AIR QUALITY PERMIT

Issued To: International Malting Company, LLC
Great Falls
P.O. Box 712
Milwaukee, WI 53201

Permit: #3238-01
Application Complete: 04/12/05
Preliminary Determination Issued: 04/20/05
Department's Decision Issued: 05/06/05
Permit Final: 05/24/05
AFS: #013-0035

An air quality permit, with conditions, is hereby granted to International Malting Company, LLC – Great Falls (IMC), 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 IMC facility is located approximately 2 miles north of the City of Great Falls, Montana, and approximately ½ mile west of Black Eagle Road. The legal description of the facility site is the NE¼ of the SE¼ of Section 30, Township 21 North, Range 4 East, in Cascade County, Montana.

B. Current Permit Action

On April 12, 2005, the Montana Department of Environmental Quality (Department) received a complete application for the modification of IMC's Montana Air Quality Permit (MAQP) #3238-00. Specifically, the modification includes the replacement of 8 fabric filter baghouses (total air-flow capacity of 215,000 dry standard cubic feet per minute (dscfm)) with a single fabric filter baghouse (air-flow capacity of 66,800 dscfm); replacement of the 14 previously permitted process and booster heaters (total heat input capacity 288.2 million British thermal units per hour (MMBtu/hr)) with 6 proposed process heaters (total heat input capacity of 218.64 MMBtu/hr); modification of the heating system from air-to-air heat exchangers to air-to-glycol heat exchangers; change in plant layout and configuration; increase in the allowable fabric filter baghouse grain loading limit from 0.005 grains per dry standard cubic feet (gr/dscf) to 0.010 gr/dscf; and a reduction in the allowable amount of elemental sulfur (S) combusted per batch of malt from 500 pounds of S per batch (lb/batch) to 200 lb S/batch.

Prior to the current permit action, potential oxides of nitrogen (NO_x), carbon monoxide (CO), and PM/PM_{10} emissions from IMC facility operations exceeded applicable Title V major source permitting thresholds. The proposed changes result in a reduction in total facility potential emissions of all regulated pollutants to a level less than Title V major source permitting thresholds. Therefore, the current permit action will result in IMC being permitted as a minor source of emissions, as defined under the Title V permitting program. A more detailed discussion of the current permit action is included in the permit analysis to this permit.

SECTION II. Conditions and Limitations

A. Operational Requirements

1. Malt and salable malt by-product production shall be limited to 16,000,000 bushels during any rolling 12-month time period (ARM 17.8.749).

2. IMC shall not receive more than 456,000 tons of barley during any rolling 12-month time period (ARM 17.8.749).

3. IMC shall house all barley preparation processes within the headhouse and shall utilize fabric filter baghouse control for emissions from the barley preparation processes (ARM 17.8.752).

4. IMC shall unload all barley shipments to underground hoppers. IMC shall utilize fabric filter baghouse emission control on the hoppers (ARM 17.8.752).

5. IMC shall load all malt and salable malt by-product for shipment via covered conveyors. IMC shall utilize fabric filter baghouse emission control on the conveyors (ARM 17.8.752).

6. Each material transfer point for grain receiving and off-loading shall incorporate an enclosure (at least 3-sided) for fugitive emission control (ARM 17.8.752).

7. IMC shall not cause or authorize the production, handling, storage, or transportation of any material without taking reasonable precautions to control emissions of particulate matter (ARM 17.8.308).

8. IMC 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).

9. IMC 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.8 (ARM 17.8.752).

10. Elemental sulfur burning for kiln operations shall be limited to 200 pounds of sulfur per kiln batch (ARM 17.8.749).

11. Total elemental sulfur burning for kiln operations (cumulative for all 3 kilns) shall be limited to 146,000 pounds during any rolling 12-month time period (ARM 17.8.749).

12. Total elemental sulfur burning for kiln operations (cumulative for all 3 kilns) shall not exceed 2190 hours during any rolling 12-month time period (ARM 17.8.749).

13. IMC shall burn only pipeline quality natural gas for the kiln operations process heaters (ARM 17.8.752).

14. IMC shall utilize dry low NO_x combustion technology to control emissions from the HEATEC Heater #1 (25 MMBtu/hr), the HEATEC Heater #2 (42 MMBtu/hr), and the Future Plant Heater (48 MMBtu/hr) (ARM 17.8.752).

15. The design of each kiln shall include a screw auger for movement of malt product/by-product out of the kiln and the kiln heat exchanger shall be located at the top of each kiln (ARM 17.8.749).

B. Emission Limitations

1. Particulate matter with an aerodynamic diameter of 10 µm or less (PM_{10}) emissions from the fabric filter baghouse controlling facility-wide process PM_{10} emissions shall be limited to 0.010 gr/dscf of air-flow (ARM 17.8.749).

2. Emissions from the MOCO process heater #1 (53.4 MMBtu/hr capacity) shall not exceed the following (ARM 17.8.749):

NOx	5.24 lb/hr calculated on a 1-hour averaging period
CO	4.40 lb/hr calculated on a 1-hour averaging period

3. Emissions from the Johnston process heater #1 (25.12 MMBtu/hr capacity) shall not exceed the following (ARM 17.8.749):

NOx	2.46 lb/hr calculated on a 1-hour averaging period
CO	2.07 lb/hr calculated on a 1-hour averaging period

4. Emissions from the Johnston process heater #2 (25.12 MMBtu/hr capacity) shall not exceed the following (ARM 17.8.749):

NOx	2.46 lb/hr calculated on a 1-hour averaging period
CO	2.07 lb/hr calculated on a 1-hour averaging period

5. Emissions from the HEATEC process heater #1 (25.0 MMBtu/hr capacity) shall not exceed the following (ARM 17.8.749):

NOx	1.23 lb/hr calculated on a 1-hour averaging period
CO	2.06 lb/hr calculated on a 1-hour averaging period

6. Emissions from the HEATEC process heater #2 (42.0 MMBtu/hr capacity) shall not exceed the following (ARM 17.8.749):

NOx	2.06 lb/hr calculated on a 1-hour averaging period
CO	3.46 lb/hr calculated on a 1-hour averaging period

7. Emissions from the Plant Heater (48.0 MMBtu/hr capacity) shall not exceed the following (ARM 17.8.749):

NOx	2.35 lb/hr calculated on a 1-hour averaging period
CO	3.95 lb/hr calculated on a 1-hour averaging period

8. SO_2 emissions from each kiln shall be limited to 33.33 lb/hr during elemental sulfur burning (ARM 17.8.749).

9. IMC 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).

10. IMC shall not cause or authorize any fugitive emissions to be discharged into the outdoor atmosphere that exhibit an opacity of 20% or greater averaged over 6-consecutive minutes (ARM 17.8.308).

C. Testing Requirements

1. Within 60 days after achieving the maximum production rate, but not later than 180 days after initial start-up of operations, IMC shall conduct performance source testing on the process baghouse and verify compliance with the particulate and opacity limitations in Section II.B.1 and Section II.B.9, respectively. After the initial source tests, additional source testing shall be conducted on an annual basis, or according to another source testing/monitoring schedule as may be approved by the Department (ARM 17.8.105 and ARM 17.8.749).

2. Within 60 days after achieving the maximum production rate, but not later than 180 days after initial start-up, IMC shall conduct performance source testing for NO_x and CO, concurrently, on the MOCO process heater #1 and verify compliance with the emission limitations in Section II.B.2. After the initial source tests, additional source testing shall be conducted as required by the Department (ARM 17.8.105 and ARM 17.8.749).

3. Within 60 days after achieving the maximum production rate, but not later than 180 days after initial start-up, IMC shall conduct performance source testing for NO_x and CO, concurrently, on the Johnston process heater #1 and verify compliance with the emission limitations in Section II.B.3. After the initial source tests, additional source testing shall be conducted as required by the Department (ARM 17.8.105 and ARM 17.8.749).

4. Within 60 days after achieving the maximum production rate, but not later than 180 days after initial start-up, IMC shall conduct performance source testing for NO_x and CO, concurrently, on the Johnston process heater #2 and verify compliance with the emission limitations in Section II.B.4. After the initial source tests, additional source testing shall be conducted as required by the Department (ARM 17.8.105 and ARM 17.8.749).

5. Within 60 days after achieving the maximum production rate, but not later than 180 days after initial start-up, IMC shall conduct performance source testing for NO_x and CO, concurrently, on the HEATEC process heater #1 and verify compliance with the emission limitations in Section II.B.5. After the initial source tests, additional source testing shall be conducted as required by the Department (ARM 17.8.105 and ARM 17.8.749).

6. Within 60 days after achieving the maximum production rate, but not later than 180 days after initial start-up, IMC shall conduct performance source testing for NO_x and CO, concurrently, on the HEATEC process heater #2 and verify compliance with the emission limitations in Section II.B.6. After the initial source tests, additional source testing shall be conducted as required by the Department (ARM 17.8.105 and ARM 17.8.749).

7. Within 60 days after achieving the maximum production rate, but not later than 180 days after initial start-up, IMC shall conduct performance source testing for NO_x and CO, concurrently, on the Plant Heater and verify compliance with the emission

limitations in Section II.B.7. After the initial source tests, additional source testing shall be conducted as required by the Department (ARM 17.8.105 and ARM 17.8.749).

8. Within 60 days after achieving the maximum production rate, but not later than 180 days after initial start-up of operations, IMC shall conduct performance source testing on the kiln stacks and verify compliance with the SO_2 emission limit in Section II.B.8. The source test shall be conducted while sulfur is being burned in the batch process. After the initial source test, additional source testing shall be conducted as required by the Department (ARM 17.8.105 and ARM 17.8.749).

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

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

D. Operational Reporting Requirements

1. IMC 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. IMC shall notify the Department of any construction or improvement project conducted pursuant to ARM 17.8.745(1), that would include a 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 or the addition of a new emission unit.

   The notice must be submitted to the Department, in writing, 10 days prior to start up 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 IMC 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. IMC shall document, by month, the total amount (in tons) of malt and salable malt by-product produced annually at the facility. By the 25th day of each month, IMC shall total the malt and salable malt by-product produced for the previous month. The monthly information will be used to verify compliance with the rolling 12-month limitation in Section II.A.1. The information for each of the previous months shall be submitted along with the annual emission inventory (ARM 17.8.749).

5. IMC shall document, by month, the total amount (tons) of barley received annually by the facility. By the 25th day of each month, IMC shall total the amount (tons) of barley received during the previous month. The monthly information will be used to verify compliance with the rolling 12-month limitation in Section II.A.2. The information for each of the previous months shall be submitted along with the annual emission inventory (ARM 17.8.749).

6. IMC shall document, per kiln batch, the total amount (pounds) of elemental sulfur burned. IMC shall maintain on-site records of the amount of sulfur burned per kiln batch to verify compliance with the limitation in Section II.A.10. A written report of the compliance verification shall be submitted with the annual emission inventory (ARM 17.8.749).

7. IMC shall document, by month, the total amount (pounds) of elemental sulfur burned for kiln operations. By the 25th day of each month, IMC shall total the amount (pounds) of elemental sulfur burned during the previous month. The monthly information will be used to verify compliance with the rolling 12-month limitation in Section II.A.11. The information for each of the previous months shall be submitted along with the annual emission inventory (ARM 17.8.749).

8. IMC shall document, by month, the total hours of elemental sulfur burning for kiln operations. By the 25th day of each month, IMC shall total the hours of elemental sulfur burning during the previous month. The monthly information will be used to verify compliance with the rolling 12-month limitation in Section II.A.12. The information for each of the previous months shall be submitted along with the annual emission inventory (ARM 17.8.749).

E. Notification

1. Within 30 days before or after commencement of construction of Phase I of the barley malt manufacturing plant operations, IMC shall notify the Department of the date of commencement of construction (ARM 17.8.749).

2. Within 15 days before or after actual startup of Phase I operations, IMC shall notify the Department of the date of actual startup (ARM 17.8.749).

3. Within 30 days before or after commencement of construction of Phase II of the barley malt manufacturing plant operations, IMC shall notify the Department of the date of commencement of construction (ARM 17.8.749).

4. Within 15 days before or after actual startup of Phase II operations, IMC shall notify the Department of the date of actual startup (ARM 17.8.749).

SECTION III: General Conditions

A. Inspection – IMC 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 IMC fails to appeal as indicated below.

C. Compliance with Statutes and Regulations – Nothing in this permit shall be construed as relieving IMC 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 the air quality permit shall be made available for inspection by the Department at the location of the source.

G. Permit Fee – Pursuant to Section 75-2-220, MCA, as amended by the 1991 Legislature, failure to pay the annual operation fee by IMC may be grounds for revocation of this permit, as required by that section and rules adopted thereunder by the Board.

H. Construction Commencement – Construction must begin within 3 years of permit issuance and proceed with due diligence until the project is complete or the permit shall be revoked (ARM 17.8.762).

Permit Analysis
International Malting Company, LLC – Great Falls
Permit #3238-01

I. Introduction/Process Description

A. Permitted Equipment

International Malting Company, LLC – Great Falls (IMC) operates a barley malt manufacturing plant with an initial Phase I malt and salable malt by-product production capacity of 10 million bushels per year and a final plant (after Phase II) capacity of 16 million bushels per year. The IMC plant incorporates the following equipment:

- 4 steeping vessels, each 20-meters in diameter;
- 8 germinating vessels, each 31-meters in diameter;
- 3 natural gas fired kilns incorporating the 6 permitted process heaters with a maximum rated heat input of 218.64 million British thermal units per hour (MMBtu/hr) heat input capacity;
- A barley washer;
- Eighty silos for storing barley and malt products;
- A single process fabric filter baghouse with an air-flow capacity of 66,800 dry standard cubic feet per minute (dscfm); and
- Associated equipment.

The above list of equipment includes all proposed equipment for Phase I and Phase II operations.

B. Source Description

The IMC facility is located approximately 2 miles north of the City of Great Falls, Montana, and approximately ½ mile west of Black Eagle Road. The legal description of the facility site is the NE¼ of the SE¼ of Section 30, Township 21 North, Range 4 East, in Cascade County, Montana.

Malt is the processed form of barley grain and the basic ingredient in the production of beer. Malting is the process by which barley is transformed into malt. The process begins with "steeping" or soaking of clean barley kernels in large tanks of water called "steeping vessels." After steeping, the barley is then removed from the steeping vessels and placed in a germinating vessel. After a period of germination, the barley is dried and roasted in a kiln to stop the germination process and reduce the moisture content of the product, now considered malt. At this stage of the process the malt product can be easily stored and/or shipped to various locations for further processing.

Construction and operation of the proposed malting plant will occur in 2 phases. After construction of Phase I, the malting plant will have the capacity to produce from 8 to 10 million bushels of malt per year. After construction of Phase II, the malting plant capacity will increase to a maximum of 16 million bushels of malt per year. IMC will commence Phase II operations within 3 years of the commencement of Phase I operations. The entire malting plant encompasses approximately 10 acres of land.

C. Permit History

On May 17, 2003, IMC was issued final Montana Air Quality Permit **#3238-00** for the operation of a barley malt manufacturing plant with an initial Phase I malt and salable malt by-product production capacity of 10 million bushels per year and a final plant (after Phase II) capacity of 16 million bushels per year. The initially permitted IMC plant incorporated the following equipment:

- 4 steeping vessels, each 20-meters in diameter
- 8 germinating vessels, each 31-meters in diameter
- 3 natural gas fired kilns incorporating 12 primary process heaters rated at 19.1 million British thermal units per hour (MMBtu/hr) heat input capacity per process heater and 2 natural gas fired booster process heaters rated at 21 MMBtu/hr and 38 MMBtu/hr heat input capacity, respectively
- A barley washer
- Eighty silos for storing barley and malt products
- 8 process fabric filter baghouses (Baghouse #1 through Baghouse #8)
- Associated equipment

In addition, potential emissions from the initially proposed and permitted plant exceeded the applicable major source Title V permitting thresholds; therefore, on February 26, 2005, IMC's was issued final and effective Title V Operating Permit **#OP3238-00**.

D. Current Permit Action

On April 12, 2005, the Montana Department of Environmental Quality (Department) received a complete application for the modification of IMC's Montana Air Quality Permit (MAQP) #3238-00. Specifically, the modification includes the following changes to permitted operations at the IMC facility:

- Replacement of 8 fabric filter baghouses (total air-flow capacity of 215,000 dry standard cubic feet per minute (dscfm)) with a single fabric filter baghouse (air-flow capacity of 66,800 dscfm);

- Replacement of the 12-19.1 million British thermal unit per hour (MMBtu/hr) heat input capacity kiln process heaters, the 21 MMBtu/hr booster heater, and the 38 MMBtu/hr booster heater with the following 6 booster heaters:

  - MOCO Heater #1 (53.40 MMBtu/hr)
  - Johnston Heater #1 (25.12 MMBtu/hr)
  - Johnston Heater #2 (25.12 MMBtu/hr)
  - HEATEC Heater #1 (25.00 MMBtu/hr)
  - HEATEC Heater #2 (42.00 MMBtu/hr)
  - Future Plant Heater (48.00 MMBtu/hr)

  The total heat input capacity of the 14 previously permitted process and booster heaters was 288.2 MMBtu/hr. The total heat input capacity of the 6 proposed process heaters is 218.64 MMBtu/hr;

- Modification of the heating system from air-to-air heat exchangers to air-to-glycol heat exchangers. This change does not impact source emissions;

- Change in plant layout and configuration, effectively moving the facility and its emitting units approximately 100 meters west of originally analyzed and permitted operations;

- Increase in the allowable fabric filter baghouse grain loading limit from 0.005 grains per dry standard cubic feet (gr/dscf) to 0.010 gr/dscf; and

- A reduction in the allowable amount of elemental sulfur (S) combusted per batch of malt from 500 pounds of S per batch (lb/batch) to 200 lb S/batch.

Prior to the current permit action, potential oxides of nitrogen (NO_x), carbon monoxide (CO), and PM/PM_{10} emissions from IMC facility operations exceeded applicable Title V major source permitting thresholds. The proposed changes result in a reduction in total facility potential emissions of all regulated pollutants to a level less than Title V major source permitting thresholds. Therefore, the current permit action will result in IMC being permitted as a minor source of emissions, as defined under the Title V permitting program. As a result, the Department will revoke IMCs major source Title V Operating Permit #OP3238-00 after issuance of the final Montana Air Quality Permit under the current permit action.

In addition to the above-cited changes under the current permit action, IMC requested that the Department remove the kilns from the emission inventory as potential PM/PM_{10} emitters. The kilns have been re-designed from that originally analyzed and permitted and, according to IMC, no particulate emissions result from the newly designed kiln operations. Because IMC was unable to provide technical information supporting this claim and because published information contained in the Environmental Protection Agency's (EPA), AP-42, Compilation of Air Pollutant Emissions Factors, indicates that the kiln operations do in fact emit PM/PM_{10}, the Department denied this request and maintained kiln PM/PM_{10} emissions in the emission inventory under the current permit action. Permit **#3238-01** replaces Permit #3238-00.

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 test, 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).

   IMC shall comply with the requirements contained in the Montana Source Test Protocol and Procedures Manual, including, but not limited, 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 17.8.220 Ambient Air Quality Standard for Settled Particulate Matter
6. ARM 17.8.221 Ambient Air Quality Standard for Visibility
7. ARM 17.8.223 Ambient Air Quality Standard for PM_{10}

IMC 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 20% for all fugitive emission sources and that reasonable precautions be taken to control emissions of airborne particulate matter. (2) Under this rule, IMC 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 60, Standards of Performance for New Stationary Sources (NSPS). This facility is not an NSPS affected source because it does not meet the definition of any NSPS subpart defined in 40 CFR 60.

   40 CFR 60, Subpart DD, Standard of Performance for Grain Elevators. This subpart does not apply to the proposed facility because the facility does not meet or exceed the grain storage capacity of an affected source as defined in this subpart.

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

1. ARM 17.8.504 Air Quality Permit Application Fees. This rule requires that an applicant submit an air quality permit application fee concurrent with the submittal of an air quality permit application. A permit application is incomplete until the proper application fee is paid to the Department. IMC submitted the appropriate permit application fee for the current permit action.

2. ARM 17.8.505 When Permit Required--Exclusions. An annual air quality operation fee must, as a condition of continued operation, be submitted to the Department by each source of air contaminants holding an air quality permit (excluding an open burning permit) issued by the Department. The air quality operation fee is based on the actual or estimated actual amount of air pollutants emitted during the previous calendar year.

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

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

1. ARM 17.8.740 Definitions. This rule is a list of applicable definitions used in this chapter, unless indicated otherwise in a specific subchapter.

2. ARM 17.8.743 Montana Air Quality Permits--When Required. This rule requires a facility to obtain an air quality permit or permit alteration if they construct, alter or use any air contaminant sources that have the Potential to Emit (PTE) greater than 25 tons per year of any pollutant. IMC has the PTE more than 25 tons per year of total particulate matter (PM), particulate matter with an aerodynamic diameter less than or equal to 10 µm (PM_{10}), sulfur dioxide (SO_2), oxides of nitrogen (NO_x), and carbon monoxide (CO); therefore, an air quality permit is required.

3. ARM 17.8.744 Montana Air Quality Permits--General Exclusions. This rule identifies the activities that are not subject to the Montana Air Quality Permit program.

4. ARM 17.8.745 Montana Air Quality Permits—Exclusion for De Minimis Changes. This rule identifies the de minimis changes at permitted facilities that are not subject to 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, alteration, or use of a source. IMC 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. IMC submitted an affidavit of publication of public notice for the February 17, 2005, issue of the *Great Falls Tribune*, a newspaper of general circulation in the Town of Great Falls in Cascade County, Montana, 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 IMC 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 altered 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.

F. ARM 17.8, Subchapter 8 – Prevention of Significant Deterioration of Air Quality, including, but not limited to:

1. ARM 17.8.801 Definitions. This rule is a list of applicable definitions used in this subchapter.

2. ARM 17.8.818 Review of Major Stationary Sources and Major Modifications--Source Applicability and Exemptions. The requirements contained in ARM 17.8.819 through ARM 17.8.827 shall apply to any major stationary source and any major modification, with respect to each pollutant subject to regulation under the FCAA that it would emit, except as this subchapter would otherwise allow.

This facility is not a major stationary source since this facility is not a listed source and the facility's potential to emit is below 250 tons per year of any pollutant (excluding fugitive emissions).

G. 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 Hazardous Air Pollutant (HAP), PTE > 25 tons/year of a combination of all HAPs, or a lesser quantity as the Department may establish by rule; or

   c. PTE > 70 tons/year of 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 Air Quality Permit #3238-01 for IMC, the following conclusions were made:

   a. The facility's PTE is less than 100 tons/year for all regulated pollutants.

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 not subject to any current NSPS.

e. This facility is not subject to any current NESHAP standards except 40 CFR 63, Subpart M, Asbestos.

f. This source is not a Title IV affected source, nor a solid waste combustion unit.

g. This source is not an EPA designated Title V source.

Based on these facts, the Department determined that IMC is a minor source of emissions as defined under the Title V operating permit program. Prior to the current permit action, IMC operations resulted in emissions of PM, NO_x, and CO which exceeded the applicable Title V major source permitting threshold(s); therefore, IMC was a Title V major source and received final and effective Title V Operating Permit #OP3238-00 on February 26, 2005. However, the current permit action modifies IMC operations to the extent that potential emissions of all regulated pollutants are below the applicable Title V threshold(s) making IMC a minor source of emissions as defined under the Title V permit program. Pending issuance of final Montana air quality Permit #3238-01, the Department will revoke Title V Operating Permit #OP3238-00.

III. BACT Determination

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

BACT is defined as an emission limitation, based on the maximum degree of reduction for each pollutant subject to regulation that would be emitted from a new or modified source for which the Department, on a case-by-case basis, taking into account energy, environmental, and economic impacts, and other costs, determines is achievable for the new or modified unit through application of control(s). Under various circumstances, the Department may prescribe a design, equipment, work practice, operational standard, or a combination thereof, in lieu of an emission limit, to require the application of BACT.

A BACT analysis was submitted by IMC in Permit Application #3238-01, addressing some available methods of controlling PM/PM_{10}, NO_x, CO, SO_2, and VOC emissions from the kiln process heaters at the proposed IMC facility; a BACT analysis for PM/PM_{10} emissions resulting from material handling processes (barley, malt, and salable malt by-product) at the plant; and a BACT analysis for fugitive PM/PM_{10} emissions resulting from vehicle traffic and other facility operations associated with the haul roads, access roads, parking lots, and the general plant area. Finally, a BACT analysis for SO_2 emissions resulting from the burning of elemental sulfur during kiln operations was conducted for the proposed project.

The Department reviewed the proposed control methods, as well as previous BACT determinations for similar sources. The following control options have been analyzed by the Department through the BACT process.

A. Process Heater BACT Analysis

1. NO_x BACT Analysis

NO_x will be formed during the combustion of natural gas in the process heaters. NO_x formation occurs by three fundamentally different mechanisms. The principal mechanism of NO_x in natural gas combustion is thermal NO_x. The thermal NO_x mechanism occurs through the thermal dissociation and the subsequent reaction of nitrogen (N_2) and oxygen (O_2) molecules in the combustion air. Most NO_x formed through the thermal NO_x mechanism occurs in the high temperature flame zone near the burners. The formation of thermal NO_x is affected by three factors: (1) oxygen concentration, (2) peak temperature, and (3) time of exposure at peak temperature. As these factors increase, NO_x emission levels increase.

The second mechanism of NO_x formation, called prompt NO_x, occurs through early reaction of nitrogen molecules in the combustion air and hydrocarbon radicals from the fuel. Prompt NO_x reactions occur within the flame and are usually negligible when compared to the amount of NO_x formed through the thermal NO_x mechanism. However, prompt NO_x levels may become significant with the use of ultra-low-NO_x burners.

The third mechanism of NO_x formation, called fuel NO_x, stems from the evolution and reaction of fuel-bound nitrogen compounds with oxygen. Due to the characteristically low fuel nitrogen content of natural gas, NO_x formation through the fuel NO_x mechanism for boilers fired with natural gas is insignificant.

NO_x Control Technology Identification

NO_x emissions from the process heaters can be reduced by several different methods. The following NO_x control technologies were analyzed for application to the process heaters at the IMC facility. These control technologies can be applied individually or in combination:

- Selective Catalytic Reduction (SCR)
- Selective Non-Catalytic Reduction (SNCR)
- Staged Combustion or Dry Low NO_x
- Wet Controls
- No Add-On Control: Good Combustion Practices/Pipeline Quality Natural Gas

The following text provides an explanation and analysis of each selected control technology/strategy listed above.

a. SCR

SCR is a post combustion gas treatment technique that uses a catalyst to reduce NO and NO_2 to molecular Nitrogen (N), water (H_2O), and oxygen (O_2). Ammonia (NH_3) is commonly used as the reducing agent. The control efficiency for an SCR system is typically estimated to be between 60% and 90%. The basic chemical reactions are as follows:

$$4NH_3 + 4NO + O_2 \rightarrow 4N_2 + 6H_2O$$
$$8NH_3 + 6NO_2 \rightarrow 7N_2 + 12H_2O$$

Ammonia vaporized and injected into the flue gas upstream of the catalyst bed combines with NO_x at the catalyst surface to form an ammonium salt intermediate. The ammonium salt intermediate then decomposes to produce elemental nitrogen and water. Another alternative is to inject an aqueous ammonia solution. Through this process the ratio of NH_3 to NO_x can be varied to achieve the desired level of NO_x reduction; however, increasing the ratio to greater than 1 results in increased un-reacted ammonia passing through the catalyst and into the atmosphere ("ammonia slip").

The catalyst lowers the temperature required for the chemical reaction between NO_x and NH_3. Catalysts used for the NO_x reduction include base metals, precious metals, and zeolites. Commonly, the catalyst of choice for the reaction is a mixture of titanium and vanadium oxides.

An attribute common to all catalysts is the narrow "window" of acceptable system temperatures. In the case of the proposed process heaters, the temperature window is approximately 400°F to 800°F. At temperatures below 400°F, the NO_x reduction reaction will not proceed. Operation at temperatures exceeding 800°F will shorten catalyst life and can lead to the oxidation of NH_3 to either nitrogen oxides (thereby increasing NO_x emissions) or possibly generating explosive levels of ammonium nitrate in the exhaust gas stream. The stack temperature for the process heaters ranges from approximately 200°F to 278°F. These temperatures make the use of SCR technically difficult for the process heaters.

Other factors impacting the effectiveness of SCR include catalyst reactor design, operating temperature, the type of fuel fired, sulfur content of the fuel, design of the NH_3 injection system, and the potential for catalyst poisoning.

The SCR system is usually operated with wet injection and or low NO_x combustors. Data shows that an SCR operated alone allows a higher ammonia slip than does an SCR operated in conjunction with a wet or dry control technology. As previously described, the use of SCR invokes various technical problems including the narrow "window" of acceptable system temperatures, short catalyst life, a possible increase in thermal NO_x production due to high operating temperatures, and the possible production of explosive levels of ammonium nitrate. Also, the disposal of spent catalyst must be considered. Unlike zeolite and precious metal catalysts, base metal catalysts constitute a hazardous waste.

Finally, the cost effectiveness ($/ton NO_x removed) of SCR for the MOCO process heater #1, the HEATEC process heater #2, and the future Plant Heater has been shown to be approximately $7,491/ton while the cost effectiveness of SCR for the Johnston Heater #1 and #2 and the HEATEC process heater #1 has been shown to be approximately $9,938/ton, making the cost effectiveness of SCR control infeasible from an economic standpoint.

Based on the above-cited economic and technical infeasibility issues associated with SCR control for process heater NO_x reduction, the Department determined that SCR will not constitute BACT in this case.

b. SNCR

SNCR involves the non-catalytic decomposition of NO_x to nitrogen and water (see chemical reaction for SCR). A nitrogenous reducing agent, typically ammonia or urea, is injected into the upper reaches of the furnace. Because a catalyst is not used to drive the reaction, temperatures of 1600°F to 2100°F are required.

NO_x removal efficiency varies considerably for this technology, depending on inlet NO_x concentrations, fluctuating flue gas temperatures, residence time, amount and type of nitrogenous reducing agent, mixing effectiveness, and the presence of interfering chemical substances in the gas stream.

As with SCR, technical difficulties exist for SNCR application. Since SNCR requires a flue gas temperature of 1600°F to 2100°F and the stack temperature for the process heaters is approximately 200°F to 278°F, additional burners would be required to raise the flue gas temperature. Additional burners would produce additional emissions and consume additional energy resources. Further, physical considerations limit the placement of reagent injection nozzles and an in-line duct burner to raise temperatures. Also, SNCR is not as widely used as SCR and may require additional research.

Finally, the cost effectiveness of SNCR for the MOCO process heater #1, the HEATEC process heater #2, and the future Plant Heater has been shown to be approximately $7,156/ton while the cost effectiveness of SNCR for the Johnston Heater #1 and #2 and the HEATEC process heater #1 has been shown to be approximately $9,661/ton, making the cost effectiveness of SNCR control infeasible from an economic standpoint.

Based on the above-cited economic and technical infeasibility issues associated with SNCR control for process heater NO_x reduction, the Department determined that SNCR will not constitute BACT in this case.

c. Staged Combustion (Dry Low NO_x (DLN))

Staged combustion, such as that provided by DLN, reduces NO_x emissions by a combination of several factors. First, a lack of available oxygen for NO_x formation in the fuel rich stage is due to off-stoichiometric firing. Second, the flame temperature may be lower in the first stage than the flame temperature in single stage combustion. Third, the peak temperature in the second stage (air rich) is lower. Staged combustion is an effective method for controlling both thermal and fuel NO_x due to this technology's ability to control the mixing of the fuel with the combustion air. Typical NO_x reduction effectiveness for DLN is approximately 80%. The NO_x reduction effectiveness depends on good burner operation, concentration of unburned hydrocarbon emissions, and poor ignition characteristics that occasionally occur under excessively fuel rich combustion circumstances.

The HEATEC process heater #1 and #2 and the future Plant Heater incorporate or will incorporate DLN control as an integral part of the heating system. However, the MOCO Heater #1 and the Johnston process heater(s) #1 and #2 do not incorporate any kind of staged combustion control mechanism. Annual operation and maintenance costs for DLN technology retrofit for these process heaters is estimated to be approximately $4921/ton for the MOCO process heater #1 and $10,472/ton for the Johnston process Heater(s) #1 and #2, respectively, making the cost effectiveness of DLN and other staged combustion technologies economically infeasible.

Therefore, staged combustion for the MOCO process heater #1 and both Johnston process heaters #1 and #2 will not constitute BACT in this case. However, since IMC proposed DLN technology for NO_x control from the HEATEC process heaters #1 and #2 and the future Plant Heater and since DLN technology is capable of significant NO_x reduction (80%) and has been deemed BACT for other recently permitted similar sources, the Department determined that DLN technology will constitute BACT for the HEATEC process heaters #1 and #2 and the future Plant Heater.

d. Wet Controls

Water and/or steam injection technology has been shown to effectively suppress NO_x emissions from gas turbines, but not used as common control for process heaters such as that proposed. The injected fluid increases the thermal mass by dilution and thereby reduces peak temperatures in the flame zone.

NO_x reduction efficiency increases as the water-to-fuel ratio increases. For a maximum efficiency, the water must be atomized and injected with homogenous mixing throughout the combustor. This technique reduces thermal NO_x, but may actually increase the production of fuel NO_x. Depending on the initial NO_x load, wet injection control may reduce NO_x by as much as 60%. Because there is potential for increased fuel NOx associated with wet controls, the Department determined that wet controls will not constitute BACT in this case.

e. No Add-On Controls: Good Combustion Practices/Pipeline Quality Natural Gas

Good combustion practices utilizing pipeline quality natural gas have been shown to produce relatively low NO_x emissions as compared with the combustion of other solid and liquid fuels. Further, these practices have no energy or economic impacts on IMC. Therefore, because the utilization of good combustion practices firing only pipeline quality natural gas is capable of significant NO_x reduction when compared to other fuels and is economically and technically feasible, this control strategy will constitute BACT for the for all of the proposed process heaters.

NOx BACT Summary and Determination

In summary, the Department analyzed the use of SCR, SNCR, DLN Staged Combustion, Wet Controls, and no add-on control with proper combustion practices and burning only pipeline quality natural gas as possible NO_x control technologies/strategies for the kiln process heaters at the proposed IMC plant. For the MOCO process heater #1 and the Johnston process heater(s) #1 and #2, due to various technical and economic feasibility factors associated with the use of SCR, SNCR, DLN Staged Combustion, and Wet Controls, as previously discussed, and the fact that good combustion practices burning only pipeline quality natural gas is capable of significant NO_x emissions reductions when compared to other fuels, the Department determined that good combustion practices firing only pipeline quality natural gas will constitute BACT for the control of NO_x emissions from these units, in this case. For the HEATEC process heater(s) #1 and #2 and the future Plant Heater, due to various technical and economic feasibility factors associated with the use of SCR, SNCR, and Wet Controls, as previously discussed, the Department determined that these control strategies will not constitute BACT for these units, in this case. However, because DLN control in combination with good combustion practices burning only pipeline quality natural gas is capable of significant NO_x emissions reductions and has been deemed technically and economically feasible for these units, as discussed above, the Department determined that the use of DLN technology in combination with good combustion practices burning only pipeline quality natural gas will constitute BACT for these units, in this case. A complete NO_x BACT analysis is contained in the application for Permit #3238-01 and is available from the Department upon request.

2. CO BACT Analysis

This BACT analysis considers the use of the following control technologies/strategies for the reduction of CO emissions resulting from the operation of the kiln process heaters:

- Oxidation of Post Combustion Gases: Catalytic and Thermal Oxidation
- No Add-On Control: Good Combustion Practices Utilizing Only Pipeline Quality Natural Gas

The following text provides an explanation and analysis of each selected control technology/strategy listed above.

a. Oxidation of Post-Combustion Gases: Catalytic and Thermal Oxidation

Oxidation of CO in post combustion gases may be accomplished through thermal oxidation with or without the assistance of a catalyst. The efficiency of these CO control technologies is typically near 80% effective. Although various specialized technologies exist, fundamentally, oxidizers, or incinerators, use heat to destroy CO in the gas stream. Incineration is an oxidation process that ideally breaks down the molecular structure of an organic compound into carbon dioxide and water vapor.

Temperature, residence time, and turbulence of the system affect CO control efficiency. A thermal oxidizer/incinerator generally operates at temperatures between 1450°F and 1600°F. Therefore, since thermal oxidation/incineration occurs at temperatures in this range and the stack temperature for the proposed process heaters is approximately 200°F to 278°F heaters, additional burners and fuel use would be required to raise the flue gas temperature. Additional burners would produce additional emissions and consume additional energy resources.

Catalytic oxidation/incineration is similar to thermal oxidation/incineration; however, catalytic incineration allows for oxidation at lower temperatures ranging from 600°F to 1000°F. Since catalytic oxidation/incineration occurs at temperatures in this range and the stack temperature for the proposed process heaters is still well below this temperature range at approximately 200°F to 278°F, additional burners and fuel use would be required to raise the flue gas temperature. Additional burners would produce additional emissions and consume additional energy resources.

The catalyst systems that are used are typically metal oxides such as nickel oxide, copper oxide, manganese dioxide, or chromium oxide. Noble metals such as platinum and palladium may also be used. Due to the high temperatures required for complete destruction, fuel costs can be expensive and fuel consumption can be excessive with oxidation units. To lower fuel usage, regenerative thermal oxidizers (RTOs) can be used to preheat exhaust gases.

As previously described, oxidation of post-combustion gases invokes various technical problems including the need for high combustion temperatures and subsequent increased fuel use. Control of CO emissions using RTO is economically infeasible ranging from $24,900/ton to $38,000/ton of CO removed for the various proposed process heaters and the control of CO using catalytic oxidation is also economically infeasible with a range of $21,400/ton to $38,600/ton of CO removed. Therefore, the Department determined that oxidation of post-combustion gases will not constitute BACT in this case.

b. No Add-On Control: Good Combustion Practices/Pipeline Quality Natural Gas

In an ideal combustion process, all of the carbon and hydrogen contained within the fuel are oxidized to carbon dioxide (CO_2) and water (H_2O). The emission of CO in a combustion process is the result of incomplete organic fuel combustion.

Some fuels inherently reduce CO emissions due to physical characteristics. For example, pipeline quality natural gas generally results in much lower CO emissions as compared to various liquid or solid fuels in wide use. IMC has proposed the burning of only pipeline quality natural gas in the process heaters for the proposed project.

Also, reduction of CO can be accomplished by controlling the combustion temperature, residence time, and available oxygen. Normal combustion practice at the IMC facility will involve maximizing the heating efficiency of the fuel in an effort to minimize fuel usage. This efficiency of fuel combustion will also minimize CO formation.

IMC proposed the burning of only pipeline quality natural gas and using proper design and combustion practices to control CO emissions from the process heaters. Because these control strategies are capable of achieving significant CO reductions when compared to other fuels, have been deemed BACT for similar sources in the industry, and because other technologies analyzed under this BACT review have been shown to be economically infeasible, the Department considers the use of pipeline quality natural gas utilizing proper design and combustion practices to be BACT in this case.

CO BACT Summary and Determination

In summary, the Department analyzed the use of proper design and combustion and oxidation of post-combustion gases as possible CO control strategies for the process heaters. Due to various technical and economic feasibility factors associated with the oxidation of post combustion gases, as previously discussed, the Department determined that proper design and combustion practices with the use of pipeline quality natural gas only will constitute BACT in this case. A complete CO BACT analysis is contained in the application for Permit #3238-01 and is available from the Department upon request.

3. PM/PM_{10} BACT Analysis

PM and PM_{10} are formed during the combustion of natural gas in the kiln process heaters. The concentration of PM and PM_{10} can be reduced by using various control technologies. The following control technologies/strategies were analyzed through the BACT process:

- Fabric Filters (baghouses)
- Wet Scrubbers
- Electrostatic Precipitators (ESPs)
- No Add-On Control/Burning Only Pipeline Quality Natural Gas

The following text provides an explanation and analysis of each control technology listed above.

a. Baghouses

Baghouses consist of one or more isolated compartments containing rows of fabric filter bags or tubes. Gas flows pass through the fabric where the particles are retained on the upstream face of the bags, while the cleaned gas stream is vented to the atmosphere or on to another control device. Baghouses are effective for the control of particles from sub-micron to several hundred microns at gas temperatures up to about 500ºF.

Fabric filters can be characterized by the types of cleaning devices (shaker, reverse-air, and pulse-jet), direction of gas flow, location of the system fan, and the gas-flow quantity. Typically the type of cleaning method distinguishes the fabric filter.

Advantages to baghouses are the high collection efficiencies (in excess of 99%) and the collection of a wide range of particle sizes. The disadvantages include the narrow temperature window of up to approximately 500 to 550ºF (for typical installations), high pressure drops, and problems with gas streams that are corrosive or sticky.

IMC proposed the burning of only pipeline quality natural gas and using proper design and combustion practices to control PM/PM_{10} emissions from the process heaters. Further, natural gas combustion, without add-on control, provides a significant reduction in potential PM/PM_{10} emissions when compared to other fuels commonly used for kiln operations. Further, IMC provided a cost effective/cost benefit analysis as part of the application for Montana Air Quality Permit #3238-01. The cost effectiveness for the reduction of PM/PM_{10} emissions from the various process heaters ranged from approximately $143,000/ton to $288,000/ton removed, making the addition of baghouse control economically infeasible. Therefore, the Department determined that baghouse control for the process heater operations does not constitute BACT in this case.

b. Wet Scrubbers

Wet scrubbers typically use water to impact, intercept, or diffuse a particle-laden gas stream. With impaction, particulate matter is accelerated and impacted onto a surface area or into a liquid droplet through devices such as venturis and/or spray chambers. When using interception, particles flow nearly parallel to the water droplets, allowing the water to intercept the particles. This strategy works most effectively for sub-micron particles. Spray augmented scrubbers and high-energy venturis employ this mechanism. Diffusion is used for particles of 0.5 micron (µm) or smaller and in situations where there is a large temperature difference between the gas and the scrubbing media. The particles migrate through the spray along lines of irregular gas density and turbulence, contacting droplets of approximately equal energy.

Six particle scrubber designs are used in control application such as that proposed: spray, wet dynamic, cyclonic spray, impactor, venturi, and augmented. In all of these scrubbing technologies, impaction is the mechanism for collecting particles larger than 3 µm. Since smaller sized particles respond to non-inertial forces, a high density of small droplets is needed to effectively trap these particles. This is accomplished at the price of high energy consumption due to hydraulic and velocity pressure losses.

The most widely used wet scrubbers are venturi scrubbers. With gas-side pressure drops exceeding 15 inches of water, particulate collection efficiencies of 85 percent or greater have been reported.

IMC has proposed the burning of only pipeline quality natural gas and using proper design and combustion practices to control PM/PM_{10} emissions from the process heaters. Further, natural gas combustion, without add-on control, provides a significant reduction in potential PM/PM_{10} emissions when compared to other fuels commonly used for kiln operations. Because potential PM/PM_{10} emissions from the process heaters are relatively minor ranging from 0.82 tons per year (tpy) to 1.74 tpy for the proposed process heaters, the addition of wet scrubber technology would be cost prohibitive. Therefore, the Department determined that wet scrubber control for the process heater operations does not constitute BACT in this case.

c. ESPs

An ESP is a particulate control device that uses electric forces to move particles out of the gas stream and onto collector plates. The particles are given an electric charge by forcing them through a corona that surrounds a highly charged electrode, frequently a wire. The electrical field then forces the charged particles to the opposite charged electrode, usually a plate. Solid particles are removed from the collecting plate by a shaking process known as “rapping.”

ESPs are employed when collection efficiencies of greater than 90 percent are required. ESPs are often used downstream of mechanical collector pre-cleaners that remove the larger size particulate matter. Collection efficiencies of 90 to 99 percent for PM/PM_{10} have been observed for ESPs.

IMC has proposed the burning of only pipeline quality natural gas and using proper design and combustion practices to control PM/PM_{10} emissions from the process heaters. Further, natural gas combustion, without add-on control, provides a significant reduction in potential PM/PM_{10} emissions when compared to other fuels commonly used for kiln operations. Because potential PM/PM_{10} emissions from the process heaters are relatively minor ranging from 0.82 tpy to 1.74 tpy for the proposed process heaters, the addition of ESP technology would be cost prohibitive. Therefore, the Department determined that ESP control for the process heater operations does not constitute BACT in this case.

d. No Add-On Control/Burning Only Pipeline Quality Natural Gas

As previously discussed, IMC proposed the burning of only pipeline quality natural gas and using proper design and combustion practices to control PM/PM_{10} emissions from the process heater operations. Because burning only pipeline quality natural gas results in significant PM/PM_{10} reductions when compared to other fuels, has been deemed BACT for similar sources in the industry, and because the other control technologies analyzed under this BACT review have been shown to be economically infeasible, the Department determined that the use of pipeline quality natural gas utilizing proper design and combustion practices is BACT in this case.

PM/PM_{10} BACT Summary and Determination

In summary, the Department analyzed the use of fabric filter baghouses, wet scrubbers, ESPs, and no additional control using good combustion practices as possible PM/PM_{10} control technologies/strategies for the process heater operations. All of the previously mentioned control strategies are capable of significant PM/PM_{10} emission reductions. However, because burning only pipeline quality natural gas results in significant PM/PM_{10} reductions when compared to other fuels, has been deemed BACT for similar sources in the industry, and because the control technologies analyzed under this BACT review have been shown to be economically infeasible, the Department determined that the use of pipeline quality natural gas utilizing proper design and combustion practices constitutes BACT in this case. A complete PM/PM_{10} BACT analysis is contained in the application for Permit #3238-01 and is available from the Department upon request.

4. SO_2 BACT Analysis

A physical property of pipeline quality natural gas is it’s low sulfur content and subsequently low production of SO_2 during combustion reactions. Therefore, because IMC is required by permit (BACT determination) to burn only pipeline quality natural gas for kiln operations, potential SO_2 emissions from this process are minimal at 0.55 tpy (cumulative). Due to the low potential SO_2 emissions from the process heater operations, the Department determined that the cost effectiveness of any add-on SO_2 control technology would be prohibitive. Therefore, the Department determined that burning only pipeline quality natural gas with no additional SO_2 control constitutes BACT in this case.

5. VOC BACT Analysis

A physical property of pipeline quality natural gas is the low production of VOCs during combustion reactions. Potential VOC emissions from this process are minimal at 5.15 tpy (cumulative). Due to the low potential VOC emissions from the process heater operations, the Department determined that the cost effectiveness of any add-on VOC control technology would be prohibitive. Therefore, the Department determined that burning only pipeline quality natural gas with no additional VOC control constitutes BACT in this case.

B. Material Handling (Barley, Malt, and Salable Malt By-Product) BACT Analysis

PM/PM_{10} BACT Analysis

IMC did not propose any changes to the material handling (barley, malt, and salable malt by-product) PM/PM_{10} BACT control strategy determined under Permit #3238-00 (baghouse control). However, since IMC proposed a change from multiple to a single baghouse control strategy and because BACT is an ever-evolving process, the Department conducted a material handling (barley, malt, and salable malt by-product) BACT analysis for the proposed permit modification.

The same control technologies/strategies analyzed for the collection of PM/PM_{10} from the kiln operations process heaters apply to the collection of particulate matter from the various barley and malt handling processes at the proposed facility, as described above. Therefore, the Department analyzed the use of ESPs, Wet Scrubbers, and Baghouses as possible PM/PM_{10} control technologies/strategies for the material handling processes at the plant. All of the previously mentioned control technologies/strategies are technically feasible and capable of significant PM/PM_{10} emission reductions; however, under Permit #3238-00, IMC proposed the use of fabric filter baghouse control, utilizing numerous pick-up points, 3-sided enclosures at material transfer locations, and covered conveyors to reduce PM/PM_{10} emissions from the proposed barley and malt handling operations at the facility. In addition, IMC proposed that all barley preparation operations will be housed in the headhouse, all unloading of barley shipments will be accomplished utilizing underground hoppers, the loading of all malt and salable malt by-product for shipment will utilize covered conveyors, and each material transfer point for grain receiving and off-loading will incorporate an enclosure (at least 3-sided) for fugitive emission control.

Because fabric filter baghouse control technologies are capable of achieving the permitted allowable PM/PM_{10} emission rate of 0.010 gr/dscf from the process baghouse, are technically feasible, and are commonly used for sources of this type, the Department determined that the use of a fabric filter baghouse control with appropriate pick-up points, 3-sided enclosures at all material transfer locations, headhouse enclosure for barley preparation processes, and covered material transfer conveyors remains BACT, in this case. A complete PM/PM_{10} BACT analysis is contained in the application for Permit #3238-00 and is available from the Department upon request. PM/PM_{10} emissions from IMC material handling operations did not appreciably change from the initial permit action; therefore, the Department determined that the PM/PM_{10} BACT analysis contained in the initial application remains appropriate and in compliance with permit application requirements.

C. Fugitive Emissions: Haul Roads, Access Roads, Parking Areas, and General Plant Property

PM/PM_{10} BACT Analysis

IMC must take reasonable precautions to limit the fugitive emissions of airborne particulate matter on the haul roads, access roads, parking areas, and the general plant property. IMC shall use water spray and/or chemical dust suppressant, as necessary, to maintain compliance with the opacity and reasonable precautions limitations. The Department determined that using water spray and/or chemical dust suppressant, as necessary, to maintain compliance with the opacity requirements and reasonable precautions limitations constitutes BACT for these sources.

D. Process SO_2 Emissions: Elemental Sulfur Burning for Kiln Operations

SO_2 BACT Analysis

During the barley-malt kiln drying process, up to 200 pounds per kiln batch of elemental sulfur is allowed to be burned. The SO_2 combustion product mixed with the drying air helps to preserve the malt product and kill harmful bacteria. As proposed, the remainder of SO_2, which is not absorbed in the process, will vent directly to the atmosphere. At the permitted emission rate of 33.33 lb/hr of SO_2, collectively, the kilns have the potential to emit approximately 36.5 tpy of SO_2.

SO_2 Control Technology Identification

IMC did not propose any changes to the elemental sulfur burning SO_2 BACT control strategy determined under Permit #3238-00 (no additional control). Further, IMC proposed a significant reduction in the allowable amount of elemental sulfur burned (500 lb/batch to 200 lb/batch) and subsequently a significant reduction in potential SO_2 emissions from this process, the Department determined that a new BACT analysis and determination is not appropriate and that the previously determined BACT control strategy remains BACT for SO_2 emissions resulting from elemental sulfur burning operations, in this case. A complete SO_2 BACT analysis is contained in the original application for Permit #3238-00 and is available from the Department upon request. SO_2 emissions from IMC operations did not appreciably change from the initial permit action; therefore, the Department determined that the SO_2 BACT analysis contained in the initial application remains appropriate and in compliance with permit application requirements.

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

IV. Emission Inventory

tons/year						
Emission Source	**PM**	**PM_{10}**	**NO_x**	**CO**	**VOC**	**SO_x**
Process Baghouse (66,800 dscfm)	50.16	25.08	0.00	0.00	0.00	0.00
MOCO Heater #1 (53.4 MMBtu/hr)	1.74	1.74	22.93	19.26	1.26	0.14
Johnston Heater #1 (25.12 MMBtu/hr)	0.82	0.82	10.79	9.06	0.59	0.06
Johnston Heater #2 (25.12 MMBtu/hr)	0.82	0.82	10.79	9.06	0.59	0.06
HEATEC Heater #1 (25 MMBtu/hr)	0.82	0.82	5.37	9.02	0.59	0.06
HEATEC Heater #2 (42 MMBtu/hr)	1.37	1.37	9.02	15.15	0.99	0.11
Future Plant Heater (48 MMBtu/hr	1.57	1.57	10.29	17.31	1.13	0.12
Elemental Sulfur Burning – Kiln Operations	0.00	0.00	0.00	0.00	0.00	36.50
Fugitive: Grain Receiving	0.80	0.18	0.00	0.00	0.00	0.00
Fugitive: Kiln Operations	25.84	23.12	0.00	0.00	0.00	0.00
Fugitive: Load-Out Operations	1.17	0.39	0.00	0.00	0.00	0.00
Fugitive: Vehicle Traffic	0.75	0.43	0.00	0.00	0.00	0.00
Total Emissions:	**85.85**	**56.34**	**69.19**	**78.86**	**5.16**	**37.06**

Process Baghouse (66,800 dscfm)

Air Flow Capacity:	66,800 dscfm (Company Information)
Operating Hours:	8760 hr/yr

PM Emissions

Emission Factor:	0.020 gr/dscf (Permit Limit)	
Calculations:	0.020 gr/dscf * 66,800 dscf/min * 60 min/hr * 1 lb/7000 gr =	11.45 lb/hr
	5.73 lb/hr * 8760 hr/yr * 0.0005 ton/lb =	50.16 ton/yr

PM_{10} Emissions

Emission Factor:	0.010 gr/dscf (Permit Limit)	
Calculations:	0.010 gr/dscf * 66,800 dscf/min * 60 min/hr * 1 lb/7000 gr =	5.73 lb/hr
	5.73 lb/hr * 8760 hr/yr * 0.0005 ton/lb =	25.08 ton/yr

MOCO Heater #1 (53.4 MMBtu/hr)

Heat Input Capacity:	53.4 MMBtu/hr (Company Information)
Natural Gas Heating Value:	1020 MMBtu/MMscf (AP-42, Chapter 1.4)
Operating Hours:	8760 hr/yr (Annual Maximum)

PM Emissions

Emission Factor:	7.6 lb/MMscf (AP-42, Table 1.4-2)	
Calculations:	7.6 lb/MMscf * 1 MMscf/1020 MMBtu * 53.4 MMBtu/hr =	0.40 lb/hr
	0.40 lb/hr * 8760 hr/yr * 0.0005 ton/lb =	1.74 ton/yr

PM_{10} Emissions

Emission Factor:	7.6 lb/MMscf (AP-42, Table 1.4-2)	
Calculations:	7.6 lb/MMscf * 1 MMscf/1020 MMBtu * 53.4 MMBtu/hr =	0.40 lb/hr
	0.40 lb/hr * 8760 hr/yr * 0.0005 ton/lb =	1.74 ton/yr

NOx Emissions

Emission Factor:	100 lb/MMscf (AP-42, Table 1.4-2)	
Calculations:	100 lb/MMscf * 1 MMscf/1020 MMBtu * 53.4 MMBtu/hr =	5.24 lb/hr
	5.24 lb/hr * 8760 hr/yr * 0.0005 ton/lb =	22.93 ton/yr

CO Emissions

Emission Factor:	84 lb/MMscf (AP-42, Table 1.4-2)	
Calculations:	84 lb/MMscf * 1 MMscf/1020 MMBtu * 53.4 MMBtu/hr =	4.40 lb/hr
	4.40 lb/hr * 8760 hr/yr * 0.0005 ton/lb =	19.26 ton/yr

VOC Emissions

Emission Factor:	5.5 lb/MMscf (AP-42, Table 1.4-2)	
Calculations:	5.5 lb/MMscf * 1 MMscf/1020 MMBtu * 53.4 MMBtu/hr =	0.29 lb/hr
	0.29 lb/hr * 8760 hr/yr * 0.0005 ton/lb =	1.26 ton/yr

SOx Emissions

Emission Factor: 0.6 lb/MMscf (AP-42, Table 1.4-2)
Calculations: 0.6 lb/MMscf * 1 MMscf/1020 MMBtu * 53.4 MMBtu/hr = 0.03 lb/hr
0.03 lb/hr * 8760 hr/yr * 0.0005 ton/lb = 0.14 ton/yr

Johnston Heater #1 (25.12 MMBtu/hr)

PM Emissions

Emission Factor: 7.6 lb/MMscf (AP-42, Table 1.4-2)
Calculations: 7.6 lb/MMscf * 1 MMscf/1020 MMBtu * 25.12 MMBtu/hr = 0.19 lb/hr
0.19 lb/hr * 8760 hr/yr * 0.0005 ton/lb = 0.82 ton/yr

PM_{10} Emissions

Emission Factor: 7.6 lb/MMscf (AP-42, Table 1.4-2)
Calculations: 7.6 lb/MMscf * 1 MMscf/1020 MMBtu * 25.12 MMBtu/hr = 0.19 lb/hr
0.19 lb/hr * 8760 hr/yr * 0.0005 ton/lb = 0.82 ton/yr

NOx Emissions

Emission Factor: 100 lb/MMscf (AP-42, Table 1.4-2)
Calculations: 100 lb/MMscf * 1 MMscf/1020 MMBtu * 25.12 MMBtu/hr = 2.46 lb/hr
2.46 lb/hr * 8760 hr/yr * 0.0005 ton/lb = 10.79 ton/yr

CO Emissions

Emission Factor: 84 lb/MMscf (AP-42, Table 1.4-2)
Calculations: 84 lb/MMscf * 1 MMscf/1020 MMBtu * 25.12 MMBtu/hr = 2.07 lb/hr
2.07 lb/hr * 8760 hr/yr * 0.0005 ton/lb = 9.06 ton/yr

VOC Emissions

Emission Factor: 5.5 lb/MMscf (AP-42, Table 1.4-2)
Calculations: 5.5 lb/MMscf * 1 MMscf/1020 MMBtu * 25.12 MMBtu/hr = 0.14 lb/hr
0.20 lb/hr * 8760 hr/yr * 0.0005 ton/lb = 0.59 ton/yr

SOx Emissions

Emission Factor: 0.6 lb/MMscf (AP-42, Table 1.4-2)
Calculations: 0.6 lb/MMscf * 1 MMscf/1020 MMBtu * 25.12 MMBtu/hr = 0.01 lb/hr
0.02 lb/hr * 8760 hr/yr * 0.0005 ton/lb = 0.06 ton/yr

Johnston Heater #2 (25.12 MMBtu/hr)

PM Emissions

Emission Factor: 7.6 lb/MMscf (AP-42, Table 1.4-2)
Calculations: 7.6 lb/MMscf * 1 MMscf/1020 MMBtu * 25.12 MMBtu/hr = 0.19 lb/hr
0.19 lb/hr * 8760 hr/yr * 0.0005 ton/lb = 0.82 ton/yr

PM_{10} Emissions

Emission Factor:	7.6 lb/MMscf (AP-42, Table 1.4-2)	
Calculations:	7.6 lb/MMscf * 1 MMscf/1020 MMBtu * 25.12 MMBtu/hr =	0.19 lb/hr
	0.19 lb/hr * 8760 hr/yr * 0.0005 ton/lb =	0.82 ton/yr

NOx Emissions

Emission Factor:	100 lb/MMscf (AP-42, Table 1.4-2)	
Calculations:	100 lb/MMscf * 1 MMscf/1020 MMBtu * 25.12 MMBtu/hr =	2.46 lb/hr
	2.46 lb/hr * 8760 hr/yr * 0.0005 ton/lb =	10.79 ton/yr

CO Emissions

Emission Factor:	84 lb/MMscf (AP-42, Table 1.4-2)	
Calculations:	84 lb/MMscf * 1 MMscf/1020 MMBtu * 25.12 MMBtu/hr =	2.07 lb/hr
	2.07 lb/hr * 8760 hr/yr * 0.0005 ton/lb =	9.06 ton/yr

VOC Emissions

Emission Factor:	5.5 lb/MMscf (AP-42, Table 1.4-2)	
Calculations:	5.5 lb/MMscf * 1 MMscf/1020 MMBtu * 25.12 MMBtu/hr =	0.14 lb/hr
	0.14 lb/hr * 8760 hr/yr * 0.0005 ton/lb =	0.59 ton/yr

SOx Emissions

Emission Factor:	0.6 lb/MMscf (AP-42, Table 1.4-2)	
Calculations:	0.6 lb/MMscf * 1 MMscf/1020 MMBtu * 25.12 MMBtu/hr =	0.01 lb/hr
	0.01 lb/hr * 8760 hr/yr * 0.0005 ton/lb =	0.06 ton/yr

HEATEC Heater #1 (25 MMBtu/hr)

PM Emissions

Emission Factor:	7.6 lb/MMscf (AP-42, Table 1.4-2)	
Calculations:	7.6 lb/MMscf * 1 MMscf/1020 MMBtu * 25 MMBtu/hr =	0.19 lb/hr
	0.19 lb/hr * 8760 hr/yr * 0.0005 ton/lb =	0.82 ton/yr

PM_{10} Emissions

Emission Factor:	7.6 lb/MMscf (AP-42, Table 1.4-2)	
Calculations:	7.6 lb/MMscf * 1 MMscf/1020 MMBtu * 25 MMBtu/hr =	0.19 lb/hr
	0.19 lb/hr * 8760 hr/yr * 0.0005 ton/lb =	0.82 ton/yr

NOx Emissions

Emission Factor:	50 lb/MMscf (AP-42, Table 1.4-2: 50% control for Dry-Low NOx Technology)	
Calculations:	50 lb/MMscf * 1 MMscf/1020 MMBtu * 25 MMBtu/hr =	1.23 lb/hr
	1.225 lb/hr * 8760 hr/yr * 0.0005 ton/lb =	5.37 ton/yr

CO Emissions

Emission Factor: 84 lb/MMscf (AP-42, Table 1.4-2)
Calculations: 84 lb/MMscf * 1 MMscf/1020 MMBtu * 25 MMBtu/hr = 2.06 lb/hr
2.06 lb/hr * 8760 hr/yr * 0.0005 ton/lb = 9.02 ton/yr

VOC Emissions

Emission Factor: 5.5 lb/MMscf (AP-42, Table 1.4-2)
Calculations: 5.5 lb/MMscf * 1 MMscf/1020 MMBtu * 25.12 MMBtu/hr = 0.13 lb/hr
0.13 lb/hr * 8760 hr/yr * 0.0005 ton/lb = 0.59 ton/yr

SOx Emissions

Emission Factor: 0.6 lb/MMscf (AP-42, Table 1.4-2)
Calculations: 0.6 lb/MMscf * 1 MMscf/1020 MMBtu * 25.12 MMBtu/hr = 0.01 lb/hr
0.01 lb/hr * 8760 hr/yr * 0.0005 ton/lb = 0.06 ton/yr

HEATEC Heater #2 (42 MMBtu/hr)

PM Emissions

Emission Factor: 7.6 lb/MMscf (AP-42, Table 1.4-2)
Calculations: 7.6 lb/MMscf * 1 MMscf/1020 MMBtu * 42 MMBtu/hr = 0.31 lb/hr
0.31 lb/hr * 8760 hr/yr * 0.0005 ton/lb = 1.37 ton/yr

PM_{10} Emissions

Emission Factor: 7.6 lb/MMscf (AP-42, Table 1.4-2)
Calculations: 7.6 lb/MMscf * 1 MMscf/1020 MMBtu * 42 MMBtu/hr = 0.31 lb/hr
0.31 lb/hr * 8760 hr/yr * 0.0005 ton/lb = 1.37 ton/yr

NOx Emissions

Emission Factor: 50 lb/MMscf (AP-42, Table 1.4-2: 50% control for Dry-Low NOx Technology)
Calculations: 50 lb/MMscf * 1 MMscf/1020 MMBtu * 42 MMBtu/hr = 2.06 lb/hr
2.06 lb/hr * 8760 hr/yr * 0.0005 ton/lb = 9.02 ton/yr

CO Emissions

Emission Factor: 84 lb/MMscf (AP-42, Table 1.4-2)
Calculations: 84 lb/MMscf * 1 MMscf/1020 MMBtu * 42 MMBtu/hr = 3.46 lb/hr
3.46 lb/hr * 8760 hr/yr * 0.0005 ton/lb = 15.15 ton/yr

VOC Emissions

Emission Factor: 5.5 lb/MMscf (AP-42, Table 1.4-2)
Calculations: 5.5 lb/MMscf * 1 MMscf/1020 MMBtu * 42 MMBtu/hr = 0.23 lb/hr
0.23 lb/hr * 8760 hr/yr * 0.0005 ton/lb = 0.99 ton/yr

SOx Emissions

Emission Factor:	0.6 lb/MMscf (AP-42, Table 1.4-2)	
Calculations:	0.6 lb/MMscf * 1 MMscf/1020 MMBtu * 42 MMBtu/hr =	0.02 lb/hr
	0.02 lb/hr * 8760 hr/yr * 0.0005 ton/lb =	0.11 ton/yr

Future Plant Heater (48 MMBtu/hr)

PM Emissions

Emission Factor:	7.6 lb/MMscf (AP-42, Table 1.4-2)	
Calculations:	7.6 lb/MMscf * 1 MMscf/1020 MMBtu * 48 MMBtu/hr =	0.36 lb/hr
	0.36 lb/hr * 8760 hr/yr * 0.0005 ton/lb =	1.57 ton/yr

PM_{10} Emissions

Emission Factor:	7.6 lb/MMscf (AP-42, Table 1.4-2)	
Calculations:	7.6 lb/MMscf * 1 MMscf/1020 MMBtu * 48 MMBtu/hr =	0.36 lb/hr
	0.36 lb/hr * 8760 hr/yr * 0.0005 ton/lb =	1.57 ton/yr

NOx Emissions

Emission Factor:	50 lb/MMscf (AP-42, Table 1.4-2: 50% control for Dry-Low NOx Technology)	
Calculations:	50 lb/MMscf * 1 MMscf/1020 MMBtu * 48 MMBtu/hr =	2.35 lb/hr
	2.35 lb/hr * 8760 hr/yr * 0.0005 ton/lb =	10.29 ton/yr

CO Emissions

Emission Factor:	84 lb/MMscf (AP-42, Table 1.4-2)	
Calculations:	84 lb/MMscf * 1 MMscf/1020 MMBtu * 48 MMBtu/hr =	3.95 lb/hr
	3.95 lb/hr * 8760 hr/yr * 0.0005 ton/lb =	17.31 ton/yr

VOC Emissions

Emission Factor:	5.5 lb/MMscf (AP-42, Table 1.4-2)	
Calculations:	5.5 lb/MMscf * 1 MMscf/1020 MMBtu * 48 MMBtu/hr =	0.26 lb/hr
	0.26 lb/hr * 8760 hr/yr * 0.0005 ton/lb =	1.13 ton/yr

SOx Emissions

Emission Factor:	0.6 lb/MMscf (AP-42, Table 1.4-2)	
Calculations:	0.6 lb/MMscf * 1 MMscf/1020 MMBtu * 48 MMBtu/hr =	0.03 lb/hr
	0.03 lb/hr * 8760 hr/yr * 0.0005 ton/lb =	0.12 ton/yr

Elemental Sulfur Burning – Kiln Operations

Molecular Weight (Sulfur):	32 lb/mol
Molecular Weight (SO_2):	64 lb/mol
Batch Process Duration:	36 hrs/batch (Company Information)
Sulfur Burning Duration - Batch Process:	3 hr/kiln batch (Company Information)
Maximum Sulfur Burned/Batch:	200 lb/kiln batch (Permit Limit)
Barley – Sulfur Absorption:	75% (Company Information – Conservative Estimate)

Kiln Throughput Capacity: 380 ton/batch/kiln (Company Information)
Number Of Kilns: 3 kilns
Operating Hours: 8760 hr/yr

Combined Total Barley Throughput Capacity (3 Kilns)
Calculations: 380 ton/batch/kiln * 1 batch/36 hr/kiln * 8760 hr/yr * 3 kilns = 277,400 ton/yr

Total Number of Batches Processed/Year (3 Kilns)
Calculations: 277,400 ton/yr * 1 batch/380 tons = 730 batches/yr (combined 3 kiln capacity)

Sulfur Burning Duration:

Calculations: 730 batches/yr * 3 hr S burning/batch = 2190 hr S burning/yr

SO_x Emissions:

Calculations: 200 lb/kiln batch * 1 kiln batch/3 hrs * 64 lb SO_2/32 lb S * (1-0.75) = 33.33 lb/hr
33.33 lb/hr * 3 hr/batch * 730 batches/yr * 0.0005 ton/lb = 36.50 ton/yr

Fugitive Emissions: Grain Receiving Pits

Barley Density: 48 lb/bu

Process Rate: 19,000,000 bu/yr (Proposed Limit)
Conversion: 48 lb/bu * 19,000,000 bu/yr * 0.0005 ton/lb = 456,000 ton/yr (Permit Limit)

PM Emissions

Emission Factor: 0.035 lb/ton (AP-42, Table 9.9.1-1, SCC03-02-005-52, Hopper Truck)
Emission Control: 90% (3-sided enclosure)
Calculations: 0.035 lb/ton * 456,000 ton/yr * (1-0.9) * 0.0005 ton/lb = 0.80 ton/yr

PM_{10} Emissions

Emission Factor: 0.0078 lb/ton (AP-42, Table 9.9.1-1, SCC03-02-005-52, Hopper Truck)
Emission Control: 90% (3-sided enclosure)
Calculations: 0.0078 lb/ton * 456,000 ton/yr * (1-0.9) * 0.0005 ton/lb = 0.18 ton/yr

Fugitive Emissions: Malt Kilns (3)

Malt Density: 34 lb/bu

Process Rate: 16,000,000 bu/yr (Company Information)
Conversion: 34 lb/bu * 16,000,000 bu/yr * 0.0005 ton/lb = 272,000 ton/yr

PM Emissions

Emission Factor: 0.19 lb/ton (AP-42, Table 9.9.1-2)
Calculations: 0.19 lb/ton * 272,000 ton/yr * 0.0005 ton/lb = 25.84 ton/yr

PM_{10} Emissions

Emission Factor: 0.17 lb/ton (AP-42, Table 9.9.1-2)
Calculations: 0.17 lb/ton * 272,000 ton/yr * 0.0005 ton/lb = 23.12 ton/yr

Fugitive Emissions: Malt Load-Out (2 spouts @ 190 tph & 2 spouts at 100 tph)

Process Rate: 272,000 ton/yr (Malt Production Capacity)

PM Emissions

Emission Factor: 0.086 lb/ton (AP-42, Table 9.9.1-1, SCC03-02-005-52, Truck)
Emission Control: 90% (3-sided enclosure/load-out spout)
Calculations: 0.086 lb/ton * 272,000 ton/yr * (1-0.9) * 0.0005 ton/lb = 1.17 ton/yr

PM_{10} Emissions

Emission Factor: 0.029 lb/ton (AP-42, Table 9.9.1-1, SCC03-02-005-52, Truck)
Emission Control: 90% (3-sided enclosure/load-out spout)
Calculations: 0.029 lb/ton * 272,000 ton/yr * (1-0.9) * 0.0005 ton/lb = 0.39 ton/yr

Fugitive Emissions: Vehicle Traffic

Assumptions:

$E = k (sL/2)^{0.65} * (W/3)^{1.5}$ (AP-42, Section 13.2.1.3, 10/02)

Where:

k = 0.028	Particle size multiplier for PM_{10} and units of interest, lb/VMT (AP-42, Section 13.2.1.3, 10/02)
k = 0.016	Particle size multiplier for PM_{10} and units of interest, lb/VMT (AP-42, Section 13.2.1.3, 10/02)
sL = 0.5	Road surface silt loading, g/m^2 (worst case default; AP-42, Section 13.2.1.3, 10/02)
W = 20	Average vehicle weight, tons (assumed)
E = 0.196	PM emission factor, lb/VMT (calculated)
E = 0.112	PM_{10} emission factor, lb/VMT (calculated)
n = 2	Number of trucks per hour (Company Information)
VMT = 0.44	Vehicle miles traveled (calculated from site plan, permit #3238-00)

PM Emissions

Emission Factor: 0.172 lb/hr (calculated PM emission rate)
Calculations: 0.172 lb/hr * 8760 hr/yr * 0.0005 ton/lb = 0.75 ton/yr

PM_{10} Emissions

Emission Factor: 0.098 lb/hr (calculated PM_{10} emission rate)
Calculations: 0.098 lb/hr * 8760 hr/yr * 0.0005 ton/lb = 0.43 ton/yr

V. Existing Air Quality

The air quality of the proposed area of operation is considered attainment/unclassified for all pollutants. Until recently, a narrow area along 10th Avenue South (bounded by 9th Avenue South on the north, 11th Avenue South on the south, 54th Street South on the east and 2nd Street South on the west) was classified as a non-attainment area for CO but has since been re-designated to attainment area status under a limited maintenance plan (LMP). This re-designation became effective on July 8, 2002. Because the current permit action will ultimately result in a decrease in allowable emissions from the IMC facility, the Department believes that the current permit action will not result in any significant impacts to existing air quality in the area.

VI. Ambient Air Impact Analysis

The Department determined, based on ambient air modeling, that the impact from this permitting action will be minor. The Department believes the current permit action will not result in IMC operations that would cause or contribute to a violation of any ambient air quality standard.

The maximum estimated emissions from the proposed IMC project are approximately 69.2 tpy of NO_x, 78.6 tpy of CO, 57.45 tpy of PM_{10}, 4.79 tpy of VOCs, and 36.72 tpy of SO_2. The air quality classification for Great Falls is "Unclassifiable or Better than National Standards" (40 CFR 81.327) for all pollutants. A narrow area along 10th Avenue South (bounded by 9th Avenue South on the north, 11th Avenue South on the south, 54th Street South on the east and 2nd Street South on the west) was previously classified as a non-attainment area for CO but has since been upgraded to an attainment area as of July 8, 2002.

Bison Engineering Inc. (Bison) submitted modeling on behalf of IMC to demonstrate compliance with the Montana and National Ambient Air Quality Standards (MAAQS/NAAQS) and the Class II PSD increments for SO_2, NOx, and PM_{10}. However, IMC was not required to demonstrate compliance with the SO_2 MAAQS for all existing sources because Montana Refining Company (MRC) does not show compliance with the MAAQS using a dispersion model and, as an existing source, uses ambient SO_2 monitoring to demonstrate compliance with these standards. IMC has shown that their contribution to the modeled MAAQS exceedances is not significant. Further, the minor source baseline dates for NO_x, PM_{10}, and SO_2 have been established in the area so a Class II increment analysis was performed. In addition, the Department requested IMC perform a Class I increment analysis.

The ISC-PRIME model was used along with 5 years of meteorological data (1987-1991) collected at the Great Falls, International Airport National Weather Station. Building downwash effects from the facility buildings were calculated using the EPA developed Building Profile Input Program for use with the ISC-PRIME (BPIP-PRIME). The receptor grid elevations were derived from digital elevation model (DEM) files using the using United States Geological Survey (USGS) 7.5-minute series (1:24,000 scale) digitized topographical maps. The receptors were placed at 50-meter intervals along the property boundaries, 100-meter intervals from the property boundaries to 1 kilometer, 250-meter intervals from 1 to 5 kilometers, and at 500-meter intervals from 5 to 8 kilometers. In addition, receptors were placed randomly along the Class I boundaries of the Gates of the Mountains Wilderness; Scapegoat Wilderness; Bob Marshall Wilderness; UL Bend Wilderness, and Glacier National Park for the Class I demonstration.

Tables 1 and 2 identify the modeling parameters entered into the model for the proposed IMC project.

TABLE 1 - POINT SOURCE MODEL PARAMETERS

SOURCE IDENTIFICATION	UTM Easting (METERS)	UTM Northing (METERS)	BASE ELEV. (FEET)	HEIGHT (FEET)	STACK TEMP. (DEG.K)	EXIT VEL. (FT/SEC)	STACK DIAMETER (FEET)
#1HEATER	480114.8	5265610	3460.0	40.0	200.0	84.0	2.0
#2HEATER	480110.8	5265610	3460.0	40.0	278.0	31.3	2.2
#3HEATER	480106.8	5265610	3460.0	40.0	278.0	31.3	2.2
#4HEATER	480102.8	5265610	3460.0	40.0	278.0	26.2	1.8
#5HEATER	480098.8	5265610	3460.0	40.0	278.0	52.5	1.8
#6HEATER	480094.8	5265610	3460.0	40.0	200.0	78.0	2.0
KLN1	480101	5265501	3461.3	42.0	100.0	80.2	15.6
KLN2	480100	5265541	3461.3	42.0	100.0	80.2	15.6
KLN3	480100	5265580.5	3461.3	42.0	100.0	80.2	15.6
BAGHOUSE	480275.9	5265596.5	3460.0	16.0	70.0	57.0	4.7

TABLE 2 - VOLUME SOURCE MODEL PARAMETERS

SOURCE IDENTIFICATION	EMISSION RATE lb/hr	UTM X (METERS)	UTM Y (METERS)	BASE ELEV. FEET	RELEASE HEIGHT (METERS)	INIT. SY (METERS)	INIT. SZ (METERS)
LOADRCV1[a]	0.18	480314.2	5265598	3455.1	15	7.1	7
GRNRECV[b]	0.44	480317.2	5265600	3455.1	15	7.1	7
HRD1[c]	0.456	479423.7	5265709	3501.0	3.5	13.95	1.63

[a] LOADRCV1 is the load-out spout emission source.
[b] GRNRECV is the grain receiving emission source.
[c] HRD1 is the truck/haul road traffic emissions source. The truck haul road traffic was divided into 50 identical volume source spaced out along the road. UTM coordinates shown for first source.

TABLE 3 - DISPERSION MODEL HOURLY EMISSION RATES

SOURCE IDENTIFICATION	NO_x (lb/hr)	PM_{10} (lb/hr)	CO (lb/hr)	SO_2-Annual (lb/hr)	SO_2-3hour (lb/hr)	SO_2-24 hour (lb/hr)
BAGHOUSE	0.000	5.726	0.000	0.000	0.000	0.000
MOCO HEATER #1	5.230	0.370	4.380	0.053	0.053	0.053
JOHNSTON HEATER #1	2.460	0.180	2.060	0.025	0.025	0.025
JOHNSTON HEATER #2	2.460	0.180	2.060	0.025	0.025	0.025
HEATEC HEATER #1	2.450	0.175	2.050	0.025	0.025	0.025
HEATEC HEATER #2	4.116	0.290	3.440	0.042	0.042	0.042
FUTURE PLANT HEATER	4.704	0.340	3.940	0.048	0.048	0.048
KLN1	0.000	2.031	0.000	2.720	33.301	4.170
KLN2	0.000	2.031	0.000	2.720	33.301	4.170
KLN3	0.000	2.031	0.000	2.720	33.301	4.170
LOADRCV1[1]	0.000	0.440	0.000	0.000	0.000	0.000
GRNRECV[2]	0.000	0.180	0.000	0.000	0.000	0.000
HRD1[3]	0.000	0.0089	0.000	0.000	0.000	0.000

PM_{10}, NO_2, and SO_2 emissions exceeded the modeling significance levels thus; additional modeling was necessary to demonstrate compliance with the NAAQS, MAAQS, and PSD increments. The largest identified radius for determining the significant impact area for this project was the 3-hour SO_2 averaging period, which extended 14.1 kilometers. CO was below the modeling significance, so no additional modeling was conducted for CO emissions.

The NAAQS/MAAQS demonstration and Class I/II analyses were performed with the following sources: Montana Refining Company (MRC), Malmstrom Air Force Base, Agri-Technology Corporation, and Montana First Megawatts Project (MFMP). The NAAQS/MAAQS analyses for NOx, SO_2, and PM_{10} were conducted using the potential emissions from IMC and the non-IMC sources. The results NAAQS/MAAQS are summarized in Table 4.

TABLE 4 - NAAQS/MAAQS Ambient Modeling Results

Pollutant	Avg. Period	Modeled Conc. (μg/m^3)	Background Conc. (μg/m^3)	Ambient Conc. (μg/m^3)	NAAQS (μg/m^3)	% of NAAQS	MAAQS (μg/m^3)	% of MAAQS
PM_{10}	24-hr	27.6	61	88.6	150	59	150	59
	Annual	7.5	21	28.5	50	57	50	57
NO_2	1-hr[a]	269	75	344	------	------	564	61
	Annual	24.2	6	30.2	100	30	94	32
SO_2	1-hr [b]	1879	35	1914	------	------	1,300	NA
	3-hr	1266	26	1292	1,300	99.4	------	NA
	24-hr	344.0	11	355	365	97.2	261	NA
	Annual	76.5	3	79.5	80	99.4	52	NA

a Ozone Limiting Method applied to these results.
b High 6th high presented. (MAAQS is based on 19th high)

Note that the SO_2 MAAQS are exceeded, which is a result of MRC's emissions. MRC is an existing source and is not required to demonstrate compliance with the MAAQS by use of a dispersion model. MRC currently has a permit with SO_2 limits set to demonstrate modeled compliance with the NAAQS and is required to operate an ambient S02 monitor to demonstrate compliance with the MAAQS. IMC has demonstrated compliance with the MAAQS on an individual basis and does not contribute to the modeled exceedances caused by MRC.

Minor source baseline dates have been triggered for NOx, SO_2 and PM_{10} in Great Falls. Although this facility is not subject to PSD, IMC has prepared a cumulative increment analysis to check for continued compliance with the Class I and II increments at MDEQ's request. Receptors were included for five nearby Class I areas (Glacier National Park, Gates of the Mountains, Scapegoat, Bob Marshal and UL Bend Wildernesses)

The results for the Class I and Class II demonstrations are summarized in Table 5.

TABLE 5 - Class I and II Modeling Results

Pollutant	Avg. Period	Class II Modeled Conc. (μg/m^3)	Class II Increment (μg/m^3)	% Class II Increment Consumed	Class I Modeled Conc. (μg/m^3)	Class I Increment (μg/m^3)	% Class I Increment Consumed
PM_{10}	24-hr	27.8	30	92.7	.09	8	1.1
	Annual	7.4	17	43.5	.005	4	0.1
SO_2	3-hr	198	512	38.7	0.72	25	2.8
	24-hr	30.5	91	33.5	0.22	5	4.4
	Annual	3.4	20	17	0.006	2	0.3
NOx	Annual	18	25	72	0.009	2.5	0.4

The Ambient Ratio Method was not applied to the modeled NO_x emissions to convert the modeled concentrations to NO_2 for comparison to the PSD NO_x increments. Therefore, these results may be considered conservative for the PSD demonstration. The reported values are the highest modeled concentrations for both the combined and simple cycle scenarios at MFMP.

As detailed in this modeling demonstration, the Department determined that the modeled impacts from the proposed IMC project should not cause or contribute to a violation of the MAAQS/NAAQS or any PSD increment.

VII. Taking or Damaging Implication Analysis

As required by 2-10-105, MCA, the Department conducted a private property taking and damaging assessment and determined there are no taking or damaging implications.

VIII. Environmental Assessment

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

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

FINAL ENVIRONMENTAL ASSESSMENT (EA)

Issued To: International Malting Company, LLC – Great Falls
P.O. Box 712
Milwaukee, WI 53201

Air Quality Permit # 3238-01

Preliminary Determination Issued: April 20, 2005
Department Decision Issued: May 6, 2005
Permit Final: May 24, 2005

1. *Legal Description of Site*: The IMC facility is located approximately 2 miles north of Great Falls, Montana, and approximately ½ mile west of Black Eagle Road. The legal description of the facility site is the NE¼ of the SE¼ of Section 30, Township 21 North, Range 4 East, in Cascade County, Montana.

2. *Description of Project*: IMC is proposing the construction and operation of a barley malt manufacturing plant with a malt and salable malt by-product production capacity of 16 million bushels per year. Construction and operation of the proposed malting plant would occur in two phases. After construction of Phase I, the malting plant would have the capacity to produce from 8 to 10 million bushels of malt and salable malt by-product per year. After construction of Phase II, the malting plant capacity would increase to a maximum of 16 million bushels of malt and salable malt by-product per year. IMC would commence Phase II operations within 3 years of the commencement of Phase I operations. The current permit action would be a permit modification and would accommodate the following changes to previously permitted operations at the IMC facility:

   - Replacement of 8 fabric filter baghouses (total air-flow capacity of 215,000 dry standard cubic feet per minute (dscfm)) with a single fabric filter baghouse (air-flow capacity of 66,800 dscfm);

   - Replacement of the 12-19.1 million British thermal unit per hour (MMBtu/hr) heat input capacity kiln process heaters, the 21 MMBtu/hr booster heater, and the 38 MMBtu/hr booster heater with the following 6 booster heaters:

     - MOCO Heater #1 (53.40 MMBtu/hr)
     - Johnston Heater #1 (25.12 MMBtu/hr)
     - Johnston Heater #2 (25.12 MMBtu/hr)
     - HEATEC Heater #1 (25.00 MMBtu/hr)
     - HEATEC Heater #2 (42.00 MMBtu/hr)
     - Future Plant Heater (48.00 MMBtu/hr)

     The total heat input capacity of the 14 previously permitted process and booster heaters was 288.2 MMBtu/hr. The total heat input capacity of the 6 proposed process heaters is 218.64 MMBtu/hr;

- Modification of the heating system from air-to-air heat exchangers to air-to-glycol heat exchangers. This change does not impact source emissions;

- Change in plant layout and configuration, effectively moving the facility and its emitting units approximately 100 meters west of originally analyzed and permitted operations;

- Increase in the allowable fabric filter baghouse grain loading limit from 0.005 grains per dry standard cubic feet (gr/dscf) to 0.010 gr/dscf; and

- A reduction in the allowable amount of elemental sulfur (S) combusted per batch of malt from 500 pounds of S per batch (lb/batch) to 200 lb S/batch.

Prior to the current permit action, potential oxides of nitrogen (NO_x), carbon monoxide (CO), and PM/PM_{10} emissions from IMC facility operations exceeded applicable Title V major source permitting thresholds. The proposed changes would result in a reduction in total facility potential emissions of all regulated pollutants to a level less than Title V major source permitting thresholds. Therefore, the current permit action would result in IMC being permitted as a minor source of emissions, as defined under the Title V permitting program.

3. *Objectives of Project*: The proposed project would include a complete change in previously permitted facility emitting units, as described in Section 2 of this EA, but would maintain the same objectives as the initial IMC permit. The overall objective of the proposed project would be to construct and operate a barley malt manufacturing plant to produce malt product for sale and use in various industries world-wide including, but not limited to, beer manufacturing.

   In addition, the current permit action would result in IMC being permitted as a minor source of emissions, as defined under the Title V permitting program. Therefore, IMC would no longer require a Title V major source operating permit. The Department would revoke IMCs existing Title V Operating Permit #OP3238-00 after issuance of the final Montana Air Quality Permit under the current permit action. Therefore, another objective of the current permit action would be to remove Title V applicability from permitted source operations.

4. *Alternatives Considered*: In addition to the proposed action, the Department also considered the "no-action" alternative. The "no-action" alternative would deny issuance of the air quality preconstruction permit to the proposed facility. However, the Department does not consider the "no-action" alternative to be appropriate because IMC demonstrated compliance with all applicable rules and regulations as required for permit issuance. Therefore, the "no-action" alternative was eliminated from further consideration.

5. *A Listing of Mitigation, Stipulations, and Other Controls*: A list of enforceable conditions, including a BACT analysis, would be included in Permit #3238-01.

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

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 proposed permit modification would not cause any new impacts to terrestrial and aquatic life and habitats that were not already analyzed in the original permit application. Overall, the proposed malting plant would result in minor impacts to terrestrial and aquatic life and habits in the proposed area of operations. A detailed discussion of initial project impacts is included in the environmental assessment (EA) conducted for Permit #3238-00.

B. Water Quality, Quantity, and Distribution

The proposed permit modification would not cause any new impacts to water quality, quantity, and distribution that were not already analyzed in the original permit application. Overall, the proposed malting plant would result in minor impacts to water quality, quantity, and distribution in the proposed area of operations. A detailed discussion of initial project impacts is included in the EA conducted for Permit #3238-00.

C. Geology and Soil Quality, Stability, and Moisture

The proposed permit modification would not cause any new impacts to the geology and soil quality, stability, and moisture content that were not already analyzed in the original permit application. Overall, the proposed malting plant would result in minor impacts to the geology and soil quality, stability, and moisture in the proposed area of operations. A discussion of initial project impacts is included in the EA conducted for Permit #3238-00.

D. Vegetation Cover, Quantity, and Quality

The proposed permit modification would not cause any new impacts to topsoil quality, stability, or moisture content that were not already analyzed in the original permit application. Overall, the proposed malting plant would result in minor impacts to the vegetation cover, quantity, and quality in the proposed area of operations. A detailed discussion of initial project impacts is included in the EA conducted for Permit #3238-00.

E. Aesthetics

The proposed permit modification would not cause any new impacts to the aesthetics of the project area that were not already analyzed in the original permit application. Overall, the proposed malting plant would result in minor impacts to the aesthetics of the proposed area of operations. A detailed discussion of initial project impacts is included in the EA conducted for Permit #3238-00.

F. Air Quality

The Clean Air Act, which was last amended in 1990, requires EPA to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment (Criteria Pollutants: CO, NO_x, Ozone, Lead, PM_{10}, SO_x). The Clean Air Act established two types of NAAQS, Primary and Secondary. Primary Standards are limits set to protect public health, including, but not limited to, the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary Standards are limits set to protect public welfare, including, but not limited to, protection against decreased visibility, damage to animals, crops, vegetation, and buildings. Primary and Secondary Standards are identical with the exception of Sulfur Dioxide which has a less stringent Secondary Standard. The air quality classification for Great Falls is "Unclassifiable or Better than National Standards" (40 CFR 81.327) for all pollutants. As described in Section V of the permit analysis, a narrow area along 10^{th} Avenue South was previously classified as a non-attainment area for CO but has since been re-designated as attainment under a limited maintenance plan (LMP). This re-designation became effective on July 8, 2002.

The Department determined, based on ambient air modeling, that the impact from the proposed permit action would be minor. The Department believes the current permit action would not result in IMC operations that would cause or contribute to a violation of any ambient air quality standard. A complete ambient air quality impact analysis would be contained in Section VI of the permit analysis to this permit.

G. Unique Endangered, Fragile, or Limited Environmental Resources

The proposed permit modification would not cause any new impacts to any unique endangered, fragile, or limited environmental resources in the proposed project area that were not already analyzed in the original permit application. Overall, the proposed malting plant would result in minor impacts to any existing unique endangered, fragile, or limited environmental resources that may be located in the proposed area of operations. A detailed discussion of initial project impacts is included in the EA conducted for Permit #3238-00.

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

The proposed permit modification would not cause any new impacts on the demands on environmental resources of water, air, and energy that were not already analyzed in the original permit application. Overall, the proposed malting plant would result in minor impacts to the demands on environmental resource of water, air, and energy in the proposed area of operations. A detailed discussion of initial project impacts is included in the EA conducted for Permit #3238-00.

I. Historical and Archaeological Sites

The proposed permit modification would not cause any new impacts to any historical or archaeological sites of the project area that were not already analyzed in the original permit application. Since the initial EA conducted for Permit #3238-00 indicated that no impacts to any historical and archaeological sites in the proposed area of operations would result from the proposed IMC operations, and because the proposed permit modification does not change these impacts, the Department determined that the current permit action would not result in any impacts to any historical and archaeological sites in the proposed area of operation. A detailed discussion of initial project impacts is included in the EA conducted for Permit #3238-00.

J. Cumulative and Secondary Impacts

Overall, the cumulative and secondary impacts from this project on the physical and biological resources of the human environment in the area affected by the current permit application would be minor. The proposed permit modification would not cause any new impacts to any physical and biological resources of the human environment in the project area that were not already analyzed in the original permit application. A detailed discussion of initial project impacts is included in the EA conducted for Permit #3238-00.

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 ECENOMIC AND SOCIAL EFFECTS: The following comments have been prepared by the Department.

A. Social Structures and Mores
B. Cultural Uniqueness and Diversity

The proposed permit modification would not cause any new impacts to any social structures and mores or cultural uniqueness and diversity in the project area that were not already analyzed in the original permit application. Overall, the proposed malting plant would result in minor impacts to the social structures and mores and the cultural uniqueness and diversity of the proposed area of operations. A detailed discussion of initial project impacts is included in the EA conducted for Permit #3238-00.

C. Local and State Tax Base and Tax Revenue

The proposed permit modification would not cause any new impacts to any local and state tax base and tax revenue of the project area that were not already analyzed in the original permit application. Overall, the proposed malting plant would result in minor impacts to the local tax base and tax revenue in the proposed area of operations. A detailed discussion of initial project impacts is included in the EA conducted for Permit #3238-00.

D. Agricultural or Industrial Production

The proposed permit modification would not cause any new impacts to any agricultural or industrial production of the project area that were not already analyzed in the original permit application. Overall, the proposed malting plant would result in minor impacts to agricultural and industrial production in the proposed area of operations. A detailed discussion of initial project impacts is included in the EA conducted for Permit #3238-00.

E. Human Health

The proposed permit modification would not cause any new impacts to the health of the human population in the project area that were not already analyzed in the original permit application. Overall, the proposed malting plant would result in minor impacts to human health in the proposed area of operations. A detailed discussion of initial project impacts is included in the EA conducted for Permit #3238-00.

F. Access to and Quality of Recreational and Wilderness Activities

The proposed permit modification would not cause any new impacts to any access to and quality of recreational and wilderness activities of the project area that were not already analyzed in the original permit application. Overall, the proposed malting plant would result in minor impacts to the access to and quality of recreational and wilderness activities in the proposed area of operations. A detailed discussion of initial project impacts is included in the EA conducted for Permit #3238-00.

G. Quantity and Distribution of Employment
H. Distribution of Population

The proposed permit modification would not cause any new impacts to the quantity and distribution of employment or the distribution of population of the project area that were not already analyzed in the original permit application. Overall, the proposed malting plant would result in minor impacts to the quantity and distribution of employment and the distribution of population in the proposed area of operations. A detailed discussion of initial project impacts is included in the EA conducted for Permit #3238-00.

I. Demands for Government Services

The proposed permit modification would not cause any new impacts to the demands for government services that were not already analyzed in the original permit application. Overall, the proposed malting plant would result in minor impacts on the demands for government services. A detailed discussion of initial project impacts is included in the EA conducted for Permit #3238-00.

J. Industrial and Commercial Activity

The proposed permit modification would not cause any new impacts to the industrial and commercial activity of the project area that were not already analyzed in the original permit application. Overall, the proposed malting plant would result in minor impacts to the industrial and commercial activity in the proposed area of operations. A detailed discussion of initial project impacts is included in the EA conducted for Permit #3238-00.

K. Locally Adopted Environmental Plans and Goals

The proposed permit modification would not cause any new impacts to any locally adopted environmental plans and goals of the project area that were not already analyzed in the original permit application. Overall, the proposed malting plant would result in minor impacts to locally adopted environmental plans and goals in the proposed area of operations. A detailed discussion of initial project impacts is included in the EA conducted for Permit #3238-00.

L. Cumulative and Secondary Impacts

Overall, the cumulative and secondary impacts from this project on the social and economic resources of the human environment in the area affected by the current permit application would be minor. The proposed permit modification would not cause any new impacts to any social and economic resources of the human environment in the project area that were not already analyzed in the original permit application. A detailed discussion of initial project impacts is included in the EA conducted for Permit #3238-00.

Recommendation: No 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 barley malt manufacturing plant. Permit #3238-01 includes conditions and limitations to ensure the facility would operate in compliance with all applicable rules and regulations. In addition, as discussed in the above EA, 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.

EA prepared by: M. Eric Merchant, MPH
Date: April 14, 2005