 Denbury 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 17.8.762 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.

12. 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).

13. 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.

14. 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.

G. 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 pollutant (excluding fugitive emissions).

H. ARM 17.8, Subchapter 12 – Operating Permit Program Applicability, including, but not limited to:

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 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 (PM_{10}) in a serious PM_{10} 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 #4740-02 for Denbury, 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 PM_{10} nonattainment area.

   d. This facility is subject to current NSPS. 40 CFR 60, Subpart A – General Provisions, 40 CFR 60, Subpart IIII - Standards of Performance for Stationary Compression Ignition Internal Combustion Engines, and 40 CFR 60, Subpart OOOO – Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution apply to this facility.

   e. This facility is subject to current NESHAP standards. 40 CFR 63, Subpart A – General Provisions and 40 CFR 63, Subpart ZZZZ - National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines apply to this facility.

   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.

   h. As allowed by ARM 17.8.1204(3), the Department may exempt a source from the requirement to obtain an air quality operating permit by establishing federally enforceable limitations which limit that source's potential to emit.

i. In applying for an exemption under this section, the owner or operator of the source shall certify to the Department that the source's potential to emit, does not require the source to obtain an air quality operating permit.

ii. Any source that obtains a federally enforceable limit on potential to emit shall annually certify that its actual emissions are less than those that would require the source to obtain an air quality operating permit.

Denbury has taken federally enforceable permit limits to keep potential emissions below major source permitting thresholds. Therefore, the facility is not a major source and a Title V operating permit is not required.

The Department determined that the annual reporting requirements contained in the permit are sufficient to satisfy this requirement.

Based on these facts, the Department determined that Denbury 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, Denbury will be required to obtain a Title V Operating Permit.

III. BACT Determination

A BACT determination is required for each new or modified source. Denbury 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.

Circular Heater Treater and Heat Media Heater

The circular heater treater and the heat media heater are natural gas fired equipment. The treater has a maximum rate firing capacity of 2 MMBtu/hr. The heat media heater has a maximum rate firing capacity of 27 MMBtu/hr. The combustion of natural gas has the potential to emit nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compound (VOC) and sulfur dioxide (SO_2) when hydrogen sulfide is present in the fuel source. A BACT analysis was submitted by Denbury in permit application #4740-03, addressing the proposed new emitting units. Proper combustion of natural gas results in low levels of the emissions and is representative of a baseline condition. Pollution control technologies typically achieve their desired destruction efficiencies when they are applied to processes with relatively high concentrations of uncontrolled pollutants. As the uncontrolled pollutant levels decrease, so do the efficiencies of the pollution control device. Pollution control technologies do not provide an adequate level of destruction efficiency when applied to processes that already have low levels of uncontrolled emissions. Control device options considered by Denbury are vapor recovery, low-NOx burners, and post-combustion control device designed to treat engine exhaust.

Vapor recovery units (VRU) recompress the emissions and route them back into the gas stream. The potential VOC emissions are minimal and effective capture of VOCs would not produce noticeable reduction in total VOC emissions. In addition, the introduction of the exhaust gas to the VRU units could impact the quality of the gas being reinjected into the subsurface.

Low NO_x burners are designed to delay the combustion process to achieve a cooler flame which results in lower NO_x emissions. According to the information provided by Denbury, the type of burners used in the heater treater and media heater are not compatible with low-NO_x burner technology due to their small size.

Post-combustion control devices designed to treat exhaust include selective non-catalytic reduction (SNCR) and selective catalytic reduction (SCR). SNCR is based on the chemical reduction of the NO_x molecule into molecular nitrogen and water vapor. A nitrogen-based reducing of the ammonia or urea, is injected into the post combustion flue gas where the NO_x preferentially reacts with reducing agent to form nitrogen and water vapor when the flue gas temperature is between 1,600 and 2,100 degrees Fahrenheit (˚F). NO_x reduction levels for SNCR range from 30 to 50 percent based on EPA fact sheet EPA -452/F-03-031. SCR operates along the same principle as SNCR but a catalyst is used to provide a broader temperature range for the chemical reactions to take place. There many factors affecting the actual removal efficiency of an SCR system with the EPA fact sheet EPA -452/F-03-032 indicating a range of 70-90 percent. However, according to the information provided by Denbury, the correct exhaust temperature and air/fuel ration controller cannot be reliably maintained and is not readily available for smaller combustion devices.

The Department has determined that BACT for the circular heater treater and the heat media heater is proper combustion of pipeline quality has with no-add on control.

IV. Emission Inventory

		Total Controlled Emissions (TPY)						
Facility ID	**Source/Equipment**	**NO_x**	**CO**	**SO_2**	**VOC**	**HAPS**	**H_2S**	**PM**
Generator	Emergency Generator Engine	0.69	0.15	0.05	0.06	-	-	0.05
ABJ-1119 ABJ-2119	(2) 5,000 bbl Dry Oil Tank	-	-	-	3.12	1.18	-	-
ABJ-1118	(1) 5,000 bbl wet oil tank	-	-	-	-	-	-	-
ABJ-1108	(1) 500 bbl slop oil tank	-	-	-	0.02	-	-	-
ABM-1120	(1) 9,700 bbl tank	-	-	-	2.28	0.11	-	-
ABJ-1129 ABJ-2129	Produced Water Tanks (2) 5,000 bbl tanks	-	-	-	-	-	-	-
BAP-137	27.00 MMBtu/hr	10.97	9.21	0.07	0.603	0.199	-	0.834
MBK-1107	2.0 MMBtu/hr	0.81	0.68	0.00	0.045	0.015	-	0.06
Sandpit Blowdown	Sandpit Blowdown	-	-	-	2.9	0.05	0.02	-
Fugitive Equipment Leaks	Fugitive Equipment Leaks	-	-	-	49.46	1.01	-	-
Fugitive Dust	Fugitive Dust	-	-	-	-	-	-	0.06
LP Flare	Emergency Flare	0.14	0.74	-	2.47	1.03	-	0.11
HP Flare	Emergency Flare	0.58	3.18	0.03	7.41	2.08	0.01	0.18
Load	Loading	-	-	-	3.34	0.04	-	-
	Total	13.19	14.0	0.15	71.70	5.71	0.03	1.29

Calculations

Natural gas-fired circular heater treater

Maximum Process Rate = 2 MMBtu/hr (Supplied information)
Fuel Heating Value = 965 Btu/scf (Supplied information)
EF Scaling Factor for Actual Heating Value = (965 Btu/scf) / (1020 Btu/scf) = 0.946 (AP 42, Table 1.4-1, footnote a, 7/98)
Maximum Hours of Operation = 8,760 hrs/yr

Filterable PM Emissions:
Emission Factor = 1.9 lb/10^6 cf (AP 42, Table 1.4-2, all PM<1um, 7/98)
EF Conversion = (1.9 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.00176 lb/MMBtu (AP 42, Table 1.4-1, footnote a, 7/98)
Calculation: (2 MMBtu/hr) * (8760 hrs/yr) * (0.00176 lb/MMBtu) * (ton/2000 lb) = 0.02 ton/yr

Filterable PM_{10} Emissions:
Emission Factor = 1.9 lb/10^6 cf (AP 42, Table 1.4-2, all PM<1um, 7/98)
EF Conversion = (1.9 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.00176 lb/MMBtu (AP 42, Table 1.4-1, footnote a, 7/98)
Calculation: (2 MMBtu/hr) * (8760 hrs/yr) * (0.00176 lb/MMBtu) * (ton/2000 lb) = 0.02 ton/yr

Filterable $PM_{2.5}$ Emissions:
Emission Factor = 1.9 lb/10^6 cf (AP 42, Table 1.4-2, all PM<1um, 7/98)
EF Conversion = (1.9 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.00176 lb/MMBtu (AP 42, Table 1.4-1, footnote a, 7/98)
Calculation: (2 MMBtu/hr) * (8760 hrs/yr) * (0.00176 lb/MMBtu) * (ton/2000 lb) = 0.02 ton/yr

Condensable PM=PM_{10}=$PM_{2.5}$ Emissions:
Emission Factor = 5.7 lb/10^6 cf (AP 42, Table 1.4-2, 7/98)
EF Conversion = (5.7 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.00529 lb/MMBtu (AP 42, Table 1.4-1, footnote a, 7/98)
Calculation: (2 MMBtu/hr) * (8760 hrs/yr) * (0.00529 lb/MMBtu) * (ton/2000 lb) = 0.05 ton/yr

CO Emissions:
Emission Factor = 84 lb/10^6 cf (AP 42, Table 1.4-2, 7/98)
EF Conversion = (84 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.07791 lb/MMBtu (AP 42, Table 1.4-1, footnote a, 7/98)
Calculation: (2 MMBtu/hr) * (8760 hrs/yr) * (0.07791 lb/MMBtu) * (ton/2000 lb) = 0.68 ton/yr

NO_x Emissions:
Emission Factor = 100 lb/10^6 cf (AP 42, Table 1.4-1, Small Boilers < 100 MMBtu/hr, 7/98)
EF Conversion = (100 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.09275 lb/MMBtu (AP 42, Table 1.4-1, footnote a, 7/98)
Calculation: (2 MMBtu/hr) * (8760 hrs/yr) * (0.09275 lb/MMBtu) * (ton/2000 lb) = 0.81 ton/yr

Pb Emissions:
Emission Factor = 0.0005 lb/10^6 cf (AP 42, Table 1.4-2, 7/98)
EF Conversion = (0.0005 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.00000 lb/MMBtu (AP 42, Table 1.4-1, footnote a, 7/98)
Calculation: (2 MMBtu/hr) * (8760 hrs/yr) * (0.00000 lb/MMBtu) * (ton/2000 lb) = 0.00 ton/yr

SO_2 Emissions:
Emission Factor = 0.6 lb/10^6 cf (AP 42, Table 1.4-2, 7/98)
EF Conversion = (0.6 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.00056 lb/MMBtu (AP 42, Table 1.4-1, footnote a, 7/98)
Calculation: (2 MMBtu/hr) * (8760 hrs/yr) * (0.00056 lb/MMBtu) * (ton/2000 lb) = 0.00 ton/yr

VOC Emissions:
Emission Factor = 5.5 lb/10^6 cf (AP 42, Table 1.4-2, 7/98)
EF Conversion = (5.5 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.00510 lb/MMBtu (AP 42, Table 1.4-1, footnote a, 7/98)
Calculation: (2 MMBtu/hr) * (8760 hrs/yr) * (0.00510 lb/MMBtu) * (ton/2000 lb) = 0.04 ton/yr

TOC Emissions:
Emission Factor = 11 lb/10^6 cf (AP 42, Table 1.4-2, 7/98)
EF Conversion = (11 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.01020 lb/MMBtu (AP 42, Table 1.4-1, footnote a, 7/98)
Calculation: (2 MMBtu/hr) * (8760 hrs/yr) * (0.01020 lb/MMBtu) * (ton/2000 lb) = 0.09 ton/yr

CH_4 Emissions:
Emission Factor = 2.3 lb/10^6 cf (AP 42, Table 1.4-2, 7/98)
EF Conversion = (2.3 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.00213 lb/MMBtu (AP 42, Table 1.4-1, footnote a, 7/98)
Calculation: (2 MMBtu/hr) * (8760 hrs/yr) * (0.00213 lb/MMBtu) * (ton/2000 lb) = 0.02 ton/yr
CO2e = 0.02 * 21 = 0.39 ton/yr (CH4 GWP = 21, 40 CFR 98, Subpart A, Table A-1)

N_2O Emissions:
Emission Factor = 2.2 lb/10^6 cf (AP 42, Table 1.4-2, uncontrolled, 7/98)
EF Conversion = (2.2 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.00204 lb/MMBtu (AP 42, Table 1.4-1, footnote a, 7/98)
Calculation: (2 MMBtu/hr) * (8760 hrs/yr) * (0.00204 lb/MMBtu) * (ton/2000 lb) = 0.02 ton/yr
CO2e = 0.02 * 310 = 5.54 ton/yr (N2O GWP = 310, 40 CFR 98, Subpart A, Table A-1)

CO_2 Emissions:
Emission Factor = 120000 lb/10^6 cf (AP 42, Table 1.4-2, 7/98)
EF Conversion = (120000 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 111.30334 lb/MMBtu (AP 42, Table 1.4-1, footnote a, 7/98)
Calculation: (2 MMBtu/hr) * (8760 hrs/yr) * (111.30334 lb/MMBtu) * (ton/2000 lb) = 975.02 ton/yr

CO_2e Emissions:
$CO_2e(Total) = CO_2 + CO_2e(CH_4) + CO_2e(N_2O)$
CO2e(Total) = 975 + 0 + 6 = 981 ton/yr

HAPS

Benzene Emissions:
Emission Factor = 0.0021 ton/yr
EF Conversion = (0.0021 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.00000 lb/MMBtu (AP 42, Table 1.4-3, footnote a, 7/98)
Calculation: (2 MMBtu/hr) * (8760 hrs/yr) * (0.00000 lb/MMBtu) * (ton/2000 lb) = 0.00 ton/yr

Formaldehyde Emissions:
Emission Factor = 0.0075 lb/10^6 cf (AP 42, Table 1.4-3,Natural gas combustion 7/98)
EF Conversion = (0.0075 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.00001 lb/MMBtu (AP 42, Table 1.4-3, footnote a, 7/98)
Calculation: (2 MMBtu/hr) * (8760 hrs/yr) * (0.00001 lb/MMBtu) * (ton/2000 lb) = 0.00 ton/yr

Hexane Emissions:
Emission Factor = 1.8 lb/10^6 cf (AP 42, Table 1.4-3,Natural gas combustion 7/98)
EF Conversion = (1.8 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.00167 lb/MMBtu (AP 42, Table 1.4-3, footnote a, 7/98)
Calculation: (2 MMBtu/hr) * (8760 hrs/yr) * (0.00167 lb/MMBtu) * (ton/2000 lb) = 0.01 ton/yr

Napthalene Emissions
Emission Factor = 0.00061 lb/MMBtu (AP 42, Table 1.4-3, footnote a, 7/98)
EF Conversion = (0.00061 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.00000 lb/MMBtu (AP 42, Table 1.4-3, footnote a, 7/98)
Calculation: (2 MMBtu/hr) * (8760 hrs/yr) * (0.00000 lb/MMBtu) * (ton/2000 lb) = 0.00 ton/yr

Toluene Emissions
Emission Factor = 0.0034 lb/MMBtu (AP 42, Table 1.4-3, footnote a, 7/98)
EF Conversion = (0.0034 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.00000 lb/MMBtu (AP 42, Table 1.4-3, footnote a, 7/98)
Calculation: (2 MMBtu/hr) * (8760 hrs/yr) * (0.00000 lb/MMBtu) * (ton/2000 lb) = 0.00 ton/yr

Natural gas-fired heat media treater

Maximum Process Rate = 27 MMBtu/hr (Supplied information)
Fuel Heating Value = 965 Btu/scf (Supplied information)
EF Scaling Factor for Actual Heating Value = (965 Btu/scf) / (1020 Btu/scf) = 0.946 (AP 42, Table 1.4-1, footnote a, 7/98)
Maximum Hours of Operation = 8,760 hrs/yr

Filterable PM Emissions:
Emission Factor = 1.9 lb/10^6 cf (AP 42, Table 1.4-2, all PM<1um, 7/98)
EF Conversion = (1.9 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.00176 lb/MMBtu (AP 42, Table 1.4-1, footnote a, 7/98)
Calculation: (27 MMBtu/hr) * (8760 hrs/yr) * (0.00176 lb/MMBtu) * (ton/2000 lb) = 0.21 ton/yr

Filterable PM_{10} Emissions:
Emission Factor = 1.9 lb/10^6 cf (AP 42, Table 1.4-2, all PM<1um, 7/98)
EF Conversion = (1.9 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.00176 lb/MMBtu (AP 42, Table 1.4-1, footnote a, 7/98)
Calculation: (27 MMBtu/hr) * (8760 hrs/yr) * (0.00176 lb/MMBtu) * (ton/2000 lb) = 0.21 ton/yr

Filterable $PM_{2.5}$ Emissions:
Emission Factor = 1.9 lb/10^6 cf (AP 42, Table 1.4-2, all PM<1um, 7/98)
EF Conversion = (1.9 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.00176 lb/MMBtu (AP 42, Table 1.4-1, footnote a, 7/98)
Calculation: (27 MMBtu/hr) * (8760 hrs/yr) * (0.00176 lb/MMBtu) * (ton/2000 lb) = 0.21 ton/yr

Condensable PM=PM_{10}=$PM_{2.5}$ Emissions:
Emission Factor = 5.7 lb/10^6 cf (AP 42, Table 1.4-2, 7/98)
EF Conversion = (5.7 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.00529 lb/MMBtu (AP 42, Table 1.4-1, footnote a, 7/98)
Calculation: (27 MMBtu/hr) * (8760 hrs/yr) * (0.00529 lb/MMBtu) * (ton/2000 lb) = 0.63 ton/yr

CO Emissions:
Emission Factor = 84 lb/10^6 cf (AP 42, Table 1.4-2, 7/98)
EF Conversion = (84 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.07791 lb/MMBtu (AP 42, Table 1.4-1, footnote a, 7/98)
Calculation: (27 MMBtu/hr) * (8760 hrs/yr) * (0.07791 lb/MMBtu) * (ton/2000 lb) = 9.21 ton/yr

NO_x Emissions:
Emission Factor = 100 lb/10^6 cf (AP 42, Table 1.4-1, Small Boilers < 100 MMBtu/hr, 7/98)
EF Conversion = (100 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.09275 lb/MMBtu (AP 42, Table 1.4-1, footnote a, 7/98)
Calculation: (27 MMBtu/hr) * (8760 hrs/yr) * (0.09275 lb/MMBtu) * (ton/2000 lb) = 10.97 ton/yr

Pb Emissions:
Emission Factor = 0.0005 lb/10^6 cf (AP 42, Table 1.4-2, 7/98)
EF Conversion = (0.0005 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.00000 lb/MMBtu (AP 42, Table 1.4-1, footnote a, 7/98)
Calculation: (27 MMBtu/hr) * (8760 hrs/yr) * (0.00000 lb/MMBtu) * (ton/2000 lb) = 0.00 ton/yr

SO_2 Emissions:
Emission Factor = 0.6 lb/10^6 cf (AP 42, Table 1.4-2, 7/98)
EF Conversion = (0.6 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.00056 lb/MMBtu (AP 42, Table 1.4-1, footnote a, 7/98)
Calculation: (27 MMBtu/hr) * (8760 hrs/yr) * (0.00056 lb/MMBtu) * (ton/2000 lb) = 0.07 ton/yr

VOC Emissions:
Emission Factor = 5.5 lb/10^6 cf (AP 42, Table 1.4-2, 7/98)
EF Conversion = (5.5 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.00510 lb/MMBtu (AP 42, Table 1.4-1, footnote a, 7/98)
Calculation: (27 MMBtu/hr) * (8760 hrs/yr) * (0.00510 lb/MMBtu) * (ton/2000 lb) = 0.60 ton/yr

CH_4 Emissions:
Emission Factor = 2.3 lb/10^6 cf (AP 42, Table 1.4-2, 7/98)
EF Conversion = (2.3 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.00213 lb/MMBtu (AP 42, Table 1.4-1, footnote a, 7/98)
Calculation: (27 MMBtu/hr) * (8760 hrs/yr) * (0.00213 lb/MMBtu) * (ton/2000 lb) = 0.25 ton/yr
CO2e = 0.25 * 21 = 5.30 ton/yr (CH4 GWP = 21, 40 CFR 98, Subpart A, Table A-1)

N_2O Emissions:
Emission Factor = 2.2 lb/10^6 cf (AP 42, Table 1.4-2, uncontrolled, 7/98)
EF Conversion = (2.2 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.00204 lb/MMBtu (AP 42, Table 1.4-1, footnote a, 7/98)
Calculation: (27 MMBtu/hr) * (8760 hrs/yr) * (0.00204 lb/MMBtu) * (ton/2000 lb) = 0.24 ton/yr
CO2e = 0.24 * 310 = 74.81 ton/yr (N2O GWP = 310, 40 CFR 98, Subpart A, Table A-1)

CO_2 Emissions:
Emission Factor = 120000 lb/10^6 cf (AP 42, Table 1.4-2, 7/98)
EF Conversion = (120000 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 111.30334 lb/MMBtu (AP 42, Table 1.4-1, footnote a, 7/98)
Calculation: (27 MMBtu/hr) * (8760 hrs/yr) * (111.30334 lb/MMBtu) * (ton/2000 lb) = 13,162.73 ton/yr
Emission Factor = 22300 lb/10^3 gal (AP 42, Table 1.3-12, No. 2, 5/10)
Control Efficiency = 0%
Calculation: (27 MMBtu/hr) * (8760 hrs/yr) * (22300 lb/10^3 gal) * (ton/2000 lb) = 2,637,198.00000 ton/yr
Calculation: (27 MMBtu/hr) * (8760 hrs/yr) * (22300 lb/10^3 gal) * (ton/2000 lb) * (1 - 0/100) = 2,637,198.00000 ton/yr

HAPS

Benzene Emissions:
Emission Factor = 0.0021 ton/yr
EF Conversion = (0.0021 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.00000 lb/MMBtu (AP 42, Table 1.4-3, footnote a, 7/98)
Calculation: (27 MMBtu/hr) * (8760 hrs/yr) * (0.00000 lb/MMBtu) * (ton/2000 lb) = 0.00 ton/yr

Formaldehyde Emissions:
Emission Factor = 0.0075 lb/10^6 cf (AP 42, Table 1.4-3,Natural gas combustion 7/98)
EF Conversion = (0.0075 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.00001 lb/MMBtu (AP 42, Table 1.4-3, footnote a, 7/98)
Calculation: (27 MMBtu/hr) * (8760 hrs/yr) * (0.00001 lb/MMBtu) * (ton/2000 lb) = 0.00 ton/yr

Hexane Emissions:
Emission Factor = 1.8 lb/10^6 cf (AP 42, Table 1.4-3,Natural gas combustion 7/98)
EF Conversion = (1.8 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.00167 lb/MMBtu (AP 42, Table 1.4-3, footnote a, 7/98)
Calculation: (27 MMBtu/hr) * (8760 hrs/yr) * (0.00167 lb/MMBtu) * (ton/2000 lb) = 0.20 ton/yr

Napthalene Emissions
Emission Factor = 0.00061 lb/MMBtu (AP 42, Table 1.4-3, footnote a, 7/98)
EF Conversion = (0.00061 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.00000 lb/MMBtu (AP 42, Table 1.4-3, footnote a, 7/98)
Calculation: (27 MMBtu/hr) * (8760 hrs/yr) * (0.00000 lb/MMBtu) * (ton/2000 lb) = 0.00 ton/yr

Toluene Emissions
Emission Factor = 0.0034 lb/MMBtu (AP 42, Table 1.4-3, footnote a, 7/98)
EF Conversion = (0.0034 lb/10^6 cf) / (1,020 MMBtu/10^6 cf) * (0.946) = 0.00000 lb/MMBtu (AP 42, Table 1.4-3, footnote a, 7/98)
Calculation: (27 MMBtu/hr) * (8760 hrs/yr) * (0.00000 lb/MMBtu) * (ton/2000 lb) = 0.00 ton/yr

Haul Roads

Vehicle Miles Traveled (VMT) per Day = 0.12 VMT/day (Estimate)
VMT per hour = (0.115068493150685 VMT/day) * (day/24 hrs) = 0.00 VMT/hr
Hours of Operation = 8,760 hrs/yr

PM Emissions:

Predictive equation for emission factor for unpaved roads at industrial sites provided per AP 42, Ch. 13.2.2, 11/06.
Emission Factor = k * (s / 12)^a * (W / 3)^b = 3.39 lb/VMT
Where: k = constant = 4.9 lbs/VMT (Value for PM30/TSP, AP 42, Table 13.2.2-2, 11/06)
s = surface silt content = 7.1 % (Mean value, sand/gravel processing, material storage area, AP 42, Table 13.2.2-1, 11/06)

W = mean vehicle weight = 3 tons (supplied information)
a = constant = 0.7 (Value for PM30/TSP, AP 42, Table 13.2.2-2, 11/06)
b = constant = 0.45 (Value for PM30/TSP, AP 42, Table 13.2.2-2, 11/06)

Control Efficiency = 50% (Water spray or chemical dust suppressant)
Calculation: (8760 hrs/yr) * (0.00 VMT/hr) * (3.39 lb/VMT) * (ton/2000 lb) = 0.07 tons/yr (Uncontrolled Emissions)
Calculation: (8760 hrs/yr) * (0.00 VMT/hr) * (3.39 lb/VMT) * (ton/2000 lb) * (1-50/100) = 0.04 tons/yr (Apply 50% control efficiency)

PM_{10} Emissions:

Predictive equation for emission factor for unpaved roads at industrial sites provided per AP 42, Ch. 13.2.2, 11/06.
Emission Factor = k * (s / 12)^a * (W / 3)^b = 0.94 lb/VMT
Where: k = constant = 1.5 lbs/VMT (Value for PM10, AP 42, Table 13.2.2-2, 11/06)
s = surface silt content = 7.1 % (Mean value, sand/gravel processing, material storage area, AP 42, Table 13.2.2-1, 11/06)
W = mean vehicle weight = 3 tons (supplied information)
a = constant = 0.9 (Value for PM10, AP 42, Table 13.2.2-2, 11/06)
b = constant = 0.45 (Value for PM10, AP 42, Table 13.2.2-2, 11/06)
Control Efficiency = 50% (Water spray or chemical dust suppressant)
Calculation: (8760 hrs/yr) * (0.00 VMT/hr) * (0.94 lb/VMT) * (ton/2000 lb) = 0.02 tons/yr (Uncontrolled Emissions)
Calculation: (8760 hrs/yr) * (0.00 VMT/hr) * (0.94 lb/VMT) * (ton/2000 lb) * (1-50/100) = 0.01 tons/yr (Apply 50% control efficiency)

$PM_{2.5}$ Emissions:

Predictive equation for emission factor for unpaved roads at industrial sites provided per AP 42, Ch. 13.2.2, 11/06.
Emission Factor = k * (s / 12)^a * (W / 3)^b = 0.09 lb/VMT
Where: k = constant = 0.15 lbs/VMT (Value for PM2.5, AP 42, Table 13.2.2-2, 11/06)
s = surface silt content = 7.1 % (Mean value, sand/gravel processing, material storage area, AP 42, Table 13.2.2-1, 11/06)
W = mean vehicle weight = 3 tons (supplied information)
a = constant = 0.9 (Value for PM2.5, AP 42, Table 13.2.2-2, 11/06)
b = constant = 0.45 (Value for PM2.5, AP 42, Table 13.2.2-2, 11/06)
Control Efficiency = 50% (Water spray or chemical dust suppressant)
Calculation: (8760 hrs/yr) * (0.00 VMT/hr) * (0.09 lb/VMT) * (ton/2000 lb) = 0.00 tons/yr (Uncontrolled Emissions)
Calculation: (8760 hrs/yr) * (0.00 VMT/hr) * (0.09 lb/VMT) * (ton/2000 lb) * (1-50/100) = 0.00 tons/yr (Apply 50% control efficiency)

Emergency diesel-fired generator engine
Operational Capacity of Engine = 447 hp
Hours of Operation = 100 hours

Total $PM/PM_{10}/PM_{2.5}$ Emissions:
Emission Factor = 0.0022 lbs/hp-hr (All PM < 1 μm, AP-42, Sec. 3.3, Table 3.3-1, 10/96)
Calculation: (100 hours) * (447 hp) * (0.0022 lbs/hp-hr) * (ton/2000 lb) = 0.05 ton/yr

NO_x Emissions:
Emission Factor = 0.031 lbs/hp-hr (AP-42, Sec. 3.3, Table 3.3-1, 10/96)
Calculation: (100 hours) * (447 hp) * (0.031 lbs/hp-hr) * (ton/2000 lb) = 0.69 ton/yr

CO Emissions:
Emission Factor = 0.00668 lbs/hp-hr (AP-42, Sec. 3.3, Table 3.3-1, 10/96)
Calculation: (100 hours) * (447 hp) * (0.00668 lbs/hp-hr) * (ton/2000 lb) = 0.15 ton/yr

VOC Emissions:
Emission Factor = 0.0025141 lbs/hp-hr (AP-42, Sec. 3.3, Table 3.3-1, TOC, Exhaust & Crankcase, 10/96)
Calculation: (100 hours) * (447 hp) * (0.0025141 lbs/hp-hr) * (ton/2000 lb) = 0.06 ton/yr

SO_2 Emissions:
Emission Factor = 0.00205 lbs/hp-hr (AP-42, Sec. 3.3, Table 3.3-1, 10/96)
Calculation: (100 hours) * (447 hp) * (0.00205 lbs/hp-hr) * (ton/2000 lb) = 0.046 ton/yr

The following emissions represent maximum potential emissions of the sand pit blowdown if it occurred continuously (8,760 hours/year).

Sources Contributing to Blowdown Emissions		E&P Emissions based on continuous operation		
		VOCs (tpy)	HAPs (tpy)	H2S*** (tpy)
Natural Gas Separator	MBD-1101	122.933	2.090	0.000
Heater Treater	MBK 1107	0.000	0.000	0.000

Sand pit blowdown is limited to no more than 206 hours per year; therefore, the maximum potential emissions from this activity are:

$$\text{VOC: } \frac{122{,}933 \text{ tons}}{\text{year}} \times \frac{206 \text{ hours}}{8{,}760 \text{ hours}} = 2.9 \frac{\text{tons}}{\text{year}}$$

$$\text{HAPs: } \frac{2.090 \text{ tons}}{\text{year}} \times \frac{206 \text{ hours}}{8{,}760 \text{ hours}} = 0.05 \frac{\text{tons}}{\text{year}}$$

FUGITIVE EMISSIONS
POTENTIAL-TO-EMIT CALCULATIONS

Equipment Leaks

Component	Count			THC Emission Factors [b] (kg/comp-hr)			Calculated THC Emissions (lb/hr)			Total THC Emissions	
	Lt. Crude	Gas	Produced Water	Lt. Crude	Gas	Produced Water	Lt. Crude	Gas	Produced Water	(lb/hr)	(tpy)
Connections	1430	2672	1144	2.1E-04	2.0E-04	1.1E-04	0.662	1.178	0.277	2.118	9.28
Flanges	586	433	469	1.1E-04	3.9E-04	2.9E-06	0.142	0.372	0.003	0.517	2.27
Open-Ends	51	96	41	1.4E-03	2.0E-03	2.5E-04	0.157	0.423	0.022	0.603	2.64
Pumps	2	0	1.6	1.3E-02	2.4E-03	2.4E-05	0.057	0.000	0.000	0.057	0.25
Valves	475	575	380	2.5E-03	4.5E-03	9.8E-05	2.618	5.705	0.082	8.406	36.82
Others	26	57	21	7.5E-03	8.8E-03	1.4E-02	0.430	1.106	0.642	2.178	9.54
TOTALS:	2570	3833	2056				4.07	8.79	1.03	13.88	60.80

a Others category includes instruments, loading arms, pressure relief valves, stuffing boxes, compressor seals, dump lever arms, and vents.
b Refer to EPA Publication No.: 453/R-95-017; "Protocol for Equipment Leak Emision Estimates", Table 2-4.

Data Input Cells

Component Speciation
Based on HYSIS output 46,160 lb mole/hr Overall Stream
Stream 100- Overall Composition

Component	Stream Profile (mole %)	Mass Flow Rate (lb/hr)	Stream Flow Rate (lb/hr)	Stream Profile (wt %)	Fugitive Emissions (lb/hr)	Fugitive Emissions (tpy)
Methane	0.0094	6,983.1421	6,983.1421	0.1851	2.57	11.25
Ethane	0.0000	54.0837	54.0837	0.0014	0.02	0.09
Propane	0.0003	540.3192	540.3192	0.0143	0.20	0.87
i-Butane	0.0002	471.6112	471.6112	0.0125	0.17	0.76
n-Butane	0.0003	839.6522	839.6522	0.0223	0.31	1.35
i-Pentane	0.0002	773.8419	773.8419	0.0205	0.28	1.25
n-Pentane	0.0002	642.0746	642.0746	0.0170	0.24	1.03
n-Hexane*	0.0001	348.3518	348.3518	0.0092	0.13	0.56
Hexanes +	0.0058	26,797.6442	26,797.6442	0.7102	9.86	43.18
Benzene*	0.0000	0.8550	0.8550	0.0000	0.00	0.00
Ethyl Benzene*	0.0000	3.9169	3.9169	0.0001	0.00	0.01
Toluene*	0.0000	7.3301	7.3301	0.0002	0.00	0.01
Xylene*	0.0001	268.4320	268.4320	0.0071	0.10	0.43
THC TOTAL	0.0166	37731.2549	37731.2549	1.0000	13.88	60.80
			TOTAL VOC	0.81	11.29	49.46
			TOTAL HAPS	0.02	0.23	1.01
H2O	0.9114	757,895.8478	757,895.8478	0.8047	11.17	48.92
CO2	0.0719	146,013.5530	146,013.5530	0.1550	2.15	9.43
H2S	0.0000	5.6967	5.6967	0.0000	0.00	0.00
Nitrogen	0.0001	151.2011	151.2011	0.0002	0.00	0.01
STREAM TOTAL	1.0072	972,492	941,798	1.9599	27.20	119.16

THC=Total Hydrocarbons

Conversion Factors

2,000	lb/ton
8,760	hr/yr

CALCULATION METHODOLOGY

Calculated THC Emissions (lb/hr) = Component Count * THC Emission Factor (kg/comp-hr) * 2.205 lb/kg
Total THC Emissions (lb/hr) = (Lt. Crude + Gas) Calculated THC Emissions (lb/hr)
Total THC Emissions (tpy) = Total Emissions (lb/hr) * 8760 hr/yr * (1 ton / 2000 lb)
Stream Flow Rate (lb/hr) = Stream Flow Rate (lb mole/hr) * MW
THC Profile (wt %) = THC Flow Rate (lb/hr) / Total THC Flow Rate (lb/hr)
HC Fugitive Emissions (lb/hr) = THC Profile (wt %) * Total THC Emissions (lb/hr)
HC Fugitive Emissions (tpy) = Total THC Emissions (lbs/hr) * 8760 (hrs/yr)*1/2000 (lbs/ton)
Non-HC Fugitive Emissions (lb/hr) = (Stream Profile (wt %) / VOC Stream Profile (wt %)) * Total VOC Emissions (lb/hr)
Non-HC Fugitive Emissions (tpy) = (Stream Profile (wt %) / VOC Stream Profile (wt %)) * Total VOC Emissions (tpy)

ASSUMPTIONS:
Fugitive emissions and component speciation data is based on the HYSYS Inlet Stream 100

TRUCK LOADING EMISSIONS
POTENTIAL-TO-EMIT CALCULATIONS

Emission Source / Emission Unit ID	Truck Loading Load		
Oil Production Rate	6,834	bbl/day	HYSYS Stream 119
Throughput*	68.34	bbl/day	estimate based on predicted production
Average Sales Oil Temperature	578	°R	HYSYS Stream 119
Vapor Molecular Weight	45.0	lb/lb mole	HYSYS Stream 119
Saturation Factor	0.6		per AP-42

*Oil is sold by pipeline. Therefore truck loading is for maintenance purposes only.
Throughput was estimated at 1% of the oil production rate.

Reid Vapor Pressure = 6.19
(HYSYS Ouput-Stream 119)

True Vapor Pressure @ Average Tank ABJ-1129 Temperature = 10.98
(HYSYS Ouput-Stream 119)

L_L - lb/1000 gallons loaded = 12.46 x S x P x M/T

Where: L_L = loading loss, lb/1,000 gal loaded
S = saturation factor
P = true vapor pressure of liquid loaded, psia
M = molecular weight of tank vapors, lb/lb mole
T = temperature of bulk liquid loaded, °R

L_L =	6.40	lb/1000 gal loaded
Total HC Emissions =	18.36	lb/day
	0.77	lb/hr

Stream 119 Compositions From HYSYS Simulation

Component	Mass Fraction (HYSYS Data)	Loading Emissions lb/hr	Loading Emissions tpy
Propane	0.0005	0.00	0.00
i-Butane	0.0019	0.00	0.01
n-Butane	0.0047	0.00	0.02
i-Pentane	0.0088	0.01	0.03
n-Pentane	0.0084	0.01	0.03
n-Hexane*	0.0065	0.00	0.02
Hexanes +	0.9590	0.73	3.21
Benzene*	0.0000	0.00	0.00
Ethyl Benzene*	0.0001	0.00	0.00
Toluene*	0.0002	0.00	0.00
Xylene*	0.0061	0.00	0.02
TOTAL VOCs	**0.9962**	0.76	3.34
TOTAL HAPs	**0.0129**	0.01	0.04
Methane	0.0000	0.00	0.00
Ethane	0.0000	0.00	0.00
H2O	0.0000	0.00	0.00
CO2	0.0036	0.00	0.00
H2S	0.0000	0.00	0.00
Nitrogen	0.0000	0.00	0.00
TOTALS	0.9998	0.76	3.34

Data Input Cells

Conversion Factors

2,000	lb/ton
379	scf/lb mole
24	hr/day
60	min/hr
1,000,000	BTU/mmBTU
1,000	scf/mscf
8,760	hr/yr
42	gal/bbl
1,000	scf/mscf
459.69	deg R=deg F + 459.69

CALCULATION METHODOLOGY

Total HC Emissions (lb/hr) = Loading Loss (lb/1000 gal loaded) * Loading Rate (bbl/hr) * 42 gal/bbl
Total HC Emissions (tpy) = Loading Loss (lb/1000 gal loaded) * Total Annual Throughput (bbl/yr) * 42 gal/bbl / 2,000 lb/ton
Loading Emissions (lb/hr) = Total HC Emissions (lb/hr) * Component Mass Fraction
Loading Emissions (tpy) = Mass Fraction (lbs/hr) *8760 hrs/yr/2000 lbs/ton

FUGITIVE DUST EMISSIONS
POTENTIAL-TO-EMIT CALCULATIONS

Source:	Fugitive Dust				
	Vehicle 1	Vehicle 2	Vehicle 3	Vehicle 4	
Mean Vehicle Weight (tons)	3	3	0	0	facility supplied
Vehicle distance traveled on site (ft)	300	300	0	0	facility supplied
Total trips per year	365	365	0	0	facility supplied
Emission Factors [a]	PM10 (lb/VMT)				Data Input Cells
Small (<50 tons)	2.7				
Medium (50-100 tons)	3.6				
Large (>100 tons)	4.5				

[a] Montana DEQ "Instructions for Registering, Updating, or Deregistering an Oil or Gas Well Facility"; Appendix A; April 2009; page 22-23

VMT = vehicle miles traveled

Data	Emission Factor (lb/VMT)	Annual Vehicle Miles Traveled (miles/yr)	Emission Rate (tpy)
Vehicle 1	2.7	21	0.03
Vehicle 2	2.7	20.7	0.03
		Total PM_{10} Emissions	0.06

Conversion Factors	
2,000	lb/ton
0.000189	miles/ft

CALCULATION METHODOLOGY

Annual Vehicle Miles Traveled (AMVT) (miles/yr) = Total Distance Travel Onsite (ft) x 0.000189 (miles/ft) x trips per year

Emission Rate (tpy) = AMVT x emission factor (lb/VMT) / 2000 (lb/ton)

OIL TANK EMISSIONS SUMMARY

Source/Equipment	Uncontrolled Emissions					
	NOx (tpy)	CO (tpy)	SO2 (tpy)	VOC (tpy)	HAPs (tpy)	H2S (tpy)
ABJ-1119 - 5,000 bbl dry oil tank ABJ-2119 - 5,000 bbl dry oil tank	NA	NA	NA	62.41	23.57	0.02
Total	**0.00**	**0.00**	**0.00**	**62.41**	**23.57**	**0.02**

*Reported VOCs value represents calculated emissions for C3+.

Source/Equipment	Controlled Emissions*					
	NOx (tpy)	CO (tpy)	SO2 (tpy)	VOC (tpy)	HAPs (tpy)	H2S (tpy)
ABJ-1119 - 5,000 bbl dry oil tank ABJ-2119 - 5,000 bbl dry oil tank	NA	NA	NA	3.12	1.18	0.00
Total	**0.00**	**0.00**	**0.00**	**3.12**	**1.18**	**0.00**

* Controlled emissions assumes VRU efficiency of 95%

Stream Compositions From HYSYS Simulation

Vapor from ABJ-1119

Streams 122G Mass Flow	**44.7400**	(lb/hr)	From HYSYS Streams 122G
Streams 122G Molar Flow	**0.9938**	(lb mole/hr)	From HYSYS Streams 122G

Vapor from ABJ-2119

Streams 122H Mass Flow	**0.0000**	(lb/hr)	From HYSYS Streams 122H
Streams 122H Molar Flow	**0.0000**	(lb mole/hr)	From HYSYS Streams 122H

Conversion Factors	
2,000	lb/ton
24	hr/day
60	min/hr
1,000,000	BTU/mmBTU
1,000	scf/mscf
8,760	hr/yr
42	gal/bbl
454	g/lb
1,000,000	scf/mmscf
7,000	grains/lb

	Stream 122G			Stream 122H		
Component	Mole % (HYSYS Composition)	Mass Flow (HYSYS Data) (lb/hr)	Mass Flow (tpy)	Mole % (HYSYS Composition)	Mass Flow (HYSYS Data) (lb/hr)	Mass Flow (tpy)
Propane	**0.0212**	0.9286	4.07	**0.0212**	0.00	0.00
i-Butane	**0.0234**	1.3510	5.92	**0.0234**	0.00	0.00
n-Butane	**0.0445**	2.5680	11.25	**0.0445**	0.00	0.00
i-Pentane	**0.0287**	2.0603	9.02	**0.0287**	0.00	0.00
n-Pentane	**0.0216**	1.5495	6.79	**0.0216**	0.00	0.00
n-Hexane*	**0.0048**	0.4087	1.79	**0.0048**	0.00	0.00
Hexanes +	**0.1487**	5.3326	23.36	**0.1487**	0.00	0.00
Benzene*	**0.0000**	0.0011	0.00	**0.0000**	0.00	0.00
Ethyl Benzene*	**0.0000**	0.0007	0.00	**0.0000**	0.00	0.00
Toluene*	**0.0000**	0.0037	0.02	**0.0000**	0.00	0.00
Xylene*	**0.0004**	0.0439	0.19	**0.0004**	0.00	0.00
TOTAL VOCs	**0.2933**	**14.2481**	**62.41**	**0.2933**	**0.00**	**0.00**
TOTAL HAPs	**0.0052**	**5.3820**	**23.57**	**0.0052**	**0.00**	**0.00**
Methane	**0.0129**	0.2060	0.90	**0.0129**	0.00	0.00
Ethane	**0.0008**	0.0232	0.10	**0.0008**	0.00	0.00
H2O	**0.0016**	0.0293	0.13	**0.0016**	0.00	0.00
CO2	**0.6912**	30.2316	132.41	**0.6912**	0.00	0.00
H2S	**0.0001**	0.0039	0.02	**0.0001**	0.00	0.00
Nitrogen	**0.0000**	0.0007	0.00	**0.0000**	0.00	0.00
TOTALS	**0.9999**	**44.7428**	**195.97**	**0.9999**	**0.00**	**0.00**

HAPS include n-hexane, benzene, toluene, ethyl benzene, and p-xylene

CALCULATION METHODOLOGY

Mass Flow (tpy) = Mass Flow (lb/hr) x 8760 (hr/yr) / 2000 (lb/ton)

Controlled Emissions (tpy) = Uncontrolled Emissions (tpy) * (1 - VRU Efficiency)

SLOP TANK EMISSIONS
POTENTIAL-TO-EMIT CALCULATIONS

Source/Equipment	Uncontrolled Emissions					
	NOx	CO	SO2	VOC	HAPs	H2S
	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)
(1) 500 bbl Slop Oil Tank	NA	NA	NA	0.34	0.01	0.00
Total	**0.00**	**0.00**	**0.00**	**0.34**	**0.01**	**0.00**

*Reported VOCs value represents calculated emissions for C3+.

Source/Equipment	Controlled Emissions*					
	NOx	CO	SO2	VOC	HAPs	H2S
	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)	(tpy)
(1) 500 bbl Slop Oil Tank	NA	NA	NA	0.02	0.00	0.00
Total	**0.00**	**0.00**	**0.00**	**0.02**	**0.00**	**0.00**

* No emissons are expected from the slop tank; however, controlled emissions assumes VRU efficiency of 95%

TANKS 4.0.9d Output -	Slop Oil Tank	lb/yr	tpy
VOC	Working Losses	59.93	0.03
	Breathing Losses	612.42	0.31
	Total Emissions	672.35	0.34
H2S	Crude Inlet	0.0000	0.00
HAPS		13.78	0.01

Assumptions:
Flow rate to slop oil tank is 1% of intlet flow rate. Oil has is mixture of all oils from site;therefore, the estimate emission using Crude Oil (RVP5) speciation profile in Tanks 4.09d. Was used to estimate emissions from the slop tank.

HYSYS Stream 122G

Component	Stream Profile (mole %)	Mass Flow Rate (lb/hr)
Propane	0.0212	540.32
i-Butane	0.0234	471.61
n-Butane	0.0445	839.65
i-Pentane	0.0287	773.84
n-Pentane	0.0216	642.07
n-Hexane*	0.0048	348.35
Hexanes +	0.1487	26,797.64
Benzene*	0.0000	0.86
Ethyl Benzene*	0.0000	3.92
Toluene*	0.0000	7.33
Xylene*	0.0004	268.43
TOTAL VOCs		30694.03
TOTAL HAPS		628.89
RATIO HAPS/VOCS		0.02

Conversion Factors

2,000	lb/ton
8,760	hr/yr

CALCULATION METHODOLOGY

Ratio of HAPS Emissions to VOC Emissions = HAPS (lbs/hr)/Total VOCs (lbs/hr)
HAPS Emissions (lbs/yr) = VOC Emissions (lbs/yr)*Ratio of HAPS to VOCs
HAPS Emissions (tons/yr) = VOC Emissions (lbs/yr)/2000 lbs/ton

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

Identification

User Identification:	Slop Oil Tank
City:	
State:	Montana
Company:	
Type of Tank:	Vertical Fixed Roof Tank
Description:	500-bbl Slop Oil Tank Belle Creek Facility

Tank Dimensions

Shell Height (ft):	16.00
Diameter (ft):	15.50
Liquid Height (ft) :	15.00
Avg. Liquid Height (ft):	5.00
Volume (gallons):	21,172.77
Turnovers:	1.38
Net Throughput(gal/yr):	29,200.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

Roof Characteristics

Type:	Cone	
Height (ft)		1.00
Slope (ft/ft) (Cone Roof)		0.13

Breather Vent Settings

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

Meterological Data used in Emissions Calculations: Billings, Montana (Avg Atmospheric Pressure = 12.92 psia)

Emissions Report for: Annual

Slop Oil Tank - Vertical Fixed Roof Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Crude oil (RVP 5)	59.93	612.42	672.35

WATER TANK EMISSIONS SUMMARY

Source/Equipment	Uncontrolled Emissions					
	NOx (tpy)	CO (tpy)	SO2 (tpy)	VOC (tpy)	HAPs (tpy)	H2S (tpy)
(1) 9,700-bbl Vortex Water	NA	NA	NA	45.67	2.14	0.08
(2) 5,000-bbl Produced Water	NA	NA	NA	0.00	0.00	0.00
(1) 5,000 bbl Wet Oil Tank	NA	NA	NA	0.00	0.00	0.00
Total	**0.00**	**0.00**	**0.00**	**45.67**	**2.14**	**0.08**

*Reported VOCs value represents calculated emissions for C3+.

Source/Equipment	Controlled Emissions*					
	NOx (tpy)	CO (tpy)	SO2 (tpy)	VOC (tpy)	HAPs (tpy)	H2S (tpy)
(1) 9,700-bbl Vortex Water	NA	NA	NA	2.28	0.11	0.00
(2) 5,000-bbl Produced Water	NA	NA	NA	0.00	0.00	0.00
(1) 5,000 bbl Wet Oil Tank	NA	NA	NA	0.00	0.00	0.00
Total	**0.00**	**0.00**	**0.00**	**2.28**	**0.11**	**0.00**

* Controlled emissions assumes VRU efficiency of 95%

Stream Compositions From HYSYS Simulation

Component	HYSYS Stream	Stream Mass Flow (lb/hr)	Stream Molar Flow (lb mole/hr)
ABM-1120 - Water Vortex Tank	122B	150.4	3.447
ABJ-1118 - Wet Oil tank	122F	0.00	0.00
ABJ-1129 - Produced Water Tank	122C	0.00	0.00
ABJ-2129 - Produced Water Tank	122D	0.00	0.00

Conversion Factors

2,000 lb/ton	42 gal/bbl
24 hr/day	1,000 scf/mscf
60 min/hr	454 g/lb
1,000,000 BTU/mmBTU	1,000,000 scf/mmscf
1,000 scf/mscf	7,000 grains/lb
8,760 hr/yr	

	Stream 122B			Streams 122C, 122D, and 122F		
	Mole % (HYSYS Composition)	Mass Flow (lb/hr)	Mass Flow (tpy)	Mole % (HYSYS Composition)	Mass Flow (lb/hr)	Mass Flow (tpy)
Propane	**0.0014**	0.18	0.79	**0.0014**	0.00	0.00
i-Butane	**0.0028**	0.53	2.31	**0.0028**	0.00	0.00
n-Butane	**0.0062**	1.18	5.16	**0.0062**	0.00	0.00
i-Pentane	**0.0062**	1.56	6.82	**0.0062**	0.00	0.00
n-Pentane	**0.0050**	1.28	5.59	**0.0050**	0.00	0.00
n-Hexane*	**0.0014**	0.44	1.91	**0.0014**	0.00	0.00
Hexanes +	**0.0378**	5.22	22.85	**0.0378**	0.00	0.00
Benzene*	**0.0000**	0.00	0.01	**0.0000**	0.00	0.00
Ethyl Benzene*	**0.0000**	0.00	0.00	**0.0000**	0.00	0.00
Toluene*	**0.0000**	0.00	0.02	**0.0000**	0.00	0.00
Xylene*	**0.0001**	0.05	0.20	**0.0001**	0.00	0.00
TOTAL VOCs	**0.0609**	**10.43**	**45.67**	**0.0609**	**0.00**	**0.00**
TOTAL HAPs	**0.0015**	**0.49**	**2.14**	**0.0015**	**0.00**	**0.00**
Methane	**0.0002**	0.01	0.02	**0.0002**	0.00	0.00
Ethane	**0.0000**	0.00	0.01	**0.0000**	0.00	0.00
H2O	**0.0227**	1.55	6.79	**0.0227**	0.00	0.00
CO2	**0.9159**	138.36	606.01	**0.9159**	0.00	0.00
H2S	**0.0001**	0.02	0.08	**0.0001**	0.00	0.00
Nitrogen	**0.0000**	0.00	0.00	**0.0000**	0.00	0.00
TOTALS	**0.9998**	**150.36**	**658.58**	**0.9998**	**0.00**	**0.00**

CALCULATION METHODOLOGY

Mass Flow (tpy) = Mass Flow (lb/hr) x 8760 (hr/yr) / 2000 (lb/ton)

Controlled Emissions (tpy) = Uncontrolled Emissions (tpy) * (1 - VRU Efficiency)

FLARE EMISSION CALCULATIONS

POTENTIAL-TO-EMIT CALCULATIONS

Emission Unit ID		LP Flare		Data Input Cells
Pilot Burner Emission Data				
Emission Source		Emission Combustion Device		
Burner Rating		2,100,000	BTU/hr	Facility Supplied
Flare Design Capacity		6.00	mscfd	Facility Supplied
Pilot Rating		5.0	scfm	
Pilot Fuel		Field Gas	Bell Creek Booster Station Field Gas Analysis	
Fuel Heating Value		965	BTU/scf	Facility Supplied
Annual Hours of Operation		8,760	hrs	Assumption
Fuel Usage		2,176	scf/hr	Calculated
MW of Gas		16.93	lb/lb-mole	Calculated from Bell Creek Booster Station Field Gas Analysis
%VOC in Gas	2.95%	0.50	lb/lb-mole	Calculated from Bell Creek Booster Station Field Gas Analysis
% HAPS in Gas	0.23%	0.04	lb/lb-mole	Calculated from Field Gas Analysis-Assume all C6+ are HAPS
THC Emissions Factor		0.14	lb/mmBTU	AP-42 Table 13.5-1
Gas Combustion Emission Data				
Annual Hours Combustion Occurs		500	hrs/year	Montana Instructions for Registering, Updating, or Deregistering an Oil or Gas V
Flare Efficiency		98%	percent	Facility Supplied
THC Emissions Factor		0.14	lb/mmBTU	AP-42 Table 13.5-1
Gas Vapor Heating Value		10,570	btu/lb-mole	Stream 122 HYSYS Simulation
		27.89	btu/scf	Calculated
Combustion Rate		2,490	mscfd	Facility Supplied
Combustible Gases Present in Gas Stream		0.13	Mole %	Calculated from HYSYS Stream 122 (Mole % of gases minus Nitrogen and CO

HYSYS Stream 122

Component	Mole % (HYSYS Composition)	Mass Flow (HYSYS Data) (lb/hr)	Emissions x Flare Efficiency (lb/hr)	Annual Emissions (lb/year)
Propane	**0.0055**	23.2724	0.47	232.72
i-Butane	**0.0068**	38.3150	0.77	383.15
n-Butane	**0.0135**	75.8901	1.52	758.90
i-Pentane	**0.0103**	71.6875	1.43	716.88
n-Pentane	**0.0080**	55.6421	1.11	556.42
n-Hexane*	**0.0020**	16.2559	0.33	162.56
Hexanes +	**0.0573**	203.8024	4.08	2,038.02
Benzene*	**0.0000**	0.0446	0.00	0.45
Ethyl Benzene*	**0.0000**	0.0293	0.00	0.29
Toluene*	**0.0000**	0.1490	0.00	1.49
Xylene*	**0.0002**	1.6996	0.03	17.00
TOTAL VOCs	**0.1036**	**486.7879**	**9.74**	**0.19**
TOTAL HAPs	**0.0022**	**205.7249**	**4.11**	**0.08**
Methane	**0.0038**	5.8268	0.12	58.27
Ethane	**0.0002**	0.5560	0.01	5.56
H2O	**0.0176**	30.5927	0.61	305.93
CO2	**0.8745**	3,709.5488	74.19	37,095.49
H2S	**0.0001**	0.4497	0.01	4.50
Nitrogen	**0.0000**	0.0275	0.00	0.28
TOTALS FOR STREAM	**0.9998**	**4,233.7894**	**84.68**	**1.69**

HAPS include n-hexane, benzene, toluene, ethyl benzene, and p-xylene

SUMMARY

Component		Emission Factor		Emission Rates lb/hr	Emission Rates tpy	Comments
Nitrogen Oxides	**Burner**	0.068	lb/mmBTU	0.20	0.05	AP-42 Table 13.5-1
	Pilot	0.068	lb/mmBTU	0.02	0.09	AP-42 Table 13.5-1
Carbon Monoxide	**Burner**	0.37	lb/mmBTU	1.07	0.27	AP-42 Table 13.5-1
	Pilot	0.37	lb/mmBTU	0.11	0.47	AP-42 Table 13.5-1
VOC	**Burner**	NA	NA	9.74	2.43	Based on HYSYS Simulation
	Pilot	0.00	lb/mmBTU	0.01	0.03	Based on Gas Analysis
HAPs	**Burner**	NA	NA	4.11	1.03	Based on HYSYS Simulation
	Pilot	0.00	lb/mmBTU	0.00	0.00	Based on Gas Analysis
H2S	**Burner**	NA	NA	0.01	0.00	Based on HYSYS Simulation
	Pilot	NA	lb/mmBTU	NA	0.00	Based on Gas Analysis-No H2S Present
SO2	**Burner**	0.02	lb/hr	0.02	0.00	Based on flare efficiency/combustion
	Pilot	NA	lb/mmBTU	NA	0.00	Based on Gas Analysis-No H2S Present
PM2.5(soot)	**Burner**	0.01	lb/mscf	0.03	0.01	AP-42 Table 13.5-1
	Pilot	0.01	lb/mscf	0.02	0.10	AP-42 Table 13.5-1

	Conversion Factors					
	2,000	lb/ton		MW of SO2	64.06	lb/lb mole
	379	scf/lb mole		MW of H2S	34.08	lb/lb mole
	24	hr/day				
	60	min/hr		1 mole of SO2 produced from the combustion of 1 mole of H2S		
	1,000,000	BTU/mmBTU				
	1,000	scf/mscf				
	8,760	hr/yr				
	42	gal/bbl				
	1,000	scf/mscf				

CALCULATION METHODOLOGY

Fuel Usage (SCF/hr) = Burner Rating (btu/hr)/Fuel Heat Value (BTU/scf)

Pilot Emission Rate (lb/hr) = Emission Factor (lb/mmBTU) * Pilot Rating (scf/min) * Fuel Heat Value (BTU/scf) * 60 min/hr / 10^6 BTU/mmBTU* (1-Flare Efficien

Emissions Flare Efficiency (lb/hr) = mass flow (lb/hr) * (1-Flare Efficiency)

Vapor Heating Value = Heat of Vapor (BTU/lb-mole) * lb-mole/379 scf

SO2 Emission Rate (lb/hr) = H2S (lb/hr) * (MW of SO2/MW of H2S)

SO2 Emission Rate (tpy) = SO2 (lb/hr) * hrs operated/year/2000(lb/ton)

PM2.5(soot) (lb/hr) = Component Emission Factor (lb/mscf) * Fuel Usage (scf/hr)/1000 scf/mscf

Annual Emissions (lb/hr) = Mass Flow (lbs/hr)* Flare Efficiency * hrs combusted

Emission Rate (tpy) = Emission Rate (lb/hr) *8,760 hr/yr / 2,000 lb/ton

Pilot Emission Rate (lb/hr) = Pilot Rating (scf/min) / 379 scf/lb mole * MW of Propane (lb/lb mole) * 60 min/hr * (1 - Flare Efficiency)

FLARE EMISSION CALCULATIONS

POTENTIAL-TO-EMIT CALCULATIONS

Emission Unit ID		HP Flare		Data Input Cells
Pilot Burner Emission Data				
Emission Source		Emission Combustion Device		
Burner Rating		2,100,000	BTU/hr	Facility Supplied
Flare Design Capacity		6.00	mscfd	Facility Supplied
Pilot Rating		5.0	scfm	
Pilot Fuel		Field Gas	Bell Creek Booster Station Field Gas Analysis	
Fuel Heating Value		965	BTU/scf	Facility Supplied
Annual Hours of Operation		8,760	hrs	Assumption
Fuel Usage		2,176	scf/hr	Calculated
MW of Gas		16.93	lb/lb-mole	Calculated from Bell Creek Booster Station Field Gas Analysis
%VOC in Gas	2.95%	0.50	lb/lb-mole	Calculated from Bell Creek Booster Station Field Gas Analysis
% HAPS in Gas	0.23%	0.04	lb/lb-mole	Calculated from Field Gas Analysis-Assume all C6+ are HAPS
THC Emissions Factor		0.14	lb/mmBTU	AP-42 Table 13.5-1
Gas Combustion Emission Data				
Annual Hours Combustion Occurs		500	hrs/year	Montana Instructions for Registering, Updating, or Deregistering an Oil or Gas V
Flare Efficiency		98%	percent	Facility Supplied
THC Emissions Factor		0.14	lb/mmBTU	AP-42 Table 13.5-1
Gas Vapor Heating Value		7,043	btu/lb-mole	Stream 310 HYSYS Simulation
		18.58	btu/scf	Calculated
Combustion Rate		37,880	mscfd	Facility Supplied
Combustible Gases Present in Gas Stream		0.16	Mole %	Calculated from HYSYS Stream 310 (Mole % of gases minus Nitrogen and CO

HYSYS Stream 310

Component	Mole % (HYSYS Composition)	Mass Flow (HYSYS Data) (lb/hr)	Emissions x Flare Efficiency (lb/hr)	Annual Emissions (lb/year)
Propane	**0.0026**	326.7769	6.54	3,267.77
i-Butane	**0.0011**	189.7868	3.80	1,897.87
n-Butane	**0.0017**	283.1773	5.66	2,831.77
i-Pentane	**0.0007**	141.9551	2.84	1,419.55
n-Pentane	**0.0005**	95.9765	1.92	959.77
n-Hexane*	**0.0001**	20.3571	0.41	203.57
Hexanes +	**0.0046**	414.5482	8.29	4,145.48
Benzene*	**0.0000**	0.0533	0.00	0.53
Ethyl Benzene*	**0.0000**	0.0325	0.00	0.33
Toluene*	**0.0000**	0.1593	0.00	1.59
Xylene*	**0.0000**	1.9024	0.04	19.02
TOTAL VOCs	**0.0113**	**1,474.7254**	**29.49**	**0.59**
TOTAL HAPs	**0.0001**	**416.6957**	**8.33**	**0.17**
Methane	**0.1432**	6,630.2327	132.60	66,302.33
Ethane	**0.0005**	44.3314	0.89	443.31
H2O	**0.0000**	56.9101	1.14	569.10
CO2	**0.8422**	106,991.7027	2,139.83	1,069,917.03
H2S	**0.0000**	2.8989	0.06	28.99
Nitrogen	**0.0018**	146.7639	2.94	1,467.64
TOTALS FOR STREAM	**0.9990**	**115,347.5651**	**2,306.95**	**46.14**

HAPS include n-hexane, benzene, toluene, ethyl benzene, and p-xylene

SUMMARY

Component		Emission Factor		Emission Rates lb/hr	Emission Rates tpy	Comments
Nitrogen Oxides	**Burner**	0.068	lb/mmBTU	1.99	0.50	AP-42 Table 13.5-1
	Pilot	0.068	lb/mmBTU	0.02	0.09	AP-42 Table 13.5-1
Carbon Monoxide	**Burner**	0.37	lb/mmBTU	10.85	2.71	AP-42 Table 13.5-1
	Pilot	0.37	lb/mmBTU	0.11	0.47	AP-42 Table 13.5-1
VOC	**Burner**	NA	NA	29.49	7.37	Based on HYSYS Simulation
	Pilot	0.00	lb/mmBTU	0.01	0.03	Based on Gas Analysis
HAPs	**Burner**	NA	NA	8.33	2.08	Based on HYSYS Simulation
	Pilot	0.00	lb/mmBTU	0.00	0.00	Based on Gas Analysis
H2S	**Burner**	NA	NA	0.06	0.01	Based on HYSYS Simulation
	Pilot	NA	lb/mmBTU	NA	0.00	Based on Gas Analysis-No H2S Present
SO2	**Burner**	0.11	lb/hr	0.11	0.03	Based on flare efficiency/combustion
	Pilot	NA	lb/mmBTU	NA	0.00	Based on Gas Analysis-No H2S Present
PM2.5(soot)	**Burner**	0.01	lb/mscf	0.29	0.07	AP-42 Table 13.5-1
	Pilot	0.01	lb/mscf	0.02	0.10	AP-42 Table 13.5-1

	Conversion Factors					
	2,000	lb/ton		MW of SO2	64.06	lb/lb mole
	379	scf/lb mole		MW of H2S	34.08	lb/lb mole
	24	hr/day				
	60	min/hr		1 mole of SO2 produced from the combustion of 1 mole of H2S		
	1,000,000	BTU/mmBTU				
	1,000	scf/mscf				
	8,760	hr/yr				
	42	gal/bbl				
	1,000	scf/mscf				

CALCULATION METHODOLOGY
Fuel Usage (SCF/hr) = Burner Rating (btu/hr)/Fuel Heat Value (BTU/scf)
Pilot Emission Rate (lb/hr) = Emission Factor (lb/mmBTU) * Pilot Rating (scf/min) * Fuel Heat Value (BTU/scf) * 60 min/hr / 10^6 BTU/mmBTU* (1-Flare Efficien
Emissions Flare Efficiency (lb/hr) = mass flow (lb/hr) * (1-Flare Efficiency)
Vapor Heating Value = Heat of Vapor (BTU/lb-mole) * lb-mole/379 scf
Burner Emission Rate = Component Emission Factor (lb/mmBTU) * Gas Consumption Rate (mscf/yr) * Gas heating Value (Btu/lb-mole)
SO2 Emission Rate (lb/hr) = H2S (lb/hr) * (MW of SO2/MW of H2S)
SO2 Emission Rate (tpy) = SO2 (lb/hr) * hrs operated/year/2000(lb/ton)
PM2.5(soot) (lb/hr) = Component Emission Factor (lb/mscf) * Fuel Usage (scf/hr)/1000 scf/mscf
Annual Emissions (lb/hr) = Mass Flow (lbs/hr)* Flare Efficiency * hrs combusted
Emission Rate (tpy) = Emission Rate (lb/hr) *8,760 hr/yr / 2,000 lb/ton
Pilot Emission Rate (lb/hr) = Pilot Rating (scf/min) / 379 scf/lb mole * MW of Propane (lb/lb mole) * 60 min/hr * (1 - Flare Efficiency)

A full copy of the hardcopy emission inventory submitted with the application for MAQP #4740-03 is on file with the Department.

V. Existing Air Quality

The location for the Bell Creek facility is in NW¼ NE¼ of Section 27, Township 8 South, Range 54 East, in Powder River County, Montana. This area is classified as unclassifiable/attainment for all pollutants for EPA-established national ambient air quality standards. MAQP #4740-03 contains operating and monitoring requirements to ensure that proper operation of the facility would not result in air emissions that violate any ambient air quality standard.

VI. Air Quality Impacts

The permitting action is reflecting the modifications made in 2012 to the facility. The additions of a circular heater treater and a heat media treater have been captured in the permitting action. The emissions for the facility have increased. The increase is not significant and the conditions and limitation established in MAQP #4740-03 have ensured that the air quality impacts will be minor.

VII. Ambient Air Impact Analysis

Based on the information provided and the conditions established in MAQP #4740-03, the Department determined that the impact from this permitting action will be minor.

VIII. 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.

IX. Environmental Assessment

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

Analysis Prepared By: Loni Patterson
Date: October 26, 2015

DEPARTMENT OF ENVIRONMENTAL QUALITY
Permitting and Compliance Division
Air Quality Bureau
P.O. Box 200901, Helena, MT 59620
(406) 444-3490

FINAL ENVIRONMENTAL ASSESSMENT (EA)

Issued To: Denbury Onshore, LLC
Bell Creek Facility

Montana Air Quality Permit (MAQP) number: 4740-03
Preliminary Determination Issued: November 5, 2015
Department Decision Issued: December 8, 2015
Permit Final: December 24, 2015

1. *Legal Description of Site*: The modification occurred at the existing facility located at NW¼ NE¼ of Section 27, Township 8 South, Range 54 East, in Powder River County, Montana. Denbury Onshore, LLC (Denbury) owns and operates an enhanced oil recovery facility.

2. *Description of Project*: The project removed one and added two natural gas fired heaters to the permitted equipment. Both the media heater treater and the circular heater separates are 3-phase separators that separate the crude oil from water and CO_2. This allows the facility to keep extracting oil from the reserve longer.

3. *Objectives of Project*: The project to add these 3-phase separator units to recover oil to be able to extract more oil from the reserve site. This provides more efficiency to the oil extraction effort. This also allows the facility to be profitable longer at this given site.

4. *Alternatives Considered*: The no action alternative would be for the facility to remove the modifications from the facility as the modification occurred in 2012. The operation would not be as efficient in the oil extraction effort this facility is intended for. There would be less NO_x and CO pollution emitted from this facility. The facility would most likely shut down and the jobs from the facility would be lost. The oil reserve would still have oil it but would not be extracted from the ground. Alternatives considered were covered in the BACT analysis of the permit, Section III. Available control technologies for the other alternatives and the "no-action" alternative have been eliminated from further consideration.

5. *A Listing of Mitigation, Stipulations, and Other Controls*: A list of enforceable conditions, including a BACT analysis, Section III, would be included in MAQP #4740-03.

6. *Regulatory Effects on Private Property*: The modification did not have any regulatory effects on private property.

7. *The following table summarizes the potential physical and biological effects of the proposed project on the human environment. The "no-action" alternative was discussed previously.*

		Major	Moderate	Minor	None	Unknown	Comments Included
A	Terrestrial and Aquatic Life and Habitats			X			Yes
B	Water Quality, Quantity, and Distribution				X		Yes
C	Geology and Soil Quality, Stability and Moisture			X			Yes
D	Vegetation Cover, Quantity, and Quality			X			Yes
E	Aesthetics			X			Yes
F	Air Quality			X			Yes
G	Unique Endangered, Fragile, or Limited Environmental Resources				X		Yes
H	Demands on Environmental Resource of Water, Air and Energy			X			Yes
I	Historical and Archaeological Sites				X		Yes
J	Cumulative and Secondary Impacts			X			Yes

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 additions of the natural gas fired heaters emit NO_x and CO. Since the facility already exists, the addition of these units did not result in significant additional emissions. Therefore, only minor effects on terrestrial life may result of equipment operations or from pollutant deposition.

Impacts on aquatic life could result from storm water runoff and pollutant deposition, but such impacts would be minor as the facility would be a minor source of and only minor amounts of water would be used. Since only a minor amount of air emissions would be generated, only minor deposition may occur.

B. Water Quality, Quantity and Distribution

No change in water quality, quantity and distribution resulted from this modification. The facility has an MPDES Water Discharge Permit for this facility, MT0031691. The permit covers the water discharge from the facility.

C. Geology and Soil Quality, Stability and Moisture

A land disturbance of 24 acres was required for the modification. Minor impacts to geology, soil quality, stability and moisture occurred.

D. Vegetation Cover, Quantity, and Quality

Pollutant deposition can potentially affect vegetation cover, quantity, and quality. MAQP #4740-03 would contain conditions which would limit the allowable emissions from the facility. The addition of the heaters will not result in a significant increase in emissions but minor impacts to vegetation cover, quantity, and quality could occur.

E. Aesthetics

The equipment may be visible and may create additional noise in the area of operation. However, MAQP #4740-03 would include conditions to control visible emissions from the plant.

F. Air Quality

MAQP #4740-03 would contain conditions limiting the allowable emissions from the facility. The amount of allowable emissions generated from the plant is below those levels which the Department would require more rigorous air quality impact analyses to be conducted. Based on the amount of allowable emissions that would be expected from the plant, the impacts expected are not significant. The modification increased the emissions from the facility but they are not significant.

G. Unique Endangered, Fragile, or Limited Environmental Resources

In an effort to assess any potential impacts to any unique endangered, fragile, or limited environmental resources in the proposed project area, the Department contacted the Natural Resource Information System – Montana Natural Heritage Program on the original facility application. Search results concluded at that time that there are no records of species of special concern in the vicinity of the project location. The modification resulted in a minor source of emissions increase and is not expected to have any impacts on any unique endangered, fragile, or limited environmental resources.

H. Demands on Environmental Resource of Water, Air and Energy

The project has minor impacts on environmental resources of water, air, and energy. The new heaters represent a minor change to the existing facility and the portion of the site's current energy demands is not significant.

I. Historical and Archaeological Sites

The modification was within the already existing facility. There was no impact to historical and archaeological sites.

J. Cumulative and Secondary Impacts

The cumulative and secondary impacts around the Belle Creek area have imposed minor impacts. This action did not contribute significant amounts of air pollution to the area Future actions in the area are unknown.

8. *The following table summarizes the potential economic and social effects of the proposed project on the human environment. The "no-action" alternative was discussed previously.*

		Major	Moderate	Minor	None	Unknown	Comments Included
A	Social Structures and Mores				X		Yes
B	Cultural Uniqueness and Diversity				X		Yes
C	Local and State Tax Base and Tax Revenue				X		Yes
D	Agricultural or Industrial Production				X		Yes
E	Human Health			X			Yes
F	Access to and Quality of Recreational and Wilderness Activities				X		Yes
G	Quantity and Distribution of Employment				X		Yes
H	Distribution of Population				X		Yes
I	Demands for Government Services			X			Yes
J	Industrial and Commercial Activity				X		Yes
K	Locally Adopted Environmental Plans and Goals				X		Yes
L	Cumulative and Secondary Impacts			X			Yes

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 did not affect the social structures and mores. Minor land disturbance was required for construction, but no social structures or mores were disturbed from the activity.

B. Cultural Uniqueness and Diversity

The project did not affect the cultural uniqueness and diversity of the region since the facility is already exists.

C. Local and State Tax Base and Tax Revenue

The operation of the modification did not have any impact on local state tax base and revenue.

D. Agricultural or Industrial Production

The project did not have an impact on agricultural and industrial production.

E. Human Health

MAQP #4740-03 would incorporate conditions to ensure that the facility would operate in compliance with all applicable air quality rules and standards. These rules and standards are designed to be protective of human health. Therefore, minor impacts would be expected to human health from the operation of the facility.

F. Access to and Quality of Recreational and Wilderness Activities

The project did not change any access to Wilderness areas as the facility already exists.

G. Quantity and Distribution of Employment

No additional employees are associated with the modification.

H. Distribution of Population

No change is distribution of population occurred as no new employees are needed for this proposed project.

I. Demands for Government Services

Government services are required for acquiring the appropriate permits for the project, as well as for verifying compliance with any permits. However, demands for government services would be minor.

J. Industrial and Commercial Activity

The operation of the modification within the facility would not result in any increase in the industrial and commercial activity in the area.

K. Locally Adopted Environmental Plans and Goals

The Department is not aware of any locally adopted environmental plans and goals in the proposed project area. The facility is required to comply with terms and conditions of MAQP #4740-03 which would be protective of human health and the environment.

L. Cumulative and Secondary Impacts

The modifications included adding two natural-gas fired emitting units to the facility. It should be noted that the modifications happened in 2012. There was additional land disturbance and noise from the modifications. This would add to the cumulative and secondary impacts to the social and economic aspects of the area. The anticipated cumulative and secondary impacts would be expected to be minor due to the nature of the activities being the same as are already common in the area.

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 a second emergency flare. MAQP #4740-03 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

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

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