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# AIR QUALITY CONSTRUCTION PERMIT

**PERMIT NUMBER: CP06-0031**

**Facility Name:** KAAPA Ethanol, LLC

**NDEQ Facility ID#:** 75073

**Mailing Address:**
PO Box 238
Minden, Nebraska 68959-0238

**Facility Location:**
8450 KAAPA Lane
Minden, Kearney County, Nebraska 68959

**Project Description:** Modification to an existing dry mill ethanol plant expanding annual production of denatured ethanol from 60,000,000 gallons to 110,000,000 gallons

The construction of two new steel grain storage bins and grain storage pile

**Standard Industrial Classification (SIC) Code:** 2869, Industrial Organic Chemicals

**Revised or Superseded Construction Permits:** This construction permit supersedes the revised construction permit issued February 12, 2005 and the permit amendment CP05-0028 issued April 24, 2006.

Pursuant to Chapter 14 of the Nebraska Air Quality Regulations, the public has been notified by prominent advertisement of this proposed construction of an air contaminant source and the thirty (30) day period allowed for comments has elapsed. This construction permit approves the proposed project as identified in the air quality construction permit application #06-0031 received July 14, 2006, including any supporting information received prior to issuance of this permit. Additional details of the proposed project, including estimated pollutant emissions caused by the project, can be found in the accompanying Fact Sheet.

Compliance with this permit shall not be a defense to any enforcement action for violation of an ambient air quality standard. The permit holder, owner, and operator of the facility shall assure that the installation, operation, and maintenance of all equipment is in compliance with all of the conditions of this permit.

The undersigned issues this permit on behalf of the Director under the authority of Title 129 – Nebraska Air Quality Regulations as amended December 13, 2006.

10/17/07
Date

Shelley Kaderly
Shelley Kaderly, Air Administrator
Air Quality Division

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# I. ABBREVIATIONS, SYMBOLS, and UNITS OF MEASURE

| | |
|---|---|
| AP-42 | Compilation of Air Pollutant Emission Factors, Volume I, Stationary Point and Area Sources |
| AEP | Anhydrous Ethanol Produced |
| BACT | Best Available Control Technology |
| bhp | Brake Horsepower |
| BMP | Best Management Practices |
| Btu | British Thermal Unit |
| bu | Bushel |
| CAA | Clean Air Act |
| CE | Control Equipment |
| CEM | Continuous Emissions Monitor |
| CEMS | Continuous Emissions Monitoring System |
| cf | Cubic feet |
| CFR | Code of Federal Regulations |
| CO | Carbon Monoxide |
| $CO_2$ | Carbon Dioxide |
| CP | Construction Permit |
| DDGS | Dry Distillers Grains with Solubles |
| dscf | Dry Standard Cubic feet |
| dscfm | Dry Standard Cubic feet per minute |
| EMIS | Emergency Management Information System |
| EPA | Environmental Protection Agency |
| EQC | Environmental Quality Council |
| EP | Emission Point |
| ESP | Electrostatic Precipitator |
| EU | Emission Unit |
| FGR | Flue Gas Recirculation |
| FIP | Federal Implementation Plan |
| FR | Federal Register |
| ft | Feet |
| FTIR | Fourier Transform Infrared |
| GACT | Generally Available Control Technology |
| $H_2S$ | Hydrogen Sulfide |
| HAP | Hazardous Air Pollutant |
| HC | Hydrocarbon |
| HP | Horsepower |
| hr | Hour |
| LDAR | Leak Detection and Repair |
| LNB | Low $NO_x$ Burner |
| MACT | Maximum Achievable Control Technology |
| Mgal | One thousand gallons |
| MMBtu | Million British Thermal Units |
| MMscf | One million standard cubic feet |
| MSDS | Material Safety Data Sheet |
| MW | Megawatt |
| NAAQS | National Ambient Air Quality Standards |
| NDEQ | Nebraska Department of Environmental Quality |
| NESHAP | National Emission Standards for Hazardous Air Pollutants |
| $NO_2$ | Nitrogen Dioxide |
| $NO_x$ | Nitrogen Oxides |
| NSPS | New Source Performance Standard |
| NSR | New Source Review |
| PAL | Plant-wide Applicability Limit |
| Pb | Lead |
| PbR | Permit-by-Rule |
| PE | Professional Engineer |
| PM | Particulate Matter |
| $PM_{10}$ | Particulate Matter with and aerodynamic diameter equal to or less than 10 microns |
| $PM_{2.5}$ | Particulate Matter with and aerodynamic diameter equal to or less than 2.5 microns |
| ppb | Parts per Billion |
| ppm | Parts per Million |
| ppmv,d | Parts per Million by Volume, Dry |
| PSD | Prevention of Significant Deterioration |
| PTE | Potential to Emit |
| RATA | Relative Accuracy Test Audit |
| RMP | Risk Management Plant |
| RTO | Regenerative Thermal Oxidizer |
| scf | Standard Cubic Feet |
| SIC | Standard Industrial Classification |
| SIP | State Implementation Plant |
| $SO_2$ | Sulfur Dixoide |
| $SO_x$ | Sulfur Oxides |
| TDS | Total Dissolved Solids |
| TO | Thermal Oxidizer |
| tpy | Tons per year |
| TRS | Total Reduced Sulfur |
| TSP | Total Suspended Particulate Matter |
| ULNB | Ultra Low $NO_x$ Burner |
| UST | Underground Storage Tank |
| UTM | Universal Transverse Mercator |
| VHAP | Volatile Hazardous Air Pollutant |
| VMT | Vehicle Miles Traveled |
| VOC | Volatile Organic Compound |
| WDGS | Wet Distillers Grains with Solubles |

(2) The date of initial startup of operations postmarked within 15 days after such date. {Chapter 7, Section 002.03}

(G) The owner or operator shall allow the Department, EPA or an authorized representative, upon presentation of credentials to: {Neb. Rev. Statute §81-1504}

(1) Enter upon the owner or operator's premises at reasonable times where a source subject to this permit is located, emissions-related activity is conducted or records are kept, for the purpose of ensuring compliance with the permit or applicable requirements;

(2) Have access to and copy, at reasonable times, any records, for the purpose of ensuring compliance with the permit or applicable requirements;

(3) Inspect at reasonable times any facilities, pollution control equipment, including monitoring and air pollution control equipment, practices, or operations, for the purpose of ensuring compliance with the permit or applicable requirements;

(4) Sample or monitor at reasonable times substances or parameters for the purpose of ensuring compliance with the permit or applicable requirements.

(H) When requested by the Department, the owner or operator shall submit completed emission inventory forms for the preceding year to the Department by March 31 of each year. {Chapter 6}

(I) Open fires are prohibited except as allowed by Chapter 30.

(J) Particulate Matter – General Requirements: {Chapter 32}

(1) The owner or operator shall not cause or permit the handling, transporting or storage of any material in a manner, which allows particulate matter to become airborne in such quantities and concentrations that it remains visible in the ambient air beyond the property line.

(2) The owner or operator shall not cause or permit the construction, use, repair or demolition of a building, its appurtenances, a road, a driveway, or an open area without applying all reasonable measures to prevent particulate matter from becoming airborne and remaining visible beyond the property line. Such measures include, but not limited to, paving or frequent cleaning of roads, driveways and parking lots; application of dust-free surfaces; application of water; and planting and maintenance of vegetative ground cover.

(K) If and when the Director declares an air pollution episode as defined in Chapter 38, Sections 003.01B, 003.01C, or 003.01D, the owner or operator shall immediately take all required actions listed in Title 129, Appendix I until the Director declares the air pollution episode terminated.

(L) This permit may be revised (reopened and reissued) or revoked for cause in accordance with Title 129 and Title 115, Rules of Practice and Procedure. Conditions under which this permit will be revised or revoked for cause, include but are not limited to: {Chapter 15, Section 006}

(1) A determination by the Director, or the Administrator of EPA that:

(C) Any emissions due to malfunctions, unplanned shutdowns, and ensuing start-ups that are, or may be, in excess of applicable emission limits shall be reported to the Department in accordance with Chapter 35, Section 005.

(D) The performance tests required in the permit shall be completed and submitted to the Department as follows: {Chapter 34}

(1) Performance tests shall be conducted while operating at full capacity within sixty (60) days after reaching the maximum capacity, but not more than 180 days after the start-up of operations of each unit, unless otherwise specified by the Department.

(2) Testing shall be conducted according to the methodologies found in Chapter 34, Section 002, or other NDEQ approved methodologies.

(3) The owner or operator of a source shall provide the Department at least thirty (30) days written notice prior to testing to afford the Department an opportunity to have an observer present. The owner or operator shall also provide the Department with an emissions testing protocol at least thirty (30) days prior to testing.

(4) The owner or operator shall monitor the operating parameters for process and control equipment during the performance testing required in the permit.

(5) A written copy of the test results signed by the person conducting the test shall be provided to the Department within forty-five (45) days of completion of the test and will, at a minimum, contain the following items:

(a) A description of the source's operating parameters (i.e. production rates, firing rates of combustion equipment, fuel usage, etc.), control equipment parameters (i.e. baghouse fan speeds, scrubber liquid flow rates, etc.), and ambient conditions (i.e. weather conditions, etc.) during testing.

(b) Copies of all data sheets from the test run(s).

(c) A description and explanation of any erroneous data or unusual circumstance(s) and the cause for such situation.

(d) A final conclusion section describing the outcome of the testing.

(e) Source-wide emission calculations, utilizing the results obtained from the performance test, verifying that the source is a synthetic minor with respect to the Federal PSD program for PM, $PM_{10}$, $SO_x$, $NO_x$, CO, and VOC.

(E) At no time during any period of twelve (12) consecutive calendar months, shall emissions from the source equal or exceed the following emission limits. {Chapters 27 and 28}

(1) 10.0 tons of any individual HAP

(2) 25.0 tons of total combined HAPs

Compliance with the emissions limitations above shall be demonstrated by performing emission calculations every month and every period of twelve (12) consecutive months using the

(1) The stack dimensions of the following emission points shall be constructed as indicated below:

| Emission Point ID# | Emission Point Name | Minimum Stack Height (ft) | Stack Exit Point Maximum Inside Diameter (ft) |
|---|---|---|---|
| KA_1002 | Grain Receiving Baghouse #1 | 150 | 3.5 |
| KA_1003 | Grain Receiving Baghouse #2 | 150 | 3.5 |
| KA_2000 | Hammermill Baghouse #1 | 15 | 1.5 |
| KA_2001 | Hammermill Baghouse #2 | 15 | 1.5 |
| KA_2002 | Hammermill Baghouse #3 | 15 | 1.5 |
| KA_8002 | DDGS Cooler Baghouse | 32.8 | 3.5 |
| KA_8001 | DDGS Loadout Baghouse | 50 | 1.5 |
| KA_3004 | Scrubber Thermal Oxidizer | 10 | 0.5 |
| KA_5005 | Dryer Thermal Oxidizer | 165 | 7 |
| KA_4000 | Liquid Loadout Flare | 10 | 2 |
| KA_7001 | Biomethanator Flare #1 | 20 | 2 |
| KA_7002 | Biomethanator Flare #2 | 20 | 2 |
| KA_5001 | Boiler #1 | 45 | 3 |
| KA_5002 | Boiler #2 | 45 | 3 |
| KA_5003 | Boiler #3 | 45 | 3 |
| KA_5004 | Boiler #4 | 45 | 3 |
| KA_5006 | Emergency Fire Water Pump Engine | 8 | 0.42 |
| KA_6000 | Cooling Tower #1, Cell A | 33 | 33 |
| KA_6001 | Cooling Tower #1, Cell B | 33 | 33 |

A site survey, or similar documentation containing the as-built stack dimensions, shall be maintained on-site and kept for the life of the source. If stack dimensions do not comply with the table above, the owner or operator shall submit a revised air dispersion modeling analysis to the Department prior to start-up of any emission unit, to ensure that the source will not interfere with the attainment or maintenance of the ambient air quality standards in Chapter 4.

(2) The owner or operator shall sufficiently restrict public access to the source at the ambient air boundary relied upon in the air dispersion modeling analysis for the NAAQS compliance demonstration. The vertices of the boundary shall be located at the coordinates indicated below:

| Fence-line Vertex ID# | UTM X (m) | UTM Y (m) |
|---|---|---|
| SW Corner | 492,820 | 4,480,976 |
| NW Corner #1 | 492,820 | 4,481,227 |
| NW Corner #2 | 492,992 | 4,481,227 |
| NW Corner #3 | 492,992 | 4,481,259 |
| NE Corner | 494,091 | 4,481,454 |
| SE Corner | 494,090 | 4,480,976 |

**III.(A) Specific Conditions for Grain Storage**

(1) Permitted Emission Points: The source is permitted to construct the emission points and associated emission units identified in the following table:

| Emission Point ID# | Control Equipment[1] | Emission Unit ID# and Description |
|---|---|---|
| EP-1005a | - | EU12: Grain Storage Silo #5 |
| EP-1005b | - | EU13: Grain Storage Silo #6 |
| EP-1006 | - | EU14: Grain Storage Pile |

[1]See Condition III.(A)(3)(a)

(2) Emission Limitations and Testing Requirements

No emission limitations and testing requirements are associated with the emission points or emission units identified in Condition III.(A)(1).

(3) Operational and Monitoring Requirements and Limitations

(a) Once the source produces 200,000 gallons or more per day of anhydrous ethanol for three consecutive days, emissions from Grain Storage Silos #5 and #6 shall be controlled by particulate filters that provide 99% particulate (PM and $PM_{10}$) emissions control. Verification of particulate emissions control shall be by manufacturer documentation. {Chapter 20}

(i) Grain Storage Silo #5 and #6 filters are to be inspected and/or replaced as often as necessary to ensure proper operation or more frequently as indicated by visual inspections. {Chapter 34}

(ii) The owner or operator shall maintain an on-site inventory of spare filters of each type used to ensure rapid replacement in the event replacement is necessary. {Chapter 34}

(b) Observations at least once each day during daylight hours shall be conducted to determine whether there are visible emissions from the storage silo vents, leaks, or other indications that corrective action is needed. If corrective action is required, it shall occur immediately. {Chapter 20}

(c) Observations at least once each day during daylight hours shall be conducted to determine whether there are visible emissions from the storage pile are leaving the plant property. If corrective action is required, it shall occur immediately. {Chapter 20}

(4) Applicable NSPS, NESHAP, and MACT Requirements:

Once the permanent storage capacity at the facility equals or exceeds 2.5 million bushels, the following NSPSs apply to the grain handling operations:

**III.(B) Specific Conditions for Grain Receiving, Handling, Storage, and Hammermilling**

(1) Permitted Emission Points: The source is permitted to construct the emission points and associated emission units identified in the following table:

| Emission Point ID# | Required Control Equipment ID# and Description | Emission Unit ID# and Description |
|---|---|---|
| EP-1002 | CE1002: Grain Receiving Baghouse #1 | EU1 and EU3: Truck Dump Pits #1 and #2 |
| | | EU2 and EU4: Receiving Legs #1 and #2 |
| | | EU5 and EU6: Grain Storage Silos #1 and #2 |
| | | EU99: Scalping Bin #1 |
| EP-1003 | CE1003: Grain Receiving Baghouse #2 | EU7: Truck/Rail Dump Pit |
| | | EU8 and EU9: Receiving Legs #3 and #4 |
| | | EU101: Scalping Bin #2 |
| EP-1004a | 99% Control Efficiency Filters | EU10: Grain Storage Silo #3 |
| EP-1004b | 99% Control Efficiency Filters | EU11: Grain Storage Silo #4 |
| EP-2000 | CE2000: Hammermill Baghouse #1 | EU15 and EU16: Hammermills #1 and #2 |
| | | EU97: Scalper #1 |
| EP-2001 | CE2001: Hammermill Baghouse #2 | EU17: Hammermill #3 |
| | | EU98 and EU100: Scalpers #2 and #3 |
| EP-2002 | CE2002: Hammermill Baghouse #3 | EU18 and EU19: Hammermills #4 and #5 |
| | | EU20: Milled Grain Transfer Conveyor |

(2) Emission Limitations and Testing Requirements:

(a) Prior to the source producing 200,000 gallons or more per day of anhydrous ethanol for three consecutive days, pollutant emission rates from each emission point identified in the table below shall not exceed the permitted limits. Initial performance testing, if required, shall be conducted in accordance with Specific Condition II.(D).

| Emission Point ID# | Pollutant | Permitted Limit | Averaging Period | Basis for Permit Limit | Initial Performance Testing Required (Yes/No) |
|---|---|---|---|---|---|
| EP-1002 | $PM/PM_{10}$ | 1.71 lb/hr | 3-hour or test method average | Chapter 19 | No |
| EP-2000 | $PM/PM_{10}$ | 0.69 lb/hr | 3-hour or test method average | Chapter 19 | No |
| EP-2001 | $PM/PM_{10}$ | 0.69 lb/hr | 3-hour or test method average | Chapter 19 | No |

(b) Once the source produces 200,000 gallons or more per day of anhydrous ethanol for three consecutive days, pollutant emission rates from each emission point identified in the table below shall not exceed the permitted limits. Initial performance testing, if required, shall be conducted in accordance with Specific Condition II.(D).

(ii) The baghouse shall be equipped with an operational pressure differential indicator. Pressure differential indicator readings shall be recorded at least once each day that the associated baghouse is operating.

(iii) Baghouse filter bags are to be inspected and/or replaced as often as necessary to ensure proper operation or more frequently as indicated by pressure differential indicator readings or other indication of bag failure.

(iv) Observations at least once each day during daylight hours of baghouse operation shall be conducted to determine whether there are visible emissions from the stack, leaks, noise, or other indications that corrective action is needed. If corrective action is required, it shall occur immediately.

(v) The owner or operator shall maintain an on-site inventory of spare bags of each type used to ensure rapid replacement in the event of bag failure.

(g) Grain receiving operations shall be located inside a building and all dump pits shall utilize choke-flow systems. {Chapters 19 and 20}

(4) Applicable NSPS, NESHAP, and MACT Requirements:

Once the permanent storage capacity at the facility equals or exceeds 2.5 million bushels, the following NSPSs apply to the grain handling operations:

| Applicable Standard | Title | Rule Citation |
|---|---|---|
| NSPS, Subpart A | General Provisions | Chapter 18, Sec. 001.01<br>40 CFR 60.1 |
| NSPS, Subpart DD | Grain Elevators | Chapter 18, Sec. 001.19<br>40 CFR 60.300 |

(5) Reporting and Recordkeeping Requirements:

(a) Records documenting when routine observations were performed with a description, including any atypical observations.

(b) Filter replacement records including filter position, type, and date of filter installation.

(c) Records documenting the date, time, and pressure differential reading for each day the associated baghouse is in operation.

(d) Filter replacement records including the date the filter replacement occurred and the type of filter installed for each baghouse or particulate filter.

(e) Records documenting the date, time, observations, and corrective actions taken for each day the associated baghouse or particulate filter is in operation.

(f) Notifications and record keeping as required by 40 CFR 60.7.

(2) Emission Limitations and Testing Requirements

(a) Prior to the source producing 200,000 gallons or more per day of anhydrous ethanol for three consecutive days, pollutant emission rates from each emission point identified in the table below shall not exceed the permitted limits. Initial performance testing, if required, shall be conducted in accordance with Specific Condition II.(D).

| Emission Point ID# | Pollutant | Permitted Limit | Averaging Period | Basis for Permit Limit | Initial Performance Testing Required (Yes/No) |
|---|---|---|---|---|---|
| EP-3000 | VOC | 9.76 lb/hr[1] | 3-hour or test method average | Chapter 19 | No |
| EP-3002 | VOC | 3.30 lb/hr[1] | 3-hour or test method average | Chapter 19 | No |

[1] Expressed as weight of VOC

(b) Once the source produces 200,000 gallons or more per day of anhydrous ethanol for three consecutive days, pollutant emission rates from each emission point identified in the table below shall not exceed the permitted limits. Initial performance testing, if required, shall be conducted in accordance with Specific Condition II.(D).

| Emission Point ID# | Pollutant | Permitted Limit | Averaging Period | Basis for Permit Limit | Initial Performance Testing Required (Yes/No) |
|---|---|---|---|---|---|
| EP-3004 | PM/ $PM_{10}$ | 0.02 lb/hr | 3-hour or test method average | Chapter 19 | Yes |
| | $SO_x$ | 0.01 lb/hr | 3-hour or test method average | Chapter 19 | Yes |
| | $NO_x$ | 0.25 lb/hr | 3-hour or test method average | Chapter 19 | Yes |
| | CO | 0.21 lb/hr | 3-hour or test method average | Chapter 19 | Yes |
| | VOC | 5.51 lb/hr[1] | 3-hour or test method average | Chapter 17 | Yes |
| | HAP | N/A | Speciation and Quantification of HAP composition at outlet | Chapter 27 | Yes |

[1] Expressed as weight of VOC

(3) Operational and Monitoring Requirements and Limitations

(a) Prior to the source producing 200,000 gallons or more per day of anhydrous ethanol for three consecutive days, emissions from the emission units and emission points identified in Condition III.(C)(1) shall be controlled as follows: EU21 through EU36 shall be controlled CE3000 and EU50 through EU56 shall be controlled by CE3002. {Chapter 19}

(iv) Observations at least once each day during daylight hours of RTO operation shall be conducted to determine whether there are visible emissions from the stack, leaks, noise, or other indications that corrective action is necessary. If corrective action is required, it shall occur immediately.

(4) Applicable NSPS, NESHAP, and MACT Requirements:

At this time the Department has not identified any NSPS, NESHAP, or MACT requirements that apply to the emission points or emission units listed in III.(C)(1).

(5) Reporting and Recordkeeping Requirements:

(a) Records documenting the date, time, temperature and flow rate of scrubbing liquid, and the pressure differential reading for each day the associated scrubber is in operation.

(b) Records documenting the date, time, observations, and corrective actions taken for each day the associated scrubber is in operation.

(c) Records documenting the date, time, and hourly-average temperatures for each day the associated RTO is in operation.

(d) Records documenting the date, time, observations, and corrective actions taken for each day the associated RTO is in operation.

(c) Operation and maintenance record for the internal floating roof tanks for EU89, EU91, EU94, and EU96, to demonstrate compliance with Condition III.(D)(3), shall include the following:

(i) Records documenting when routine maintenance and preventive actions were conducted with a description of the maintenance and/or preventive action conducted.

(ii) Records documenting equipment failures, malfunctions, or other variations including time of occurrence, remedial action taken, and when corrections were made. Reporting to the Department shall be in accordance with Chapter 35, Section 005.

(iii) Records of testing and monitoring conducted in accordance with Condition III.(D)(3).

(g) Once the source produces 200,000 gallons or more per day of anhydrous ethanol for three consecutive days, when ethanol loadout is occurring via truck and/or rail, a flame shall be present at the flare. The facility must install an appropriate safety device or flame monitoring system to ensure that truck loadout cannot occur without the presence of a flame. {Chapters 19 and 27}

(4) Applicable NSPS, NESHAP, and MACT Requirements:

At this time the Department has not identified any NSPS, NESHAP, or MACT requirements that apply to the emission points or emission units listed in III.(E)(1).

(5) Reporting and Recordkeeping Requirements:

Once the source produces 200,000 gallons or more per day of anhydrous ethanol for three consecutive days, records documenting the amount of ethanol loaded out by truck for each calendar month and for each period of twelve (12) consecutive calendar months shall be kept.

(ii) The RTO shall be equipped with a device capable of continuously monitoring and recording the temperature of the thermal oxidation combustion chamber(s).

(iii) All monitored operating parameters of the RTO shall be maintained at the levels recorded during the most recent performance test that demonstrated compliance with the permitted emissions limits. Alternative levels may be used provided the owner or operator can justify that better emissions control is being achieved. Prior to compliance being demonstrated the combustion chamber temperature shall not be operated below 1,400 degrees Fahrenheit. Combustion chamber temperature shall be averaged hourly from a minimum of one cycle of sampling, analyzing, and data recording for each successive fifteen minute period. Normal operating parameters, or operating parameter ranges, that demonstrate compliance with the permitted emissions limits, with appropriate averaging periods shall be submitted with the source's operating permit application.

(iv) Observations at least once each day during daylight hours of RTO operation shall be conducted to determine whether there are visible emissions from the stack, leaks, noise, or other indications that corrective action is necessary. If corrective action is required, it shall occur immediately.

(4) Applicable NSPS, NESHAP, and MACT Requirements:

At this time the Department has not identified any NSPS, NESHAP, or MACT requirements that apply to the emission points or emission units listed in Condition III.(F)(1).

(5) Reporting and Recordkeeping Requirements:

(a) Records documenting the date, time, and hourly-average temperatures for each day the associated RTO is in operation.

(b) Records documenting the date, time, observations, and corrective actions taken for each day the associated RTO is in operation.

(iii) Baghouse filter bags are to be inspected and/or replaced as often as necessary to ensure proper operation or more frequently as indicated by pressure differential indicator readings or other indication of bag failure.

(iv) Observations at least once each day during daylight hours of baghouse operation shall be conducted to determine whether there are visible emissions from the stack, leaks, noise, or other indications that corrective action is needed. If corrective action is required, it shall occur immediately.

(v) The owner or operator shall maintain an on-site inventory of spare bags of each type used to ensure rapid replacement in the event of bag failure.

(c) DDGS storage and loadout operations shall be located inside a building. {Chapters 19 and 20}

(4) Applicable NSPS, NESHAP, and MACT Requirements:

At this time the Department has not identified any NSPS, NESHAP, or MACT requirements that apply to the emission points or emission units listed in Condition III.(G)(1).

(5) Reporting and Recordkeeping Requirements:

(a) Records documenting the date, time, and pressure differential reading for each day the associated baghouse is in operation.

(b) Filter/Bag replacement records including the date the filter replacement occurred and the type of filter installed.

(c) Records documenting the date, time, observations, and corrective actions taken for each day the associated baghouse is in operation.

## III.(I) Specific Conditions for Boilers

(1) Permitted Emission Points: The source is permitted to construct the emission points and associated emission units identified in the following table at the capacities and using the fuel types listed:

| Emission Point ID# | Control Equipment ID# and Description | Emission Unit ID# and Description | Maximum Capacity | Permitted Fuel Type |
|---|---|---|---|---|
| EP-5001 | - | EU74: Boiler #1 | 73.5 MMBtu/hr | Natural Gas |
| EP-5002 | - | EU75: Boiler #2 | 73.5 MMBtu/hr | Natural Gas |
| EP-5003 | - | EU76: Boiler #3 | 73.5 MMBtu/hr | Natural Gas |
| EP-5004 | - | EU77: Boiler #4 | 73.5 MMBtu/hr | Natural Gas |

(2) Emission Limitations and Testing Requirements:

Once the source produces 200,000 gallons or more per day of anhydrous ethanol for three consecutive days, pollutant emission rates from each emission point identified in the table below shall not exceed the permitted limits. Initial performance testing, if required, shall be conducted in accordance with Specific Condition II.(D).

| Emission Point ID# | Pollutant | Permitted Limit per Emission Point | Averaging Period | Basis for Permit Limit | Initial Performance Testing Required (Yes/No) |
|---|---|---|---|---|---|
| EP-5001 EP-5002 EP-5003 | PM/ $PM_{10}$ | 0.55 lb/hr | 3-hour or test method average | Chapter 19 | Yes |
| | $NO_x$ | 4.10 lb/hr | 3-hour or test method average | Chapter 19 | Yes |
| | CO | 1.05 lb/hr | 3-hour or test method average | Chapter 19 | Yes |
| | VOC | 0.40 lb/hr | 3-hour or test method average | Chapter 17 | Yes |
| EP-5004 | PM/ $PM_{10}$ | 0.55 lb/hr | 3-hour or test method average | Chapter 19 | Yes |
| | $NO_x$ | 2.95 lb/hr | 3-hour or test method average | Chapter 19 | Yes |
| | CO | 1.05 lb/hr | 3-hour or test method average | Chapter 19 | Yes |
| | VOC | 0.40 lb/hr | 3-hour or test method average | Chapter 17 | Yes |

(3) Operational and Monitoring Requirements and Limitations:

No operational and monitoring requirements are limitations are applicable to the emission points identified in Condition III.(I)(1).

**III.(J) Specific Conditions for Emergency Firewater Pump Engine**

(1) Permitted Emission Point: The source is permitted to construct the emission point and associated emission unit identified in the following table at the capacity and using the fuel type listed:

| Emission Point ID# | Control Equipment ID# and Description | Emission Unit ID# and Description | Rating (MMBtu/hr) | Permitted Fuel Type |
|---|---|---|---|---|
| EP-5006 | -- | EU80: Emergency Firewater Pump Engine | 1.33 | Diesel Fuel |

(2) Emission Limitations and Testing Requirements:

No emission limitations or testing requirements apply to the emission point or emissions unit identified in Condition III.(J)(1).

(3) Operational and Monitoring Requirements and Limitations:

(a) EU80 shall be limited to 100 operating hours per any period of twelve (12) consecutive calendar months. {Chapter 19}

(b) The emergency firewater pump engine shall be equipped with a non-resettable hour meter to record the operating hours.

(c) The sulfur content of the diesel fuel shall not exceed 0.05% by weight. {Chapter 24}

(4) Applicable NSPS, NESHAP, and MACT Requirements:

At this time the Department has not identified any NSPS, NESHAP, or MACT requirements that apply to the emission points or emission units listed in Condition III.(J)(1).

(5) Reporting and Recordkeeping Requirements:

(a) Fuel receipts for the diesel fuel from the supplier. Fuel receipt shall state the sulfur content, by weight, in the diesel fuel.

(b) Hours of operation for the emergency firewater pump engine for each calendar month and for each period of twelve (12) consecutive calendar months.

**III.(L) Specific Conditions for the Equipment Leaks (F9000)**

(1) Description of Emission Points:

Each valve, pump, compressor, pressure relief device, sampling connection system, open-ended valve or line, flange, or other connector in VOC service and any device or system required by NSPS, Subpart VV located throughout the ethanol plant.

(2) Emission Limitations and Testing Requirements:

Emission limitations and testing requirements as established by 40 CFR 60 Subpart VV.

(3) Operational and Monitoring Requirements and Limitations:

Operational and Monitoring Requirements and Limitations as established by 40 CFR 60 Subpart VV.

(4) Applicable NSPS, NESHAP, and MACT Standards

| Applicable Standard | Title | Rule Citation |
|---|---|---|
| NSPS, Subpart A | General Provisions | Chapter 18, Sec. 001.01<br>40 CFR 60.1 |
| NSPS, Subpart VV | Equipment Leaks in the Synthetic Organic Chemicals Manufacturing Industry | Chapter 18, Sec. 001.14<br>40 CFR 60.480 |

(5) Reporting and Recordkeeping Requirements:

(a) Notifications and record keeping as required by 40 CFR 60.7.

(b) Record keeping and reporting as required by 40 CFR 60.486 and 40 CFR 60.487.

(c) Records including the date in which leak detection testing occurred, which valves, pumps, seals, open-ended lines, flanges, connectors, etc. were tested, and name of the individual who conducted the testing.

(d) The owner or operator shall submit a semi-annual leak detection and repair report every six (6) calendar months to the Department. The initial semi-annual report shall be submitted beginning six (6) months after the initial startup date [60.487 (a)]. Subsequent reports for each six (6) calendar month reporting period shall be submitted within 45 days following June 30 and December 31 of each year. Each report must be certified by a responsible official and include the following items:

(i) Date and time testing occurred

(ii) Name of individual who conducted the testing; and

(iii) Additional information required to be reported to the Department in accordance with 40 CFR 60.480

## IV. HAP Emission Calculation Methodology (<200k/day)

Prior to the source producing 200,000 gallons or more per day of anhydrous ethanol for three consecutive days, the source shall use the following calculation method to demonstrate compliance with the emission limits specified in Condition II.(E). Emissions shall be calculated each calendar month using data from the following sources listed in descending order of preference. For compliance purposes, total HAP is equivalent to the sum of individual HAPs.

1. Most recent valid performance test results performed in the past five years.
2. Manufacturer's guarantees and Material Safety Data Sheet (MSDS)
3. Manufacturer/engineering estimates
4. Emission factors from AP-42 or other EPA published documents

If it is necessary to convert uncontrolled to controlled emissions, multiply the uncontrolled emissions by one minus the overall control efficiency (fraction) of the control equipment.

**Boilers, Loadout Flare Pilot, and Biomethanator Flare Pilot(s)**

Emissions from the boilers and flare pilots shall each be calculated using Equation (1).

(1) $E_U = (EF) \times (NG_U) \ / \ (2000 \text{ lbs/ton})$

Where
$E_U$ = Emissions from Unit (tons/month)
EF = Emission factor (lbs/MMscf)
$NG_U$ = Natural Gas Usage of Unit (MMscf/month)

| Pollutant | Emission Factor (lb/MMscf) |
|---|---|
| Individual HAPs | |
| Benzene | 0.0021 |
| Dichlorobenzene | 0.0012 |
| Formaldehyde | 0.075 |
| Hexane | 1.8 |
| Lead Compounds | 0.0005 |
| Naphthalene | 0.00061 |
| Polycyclic Organic Matter (POM) | 0.0000882 |
| Toluene | 0.0034 |
| Arsenic Compounds (ASC) | 0.0002 |
| Beryllium Compounds (BEC) | 0.000012 |
| Cadmium Compounds (CDC) | 0.0011 |
| Chromium Compounds (CRC) | 0.0014 |
| Cobalt Compounds (COC) | 0.000084 |
| Manganese Compounds (MNC) | 0.00038 |
| Mercury Compounds (HGC) | 0.00026 |
| Nickel Compounds (NIC) | 0.0021 |
| Selenium Compounds (SEC) | 0.000024 |
| Total HAPs | 1.89 |

(4d) $E_{VOC,LL,R} = E_{VOC,LL,R,E} + E_{VOC,LL,R,D}$

(4e) $E_{VOC,LL,R} = \{[(EF_{VOC,LL,R,E}) \times (P_{LL,R})] + [(EF_{VOC,LL,R,D}) \times (P_{LL,R})]\} \ / \ (2000 \text{ lbs/ton})$

Where
$E_{VOC,LL}$ = VOC Emissions from Liquid Loadout (tons/month)
$E_{VOC,LL,T}$ = VOC Emissions from Liquid Loadout into Trucks (tons/month)
$E_{VOC,LL,R}$ = VOC Emissions from Liquid Loadout into Railcars (tons/month)
$E_{VOC,LL,T,G}$ = VOC Emissions from displacing Gasoline from Trucks (tons/month)
$E_{VOC,LL,T,E}$ = VOC Emissions from Loading Ethanol into Trucks (tons/month)
$E_{VOC,LL,T,D}$ = VOC Emissions from Loading Denaturant into Trucks (tons/month)
$EF_{VOC,LL,T,G}$ = VOC Controlled Emission Factor for displacing gasoline from Trucks (lbs/Mgal)
$EF_{VOC,LL,T,E}$ = VOC Controlled Emission Factor for loading ethanol into Trucks (lbs/Mgal)
$EF_{VOC,LL,T,D}$ = VOC Controlled Emission Factor for loading denaturant into Trucks (lbs/Mgal)
$P_{LL,T}$ = Product loaded into Trucks (Mgal/month)
$E_{VOC,LL,T,E}$ = VOC Emissions from Loading Ethanol into Trucks (tons/month)
$E_{VOC,LL,T,E}$ = VOC Emissions from Loading Denaturant into Trucks (tons/month)
$EF_{VOC,LL,R,E}$ = VOC Controlled Emission Factor for loading ethanol into Railcars (lbs/Mgal)
$EF_{VOC,LL,R,D}$ = VOC Controlled Emission Factor for loading denaturant into Railcars (lbs/Mgal)
$P_{LL,T}$ = Product loaded into Railcars (Mgal/month)

| **Pollutant** | **Uncontrolled Emission Factors (lbs/Mgal)** | |
|---|---|---|
| | **Truck Loadout** | **Rail Loadout** |
| VOC | | |
| Gasoline | 0.903 | |
| Ethanol | 0.380 | 0.380 |
| Denaturant | 0.099 | 0.099 |

(4f) $E_{HAP,LL} = E_{HAP,LL,T} + E_{HAP,LL,R}$

(4g) $E_{HAP,LL,T} = E_{HAP,LL,T,G} + E_{HAP,LL,T,E} + E_{HAP,LL,T,D}$

(4h) $E_{HAP,LL,T} = (E_{VOC,LL,T,G} \times WF_{HAP,G}) + (E_{VOC,LL,T,E} \times WF_{HAP,E}) + (E_{VOC,LL,T,D} \times WF_{HAP,D})$

(4i) $E_{HAP,LL,R} = E_{HAP,LL,R,E} + E_{HAP,LL,R,D}$

(4j) $E_{HAP,LL,R} = (E_{VOC,LL,R,E} \times WF_{HAP,E}) + (E_{VOC,LL,R,D} \times WF_{HAP,D})$

Where:
$E_{HAP,LL}$ = HAP emissions from liquid loadout (tons/month)
$E_{HAP,LL,T}$ = HAP Emissions from Liquid Loadout into Trucks (tons/month)
$E_{HAP,LL,R}$ = HAP Emissions from Liquid Loadout into Railcars (tons/month)
$E_{HAP,LL,T,G}$ = HAP Emissions from displacing Gasoline from Trucks (tons/month)
$E_{HAP,LL,T,E}$ = HAP Emissions from Loading Ethanol into Trucks (tons/month)
$E_{HAP,LL,T,D}$ = HAP Emissions from Loading Denaturant into Trucks (tons/month)
$WF_{HAP,G}$ = Weight Fraction of HAP in Gasoline (HAP/VOC)
$WF_{HAP,E}$ = Weight Fraction of HAP in Ethanol (HAP/VOC)
$WF_{HAP,D}$ = Weight Fraction of HAP in Denaturant (HAP/VOC)
$E_{HAP,LL,R,E}$ = HAP Emissions from Loading Ethanol into Railcars (tons/month)
$E_{HAP,LL,R,D}$ = HAP Emissions from Loading Denaturant into Railcars (tons/month)

$E_{ST\text{-}VOC}$ = VOC emissions from storage tank (tons/month)
$PPM_{ST}$ = HAP content of material stored in storage tank (ppm by weight)

**Equipment Leaks**

VOC emissions from equipment leaks shall be calculated using Equation (7). HAP emissions from equipment leaks shall be calculated using Equation (8). These equations are based on compliance with the LDAR program.

(7) $LK,_{VOC} = \{\Sigma[(N\text{-}LK) \times (EF\text{-}LK) \times (1-(CE\text{-}LK/100))]\} \times (OH\text{-}LK) \times (2.21\ lbs/kg) / (2{,}000\ lbs/ton)$

Where:
$LK,_{VOC}$ = VOC emissions from equipment leaks (tons/month)
$\Sigma$ = Summation over all types of components
N-LK = Number of components in each type
EF-LK= Equipment leak emission factor (kg/hr/source)
CE-LK = Control efficiency of LDAR system (%)
OH-LK = Operating hours = 720 or 744 (hrs/month)

(8) $LK,_{HAP} = (LK,_{VOC}) \times (PPM\text{-}LK/10^6)$

Where:
$LK,_{HAP}$ = HAP emissions from equipment leaks (tons/month)
$LK,_{VOC}$ = VOC emissions from equipment leaks (tons/month)
PPM-LK = HAP content of anhydrous ethanol (ppm by weight)

**Fermentation and Distillation Operations**

Emissions from RTO #1 (EP-3004) shall each be calculated using Equation (2a), (2b), or (2c).

(2a) $E_{SRTO} = (CEF_{SRTO}) \times (P) / (2000 \text{ lbs/ton})$

(2b) $E_{SRTO} = \{(EF) \times (NG_U)\}] / (2000 \text{ lbs/ton})$

(2c) $E_{SRTO} = (ER_{SRTO}) \times OT / (2000 \text{ lbs/ton})$

Where
$E_{SRTO}$ = Emissions from Scrubber RTO (tons/month)
$CEF_{SRTO}$ = Controlled process emission factor (lb/MMgal AEP)
P = Anhydrous ethanol production rate (gal/month)
EF = Natural Gas Emission factor (lbs/MMscf)
$NG_U$ = Natural Gas Usage of Unit (MMscf/month)
$ER_{SRTO}$ = Emission Rate for Unit (lbs/hr)
OT = Operating Time of Unit (hours/month)

| **Hazardous Air Pollutant** | **Controlled Process Emission Factors** | |
|---|---|---|
| Individual Hazardous Air Pollutants (HAP) | | |
| Acetaldehyde | 90.81 | lb/MMgal AEP |
| Acrolein | 7.26 | lb/MMgal AEP |
| Benzene | 0.0021 | lb/MMscf NG |
| Dichlorobenzene | 0.0012 | lb/MMscf NG |
| Formaldehyde | 0.0318 | lb/hr |
| Hexane | 1.8 | lb/MMscf NG |
| Lead Compounds | 0.0005 | lb/MMscf NG |
| Methanol | 10.89 | lb/MMgal AEP |
| Naphthalene | 0.00061 | lb/MMscf NG |
| Polycyclic Organic Matter (POM) | 0.0000882 | lb/MMscf NG |
| Toluene | 0.0034 | lb/MMscf NG |
| Arsenic Compounds (ASC) | 0.0002 | lb/MMscf NG |
| Beryllium Compounds (BEC) | 0.000012 | lb/MMscf NG |
| Cadmium Compounds (CDC) | 0.0011 | lb/MMscf NG |
| Chromium Compounds (CRC) | 0.0014 | lb/MMscf NG |
| Cobalt Compounds (COC) | 0.000084 | lb/MMscf NG |
| Manganese Compounds (MNC) | 0.00038 | lb/MMscf NG |
| Mercury Compounds (HGC) | 0.00026 | lb/MMscf NG |
| Nickel Compounds (NIC) | 0.0021 | lb/MMscf NG |
| Selenium Compounds (SEC) | 0.000024 | lb/MMscf NG |
| Total HAPs | 1.34 | lb/hr |

**DDGS Drying Operations**

Emissions from RTO #2 (EP-5005) shall each be calculated using Equation (3a), (3b), or (3c).

(3a) $E_{DRTO} = (CEF_{DRTO}) \times (P) / (2000 \text{ lbs/ton})$

(4e) $E_{VOC,LL,R} = \{[(EF_{VOC,LL,R,E}) \times (P_{LL,R})] + [(EF_{VOC,LL,R,D}) \times (P_{LL,R})]\} \ / \ (2000 \text{ lbs/ton})$

Where
$E_{VOC,LL}$ = VOC Emissions from Liquid Loadout (tons/month)
$E_{VOC,LL,T}$ = VOC Emissions from Liquid Loadout into Trucks (tons/month)
$E_{VOC,LL,R}$ = VOC Emissions from Liquid Loadout into Railcars (tons/month)
$E_{VOC,LL,T,G}$ = VOC Emissions from displacing Gasoline from Trucks (tons/month)
$E_{VOC,LL,T,E}$ = VOC Emissions from Loading Ethanol into Trucks (tons/month)
$E_{VOC,LL,T,D}$ = VOC Emissions from Loading Denaturant into Trucks (tons/month)
$EF_{VOC,LL,T,G}$ = VOC Controlled Emission Factor for displacing gasoline from Trucks (lbs/Mgal)
$EF_{VOC,LL,T,E}$ = VOC Controlled Emission Factor for loading ethanol into Trucks (lbs/Mgal)
$EF_{VOC,LL,T,D}$ = VOC Controlled Emission Factor for loading denaturant into Trucks (lbs/Mgal)
$P_{LL,T}$ = Product loaded into Trucks (Mgal/month)
$E_{VOC,LL,T,E}$ = VOC Emissions from Loading Ethanol into Trucks (tons/month)
$E_{VOC,LL,T,E}$ = VOC Emissions from Loading Denaturant into Trucks (tons/month)
$EF_{VOC,LL,R,E}$ = VOC Controlled Emission Factor for loading ethanol into Railcars (lbs/Mgal)
$EF_{VOC,LL,R,D}$ = VOC Controlled Emission Factor for loading denaturant into Railcars (lbs/Mgal)
$P_{LL,T}$ = Product loaded into Railcars (Mgal/month)

| Pollutant | Uncontrolled Emission Factors (lbs/Mgal) | |
|---|---|---|
| | Truck Loadout | Rail Loadout |
| VOC | | |
| Gasoline | 0.903 | |
| Ethanol | 0.380 | 0.380 |
| Denaturant | 0.099 | 0.099 |

(4f) $E_{HAP,LL} = E_{HAP,LL,T} + E_{HAP,LL,R}$

(4g) $E_{HAP,LL,T} = E_{HAP,LL,T,G} + E_{HAP,LL,T,E} + E_{HAP,LL,T,D}$

(4h) $E_{HAP,LL,T} = (E_{VOC,LL,T,G} \times WF_{HAP,G}) + (E_{VOC,LL,T,E} \times WF_{HAP,E}) + (E_{VOC,LL,T,D} \times WF_{HAP,D})$

(4i) $E_{HAP,LL,R} = E_{HAP,LL,R,E} + E_{HAP,LL,R,D}$

(4j) $E_{HAP,LL,R} = (E_{VOC,LL,R,E} \times WF_{HAP,E}) + (E_{VOC,LL,R,D} \times WF_{HAP,D})$

Where:
$E_{HAP,LL}$ = HAP emissions from liquid loadout (tons/month)
$E_{HAP,LL,T}$ = HAP Emissions from Liquid Loadout into Trucks (tons/month)
$E_{HAP,LL,R}$ = HAP Emissions from Liquid Loadout into Railcars (tons/month)
$E_{HAP,LL,T,G}$ = HAP Emissions from displacing Gasoline from Trucks (tons/month)
$E_{HAP,LL,T,E}$ = HAP Emissions from Loading Ethanol into Trucks (tons/month)
$E_{HAP,LL,T,D}$ = HAP Emissions from Loading Denaturant into Trucks (tons/month)
$WF_{HAP,G}$ = Weight Fraction of HAP in Gasoline (HAP/VOC)
$WF_{HAP,E}$ = Weight Fraction of HAP in Ethanol (HAP/VOC)
$WF_{HAP,D}$ = Weight Fraction of HAP in Denaturant (HAP/VOC)
$E_{HAP,LL,R,E}$ = HAP Emissions from Loading Ethanol into Railcars (tons/month)
$E_{HAP,LL,R,D}$ = HAP Emissions from Loading Denaturant into Railcars (tons/month)

| Pollutant | Emission Factor (lb/MMBtu) |
|---|---|
| Individual Hazardous Air Pollutants (HAP) | |
| Acetaldehyde | 7.67E-04 |
| Acrolein | 9.25E-04 |
| Benzene | 9.33E-04 |
| Formaldehyde | 1.80E-03 |
| Naphthalene | 8.48E-05 |
| Toluene | 4.09E-04 |
| Xylene | 2.85E-04 |
| Total HAPs | 5.20E-03 |

**Storage Tanks**

VOC emission from storage tanks shall be calculated using the EPA's TANKS program. HAP emissions from each of the storage tanks shall be calculated using Equation (7).

(7) $E_{ST\text{-}HAP} = (E_{ST\text{-}VOC}) \times (PPM_{ST}/10^6)$

Where:
$E_{ST\text{-}HAP}$ = Individual HAP emissions from storage tank (tons/month)
$E_{ST\text{-}VOC}$ = VOC emissions from storage tank (tons/month)
$PPM_{ST}$ = HAP content of material stored in storage tank (ppm by weight)

**Equipment Leaks**

VOC emissions from equipment leaks shall be calculated using Equation (8). HAP emissions from equipment leaks shall be calculated using Equation (9). These equations are based on compliance with the LDAR program.

(8) $LK,_{VOC} = \{\Sigma[(N\text{-}LK) \times (EF\text{-}LK) \times (1-(CE\text{-}LK/100))]\} \times (OH\text{-}LK) \times (2.21 \text{ lbs/kg}) / (2{,}000 \text{ lbs/ton})$

Where:
$LK,_{VOC}$ = VOC emissions from equipment leaks (tons/month)
$\Sigma$ = Summation over all types of components
N-LK = Number of components in each type
EF-LK= Equipment leak emission factor (kg/hr/source)
CE-LK = Control efficiency of LDAR system (%)
OH-LK = Operating hours = 720 or 744 (hrs/month)

(9) $LK,_{HAP} = (LK,_{VOC}) \times (PPM\text{-}LK/10^6)$

Where:
$LK,_{HAP}$ = HAP emissions from equipment leaks (tons/month)
$LK,_{VOC}$ = VOC emissions from equipment leaks (tons/month)
PPM-LK = HAP content of anhydrous ethanol (ppm by weight)

**DDGS Cooling**

Emissions from the DDGS Cooling Baghouse shall each be calculated using Equation (10).

# FACT SHEET

KAAPA Ethanol, LLC
8450 KAAPA Lane
Minden, Nebraska 68959

**Located at**

SW ¼, SE ¼, S13, T6N, R16W,
at the Intersection of State Highways 44 and 6,
Seven Miles West of Minden,
Kearney County, Nebraska

October 17, 2007

## DESCRIPTION OF THE FACILITY OR ACTIVITY:

KAAPA Ethanol, LLC (KAAPA), NDEQ ID# 75073, is an operating ethanol production facility (standard industrial classification, SIC, code 2869) that utilizes a corn dry milling process to produce approximately sixty (60) million gallons per year (MMgal/yr) of denatured ethanol. This facility is located at SW ¼, SE ¼, Sec 13, T6N, R16W, at the Intersection of State Highways 44 and 6, seven miles west of Minden.

KAAPA was originally issued a construction permit to construct an ethanol manufacturing plant that would produce 45.25 MMgal/yr of denatured ethanol on October 22, 2002. A second construction permit was issued to the facility on February 12, 2005 that approved the expansion of KAAPA to produce sixty (60) MMgal/yr of denatured ethanol. The permit issued in February 2005 superseded the permit issued in October 2002 in its entirety. A third construction permit was issued to KAAPA on April 24, 2006, which revised several permit conditions in the permit issued in February 2005. The permit revision permitted a second milling baghouse, an increase in the volatile organic compound (VOC) limit for the distillation scrubber, haul road requirements were revised, the emergency fire pump's operating hours were limited, facility-wide criteria pollutant limits were removed, and recordkeeping requirements were updated to reflect the revisions made.

The Department received an operating permit application from KAAPA on November 15, 2004; however, an operating permit has not yet been issued to the facility.

On July 14, 2006, the Department received a construction permit application from KAAPA. The requested modifications to the facility contained in the application are listed below:

- The facility will expand its denatured ethanol production from sixty (60) MMgal/yr to 110 MMgal/yr.
- A new baghouse will be installed to control the particulate matter associated with the transport of milled grain to the slurry tank.
- The facility will expand its fermentation operations by constructing additional fermentation equipment. A new wet scrubber will be installed to recover ethanol vapors and to control the VOC and hazardous air pollutant (HAP) emissions generated by the fermentation process.
- KAAPA will expand its distillation operations by constructing additional equipment. A second new wet scrubber will be installed to recover ethanol vapors and to control VOC and HAP emissions released during the distillation process.

The difference between the two solid products is moisture content; DDGS contains approximately 10% moisture while WDGS contains approximately 65% moisture.

Emissions from each of the following emission units have been accounted for in determining the facility's potential emissions. The table identifies the emission point identification numbers and the location in the construction permit where conditions for each production step are located. The table also indicates if a unit is new (i.e. being permitted to be constructed) or if the unit has previously been permitted (i.e. is existing).

| Permit Condition | Emission Point ID# | Emission Unit ID# | Emission Unit Description | New/Existing Unit |
|---|---|---|---|---|
| Condition III.(B) | EP-1002 | EU1 | Truck Dump Pit #1 | Existing |
| | | EU2 | Receiving Leg #1 | Existing |
| | | EU3 | Truck Dump Pit #2 | Existing |
| | | EU4 | Receiving Leg #2 | Existing |
| | | EU5 | Grain Storage Silo #1 | Existing |
| | | EU6 | Grain Storage Silo #2 | Existing |
| | | EU99 | Scalping Bin #1 | Existing |
| | | CE1002 | Grain Receiving Baghouse #1 | Existing |
| | EP-1003 | EU7 | Truck/Rail Dump Pit | New |
| | | EU8 | Receiving Leg #3 | New |
| | | EU9 | Receiving Leg #4 | New |
| | | EU101 | Scalping Bin #2 | New |
| | | CE1003 | Grain Receiving Baghouse #2 | New |
| | EP-1004a | EU10 | Grain Storage Silo #3 | New |
| | EP-1004b | EU11 | Grain Storage Silo #4 | New |
| Condition III.(A) | EP-1005a | EU12 | Grain Storage Silo #5 | New |
| | EP-1005b | EU13 | Grain Storage Silo #6 | New |
| | EP-1006 | EU14 | Grain Storage Pile | New |
| Condition III.(B) | EP-2000 | EU15 | Hammermill #1 | Existing |
| | | EU16 | Hammermill #2 | Existing |
| | | EU97 | Scalper #1 | Existing |
| | | CE2000 | Hammermill Baghouse #1 | Existing |
| | EP-2001 | EU17 | Hammermill #3 | Existing |
| | | EU98 | Scalper #2 | Existing |
| | | EU100 | Scalper #3 | New |
| | | CE2001 | Hammermill Baghouse #2 | Existing |
| | EP-2002 | EU18 | Hammermill #4 | New |
| | | EU19 | Hammermill #5 | New |
| | | EU20 | Milled Grain Transfer Conveyor | New |
| | | CE2002 | Hammermill Baghouse #3 | New |
| Condition III.(C) | EP-3000 | CE3000 | $CO_2$ Scrubber #1 | Existing |
| | EP-3001 | CE3001 | $CO_2$ Scrubber #2 | New |
| | EP-3002 | CE3002 | Distillation Scrubber #1 | Existing |
| | EP-3003 | CE3003 | Distillation Scrubber #2 | New |
| | EP-3004 | CE3004 | Regenerative Thermal Oxidizer #1 | New |

## TYPE AND QUANTITY OF AIR CONTAMINANT EMISSIONS ANTICIPATED:

The ethanol plant will generate emissions of several air pollutants, including particulate matter (PM), particulate matter with an aerodynamic diameter less than or equal to 10 micrometers ($PM_{10}$), sulfur oxides ($SO_x$), nitrogen oxides ($NO_x$), carbon monoxide (CO), volatile organic compounds (VOC), and hazardous air pollutants (HAP), specifically Acetaldehyde. The primary emission sources at the facility will be from the following equipment/processes:

| Equipment/Process | Expected Pollutants |
|---|---|
| Grain Receiving, Handling, Storing, and Milling | PM and $PM_{10}$ |
| Fermentation and Distillation | VOC and HAP |
| Ethanol Storage and Loadout | PM, $PM_{10}$, $NO_x$, $SO_2$, CO, VOC, and HAP |
| WDGS Storage and Loadout | VOC and HAP |
| DDGS Drying, Storage and Loadout | PM, $PM_{10}$, $NO_x$, $SO_2$, CO, VOC, and HAP |
| Steam Generation | PM, $PM_{10}$, $NO_x$, $SO_2$, CO, VOC, and HAP |
| Emergency Firewater Pump | PM, $PM_{10}$, $NO_x$, $SO_2$, CO, VOC, and HAP |
| Fugitive Emissions | PM, $PM_{10}$, VOC, and HAP |

Potential emissions of criteria pollutants and HAPs were estimated using a combination of vendor guarantees, process design data, emission factors from EPA's Compilation of Air Pollutant Emission Factors, 5th Edition, Volume 1 (AP-42), EPA protocol and guidance documents, EPA's TANKS version 4.09D (10/05), and test results from the facility. Detailed emission calculations are presented in the Fact Sheet Attachment.

### Grain Receiving, Storing, and Milling

The grain handling operations consists of the unloading of grain by trucks and rail. There are currently two truck dump pits (EU1 and EU3). The facility plans to construct a third dump pit that can accommodate both truck and rail unloading (Truck/Rail Dump Pit, EU7). Currently, there are two 228,614-bushel capacity concrete storage silos (EU5 and EU6). The facility will be constructing four additional storage silos, two new steel storage silos (EU12 and EU13) which will have capacities of 658,104 bushels each and two additional 600,000-bushel capacity concrete storage silos (EU10 and EU11), bringing the storage silo total to six. The total permanent storage capacity at the facility will be 2,973,436 bushels after this permitting action. Additional existing grain handling equipment includes two receiving legs (receiving legs #1 and #2) and associated conveyors. Two new receiving legs and associated conveyors will be constructed with the expansion.

The annual grain usage estimated based on the anhydrous ethanol production rate of 104.5 MMgal/yr is 1,083,704 tons/yr. Grain is received at the facility in 25-ton hopper bottom trucks inside a building. The dump pits are fitted with conveyor belts, which feed the elevator legs and grain-to-grain storage silos.

The grain milling operations consist of three scalpers, five hammermills, and associated corn day bins and conveyors. An existing grain transfer conveyor feeds grain from the receiving pits to one of two existing scalpers (EU97 and EU98). The expansion calls for a third scalper to be constructed (EU100). The scalpers remove sticks, cobs, and other unusable debris from the grain. The scalped corn is then

$$\text{Simple Sugar + Yeast} \longrightarrow \text{Ethanol + Carbon Dioxide}$$

$$C_6H_{12}O_6 + \text{Yeast} \longrightarrow 2\ CH_3CH_2OH + 2\ CO_2$$

The mash stays in one fermenter for approximately 48 to 52 hours before the fermentation is complete and the distillation process can begin. The fermented mash, called "beer" contains 10% ethanol by weight, 90% water, and leftover solids from the grain and yeast. When fermentation is completed, the beer is transferred to the beer well via the fermenter pumps. Sulfuric acid may be added between the fermentation and distillation processes for pH adjustment.

The $CO_2$ generated from the fermentation process passes through one of two scrubbers. Emissions from the existing fermentation equipment is and will continue to be routed to the existing fermentation scrubber, $CO_2$ Scrubber #1 (CE3001), while the new fermentation equipment will be routed to a new fermentation scrubber, $CO_2$ Scrubber #2 (CE3002). The fermentation scrubbers allows for ethanol vapors to be collected in order for a higher product yield, however the units also provide VOC and HAP emission control.

**Distillation**

The distillation operations at KAAPA currently consist of one beer column, one side stripper, one rectifier column, two molecular sieves, and two condensers. As a result of the expansion, KAAPA will be constructing additional distillation equipment. The additional equipment includes a beer column, side stripper, rectifier column, two molecular sieves, and two condensers.

The beer well is a process tank that provides a continuous flow of beer slurry to the distillation column. The distillation column's function is to separate the ethanol from the residual grain solids. The remaining grain solids, known as stillage, are sent to the whole stillage tank to be further processed for use as cattle feed.

The ethanol is separated from the beer by distillation and leaves the distillation section as 190-proof anhydrous ethanol vapor. The vapor is then superheated in the molecular sieve units using steam, in a process known as dehydration. The dehydration process is used to increase the ethanol to 200-proof.

Stillage from the whole stillage tank is pumped to the stillage centrifuge. The stillage centrifuge splits the feed into two flows: the wet cake and thin stillage (centrate). The wet cake, also called WDGS, consists of approximately 33-35% solids (mostly suspended solids) and 65-67% water.

Vapors from the existing distillation equipment are and will continue to flow through the existing distillation scrubber, Distillation Scrubber #1 (CE3002). Vapors that will be emitted from the distillation equipment being constructed will flow through a new distillation scrubber, Distillation Scrubber #2 (CE3003). The distillation scrubbers allow for ethanol vapors to be collected in order for a higher product yield, however the units also provide VOC and HAP emission control.

The emissions emitted from all four fermentation and distillation scrubbers will be routed to a new 2.5 MMBtu/hr regenerative thermal oxidizer (RTO), RTO #1. The RTO will be used to provide additional VOC and HAP control. The RTO will regenerate via an online regenerative process and will be fueled by natural gas and biogas generated by the biomethanator located at the facility.

the wet cake will remain moist on the storage pad. Because the wet cake will be transferred offsite or to the DDGS dryers quickly (e.g., in 1 or 2 days), the cake will not dry completely in most types of weather. Therefore, wet cake storage and handling is expected to produce negligible PM and $PM_{10}$ emissions. However, VOC and HAP emissions are emitted from wet cake. Potential VOC and HAP emissions resulting from wet cake storage were estimated based on the emission factors derived from the November 2004 stack test at the Diversified Energy Co. (DENCO) ethanol facility located in Morris, Minnesota.

**DDGS Drying, Storage, and Loadout**

If the WDGS is not to be delivered for wet feed to feed lots in the area, the WDGS will be conveyed into the new 90.0 MMBtu/hr natural gas fired dryer, DDGS Dryer (EU78). The DDGS dryer is capable of drying 60.0 tons/hr, therefore it is only capable of drying 62% of the WDGS produced at the facility. During the drying process, the cake solids concentration increases from 35% to 90%. The resulting product, DDGS, will be stored in a building until it is shipped off site by truck and/or rail for use primarily as cattle feed in feedlots. If the dryer operates continuously, the facility will have the capacity to produce up to 178,750 tons/yr of DDGS and 320,352 tons/yr of WDGS will remain.

A second RTO, RTO #2 (CE5005) with a heat input rating of 20.0 MMBtu/hr, will be constructed at the facility in order to control the VOC and HAP emissions that result from drying wet cake. Both RTOs being constructed utilize heat recovery chambers with ceramic heat transfer media, which cycle back and forth. One side of the RTO handles hot clean oxidized gas and the other side handles a portion of the inlet gas. The function of each chamber will alternate, either adding heat to or removing heat from the heat transfer media, thereby preheating the inlet process gas stream and reducing the overall energy costs for the system. Each chamber will be equipped with a transition zone to allow for uniform air distribution to the bottom of the heat recovery beds, which also minimizes any discharge of unoxidized emissions during valve cycling. Both RTOs will regenerate via an online regeneration process and will be permitted to combust natural gas as fuel. Biogas will not be permitted to be combusted in the second RTO since it operates only when DDGS drying is occurring (i.e. not continuously).

Potential emissions from RTO #2 were calculated by using information provided by the facility and from AP-42, Section 1.4, *Natural Gas Combustion (7/98)*. Performance tests will be required to verify that the facility is in compliance with its permit limitations established for RTO #2.

A new DDGS cooling cyclone (EU86) will be used to lower the temperature of the DDGS directly after the drying occurs. A new baghouse, DDGS Cooler Baghouse (CE8002) will be installed to control the PM and $PM_{10}$ emissions from the cooling cyclone. VOC and HAP emissions are also expected to be emitted from the cooling cyclone. Performance tests will be required to verify that the facility will be in compliance with its permit limitations for PM, VOC, and HAP emissions from the cooling cyclone that were established based on information provided in the application.

DDGS storage and loadout is a source of PM and $PM_{10}$ emissions. The DDGS will be loaded into trucks or railcars. Actual loading will occur inside a building to control and capture PM and $PM_{10}$ emissions. A DDGS Loadout Baghouse (CE8001) will control the dust at the transfer points of the material handling. The emissions from the baghouse were calculated by using design air flow rates of the units and a baghouse outlet grain loading of 0.004 grains per dry standard cubic foot (dscf), which is based on vendor guarantees. Fugitive emissions were calculated by using emission factors from AP-42, Chapter 9, Section 9.9.1 (5/2003) and by assuming that 10% of the emissions are not collected by the DDGS Cooler/Loadout Baghouse.

back to a temperature that is useful for the process. The drift loss of both cooling towers is limited to 0.005%.

Potential $PM/PM_{10}$ emissions at the cooling tower were calculated with a mass balance approach as presented in AP-42, Section 13.4: *Wet Cooling Towers* (1/95), using data on water circulation rate, TDS concentration, and cooling tower drift losses. This method assumes that the TDS present in water evaporated at the cooling tower produce $PM/PM_{10}$ emissions.

**Tanks**

The facility currently has five (5) production tanks. Five additional storage tanks will be constructed at this facility as a result of the modifications occurring at this time. The production tanks will hold raw material (denaturant) and final products (various grades of ethanol and denatured alcohol). Table A lists the existing and proposed (new) storage tanks at the facility. All of the storage tanks are, or will be, internal floating-roof, vertical, aboveground tanks.

**Table A: Storage Tanks**

| Tank ID# | Tank Capacity (gallons) | Tank Contents | Installation Date |
|---|---|---|---|
| EP-9001 | 750,000 | Denatured Ethanol | 2003 |
| EP-9002 | 750,000 | Denatured Ethanol | 2003 |
| EP-9003 | 100,000 | 200-Proof Ethanol | 2003 |
| EP-9004 | 100,000 | Natural Gasoline | 2003 |
| EP-9005 | 100,000 | 190-Proof Ethanol | 2003 |
| EP-9006 | 2,000,000 | Denatured Ethanol | NEW |
| EP-9007 | 2,000,000 | Denatured Ethanol | NEW |
| EP-9008 | 100,000 | 200-Proof Ethanol | NEW |
| EP-9009 | 100,000 | Natural Gasoline | NEW |
| EP-9010 | 100,000 | 190-Proof Ethanol | NEW |

All ten tanks are sources of VOC and HAP emissions and will vent directly to the atmosphere. Emissions from these tanks have been estimated using the EPA's TANKS version 4.09d model.

**Equipment Leaks**

Fugitive VOC emissions will occur from plant piping, such as valves and pumps in light and heavy service, gas valves, compressor seals, pressure relief valves, sampling connections and connectors. KAAPA will perform Leak Detection and Repair (LDAR) Program in accordance with NSPS, Subpart VV (40 CFR 60.480 through 60.489). Fugitive emissions from the components within the plant piping system were estimated based on EPA's Synthetic Organic Chemical Manufacturing Industry (SOCMI) emission factors found in EPA 453/R-95-017, *Protocol for Equipment Leak and Emission Estimates* (11/95).

The change in facility-wide potential emissions as a result of this permitting action are presented below

| Pollutant | Pre-Modification Facility PTE[1] (tons/year) | Facility PTE after Modification (tons/year) | PTE Emission Increase due to Project (tons/year) |
|---|---|---|---|
| Particulate Matter (PM) | 76.2019 | 93.23 | 17.03 |
| Particulate Matter ($PM_{10}$) | 37.3359 | 60.32 | 22.98 |
| Sulfur Dioxide ($SO_2$) | 0.5895 | 95.36 | 94.77 |
| Nitrogen Oxides ($NO_x$) | 98.1245 | 99.51 | 1.39 |
| Carbon Monoxide (CO) | 96.6235 | 91.49 | -5.13 |
| Volatile Organic Compounds (VOC) | 83.9075 | 89.43 | 5.52 |
| Total Reduced Sulfur | 0.0 | 0.29 | 0.29 |
| Single Largest HAP: Acetaldehyde | <10.0 | <10.0 | - |
| Total HAPs | <25.0 | <25.0 | - |

[1]Pre-Modification Facility PTE obtained from the Fact Sheet that accompanies the permit issued on April 24, 2006

## APPLICABLE REQUIREMENTS AND VARIANCES OR ALTERNATIVES TO REQUIRED STANDARDS:

### Title 129, Chapter 4 – Ambient Air Quality Standards (AAQS)

An air quality impact analysis for the KAAPA facility, post-expansion, was conducted, which consisted of a refined modeling analysis to demonstrate that the proposed facility will not cause or significantly contribute to any violations of applicable National and State AAQS. The impact analysis was only conducted for those pollutants that the facility would emit in amounts that exceeded the emission thresholds in Table 1.0-1 of the Department's *Atmospheric Dispersion Modeling Guidance for Permits (09/05)* guidance document. The potential emission rates from KAAPA, after this permitting action, exceed the thresholds for $PM_{10}$, $SO_2$, $NO_2$, and CO. Therefore air dispersion modeling was conducted to ensure that KAAPA, post-expansion, would not cause or significantly contribute to any modeled violations of the AAQS for $PM_{10}$ (24-hour & Annual), $SO_2$ (3-hour, 24-hour, & Annual), $NO_2$ (Annual), and CO (1-hr & 8-hr). The Nebraska and National AAQS are identical. The AAQS are shown below:

## $SO_2$ Results

The results of the $SO_2$ refined modeling analysis are presented in the table below. The predicted concentrations shown are the 2nd highest predicted values for each individual year used to demonstrate compliance with the 3-hr and 24-hr standards and the highest value for the annual standard. The modeled impacts shown are from the KAAPA facility, post-expansion, and other nearby sources. As shown below, compliance with all $SO_2$ AAQS is expected.

**Maximum Predicted Ambient $SO_2$ Concentrations**

| Averaging Period | Year | UTM Coordinates (m) X | UTM Coordinates (m) Y | Background ($\mu g/m^3$) | Modeled ($\mu g/m^3$) | Total ($\mu g/m^3$) | AAQS ($\mu g/m^3$) |
|---|---|---|---|---|---|---|---|
| 3-hour | 2000 | 493500.00 | 4481400.00 | 120 | 428.14 | 548.14 | 1,300 |
| | 2001 | 493500.00 | 4481350.00 | | 454.49 | 574.49 | |
| | 2002 | 493500.00 | 4481400.00 | | 424.55 | 544.55 | |
| | 2003 | 493500.00 | 4481400.00 | | 508.62 | 628.62 | |
| | 2004 | 493500.00 | 4481350.00 | | 457.21 | 577.21 | |
| 24-hour | 2000 | 493500.00 | 4481350.00 | 48 | 142.35 | 190.35 | 365 |
| | 2001 | 493500.00 | 4481350.00 | | 174.58 | 222.58 | |
| | 2002 | 493500.00 | 4481350.00 | | 142.84 | 190.84 | |
| | 2003 | 493500.00 | 4481350.00 | | 175.41 | 223.41 | |
| | 2004 | 493500.00 | 4481350.00 | | 186.52 | 234.52 | |
| Annual | 2000 | 493500.00 | 4481350.00 | 12 | 26.56 | 38.56 | 80 |
| | 2001 | 493500.00 | 4481350.00 | | 32.02 | 44.02 | |
| | 2002 | 493500.00 | 4481350.00 | | 31.18 | 43.18 | |
| | 2003 | 493500.00 | 4481350.00 | | 29.30 | 41.30 | |
| | 2004 | 493500.00 | 4481350.00 | | 28.54 | 40.54 | |

## $NO_2$ Results

The results of the $NO_2$ refined modeling analysis are presented in the table below. The predicted concentrations shown are the highest predicted values for each individual year used to demonstrate compliance with the annual standard The modeled impacts shown are from the KAAPA facility, post-expansion, and other nearby sources. As shown below, compliance with the $NO_2$ AAQS is expected.

**Maximum Predicted Ambient $NO_2$ Concentrations**

| Averaging Period | Year | UTM Coordinates (m) X | UTM Coordinates (m) Y | Background ($\mu g/m^3$) | Modeled ($\mu g/m^3$) | Total ($\mu g/m^3$) | AAQS ($\mu g/m^3$) |
|---|---|---|---|---|---|---|---|
| Annual | 2000 | 493450.00 | 4481350.00 | 15 | 18.61 | 33.61 | 100 |
| | 2001 | 493450.00 | 4481350.00 | | 21.41 | 36.41 | |
| | 2002 | 493450.00 | 4481350.00 | | 21.43 | 36.43 | |
| | 2003 | 493450.00 | 4481350.00 | | 19.33 | 34.33 | |
| | 2004 | 493450.00 | 4481350.00 | | 20.08 | 35.08 | |

**Title 129, Chapter 18 – New Source Performance Standards (NSPS), and 40 CFR Part 60**

Subpart A – General Provisions: This subpart, adopted by reference in Title 129, Chapter 18, Section 001.01, applies to those units covered by the specific NSPS as discussed below. The owner or operator is required to notify the Department when several milestones occur including, but not limited to, the date construction commenced postmarked no later than thirty (30) days after such date {40 CFR 60.7(a)(1)}, the actual date of initial start up of the equipment postmarked within fifteen (15) days after such date {40 CFR 60.7(a)(3)}, and any physical or operational change to an existing facility which may increase the emission rate of any air pollutant to which a standard applies, unless that change is specifically exempted under an applicable subpart {40 CFR 60.7(a)(4)}.

Subpart Dc – Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units: This subpart, adopted by reference in Title 129, Chapter 18, Section 001.52, is for steam generating units with a design rate between 10 MMBtu/hr and 100 MMBtu/hr, constructed, reconstructed, or modified after June 9, 1989. A steam-generating unit is defined as any device which combusts any fuel to produce steam, heat water, or heat any heat transfer medium, including air. All four boilers located at this facility are subject to Subpart Dc since their heat input ratings are each 73.5 MMBtu/hr. The regenerative thermal oxidizers that will be constructed with the expansion are not subject to this subpart since the units are not considered steam generating units.

The NSPS, Subpart Dc requirements include, but are not limited to, the following:

(1) The owner or operator shall record and maintain records of the amounts of each fuel combusted during each day. The owner or operator of an affected facility that only burns very low sulfur fuel oil or other liquid or gaseous fuels with potential sulfur dioxide emissions rate pf 140 ng/J (0.32 lb/MMBtu) heat input or less shall record and maintain records of the fuels combusted during each calendar month.

Subpart DD – Standards of Performance for Grain Elevators: This subpart, adopted by reference in Title 129, Chapter 18, Section 001.19, applies to each truck unloading and/or loading station, barge and ship unloading and/or loading station, railcar unloading and/or loading station, grain dryer, and grain handling operations that are located at any grain terminal or storage elevator that commenced construction, modification, or reconstruction after August 3, 1978. This subpart applies to the grain handling operations at this facility because this facility receives and handles dry corn which is not for human consumption and the permanent storage capacity is greater than 2.5 million bushels at this source after the expansion occurs (i.e. the definitions of a grain terminal and storage elevator are met). Total storage capacity is expected to be 2,973,436 bushels after this permitting action.

The NSPS, Subpart DD requirements include, but are not limited to, the following:

(a) No affected units, other than a grain dryer, shall cause particulate matter to be discharged into the atmosphere in excess of 0.023 g/dscm (0.01 gr/dscf). {40 CFR 60.302(b)(1)}

(b) Affected units, other than a grain dryer, and fugitive emissions associated with grain handling operations shall not exhibit greater than 0% opacity. {40 CFR 60.302(b)(2) and (c)(2)}

(c) Fugitive emissions associated with any individual truck unloading station, railcar unloading station, or railcar loading station, shall not exhibit greater than 5% opacity. {40 CFR 60.302(c)(1)}

(c) The owner or operator shall report and keep records as described in 40 CFR 60.487 – Reporting requirements and in 40 CFR 60.486 – Recordkeeping requirements. Each owner or operator shall submit semiannual reports to the Department beginning six months after the initial startup date.

(d) Emissions from the equipment leaks shall be detected and controlled by the Leak Detection and Repair Program as defined in 40 CFR 60.482-1 through 60.482-10.

Subpart NNN – Standards of Performance for Volatile Organic Compound (VOC) Emissions from Synthetic Organic Chemicals Manufacturing Industry (SOCMI) Distillation Operations: This subpart, adopted by reference in Title 129, Chapter 18, Section 001.61, applies to each distillation unit or distillation units that are or are not in combination with a recovery system that is part of a process unit that produces any of the chemicals listed in 40 CFR 60.667 as a product, co-product, byproduct, or intermediate, for which construction, modification, or reconstruction commenced after December 30, 1983. The distillation operations located at this ethanol plant are not subject to this subpart per EPA's January 24, 2000, letter from Richard Tripp, EPA Region VII to Randy Griffin, Nebraska Air Quality Compliance Supervisor, concerning applicability of 40 CFR 60 to biomass ethanol production. The letter stated that Subpart NNN does not apply to ethanol derived from biomass. Subpart NNN applies to synthetic (chemical reaction of petroleum refining products), not biological, processes to produce organic chemicals. Ethanol, however, is one of the chemicals listed in 40 CFR 60.667.

Subpart RRR – Standards of Performance for Volatile Organic Compound (VOC) Emissions from Synthetic Organic Chemicals Manufacturing Industry (SOCMI) Reactor Processes: This subpart, adopted by reference in Title 129, Chapter 18, Section 001.70, applies to each reactor or reactors that are or are not in combination with a recovery system that is part of a process unit that produces any of the chemicals listed in 40 CFR 60.707 as a product, co-product, byproduct, or intermediate, for which construction, modification, or reconstruction commenced after June 29, 1990. The fermentation reactors located at this ethanol plant are not subject to this subpart per EPA's January 24, 2000, letter from Richard Tripp, EPA Region VII to Randy Griffin, Nebraska Air Quality Compliance Supervisor, concerning applicability of 40 CFR 60 to biomass ethanol production. The letter stated that Subpart NNN does not apply to ethanol derived from biomass. Subpart RRR applies to synthetic (chemical reaction of petroleum refining products), not biological, processes to produce organic chemicals. Ethanol, however, is one of the chemicals listed in 40 CFR 60.707.

Subpart IIII – Standards of Performance for Stationary Compression Ignition Internal Combustion Engines: This subpart, not yet adopted into Title 129, Chapter 18, applies to stationary compression ignition internal combustion engines with a displacement of less than 30 liters per cylinder that has commenced construction or has been modified or reconstructed after July 11, 2005. The emergency fire water pump at this facility is not subject to this subpart since it was constructed in 2003, however if the fire water pump is modified or reconstructed in the future, the unit may be subject to this subpart.

**Title 129, Chapter 19 – Prevention of Significant Deterioration (PSD)**

This construction permitting action does not trigger the PSD applicability thresholds. This facility is a Synthetic Organic Compound Manufacturing Industry (SOCMI) plant, therefore the PSD major source threshold is 100 tons per year each for PM, $PM_{10}$, $SO_x$, $NO_x$, VOC, and CO (including fugitive emissions). Since the controlled emissions do not exceed 100 tons/yr for any criteria pollutant, this plant is not subject to PSD and is a PSD minor source.

| Process | BACT Equipment/Activities |
|---|---|
| Fermentation and Distillation | Wet Scrubbers, RTO |
| Ethanol and Denaturant Loadout | Submerged Filling<br>Ethanol Loadout Flare |
| DDGS Drying, Cooling, Storage and Loadout | RTO |
| Fugitive Emissions | Tanks are equipped with<br>Internal Floating Roofs |

*Title 129, Chapter 27, Section 003 - Maximum Achievable Control Technology*

This facility is not subject to MACT since the controlled emissions are less than 10 tons/year of any individual HAP and less than 25 tons/year of combined HAPs. Specific Condition II.(E) of the permit limits the facility-wide HAP emissions below MACT threshold levels.

**Title 129, Chapter 28 – Hazardous Air Pollutant Emission Standards**

This facility is not subject to any National Emissions Standards for Hazardous Air Pollutants (NESHAPs) since the controlled emissions are less than 10 tons/year of any individual HAP and less than 25 tons/year of combined HAPs. Specific Condition II.(E) of the permit limits the facility-wide HAP emissions below NESHAP threshold levels. If the facility-wide HAP emissions exceed the NESHAP thresholds, then the facility may be subject to one or more of the following NESHAPs:

Subpart F – National Emission Standards for Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry: This subpart, adopted by reference in Title 129, Chapter 28, Section 001.20, applies to manufacturing facilities which produce a hazardous air pollutant as the primary chemical {§63.100(b)(1)}, and use the chemical as a reactant or manufacture the chemical as a product or co-product {§63.100(b)(2)}, and are located at a plant site that is a major source (≥10 tons/year of individual HAP or ≥ 25 tons/year of combined HAPs). This plant produces ethanol, which contains acetaldehyde and methanol, as well as the HAPs in the denaturant. This facility is not subject to this subpart because the primary product is ethanol (which is not on the HAP list in this subpart) and the facility is limited to less than 10 tons/year of individual HAP and less than 25 tons/year of combined HAPs.

Subpart G – National Emission Standards for Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry for Process Vents, Storage Vessels, Transfer Operations, and Wastewater: This subpart, adopted by reference in Title 129, Chapter 28, Section 001.21, applies to the same manufacturing facilities as Subpart F, but only for all of the process vents, storage vessels, transfer racks and wastewater streams. Since this plant is exempt from Subpart F, it is also exempt from Subpart G.

Subpart H – National Emission Standards for Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry for Equipment Leaks: This subpart, adopted by reference in Title 129, Chapter 28, Section 001.22, applies to the same manufacturing facilities as Subpart F, but only for the following equipment: pumps, compressors, agitators, pressure relief devices, sampling connection systems, open-ended valves or lines, valves, connectors, surge control vessels, bottoms receivers, instrumentation systems, and control devices or closed vent systems that are intended in operate in organic hazardous air pollutant service 300 hours or more during the calendar year. Since this plant is exempt from Subpart F, it is also exempt from Subpart H.

**February 12, 2005 and April 24, 2006**

Conditions I. through XII.: The general conditions have been replaced with the current general conditions used by the Department.

Condition XIII.(A): This condition has been removed from the permit. This condition does not need to be included since this requirement is explicitly stated in Title 129, Chapter 20. All sources are subject to this requirement and it does not need to be in the specific conditions of this permit.

Condition XIII.(B): This condition is for the three existing 73.5 MMBtu/hr boilers. The three boilers are now permitted in Condition III.(I) along with the new 73.5 MMBtu/hr boiler being constructed. The heat input ratings of the three units are the same and natural gas remains a permitted fuel type. The methane from the biomethanators will no longer be permitted to be combusted in the boilers. The boilers will remain subject to NSPS Subpart Dc, however since fuel monitoring requirements have changed, Condition XIII.(B)(4)(a) has been removed in order to accommodate future changes to the subpart if they were to occur. Condition XIII.(B)(5) is now located in Condition II.(B).

Condition XIII.(C): This condition is for the grain handling and milling operations at the facility. The grain handling and milling operations are now permitted in Condition III.(B). This condition has not been altered significantly, however several additional baghouses are being constructed at the facility that have been incorporated into Condition III.(B). Baghouse maintenance language has also been updated.

Condition XIII.(D): This condition is for the fermentation and distillation operations. The fermentation and distillation operations at the facility are planning to expand. Since after the expansion the fermentation and distillation operations' emissions will be routed to a new RTO, this condition has been revised significantly. The fermentation and distillation operations are now permitted under Condition III.(C). The facility is required to use the scrubbers to control VOC and HAP emissions; however the scrubber maintenance requirements have been updated. The existing scrubbers are required to comply with their existing VOC limitations until the expansion occurs. New emissions limitations have been established for the new RTO and the facility is required to perform and initial performance test on the unit once it is constructed.

Condition XIII.(E): This condition is for the storage tanks. The existing five (5) storage tanks are now permitted in Condition III.(D), along with five (5) new storage tanks being constructed. The denaturant and denatured ethanol tanks will remain subject to NSPS Subpart Kb and are still required to have internal floating roofs installed for pollution control. The process tanks (i.e. anhydrous ethanol tanks) are required to be installed with internal floating roofs in order to comply with State HAP BACT requirements.

Condition XIII.(F): This condition is for fugitive emission sources located at the facility, specifically equipment leaks, haul road emissions, and wet cake storage and loadout. Equipment leak requirements are now located in Condition III.(L), haul roads in Condition III.(M), and wet cake storage and loadout requirements have been removed since the Department has begun using emission factors for calculating potential emissions and testing is no longer required. Haul road requirements have been changed. The silt load content previously permitted was 0.4 $g/m^2$, however the facility was unable to continuously maintain that silt load. This permit raises the silt load from 0.4 to 2.0 $g/m^2$.

be established in the future to better ensure compliance. Documentation detailing operation and maintenance can be operational and maintenance manuals provided by the manufacturer. If manufacturer manuals are not available, the owner or operator must develop a document containing proper operation and maintenance requirements for each permitted emission unit and piece of required control equipment. KAAPA is required to keep daily anhydrous ethanol production amounts so that it is clear when the facility has expanded and the new emission limitations are in effect for the source. The facility as it is currently constructed is not capable of producing more than 200,000 gallons of anhydrous ethanol a day. Only when the expansion occurs with the facility have this production capacity.

II.(B) This condition requires all permitted emission units, control equipment, and monitoring equipment to be properly installed, operated, and maintained. It is expected that the installation, operation, and maintenance conducted will be similar to the items contained in the documents detailing proper operation, inspection, and maintenance of the equipment (required in Specific Condition II.(A)(5)). It is very important that permitted and required equipment is operating properly and maintained since un-maintained equipment may emit greater amounts of pollution into the atmosphere or monitor items incorrectly or inaccurately. Emission estimates for this permitting action assume that all equipment is operating properly and being properly maintained.

II.(C) This condition requires any emissions resulting from equipment failures, malfunctions, or other variations in control or process equipment performance that are, or may be, in excess of the applicable emission control regulations to be reported to the Department in accordance with Title 129, Chapter 35, Section 005. The Department must be notified when excess emissions have, or may have occurred along with the cause of the emissions in order to determine the appropriate enforcement action. These reports also assist with verifying proper operation and maintenance of process and control equipment.

II.(D) General initial performance testing requirements. All performance tests required throughout this permit are required to be conducted in accordance with these conditions. The owner or operator is required to provide the Department at least thirty (30) days written (i.e. hard copy, not electronic or verbal) notice prior to testing. The notification should include the emissions testing protocol. This is to ensure that the Department has the opportunity to witness the emissions testing and/or agree with the testing plan proposed. The owner or operator must also submit the final test results within forty-five (45) days after the test has occurred. EPA's stack testing guidance indicates that full capacity is operation at 90% of maximum rated capacity or greater.

II.(E) This condition limits facility wide annual HAP emissions to below the major source thresholds. The facility has been designed as a synthetic minor source for HAP emissions and therefore, is exempt from Federal NESHAP/MACT requirements. The permit limits were set at the applicability thresholds for being a major source of HAPs due to the variability of HAPs from ethanol plants. The methodology for calculating actual HAP emissions to demonstrate compliance with the facility-wide emission limits is provided in Attachment A of this permit. Actual emissions should be based on the following data sources listed in descending order of preference: 1) performance test results, 2) manufacturer's guarantees, 3) manufacturer and/or engineering estimates, and 4) AP-42 emission factors. Upon startup, emissions from the facility should be calculated based on the initial assumptions and data used as the basis for issuing the permit (see emission calculations in Attachment A). The facility will be required to conduct stack testing to verify the assumptions used to calculate emissions from several emission sources. Once the required initial stack tests have been conducted, emissions should be calculated using the most recent valid test results. Because the stack test results are site-specific, the use of stack

II.(A) are also required to be maintained, which includes but is not limited to, documenting equipment failures and malfunctions.

**Condition III.(B): Grain Receiving, Handling, Storage, and Hammermilling**
**EP-1002, EP-1003, EP-1004a, EP-1004b, EP-2000, EP-2001, and EP-2002**

(1) The owner or operator is permitted to construct the emission points and associated emission units contained in the table.

(2) Emission limitations have been established for the emission points that are controlled by baghouses in order to ensure the facility is minor for PSD. Two sets of emission limitations have been established based on whether or not the facility has been expanded. If the facility expands, the lb/hr limitations on the existing emission points must be reduced in order for the minor status to be maintained after the expansion. Testing is required on all emission points after the expansion occurs to ensure that the limits can be complied with. Existing units are required to be tested due to the increase of grain throughput.

(3) $PM/PM_{10}$ emissions generated by the grain receiving, handling, storage, and hammermilling processes are required to be controlled by one of five baghouses. In order to control particulate emissions, a baghouse must be properly operated whenever the associated emission units are in operation. One indication of baghouse malfunction is an atypical pressure drop across the baghouse. Therefore, each baghouse is required to be equipped with an operational pressure differential indicator. The facility must conduct daily observations, during the daylight hours of baghouse operation, to ensure that there are not visible emissions from the stack, leaks, noise from the unit, or atypical pressure differential readings. By requiring daily observations, the Department is confident that baghouse malfunctions will be detected quickly and be corrected. The facility is required to keep an on-site inventory of spare bags of each type used. If a baghouse is not operating properly (i.e. has a blown bag), it is expected that there will be excess emissions emitted from the unit. Keeping spare bags will minimize the duration of excess emissions. The grain receiving operations are required to be conducted within a building and all dump pits are required to be installed with choke-flow systems for purposes of capturing the emissions generated via the unloading process. The doors are not required to be closed during unloading operations since fugitive emissions have been conservatively estimated.

(4) Once the permanent storage capacity at KAAPA Ethanol equals or exceeds 2.5 million bushels, NSPS, Subpart DD will apply to the facility.

(5) Recordkeeping requirements that include documenting pressure differential indicator readings, indicators that corrective action is needed, when baghouse filters are replaced, observations and corrective actions taken. The owner or operator is also required to maintain records including when filters are replaced on the silos. Additional recordkeeping requirements in accordance with Specific Condition II.(A) are also required to be maintained, which includes but is not limited to, documenting equipment failures and malfunctions.

**Condition III.(C): Fermentation and Distillation Operations**
**EP-3000, EP-3001, EP-3002, EP-3003, and EP-3004**

(1) The owner or operator is permitted to construct the emission points and associated emission units contained in the table.

(2) Emission limitations have been established for the emission points associated with fermentation and distillation to ensure the facility is minor for PSD for VOC and that HAPs are controlled in accordance with State HAP BACT requirements. Two sets of emission limitations have been established based on whether or not the facility has been expanded. If

Appropriate operational and maintenance requirements, in accordance with NSPS, Subpart Kb, are required for all the tanks.

(4) EU87, EU88, EU90, EU92, EU93, and EU95 are subject to NSPS, Subpart Kb.

(5) Recordkeeping requirements in accordance to NSPS, Subpart Kb. Additional recordkeeping requirements in accordance with Specific Condition II.(A) are also required to be maintained.

**Condition III.(E): Ethanol Loadout**
**EP-4000**

(1) The owner or operator is permitted to construct the loadout operations as described in the table.

(2) There are no emission limitations applicable to this emission point.

(3) Once the expansion occurs the facility will be permitted to loadout only 55.0 million gallons of denatured ethanol per year via truck. This limitation has been established in order to ensure compliance with Chapter 19, specifically for PM emissions from haul road traffic. VOC and HAP emissions will be captured and controlled by a vapor recovery system. The truck loadout is required to be controlled by the vapor recovery system at time of permitting while the rail loadout operations are only required to be controlled after the expansion occurs. Submerged loading is required when transferring liquid to limit the amount of VOC and HAPs emitted during the transfer process. Vapor recovery system operation and maintenance requirements are included to ensure that the control equipment is operating correctly and is maintained. If the vapor recovery system were not required, the facility would have the potential to be a PSD and/or NESHAP major source.

(4) At this time the Department has not identified any NSPS, NESHAP, or MACT requirements that apply to the emission points listed in Condition III.(E)(1).

(5) Recordkeeping requirements that include how much ethanol is loaded out by truck. Additional recordkeeping requirements in accordance with Specific Condition II.(A) are also required to be maintained.

**Condition III.(F): DGS Drying Operations**
**EP-5005**

(1) The owner or operator is permitted to construct the emission units, at the capacities and fuel types, as described in the table.

(2) Pound per hour emission limitations for RTO #2 to ensure that the facility-wide emissions are below the major source thresholds for PM, $SO_x$, $NO_x$, CO, and VOC. HAP testing is required to verify emission estimates.

(3) The DGS drying operations are required to be controlled by RTO #2. The combustion chamber temperature is important in determining whether the thermal oxidation system is providing enough emissions control. The hourly-average temperature is required to be maintained. Specific operating parameters or parameter ranges will be incorporated into the source's operating permit. Specific parameters are not being established at this time since it is unknown what all of the monitored parameters will need to be and what the values will be to ensure compliance with the permitted emission limits. The facility must conduct daily observations, during the daylight hours of dryer operation, to ensure that there are not visible emissions from the stack, leaks, or noise from the unit. By requiring daily observations, the Department is confident that malfunctions will be detected quickly and be corrected. Specific operating parameters shall be established in the operating permit to ensure proper emissions control.

**Condition III.(I): Boilers**
**EP-5001, EP-5002, EP-5003, and EP-5004**

(1) The owner or operator is permitted to construct the emission units, at the capacities and fuel types, as described in the table.
(2) Pound per hour emission limitations that apply to the units after the expansion occurs for each of the boilers to ensure that the facility-wide emissions are below the major source thresholds for PM, $SO_x$, $NO_x$, CO, and VOC. The boilers are required to be tested to ensure the limitations are complied with.
(3) Operational and Maintenance requirements are required in Condition II.(B).
(4) All of the boilers are subject to NSPS, Subpart Dc.
(5) Recordkeeping requirements that include the required records for compliance with the NSPS subparts. Recordkeeping requirements shall be completed in accordance with Specific Condition II.(A)

**Condition III.(J): Emergency Fire Water Pump Engine**
**EP-5006**

(1) The source is permitted to construct the equipment listed in the table. The maximum horsepower ratings and permitted fuel types of the combustion equipment is also listed.
(2) No emission limitations or testing requirements apply to the emission point or emissions unit identified in Condition III.(J)(1).
(3) The emergency firewater pump engine is limited to operating 100 hours per year in order for the facility-wide potential emissions to be below the major source thresholds. The facility must install an hour meter on the engine to record the hours of engine operation. The engines may only combust distillate fuel with a maximum sulfur content of 0.05% by weight in accordance with the NSPS.
(4) At this time the Department has not identified any NSPS, NESHAP, or MACT requirements that apply to the emission points or emission units listed in Condition III.(J)(1).
(5) Recordkeeping requirements that include maintaining fuel receipts to indicate that distillate fuel with a maximum sulfur content of 0.05% by weight is the only fuel being combusted in the engine and records indicating that the engines have not exceeded their 100 hour/year operational limit. Recordkeeping requirements shall be completed in accordance with Specific Condition II.(A)

**Condition III.(K): Cooling Towers**
**EP-6000 and EP-6001**

(1) KAAPA is permitted to construct two cooling towers each with four (4) cells and each with a total maximum water circulation rate of 1,200,000 gallons/hour
(2) No emission limitations or testing requirements are being established on the cooling tower. Monitoring of TDS concentration is being required and is discussed below.
(3) The total dissolved solids (TDS) concentration in cooling tower water has been limited to 2,000 ppm to ensure $PM/PM_{10}$ emissions from the cooling tower are consistent with the emission calculations performed. The owner or operator is required to conduct monthly cooling tower water tests to determine TDS concentration. A limitation on the drift loss percent from the cooling tower has also been established based on the manufacturer's drift loss percent. If the cooling tower is properly maintained and operated then the drift loss percent limitation is expected to be complied with.

(3) Haul road emissions must be controlled to prevent off-site transport of fugitive particulate matter and to ensure compliance with the silt load limit. If the visible fugitive emissions go beyond the property line, then the facility may be in violation of General Condition I.(J). The facility should be conducting BMPs to control the emissions from the haul roads. The BMPs can include, but are not limited to: vacuuming, sweeping, and applying chemical stabilizers. The facility is required to develop a fugitive dust control plan (FDCP) to control PM emissions. The FDCP should outline the control methods, frequencies, and triggers for when implementation of fugitive dust controls will be utilized based on daily surveys and silt load testing. If silt testing results indicate that the permitted silt load cannot be consistently achieved with the current FDCP, the FDCP must be revised in order to decrease emissions from the haul road (i.e. to be able to consistently achieve the permitted silt load).

(4) At this time the Department has not identified any NSPS, NESHAP, or MACT requirements that apply to the emission points listed in Condition III.(M)(1).

(5) Recordkeeping requirements that include documenting the BMPs used to control fugitive dust, when daily haul road emissions observations occur, and the results of each silt load test.

## STATUTORY OR REGULATORY PROVISIONS ON WHICH PERMIT REQUIREMENTS ARE BASED:

Applicable regulations: Title 129 - Nebraska Air Quality Regulations as amended December 13, 2006.

## PROCEDURES FOR FINAL DETERMINATION WITH RESPECT TO THE PROPOSED CONSTRUCTION PERMIT:

The public notice, as required under NAQR Chapter 14, shall be published on September 12, 2007, in the Minden Courier newspaper. Persons or groups shall have 30 days from that issuance of public notice (October 11, 2007) to provide the NDEQ with any written comments concerning the proposed permit action and/or to request a public hearing, in accordance with NAQR Chapter 14. If a public hearing is granted by the Director, there will be a notice of that meeting published at least 30 days prior to the hearing. Persons having comments or requesting a public hearing may contact:

W. Clark Smith-Permitting Section Supervisor
Air Quality Division
Nebraska Department of Environmental Quality - PO Box 98922
Lincoln, Nebraska 68509-8922

If no public hearing is requested, the permit may be granted at the close of the 30-day comment period. If a public hearing is requested, the Director of the NDEQ may choose to extend the date on which the permit is to be granted until after that public hearing has been held. During the 30-day comment period, persons requiring further information should contact:

Sara Speser-Environmental Engineer
Air Quality Division-Permitting Section
Nebraska Department of Environmental Quality-PO Box 98922
Lincoln, Nebraska 68509-8922

**Telephone inquiries may be made at:** (402) 471-2189

**TDD users please call 711 and ask the relay operator to call us at (402) 471-2186.**

## Fact Sheet Attachment: Facility Process Information

**KAAPA Ethanol, LLC.**
**Facility ID #75073**

### Scenario A Process Information

Scenario A is the current operating scenario of KAAPA Ethanol before the additional storage bins and storage pile are constructed/formed and prior to the ethanol production expansion (60 MMgal/yr to 110 MMgal/yr denatured ethanol)

### Scenario A Process Data

| | | | | | |
|---|---|---|---|---|---|
| Maximum Capacity (Anhydrous Ethanol Produced) | 57,000,000 | gallons per year | | | |
| Grain to Ethanol Conversion Factor | 2.7 | gallons of Ethanol per bushel of corn | | | |
| Grain Density: | 56 | lb/bushel for Corn | | | |
| Total Grain Receiving Throughput: | 591,111 | ton/yr | = | 67.5 | ton/hr |
| | 591,111 | ton/yr | = | 21,111,111 | bu/yr |
| DDGS produced by a Bushel of Grain | 17 | lb DDGS/bushel of Corn | | | |
| Dryers are capable of drying % of WDGS | 0% | | | | |
| Note: The facility does not have any DGS dryers currently installed | | | | | |
| DDGS Generated (10% Moisture) | 0 | ton/yr | | | |
| DDGS Generated (Dry Basis) | 0 | ton/yr | | | |
| 100% WDGS Generated (65% Moisture) | 461,429 | ton/yr | | | |

### Scenario A Maximum Production/Throughputs

| | | |
|---|---|---|
| Product #1: Denatured Ethanol (95% Ethanol, 5% Denaturant) | 60,000,000 | gallons/year |
| Product #2: WDGS | 461,429 | tons/year |
| Product #3: DDGS | 0 | tons/year |
| Raw Material #1: Grain | 591,111 | tons/year |
| Raw Material #2: Denaturant | 3,000,000 | gallons/year |
| Total Grain Received at Facility | | |

### Scenario A Additional Information

| | | |
|---|---|---|
| Maximum Grain Unloading by Truck<br>Two (2) Truck Dump Pits | 840 | ton/hr |
| Maximum Existing Concrete Silo Filling | 840 | ton/hr |
| Permanent Storage Capacity<br>Two (2) 228,614 bu each concrete silos | 457,228 | bushels |
| Maximum Scalper Capacity (per unit, two units)<br>Two (2) 3,000 bu/hr each | 84 | ton/hr |
| Maximum Hammermill Capacity (per unit, three units)<br>Three (3) 1,200 bu/hr each | 33.6 | ton/hr |

## Fact Sheet Attachment: Facility Process Information (continued)

**KAAPA Ethanol, LLC.**
**Facility ID #75073**

**Scenario C Process Information**

Scenario C includes the additional steel storage bins and storage pile are constructed/formed and the ethanol production expansion (60 MMgal/yr to 110 MMgal/yr denatured ethanol)

**Scenario C Process Data**

| | | | | | |
|---|---|---|---|---|---|
| Maximum Capacity (Anhydrous Ethanol Produced) | 104,500,000 | gallons per year | | | |
| Grain to Ethanol Conversion Factor | 2.7 | gallons of Ethanol per bushel of corn | | | |
| Grain Density: | 56 | lb/bushel for Corn | | | |
| Total Grain Receiving Throughput: | 1,083,704 | ton/yr | = | 123.7 | ton/hr |
| | 1,083,704 | ton/yr | = | 38,703,704 | bu/yr |
| DDGS produced by a Bushel of Grain | 17 | lb DDGS/bushel of Corn | | | |
| Dryers are capable of drying % of WDGS | 62% | | | | |
| DDGS Generated (10% Moisture) | 204,400 | ton/yr | | | |
| DDGS Generated (Dry Basis) | 183,960 | ton/yr | | | |
| 100% WDGS Generated (65% Moisture) | 845,952 | ton/yr | | | |
| 38% WDGS Generated (65% Moisture) | 320,352 | ton/yr | | | |

**Scenario C Maximum Production/Throughputs**

| | | | | | |
|---|---|---|---|---|---|
| Product #1: Denatured Ethanol (95% Ethanol, 5% Denaturant) | 110,000,000 | gallons/year | | | |
| Product #2: WDGS | 845,952 | ton/yr | = | 96.6 | ton/hr |
| Product #3: DDGS | 204,400 | tons/year | | | |
| Raw Material #1: Grain | 1,083,704 | tons/year | | | |
| Raw Material #2: Denaturant | 5,500,000 | gallons/year | | | |

**Scenario C Additional Information**

| | | |
|---|---|---|
| Maximum Grain Unloading by Truck or Rail | 2,240 | ton/hr |
| Two (2) Truck Dump Pits | | |
| One (1) Dual Dump Pit (can unload rail and truck) | | |
| Maximum Existing Concrete Silo Filling | 840 | ton/hr |
| Maximum New Steel Silo Filling | 420 | ton/hr |
| Maximum New Concrete Silo Filling | 1400 | ton/hr |
| Permanent Storage Capacity | 2,973,436 | bushels |
| Two (2) 228,614 bu each concrete silos | | |
| Two (2) 658,104 bu steel bin | | |
| Two (2) 600,000 bu each concrete silos | | |
| Storage Pile Capacity | 1,500,000 | bushels |
| Maximum Scalper Capacity (per unit, three units) | 84 | ton/hr |
| Two (2) 3,000 bu/hr each | | |
| One (1) 3,000 bu/hr unit | | |
| Maximum Hammermill Capacity (per unit, three units) | 33.6 | ton/hr |
| Maximum Hammermill Capacity (per unit, two units) | 42 | ton/hr |
| Three (3) 1,200 bu/hr each | | |
| Two (2) 1,500 bu/hr each | | |
| DDGS Dryer Capacity | 60 | ton/hr |
| DDGS Loadout Spout | 420 | ton/hr |

**Scenario C Requested Permit Limitations**

| | | |
|---|---|---|
| Denatured Ethanol Loaded Out by Truck: | 55,000,000 | gallons/year |
| Emergency Fire Pump Engine Operating Hours | 100 | hours/year |
| Grain Receiving Limitation | 600,000 | bushels/day |

## Fact Sheet Attachment: Grain Receiving, Handling, Storage, and Hammermilling (Scenario B)

**KAAPA Ethanol, LLC.**
**Facility ID #75073**
**Emission Points: EP-1002, EP-2000, EP-2001, F-1002, EP-1004a, and EP-1004b**

### $PM/PM_{10}$ Emissions from Grain Receiving, Handling, Storage, and Hammermilling

| Emission Point ID# | Control Equipment ID# | Emission Point Description | Installation Date | (A) Flow Rate | (B) Emission Factor (Grain Loading) | Controlled $PM/PM_{10}$ Emissions | |
|---|---|---|---|---|---|---|---|
| | | | | dscf/min | grains/dscf | Permit Limitations (C) = (A)x(B)x60/7000 (lb/hour) | Permitted Emissions (D) = (C)x8760/2000 (ton/year) |
| EP-1002 | CE-1002 | Grain Receiving Baghouse | 2003 | 42,000 | 0.005 | 1.80 | 7.88 |
| EP-2000 | CE-2000 | Hammermill Baghouse #1 | 2003 | 9,800 | 0.01 | 0.84 | 3.68 |
| EP-2001 | CE-2001 | Hammermill Baghouse #2 | 8/2/2005 | 9,800 | 0.01 | 0.84 | 3.68 |

Conversion Factors: 7,000 grains per pound; 60 minutes per hour; 8,760 hours per year; 2,000 pounds per ton

### $PM/PM_{10}$ Fugitive Emissions from Grain Receiving

| Emission Point ID# | | (A) Hourly Throughput | (B) Annual Throughput | (C) Percent Fugitives[1] | Emission Factors[2] (lbs/ton) | | PM Emissions | | $PM_{10}$ Emissions | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | (tons/hour) | (tons/year) | | (D) PM | (E) $PM_{10}$ | (F)=(A)x(C)x(D) (lbs/hr) | (G)=(B)x(C)x(D)/2000 (tons/yr) | (H)=(A)x(C)x(E) (lbs/hr) | (I)=(B)x(C)x(E)/2000 (tons/yr) |
| F-1002 | Grain Receiving Fugitives | 840 | 591,111 | 5% | 0.035 | 0.0078 | 1.47 | 0.52 | 0.33 | 0.12 |
| 1004a | Grain Storage Silo Vent #1 | 420 | 203,562 | 100% | 0.025 | 0.0063 | 10.50 | 2.54 | 2.65 | 0.64 |
| 1004b | Grain Storage Silo Vent #2 | 420 | 219,355 | 100% | 0.025 | 0.0063 | 10.50 | 2.74 | 2.65 | 0.69 |

[1]5% fugitives are assumed since unloading operations will occur in an enclosure with choke flow
[1]Storage Silos will be controlled with 99% control efficient filters
[2]Emission Factors are from AP-42 Section 9.9.1 (5/2003)

### Total Emissions from Grain Receiving, Handling, Storage, and Hammermilling

| | | |
|---|---|---|
| Particulate Matter (PM) | 21.05 | tons/year |
| Particulate Matter ($PM_{10}$) | 16.69 | tons/year |

## Fact Sheet Attachment: Grain Storage Pile (Scenarios B and C)

**KAAPA Ethanol, LLC.**
**Facility ID #75073**
**Emission Point EP-1006**
**Installation Date: NEW**

*Assumptions*
· All emissions from storage pile are fugitive.
· Material moisture content is based on product specifications.
· The calculations are for an active storage pile including receiving and shipping.

$$E = \frac{k * (0.0032) * (U/5)^{1.3}}{(M/2)^{1.4}}$$

| Factor | Description | PM Value | $PM_{10}$ Value |
|---|---|---|---|
| E = | Emission factor (lb/ton) | 2.05E-03 | 9.69E-04 |
| k = | Particle size multiplier (dimensionless) | 0.74 | 0.35 |
| U = | mean wind speed (miles per hour) | 12.00 | 12.00 |
| M = | material moisture content (%) | 5.00 | 5.00 |

Emission factor source = AP-42 5th Edition Chapter 13.2.4 Equation 1 for active storage piles

Grain Throughput 1,500,000 bushels/year
42,000 ton/yr

Total PM Emissions = 0.0020 lb/ton · 42000 ton/year · 1ton/2,000 lb
= 0.04 ton/year

Total PM10 Emissions = 0.00097 lb/ton · 42000 ton/year · 1ton/2,000 lb
= 0.02 ton/year

## Fact Sheet Attachment: DDGS Loadout (Scenario C)

**KAAPA Ethanol, LLC.**
**Facility ID #75073**
**Emission Points EP-8001 and F-8001**

### PM/$PM_{10}$ Emissions from DDGS Loadout

| Emission Point ID# | Control Equipment ID# | Emission Point Description | (A) Flow Rate | (B) Emission Factor (Grain Loading) | Controlled PM/$PM_{10}$ Emissions | |
|---|---|---|---|---|---|---|
| | | | dscf/min | grains/dscf | Permit Limitation (C) = (A)x(B)x60/7000 (lb/hour) | Permitted Emissions (D) = (C)x8760/2000 (ton/year) |
| EP-8001 | CE-8001 | DDGS Loadout Baghouse | 3,500 | 0.004 | 0.12 | 0.53 |

Conversion Factors: 7,000 grains per pound; 60 minutes per hour; 8,760 hours per year; 2,000 pounds per ton

### PM/$PM_{10}$ Fugitive Emissions from DDGS Loadout

| Emission Point ID# | Emission Point Description | (A) Hourly Throughput | (B) Annual Throughput | (C) Percent Fugitives[1] | Emission Factors[2] (lbs/ton) | | PM Emissions | | $PM_{10}$ Emissions | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | (tons/hour) | (tons/year) | | (D) PM | (E) $PM_{10}$ | (F)=(A)x(C)x(D) (lbs/hr) | (G)=(B)x(C)x(D)/2000 (tons/yr) | (H)=(A)x(C)x(E) (lbs/hr) | (I)=(B)x(C)x(E)/2000 (tons/yr) |
| F-8001 | DDGS Loadout Fugitives | 420 | 204,400 | 10% | 0.0033 | 0.0008 | 0.14 | 0.03 | 0.03 | 0.01 |

[1]10% fugitives are assumed since loading operations will occur in an enclosure
[2]Emission Factors are from AP-42 Section 9.9.1 (5/2003)

### Total Emissions from DDGS Loadout

| | | |
|---|---|---|
| Particulate Matter (PM) | 0.56 | tons/year |
| Particulate Matter ($PM_{10}$) | 0.53 | tons/year |

## Fact Sheet Attachment: Distillation Scrubber (Scenarios A and B)

**KAAPA Ethanol, LLC.**
**Facility ID #75073**
**Emission Point EP-3002**

Conversion Factors
1 lb-mol = 379.0 $ft^3$ @ 60 F

| | | |
|---|---|---|
| Flow Rate Exiting Scrubber: | 702 | dscf/minute |
| From October 2006 test results | 42,120 | dscf/hour |

**Emission Units Routed to Distillation Scrubber**

| Emission Unit ID | Emission Source |
|---|---|
| EU50 | Beer Column #1 |
| EU51 | Side Stripper #1 |
| EU52 | Rectifier Column #1 |
| EU53 | Molecular Sieve #1 |
| EU54 | Molecular Sieve #2 |
| EU55 | Condenser #1 |
| EU56 | Condenser #2 |

| Pollutant | Estimated Controlled Potential Emissions[1] | Molecular Weight | Controlled Emission Rate[2] | Controlled Emission Rate[3] | Permit Limitation[4] | Permitted Emissions[5] |
|---|---|---|---|---|---|---|
| | (ppmv,d) | (lb/lb-mol) | (lb/hour) | (ton/year) | (lb/hour) | (ton/year) |
| Volatile Organic Compounds (VOC) as VOC | - | - | 3.30 | 14.45 | 3.30 | 14.45 |
| Individual Hazardous Air Pollutants (HAP) | | | | | | |
| Acetaldehyde | 85.50 | 44.05 | 0.4186 | 1.8333 | N/A | N/A |
| Acrolein | 0.20 | 56.06 | 0.0012 | 0.0055 | N/A | N/A |
| Formaldehyde | 0.20 | 33.03 | 0.0007 | 0.0032 | N/A | N/A |
| Methanol | 0.20 | 32.04 | 0.0007 | 0.0031 | N/A | N/A |
| Total HAPs | - | - | 0.42 | 1.85 | N/A | N/A |

[1] VOC lb/hr is current permitted emission limit and HAP controlled emissions (ppmv,d) from October 2006 Stack Test Results
[2] (ppmv,d) x MW (lb/lb-mol) x Flow Rate (dscf/hour) / 379 ($ft^3$/lb-mol)
[3] Emission Rate (lb/hr) x 8,760 (hr/yr) / 2,000 (lb/ton)
[4] Permitted lb/hr emission rate
[5] (lb/hr) x 8,760 (hours/year) / 2,000 (lbs/ton)

## Fact Sheet Attachment: Scrubber Thermal Oxidizer (Scenario C)

**KAAPA Ethanol, LLC.**
**Facility ID #75073**
**Emission Point EP-3004**
**Installation Date: NEW**

### Thermal Oxidizer Process Emissions

| | | |
|---|---|---|
| **Anhydrous Ethanol Produced (AEP):** | 104,500,000 | gallons/year |
| | 104.5 | MMgal/year |
| | 0.0119 | MMgal/hr |

| Pollutant | (A) Controlled Emission Factor[1] (lb/MMgal AEP) | Potential Controlled Emission Rate | |
|---|---|---|---|
| | | (B) = (A)x MMgal/hr (lb/hr) | (C) = (A)xMMgal/yr/2000 (ton/yr) |
| Volatile Organic Compounds (VOC) | 461.0 | 5.50 | 24.09 |
| Individual Hazardous Air Pollutants (HAP) | | | |
| Acetaldehyde | 90.81 | 1.08 | 4.74 |
| Acrolein | 7.26 | 0.09 | 0.38 |
| Formaldehyde | 2.65 | 0.03 | 0.14 |
| Methanol | 10.89 | 0.13 | 0.57 |
| Total HAPs | - | 1.3314 | 5.8316 |

[1]Emission Factors and control based on ICM Emissions Guide and DDGS throughput

### Total Emissions Emitted from Thermal Oxidizer

| Pollutant | Potential Controlled Emission Rate | | Permit Limitations | Permitted Emissions |
|---|---|---|---|---|
| | (lb/hr) | (ton/yr) | lb/hour | ton/year |
| Particulate Matter (PM) | 0.0190 | 0.0832 | 0.02 | 0.0876 |
| Particulate Matter ($PM_{10}$) | 0.0190 | 0.0832 | 0.02 | 0.0876 |
| Sulfur Dioxide ($SO_2$) | 0.0015 | 0.0066 | 0.01 | 0.04 |
| Nitrogen Oxides ($NO_x$) | 0.2500 | 1.0950 | 0.25 | 1.10 |
| Carbon Monoxide (CO) | 0.2100 | 0.9198 | 0.21 | 0.92 |
| Volatile Organic Compounds (VOC) | 5.5131 | 24.1475 | 5.51 | 24.13 |
| Individual Hazardous Air Pollutants (HAP) | | | | |
| Acetaldehyde | 1.08E+00 | 4.74E+00 | N/A | N/A |
| Acrolein | 8.66E-02 | 3.79E-01 | N/A | N/A |
| Benzene | 5.25E-06 | 2.30E-05 | N/A | N/A |
| Dichlorobenzene | 3.00E-06 | 1.31E-05 | N/A | N/A |
| Formaldehyde | 3.18E-02 | 1.39E-01 | N/A | N/A |
| Hexane | 4.50E-03 | 1.97E-02 | N/A | N/A |
| Lead Compounds | 1.25E-06 | 5.48E-06 | N/A | N/A |
| Methanol | 1.30E-01 | 5.69E-01 | N/A | N/A |
| Naphthalene | 1.53E-06 | 6.68E-06 | N/A | N/A |
| Polycyclic Organic Matter (POM) | 2.21E-07 | 9.66E-07 | N/A | N/A |
| Toluene | 8.50E-06 | 3.72E-05 | N/A | N/A |
| Arsenic Compounds (ASC) | 5.00E-07 | 2.19E-06 | N/A | N/A |
| Beryllium Compounds (BEC) | 3.00E-08 | 1.31E-07 | N/A | N/A |
| Cadmium Compounds (CDC) | 2.75E-06 | 1.20E-05 | N/A | N/A |
| Chromium Compounds (CRC) | 3.50E-06 | 1.53E-05 | N/A | N/A |
| Cobalt Compounds (COC) | 2.10E-07 | 9.20E-07 | N/A | N/A |
| Manganese Compounds (MNC) | 9.50E-07 | 4.16E-06 | N/A | N/A |
| Mercury Compounds (HGC) | 6.50E-07 | 2.85E-06 | N/A | N/A |
| Nickel Compounds (NIC) | 5.25E-06 | 2.30E-05 | N/A | N/A |
| Selenium Compounds (SEC) | 6.00E-08 | 2.63E-07 | N/A | N/A |
| Total HAPs | 1.34 | 5.85 | N/A | N/A |

## Fact Sheet Attachment: Dryer Thermal Oxidizer (continued)

**KAAPA Ethanol, LLC.**
**Facility ID #75073**
**Emission Point EP-5005**
**Installation Date: NEW**

**Natural Gas Combustion Emissions from RTO (One (1) 20.0 MMBtu/hr Unit)**

| | | | | | |
|---|---|---|---|---|---|
| Total Heat Input Capacity | 20.0 | MMBtu/hr | | | |
| Potential Natural Gas Throughput | 0.0196 | MMscf/hr | = | 171.7 | MMscf/yr |

| Pollutant | (A) Emission Factor[1] (lb/MMscf) | (B) = (A)x MMscf/hr Potential Emission Rate (lbs/hr) | (C) = (B)x8760 Potential Emission Rate (lbs/year) | (D) = (C)/2000 Potential Emission Rate (tons/year) |
|---|---|---|---|---|
| Nitrogen Oxides ($NO_x$)[2] | 0.1 | 2.00 | 17520.00 | 8.76 |
| Individual Hazardous Air Pollutants (HAP) | | | | |
| Benzene | 0.0021 | 4.12E-05 | 3.61E-01 | 1.80E-04 |
| Dichlorobenzene | 0.0012 | 2.35E-05 | 2.06E-01 | 1.03E-04 |
| Formaldehyde | 0.075 | 1.47E-03 | 1.29E+01 | 6.44E-03 |
| Hexane | 1.8 | 3.53E-02 | 3.09E+02 | 1.55E-01 |
| Lead Compounds | 0.0005 | 9.80E-06 | 8.58E-02 | 4.29E-05 |
| Naphthalene | 0.00061 | 1.20E-05 | 1.05E-01 | 5.24E-05 |
| Polycyclic Organic Matter (POM) | 0.0000882 | 1.73E-06 | 1.51E-02 | 7.57E-06 |
| Toluene | 0.0034 | 6.66E-05 | 5.84E-01 | 2.92E-04 |
| Arsenic Compounds (ASC) | 0.0002 | 3.92E-06 | 3.43E-02 | 1.72E-05 |
| Beryllium Compounds (BEC) | 0.000012 | 2.35E-07 | 2.06E-03 | 1.03E-06 |
| Cadmium Compounds (CDC) | 0.0011 | 2.16E-05 | 1.89E-01 | 9.44E-05 |
| Chromium Compounds (CRC) | 0.0014 | 2.74E-05 | 2.40E-01 | 1.20E-04 |
| Cobalt Compounds (COC) | 0.000084 | 1.65E-06 | 1.44E-02 | 7.21E-06 |
| Manganese Compounds (MNC) | 0.00038 | 7.45E-06 | 6.52E-02 | 3.26E-05 |
| Mercury Compounds (HGC) | 0.00026 | 5.10E-06 | 4.46E-02 | 2.23E-05 |
| Nickel Compounds (NIC) | 0.0021 | 4.12E-05 | 3.61E-01 | 1.80E-04 |
| Selenium Compounds (SEC) | 0.000024 | 4.70E-07 | 4.12E-03 | 2.06E-06 |
| Total HAPs | 1.89 | 0.0370 | 324.24 | 0.16 |

[1]Emission Factors from AP-42 Tables 1.4-1, 1.4-2, 1.4-3, and 1.4-4 (7/98)
[2]$NO_x$ emission factor from facility based on standard configuration and in lb/MMBtu
Assumes PM, $PM_{10}$, $SO_2$, CO, and VOC combustion emissions are accounted for in process emissions
Conversion Factor: 1 MMscf = 1020 MMBtu

## Fact Sheet Attachment: Dryer Thermal Oxidizer (continued)

**KAAPA Ethanol, LLC.**
**Facility ID #75073**
**Emission Point EP-5005**
**Installation Date: NEW**

**Total Emissions Emitted from Thermal Oxidizer**

| Pollutant | Potential Controlled Emission Rate | | Permit Limitations | |
|---|---|---|---|---|
| | (lb/hr) | (ton/yr) | lb/hour | ton/year |
| Particulate Matter (PM) | 2.57 | 11.24 | 2.89 | 12.66 |
| Particulate Matter ($PM_{10}$) | 2.57 | 11.24 | 2.89 | 12.66 |
| Sulfur Dioxide ($SO_2$) | 15.51 | 67.93 | 15.51 | 67.93 |
| Nitrogen Oxides ($NO_x$) | 6.77 | 1399.50 | 6.00 | 26.28 |
| Carbon Monoxide (CO) | 9.33 | 40.88 | 10.52 | 46.08 |
| Volatile Organic Compounds (VOC) | 5.83 | 25.55 | 6.57 | 28.78 |
| Individual Hazardous Air Pollutants (HAP) | | | | |
| Acetaldehyde | 3.79E-01 | 1.66E+00 | N/A | N/A |
| Acrolein | 5.78E-02 | 2.53E-01 | N/A | N/A |
| Benzene | 4.12E-05 | 1.80E-04 | N/A | N/A |
| Dichlorobenzene | 2.35E-05 | 1.03E-04 | N/A | N/A |
| Formaldehyde | 3.77E-03 | 6.01E-02 | N/A | N/A |
| Hexane | 3.53E-02 | 1.55E-01 | N/A | N/A |
| Lead Compounds | 9.80E-06 | 4.29E-05 | N/A | N/A |
| Methanol | 5.54E-02 | 2.43E-01 | N/A | N/A |
| Naphthalene | 1.20E-05 | 5.24E-05 | N/A | N/A |
| Polycyclic Organic Matter (POM) | 1.73E-06 | 7.57E-06 | N/A | N/A |
| Toluene | 6.66E-05 | 2.92E-04 | N/A | N/A |
| Arsenic Compounds (ASC) | 3.92E-06 | 1.72E-05 | N/A | N/A |
| Beryllium Compounds (BEC) | 2.35E-07 | 1.03E-06 | N/A | N/A |
| Cadmium Compounds (CDC) | 2.16E-05 | 9.44E-05 | N/A | N/A |
| Chromium Compounds (CRC) | 2.74E-05 | 1.20E-04 | N/A | N/A |
| Cobalt Compounds (COC) | 1.65E-06 | 7.21E-06 | N/A | N/A |
| Manganese Compounds (MNC) | 7.45E-06 | 3.26E-05 | N/A | N/A |
| Mercury Compounds (HGC) | 5.10E-06 | 2.23E-05 | N/A | N/A |
| Nickel Compounds (NIC) | 4.12E-05 | 1.80E-04 | N/A | N/A |
| Selenium Compounds (SEC) | 4.70E-07 | 2.06E-06 | N/A | N/A |
| Total HAPs | 0.58 | 2.55 | N/A | N/A |

## Fact Sheet Attachment: Ethanol Liquid Loadout (Scenarios A and B)

KAAPA Ethanol, LLC.
Facility ID #75073
Emission Point F-4000

**Total VOC Emission Calculations from Denatured Ethanol Loadout**

| Loadout Type/Material | (A) Denatured Ethanol Loaded Out (Mgal/year) | (B) Uncontrolled Emission Factor (lbs VOC/Mgal) | (C)=(A)x(B)/2000 Total VOC Emissions (tons/year) | (D) Capture Efficiency (%) | (E)=(C)*(D) Captured VOC Emissions (tons/year) | (F)=(C)-(E) Uncaptured VOC Emissions (tons/year) | (G) Control Efficiency (%) | (H)=(E)x[1-(G)] Captured and Controlled VOC Emissions (tons/year) | (I)=(F)+(H) Total VOC Emissions |
|---|---|---|---|---|---|---|---|---|---|
| 100% Loadout by Truck | | | 41.46 | | 37.31 | 4.15 | | 0.7463 | 4.89 |
| Truck Loadout | | | | | | | | | |
| Gasoline | 60,000 | 0.903 | 27.09 | 90.00% | 24.38 | 2.71 | 98.0% | 0.4876 | 3.20 |
| Ethanol | | 0.380 | 11.40 | 90.00% | 10.26 | 1.14 | 98.0% | 0.2052 | 1.35 |
| Denaturant | | 0.099 | 2.97 | 90.00% | 2.67 | 0.30 | 98.0% | 0.0535 | 0.35 |
| 100% Loadout By Rail | | | 14.37 | | 0.00 | 14.37 | | 0.0000 | 14.37 |
| Rail Loadout | | | | | | | | | |
| Ethanol | 60,000 | 0.380 | 11.40 | 0.00% | 0.00 | 11.40 | 0.0% | 0.0000 | 11.40 |
| Denaturant | | 0.099 | 2.97 | 0.00% | 0.00 | 2.97 | 0.0% | 0.0000 | 2.97 |

**Controlled Hazardous Air Pollutant Emissions assuming 100% Truck Loadout**

| Hazardous Air Pollutant | Truck Loadout | | | Maximum Controlled |
|---|---|---|---|---|
| | Gasoline | Ethanol | Denaturant | |
| Acetaldehyde | N/A | 2.69E-04 | N/A | 2.69E-04 |
| Benzene | 7.99E-03 | N/A | 8.76E-04 | 8.87E-03 |
| Carbon disulfide | 6.39E-05 | N/A | 7.01E-06 | 7.09E-05 |
| Cumene | 3.20E-04 | N/A | 3.50E-05 | 3.55E-04 |
| Ethyl benzene | 1.60E-04 | N/A | 1.75E-05 | 1.77E-04 |
| n-Hexane | 1.60E-01 | N/A | 1.75E-02 | 1.77E-01 |
| Methanol | N/A | 2.69E-04 | N/A | 2.69E-04 |
| Toluene | 1.60E-02 | N/A | 1.75E-03 | 1.77E-02 |
| Xylene | 1.60E-03 | N/A | 1.75E-04 | 1.77E-03 |
| Total HAPs | 0.21 | | | 0.21 |

**Controlled Hazardous Air Pollutant Emissions assuming 100% Rail Loadout**

| Hazardous Air Pollutant | Rail Loadout (ton/yr) | | Maximum Controlled HAP Emissions (tons/year) |
|---|---|---|---|
| | Ethanol | Denaturant | |
| Acetaldehyde | 2.28E-03 | N/A | 2.28E-03 |
| Benzene | N/A | 7.43E-03 | 7.43E-03 |
| Carbon disulfide | N/A | 5.94E-05 | 5.94E-05 |
| Cumene | N/A | 2.97E-04 | 2.97E-04 |
| Ethyl benzene | N/A | 1.49E-04 | 1.49E-04 |
| n-Hexane | N/A | 1.49E-01 | 1.49E-01 |
| Methanol | 2.28E-03 | N/A | 2.28E-03 |
| Toluene | N/A | 1.49E-02 | 1.49E-02 |
| Xylene | N/A | 1.49E-03 | 1.49E-03 |
| Total HAPs | 0.18 | | 0.18 |

**Total Emissions from Denatured Ethanol Loadout**

| Pollutant | Ethanol Loadout Emissions (tons/year) |
|---|---|
| Volatile Organic Compounds (VOC) | 14.37 |
| Individual HAPs | |
| Acetaldehyde | 2.28E-03 |
| Benzene | 8.87E-03 |
| Carbon disulfide | 7.09E-05 |
| Cumene | 3.55E-04 |
| Ethyl benzene | 1.77E-04 |
| n-Hexane | 1.77E-01 |
| Methanol | 2.28E-03 |
| Toluene | 1.77E-02 |
| Xylene | 1.77E-03 |
| Total HAPs | 2.07E-01 |

## Fact Sheet Attachment: Ethanol Liquid Loadout (Scenario C)

KAAPA Ethanol, LLC.
Facility ID #75073
Emission Point F-4000

**Total VOC Emission Calculations from Denatured Ethanol Loadout**

| Loadout Type/Material | (A) Denatured Ethanol Loaded Out (Mgal/year) | (B) Uncontrolled Emission Factor (lbs VOC/Mgal) | (C)=(A)x(B)/2000 Total VOC Emissions (tons/year) | (D) Capture Efficiency (%) | (E)=(C)*(D) Captured VOC Emissions (tons/year) | (F)=(C)-(E) Uncaptured VOC Emissions (tons/year) | (G) Control Efficiency (%) | (H)=(E)x[1-(G)] Captured and Controlled VOC Emissions (tons/year) | (I)=(F)+(H) Total VOC Emissions |
|---|---|---|---|---|---|---|---|---|---|
| 50% Truck / 50% Rail Loadout | | | 51.18 | | 46.06 | 5.12 | | 0.9212 | 6.04 |
| Truck Loadout | | | | | | | | | |
| Gasoline | 55,000 | 0.903 | 24.83 | 90.00% | 22.35 | 2.48 | 98.0% | 0.4470 | 2.93 |
| Ethanol | | 0.380 | 10.45 | 90.00% | 9.41 | 1.05 | 98.0% | 0.1881 | 1.23 |
| Denaturant | | 0.099 | 2.72 | 90.00% | 2.45 | 0.27 | 98.0% | 0.0490 | 0.32 |
| Rail Loadout | | | | | | | | | |
| Ethanol | 55,000 | 0.380 | 10.45 | 90.00% | 9.41 | 1.05 | 98.0% | 0.1881 | 1.23 |
| Denaturant | | 0.099 | 2.72 | 90.00% | 2.45 | 0.27 | 98.0% | 0.0490 | 0.32 |
| 100% Loadout By Rail | | | 26.35 | | 23.71 | 2.63 | | 0.4742 | 3.11 |
| Rail Loadout | | | | | | | | | |
| Ethanol | 110,000 | 0.380 | 20.90 | 90.00% | 18.81 | 2.09 | 98.0% | 0.3762 | 2.47 |
| Denaturant | | 0.099 | 5.45 | 90.00% | 4.90 | 0.54 | 98.0% | 0.0980 | 0.64 |

**Controlled Hazardous Air Pollutant Emissions assuming 50% Truck / 50% Rail Loadout**

| Hazardous Air Pollutant | Truck Loadout | | | Rail Loadout | | Maximum Controlled |
|---|---|---|---|---|---|---|
| | Gasoline | Ethanol | Denaturant | Ethanol | Denaturant | |
| Acetaldehyde | N/A | 2.47E-04 | N/A | 2.47E-04 | N/A | 4.93E-04 |
| Benzene | 7.33E-03 | N/A | 8.03E-04 | N/A | 8.03E-04 | 8.93E-03 |
| Carbon disulfide | 5.86E-05 | N/A | 6.43E-06 | N/A | 6.43E-06 | 7.15E-05 |
| Cumene | 2.93E-04 | N/A | 3.21E-05 | N/A | 3.21E-05 | 3.57E-04 |
| Ethyl benzene | 1.47E-04 | N/A | 1.61E-05 | N/A | 1.61E-05 | 1.79E-04 |
| n-Hexane | 1.47E-01 | N/A | 1.61E-02 | N/A | 1.61E-02 | 1.79E-01 |
| Methanol | N/A | 2.47E-04 | N/A | 2.47E-04 | N/A | 4.93E-04 |
| Toluene | 1.47E-02 | N/A | 1.61E-03 | N/A | 1.61E-03 | 1.79E-02 |
| Xylene | 1.47E-03 | N/A | 1.61E-04 | N/A | 1.61E-04 | 1.79E-03 |
| Total HAPs | 0.19 | | | 0.02 | | 0.21 |

**Controlled Hazardous Air Pollutant Emissions assuming 100% Rail Loadout**

| Hazardous Air Pollutant | Rail Loadout (ton/yr) | | Maximum Controlled HAP Emissions (tons/year) |
|---|---|---|---|
| | Ethanol | Denaturant | |
| Acetaldehyde | 4.93E-04 | N/A | 4.93E-04 |
| Benzene | N/A | 1.61E-03 | 1.61E-03 |
| Carbon disulfide | N/A | 1.29E-05 | 1.29E-05 |
| Cumene | N/A | 6.43E-05 | 6.43E-05 |
| Ethyl benzene | N/A | 3.21E-05 | 3.21E-05 |
| n-Hexane | N/A | 3.21E-02 | 3.21E-02 |
| Methanol | 4.93E-04 | N/A | 4.93E-04 |
| Toluene | N/A | 3.21E-03 | 3.21E-03 |
| Xylene | N/A | 3.21E-04 | 3.21E-04 |
| Total HAPs | 0.04 | | 0.04 |

**Total Emissions from Denatured Ethanol Loadout**

| Pollutant | Ethanol Loadout Emissions (tons/year) |
|---|---|
| Volatile Organic Compounds (VOC) | 6.04 |
| Individual HAPs | |
| Acetaldehyde | 4.93E-04 |
| Benzene | 8.93E-03 |
| Carbon disulfide | 7.15E-05 |
| Cumene | 3.57E-04 |
| Ethyl benzene | 1.79E-04 |
| n-Hexane | 1.79E-01 |
| Methanol | 4.93E-04 |
| Toluene | 1.79E-02 |
| Xylene | 1.79E-03 |
| Total HAPs | 2.09E-01 |

## Fact Sheet Attachment: Liquid Loadout Flare (Scenario C)

**KAAPA Ethanol, LLC.**
**Facility ID #75073**
**Emission Point EP-4000**

**Potential to Emit Calculations for Emissions from the Liquid Loadout Flare**

### Flaring Emissions

| | | |
|---|---|---|
| Flare Heat Input Capacity | 14.0 | MMBtu/hr |
| Operating Time | 8,760 | hr/yr |

| Pollutant | (A) Emission Factor (lb/MMBtu) | (B) = (A)x MMBtu/hr Potential Emission Rate (lbs/hr) | (C) = (B)xOT Potential Emission Rate (lbs/year) | (D) = (C)/2000 Potential Emission Rate (tons/year) |
|---|---|---|---|---|
| Particulate Matter (PM) | Negligible, Smokeless Design | | | |
| Particulate Matter ($PM_{10}$) | Negligible, Smokeless Design | | | |
| Sulfur Oxides ($SO_x$) | Negligible, Due to fuel type | | | |
| Nitrogen Oxides ($NO_x$) | 0.068 | 0.95 | 8339.52 | 4.17 |
| Carbon Monoxide (CO) | 0.37 | 5.18 | 45376.80 | 22.69 |

[1]Emission Factors for Waste Gas from AP-42 Tables 13.5-1 and 13.5-2 (9/91) in lb/MMBtu

### Pilot Emissions

| | | |
|---|---|---|
| Total Heat Input Capacity of Pilot | 0.100 | MMBtu/hr |
| Heating Value | 1020 | Btu/scf |
| Operating Time | 8760 | hr/yr |
| Total Natural Gas Usage | 0.0001 | MMscf/hr |

| Pollutant | (A) Emission Factor[1] (lb/MMscf) | (B) = (A)x MMscf/hr Potential Emission Rate (lbs/hr) | (C) = (B)xOT Potential Emission Rate (lbs/year) | (D) = (C)/2000 Potential Emission Rate (tons/year) |
|---|---|---|---|---|
| Particulate Matter (PM) | 7.6 | 0.0007 | 6.5271 | 0.0033 |
| Particulate Matter ($PM_{10}$) | 7.6 | 0.0007 | 6.5271 | 0.0033 |
| Sulfur Dioxide ($SO_2$) | 0.6 | 0.0001 | 0.5153 | 0.0003 |
| Nitrogen Oxides ($NO_x$) | 100 | 0.0098 | 85.8824 | 0.0429 |
| Carbon Monoxide (CO) | 84 | 0.0082 | 72.1412 | 0.0361 |
| Volatile Organic Compounds (VOC) | 5.5 | 0.0005 | 4.7235 | 0.0024 |

[1]Emission Factors from AP-42 Tables 1.4-1, 1.4-2, 1.4-3, and 1.4-4 (7/98)

### Total Flare Emissions

| Pollutant | Total Potential Emission Rate (tons/year) |
|---|---|
| Particulate Matter (PM) | 0.0033 |
| Particulate Matter ($PM_{10}$) | 0.0033 |
| Sulfur Dioxide ($SO_2$) | 0.0003 |
| Nitrogen Oxides ($NO_x$) | 4.21 |
| Carbon Monoxide (CO) | 22.72 |
| Volatile Organic Compounds (VOC) | 0.0024 |

## Fact Sheet Attachment: Biomethanator Flare (Scenario C)

**KAAPA Ethanol, LLC.**
**Facility ID #75073**
**Emission Point EP-7002**
**Installation Date: NEW**

**Flare Emission Calculations when Flaring Biogas and Pilot operating on Natural Gas**

**Flaring Emissions**

Assumptions
- 1% of Biogas is Hydrogen Sulfide = 10,000 ppm
- At Standard Conditions, Weight Concentration, $mg/m^3$ = ppm x $MW_{H2S}/MW_{biogas}$
- Uncontrolled Emission Rate, lb/hr = Weight Concentration x (g/1000 mg) x (lb/453.6 g) x ($m^3$/35.313 $ft^3$) x gas flow (scf/min) x (60 min/hr)

| | | |
|---|---|---|
| Volume Concentration, $H_2S$ | 10,000 | ppm |
| Molecular Weight (MW), $H_2S$ | 34 | g/mole |
| Molecular Weight (MW), Biogas | 27.1 | g/mole |

| Component | Percentage | Molecular Weight | |
|---|---|---|---|
| Methane | 60% | 16 | g/mol |
| Carbon Dioxide | 39% | 44 | g/mol |
| $H_2S$ | 1% | 34 | g/mol |

| | | |
|---|---|---|
| Weight Concentration, $H_2S$ | 12,546 | $mg/m^3$ |
| Gas Flow Rate (amount produced) | 34.9 | scf/min |
| Gas Flow Rate | 0.002094 | MMscf/hr |
| Uncontrolled Emission Rate, $H_2S$ | 1.64 | lb/hr |
| Uncontrolled Emission Rate, $H_2S$ | 7.18 | ton/year |
| Estimated Control Efficiency<br>Control provided by combustion of gas | 98.0% | |
| Controlled Emission Rate, $H_2S$ | 0.0328 | lb/hr |
| Controlled Emission Rate, $H_2S$ | 0.1437 | ton/year |
| Heat Content of Methane | 1,000 | Btu/scf |
| Heat Content of Biogas | 600.0 | Btu/scf |
| Heat Input of Flare | 1.3 | MMBtu/hr |

KAPPA has indicated that the flare is rated at 3.2 MMBtu/hr so all of the biogas generated will be able to be combusted.

| Pollutant | (A) Emission Factors[1] | | (B) = (A)x MMscf/hr Potential Emission Rate (lbs/hr) | (C) = (B)x8760 Potential Emission Rate (lbs/year) | (D) = (C)/2000 Potential Emission Rate (tons/year) |
|---|---|---|---|---|---|
| Nitrogen Oxides ($NO_x$) | 0.068 | lb/MMBtu | 0.0854 | 748.41 | 0.37 |
| Sulfur Dioxide ($SO_2$) | 3.03 | lb/hr | 3.0256 | 26503.91 | 13.25 |
| Carbon Monoxide (CO) | 0.37 | lb/MMBtu | 0.3700 | 3241.20 | 1.62 |
| Volatile Organic Compounds (VOC) | 0.0518 | lb/MMBtu | 0.0518 | 453.77 | 0.23 |
| Hydrogen Sulfide ($H_2S$) | 0.0328 | lb/hr | 0.0328 | 287.35 | 0.14 |

[1]Emission Factors for $NO_x$, $SO_2$, and VOC from AP-42 Tables 13.5-1 and 13.5-2 (9/91), $SO_2$ and $H_2S$ from the established from information/calculation above

**Pilot Emissions**

| | | |
|---|---|---|
| Total Heat Input Capacity of Pilot | 0.1 | MMBtu/hr |
| Heating Value | 1020 | Btu/scf |
| Operating Time | 8760 | hr/yr |
| Total Natural Gas Usage | 0.000098 | MMscf/hr |

| Pollutant | (A) Emission Factor[1] (lb/MMscf) | (B) = (A)x MMscf/hr Potential Emission Rate (lbs/hr) | (C) = (B)xOT Potential Emission Rate (lbs/year) | (D) = (C)/2000 Potential Emission Rate (tons/year) |
|---|---|---|---|---|
| Particulate Matter (PM) | 7.6 | 0.0007 | 6.5271 | 0.0033 |
| Particulate Matter ($PM_{10}$) | 7.6 | 0.0007 | 6.5271 | 0.0033 |
| Nitrogen Oxides ($NO_x$) | 100 | 0.0098 | 85.8824 | 0.0429 |
| Sulfur Dioxide ($SO_2$) | 0.6 | 0.0001 | 0.5153 | 0.0003 |
| Carbon Monoxide (CO) | 84 | 0.0082 | 72.1412 | 0.0361 |
| Volatile Organic Compounds (VOC) | 5.5 | 0.0005 | 4.7235 | 0.0024 |

[1]Emission Factors from AP-42 Tables 1.4-1, 1.4-2, 1.4-3, and 1.4-4 (7/98)

**Total Flare Emissions**

| Pollutant | Total Potential Emission Rate (tons/year) |
|---|---|
| Particulate Matter (PM) | 0.0033 |
| Particulate Matter ($PM_{10}$) | 0.0033 |
| Sulfur Dioxide ($SO_2$) | 13.2523 |
| Nitrogen Oxides ($NO_x$) | 0.4171 |
| Carbon Monoxide (CO) | 1.6567 |
| Volatile Organic Compounds (VOC) | 0.2293 |
| Hydrogen Sulfide ($H_2S$) | 0.14 |

## Fact Sheet Attachment: Solid Product Loadout (Scenario C)

**KAAPA Ethanol, LLC.**
**Facility ID #75073**

### Potential to Emit Calculations for Emissions from WDGS Loadout

| | | |
|---|---|---|
| Maximum amount of WDGS produced | 845,952 | tons/year |
| | 96.57 | tons/hour |

| Pollutant | (A) Emission Factor[1] (lb/ton WDGS) | Potential Emission Rate | |
|---|---|---|---|
| | | (B) = (A)x ton WDGS/hr (lb/hr) | (C) = (B)x8760/2000 (ton/yr) |
| Volatile Organic Compounds (VOC) | 0.0083 | 0.80 | 3.51 |
| Individual Hazardous Air Pollutants (HAP) | | | |
| Acetaldehyde | 1.11E-04 | 0.0107 | 0.0470 |
| Acrolein | 1.67E-05 | 0.0016 | 0.0071 |
| Formaldehyde | 2.22E-04 | 0.0214 | 0.0939 |
| Methanol | 4.44E-05 | 0.0043 | 0.0188 |
| Total HAPs | - | 0.0381 | 0.1667 |

[1]Emission Factors from DENCO stack test

## Fact Sheet Attachment: External Combustion Units (Scenario C)

**KAAPA Ethanol, LLC.**
**Facility ID #75073**
**Emission Points EP-5001, EP-5002, EP-5003, and EP-5004**

**Unit Description: Three (3) Existing 73.5 MMBtu/hr rated Boilers**

| | | |
|---|---|---|
| Total Heat Input Capacity | 220.5 | MMBtu/hr |
| Potential Natural Gas Throughput | 0.2162 | MMscf/hr |
| | 1893.9 | MMscf/yr |

| Pollutant | (A) Emission Factor[1] (lb/MMscf) | (B) = (A)x MMscf/hr Potential Emission Rate (lbs/hr) | (C) = (B)x8760 Potential Emission Rate (lbs/year) | (D) = (C)/2000 Potential Emission Rate (tons/year) | Permit Limitations per boiler | |
|---|---|---|---|---|---|---|
| | | | | | lb/hour | ton/year |
| Particulate Matter (PM) | 7.6 | 1.64 | 14393.73 | 7.20 | 0.55 | 2.41 |
| Particulate Matter ($PM_{10}$) | 7.6 | 1.64 | 14393.73 | 7.20 | 0.55 | 2.41 |
| Nitrogen Oxides ($NO_x$)[2] | 0.055 | 12.13 | 106236.90 | 53.12 | 4.10 | 17.96 |
| Sulfur Dioxide ($SO_2$) | 0.6 | 0.13 | 1136.35 | 0.57 | N/A | 0.19 |
| Carbon Monoxide (CO)[3] | 14 | 3.03 | 26514.77 | 13.26 | 1.05 | 4.60 |
| Volatile Organic Compounds (VOC) | 5.5 | 1.19 | 10416.52 | 5.21 | 0.40 | 1.75 |
| Individual Hazardous Air Pollutants (HAP) | | | | | | |
| Benzene | 0.0021 | 4.54E-04 | 3.98E+00 | 1.99E-03 | N/A | N/A |
| Dichlorobenzene | 0.0012 | 2.59E-04 | 2.27E+00 | 1.14E-03 | N/A | N/A |
| Formaldehyde | 0.075 | 1.62E-02 | 1.42E+02 | 7.10E-02 | N/A | N/A |
| Hexane | 1.8 | 3.89E-01 | 3.41E+03 | 1.70E+00 | N/A | N/A |
| Lead Compounds | 0.0005 | 1.08E-04 | 9.47E-01 | 4.73E-04 | N/A | N/A |
| Naphthalene | 0.00061 | 1.32E-04 | 1.16E+00 | 5.78E-04 | N/A | N/A |
| Polycyclic Organic Matter (POM) | 0.0000882 | 1.91E-05 | 1.67E-01 | 8.35E-05 | N/A | N/A |
| Toluene | 0.0034 | 7.35E-04 | 6.44E+00 | 3.22E-03 | N/A | N/A |
| Arsenic Compounds (ASC) | 0.0002 | 4.32E-05 | 3.79E-01 | 1.89E-04 | N/A | N/A |
| Beryllium Compounds (BEC) | 0.000012 | 2.59E-06 | 2.27E-02 | 1.14E-05 | N/A | N/A |
| Cadmium Compounds (CDC) | 0.0011 | 2.38E-04 | 2.08E+00 | 1.04E-03 | N/A | N/A |
| Chromium Compounds (CRC) | 0.0014 | 3.03E-04 | 2.65E+00 | 1.33E-03 | N/A | N/A |
| Cobalt Compounds (COC) | 0.000084 | 1.82E-05 | 1.59E-01 | 7.95E-05 | N/A | N/A |
| Manganese Compounds (MNC) | 0.00038 | 8.22E-05 | 7.20E-01 | 3.60E-04 | N/A | N/A |
| Mercury Compounds (HGC) | 0.00026 | 5.62E-05 | 4.92E-01 | 2.46E-04 | N/A | N/A |
| Nickel Compounds (NIC) | 0.0021 | 4.54E-04 | 3.98E+00 | 1.99E-03 | N/A | N/A |
| Selenium Compounds (SEC) | 0.000024 | 5.19E-06 | 4.55E-02 | 2.27E-05 | N/A | N/A |
| Total HAPs | - | 0.4083 | 3.58E+03 | 1.7883 | N/A | N/A |

[1]Emission Factors from AP-42 Tables 1.4-1, 1.4-2, 1.4-3, and 1.4-4 (7/98) unless otherwise specified

[2]Emission Factor from Vendor Information and in units of lb/MMBtu

[3]Emission Factor from Vendor Information and in units of lb/MMscf

Conversion Factor: 1 MMscf = 1020 MMBtu

## Fact Sheet Attachment: External Combustion Units (Scenario C)

**KAAPA Ethanol, LLC.**
**Facility ID #75073**
**Emission Points EP-5001, EP-5002, EP-5003, and EP-5004**

**Total Emissions from all four (4) Boilers**

| Pollutant | Emission Rate (tons/year) |
|---|---|
| Particulate Matter (PM) | 9.64 |
| Particulate Matter ($PM_{10}$) | 9.64 |
| Nitrogen Oxides ($NO_x$) | 66.80 |
| Sulfur Dioxide ($SO_2$) | 0.76 |
| Carbon Monoxide (CO) | 18.40 |
| Volatile Organic Compounds (VOC) | 7.01 |
| Individual Hazardous Air Pollutants (HAP) | |
| Benzene | 3.98E-03 |
| Dichlorobenzene | 2.27E-03 |
| Formaldehyde | 1.42E-01 |
| Hexane | 3.41E+00 |
| Lead Compounds | 9.47E-04 |
| Naphthalene | 1.16E-03 |
| Polycyclic Organic Matter (POM) | 1.67E-04 |
| Toluene | 6.44E-03 |
| Arsenic Compounds (ASC) | 3.79E-04 |
| Beryllium Compounds (BEC) | 2.27E-05 |
| Cadmium Compounds (CDC) | 2.08E-03 |
| Chromium Compounds (CRC) | 2.65E-03 |
| Cobalt Compounds (COC) | 1.59E-04 |
| Manganese Compounds (MNC) | 7.20E-04 |
| Mercury Compounds (HGC) | 4.92E-04 |
| Nickel Compounds (NIC) | 3.98E-03 |
| Selenium Compounds (SEC) | 4.55E-05 |
| Total HAPs | 3.58 |

## Fact Sheet Attachment: Cooling Tower #1 (Scenarios A, B, and C)

**KAAPA Ethanol, LLC.**
**Facility ID #75073**
**Emission Point EP-6000**
**Installation Date: 2003**

### Potential to Emit Calculations for Emissions from the Cooling Tower

| | | |
|---|---|---|
| Circulation rate: | 1,200,000 | gal/hr |
| | 10,512,000 | Mgal/yr (based on 8,760 hrs/yr) |
| Drift loss percent: | 0.005 | % |
| Water density: | 8.34 | lbs/gal |
| TDS concentration: | 2,000 | ppm single sample event |
| | 2,000 | ppm average annual rate |

**Emission Factor Calculation for PM and $PM_{10}$**

Emission factor equation from AP-42, Section 13.4-2 (01/1995)

$$PM/PM_{10} \text{ emission factor} = \left(\frac{ppmTDS}{1{,}000{,}000\, lbswater}\right)\left(\frac{8.34\, lbs}{gal}\, water\right)\left(\frac{1{,}000\, gal}{1 Mgal}\right)\left(\frac{0.005}{100}\, driftloss\right)$$

| | |
|---|---|
| 0.000834 | lbs/Mgal single sample event (highest hourly rate) |
| 0.000834 | lbs/Mgal average annual rate |

Hourly Emissions = (lbs/Mgal single sample event)(hourly throughput gal/hr)(1 Mgal/1,000 gal)
Annual Emissions = (lbs/Mgal average annual rate)(annual throughput Mgal/yr)/(2,000 lbs/ton)

| Cooling Tower Emission Summary | | |
|---|---|---|
| Pollutant | Hourly PTE (lbs/hr) | Annual PTE (tons/year) |
| PM | 1.00 | 4.38 |
| $PM_{10}$ | 1.00 | 4.38 |

## Fact Sheet Attachment: Storage Tanks (Scenarios A and B)

**KAAPA Ethanol, LLC.**
**Facility ID #75073**
**Installation Date: 2003**

**Liquid Throughputs**

| | | |
|---|---|---|
| Anhydrous Ethanol Produced: | 57,000,000 | gallons/year |
| Denaturant Usage: | 3,000,000 | gallons/year |
| Denatured Ethanol Produced: | 60,000,000 | gallons/year |

**Storage Tanks VOC Emission Summary**

| Emission Point | Tank ID# and Product Stored | | Tank Capacity | Throughput | Turnovers | VOC[1] | Amount of VOC from Ethanol[1] | Amount of VOC from Denaturant[1] |
|---|---|---|---|---|---|---|---|---|
| | | | (gallons) | (gallons/year) | | (lbs/yr) | (lbs/yr) | (lbs/yr) |
| EP-9001 | TK87 | Denatured Ethanol | 750,000 | 30,000,000 | 40 | 542.66 | 433.22 | 109.44 |
| EP-9002 | TK88 | Denatured Ethanol | 750,000 | 30,000,000 | 40 | 542.66 | 433.22 | 109.44 |
| EP-9003 | TK89 | 200-Proof Ethanol | 100,000 | 57,000,000 | 570 | 719.20 | 719.20 | - |
| EP-9004 | TK90 | Natural Gasoline | 100,000 | 3,000,000 | 30 | 2,604.49 | - | 2,604.49 |
| EP-9005 | TK91 | 190-Proof Ethanol | 100,000 | 57,000,000 | 570 | 719.20 | 719.20 | - |

[1]VOC emissions calculated by using EPA's TANKS 4.08 and obtained from Fact Sheet 75073f02.doc

| | | |
|---|---|---|
| **Total VOC Emissions** | **5128.21** | **lb/yr** |
| | **2.56** | **ton/yr** |

**Storage Tanks HAP Emission Summary**

| Material | Hazardous Air Pollutant | HAP Fraction | HAPs from Individual Tanks (lbs/yr) | | | | | Total Individual HAPs | Total Individual HAPs |
|---|---|---|---|---|---|---|---|---|---|
| | | | EP-9001 | EP-9002 | EP-9003 | EP-9004 | EP-9005 | lb/year | tons/yr |
| Anhydrous Ethanol | Acetaldehyde | 2.00E-04 | 0.09 | 0.09 | 0.14 | - | 0.14 | 0.46 | 2.30E-04 |
| | Methanol | 2.00E-04 | 0.09 | 0.09 | 0.14 | - | 0.14 | 0.46 | 2.30E-04 |
| Denaturant | Benzene | 2.50E-03 | 0.27 | 0.27 | - | 6.51 | - | 7.06 | 3.53E-03 |
| | Carbon | 2.00E-05 | 0.00 | 0.00 | - | 0.05 | - | 0.06 | 2.82E-05 |
| | Cumene | 1.00E-04 | 0.01 | 0.01 | - | 0.26 | - | 0.28 | 1.41E-04 |
| | Ethyl Benzene | 5.00E-05 | 0.01 | 0.01 | - | 0.13 | - | 0.14 | 7.06E-05 |
| | n-Hexane | 5.00E-02 | 5.47 | 5.47 | - | 130.22 | - | 141.17 | 7.06E-02 |
| | Toluene | 5.00E-03 | 0.55 | 0.55 | - | 13.02 | - | 14.12 | 7.06E-03 |
| | Xylenes | 5.00E-04 | 0.05 | 0.05 | - | 1.30 | - | 1.41 | 7.06E-04 |
| | | | | | | Total HAPs from Storage Tanks: | | 165.16 | 0.0826 |

## Fact Sheet Attachment: Equipment Leaks (Scenarios A and B)

**KAAPA Ethanol, LLC.**
**Facility ID #75073**
**Emission Point F-9000**

**Potential to Emit from leaking product via Equipment Leaks**

| Type of Component | (A) Number of Components | (B) Leaking Emission Factor (kg/hr/source) | VOC Uncontrolled Emissions | | (E) LDAR (cont.eff. %) | VOC Controlled Emissions | |
|---|---|---|---|---|---|---|---|
| | | | (C) = (A)x(B)x2.21 (lb/hr) | (D) = (C)x8760/2000 (ton/year) | | (F) = (C)x[1-(E)] (lb/hr) | (G) = (D)x[1-(E)] (ton/year) |
| Light Liquid Valves | 392 | 0.00403 | 3.49 | 15.29 | 84.00% | 0.56 | 2.45 |
| Light Liquid Pumps | 29 | 0.0199 | 1.28 | 5.59 | 69.00% | 0.40 | 1.73 |
| Light Liquid Check Valves | 26 | 0.00403 | 0.23 | 1.01 | 84.00% | 0.04 | 0.16 |
| Light Liquid Control Valves | 87 | 0.00403 | 0.77 | 3.39 | 84.00% | 0.12 | 0.54 |
| Pressure Relief Valves | 15 | 0.104 | 3.45 | 15.10 | 87.00% | 0.45 | 1.96 |

VOC Emissions are calculated from *Protocol for Leak Emission Estimates*, EPA-453/R-95-017, November 1995.

| | | |
|---|---|---|
| Total VOC Emissions | 1.56 | lb/hr |
| | 6.85 | ton/year |

| Hazardous Air Pollutant | Mass Fraction of HAP | HAP Emissions | |
|---|---|---|---|
| | | lb/hr | ton/year |
| Acetaldehyde | 0.0002 | 0.0003 | 0.0014 |
| Acrolein | 0.0002 | 0.0003 | 0.0014 |
| Formaldehyde | 0.0001 | 0.0002 | 0.0007 |
| Methanol | 0.0002 | 0.0003 | 0.0014 |
| Total HAPs | - | 0.0011 | 0.0048 |

# Fact Sheet Attachment: Haul Road Emissions (Scenario A)

**KAPPA Ethanol, LLC**
**Facility ID #75073**
**Emission Points F-1000 and F-1001**

**Paved roads** {AP-42 Chapter 13.2.1 (11/06)}

*Equation (2): (modified)*

$$E = k \times \left(\frac{sL}{2}\right)^{0.65} \times \left(\frac{W}{3}\right)^{1.5} \times \left(1 - \frac{P}{4 \times 365}\right) \times \left(\frac{S}{30}\right)^{d}$$

| | $k$ | $d$ |
|---|---|---|
| PM | 0.082 | 0.3 |
| $PM_{10}$ | 0.016 | 0.5 |

**Unpaved roads** {AP-42 Chapter 13.2.2 (11/06)}

*Equation (1a): (modified)*

$$E = k \times \left(\frac{sC}{12}\right)^{a} \times \left(\frac{W}{3}\right)^{b} \times \left(\frac{365 - P}{365}\right) \times \left(\frac{S}{30}\right)^{d} \times (1 - CE)$$

| | $k$ | $a$ | $b$ | $d$ |
|---|---|---|---|---|
| PM | 4.9 | 0.7 | 0.45 | 0.3 |
| $PM_{10}$ | 1.5 | 0.9 | 0.45 | 0.5 |

**Haul Road / Traffic Parameters**

| Activity / Road Description | Road Type / Silt Value | | Roundtrip Distance (feet) | | Truck Weight (tons) | | | Ave. Speed (mph) | Maximum Throughput (units/yr) [2] | Ave. Truck Capacity (units/truck) | | Annual VMT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | empty | full | empty | full | Ave.[1] | | | | | |
| Grain Delivery | p | 3.00 | 2,015 | 1,415 | 15 | 40 | 25.3 | 15 | 591,111 | 28 | ton | 13,714 |
| Denaturant | p | 3.00 | 2,190 | 1,760 | 15 | 40 | 26.1 | 15 | 3,000,000 | 7,900 | gallon | 284 |
| Ethanol Loadout | p | 3.00 | 1,760 | 2,190 | 15 | 40 | 28.9 | 15 | 60,000,000 | 7,900 | gallon | 5,682 |
| Anhydrous Ammonia | p | 3.00 | 2,080 | 1,222 | 15 | 38.23 | 23.6 | 15 | 244,500 | 8,150 | gallon | 19 |
| Corrosion Inhibitor | p | 3.00 | 1,737 | 1,676 | 15 | 18.9 | 16.9 | 15 | 6,000 | 1,500 | gallon | 3 |
| Caustic Soda | p | 3.00 | 1,200 | 1,300 | 15 | 41 | 28.5 | 15 | 420,000 | 5,000 | gallon | 40 |
| Sulfuric Aid | p | 3.00 | 1,200 | 1,300 | 15 | 37.19 | 26.5 | 15 | 313,200 | 2,900 | gallon | 51 |
| WDGS | p | 3.00 | 1,415 | 2,015 | 15 | 40 | 29.7 | 15 | 461,429 | 28 | ton | 10,705 |

[1] Weighted average = {(distance*weight empty)+(distance*weight full)}/( Roundtrip distance)

Total VMT: 30,498

[2] Includes permit-limited throughput

**Emission Calculations**

| | Emission Factors (lb/VMT) | | Potential Emissions (tons/yr) | |
|---|---|---|---|---|
| | PM | $PM_{10}$ | PM | $PM_{10}$ |
| Grain Delivery | 1.99 | 0.34 | 13.67 | 2.32 |
| Denaturant | 2.09 | 0.36 | 0.30 | 0.05 |
| Ethanol Loadout | 2.43 | 0.41 | 6.90 | 1.17 |
| Anhydrous Ammonia | 1.79 | 0.30 | 0.02 | 0.00 |
| Corrosion Inhibitor | 1.09 | 0.18 | 0.00 | 0.00 |
| Caustic Soda | 2.38 | 0.41 | 0.05 | 0.01 |
| Sulfuric Aid | 2.14 | 0.36 | 0.05 | 0.01 |
| WDGS | 2.53 | 0.43 | 13.55 | 2.30 |
| **Total Annual Emissions:** | | | 34.54 | 5.87 |

**Description of Constants/Variables**

$E$: haul road emissions (lb/VMT)

$k, a, b, c, d$: dimensionless constants from AP-42 Tables 13.2.1-1 & 13.2.2-2

$sL$: silt loading ($g/m^2$) of paved road surface

$sC$: silt content (%) of unpaved road surface

$W$: average vehicle weight (tons)

$P$: days/yr with at least 0.01" of precipitation

$P$ = 90

$S$: mean vehicle speed on road (mph)
default = 30, minimum =15

$CE$: unpaved road, dust control efficiency
$CE$ = 0 % default = 0%

VMT: vehicle miles traveled

# Fact Sheet Attachment: Haul Road Emissions (Scenario C)

**KAPPA Ethanol, LLC**
**Facility ID #75073**
**Emission Points F-1000 and F-1001**

**Paved roads** {AP-42 Chapter 13.2.1 (11/06)}

*Equation (2): (modified)*

$$E = k \times \left(\frac{sL}{2}\right)^{0.65} \times \left(\frac{W}{3}\right)^{1.5} \times \left(1 - \frac{P}{4 \times 365}\right) \times \left(\frac{S}{30}\right)^{d}$$

| | $k$ | $d$ |
|---|---|---|
| PM | 0.082 | 0.3 |
| $PM_{10}$ | 0.016 | 0.5 |

**Unpaved roads** {AP-42 Chapter 13.2.2 (11/06)}

*Equation (1a): (modified)*

$$E = k \times \left(\frac{sC}{12}\right)^{a} \times \left(\frac{W}{3}\right)^{b} \times \left(\frac{365 - P}{365}\right) \times \left(\frac{S}{30}\right)^{d} \times (1 - CE)$$

| | $k$ | $a$ | $b$ | $d$ |
|---|---|---|---|---|
| PM | 4.9 | 0.7 | 0.45 | 0.3 |
| $PM_{10}$ | 1.5 | 0.9 | 0.45 | 0.5 |

**Haul Road / Traffic Parameters**

| Activity / Road Description | Road Type / Silt Value | | Roundtrip Distance (feet) | | Truck Weight (tons) | | | Ave. Speed (mph) | Maximum Throughput (units/yr) [2] | Ave. Truck Capacity (units/truck) | | Annual VMT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | empty | full | empty | full | Ave.[1] | | | | | |
| Grain Delivery | p | 2.00 | 2,015 | 1,415 | 15 | 40 | 25.3 | 15 | 1,083,704 | 28 | ton | 25,143 |
| Grain to Pile | p | 2.00 | 1,875 | 1,875 | 15 | 40 | 27.5 | 15 | 42,000 | 28 | ton | 1,065 |
| Grain to Pile | u | 10.00 | 100 | 100 | 15 | 40 | 27.5 | 15 | 42,000 | 28 | ton | 57 |
| Grain from Pile | p | 2.00 | 4,125 | 1,425 | 15 | 40 | 21.4 | 15 | 42,000 | 28 | ton | 1,577 |
| Grain from Pile | u | 10.00 | 100 | 100 | 15 | 40 | 27.5 | 15 | 42,000 | 28 | ton | 57 |
| Denaturant | p | 2.00 | 2,190 | 1,760 | 15 | 40 | 26.1 | 15 | 5,500,000 | 7,900 | gallon | 521 |
| Ethanol Loadout | p | 2.00 | 1,760 | 2,190 | 15 | 40 | 28.9 | 15 | 55,000,000 | 7,900 | gallon | 5,208 |
| Anhydrous Ammonia | p | 2.00 | 2,080 | 1,222 | 15 | 38.23 | 23.6 | 15 | 244,500 | 8,150 | gallon | 19 |
| Corrosion Inhibitor | p | 2.00 | 1,737 | 1,676 | 15 | 18.9 | 16.9 | 15 | 6,000 | 1,500 | gallon | 3 |
| Caustic Soda | p | 2.00 | 1,200 | 1,300 | 15 | 41 | 28.5 | 15 | 420,000 | 5,000 | gallon | 40 |
| Sulfuric Aid | p | 2.00 | 1,200 | 1,300 | 15 | 37.19 | 26.5 | 15 | 313,200 | 2,900 | gallon | 51 |
| 70% DDGS | p | 2.00 | 1,415 | 2,015 | 15 | 40 | 29.7 | 15 | 204,400 | 28 | ton | 4,742 |
| 30% WDGS | p | 2.00 | 1,415 | 2,015 | 15 | 40 | 29.7 | 15 | 320,352 | 28 | ton | 7,432 |
| 100% WDGS | p | 2.00 | 1,415 | 2,015 | 15 | 40 | 29.7 | 15 | 845,952 | 28 | ton | 19,627 |
| | | | | | | | | | | | Total VMT: | 65,541 |

[1] Weighted average = {(distance*weight empty)+(distance*weight full)}/( Roundtrip distance)

[2] Includes permit-limited throughput

**Emission Calculations**

| | Emission Factors (lb/VMT) | | Potential Emissions (tons/yr) | |
|---|---|---|---|---|
| | PM | $PM_{10}$ | PM | $PM_{10}$ |
| Grain Delivery | 1.53 | 0.26 | 19.26 | 3.27 |
| Grain to Pile | 1.73 | 0.29 | 0.92 | 0.16 |
| Grain to Pile | 7.15 | 1.84 | 0.20 | 0.05 |
| Grain from Pile | 1.19 | 0.20 | 0.94 | 0.16 |
| Grain from Pile | 7.15 | 1.84 | 0.20 | 0.05 |
| Denaturant | 1.61 | 0.27 | 0.42 | 0.07 |
| Ethanol Loadout | 1.86 | 0.32 | 4.86 | 0.82 |
| Anhydrous Ammonia | 1.38 | 0.23 | 0.01 | 0.00 |
| Corrosion Inhibitor | 0.84 | 0.14 | 0.00 | 0.00 |
| Caustic Soda | 1.83 | 0.31 | 0.04 | 0.01 |
| Sulfuric Aid | 1.64 | 0.28 | 0.04 | 0.01 |
| 70% DDGS | 1.95 | 0.33 | 4.61 | 0.78 |
| 30% WDGS | 1.95 | 0.33 | 7.23 | 1.23 |
| 100% WDGS | 1.95 | 0.33 | 19.09 | 3.24 |
| **Total Annual Emissions[3]:** | | | **38.74** | **6.62** |

[3] Total annual emissions do not include emission associated with 100% WDGS loadout since DDGS production is worst-case for

**Description of Constants/Variables**

$E$: haul road emissions (lb/VMT)
$k, a, b, c, d$: dimensionless constants from AP-42 Tables 13.2.1-1 & 13.2.2-2
$sL$: silt loading (g/m$^2$) of paved road surface
$sC$: silt content (%) of unpaved road surface
$W$: average vehicle weight (tons)
$P$: days/yr with at least 0.01" of precipitation
$P$ = 90
$S$: mean vehicle speed on road (mph)
default = 30, minimum = 15
$CE$: unpaved road, dust control efficiency
$CE$ = 0 % default = 0%
VMT: vehicle miles traveled

## Fact Sheet Attachment: Facility Wide Emissions (Scenario A)

**KAPPA Ethanol, LLC**
**Facility ID #75073**

**Facility Wide Emissions as Limited by the Permit**

| Process or Unit | Pollutants (tons/year) | | | | | | |
|---|---|---|---|---|---|---|---|
| | Particulate Matter (PM) | Particulate Matter ($PM_{10}$) | Sulfur Oxides ($SO_x$) | Nitrogen Oxides ($NO_x$) | Carbon Monoxide (CO) | Volatile Organic Compounds (VOC) | Total Reduced Sulfur as $H_2S$ |
| Grain Receiving, Storage, and Milling | 15.76 | 15.36 | - | - | - | - | - |
| Fermentation Scrubber | - | - | - | - | - | 42.75 | - |
| Distillation Scrubber | - | - | - | - | - | 14.45 | - |
| Liquid Loadout | - | - | - | - | - | 14.37 | - |
| Loadout Flare | 0.0033 | 0.0033 | 0.0003 | 2.22 | 11.87 | 0.0024 | - |
| Biomethanator Flare | 0.0033 | 0.0033 | 13.25 | 0.42 | 1.66 | 0.23 | 0.14 |
| WDGS Loadout | - | - | - | - | - | 1.91 | - |
| Boilers | 7.20 | 7.20 | 0.57 | 22.64 | 0.70 | 5.21 | - |
| Emergency Fire Pump | 0.02 | 0.02 | 0.02 | 0.29 | 0.06 | 0.02 | - |
| Cooling Tower | 4.38 | 4.38 | - | - | - | - | - |
| Storage Tanks | - | - | - | - | - | 2.56 | - |
| Equipment Leaks | - | - | - | - | - | 6.85 | - |
| Haul Roads | 34.54 | 5.87 | - | - | - | - | - |
| Facility-Wide Emissions as Permitted | 61.91 | 32.83 | 13.84 | 25.57 | 14.29 | 88.36 | 0.14 |

## Fact Sheet Attachment: Facility Wide Emissions (Scenario C)

**KAPPA Ethanol, LLC**
**Facility ID #75073**

**Facility Wide Emissions as Limited by the Permit**

| Process or Unit | Pollutants (tons/year) | | | | | | |
|---|---|---|---|---|---|---|---|
| | Particulate Matter (PM) | Particulate Matter ($PM_{10}$) | Sulfur Oxides ($SO_x$) | Nitrogen Oxides ($NO_x$) | Carbon Monoxide (CO) | Volatile Organic Compounds (VOC) | Total Reduced Sulfur as $H_2S$ |
| Grain Receiving, Storage, and Milling | 16.92 | 16.01 | - | - | - | - | - |
| Storage Pile | 0.04 | 0.02 | - | - | - | - | - |
| DDGS Cooling Cyclone | 6.01 | 6.01 | - | - | - | 10.51 | - |
| DDGS Loadout | 0.56 | 0.53 | - | - | - | - | - |
| Scrubber TO | 0.09 | 0.09 | 0.04 | 1.10 | 0.92 | 24.13 | - |
| Dryer TO | 12.66 | 12.66 | 67.93 | 26.28 | 46.08 | 28.78 | - |
| Liquid Loadout | - | - | - | - | - | 6.04 | - |
| Loadout Flare | 0.0033 | 0.0033 | 0.0003 | 4.21 | 22.72 | 0.00 | - |
| Biomethanator Flare #1 | 0.0033 | 0.0033 | 13.25 | 0.42 | 1.66 | 0.23 | 0.14 |
| Biomethanator Flare #2 | 0.0033 | 0.0033 | 13.25 | 0.42 | 1.66 | 0.23 | 0.14 |
| Boilers | 9.64 | 9.64 | 0.76 | 66.80 | 18.40 | 7.01 | - |
| Emergency Fire Pump | 0.02 | 0.02 | 0.02 | 0.29 | 0.06 | 0.02 | - |
| Cooling Tower #1 | 4.38 | 4.38 | - | - | - | - | - |
| Cooling Tower #2 | 4.38 | 4.38 | - | - | - | - | - |
| Equipment Leaks | - | - | - | - | - | 10.87 | - |
| Haul Roads | 38.74 | 6.62 | - | - | - | - | - |
| Facility-Wide Emissions as Permitted | 93.45 | 60.36 | 95.26 | 99.51 | 91.49 | 87.82 | 0.29 |

## Fact Sheet Attachment: Title 129, Chapter 20 Applicability

**KAAPA Ethanol, LLC.**
**Facility ID #75073**
**Title 129, Chapter 20 Applicability after Ethanol Expansion**

**Title 129, Chapter 20, Section 001**

For process weight rates up to 60,000 lbs/hr: $E = 4.10\ p^{0.67}$
For process weight rates in excess of 60,000 lbs/hr: $E = 55.0\ p^{0.11} - 40$
where E = rate of emissions in lbs/hr PM and p = process weight rate in tons/hr.

| Process | P | E | Unit PM emission rate |
|---|---|---|---|
| Grain Receiving/Handling Baghouse | 247,421 lbs/hr<br>123.71 tons/hr | 53.44 lbs/hr | 2.47 lbs/hr |
| Grain Storage Silo Vent (EP1004a and EP1004b) | 840,000 lbs/hr<br>420.00 tons/hr | 66.89 lbs/hr | 10.50 lbs/hr |
| Grain Storage Silo Vent (EP1005a and EP1005b) | 2,800,000 lbs/hr<br>1400.00 tons/hr | 82.02 lbs/hr | 0.35 lbs/hr |
| Hammermilling Baghouses | 369,600 lbs/hr<br>184.80 tons/hr | 57.66 lbs/hr | 1.12 lbs/hr |
| DDGS Production | 120,000 lbs/hr<br>60.00 tons/hr | 46.29 lbs/hr | 2.89 lb/hr |
| DDGS Cooling | 46,667 lbs/hr<br>23.33 tons/hr | 33.83 lbs/hr | 1.37 lb/hr |
| DDGS Storage and Loadout | 46,667 lbs/hr<br>23.33 tons/hr | 33.83 lbs/hr | 0.26 lb/hr |
| Cooling Tower | 20,016,000 lbs/hr<br>10,008 tons/hr | 111.5 lbs/hr | 2.00 lb/hr |

**Title 129, Chapter 20, Section 002**

| Total Heat Input (MMBtu/hr) | Maximum Allowable Emissions of PM (lbs/MMBtu) |
|---|---|
| 10 or less | 0.6 |
| Between 10 and 10,000 | $1.026/I^{0.233}$<br>Where I = total heat input in MMBtu/hr. |
| 10,000 or more | 0.12 |

| Process equipment | MMBtu/hr | Allowable PM (lbs/MMBtu) | Unit PM emission rate (lbs/MMBtu) |
|---|---|---|---|
| DDGS Dryer | 90 | 0.36 | 0.05 |
| Emergency Fire Pump | 1.33 | 0.60 | 0.02 |
| Boilers | 294.00 | 0.27 | 0.01 |

## Fact Sheet Attachment: Facility Wide Emissions (Scenario B)

**KAPPA Ethanol, LLC**
**Facility ID #75073**

**Facility Wide Emissions as Limited by the Permit**

| Process or Unit | Pollutants (tons/year) | | | | | | |
|---|---|---|---|---|---|---|---|
| | Particulate Matter (PM) | Particulate Matter ($PM_{10}$) | Sulfur Oxides ($SO_x$) | Nitrogen Oxides ($NO_x$) | Carbon Monoxide (CO) | Volatile Organic Compounds (VOC) | Total Reduced Sulfur as $H_2S$ |
| Grain Receiving, Storage, and Milling | 21.05 | 16.69 | - | - | - | - | - |
| Storage Pile | 0.04 | 0.02 | - | - | - | - | - |
| Fermentation Scrubber | - | - | - | - | - | 42.75 | - |
| Distillation Scrubber | - | - | - | - | - | 14.45 | - |
| Liquid Loadout | - | - | - | - | - | 14.37 | - |
| Loadout Flare | 0.0033 | 0.0033 | 0.0003 | 2.22 | 11.87 | 0.0024 | - |
| Biomethanator Flare | 0.0033 | 0.0033 | 13.25 | 0.42 | 1.66 | 0.23 | 0.14 |
| WDGS Loadout | - | - | - | - | - | 1.91 | - |
| Boilers | 7.20 | 7.20 | 0.57 | 22.64 | 0.70 | 5.21 | - |
| Emergency Fire Pump | 0.02 | 0.02 | 0.02 | 0.29 | 0.06 | 0.02 | - |
| Cooling Tower | 4.38 | 4.38 | - | - | - | - | - |
| Storage Tanks | - | - | - | - | - | 2.56 | - |
| Equipment Leaks | | | | | | 6.85 | - |
| Haul Roads | 37.37 | 6.38 | | | | | - |
| Facility-Wide Emissions as Permitted | 70.07 | 34.70 | 13.84 | 25.57 | 14.29 | 88.36 | 0.14 |

## Fact Sheet Attachment: Determining Worst-Case (DDGS or WDGS Production)

**KAPPA Ethanol, LLC**
**Facility ID #75073**

The following calculations support the determination that 100% DDGS production presents the worst-case scenario for emissions from the KAAPA Ethanol, LLC Ethanol Plant

**DDGS Production Scenario**

| Process or Unit | Pollutants | | | | | |
|---|---|---|---|---|---|---|
| | Particulate Matter (PM) | Particulate Matter ($PM_{10}$) | Sulfur Oxides ($SO_x$) | Nitrogen Oxides ($NO_x$) | Carbon Monoxide (CO) | Volatile Organic Compounds (VOC) |
| DDGS Cooling | 6.01 | 6.01 | - | - | - | 10.51 |
| DDGS Loadout Baghouse & Fugitives | 0.56 | 0.53 | - | - | - | - |
| Dryer TO | 12.66 | 12.66 | 67.93 | 26.28 | 46.08 | 28.78 |
| Truck Traffic (70% DDGS and 30% WDGS Loadout) | 11.84 | 2.01 | | | | |
| **DDGS Production Totals** | **31.07** | **21.21** | **67.93** | **26.28** | **46.08** | **39.29** |

**WDGS Production Scenario**

| Process or Unit | Pollutants | | | | | |
|---|---|---|---|---|---|---|
| | Particulate Matter (PM) | Particulate Matter ($PM_{10}$) | Sulfur Oxides ($SO_x$) | Nitrogen Oxides ($NO_x$) | Carbon Monoxide (CO) | Volatile Organic Compounds (VOC) |
| WDGS Storage and Loadout | - | - | - | - | - | 3.51 |
| Truck Traffic (100% WDGS Loadout) | 19.09 | 3.24 | - | - | - | - |
| **WDGS Production Totals** | **19.09** | **3.24** | **0.00** | **0.00** | **0.00** | **3.51** |

## Fact Sheet Attachment: Haul Road Emissions (Scenario B)

**KAPPA Ethanol, LLC**
**Facility ID #75073**
**Emission Points F-1000 and F-1001**

**Paved roads** {AP-42 Chapter 13.2.1 (11/06)}

*Equation (2): (modified)*

$$E = k \times \left(\frac{sL}{2}\right)^{0.65} \times \left(\frac{W}{3}\right)^{1.5} \times \left(1 - \frac{P}{4 \times 365}\right) \times \left(\frac{S}{30}\right)^{d}$$

| | *k* | *d* |
|---|---|---|
| PM | 0.082 | 0.3 |
| $PM_{10}$ | 0.016 | 0.5 |

**Unpaved roads** {AP-42 Chapter 13.2.2 (11/06)}

*Equation (1a): (modified)*

$$E = k \times \left(\frac{sC}{12}\right)^{a} \times \left(\frac{W}{3}\right)^{b} \times \left(\frac{365 - P}{365}\right) \times \left(\frac{S}{30}\right)^{d} \times (1 - CE)$$

| | *k* | *a* | *b* | *d* |
|---|---|---|---|---|
| PM | 4.9 | 0.7 | 0.45 | 0.3 |
| $PM_{10}$ | 1.5 | 0.9 | 0.45 | 0.5 |

**Haul Road / Traffic Parameters**

| Activity / Road Description | Road Type / Silt Value | | Roundtrip Distance (feet) | | Truck Weight (tons) | | | Ave. Speed (mph) | Maximum Throughput (units/yr) [2] | Ave. Truck Capacity (units/truck) | | Annual VMT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | empty | full | empty | full | Ave.[1] | | | | | |
| Grain Delivery | p | 3.00 | 2,015 | 1,415 | 15 | 40 | 25.3 | 15 | 591,111 | 28 | ton | 13,714 |
| Grain to Pile | p | 3.00 | 1,875 | 1,875 | 15 | 40 | 27.5 | 15 | 42,000 | 28 | ton | 1,065 |
| Grain to Pile | u | 10.00 | 100 | 100 | 15 | 40 | 27.5 | 15 | 42,000 | 28 | ton | 57 |
| Grain from Pile | p | 3.00 | 4,125 | 1,425 | 15 | 40 | 21.4 | 15 | 42,000 | 28 | ton | 1,577 |
| Grain from Pile | u | 10.00 | 100 | 100 | 15 | 40 | 27.5 | 15 | 42,000 | 28 | ton | 57 |
| Denaturant | p | 3.00 | 2,190 | 1,760 | 15 | 40 | 26.1 | 15 | 3,000,000 | 7,900 | gallon | 284 |
| Ethanol Loadout | p | 3.00 | 1,760 | 2,190 | 15 | 40 | 28.9 | 15 | 60,000,000 | 7,900 | gallon | 5,682 |
| Anhydrous Ammonia | p | 3.00 | 2,080 | 1,222 | 15 | 38.23 | 23.6 | 15 | 244,500 | 8,150 | gallon | 19 |
| Corrosion Inhibitor | p | 3.00 | 1,737 | 1,676 | 15 | 18.9 | 16.9 | 15 | 6,000 | 1,500 | gallon | 3 |
| Caustic Soda | p | 3.00 | 1,200 | 1,300 | 15 | 41 | 28.5 | 15 | 420,000 | 5,000 | gallon | 40 |
| Sulfuric Aid | p | 3.00 | 1,200 | 1,300 | 15 | 37.19 | 26.5 | 15 | 313,200 | 2,900 | gallon | 51 |
| WDGS | p | 3.00 | 1,415 | 2,015 | 15 | 40 | 29.7 | 15 | 461,429 | 28 | ton | 10,705 |
| | | | | | | | | | | | Total VMT: | 33,254 |

[1] Weighted average = {(distance*weight empty)+(distance*weight full)}/( Roundtrip distance)
[2] Includes permit-limited throughput

**Emission Calculations**

| | Emission Factors (lb/VMT) | | Potential Emissions (tons/yr) | |
|---|---|---|---|---|
| | PM | $PM_{10}$ | PM | $PM_{10}$ |
| Grain Delivery | 1.99 | 0.34 | 13.67 | 2.32 |
| Grain to Pile | 2.26 | 0.38 | 1.20 | 0.20 |
| Grain to Pile | 7.15 | 1.84 | 0.20 | 0.05 |
| Grain from Pile | 1.55 | 0.26 | 1.22 | 0.21 |
| Grain from Pile | 7.15 | 1.84 | 0.20 | 0.05 |
| Denaturant | 2.09 | 0.36 | 0.30 | 0.05 |
| Ethanol Loadout | 2.43 | 0.41 | 6.90 | 1.17 |
| Anhydrous Ammonia | 1.79 | 0.30 | 0.02 | 0.00 |
| Corrosion Inhibitor | 1.09 | 0.18 | 0.00 | 0.00 |
| Caustic Soda | 2.38 | 0.41 | 0.05 | 0.01 |
| Sulfuric Aid | 2.14 | 0.36 | 0.05 | 0.01 |
| WDGS | 2.53 | 0.43 | 13.55 | 2.30 |
| **Total Annual Emissions:** | | | **37.37** | **6.38** |

**Description of Constants/Variables**

*E*: haul road emissions (lb/VMT)
*k, a, b, c, d*: dimensionless constants from AP-42 Tables 13.2.1-1 & 13.2.2-2
*sL*: silt loading ($g/m^2$) of paved road surface
*sC*: silt content (%) of unpaved road surface
*W*: average vehicle weight (tons)
*P*: days/yr with at least 0.01" of precipitation
*P* = 90
*S*: mean vehicle speed on road (mph) default = 30, minimum =15
*CE*: unpaved road, dust control efficiency
*CE* = 0 % default = 0%
VMT: vehicle miles traveled

## Fact Sheet Attachment: External Combustion Units (Scenarios A and B)

**KAAPA Ethanol, LLC.**
**Facility ID #75073**
**Emission Points EP-5001, EP-5002, and EP-5003**

**Unit Description: Three (3) Existing 73.5 MMBtu/hr rated Boilers**

**Potential to Emit from Combusting Natural Gas by External Combustion**

| | | |
|---|---|---|
| Total Heat Input Capacity | 220.5 | MMBtu/hr |
| Potential Natural Gas Throughput | 0.2162 | MMscf/hr |
| | 1893.9 | MMscf/yr |

| Pollutant | (A) Emission Factor[1] (lb/MMscf) | (B) = (A)x MMscf/hr Potential Emission Rate (lbs/hr) | (C) = (B)x8760 Potential Emission Rate (lbs/year) | (D) = (C)/2000 Potential Emission Rate (tons/year) |
|---|---|---|---|---|
| Particulate Matter (PM) | 7.6 | 1.64 | 14393.73 | 7.20 |
| Particulate Matter ($PM_{10}$) | 7.6 | 1.64 | 14393.73 | 7.20 |
| Nitrogen Oxides ($NO_x$)[2] | - | 5.17 | 45289.20 | 22.64 |
| Sulfur Dioxide ($SO_2$) | 0.6 | 0.13 | 1136.35 | 0.57 |
| Carbon Monoxide (CO)[2] | - | 0.16 | 1401.60 | 0.70 |
| Volatile Organic Compounds (VOC) | 5.5 | 1.19 | 10416.52 | 5.21 |
| Individual Hazardous Air Pollutants (HAP) | | | | |
| Benzene | 0.0021 | 4.54E-04 | 3.98E+00 | 1.99E-03 |
| Dichlorobenzene | 0.0012 | 2.59E-04 | 2.27E+00 | 1.14E-03 |
| Formaldehyde | 0.075 | 1.62E-02 | 1.42E+02 | 7.10E-02 |
| Hexane | 1.8 | 3.89E-01 | 3.41E+03 | 1.70E+00 |
| Lead Compounds | 0.0005 | 1.08E-04 | 9.47E-01 | 4.73E-04 |
| Naphthalene | 0.00061 | 1.32E-04 | 1.16E+00 | 5.78E-04 |
| Polycyclic Organic Matter (POM) | 0.0000882 | 1.91E-05 | 1.67E-01 | 8.35E-05 |
| Toluene | 0.0034 | 7.35E-04 | 6.44E+00 | 3.22E-03 |
| Arsenic Compounds (ASC) | 0.0002 | 4.32E-05 | 3.79E-01 | 1.89E-04 |
| Beryllium Compounds (BEC) | 0.000012 | 2.59E-06 | 2.27E-02 | 1.14E-05 |
| Cadmium Compounds (CDC) | 0.0011 | 2.38E-04 | 2.08E+00 | 1.04E-03 |
| Chromium Compounds (CRC) | 0.0014 | 3.03E-04 | 2.65E+00 | 1.33E-03 |
| Cobalt Compounds (COC) | 0.000084 | 1.82E-05 | 1.59E-01 | 7.95E-05 |
| Manganese Compounds (MNC) | 0.00038 | 8.22E-05 | 7.20E-01 | 3.60E-04 |
| Mercury Compounds (HGC) | 0.00026 | 5.62E-05 | 4.92E-01 | 2.46E-04 |
| Nickel Compounds (NIC) | 0.0021 | 4.54E-04 | 3.98E+00 | 1.99E-03 |
| Selenium Compounds (SEC) | 0.000024 | 5.19E-06 | 4.55E-02 | 2.27E-05 |
| Total HAPs | - | 0.4083 | 3.58E+03 | 1.7883 |

[1]Emission Factors from AP-42 Tables 1.4-1, 1.4-2, 1.4-3, and 1.4-4 (7/98) unless otherwise specified
[2]lb/hr emission rates are the average lb/hr emission rate tested in May 2004 of all three boilers
Conversion Factor: 1 MMscf = 1020 MMBtu

## Fact Sheet Attachment: Solid Product Loadout (Scenarios A and B)

**KAAPA Ethanol, LLC.**
**Facility ID #75073**

### Potential to Emit Calculations for Emissions from WDGS Loadout

| | | |
|---|---|---|
| Maximum amount of WDGS produced | 461,429 | tons/year |
| | 52.67 | tons/hour |

| Pollutant | (A) Emission Factor[1] (lb/ton WDGS) | Potential Emission Rate | |
|---|---|---|---|
| | | (B) = (A)x ton WDGS/hr (lb/hr) | (C) = (B)x8760/2000 (ton/yr) |
| Volatile Organic Compounds (VOC) | 0.0083 | 0.44 | 1.91 |
| Individual Hazardous Air Pollutants (HAP) | | | |
| Acetaldehyde | 1.11E-04 | 0.0058 | 0.0256 |
| Acrolein | 1.67E-05 | 0.0009 | 0.0039 |
| Formaldehyde | 2.22E-04 | 0.0117 | 0.0512 |
| Methanol | 4.44E-05 | 0.0023 | 0.0102 |
| Total HAPs | - | 0.0208 | 0.0909 |

[1]Emission Factors from DENCO stack test

## Fact Sheet Attachment: Biomethanator Flare (Scenarios A, B, and C)

**KAAPA Ethanol, LLC.**
**Facility ID #75073**
**Emission Point EP-7001**
**Installation Date: 2003**

**Flare Emission Calculations when Flaring Biogas and Pilot operating on Natural Gas**

**Flaring Emissions**

Assumptions
- 1% of Biogas is Hydrogen Sulfide = 10,000 ppm
- At Standard Conditions, Weight Concentration, $mg/m^3$ = ppm x $MW_{H2S}/MW_{biogas}$
- Uncontrolled Emission Rate, lb/hr = Weight Concentration x (g/1000 mg) x (lb/453.6 g) x ($m^3$/35.313 $ft^3$) x gas flow (scf/min) x (60 min/hr)

| | | |
|---|---|---|
| Volume Concentration, $H_2S$ | 10,000 | ppm |
| Molecular Weight (MW), $H_2S$ | 34 | g/mole |
| Molecular Weight (MW), Biogas | 27.1 | g/mole |

| Component | Percentage | Molecular Weight | |
|---|---|---|---|
| Methane | 60% | 16 | g/mol |
| Carbon Dioxide | 39% | 44 | g/mol |
| $H_2S$ | 1% | 34 | g/mol |

| | | |
|---|---|---|
| Weight Concentration, $H_2S$ | 12,546 | $mg/m^3$ |
| Gas Flow Rate (amount produced) | 34.9 | scf/min |
| Gas Flow Rate | 0.002094 | MMscf/hr |
| Uncontrolled Emission Rate, $H_2S$ | 1.64 | lb/hr |
| Uncontrolled Emission Rate, $H_2S$ | 7.18 | ton/year |
| Estimated Control Efficiency<br>Control provided by combustion of gas | 98.0% | |
| Controlled Emission Rate, $H_2S$ | 0.0328 | lb/hr |
| Controlled Emission Rate, $H_2S$ | 0.1437 | ton/year |
| Heat Content of Methane | 1,000 | Btu/scf |
| Heat Content of Biogas | 600.0 | Btu/scf |
| Heat Input of Flare | 1.3 | MMBtu/hr |

KAPPA has indicated that the flare is rated at 3.2 MMBtu/hr so all of the biogas generated will be able to be combusted.

| Pollutant | (A) Emission Factors[1] | | (B) = (A)x MMscf/hr Potential Emission Rate (lbs/hr) | (C) = (B)x8760 Potential Emission Rate (lbs/year) | (D) = (C)/2000 Potential Emission Rate (tons/year) |
|---|---|---|---|---|---|
| Nitrogen Oxides ($NO_x$) | 0.068 | lb/MMBtu | 0.0854 | 748.41 | 0.37 |
| Sulfur Dioxide ($SO_2$) | 3.03 | lb/hr | 3.0256 | 26503.91 | 13.25 |
| Carbon Monoxide (CO) | 0.37 | lb/MMBtu | 0.3700 | 3241.20 | 1.62 |
| Volatile Organic Compounds (VOC) | 0.0518 | lb/MMBtu | 0.0518 | 453.77 | 0.23 |
| Hydrogen Sulfide ($H_2S$) | 0.0328 | lb/hr | 0.0328 | 287.35 | 0.14 |

[1]Emission Factors for $NO_x$, $SO_2$, and VOC from AP-42 Tables 13.5-1 and 13.5-2 (9/91), $SO_2$ and $H_2S$ from the established from information/calculation above

**Pilot Emissions**

| | | |
|---|---|---|
| Total Heat Input Capacity of Pilot | 0.1 | MMBtu/hr |
| Heating Value | 1020 | Btu/scf |
| Operating Time | 8760 | hr/yr |
| Total Natural Gas Usage | 0.000098 | MMscf/hr |

| Pollutant | (A) Emission Factor[1] (lb/MMscf) | (B) = (A)x MMscf/hr Potential Emission Rate (lbs/hr) | (C) = (B)xOT Potential Emission Rate (lbs/year) | (D) = (C)/2000 Potential Emission Rate (tons/year) |
|---|---|---|---|---|
| Particulate Matter (PM) | 7.6 | 0.0007 | 6.5271 | 0.0033 |
| Particulate Matter ($PM_{10}$) | 7.6 | 0.0007 | 6.5271 | 0.0033 |
| Nitrogen Oxides ($NO_x$) | 100 | 0.0098 | 85.8824 | 0.0429 |
| Sulfur Dioxide ($SO_2$) | 0.6 | 0.0001 | 0.5153 | 0.0003 |
| Carbon Monoxide (CO) | 84 | 0.0082 | 72.1412 | 0.0361 |
| Volatile Organic Compounds (VOC) | 5.5 | 0.0005 | 4.7235 | 0.0024 |

[1]Emission Factors from AP-42 Tables 1.4-1, 1.4-2, 1.4-3, and 1.4-4 (7/98)

**Total Flare Emissions**

| Pollutant | Total Potential Emission Rate (tons/year) |
|---|---|
| Particulate Matter (PM) | 0.0033 |
| Particulate Matter ($PM_{10}$) | 0.0033 |
| Sulfur Dioxide ($SO_2$) | 13.2523 |
| Nitrogen Oxides ($NO_x$) | 0.4171 |
| Carbon Monoxide (CO) | 1.6567 |
| Volatile Organic Compounds (VOC) | 0.2293 |
| Hydrogen Sulfide ($H_2S$) | 0.14 |

## Fact Sheet Attachment: Liquid Loadout Flare (Scenarios A and B)

**KAAPA Ethanol, LLC.**
**Facility ID #75073**
**Emission Point EP-4000**

**Potential to Emit Calculations for Emissions from the Liquid Loadout Flare**

### Flaring Emissions

| | | |
|---|---|---|
| Flare Heat Input Capacity | 7.3 | MMBtu/hr |
| Operating Time | 8,760 | hr/yr |

| Pollutant | (A) Emission Factor (lb/MMBtu) | (B) = (A)x MMBtu/hr Potential Emission Rate (lbs/hr) | (C) = (B)xOT Potential Emission Rate (lbs/year) | (D) = (C)/2000 Potential Emission Rate (tons/year) |
|---|---|---|---|---|
| Particulate Matter (PM) | Negligible, Smokeless Design | | | |
| Particulate Matter ($PM_{10}$) | Negligible, Smokeless Design | | | |
| Sulfur Oxides ($SO_x$) | Negligible, Due to fuel type | | | |
| Nitrogen Oxides ($NO_x$) | 0.068 | 0.50 | 4348.46 | 2.17 |
| Carbon Monoxide (CO) | 0.37 | 2.70 | 23660.76 | 11.83 |

[1]Emission Factors for Waste Gas from AP-42 Tables 13.5-1 and 13.5-2 (9/91) in lb/MMBtu

### Pilot Emissions

| | | |
|---|---|---|
| Total Heat Input Capacity of Pilot | 0.100 | MMBtu/hr |
| Heating Value | 1020 | Btu/scf |
| Operating Time | 8760 | hr/yr |
| Total Natural Gas Usage | 0.0001 | MMscf/hr |

| Pollutant | (A) Emission Factor[1] (lb/MMscf) | (B) = (A)x MMscf/hr Potential Emission Rate (lbs/hr) | (C) = (B)xOT Potential Emission Rate (lbs/year) | (D) = (C)/2000 Potential Emission Rate (tons/year) |
|---|---|---|---|---|
| Particulate Matter (PM) | 7.6 | 0.0007 | 6.5271 | 0.0033 |
| Particulate Matter ($PM_{10}$) | 7.6 | 0.0007 | 6.5271 | 0.0033 |
| Sulfur Dioxide ($SO_2$) | 0.6 | 0.0001 | 0.5153 | 0.0003 |
| Nitrogen Oxides ($NO_x$) | 100 | 0.0098 | 85.8824 | 0.0429 |
| Carbon Monoxide (CO) | 84 | 0.0082 | 72.1412 | 0.0361 |
| Volatile Organic Compounds (VOC) | 5.5 | 0.0005 | 4.7235 | 0.0024 |

[1]Emission Factors from AP-42 Tables 1.4-1, 1.4-2, 1.4-3, and 1.4-4 (7/98)

### Total Flare Emissions

| Pollutant | Total Potential Emission Rate (tons/year) |
|---|---|
| Particulate Matter (PM) | 0.0033 |
| Particulate Matter ($PM_{10}$) | 0.0033 |
| Sulfur Dioxide ($SO_2$) | 0.0003 |
| Nitrogen Oxides ($NO_x$) | 2.22 |
| Carbon Monoxide (CO) | 11.87 |
| Volatile Organic Compounds (VOC) | 0.0024 |

## Fact Sheet Attachment: Ethanol Liquid Loadout (Scenario C)

**KAAPA Ethanol, LLC.**
**Facility ID #75073**
**Emission Point F-4000**

| | | |
|---|---|---|
| Anhydrous Ethanol Loading Rate: | 104.50 | MMgal/yr |
| Denaturant Loading Rate: | 5.50 | MMgal/yr |
| Denatured Ethanol Loading Rate: | 110.00 | MMgal/yr |
| Denatured Ethanol Loadout via Truck Limitation | 55.00 | MMgal/yr |

Vapor Recovery Control Efficiency provided in Application

| | Truck loadout | Rail loadout |
|---|---|---|
| Capture efficiency: | 90.0% | 90.0% |
| Control efficiency: | 98.0% | 98.0% |
| Overall control efficiency: | 88.2% | 88.2% |

Material Physical Data

| | Gasoline (RVP-13) | Ethanol | Denaturant (Natural Gasoline) |
|---|---|---|---|
| Molecular weight (M, lbs/lbs-mole) | 62 | 49.9 | 62 |
| Temperature (T, deg R)[1] | 509.71 | 509.71 | 509.71 |
| Vapor pressure (P, psia) | 5.96 | 0.636 | 5.96 |
| Liquid molecular weight (ML) | 92 | 46 | 92 |
| Density (D, lb/gal) | 5.6 | 6.6 | 5.6 |
| Liquid Mole Fraction (X)[2] | N/A | 0.98 | 0.02 |

[1]Temperatures from TANKS 4.09d, average ambient temperature for Grand Island, NE
[2]Liquid Mole Fraction (X) was calculated as follows, where V = loading rate:

$$X = \frac{\left(\frac{D * V}{ML}\right)}{\left(\frac{D_{ethanol} * V_{ethanol}}{ML_{ethanol}}\right) + \left(\frac{D_{denaturant} * V_{denaturant}}{ML_{denaturant}}\right)}$$

Hazardous Air Pollutant Weight Fractions

| Individual HAPs | Weight Fraction of VOC Emissions | | |
|---|---|---|---|
| | Gasoline | Ethanol | Denaturant |
| Acetaldehyde | N/A | 2.00E-04 | N/A |
| Benzene | 2.50E-03 | N/A | 2.50E-03 |
| Carbon disulfide | 2.00E-05 | N/A | 2.00E-05 |
| Cumene | 1.00E-04 | N/A | 1.00E-04 |
| Ethyl benzene | 5.00E-05 | N/A | 5.00E-05 |
| n-Hexane | 5.00E-02 | N/A | 5.00E-02 |
| Methanol | N/A | 2.00E-04 | N/A |
| Toluene | 5.00E-03 | N/A | 5.00E-03 |
| Xylene | 5.00E-04 | N/A | 5.00E-04 |
| Total HAPs | 5.82E-02 | 4.00E-04 | 5.82E-02 |

Saturation Factors

| | | |
|---|---|---|
| $S_{normal\ dedicated,\ submerged\ loading}$ | 0.6 | Saturation factor |
| $S_{clean\ cargo,\ submerged\ loading}$ | 0.5 | Saturation factor |

Truck loadout is assumed to be non-dedicated trucks, which previous load was unleaded gasoline.
The gasoline vapors are assumed to be displaced by the ethanol, for worst-case assumption.
Rail loadout is assumed to be in dedicated railcars, which previous load was denatured ethanol.

VOC Emissions

Denatured Ethanol Emission Factor Calculations

| | Truck Loadout Uncontrolled Emission Factor (lbs VOC/Mgal) | Railcar Loadout Uncontrolled Emission Factor (lbs VOC/Mgal) |
|---|---|---|
| $EF_{gasoline}$ | 0.903 | N/A |
| $EF_{ethanol}$ | 0.380 | 0.380 |
| $EF_{denaturant}$ | 0.099 | 0.099 |
| $EF_{voc}$ | 1.382 | 0.479 |

VOC emission factor equation from AP-42, Section 5.2.2 - Loading Losses (1/1995)
EF = 12.46*S*P*M/T*(1-eff/100)*X = lbs/Mgal per component
$EF_{gasoline}$ emission factors assumes $S = S_{normal} - S_{clean\ cargo}$ and do not use the Liquid Mole Fraction (X) in the equations.

## Fact Sheet Attachment: Ethanol Liquid Loadout (Scenarios A and B)

**KAAPA Ethanol, LLC.**
**Facility ID #75073**
**Emission Point F-4000**

| | | |
|---|---|---|
| Anhydrous Ethanol Loading Rate: | 57.00 | MMgal/yr |
| Denaturant Loading Rate: | 3.00 | MMgal/yr |
| Denatured Ethanol Loading Rate: | 60.00 | MMgal/yr |
| Denatured Ethanol Loadout via Truck Limitation | 60.00 | MMgal/yr |

Vapor Recovery Control Efficiency provided in Application

| | Truck loadout | Rail loadout |
|---|---|---|
| Capture efficiency: | 90.0% | 0.0% |
| Control efficiency: | 98.0% | 0.0% |
| Overall control efficiency: | 88.2% | 0.0% |

Material Physical Data

| | Gasoline (RVP-13) | Ethanol | Denaturant (Natural Gasoline) |
|---|---|---|---|
| Molecular weight (M, lbs/lbs-mole) | 62 | 49.9 | 62 |
| Temperature (T, deg R)[1] | 509.71 | 509.71 | 509.71 |
| Vapor pressure (P, psia) | 5.96 | 0.636 | 5.96 |
| Liquid molecular weight (ML) | 92 | 46 | 92 |
| Density (D, lb/gal) | 5.6 | 6.6 | 5.6 |
| Liquid Mole Fraction (X)[2] | N/A | 0.98 | 0.02 |

[1]Temperatures from TANKS 4.09d, average ambient temperature for Grand Island, NE
[2]Liquid Mole Fraction (X) was calculated as follows, where V = loading rate:

$$X = \frac{\left(\frac{D * V}{ML}\right)}{\left(\frac{D_{ethanol} * V_{ethanol}}{ML_{ethanol}}\right) + \left(\frac{D_{denaturant} * V_{denaturant}}{ML_{denaturant}}\right)}$$

Hazardous Air Pollutant Weight Fractions

| Individual HAPs | Weight Fraction of VOC Emissions | | |
|---|---|---|---|
| | Gasoline | Ethanol | Denaturant |
| Acetaldehyde | N/A | 2.00E-04 | N/A |
| Benzene | 2.50E-03 | N/A | 2.50E-03 |
| Carbon disulfide | 2.00E-05 | N/A | 2.00E-05 |
| Cumene | 1.00E-04 | N/A | 1.00E-04 |
| Ethyl benzene | 5.00E-05 | N/A | 5.00E-05 |
| n-Hexane | 5.00E-02 | N/A | 5.00E-02 |
| Methanol | N/A | 2.00E-04 | N/A |
| Toluene | 5.00E-03 | N/A | 5.00E-03 |
| Xylene | 5.00E-04 | N/A | 5.00E-04 |
| Total HAPs | 5.82E-02 | 4.00E-04 | 5.82E-02 |

Saturation Factors

| | | |
|---|---|---|
| $S_{normal\ dedicated,\ submerged\ loading}$ | 0.6 | Saturation factor |
| $S_{clean\ cargo,\ submerged\ loading}$ | 0.5 | Saturation factor |

Truck loadout is assumed to be non-dedicated trucks, which previous load was unleaded gasoline.
The gasoline vapors are assumed to be displaced by the ethanol, for worst-case assumption.
Rail loadout is assumed to be in dedicated railcars, which previous load was denatured ethanol.

**VOC Emissions**

Denatured Ethanol Emission Factor Calculations

| | Truck Loadout Uncontrolled Emission Factor (lbs VOC/Mgal) | Railcar Loadout Uncontrolled Emission Factor (lbs VOC/Mgal) |
|---|---|---|
| $EF_{gasoline}$ | 0.903 | N/A |
| $EF_{ethanol}$ | 0.380 | 0.380 |
| $EF_{denaturant}$ | 0.099 | 0.099 |
| $EF_{voc}$ | 1.382 | 0.479 |

VOC emission factor equation from AP-42, Section 5.2.2 - Loading Losses (1/1995)
EF = 12.46*S*P*M/T*(1-eff/100)*X = lbs/Mgal per component
$EF_{gasoline}$ emission factors assume $S = S_{normal} - S_{clean\ cargo}$ and do not use the Liquid Mole Fraction (X) in the equations.

## Fact Sheet Attachment: Dryer Thermal Oxidizer (continued)

**KAAPA Ethanol, LLC.**
**Facility ID #75073**
**Emission Point EP-5005**
**Installation Date: NEW**

**Thermal Oxidizer Process Emissions**

| | | |
|---|---|---|
| Anhydrous Ethanol Produced | 104,500,000 | gallons/year |
| DDGS Produced (DDGS): | 204,400 | tons/year |
| | 23.33 | tons/hr |

| Pollutant | (A) Controlled Emission Factor[1] (lb/ton DDGS) | Potential Controlled Emission Rate | |
|---|---|---|---|
| | | (B) = (A) x ton DDGS/hr (lb/hr) | (C) = (A) x ton DDGS/yr/2000 (ton/yr) |
| Particulate Matter (PM) | 0.11 | 2.57 | 11.24 |
| Particulate Matter ($PM_{10}$) | 0.11 | 2.57 | 11.24 |
| Sulfur Dioxide ($SO_2$)[2] | 0.0013 | 15.51 | 67.93 |
| Carbon Monoxide (CO) | 0.4 | 9.33 | 40.88 |
| Volatile Organic Compounds (VOC) | 0.25 | 5.83 | 25.55 |
| Individual Hazardous Air Pollutants (HAP) | | | |
| Acetaldehyde | 0.0163 | 0.3792 | 1.6608 |
| Acrolein | 0.0025 | 0.0578 | 0.2529 |
| Formaldehyde | 0.0023 | 0.0537 | 0.2351 |
| Methanol | 0.0024 | 0.0554 | 0.2427 |
| Total HAPs | - | 0.5460 | 2.3915 |

[1]Emission Factors provided by facility

[2]Use of Sulfuric Acid to control pH in the process is the source of sulfur in the process emissions, Emission factor in units of lb/gallons ETOH produced

## Fact Sheet Attachment: Dryer Thermal Oxidizer (Scenario C)

**KAAPA Ethanol, LLC.**
**Facility ID #75073**
**Emission Point EP-5005**
**Installation Date: NEW**

**Emission Units Routed to the Dryer Thermal Oxidizer**

| Emission Unit ID | Emission Source | Installation Date |
|---|---|---|
| EU78 | DDGS Dryer | NEW |

**Natural Gas Combustion Emissions from Dryer (One (1) 90.0 MMBtu/hr Units)**

| | | | | |
|---|---|---|---|---|
| Total Heat Input Capacity | 90.0 | MMBtu/hr | | |
| Heat Content of Natural Gas<br>AP-42, Table 1.4-1, Footnote a | 1020 | MMBtu/MMscf | | |
| Potential Natural Gas Throughput | 0.0882 | MMscf/hr = | 772.6 | MMscf/yr |
| Limited Natural Gas Throughput | No Limit | MMscf/yr | | |
| Limited Operating Hours | No Limit | hr/year | | |

| Pollutant | (A) Emission Factor[1] (lb/MMscf) | (B) = (A) x MMscf/hr Emission Rate (lbs/hr) | | (C)[2] Emission Rate (lbs/year) | | (D) = (C)/2000 Emission Rate (tons/year) | |
|---|---|---|---|---|---|---|---|
| | | Potential | Limited | Potential | Limited | Potential | Limited |
| Nitrogen Oxides ($NO_x$) | 54.06 | 4.7681 | 4.7681 | 41768.4859 | 41768.4859 | 20.8842 | 20.8842 |
| Individual Hazardous Air Pollutants (HAP) | | | | | | | |
| Benzene | 0.0021 | 1.85E-04 | 1.85E-04 | 1.62E+00 | 1.62E+00 | 8.11E-04 | 8.11E-04 |
| Dichlorobenzene | 0.0012 | 1.06E-04 | 1.06E-04 | 9.27E-01 | 9.27E-01 | 4.64E-04 | 4.64E-04 |
| Formaldehyde | 0.075 | 6.62E-03 | 6.62E-03 | 5.79E+01 | 5.79E+01 | 2.90E-02 | 2.90E-02 |
| Hexane | 1.8 | 1.59E-01 | 1.59E-01 | 1.39E+03 | 1.39E+03 | 6.95E-01 | 6.95E-01 |
| Lead Compounds | 0.0005 | 4.41E-05 | 4.41E-05 | 3.86E-01 | 3.86E-01 | 1.93E-04 | 1.93E-04 |
| Naphthalene | 0.00061 | 5.38E-05 | 5.38E-05 | 4.71E-01 | 4.71E-01 | 2.36E-04 | 2.36E-04 |
| Polycyclic Organic Matter (POM) | 0.0000882 | 7.78E-06 | 7.78E-06 | 6.81E-02 | 6.81E-02 | 3.41E-05 | 3.41E-05 |
| Toluene | 0.0034 | 3.00E-04 | 3.00E-04 | 2.63E+00 | 2.63E+00 | 1.31E-03 | 1.31E-03 |
| Arsenic Compounds (ASC) | 0.0002 | 1.76E-05 | 1.76E-05 | 1.55E-01 | 1.55E-01 | 7.73E-05 | 7.73E-05 |
| Beryllium Compounds (BEC) | 0.000012 | 1.06E-06 | 1.06E-06 | 9.30E-03 | 9.27E-03 | 4.65E-06 | 4.64E-06 |
| Cadmium Compounds (CDC) | 0.0011 | 9.70E-05 | 9.70E-05 | 8.50E-01 | 8.50E-01 | 4.25E-04 | 4.25E-04 |
| Chromium Compounds (CRC) | 0.0014 | 1.23E-04 | 1.23E-04 | 1.08E+00 | 1.08E+00 | 5.41E-04 | 5.41E-04 |
| Cobalt Compounds (COC) | 0.000084 | 7.41E-06 | 7.41E-06 | 6.49E-02 | 6.49E-02 | 3.25E-05 | 3.25E-05 |
| Manganese Compounds (MNC) | 0.00038 | 3.35E-05 | 3.35E-05 | 2.94E-01 | 2.94E-01 | 1.47E-04 | 1.47E-04 |
| Mercury Compounds (HGC) | 0.00026 | 2.29E-05 | 2.29E-05 | 2.01E-01 | 2.01E-01 | 1.00E-04 | 1.00E-04 |
| Nickel Compounds (NIC) | 0.0021 | 1.85E-04 | 1.85E-04 | 1.62E+00 | 1.62E+00 | 8.11E-04 | 8.11E-04 |
| Selenium Compounds (SEC) | 0.000024 | 2.12E-06 | 2.12E-06 | 1.85E-02 | 1.85E-02 | 9.25E-06 | 9.27E-06 |
| Total HAPs | 1.8884582 | 0.1666 | 0.1666 | 1459.0832 | 1459.0832 | 0.7295 | 0.7295 |

[1]Emission Factors from AP-42 Tables 1.4-1, 1.4-2, 1.4-3, and 1.4-4 (7/98); $NO_x$ Emission Factor Provided by in application 0.053 lb/MMBtu

[2]For Potential Emissions (C) = (B) x 8,760 (hours/year); For Limited Emissions, if no operational limitations (C) = (B) x 8,760 (hours/year), if natural gas throughput limitation (C) = Limited Throughput (MMscf/year) x (A) (lb/MMscf), if hourly limitation (C) = Limited Hours (hours/year) x (B)

## Fact Sheet Attachment: Scrubber Thermal Oxidizer (Scenario C)

**KAAPA Ethanol, LLC.**
**Facility ID #75073**
**Emission Point EP-3004**
**Installation Date: NEW**

**Emission Units Routed to the Thermal Oxidizer**

| Emission Unit ID | Emission Source | Installation Date |
|---|---|---|
| EU64/EP-3000 | Fermentation Scrubber #1 | 2003 |
| EU65/EP-3001 | Fermentation Scrubber #2 | NEW |
| EU66/EP-3002 | Distillation Scrubber #1 | 2003 |
| EU67/EP-3003 | Distillation Scrubber #2 | NEW |

**Natural Gas Combustion Emissions from RTO (One (1) 2.5 MMBtu/hr Unit)**

| | | | | | |
|---|---|---|---|---|---|
| Total Heat Input Capacity | 2.5 | MMBtu/hr | | | |
| Potential Natural Gas Throughput | 0.0025 | MMscf/hr | = | 21.9 | MMscf/yr |

| Pollutant | (A) Emission Factor[1] (lb/MMscf) | (B) = (A)x MMscf/hr Potential Emission Rate (lbs/hr) | (C) = (B)x8760 Potential Emission Rate (lbs/year) | (D) = (C)/2000 Potential Emission Rate (tons/year) |
|---|---|---|---|---|
| Particulate Matter (PM) | 7.6 | 0.0190 | 166.44 | 0.08 |
| Particulate Matter ($PM_{10}$) | 7.6 | 0.0190 | 166.44 | 0.08 |
| Sulfur Dioxide ($SO_2$) | 0.6 | 0.0015 | 13.14 | 0.01 |
| Nitrogen Oxides ($NO_x$)[2] | 0.1 | 0.2500 | 2190.00 | 1.10 |
| Carbon Monoxide (CO)[2] | 0.084 | 0.2100 | 1839.60 | 0.92 |
| Volatile Organic Compounds (VOC) | 5.5 | 0.0138 | 120.45 | 0.06 |
| Individual Hazardous Air Pollutants (HAP) | | | | |
| Benzene | 0.0021 | 5.25E-06 | 4.60E-02 | 2.30E-05 |
| Dichlorobenzene | 0.0012 | 3.00E-06 | 2.63E-02 | 1.31E-05 |
| Formaldehyde | 0.075 | 1.88E-04 | 1.64E+00 | 8.21E-04 |
| Hexane | 1.8 | 4.50E-03 | 3.94E+01 | 1.97E-02 |
| Lead Compounds | 0.0005 | 1.25E-06 | 1.10E-02 | 5.48E-06 |
| Naphthalene | 0.00061 | 1.53E-06 | 1.34E-02 | 6.68E-06 |
| Polycyclic Organic Matter (POM) | 0.0000882 | 2.21E-07 | 1.93E-03 | 9.66E-07 |
| Toluene | 0.0034 | 8.50E-06 | 7.45E-02 | 3.72E-05 |
| Arsenic Compounds (ASC) | 0.0002 | 5.00E-07 | 4.38E-03 | 2.19E-06 |
| Beryllium Compounds (BEC) | 0.000012 | 3.00E-08 | 2.63E-04 | 1.31E-07 |
| Cadmium Compounds (CDC) | 0.0011 | 2.75E-06 | 2.41E-02 | 1.20E-05 |
| Chromium Compounds (CRC) | 0.0014 | 3.50E-06 | 3.07E-02 | 1.53E-05 |
| Cobalt Compounds (COC) | 0.000084 | 2.10E-07 | 1.84E-03 | 9.20E-07 |
| Manganese Compounds (MNC) | 0.00038 | 9.50E-07 | 8.32E-03 | 4.16E-06 |
| Mercury Compounds (HGC) | 0.00026 | 6.50E-07 | 5.69E-03 | 2.85E-06 |
| Nickel Compounds (NIC) | 0.0021 | 5.25E-06 | 4.60E-02 | 2.30E-05 |
| Selenium Compounds (SEC) | 0.000024 | 6.00E-08 | 5.26E-04 | 2.63E-07 |
| Total HAPs | 1.89 | 0.0047 | 41.36 | 0.02 |

[1]Emission Factors from AP-42 Tables 1.4-1, 1.4-2, 1.4-3, and 1.4-4 (7/98)
[2]$NO_x$ and CO emission factors from facility based on standard configuration and in lb/MMBtu
Conversion Factor: 1 MMscf = 1020 MMBtu

## Fact Sheet Attachment: Fermentation Scrubber (Scenarios A and B)

**KAAPA Ethanol, LLC.**
**Facility ID #75073**
**Emission Point EP-3000**

Conversion Factors
1 lb-mol = 379.0 $ft^3$ @ 60 F

| | | |
|---|---|---|
| Flow Rate Exiting Scrubber: | 6,294 | dscf/minute |
| From October 2006 test results | 377,640 | dscf/hour |

**Emission Units Routed to Fermentation Scrubber**

| Emission Unit ID | Emission Source | Emission Unit ID | Emission Source |
|---|---|---|---|
| EU21 | Mixer | EU29 | Liquifaction Tank #3 |
| EU22 | Cook Water Tank | EU30 | Yeast Tank #1 |
| EU23 | Slurry Tank #1 | EU31 | Fermentation Tank #1 |
| EU24 | Slurry Tank #2 | EU32 | Fermentation Tank #2 |
| EU25 | Flash Tank #1 | EU33 | Fermentation Tank #3 |
| EU26 | Receiver Tank #1 | EU34 | Fermentation Tank #4 |
| EU27 | Liquifaction Tank #1 | EU35 | Fermentation Tank #5 |
| EU28 | Liquifaction Tank #2 | EU36 | Beer Well |

| Pollutant | Estimated Controlled Potential Emissions[1] | Molecular Weight | Controlled Emission Rate[2] | Controlled Emission Rate[3] | Permit Limitation[4] | Permitted Emissions[5] |
|---|---|---|---|---|---|---|
| | (ppmv,d) | (lb/lb-mol) | (lb/hour) | (ton/year) | (lb/hour) | (ton/year) |
| Volatile Organic Compounds (VOC) as VOC | - | - | 9.76 | 42.75 | 9.76 | 42.75 |
| Individual Hazardous Air Pollutants (HAP) | | | | | | |
| Acetaldehyde | 62.20 | 44.05 | 2.7301 | 11.9577 | N/A | N/A |
| Acrolein | 0.20 | 56.06 | 0.0112 | 0.0489 | N/A | N/A |
| Formaldehyde | 0.20 | 33.03 | 0.0066 | 0.0288 | N/A | N/A |
| Methanol | 0.20 | 32.04 | 0.0064 | 0.0280 | N/A | N/A |
| Total HAPs | - | - | 2.75 | 12.06 | N/A | N/A |

[1] VOC lb/hr is current permitted emission limit and HAP controlled emissions (ppvm,d) from October 2006 Stack Test Results
[2] (ppmv,d) x MW (lb/lb-mol) x Flow Rate (dscf/hour) / 379 ($ft^3$/lb-mol)
[3] Emission Rate (lb/hr) x 8,760 (hr/yr) / 2,000 (lb/ton)
[4] Permitted lb/hr emission rate
[5] (lb/hr) x 8,760 (hours/year) / 2,000 (lbs/ton)

## Fact Sheet Attachment: DDGS Cooling Cyclone (Scenario C)

**KAAPA Ethanol, LLC.**
**Facility ID #75073**
**Emission Point EP-8002**
**Installation Date: NEW**

| Emission Point ID# | Control Equipment ID# | Emission Point Description | (A) Flow Rate | (B) Emission Factor (Grain Loading) | Controlled $PM/PM_{10}$ Emissions | |
|---|---|---|---|---|---|---|
| | | | dscf/min | grains/dscf | Permit Limitation (C) = (A)x(B)x60/7000 (lb/hour) | Permitted Emissions (D) = (C)x8760/2000 (ton/year) |
| EP-8002 | CE-8002 | DDGS Cooler Baghouse | 40,000 | 0.004 | 1.37 | 6.01 |

Conversion Factors: 7,000 grains per pound; 60 minutes per hour; 8,760 hours per year; 2,000 pounds per ton

Maximum DDGS Produced (DDGS): 204,400 tons/year
23.33 tons/hr

| Pollutant | (A) Uncontrolled Emission Factor[1] (lb/ton DDGS) | Emission Rate | | Permit Limitations | |
|---|---|---|---|---|---|
| | | (B) = (A) x ton DDGS/hr (lb/hr) | (C) = (A) x ton DDGS/yr/2000 (ton/yr) | lb/hour | ton/year |
| Volatile Organic Compounds (VOC) | 0.1 | 2.33 | 10.22 | 2.40 | 10.51 |
| Individual Hazardous Air Pollutants (HAP) | | | | | |
| Acetaldehyde | 0.003 | 0.0700 | 0.3066 | N/A | N/A |
| Acrolein | 0.0013 | 0.0303 | 0.1329 | N/A | N/A |
| Formaldehyde | 0.0007 | 0.0163 | 0.0715 | N/A | N/A |
| Methanol | 0.0007 | 0.0163 | 0.0715 | N/A | N/A |
| Total HAPs | - | 0.1330 | 0.5825 | N/A | N/A |

[1]Emission Factors submitted by the facility
NOTE: Permit Limitations may be slightly higher than the predicted emission rate to account for uncertainty

**Fact Sheet Attachment: Grain Receiving, Handling, Storage, and Hammermilling (Scenario C)**

**KAAPA Ethanol, LLC.**
**Facility ID #75073**
**Emission Points: EP-1002, EP-1003, EP-2000, EP-2001, EP-2002, F-1002, EP-1004a, EP-1004b, EP-1005a, and EP-1005b**

**PM/$PM_{10}$ Emissions from Grain Receiving, Handling, Storage, and Hammermilling**

| Emission Point ID# | Control Equipment ID# | Emission Point Description | Installation Date | (A) Flow Rate | (B) Emission Factor (Grain Loading) | Controlled PM/$PM_{10}$ Emissions | |
|---|---|---|---|---|---|---|---|
| | | | | dscf/min | grains/dscf | Permit Limitations (C) = (A)x(B)x60/7000 (lb/hour) | Permitted Emissions (D) = (C)x8760/2000 (ton/year) |
| EP-1002 | CE-1002 | Grain Receiving Baghouse #1 | 2003 | 42,000 | 0.004 | 1.44 | 6.31 |
| EP-1003 | CE-1003 | Grain Receiving Baghouse #2 | NEW | 30,000 | 0.004 | 1.03 | 4.51 |
| EP-2000 | CE-2000 | Hammermill Baghouse #1 | 2003 | 9,800 | 0.004 | 0.34 | 1.47 |
| EP-2001 | CE-2001 | Hammermill Baghouse #2 | 8/2/2005 | 9,800 | 0.004 | 0.34 | 1.47 |
| EP-2002 | CE-2002 | Hammermill Baghouse #3 | NEW | 13,200 | 0.004 | 0.45 | 1.98 |

Conversion Factors: 7,000 grains per pound; 60 minutes per hour; 8,760 hours per year; 2,000 pounds per ton

**PM/$PM_{10}$ Fugitive Emissions from Grain Receiving**

| Emission Point ID# | Emission Point Description | (A) Hourly Throughput | (B) Daily Throughput | (C) Annual Throughput | (D) Percent Fugitives[1] | Emission Factors[3] (lbs/ton) | | PM Emissions | | | $PM_{10}$ Emissions | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | (tons/hour) | (tons/day) | (tons/year) | | (E) PM | (F) $PM_{10}$ | (G)=(A)x(D)x(E) (lbs/hr) | (H)=(B)x(D)x(E) (lbs/day)[2] | (I)=(C)x(D)x(E)/2000 (tons/yr) | (J)=(A)x(D)x(F) (lbs/hr) | (K)=(B)x(D)x(F) (lbs/day)[2] | (L)=(C)x(D)x(F)/2000 (tons/yr) |
| F-1002 | Grain Receiving Fugitives | 2,240 | 16,800 | 1,209,600 | 5% | 0.035 | 0.0078 | 3.92 | 29.40 | 1.06 | 0.87 | 6.552 | 0.24 |
| 1004a | Grain Storage Silo Vent #1 | 420 | - | 267,718 | 1% | 0.025 | 0.0063 | 0.11 | - | 0.03 | 0.03 | - | 0.01 |
| 1004b | Grain Storage Silo Vent #2 | 420 | - | 267,718 | 1% | 0.025 | 0.0063 | 0.11 | - | 0.03 | 0.03 | - | 0.01 |
| 1005a | Grain Storage Silo Vent #3 | 1,400 | - | 244,081 | 1% | 0.025 | 0.0063 | 0.35 | - | 0.03 | 0.09 | - | 0.01 |
| 1005b | Grain Storage Silo Vent #4 | 1,400 | - | 244,081 | 1% | 0.025 | 0.0063 | 0.35 | - | 0.03 | 0.09 | - | 0.01 |

[1]5% fugitives are assumed since unloading operations will occur in an enclosure with choke flow
[1]Storage Silos will be controlled with 99% control efficient filters
[2]Emission Factors are from AP-42 Section 9.9.1 (5/2003)
[3]lb/day emission rate is used for modeling purposes only

**Total Emissions from Grain Receiving, Handling, Storage, and Hammermilling**

| | | |
|---|---|---|
| Particulate Matter (PM) | 16.92 | tons/year |
| Particulate Matter ($PM_{10}$) | 16.01 | tons/year |

## Fact Sheet Attachment: Grain Receiving, Handling, Storage, and Hammermilling (Scenario A)

**KAAPA Ethanol, LLC.**
**Facility ID #75073**
**Emission Points: EP-1002, EP-2000, EP-2001, and F-1002**

### PM/$PM_{10}$ Emissions from Grain Receiving, Handling, Storage, and Hammermilling

| Emission Point ID# | Control Equipment ID# | Emission Point Description | Installation Date | (A) Flow Rate | (B) Emission Factor (Grain Loading) | Controlled PM/$PM_{10}$ Emissions | |
|---|---|---|---|---|---|---|---|
| | | | | dscf/min | grains/dscf | Permit Limitations (C) = (A)x(B)x60/7000 (lb/hour) | Permitted Emissions (D) = (C)x8760/2000 (ton/year) |
| EP-1002 | CE-1002 | Grain Receiving Baghouse | 2003 | 42,000 | 0.005 | 1.80 | 7.88 |
| EP-2000 | CE-2000 | Hammermill Baghouse #1 | 2003 | 9,800 | 0.01 | 0.84 | 3.68 |
| EP-2001 | CE-2001 | Hammermill Baghouse #2 | 8/2/2005 | 9,800 | 0.01 | 0.84 | 3.68 |

Conversion Factors: 7,000 grains per pound; 60 minutes per hour; 8,760 hours per year; 2,000 pounds per ton

### PM/$PM_{10}$ Fugitive Emissions from Grain Receiving

| Emission Point ID# | Emission Point Description | (A) Hourly Throughput | (B) Annual Throughput | (C) Percent Fugitives[1] | Emission Factors[2] (lbs/ton) | | PM Emissions | | $PM_{10}$ Emissions | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | (tons/hour) | (tons/year) | | (D) PM | (E) $PM_{10}$ | (F)=(A)x(C)x(D) (lbs/hr) | (G)=(B)x(C)x(D)/2000 (tons/yr) | (H)=(A)x(C)x(E) (lbs/hr) | (I)=(B)x(C)x(E)/2000 (tons/yr) |
| F-1002 | Grain Receiving Fugitives | 840 | 591,111 | 5% | 0.035 | 0.0078 | 1.47 | 0.52 | 0.33 | 0.12 |

[1]5% fugitives are assumed since unloading operations will occur in an enclosure with choke flow
[2]Emission Factors are from AP-42 Section 9.9.1 (5/2003)

### Total Emissions from Grain Receiving, Handling, Storage, and Hammermilling

| | | |
|---|---|---|
| Particulate Matter (PM) | 15.76 | tons/year |
| Particulate Matter ($PM_{10}$) | 15.36 | tons/year |

## Fact Sheet Attachment: Facility Process Information (continued)

**KAAPA Ethanol, LLC.**
**Facility ID #75073**

**Scenario B Process Information**

Scenario B is the current operating scenario of KAAPA Ethanol with the additional steel storage bins and storage pile are constructed/formed and prior to the ethanol production expansion (60 MMgal/yr to 110 MMgal/yr denatured ethanol)

**Scenario B Process Data**

| | | | | | |
|---|---|---|---|---|---|
| Maximum Capacity (Anhydrous Ethanol Produced) | 57,000,000 | gallons per year | | | |
| Grain to Ethanol Conversion Factor | 2.7 | gallons of Ethanol per bushel of corn | | | |
| Grain Density: | 56 | lb/bushel for Corn | | | |
| Total Grain Receiving Throughput: | 591,111 | ton/yr | = | 67.5 | ton/hr |
| | 591,111 | ton/yr | = | 21,111,111 | bu/yr |
| DDGS produced by a Bushel of Grain | 17 | lb DDGS/bushel of Corn | | | |
| Dryers are capable of drying % of WDGS | 0% | | | | |
| Note: The facility does not have any DGS dryers currently installed | | | | | |
| DDGS Generated (10% Moisture) | 0 | ton/yr | | | |
| DDGS Generated (Dry Basis) | 0 | ton/yr | | | |
| 100% WDGS Generated (65% Moisture) | 461,429 | ton/yr | | | |

**Scenario B Maximum Production/Throughputs**

| | | |
|---|---|---|
| Product #1: Denatured Ethanol (95% Ethanol, 5% Denaturant) | 60,000,000 | gallons/year |
| Product #2: WDGS | 461,429 | tons/year |
| Product #3: DDGS | 0 | tons/year |
| Raw Material #1: Grain | 591,111 | tons/year |
| Raw Material #2: Denaturant | 3,000,000 | gallons/year |
| Anhydrous Ethanol Produced | 57,000,000 | gallons/year |

**Scenario B Additional Information**

| | | |
|---|---|---|
| Maximum Grain Unloading by Truck | 840 | ton/hr |
| Two (2) Truck Dump Pits | | |
| Maximum Existing Concrete Silo Filling | 840 | ton/hr |
| Maximum New Steel Silo Filling | 420 | ton/hr |
| Permanent Storage Capacity | 1,773,436 | bushels |
| Two (2) 228,614 bu each concrete silos | | |
| Two (2) 658,104 bu steel bin | | |
| Storage Pile Capacity | 1,500,000 | bushels |
| Maximum Scalper Capacity (per unit, three units) | 84 | ton/hr |
| Two (2) 3,000 bu/hr each | | |
| Maximum Hammermill Capacity (per unit, three units) | 33.6 | ton/hr |
| Three (3) 1,200 bu/hr each | | |

(4) At this time the Department has not identified any NSPS, NESHAP, or MACT requirements that apply to the emission points listed in Condition III.(K)(1).

(5) Recordkeeping requirements that include documenting when routine maintenance and preventative actions are performed on the cooling towers, when equipment failures occur, and the TDS testing results.

**Condition III.(L): Equipment Leaks**
**F9000**

(1) Valves, pumps, compressors, pressure relief devices, sampling connection systems, open-ended valves or lines, flanges, or other connector in VOC service are prone to experience emission leaks. Therefore these sources of fugitive emissions are required to be tested periodically to ensure fugitive VOC and HAP emissions are maintained at a minimum.

(2) Emission limitations and testing required by NSPS, Subpart VV are required, as appropriate.

(3) Operational and monitoring requirements and limitations required by NSPS, Subpart VV are required to be complied with.

(4) Equipment leaks that occur at the source are subject to NSPS, Subparts A and VV and these regulations are required to be complied with.

(5) The owner or operator is also required to maintain appropriate records and make appropriate notifications in accordance with the NSPS requirements. Additional recordkeeping requirement have been established by the Department to ensure that adequate documentation and reporting of leak detection and repair programs are maintained.

**Condition III.(M): Haul Roads**
**F1000 and F1001**

(1) All haul roads, with the exception of the roads associated with the grain storage pile, are required to be paved.

(2) Prior to the expansion occurring, the facility's paved haul roads must comply with a silt load limitation of 3.0 grams/square meter. Once the expansion occurs, a silt load limit of 2.0 grams/square meter must be complied with established for the facility's paved haul roads. Haul road emissions must be controlled to prevent off-site transport of fugitive particulate matter. This requirement is also to limit PM and $PM_{10}$ emissions to comply with the PSD limitations. If the visible fugitive emissions go beyond the property line, then the facility may be in violation of General Condition I.(J). The facility should be conducting Best Management Practices (BMPs) to control the emissions from the haul roads. The BMPs can include, but not limited to: vacuuming, sweeping, and applying chemical stabilizers. Silt load testing is required to be conducted each quarter during the first year after the expansion occurs. This is an existing facility that has been conducting quarterly silt load testing. The table below presents the past year of silt load testing results. The Department feels that KAAPA is capable of maintaining a silt load content of 2.0 $g/m^2$.

| Date of Silt Load Testing | Silt Load ($g/m^2$) |
|---|---|
| 2/22/06 | 1.059 |
| 11/5/05 | 0.881 |
| 9/7/05 | 0.635 |
| 6/22/05 | 0.186 |

(4) At this time the Department has not identified any NSPS, NESHAP, or MACT requirements that apply to the emission points or emission units listed in Condition III.(F)(1).

(5) Recordkeeping requirements including hourly temperature averages of the RTO burners. Additional recordkeeping requirements in accordance with Specific Condition II.(A) are also required to be maintained.

**Condition III.(G): DDGS Cooling, Storage, and Loadout**
**EP-8001 and EP-8002**

(1) The owner or operator is permitted to construct and operate the units listed in the table.

(2) $PM/PM_{10}$ and VOC hourly emissions limitations have been established to ensure the facility demonstrates compliance with Title 129, Chapter 19. The emission point identified is required to be tested in order to demonstrate compliance with the limitation.

(3) The DDGS Storage and Loadout operations are required to be conducted within an enclosure for purposes of capturing the emissions generated via the unloading process. $PM/PM_{10}$ emissions generated by the DDGS storage and loadout processes are required to be controlled by one of two baghouses. In order to control particulate emissions, a baghouse must be properly operated whenever the associated emission units are in operation. One indication of baghouse malfunction is an atypical pressure drop across the baghouse. Therefore, each baghouse is required to be equipped with an operational pressure differential indicator. The facility must conduct daily observations, during the daylight hours of baghouse operation, to ensure that there are not visible emissions from the stack, leaks, noise from the unit, or atypical pressure differential readings. By requiring daily observations, the Department is confident that baghouse malfunctions will be detected quickly and be corrected. The facility is required to keep an on-site inventory of spare bags of each type used. If a baghouse is not operating properly (i.e. has a blown bag), it is expected that there will be excess emissions emitted from the unit. Keeping spare bags will minimize the duration of excess emissions.

(4) At this time the Department has not identified any NSPS, NESHAP, or MACT requirements that apply to the emission points listed in Condition III.(G)(1).

(5) Recordkeeping requirements that include documenting pressure differential indicator readings, indicators that corrective action is needed, when baghouse filters are replaced, observations and corrective actions taken. Additional recordkeeping requirements in accordance with Specific Condition II.(A) are also required to be maintained, which includes but is not limited to documenting equipment failures and malfunctions.

**Condition III.(H): Biomethanator Operations**
**EP-7001 and EP-7002**

(1) The facility is permitted to construct the equipment listed in the table.

(2) There are no emission limitations applicable to these emission points.

(3) The permittee is required to combust all the biogas generated in the biomethanator in either the biomethanator flares or RTO #1. Biomethanator and flare operation and maintenance requirements are included to ensure that the control equipment is operating correctly and is maintained.

(4) At this time the Department has not identified any NSPS, NESHAP, or MACT requirements that apply to the emission points or emission units listed in Condition III.(H)(1).

(5) Recordkeeping requirements shall be completed in accordance with Specific Condition II.(A)

the facility expands, all of the existing and newly constructed scrubbers must be routed to a regenerative thermal oxidizer. Testing is required to occur on the new RTO in order to ensure emissions are below major source thresholds and to verify the emission calculations and air modeling conducted.

(3) In order to control VOC and HAP emissions, a scrubber must be properly operated whenever the associated emission units are in operation. Each scrubber is required to be equipped with devices capable of monitoring scrubbing liquid temperature and flow rate, and pressure differential of the unit. These three parameters are important in determining whether a scrubber is providing enough emissions control. Specific operating parameters or parameter ranges, with averaging periods, will be incorporated into the source's operating permit. Specific parameters are not being established at this time since it is unknown what the monitored parameters will need to be and what the values will be to ensure compliance with the permitted emission limits. The facility must conduct daily observations, during the daylight hours of scrubber operation, to ensure that there are no visible emissions from the stack, leaks, or noise from the unit. By requiring daily observations, the Department is confident that scrubber malfunctions will be detected quickly and be corrected. Specific operating parameters shall be established in the operating permit to ensure proper emissions control. The RTO must be properly operated whenever the associated emission units are in operation. Each RTO is required to be equipped with a device capable of monitoring and recording the temperature of the RTO's combustion chamber(s). The combustion chamber temperature is important in determining whether an RTO is providing enough emissions control. The hourly-average temperature is required to be maintained. Specific operating parameters or parameter ranges will be incorporated into the source's operating permit. Specific parameters are not being established at this time since it is unknown what all of the monitored parameters will need to be and what the values will be to ensure compliance with the permitted emission limits. The facility must conduct daily observations, during the daylight hours of RTO operation, to ensure that there are not visible emissions from the stack, leaks, or noise from the unit. By requiring daily observations, the Department is confident that RTO malfunctions will be detected quickly and be corrected. Specific operating parameters shall be established in the operating permit to ensure proper emissions control.

(4) At this time the Department has not identified any NSPS, NESHAP, or MACT requirements that apply to the emission points or emission units listed in Condition III.(C)(1).

(5) Recordkeeping requirements that include documenting scrubbing liquid temperature and flow rate, pressure differential indicator readings, and observations and corrective actions taken on the scrubbers. Recordkeeping requirements that include documenting hourly-temperature averages and types of observations and corrective actions taken on the RTO. Additional recordkeeping requirements in accordance with Specific Condition II.(A) are also required to be maintained, which includes but is not limited to documenting equipment failures and malfunctions.

**<u>Condition III.(D): Tanks</u>**
**EP-9001 through EP-9010**

(1) The owner or operator is permitted to construct the storage and process tanks, at the capacity and for the products, listed in the table.

(2) There are no emission limitations being established for these emission points. Testing will be conducted in accordance with the NSPS subpart.

(3) All of the tanks that exist and are being constructed at KAAPA are required to be installed with internal floating roofs to comply with State HAP BACT requirements (Chapter 27).

test data is preferred over information obtained from vendor guarantees, vendor/engineering estimates, and/or AP-42. The source is required to keep records of all documentation necessary to support the emission calculations, especially when the data being used is different from the initial assumptions.

II.(F) This condition is applicable prior to the expansion and requires the owner or operator to construct the source in accordance with the minimum stack heights and stack orientations presented in the table. Air dispersion modeling conducted for the source indicated that if these stack parameters are modified, the NAAQS might be exceeded. The owner or operator is also required to restrict public access in order to define where ambient air is located.

II.(G) This condition is applicable after the expansion occurs and requires the owner or operator to construct the source in accordance with the minimum stack heights and maximum stack diameters presented in the table. Air dispersion modeling conducted for the source indicated that if these stack parameters are modified, the NAAQS might be exceeded. If the source is constructed with different stack parameters, a revised modeling analysis must be submitted to the Department to ensure that a NAAQS exceedance is not modeled. The owner or operator is also required to restrict public access in order to define where ambient air is located. Air dispersion modeling conducted for the source indicated that if the fenceline is modified, the NAAQS might be exceeded. If the source is constructed with a different fenceline, a revised modeling analysis must be submitted to the Department to ensure that a NAAQS exceedance is not modeled.

II.(H) KAAPA is required to notify the Department when anhydrous ethanol production equals or exceeds 200,000 gallons per day for three consecutive days so that the Department is aware that the new emission limitations are not in effect.

II.(I) KAAPA has requested a daily grain throughput limitation of 600,000 bushels of grain per day and 43,200,000 bushels of grain per year in order to limit the fugitive emissions associated with grain unloading. If daily and annual throughput limitations were not established, the source would not be in compliance with the ambient air quality standard. The facility will be able to track the amount of grain that is received by weighing the grain delivery trucks before and after the grain is unloaded at the facility.

**Emission Point Conditions contained in the proposed permit are discussed as follows:**

**<u>Condition III.(A): Grain Storage</u>**
**EP-1005a, EP-1005b, and EP-1006**

(1) The owner or operator is permitted to construct the emission points and associated emission units contained in the table.
(2) No emission limitations and testing requirements are associated with the emission points or emission units identified in Condition III.(A)(1).
(3) Emissions from grain storage silos #5 and #6 shall be controlled by filters that are 99% efficient once the expansion occurs. The efficiency shall be demonstrated by manufacturer documentation. The filters are required in order for the source to be minor for PSD after the expansion.
(4) At this time the Department has not identified any NSPS, NESHAP, or MACT requirements that apply to the emission points or emission units listed in Condition III.(A)(1).
(5) The owner or operator is required to maintain records including when filters are replaced on the silos. Additional recordkeeping requirements in accordance with Specific Condition

Condition XIII.(G): This condition applies to liquid product loading of ethanol. This process is now permitted in Condition III.(E) for Ethanol Liquid Loading. The requirements have not been altered significantly.

Condition XIII.(H): This condition is for the existing cooling tower. The existing cooling tower is now permitted in Condition III.(K), along with the new cooling tower that is being constructed. The cooling tower requirements have not been altered significantly.

Condition XIII.(I): This condition is for the biomethanator operations. The biomethanator operations are now permitted in Condition III.(H) along with the new biomethanator system that will constructed with the expansion. The methane generated from the biomethantors is no longer permitted to be combusted in the boilers, it will also be combusted in the RTO responsible for controlling emissions from the fermentation and distillation scrubbers (RTO #1). The biomethanator flare requirements remain unchanged. The emissions resulting from combusting biogas have been incorporated into the facility-wide potential to emit (PTE) calculation.

Condition XIII.(J): This condition is for the emergency equipment, the one (1) 190 HP, diesel fired emergency fire water pump. The emergency fire water pump is now permitted in Condition III.(J). The requirements for the fire water pump have not been altered. A fuel sulfur limit of 0.05% by weight has been added to ensure that the unit is in compliance with Title 129, Chapter 35.

Condition XIII.(K): This condition limits the facility-wide HAP emission below the major source thresholds. This requirement has been incorporated into Condition II.(E).

Condition XIII.(L): This condition established stack height requirements for several of the emission units based on the air dispersion modeling analysis that was conducted for the facility and other requirements in place for compliance with the NAAQS. Requirements associated with NAAQS compliance prior to the expansion are now located in Condition II.(F).

Conditions XIII.(M), (N), and (P): These conditions has been removed from the permit. The conditions does not need to be included since the requirements are explicitly stated in Title 129, Chapter 20, Chapter 24, and Chapter 35 respectively. All sources are subject to these requirements and therefore do not to be in the specific conditions of this permit.

Condition XIII.(O): This condition established performance testing requirements. The current performance testing requirements are now located in Condition II.(D).

Condition XIII.(R): This condition lists all of the monitoring and related recordkeeping and reporting requirements for the facility. The recordkeeping requirements are now located with the emission point that they support and in Condition II.(A). Recordkeeping has been updated to reflect the changes made to the permit.

**Permit conditions specific to the proposed permit are discussed as follows:**

II.(A) This condition contains general recordkeeping and reporting requirements that apply to all permitted emission units, control equipment, and monitoring devices. These requirements establish several things including, a completion date when records must be completed, how long records need to be maintained, and identifying specific types of records that must be maintained. Records are required to be maintained to ensure compliance with all applicable requirements, specifically those required in this permit. However, additional recordkeeping requirements may

Subpart Q – National Emission Standards for Hazardous Air Pollutants for Industrial Process Cooling Towers: This subpart, adopted by reference in Title 129, Chapter 28, Section 001.04, applies to industrial process cooling towers that are operated with chromium-based water treatment chemicals and are located at major facilities for HAPs (≥10 tons/year of individual HAP or ≥ 25 tons/year of combined HAPs). This facility is exempt from this subpart because the facility is limited to below the major source thresholds. Also, no chromium-based water treatment chemicals are expected to be used for the cooling towers.

Subpart EEEE – National Emission Standards for Hazardous Air Pollutants for Organic Liquids Distribution (non-gasoline): This subpart, adopted by reference in Title 129, Chapter 28, Section 001.83, applies to major HAP facilities (≥10 tons/year of individual HAP or ≥ 25 tons/year of combined HAPs), which have organic liquids distribution. The organic liquids distribution operation must have 7.29 million gallons per year or more either into or out of the operation to be subject to this subpart. Organic liquids are all crude oils other than black oil, and those liquids or liquid mixtures, except gasoline, that contain a total of 5 percent by weight or more of the organic HAP listed in the subpart (including acetaldehyde, methanol, benzene, carbon disulfide, cumene, ethyl benzene, hexane, toluene, xylenes). Fuels used on-site (such as fuels used for fleet refueling) are exempt from this subpart. If the facility-wide HAP emissions exceed the major source threshold, then an analysis will need to be conducted on the organic liquid distribution operations to determine if this subpart is applicable.

Subpart FFFF – National Emission Standards for Hazardous Air Pollutants for Miscellaneous Organic Chemical Manufacturing: This subpart, adopted by reference in Title 129, Chapter 28, Section 001.78, applies to major HAP facilities (≥10 tons/year of individual HAP or ≥ 25 tons/year of combined HAPs), which own or operate miscellaneous organic chemical manufacturing process units (MCPU). An MCPU includes equipment necessary to operate a miscellaneous organic chemical manufacturing process, as defined in §63.2550 (process includes reaction, recovery, separation, purification, or other activity, operation, manufacture, or treatment which are used to produce a product of isolated intermediate), that produce an organic chemical(s) in the specified SIC (includes SIC code 2869), and it processes, uses, or produces HAP. If the facility-wide HAP emissions exceed the major source threshold, then the miscellaneous organic chemical manufacturing units and operations would be subject to this NESHAP.

Subpart ZZZZ – Stationary Reciprocating Internal Combustion Engines (RICE): This subpart, adopted by reference in Title 129, Chapter 28, Section 001.88, currently applies to stationary reciprocating internal combustion engines (non-road) equal to or greater than 500 brake horsepower (bhp) that are located at major HAP sources (≥10 tons/year of individual HAP or ≥ 25 tons/year of combined HAPs). Proposed changes to this rule were published in the Federal Register on July 12, 2006 (71 FR 33804-33855). The proposed rule extends coverage to RICEs that are less than 500 bhp and to RICEs of all sizes that are located at area sources of HAP. At the time this fact sheet was drafted, the existing emergency fire pump engine is not subject to this regulation. However, if the proposed rule is finalized it may be subject to the requirements.

**Past permitting conditions and how they have been incorporated into this permitting action:**

**October 22, 2002**: The construction permit issued on this date will not be discussed since the construction permits issued on February 12, 2005 and April 24, 2006 superceded it.

## Title 129, Chapter 20 – Particulate Matter Emissions

*Title 129, Chapter 20, Section 001 - Process Weight Rate*

Each of the permitted emission rate limitations ensures the process weight rate limitations will not be exceeded. The following formulas were used to determine compliance: for process weight rates up to 60,000 lbs/hr, $E= 4.10\ p^{0.67}$, and for process weight rates in excess of 60,000 lbs/hr, $E= 55.0\ p^{0.11}-40$, where E = rate of emissions in lbs/hr and p = process weight rate in tons/hr. The facility is expected to be in compliance with the process weight rate limitations. The process weight rate limitations are calculated in the Fact Sheet Attachment.

*Title 129, Chapter 20, Section 002 -Particulate Emissions from Combustion Sources*

This facility is expected to be in compliance with this regulation because the fuel combusted is natural gas. The allowable emission rates per Title 129, Chapter 20, Section 002 are calculated in the fact sheet attachment.

*Title 129, Chapter 20, Section 004 - Opacity*

All of the equipment at the facility is subject to the opacity standard (20% opacity limit) specified in Title 129, Chapter 20, Section 004. It is very unlikely the fuel burning equipment would exceed the opacity standard due to the use of natural gas and distillate fuel oil (diesel) as fuel. These fuels are considered "clean fuels" with regard to particulate emissions. In addition, control equipment used throughout the facility will help comply with the opacity standard.

## Title 129, Chapter 24 – Sulfur Compound Emissions

All fossil fuel burning equipment at the facility shall not emit sulfur oxides greater than two and one-half (2.5) pounds per million British thermal unit input (lb/MMBtu). This limit is not expected to be exceeded since natural gas and distillate fuel oil (diesel) are the only fuels being combusted at this facility. The following table presents the emission factors used to calculate the sulfur oxide emissions from the combustion equipment. It can be determined by these emission factors that the 2.5 lb/MMBtu sulfur limit should not be exceeded.

| Fuel Type | Combustion Units | Emission Factor | Emission Factor (lb/MMBtu) |
|---|---|---|---|
| Natural Gas | RTOs, Boilers, DDGS Dryers | 0.6 lb/MMscf | 0.0006 |
| Diesel Fuel | Emergency Fire Pump | 0.29 lb/MMBtu | 0.29 |

## Title 129, Chapter 27 – Hazardous Air Pollutants; Maximum Achievable Control Technology (MACT)

*Title 129, Chapter 27, Section 002 - Best Available Control Technology (BACT)*

This facility is subject to State BACT since the controlled individual HAP emissions exceed 2.5 tons/year and combined HAP emissions exceed 10 tons/year. All of the BACT equipment/activities are similar in ethanol plants that emit less than 10 tons/year of a single HAP and 25 tons/year of combined HAPs. The Department has determined that BACT equipment and activities shall include the following:

(d) Fugitive emissions associated with any truck loading station, shall not exhibit greater than 10% opacity {40 CFR 60.302(c)(3)}

Subpart Kb – Standards of Performance for Volatile Organic Liquid Storage Vessels: This subpart, adopted by reference in Title 129, Chapter 18, Section 001.62, applies to each storage vessel with a capacity greater than or equal to seventy-five (75) cubic meters ($m^3$), 19,800 gallons, that is used to store volatile organic liquids for which construction, reconstruction, or modification is commenced after July 23, 1984. Tanks that are used within a process (including a solvent or raw material recovery process) to collect material discharged from a feedstock storage vessel or equipment within the process before the material is transferred to other equipment within the process, to a product or by-product storage vessel, or to a vessel used to store recovered solvent or raw material (i.e. process vessels) are except from this subpart. At the time these permitting documents were being drafted, EPA was working on an official NSPS applicability of this subpart to the anhydrous ethanol tanks that are or will be constructed at this facility. Currently the Department classifies the anhydrous ethanol tanks that are and will be located at this facility as process tanks and therefore are not subject to this subpart. If EPA determines that this subpart applies to the large anhydrous ethanol tanks, the source will be notified. Subpart Kb is applicable to the denaturant (EU90 and EU95) and denatured ethanol storage (EU87, EU88, EU92, and EU93) tanks.

The NSPS, Subpart Kb requirements include, but are not limited to, the following:

(a) The tanks shall each be equipped with an internal floating roof, in accordance with the specifications in 40 CFR 60.112b(a)(1).

(b) The tanks shall each be visibly inspected and repaired in accordance with testing and procedures per 40 CFR 60.113b(a).

(c) The owner or operator of the affected tanks shall report and keep records as described in 40 CFR 60.115b – Reporting and record keeping requirements and in 40 CFR 60.116b – Monitoring of operations.

Subpart VV – Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry: This subpart, adopted by reference in Title 129, Chapter 18, Section 001.14, applies to each pump, compressor, pressure relief device, sampling connection system, open-ended valve or line, valve, and flange or other connector in VOC service and any devices or systems required by this subpart located at a synthetic organic chemical manufacturing facility that commences construction or modification after January 5, 1981. This subpart is associated with NSPS, Subparts NNN & RRR, but NNN & RRR are based on how the chemical is produced (biomass versus synthetic), while VV is based on the chemicals produced. Since new organic chemicals are synthesized (process doesn't matter), then all of the associated equipment leaks are subject to this subpart.

The NSPS, Subpart VV requirements include, but are not limited to, the following:

(a) Compliance with NSPS, Subpart VV shall be demonstrated for all equipment within 180 days of initial startup. (40 CFR 60.482-1)

(b) Test methods and procedures shall be consistent with the requirements found in 40 CFR 60.485.

## CO Results

The results of the CO refined modeling analysis are presented in the table below. The predicted concentrations shown are the 2nd highest predicted values for each individual year used to demonstrate compliance with the 1-hr and 8-hr standards. The modeled impacts shown are from the KAAPA facility, post-expansion, and other nearby sources. As shown below, compliance with all the CO AAQS is expected.

**Maximum Predicted Ambient CO Concentrations**

| Averaging Period | Year | UTM Coordinates (m) X | UTM Coordinates (m) Y | Background ($\mu g/m^3$) | Modeled ($\mu g/m^3$) | Total ($\mu g/m^3$) | AAQS ($\mu g/m^3$) |
|---|---|---|---|---|---|---|---|
| 1-hour | 2000 | 493327.31 | 4481319.00 | 7,570 | 3,829.76 | 11,399.76 | 40,000 |
| | 2001 | 493327.31 | 4481319.00 | | 4,003.38 | 11,573.38 | |
| | 2002 | 493327.31 | 4481319.00 | | 3,513.18 | 11,083.18 | |
| | 2003 | 493327.31 | 4481319.00 | | 3,954.62 | 11,524.62 | |
| | 2004 | 493450.00 | 4481350.00 | | 3,251.97 | 10,821.97 | |
| 8-hour | 2000 | 493327.31 | 4481319.00 | 2,330 | 1,125.64 | 3,455.64 | 10,000 |
| | 2001 | 493375.00 | 4481327.50 | | 1,091.56 | 3,421.56 | |
| | 2002 | 493375.00 | 4481327.50 | | 1,287.61 | 3,617.61 | |
| | 2003 | 493375.00 | 4481327.50 | | 1,644.42 | 3,974.42 | |
| | 2004 | 493375.00 | 4481327.50 | | 1,099.28 | 3,429.28 | |

## Title 129, Chapter 17 – Construction Permit Requirements

A State construction permit is required for this facility because this construction project (i.e. the modifications occurring to accommodate the ethanol production increase) has an uncontrolled net increase in emissions at the site greater than one or more of the threshold levels identified in Title 129, Chapter 17, Section 001.01 for $PM_{10}$, $SO_x$ ($SO_2$ and/or $SO_3$), $NO_x$, CO, VOC, and HAPs. The thresholds are as follows:

| Pollutant | Threshold |
|---|---|
| $PM_{10}$ | 15 tons/yr |
| $SO_x$ ($SO_2$ and/or $SO_3$) | 40 tons/yr |
| $NO_x$ | 40 tons/yr |
| CO | 50 tons/yr |
| VOC | 40 tons/yr |
| Individual HAP | 2.5 tons/yr |
| Total combined HAPs | 10 tons/yr |

The facility-wide potential emissions from the facility after the issuance of this permit falls into the following category:

50 tons or more but less than 100 tons per year of any air pollutant; or
2.5 tons or more but less than 10 tons per year of any single HAP; or
10 tons or more but less than 25 tons per year of any combination of HAPs

Therefore, the facility submitted a $1,500.00 fee when submitting their Air Quality Construction Permit Application, in accordance with Title 129, Chapter 17, Section 003.01.

**Nebraska and National Ambient Air Quality Standards for $PM_{10}$, $SO_2$, $NO_2$, and CO**

| Pollutant | Averaging Period | Ambient Air Quality Standards ($\mu g/m^3$) National | Nebraska |
|---|---|---|---|
| $PM_{10}$ | 24-hour [b] | 150 | 150 |
| | Annual | 50 | 50 |
| $SO_2$ | 3-hour [a] | 1300 | 1300 |
| | 24-hour [a] | 365 | 365 |
| | Annual | 80 | 80 |
| $NO_2$ | Annual | 100 | 100 |
| CO | 1-hr [a] | 40,000 | 40,000 |
| | 8-hr [a] | 10,000 | 10,000 |

[a] Concentration is allowed to be exceeded once per year at a single receptor.
[b] Concentration is allowed to be exceeded five times in a five-year period at a single receptor.

This ambient air quality impact analysis takes into account the combined impacts of emissions from the KAAPA facility, contributions from nearby major and minor sources, and background concentrations due to distant major and minor sources and natural sources. Based on the potential emissions from the proposed facility and other sources' allowable emissions, this analysis demonstrates that the KAAPA facility will not cause or significantly contribute to any of the modeled exceedances of the AAQS. The specifics of the air quality impact analysis can be found in the facility's permitting file at the Department.

**$PM_{10}$ Results**

The results of the $PM_{10}$ refined modeling analysis are presented in the table below. The predicted concentrations shown are the highest predicted values for each individual year used to demonstrate compliance with the annual standard and the 6th highest value for the 24-hr standard in which a five-year met file was used. The modeled impacts shown are from the KAAPA facility, post-expansion, and other nearby sources. Impacts from haul roads located at facilities that are required to conduct best management practices for dust control have not been included in the concentrations provided in accordance with NDEQ's haul road policy. As shown below, compliance with all $PM_{10}$ AAQS is expected.

**Maximum Predicted Ambient $PM_{10}$ Concentrations**

| Averaging Period | Date or Year | UTM Coordinates (m) X | Y | Background ($\mu g/m^3$) | Modeled ($\mu g/m^3$) | Total ($\mu g/m^3$) | AAQS ($\mu g/m^3$) |
|---|---|---|---|---|---|---|---|
| 24-hour | 12/24/03 | 493470.59 | 4481344.50 | 60 | 83.14 | 143.14 | 150 |
| Annual | 2000 | 493450.00 | 4481350.00 | 25 | 12.54 | 37.54 | 50 |
| | 2001 | 493470.59 | 4481344.50 | | 14.39 | 39.39 | |
| | 2002 | 493470.59 | 4481344.50 | | 13.97 | 38.97 | |
| | 2003 | 493470.59 | 4481344.50 | | 13.21 | 38.21 | |
| | 2004 | 493450.00 | 4481350.00 | | 13.40 | 38.40 | |

**Paved Roads**

Most of KAAPA's in-plant haul roads are required to be paved. The only road that is permitted to be unpaved is the road to the grain storage pile. Fugitive dust emissions from traffic on these roads have been calculated using AP-42, Section 13.2.1: *Paved Roads* (11/06) and typical characteristics for paved roads. The unpaved haul road emission have been calculated using AP-42, Section 13.2.2: *Unpaved Roads* (11/06) and typical characteristics for unpaved roads.

A permitted silt load factor of 2.0 grams per square meter ($g/m^2$) for the paved haul roads was used to establish the pounds per vehicle mile traveled (lb/VMT) emission factor for PM and $PM_{10}$. The facility is required to conduct silt load testing during the first year this permit is in effect to ensure compliance with the permitted silt load.

**Emissions Summary**

KAAPA will remain a minor source for Prevention of Significant Deterioration (PSD) as a result of this permitting action. Estimated potential emissions in this application for VOC and HAPs are below major source thresholds; however, facility-wide emission limits have been set at the major source emission thresholds for HAPs (e.g. 10 tons per year for a single HAP and 25 tons per year for combined HAPs) to account for uncertainties in HAP emissions at ethanol plants. The total facility wide permitted emissions anticipated due to the proposed construction are estimated in the following table:

| Regulated Pollutant | Potential Emissions as Permitted (tons/yr) |
|---|---|
| Particulate Matter (PM) | 93.23 |
| Particulate Matter smaller than 10 microns ($PM_{10}$) | 60.32 |
| Sulfur Oxide ($SO_x$) | 95.36 |
| Nitrogen Oxides ($NO_x$) | 99.51 |
| Carbon Monoxide (CO) | 91.49 |
| Volatile Organic Compounds (VOC) | 89.43 |
| Total Reduced Sulfur (TRS) | 0.29 |
| Hazardous Air Pollutants (HAPs): | <10.0 per individual HAP |
| Acetaldehyde | |
| Methanol | |
| Total HAPs | <25.0 |

**Steam Generation**

Steam is required to power the ethanol production process. KAAPA has three-existing 73.5 MMBtu/hr boilers (B1, B2, and B3) that are currently in operation. These three boilers will be retrofitted with new low-$NO_x$ burners when the facility's ethanol capacity expands to 110 MMGal/year.

A fourth, new 73.5 MMBtu/hr boiler (B4) will be installed at the facility. The new boiler will also be installed with low-$NO_x$ burners. All boilers will be limited to combusting only natural gas as fuel. Potential emissions for the boilers are based on emission factors supplied by the facility and AP-42, Section 1.4: *Natural Gas Combustion* and using manufacturer emission factors provided in the application materials. Performance testing is being required for the boilers in order to verify the information submitted by the facility.

**Emergency Firewater Pump**

The facility currently operates a diesel-powered emergency firewater pump. The firewater pump emissions are for a typical diesel-powered internal combustion engine with a power rating of 190 horsepower (HP).

The engine is limited to the expected number of operating hours to ensure the facility's potential emissions are below 100 tons/year. If there is an emergency requiring the fire water-pump, it is expected that the rest of the facility will be shut down. The fire pump is limited to operating 100 hours per year.

Since the emergency equipment is diesel fired, a diesel storage tank has been installed. Due to the small tank size, low volume throughput, and low vapor pressure of diesel fuel, the VOC emissions associated with the diesel fuel storage are negligible.

Potential emissions were estimated using AP-42, Section 3.3: *Gasoline and Diesel Industrial Engines (10/96)*. The information presented in Section 3.3 is for industrial engines less than 600 HP.

**Biomethanator Operations**

The facility currently has one biomethanator system that is composed of two biomethanator tanks and a biomethanator flare (CE7001). The water stream from the evaporators goes into the biomethanator, which is an anaerobic biological water treatment system that converts organic matter to a fuel gas (biogas). The facility also plans to install a second biomethanator system that is identical to the system that currently exists (CE7002).

The biogas will be used as supplemental fuel in the RTO that controls the fermentation and distillation scrubbers (RTO #1). Since the wastewater treatment tanks are enclosed, no significant fugitive VOC emissions are expected. The biomethanator flare emissions were taken into consideration when determining the facility's potential emissions.

**Cooling Tower**

The facility currently has one cooling tower, with a circulation rate of 1,200,000 gal/hour (EP6000). The total dissolved solids (TDS) concentration in the cooling water is limited to 2,000 ppm for any single sampling event. KAAPA will be constructing one additional cooling tower, also with a circulation rate of 1,200,000 gal/hour (F80b). The second cooling tower will also be limited to a TDS concentration of 2,000 ppm for any single sampling event. The cooling towers are used to cool non-contact process water

Potential emissions from RTO #1 were calculated by using information provided by the facility in their application and from AP-42, Section 1.4, *Natural Gas Combustion (7/98)*. Performance tests will be required to verify that the facility is in compliance with its permit limitations established for RTO #1.

**Ethanol and Denaturant Loadout**

Prior to shipping the 200-proof ethanol out of the facility, the ethanol will be combined with 5% natural gasoline. The gasoline is added to the final product in order to make the ethanol unfit for human consumption. Liquid product loading consists of submerged loading of natural gasoline (denaturant) and denatured ethanol to and from tanker trucks and tanker railcars. The facility currently loads denatured ethanol out via tanker truck and railcar, however only the emissions emitted via truck loadout are captured and controlled by a vapor recovery system with flare (CE4000). The facility will construct two additional rail loadout spouts with vapor recovery. The loadout flare will double its heat input capacity. The vapor recovery system will be expanded to capture emissions from all of the rail loadout spouts in addition to the truck loadout spout.

Loading losses were estimated using the method prescribed in AP-42, Section 5.2: *Transportation and Marketing of Petroleum Liquids* (1/95). Emissions of VOC and HAP from product loadout were calculated using the assumptions listed below. The estimated emissions also consider combustion products (PM, $PM_{10}$, $SO_2$, $NO_x$, and CO) released at the flare. The flare emissions have been estimated based on AP-42. AP-42, Section 1.4: *Natural Gas Combustion* was used to calculate the emissions associated with the natural gas combustion for the flare's pilot while AP-42, Section 13.5: *Industrial Flares*, Tables 13.5-1 and 13.5-2 (9/91) were used to calculate the emissions from the waste gas being combusted.

Loadout emissions were based on the following:

1. The tanker trucks previously contained conventional unleaded gasoline (RVP 13) and the gasoline vapors are displaced as the denatured ethanol is loaded. This is a worst-case assumption; emissions will be less if the tanker trucks previously contained denatured ethanol.
2. The railcars previously contained denatured ethanol, and the denatured ethanol vapors are displaced as the denatured ethanol is loaded.
3. Emissions from displacement of gasoline previously contained in the tanker trucks are estimated based on the difference between the saturation factors (S) for normal dedicated and clean cargo provided in AP-42, Section 5.2.
4. HAP emissions are based on the HAP content of gasoline (RVP 13), anhydrous ethanol, and denatured ethanol.
5. The vapor control system has an overall efficiency of 88.2% (90% capture, 98% destruction).

**WDGS Storage and Loadout**

The wet cake may be stored in an outside storage area, from which it may be loaded onto trucks for delivery to cattle feed lots in the vicinity of the facility. The facility will have the capacity to produce up to 845,952 tons/yr of WDGS after the expansion occurs.

The WDGS will be temporarily stored on a concrete pad prior to shipping. The storage of WDGS generates VOC and HAPs emissions as the top layer of the WDGS dries. At about 65% water content,

transferred to the corn day bins prior to the milling process. KAAPA currently has one scalping bin (EU99); however, a second scalping bin (EU101) will be constructed with the expansion. Hammermills #1, #2, and #3 (EU15, EU16, and EU17) are existing units each with a 1,200 bu/hr capacity and Hammermills #4 and #5 (EU18 and EU19), each with a 1,500 bu/hr capacity, will be constructed with the expansion. The hammermills grind the scalped grain into a powdered "meal". The ground grain is then transferred to the slurry tank, which marks the beginning of the fermentation process.

The two existing truck dump pits, receiving legs #1 and #2, the two existing concrete storage bins (EU5 and EU6), and the existing scalping bin are controlled by the existing grain receiving baghouse (CE1002), which will now be referred to as Grain Receiving Baghouse #1. A new baghouse, Grain Receiving Baghouse #2 (CE1003), will be constructed to provide control to the new Truck/Rail Dump Pit, two new receiving legs, and the new scalping bin. Hammermills #1 and #2 and Scalper #1 are, and will continue to be, controlled by Hammermill Baghouse #1 (CE2000). Hammermill #3 and Scalper #2 are controlled by Hammermill Baghouse #2 (CE2001). The new scalper (Scalper #3) will also be controlled by Hammermill Baghouse #2. A new baghouse, Hammermill Baghouse #3 (CE2002), will be constructed in order to control emissions from the two new hammermills, Hammermills #4 and #5, and the new milled grain transfer conveyor.

Potential to emit calculations were calculated for the grain receiving, storing, and milling in two ways. The emissions from each baghouse were calculated by using design air flow rates of the units, provided in the application, and a baghouse outlet grain loading of 0.004 grains per dry standard cubic foot (dscf), which is based on vendor guarantees. Fugitive and uncontrolled emissions were calculated by using emission factors from AP-42, Chapter 9, Section 9.9.1 (5/2003) and by assuming that 5% of the emissions are not collected by the grain receiving baghouse. Emissions from the new storage bins were calculated using AP-42 emission factors and a 99% control efficiency since bin vent filter systems will be used for emissions control.

**Fermentation**

The fermentation operations at KAAPA currently consist of one mixer, one cook water tank, two slurry tanks, one flash tank, one receiver tank, three liquefaction tanks, one yeast tank, five fermentation tanks, and one beer well. As a result of the expansion, KAAPA will be constructing two fermentation tanks, two slurry tanks, one flash tank, one receiving tank, two liquefaction tanks, one yeast tank, and four enzyme tanks.

The milled grain transfer conveyor will transfer the milled grain to the mash mixer under flow-ratio control. The mash mixer mixes the grain with hot water from the hot well and recycled process water from the stripper column and evaporators to form a slurry. The slurry is then discharged by gravity from the mash mixer to a slurry tank. The slurry tank provides surge capacity in the cooking system, allows for pre-liquefaction of the starch, and if necessary, controls viscosity. The slurry is cooked to liquefy and breakdown the starch into sugars. The slurry is flash cooled with non-contact cooling water through a cooking cooling system. The slurry will then travel through the receiver tank and liquefaction tanks. Yeast will be added to the slurry prior to the slurry entering the fermentation tanks.

The cooled mash is sent to the fermenter process vessels where a batch fermentation process takes place. Saccharifying enzymes, nutrients, and industrial antibiotics are added to the fermenter during filling. The saccharification enzyme completes the conversion of starch to fermentable sugar, and the yeast converts the fermentable sugar to ethanol and carbon dioxide ($CO_2$). The chemical process and chemical equation occurring during fermentation is shown below:

| Permit Condition | Emission Point ID# | Emission Unit ID# | Emission Unit Description | New/Existing Unit |
|---|---|---|---|---|
| Condition III.(E) | EP-4000 | EU69 | Ethanol Rail Loadout #1 | Existing |
| | | EU70 | Ethanol Rail Loadout #2 | New |
| | | EU71 | Ethanol Rail Loadout #3 | New |
| | | EU72 | Ethanol Truck Loadout | Existing |
| | | CE4000 | Vapor Recovery System Flare | Existing |
| Condition III.(I) | EP-5001 | EU74 | Boiler #1 | Existing |
| | EP-5002 | EU75 | Boiler #2 | Existing |
| | EP-5003 | EU76 | Boiler #3 | Existing |
| | EP-5004 | EU77 | Boiler #4 | New |
| Condition III.(F) | EP-5005 | EU78 | DDGS Dryer | New |
| | | CE5005 | Regenerative Thermal Oxidizer #2 | New |
| Condition III.(J) | EP-5006 | EU80 | Emergency Fire Water Pump Engine | Existing |
| Condition III.(K) | EP-6000 | EU81 | Cooling Tower #1 | Existing |
| | EP-6001 | EU82 | Cooling Tower #2 | New |
| Condition III.(H) | EP-7001 | EU83 | Biomethanator System #1 | Existing |
| | | EU84 | Biomethanator System #2 | Existing |
| | | CE7001 | Biomethanator Flare #1 | Existing |
| | EP-7002 | EU85 | Biomethanator System #3 | New |
| | | EU86 | Biomethanator System #4 | New |
| | | CE7002 | Biomethanator Flare #2 | New |
| N/A | EP-8000 | - | WDGS Storage and Loadout | Existing (Expanding) |
| Condition III.(G) | EP-8001 | EU85 | DDGS Loadout | New |
| | EP-8002 | EU86 | DDGS Cooler | New |
| Condition III.(D) | EP-9001 | EU87 | Denatured Ethanol Tank #1 | Existing |
| | EP-9002 | EU88 | Denatured Ethanol Tank #2 | Existing |
| | EP-9003 | EU89 | 200-Proof Tank #1 | Existing |
| | EP-9004 | EU90 | Denaturant Storage Tank #1 | Existing |
| | EP-9005 | EU91 | 190-Proof Tank #1 | Existing |
| | EP-9006 | EU92 | Denatured Ethanol Tank #3 | New |
| | EP-9007 | EU93 | Denatured Ethanol Tank #4 | New |
| | EP-9008 | EU94 | 200-Proof Tank #2 | New |
| | EP-9009 | EU95 | Denaturant Storage Tank #2 | New |
| | EP-9010 | EU96 | 190-Proof Tank #2 | New |
| Condition III.(M) | F1000 | - | Paved Haul Roads | Existing – Traffic Increasing |
| | F1001 | - | Unpaved Haul Roads | New |
| Condition III.(K) | F9000 | - | Equipment Leaks | Existing – Component Count Increasing |

- A new regenerative thermal oxidizer (RTO) will be installed to provide additional VOC and HAP control for the two new and two existing wet scrubbers. The emissions from all four of the scrubbers will be routed to the RTO.
- Equipment will be installed in order for the facility to produce dry distillers grains with solubles (DDGS) and/or modified wet distillers grains with solubles (MWDGS). This equipment includes one new dryer, one cooling cyclone and associated baghouse, DDGS storage and loadout operations and associated baghouse, and a second new RTO to control the VOCs and HAPs emitted as a result of the drying process.
- Construct a second cooling tower with a circulation rate of 1,200,000 gallons/hr.
- Install a fourth 73.5 million British thermal unit per hour (MMBtu/hr) boiler.
- Construct five new storage tanks ranging in size from 100,000 gallons to 750,000 gallons.

On October 23, 2006, the Department received revised application forms from KAAPA due to design modifications that were made to the proposed expansion. The requested modifications to the facility contained in the application revision are listed below:

- Grain loading emission factors for all baghouses were reduced from 0.005 grains per dry standard cubic foot (gr/dscf) to 0.004 gr/dscf.
- A new dual dump pit will be installed and controlled by a new baghouse. The dual dump pit is able to receive grain via both truck and rail.
- Install two new hammermills, a baghouse and the associated milled grain transfer conveyor.
- The number of DDGS dryers has been reduced from two (2) 45.0 MMBtu/hr units to one (1) 90.0 MMBtu/hr unit.
- An additional biomethanator system will be installed and additional operational limitations taken on the new and existing systems.
- Two of the new storage tanks will be increased in size from 750,000 gallons to 2,000,000 gallons.

On February 8, 2007, the Department received additional revised information that included two new steel storage bins and a new storage pile.

This permitting action will supersede the construction permits issued on February 12, 2005 and April 24, 2006 in their entirety. This construction permit is written so that it contains new requirements that are applicable to the two new steel bins and new storage pile that will be constructed as soon as this permit is issued and a set of requirements that will apply to the facility once the denatured ethanol production exceeds sixty (60) MMgal/yr.

Throughout the permitting action, KAAPA has discussed "partial expansions" such as not expanding the ethanol production, but constructing DGS drying operations. The facility's potential emissions are only protected (i.e. known to be below 100 tpy for each pollutant) if the entire expansion occurs and all of the new emission limitations are in effect. If the facility chooses to only expand several of the operations, it will have to perform PTE calculations to demonstrate that the source will still be minor.

After the full expansion, KAAPA will have an anticipated production capacity of 104.5 MMGal/yr of anhydrous ethanol. The ethanol will be denatured with gasoline to produce an estimated 110 MMGal/yr denatured ethanol. Solids from the process will be sold as animal feed. This will result in the production of up to 204,400 tons per year (tons/yr) of DDGS (NOTE: KAAPA will only be able to dry approximately 62% of the WDGS produced due to dryer capacity) and up to 845,952 tons/yr of WDGS.

(10) $E_{DCC} = (CEF_{DCC}) \times (P) / (2000 \text{ lbs/ton})$

Where
$E_{DCC}$ = Emissions from DDGS Cooling Cyclone (tons/month)
$CEF_{DCC}$ = Controlled process emission factor (lb/ton DDGS)
P = DDGS production rate (ton/month)

| **Hazardous Air Pollutant** | **Controlled Process Emission Factors** | |
|---|---|---|
| Individual Hazardous Air Pollutants (HAP) | | |
| Acetaldehyde | 0.003 | lb/ton DDGS |
| Acrolein | 0.0013 | lb/ton DDGS |
| Formaldehyde | 0.0007 | lb/ton DDGS |
| Methanol | 0.0007 | lb/ton DDGS |
| Total HAPs | 0.0057 | lb/ton DDGS |

| Pollutants | Weight Fraction of VOC Emissions | | |
|---|---|---|---|
| | Gasoline | Ethanol | Denaturant |
| Individual HAPs | | | |
| Acetaldehyde | N/A | 2.00E-04 | N/A |
| Benzene | 2.50E-03 | N/A | 2.50E-03 |
| Carbon disulfide | 2.00E-05 | N/A | 2.00E-05 |
| Cumene | 1.00E-04 | N/A | 1.00E-04 |
| Ethyl benzene | 5.00E-05 | N/A | 5.00E-05 |
| n-Hexane | 5.00E-02 | N/A | 5.00E-02 |
| Methanol | N/A | 2.00E-04 | N/A |
| Toluene | 5.00E-03 | N/A | 5.00E-03 |
| Xylene | 5.00E-04 | N/A | 5.00E-04 |
| Total HAPs | 5.82E-02 | 4.00E-04 | 5.82E-02 |

**WDGS Storage**

Emissions from the WDGS storage shall be calculated using Equation (5).

(5) $E_{WC} = (EF_{WC}) \times (P_{WC}) / (2{,}000 \text{ lbs/ton})$

Where:
$E_{WC}$ = Emissions from WDGS storage (tons/month)
$EF_{WC}$ = Emission factor for WDGS storage (lbs/ton WDGS)
$P_{wc}$ = WDGS stored as product (tons WDGS/month)

| Pollutant | Emission Factor (lb/ton) |
|---|---|
| Individual HAPs | |
| Acetaldehyde | 1.11E-04 |
| Acrolein | 1.67E-05 |
| Formaldehyde | 2.22E-04 |
| Methanol | 4.44E-05 |
| Total HAPs | 3.94E-04 |

**Emergency Firewater Pump Engine**

Emissions from the emergency firewater pump engine shall be calculated using Equation (6).

(6) $E_E = (EF_E) \times (HI_E) \times OT / (2000 \text{ lbs/ton})$

Where
$E_E$ = Emissions from Engine (tons/month)
$EF_E$ = Emission factor for Engine (lbs/MMBtu)
$HI_E$ = Heat Input of Engine (MMBtu/hr)
OT = Operating Time of Engine (hours/month)

(3b) $E_{DRTO} = \{(EF) \times (NG_U)\}] / (2000 \text{ lbs/ton})$

(3c) $E_{DRTO} = (ER_{DRTO}) \times OT / (2000 \text{ lbs/ton})$

Where
$E_{DRTO}$ = Emissions from Dryer RTO (tons/month)
$CEF_{DRTO}$ = Controlled process emission factor (lb/ton DDGS)
P = DDGS production rate (ton/month)
EF = Natural Gas Emission factor (lbs/MMscf)
$NG_U$ = Natural Gas Usage of Dryer RTO and Dryers (MMscf/month)
$ER_{DRTO}$ = Emission Rate for Unit (lbs/hr)
OT = Operating Time of Unit (hours/month)

| **Hazardous Air Pollutant** | **Controlled Process Emission Factors** | |
|---|---|---|
| Individual Hazardous Air Pollutants (HAP) | | |
| Acetaldehyde | 0.016 | lb/ton |
| Acrolein | 0.0025 | lb/ton |
| Benzene | 0.0021 | lb/MMscf NG |
| Dichlorobenzene | 0.0012 | lb/MMscf NG |
| Formaldehyde | 0.0416 | lb/hr |
| Hexane | 1.8 | lb/MMscf NG |
| Lead Compounds | 0.0005 | lb/MMscf NG |
| Methanol | 0/0024 | lb/ton |
| Naphthalene | 0.00061 | lb/MMscf NG |
| Polycyclic Organic Matter (POM) | 0.0000882 | lb/MMscf NG |
| Toluene | 0.0034 | lb/MMscf NG |
| Arsenic Compounds (ASC) | 0.0002 | lb/MMscf NG |
| Beryllium Compounds (BEC) | 0.000012 | lb/MMscf NG |
| Cadmium Compounds (CDC) | 0.0011 | lb/MMscf NG |
| Chromium Compounds (CRC) | 0.0014 | lb/MMscf NG |
| Cobalt Compounds (COC) | 0.000084 | lb/MMscf NG |
| Manganese Compounds (MNC) | 0.00038 | lb/MMscf NG |
| Mercury Compounds (HGC) | 0.00026 | lb/MMscf NG |
| Nickel Compounds (NIC) | 0.0021 | lb/MMscf NG |
| Selenium Compounds (SEC) | 0.000024 | lb/MMscf NG |
| Total HAPs | 0.51 | lb/hr |

**Liquid Product Loadout**

Emissions from liquid product loadout shall each be calculated using Equations (4a) through (4j).

(4a) $E_{VOC,LL} = E_{VOC,LL,T} + E_{VOC,LL,R}$

(4b) $E_{VOC,LL,T} = E_{VOC,LL,T,G} + E_{VOC,LL,T,E} + E_{VOC,LL,T,D}$

(4c) $E_{VOC,LL,T} = \{[(EF_{VOC,LL,T,G}) \times (P_{LL,T})] + [(EF_{VOC,LL,T,E}) \times (P_{LL,T})] + [(EF_{VOC,LL,T,D}) \times (P_{LL,T})]\} / (2000 \text{ lbs/ton})$

(4d) $E_{VOC,LL,R} = E_{VOC,LL,R,E} + E_{VOC,LL,R,D}$

## V. HAP Emission Calculation Methodology

Once the source produces 200,000 gallons or more per day of anhydrous ethanol for three consecutive days, the source shall use the following calculation method to demonstrate compliance with the emission limits specified in Condition II.(E). Emissions shall be calculated each calendar month using data from the following sources listed in descending order of preference. For compliance purposes, total HAP is equivalent to the sum of individual HAPs.

1. Most recent valid performance test results performed in the past five years.
2. Manufacturer's guarantees and Material Safety Data Sheet (MSDS)
3. Manufacturer/engineering estimates
4. Emission factors from AP-42 or other EPA published documents

If it is necessary to convert uncontrolled to controlled emissions, multiply the uncontrolled emissions by one minus the overall control efficiency (fraction) of the control equipment.

**Boilers, Loadout Flare Pilot, and Biomethanator Flare Pilot(s)**

Emissions from the boilers and flare pilots shall each be calculated using Equation (1).

(1) $E_U = (EF) \times (NG_U) \ / \ (2000 \text{ lbs/ton})$

Where
$E_U$ = Emissions from Unit (tons/month)
EF = Emission factor (lbs/MMscf)
$NG_U$ = Natural Gas Usage of Unit (MMscf/month)

| Pollutant | Emission Factor (lb/MMscf) |
|---|---|
| Individual HAPs | |
| Benzene | 0.0021 |
| Dichlorobenzene | 0.0012 |
| Formaldehyde | 0.075 |
| Hexane | 1.8 |
| Lead Compounds | 0.0005 |
| Naphthalene | 0.00061 |
| Polycyclic Organic Matter (POM) | 0.0000882 |
| Toluene | 0.0034 |
| Arsenic Compounds (ASC) | 0.0002 |
| Beryllium Compounds (BEC) | 0.000012 |
| Cadmium Compounds (CDC) | 0.0011 |
| Chromium Compounds (CRC) | 0.0014 |
| Cobalt Compounds (COC) | 0.000084 |
| Manganese Compounds (MNC) | 0.00038 |
| Mercury Compounds (HGC) | 0.00026 |
| Nickel Compounds (NIC) | 0.0021 |
| Selenium Compounds (SEC) | 0.000024 |
| Total HAPs | 1.89 |

| Pollutants | Weight Fraction of VOC Emissions | | |
|---|---|---|---|
| | Gasoline | Ethanol | Denaturant |
| Individual HAPs | | | |
| Acetaldehyde | N/A | 2.00E-04 | N/A |
| Benzene | 2.50E-03 | N/A | 2.50E-03 |
| Carbon disulfide | 2.00E-05 | N/A | 2.00E-05 |
| Cumene | 1.00E-04 | N/A | 1.00E-04 |
| Ethyl benzene | 5.00E-05 | N/A | 5.00E-05 |
| n-Hexane | 5.00E-02 | N/A | 5.00E-02 |
| Methanol | N/A | 2.00E-04 | N/A |
| Toluene | 5.00E-03 | N/A | 5.00E-03 |
| Xylene | 5.00E-04 | N/A | 5.00E-04 |
| Total HAPs | 5.82E-02 | 4.00E-04 | 5.82E-02 |

**Emergency Firewater Pump Engine**

Emissions from the emergency firewater pump engine shall be calculated using Equation (5).

(5) $$E_E = (EF_E) \times (HI_E) \times OT / (2000 \text{ lbs/ton})$$

Where
$E_E$ = Emissions from Engine (tons/month)
$EF_E$ = Emission factor for Engine (lbs/MMBtu)
$HI_E$ = Heat Input of Engine (MMBtu/hr)
OT = Operating Time of Engine (hours/month)

| Pollutant | Emission Factor (lb/MMBtu) |
|---|---|
| Individual Hazardous Air Pollutants (HAP) | |
| Acetaldehyde | 7.67E-04 |
| Acrolein | 9.25E-04 |
| Benzene | 9.33E-04 |
| Formaldehyde | 1.80E-03 |
| Naphthalene | 8.48E-05 |
| Toluene | 4.09E-04 |
| Xylene | 2.85E-04 |
| Total HAPs | 5.20E-03 |

**Storage Tanks**

VOC emission from storage tanks shall be calculated using the EPA's TANKS program. HAP emissions from each of the storage tanks shall be calculated using Equation (6).

(6) $$E_{ST\text{-}HAP} = (E_{ST\text{-}VOC}) \times (PPM_{ST}/10^6)$$

Where: $E_{ST\text{-}HAP}$ = Individual HAP emissions from storage tank (tons/month)

**Fermentation and Distillation Operations**

Emissions from the fermentation and distillation scrubbers shall each be calculated using Equation (2).

(2) $E_S = (CEF_S) \times (OH) / (2000 \text{ lbs/ton})$

Where
$E_S$ = Emissions from Scrubber (tons/month)
$CEF_S$ = Controlled process emission factor (lbs/hr)
OH = Operation Hours (hr/month)

| Hazardous Air Pollutant | Controlled Process Emission Factors (lbs/hr) | |
|---|---|---|
| | Fermentation Scrubber (EP-3000) | Distillation Scrubber (EP-3002) |
| Acetaldehyde | 2.7301 | 0.4186 |
| Acrolein | 0.0112 | 0.0012 |
| Formaldehyde | 0.0066 | 0.0007 |
| Methanol | 0.0064 | 0.0007 |
| Total HAPs | 2.75 | 0.42 |

**WDGS Storage**

Emissions from the WDGS storage shall be calculated using Equation (3).

(3) $E_{WC} = (EF_{WC}) \times (P_{WC}) / (2{,}000 \text{ lbs/ton})$

Where:
$E_{WC}$ = Emissions from WDGS storage (tons/month)
$EF_{WC}$ = Emission factor for WDGS storage (lbs/ton WDGS)
$P_{wc}$ = WDGS stored as product (tons WDGS/month)

| Pollutant | Emission Factor (lb/ton) |
|---|---|
| Individual HAPs | |
| Acetaldehyde | 1.11E-04 |
| Acrolein | 1.67E-05 |
| Formaldehyde | 2.22E-04 |
| Methanol | 4.44E-05 |
| Total HAPs | 3.94E-04 |

**Liquid Product Loadout**

Emissions from liquid product loadout shall each be calculated using Equations (4a) through (4j).

(4a) $E_{VOC,LL} = E_{VOC,LL,T} + E_{VOC,LL,R}$

(4b) $E_{VOC,LL,T} = E_{VOC,LL,T,G} + E_{VOC,LL,T,E} + E_{VOC,LL,T,D}$

(4c) $E_{VOC,LL,T} = \{[(EF_{VOC,LL,T,G}) \times (P_{LL,T})] + [(EF_{VOC,LL,T,E}) \times (P_{LL,T})] + [(EF_{VOC,LL,T,D}) \times (P_{LL,T})]\} / (2000 \text{ lbs/ton})$

**III.(M) Specific Conditions for Haul Roads (F1000 and F1001)**

(1) All on-site haul roads with production-related truck traffic, except for the road to the grain storage pile, shall be paved. {Chapters 20 and 32}

(2) Emission Limitations and Testing Requirements

(a) Prior to the source producing 200,000 gallons or more per day of anhydrous ethanol for three consecutive days, the paved haul road silt loading shall not exceed 3.0 $g/m^2$ {Chapter 19}.

(b) Once the source produces 200,000 gallons or more per day of anhydrous ethanol for three consecutive days, the following conditions shall apply to the paved haul roads:

(i) The haul road silt loading shall not exceed 2.0 $g/m^2$ {Chapter 19}.

(ii) A series of silt loading performance tests shall be conducted once per calendar quarter beginning no later than 45 days after notification required in Specific Condition II.(H), and continuing for four (4) consecutive quarters. Silt load testing shall be conducted in accordance with Specific Condition II.(D).

(3) Operational and Monitoring Requirements and Limitations

(a) The owner or operator shall develop, maintain, and implement a Fugitive Dust Control Plan (FDCP) to control emissions from haul roads to comply with General Condition I.(J) and Condition III.(M)(2).

(b) For each day of operation, the owner or operator shall conduct a survey of the plant property and haul roads to determine if visible fugitive emissions are being generated and leaving plant property. Implementation of fugitive dust control shall be taken upon observation of visible fugitive emissions leaving plant property or more frequency in accordance with the FDCP. Documentation of all corrective actions and daily surveys shall be maintained in a log that shall accompany the FDCP.

(4) Applicable NSPS, NESHAP, and MACT Requirements

At this time the Department has not identified any NSPS, NESHAP, or MACT requirements that apply to the haul roads.

(5) Reporting and Recordkeeping Requirements

(a) The FDCP shall be kept onsite and a copy shall be submitted to the Department within thirty (30) days after initial startup of operations.

(b) Records documenting use of fugitive dust control measures on haul roads.

(c) Records of haul road visible emissions checks taken daily during operation and a description of corrective action taken, if needed.

(d) Records documenting when silt load testing was completed and the results of each testing.

**III.(K) Specific Conditions for Cooling Towers**

(1) Description of Emission Point: The source is permitted to construct the emission point and associated emission units identified in the following table with the number of cooling tower cells and at the circulation rate listed:

| Emission Point ID# | Control Equipment ID# and Description | EU ID# and Description | Number of Cooling Tower Cells | Maximum Circulation Rate (gal/hr) |
|---|---|---|---|---|
| EP-6000 | - | EU81: Cooling Tower #1 | 4 | 1,200,000 (total) |
| EP-6001 | - | EU82: Cooling Tower #2 | 4 | 1,200,000 (total) |

(2) Emission Limitations and Testing Requirements:

The cooling towers identified above are not subject to any emissions limitations. Testing shall be conducted to ensure compliance with the TDS limitation establish, discussed below.

(3) Operational and Monitoring Requirements and Limitations:

(a) Drift loss from each cooling tower shall be limited to 0.005 percent. Verification of drift loss shall be by manufacturer's guarantee. Manufacturer's drift loss guarantee shall be kept on site and readily available to Department representatives, upon request, for the life of the unit. {Chapter 19}

(b) TDS concentration of the cooling water in each cooling tower shall not exceed 2,000 ppm. A representative TDS sample shall be collected and tested from each cooling tower a minimum of once per calendar month. The test method used to determine TDS concentration shall be in accordance with an EPA approved method and be documented. {Chapter 19}

(4) Applicable NSPS, NESHAP, and MACT Requirements:

At this time the Department has not identified any NSPS, NESHAP, or MACT requirements that apply to the emission points or emission units listed in Condition III.(K)(1).

(5) Reporting and Recordkeeping Requirements:

TDS concentration in cooling water for each tower for each sampling event and test method used.

(4) Applicable NSPS, NESHAP, and MACT Requirements:

The following standards apply to EU74, EU75, EU76, and EU77:

| Applicable Standard | Title | Rule Citation |
|---|---|---|
| NSPS, Subpart A | General Provisions | Chapter 18, Sec. 001.01<br>40 CFR 60.1 |
| NSPS, Subpart Dc | Small Industrial, Commercial, Institutional Steam Generation Units | Chapter 18, Sec. 001.52<br>40 CFR 60.40c |

(5) Reporting and Recordkeeping Requirements:

(a) Notifications and record keeping as required by 40 CFR 60.7

(b) Reporting and recordkeeping as required by 40 CFR 60.48c

**III.(H) Specific Conditions for Biomethanator Operations**

(1) Permitted Emission Points: The source is permitted to construct the emission points and associated emission units identified in the following table at the capacities and using the fuel types listed:

| Emission Point ID# | Control Equipment ID# and Description | Emission Unit ID# and Description | Maximum Capacity | Permitted Fuel Type |
|---|---|---|---|---|
| EP-7001 | CE7001: Biomethanator Flare #1 | EU83: Biomethanator #1 | | |
| | | EU84: Biomethanator #2 | | |
| | | CE7001: Biomethanator Flare #1 | 3.2 MMBtu/hr Flare | Biomethanator Off-Gases |
| | | | 0.1 MMBtu/hr Pilot | Natural Gas |
| EP-7002 | CE7002: Biomethanator Flare #2 | EU85: Biomethanator #3 | | |
| | | EU86: Biomethanator #4 | | |
| | | CE7002: Biomethanator Flare #2 | 3.2 MMBtu/hr Flare | Biomethanator Off-Gases |
| | | | 0.1 MMBtu/hr Pilot | Natural Gas |

(2) Emission Limitations and Testing Requirements:

No emission limitations or testing requirements are applicable to the emission point identified in Condition III.(H)(1).

(3) Operational and Monitoring Requirements and Limitations:

(a) Biogas generated from the biomethanators shall be combusted in the biomethanator flares or RTO #1 at all times biogas is being produced. {Chapters 19 and 27}

(b) When biogas is being routed to the biomethanator flare, a flame shall be present at the flare. The facility must install an appropriate safety device or flame monitoring system to ensure that biogas cannot be sent to the biomethanator flare without the presence of a flame. {Chapters 19 and 27}

(4) Applicable NSPS, NESHAP, and MACT Requirements:

At this time the Department has not identified any NSPS, NESHAP, or MACT requirements that apply to the emission points or emission units listed in Condition III.(H)(1).

(5) Reporting and Recordkeeping Requirements:

Reporting and Recordkeeping in accordance with Specific Condition II.(C).

**III.(G) Specific Conditions for DDGS Cooling, Storage, and Loadout**

(1) Permitted Emission Points: The source is permitted to construct the emission points and associated emission units identified in the following table:

| Emission Point ID# | Required Control Equipment ID# and Description | Emission Unit Description |
|---|---|---|
| EP-8002 | CE8002: DDGS Cooler Baghouse | EU86: DDGS Cooler |
| EP-8001 | CE8001: DDGS Loadout Baghouse | EU85: DDGS Loadout |

(2) Emission Limitations and Testing Requirements:

Pollutant emission rates from each emission point identified in the table below shall not exceed the permitted limits. Initial performance testing, if required, shall be conducted in accordance with Specific Condition II.(D).

| Emission Point ID# | Pollutant | Permitted Limit | Averaging Period | Basis for Permit Limit | Initial Performance Testing Required (Yes/No) |
|---|---|---|---|---|---|
| EP-8002 | $PM/PM_{10}$ | 1.37 lb/hr | 3-hour or test method average | Chapter 19 | Yes |
| | VOC | 2.40 lb/hr[1] | 3-hour or test method average | Chapter 17 | Yes |
| | HAP | N/A | Speciation and Quantification of HAP composition at outlet | Chapter 27 | Yes |
| EP-8001 | $PM/PM_{10}$ | 0.12 lb/hr | 3-hour or test method average | Chapter 19 | Yes |

[1]Expressed as weight VOC

(3) Operational and Monitoring Requirements and Limitations

(a) Emissions from the emission units identified in Condition III.(G)(1) shall be controlled by pollution control equipment as follows: EU86 shall be controlled by CE8002 and EU85 shall be controlled by CE8001. {Chapters 19 and 20}

(b) Operation and maintenance of each baghouse shall be in accordance with the following requirements: {Chapters 19 and 20}

(i) The baghouse shall be operated and be controlling emissions at all times when the associated emission units are in operation.

(ii) The baghouse shall be equipped with an operational pressure differential indicator. Pressure differential indicator readings shall be recorded at least once each day that the associated baghouse is operating.

**III.(F) Specific Conditions for DGS Drying Operations**

(1) Permitted Emission Points: The source is permitted to construct the emission points and associated emission units identified in the following table at the capacities and using the fuel types listed:

| Emission Point ID# | Control Equipment ID# and Description | Emission Unit ID# and Description | Maximum Capacity | Permitted Fuel Type |
|---|---|---|---|---|
| EP-5005 | CE5005: RTO #2 | EU78: DGS Dryer | 90.0 MMBtu/hr | Natural Gas |
| | | EU79: RTO #2 | 20.0 MMBtu/hr | Natural Gas |

(2) Emission Limitations and Testing Requirements

Pollutant emission rates from each emission point identified in the table below shall not exceed the permitted limits. Initial performance testing, if required, shall be conducted in accordance with Specific Condition II.(D).

| Emission Point ID# | Pollutant | Permitted Limit | Averaging Period | Basis for Permit Limit | Initial Performance Testing Required (Yes/No) |
|---|---|---|---|---|---|
| EP-5005 | PM/ $PM_{10}$ | 2.89 lb/hr | 3-hour or test method average | Title 129, Chapter 19 | Yes |
| | $SO_x$ | 15.51 lb/hr | 3-hour or test method average | Title 129, Chapter 19 | Yes |
| | $NO_x$ | 6.00 lb/hr | 3-hour or test method average | Title 129, Chapter 19 | Yes |
| | CO | 10.52 lb/hr | 3-hour or test method average | Title 129, Chapter 19 | Yes |
| | VOC | 6.57 lb/hr[1] | 3-hour or test method average | Title 129, Chapter 17 | Yes |
| | HAP | N/A | Speciation and Quantification of HAP composition at outlet | Title 129, Chapter 27 | Yes |

[1]Expressed as weight VOC

(3) Operational and Monitoring Requirements and Limitations

(a) Emissions from the emission units and emission points identified in Condition III.(C)(1) shall be controlled as follows: EU78 and EU79 shall be controlled by CE5005. {Chapter 19}

(b) Operation and maintenance of each RTO shall be in accordance with the following requirements {Chapters 19 and 34}:

(i) The RTO shall be operated and be controlling emissions at all times when the associated emission units are in operation.

**III.(E) Specific Conditions for Ethanol Loadout**

(1) Permitted Emission Point: The source is permitted to construct the emission point and associated emission units identified in the following table at the capacities and using the fuel types listed:

| Emission Point ID# | Control Equipment ID# and Description | Emission Unit ID# and Description | Maximum Capacity | Permitted Fuel Type |
|---|---|---|---|---|
| EP-4000 | CE4000: Liquid Loadout Flare | EU69: Ethanol Rail Loadout #1 | - | - |
| | | EU70: Ethanol Rail Loadout #2 | - | - |
| | | EU71: Ethanol Rail Loadout #3 | - | - |
| | | EU72: Ethanol Truck Loadout | - | - |
| | | EU73: Liquid Loadout Flare | 14.0 MMBtu/hr Flare | Ethanol Vapors |
| | | | 0.1 MMBtu/hr Pilot | Natural Gas |

(2) Emission Limitations and Testing Requirements:

No emission limitations or testing requirements are applicable to the emission point identified in Condition III.(E)(1).

(3) Operational and Monitoring Requirements and Limitations:

(a) Once the source produces 200,000 gallons or more per day of anhydrous ethanol for three consecutive days, ethanol loadout by truck from EU73 shall be limited to 55,000,000 gallons per any period of twelve (12) consecutive calendar months. At no time during the first eleven (11) months after start up shall the ethanol loaded out by truck exceed 55,000,000 gallons. {Chapter 19}

(b) The truck loadout operations, EU73, shall be equipped with a flow meter to record the amount of ethanol loaded out.

(c) The source shall use submerged or bottom loading when transferring liquid product from the storage tanks to tanker railcars or tanker trucks. {Chapters 19 and 27}

(d) Truck loadout of liquid product from EU72 shall be controlled by a closed vapor recovery system with an enclosed flare (CE4000) at all times liquid product loadout by truck is occurring. {Chapters 19 and 27}

(e) When ethanol loadout is occurring via truck, a flame shall be present at the flare. The facility must install an appropriate safety device or flame monitoring system to ensure that truck loadout cannot occur without the presence of a flame. {Chapters 19 and 27}

(f) Once the source produces 200,000 gallons or more per day of anhydrous ethanol for three consecutive days, rail loadout of liquid product from EU69, EU70, and EU71 shall be controlled by a closed vapor recovery system with an enclosed flare (CE4000) at all times liquid product loadout by rail is occurring. {Chapters 19 and 27}

**III.(D) Specific Conditions for Tanks**

(1) Permitted Emission Points: The source is permitted to construct the storage and process tanks identified in the following table at the capacities and for the storage of the products listed:

| Emission Point ID# | Maximum Storage Capacity (gallons) | Emission Unit ID#: Product Stored in Tank |
|---|---|---|
| EP-9001 | 750,000 | EU87: Denatured Ethanol |
| EP-9002 | 750,000 | EU88: Denatured Ethanol |
| EP-9003 | 100,000 | EU89: 200-Proof Ethanol |
| EP-9004 | 100,000 | EU90: Natural Gasoline |
| EP-9005 | 100,000 | EU91: 190-Proof Ethanol |
| EP-9006 | 2,000,000 | EU92: Denatured Ethanol |
| EP-9007 | 2,000,000 | EU93: Denatured Ethanol |
| EP-9008 | 100,000 | EU94: 200-Proof Ethanol |
| EP-9009 | 100,000 | EU95: Natural Gasoline |
| EP-9010 | 100,000 | EU96: 190-Proof Ethanol |

(2) Emission Limitations and Testing Requirements:

No emission limitations and testing requirements are associated with the emission points or emission units identified in Condition III.(D)(1).

(3) Operational and Monitoring Requirements and Limitations:

EU87 through EU96 shall each be equipped with a fixed roof in combination with an internal floating roof, in accordance with the specifications in 40 CFR 60.112b(a)(1). Each tank is also subject to the inspection requirements as required by 40 CFR 60.113b(a). {Chapters 18 and 27}

(4) Applicable NSPS, NESHAP, and MACT Standards:

The following standards apply to EU87, EU88, EU90, EU92, EU93, and EU95:

| Applicable Standard | Title | Rule Citation |
|---|---|---|
| NSPS, Subpart A | General Provisions | Chapter 18, Sec. 001.01<br>40 CFR 60.1 |
| NSPS, Subpart Kb | Volatile Organic Liquid Storage Vessels (Including Liquid Storage Vessels) | Chapter 18, Sec. 001.62<br>40 CFR 60.110b |

(5) Reporting and Recordkeeping Requirements:

(a) Notifications and recordkeeping as required by 40 CFR 60.7 for EU87, EU88, EU90, EU92, EU93, and EU95.

(b) Reporting and recordkeeping as required by 40 CFR 60.115b for EU87, EU88, EU90, EU92, EU93, and EU95.

(b) Once the source produces 200,000 gallons or more per day of anhydrous ethanol for three consecutive days, emissions from the emission units and emission points identified in Condition III.(C)(1) shall be controlled as follows: EU21 through EU36 shall be controlled CE3000 ; EU37 through EU49 shall be controlled by CE3001; EU50 through EU56 shall be controlled by CE3002; EU57 through EU63 shall be controlled by CE3003; and CE3000 through CE3003 shall be controlled by CE3004. {Chapter 19}

(c) Operation and maintenance of each scrubber shall be in accordance with the following requirements: {Chapters 19 and 27}

(i) The scrubber shall be operated and be controlling emissions at all times when the associated emission units are in operation.

(ii) The scrubber shall be equipped with devices capable of continuously monitoring operating parameters including, at a minimum, the scrubbing liquid temperature, scrubbing liquid flow rate, and pressure differential. Operating parameter readings shall be recorded at least once each day the scrubber is in operation.

(iii) All monitored operating parameters of the scrubber shall be maintained at the levels recorded during the most recent performance test that demonstrated compliance with the permitted emissions limits. Alternative levels may be used providing the facility can justify that better emissions control is being achieved. Normal operating parameters, or operating parameter ranges, that demonstrate compliance with the permitted emissions limits, with appropriate averaging periods shall be submitted with the source's operating permit application.

(iv) Observations at least once each day during daylight hours of scrubber operation shall be conducted to determine whether there are leaks, noise, or other indications that corrective action is necessary. If corrective action is required, it shall occur immediately.

(d) Operation and maintenance of the RTO shall be in accordance with the following requirements: {Chapter 19}

(i) The RTO shall be operated and be controlling emissions at all times when the associated emission units are in operation.

(ii) The RTO shall be equipped with a device capable of continuously monitoring and recording the temperature of the thermal oxidation combustion chamber(s).

(iii) All monitored operating parameters of the RTO shall be maintained at the levels recorded during the most recent performance test that demonstrated compliance with the permitted emissions limits. Alternative levels may be used provided the owner or operator can justify that better emissions control is being achieved. Prior to compliance being demonstrated the combustion chamber temperature shall not be operated below 1,400 degrees Fahrenheit. Combustion chamber temperature shall be averaged hourly from a minimum of one cycle of sampling, analyzing, and data recording for each successive fifteen minute period. Normal operating parameters, or operating parameter ranges, that demonstrate compliance with the permitted emissions limits, with appropriate averaging periods shall be submitted with the source's operating permit application.

**III.(C) Specific Conditions for Fermentation and Distillation Operations**

(1) Permitted Emission Points: The source is permitted to construct the emission points and associated emission units identified in the following table at the capacities and using the fuel types listed:

| Emission Point ID# | Control Equipment ID# and Description | Emission Unit ID# and Description | Maximum Capacity | Permitted Fuel Type |
|---|---|---|---|---|
| EP-3000[1] | CE3000: $CO_2$ Scrubber #1 | EU21: Mixer #1 | - | - |
| | | EU22: Cook Water Tank | - | - |
| | | EU23 and EU24: Slurry Tanks #1 and #2 | - | - |
| | | EU25: Flash Tank #1 | - | - |
| | | EU26: Receiver Tank #1 | - | - |
| | | EU27, EU28, and EU29: Liquefaction Tanks #1, #2, and #3 | - | - |
| | | EU30: Yeast Tank #1 | - | - |
| | | EU31, EU32, EU33, EU34, EU35: Fermentation Tanks #1, #2, #3, #4, and #5 | - | - |
| | | EU36: Beer Well | - | - |
| EP-3001[1] | CE3001: $CO_2$ Scrubber #2 | EU37 and EU38: Fermentation Tanks #6 and #7 | - | - |
| | | EU39 and EU40: Slurry Tanks #3 and #4 | - | - |
| | | EU41: Flash Tank #2 | - | - |
| | | EU42: Receiver Tank #2 | - | - |
| | | EU43 and EU44: Liquefaction Tanks #4 and #5 | - | - |
| | | EU45: Yeast Tank #2 | - | - |
| | | EU46, EU47, EU48, and EU49: Enzyme Tanks #1, #2, #3, and #4 | - | - |
| EP-3002[1] | CE3002: Distillation Scrubber #1 | EU50: Beer Column #1 | - | - |
| | | EU51: Side Stripper #1 | - | - |
| | | EU52: Rectifier Column #1 | - | - |
| | | EU53 and EU54: Molecular Sieves #1 and #2 | - | - |
| | | EU55 and EU56: Condensers #1 and #2 | - | - |
| EP-3003[1] | CE3003: Distillation Scrubber #2 | EU57: Beer Column #2 | - | - |
| | | EU58: Side Stripper #2 | - | - |
| | | EU59: Rectifier Column #2 | - | - |
| | | EU60 and EU61: Molecular Sieves #3 and #4 | - | - |
| | | EU62 and EU63: Condensers #3 and #4 | - | - |
| EP-3004 | CE3004: RTO #1 | CE3000: $CO_2$ Scrubber #1 | - | - |
| | | CE3001: $CO_2$ Scrubber #2 | - | - |
| | | CE3002: Distillation Scrubber #1 | - | - |
| | | CE3003: Distillation Scrubber #2 | - | - |
| | | EU68: RTO #1 | 2.5 MMBtu/hr | Natural Gas |

[1] Emissions from CE3000: $CO_2$ Scrubber #1, CE3001: $CO_2$ Scrubber #2, CE3002: Distillation Scrubber #1, and CE3003: Distillation Scrubber #2 will be routed to RTO #1 once it is constructed

| Emission Point ID# | Pollutant | Permitted Limit | Averaging Period | Basis for Permit Limit | Initial Performance Testing Required (Yes/No) |
|---|---|---|---|---|---|
| EP-1002 | $PM/PM_{10}$ | 1.44 lb/hr | 3-hour or test method average | Chapter 19 | Yes |
| EP-1003 | $PM/PM_{10}$ | 1.03 lb/hr | 3-hour or test method average | Chapter 19 | Yes |
| EP-2000 | $PM/PM_{10}$ | 0.34 lb/hr | 3-hour or test method average | Chapter 19 | Yes |
| EP-2001 | $PM/PM_{10}$ | 0.34 lb/hr | 3-hour or test method average | Chapter 19 | Yes |
| EP-2002 | $PM/PM_{10}$ | 0.45 lb/hr | 3-hour or test method average | Chapter 19 | Yes |

(3) Operational and Monitoring Requirements and Limitations

(a) Emissions from the emission units identified in Condition III.(A)(1) shall be controlled as follows: EU01 through EU06 and EU99 shall be controlled by CE1002; EU07 through EU09 and EU101 shall be controlled by CE1003; EU15, EU16, and EU97 shall be controlled by CE2000; EU17, EU98, and EU100 shall be controlled by CE2001; and EU18 through EU20 shall be controlled by CE2002. {Chapters 19 and 20}

(b) Emissions from Grain Storage Silos #3 and #4 shall be controlled by particulate filters that provide 99% particulate (PM and $PM_{10}$) emissions control. Verification of particulate emissions control shall be by manufacturer documentation. {Chapters 19 and 20}

(c) Observations at least once each day during daylight hours shall be conducted to determine whether there are visible emissions from the storage silo vents, leaks, or other indications that corrective action is needed. If corrective action is required, it shall occur immediately. {Chapters 19 and 20}

(d) Grain Storage Silo #3 and #4 filters are to be inspected and/or replaced as often as necessary to ensure proper operation or more frequently as indicated by visual inspections. {Chapter 34}

(e) The owner or operator shall maintain an on-site inventory of spare filters of each type used to ensure rapid replacement in the event replacement is necessary. {Chapter 34}

(f) Operation and maintenance of each baghouse shall be in accordance with the following requirements: {Chapters 19 and 20}

(i) The baghouse shall be operated and be controlling emissions at all times when the associated emission units are in operation.

| Applicable Standard | Title | Rule Citation |
|---|---|---|
| NSPS, Subpart A | General Provisions | Chapter 18, Sec. 001.01<br>40 CFR 60.1 |
| NSPS, Subpart DD | Grain Elevators | Chapter 18, Sec. 001.19<br>40 CFR 60.300 |

(5) Reporting and Recordkeeping Requirements:

(a) Records documenting when routine observations were performed with a description, including any atypical observations.

(b) Filter replacement records including filter position, type, and date of filter installation.

A site survey, or similar documentation containing the locations of the boundary vertices, shall be maintained on-site and kept for the life of the source. If the boundary dimensions do not comply with the table above, the owner or operator shall submit a revised air dispersion modeling analysis to the Department prior to start-up of any emission unit, to ensure that the source will not interfere with the attainment or maintenance of the ambient air quality standards in Chapter 4.

(H) The owner or operator shall notify the Department, in writing, within thirty (30) days of the anhydrous ethanol production equaling or exceeding 200,000 gallons per day for three consecutive days.

(I) The facility shall not receive more than 600,000 bushels (16,800 tons) of grain per day and 43,200,000 bushels (1,209,600 tons) of grain per any period of twelve (12) consecutive calendar months. Compliance shall be demonstrated by recording the total amount of grain received at the facility per day, each calendar month, and each year. {Chapters 4 and 17}

calculation methodology in either Attachment IV or Attachment V. The calculation methodology in Attachment IV shall be used upon issuance of this permit until the source produces 200,000 gallons per day or more of anhydrous ethanol for three consecutive days. The calculation methodology in Attachment V shall be used once the source produces 200,000 gallons or more per day of anhydrous ethanol for three consecutive days. If testing is required, the emission factors and pound per hour (lb/hr) emission rates presented in the Attachments shall be replaced with data obtained from the most current, approved emissions test conducted in accordance with Specific Condition II.(D).

(F) Prior to the source producing 200,000 gallons or more per day of anhydrous ethanol for three consecutive days, the following conditions apply to the verification of NAAQS modeling analysis: {Chapter 4}

(1) The stack dimensions of the following emission points shall be constructed as indicated below:

| Emission Point ID# | Emission Point Name | Minimum Stack Height (ft) | Stack Description |
|---|---|---|---|
| EP-1002 | Grain Receiving Baghouse #1 | 15.0 | Vertical Exhaust, no raincap |
| EP-2000 | Hammermill Baghouse #1 | 15.0 | Vertical Exhaust, no raincap |
| EP-2001 | Hammermill Baghouse #2 | 15.0 | - |
| EP-5001 | Boiler #1 | 45.0 | Vertical Exhaust, no raincap |
| EP-5002 | Boiler #2 | 45.0 | Vertical Exhaust, no raincap |
| EP-5003 | Boiler #3 | 45.0 | Vertical Exhaust, no raincap |
| EP-6000 | Cooling Tower #1 | 33.0 | - |
| EP-7001 | Biomethanator Flare #1 | 20.0 | - |

(2) The facility shall install a security fence around the facility in order to restrict unauthorized access to the site. The fence material will be six-foot tall chain link. The location of the fence shall be consistent with the locations identified in the NAAQS modeling submittal. Periodic inspections to verify fence integrity will be performed by the facility. The secondary access road shall be gated and padlocked unless KAAPA personnel are present in the immediate area at any time the secondary access gate is open. The facility shall also install security cameras that look down the property line and provide an unobstructed view of the perimeter and any openings in the security fence. A camera will be installed at the main entrance. These cameras will be linked to closed-circuit television monitors located in the plant control room and will be continuous monitored to prevent unauthorized access to the site.

(G) Once the source produces 200,000 gallons or more per day of anhydrous ethanol for three consecutive days, the following conditions apply to the verification of NAAQS modeling analysis: {Chapter 4}

(a) the permit must be revised to ensure compliance with the applicable requirements;

(b) the permit contains a material mistake or that inaccurate statements were made in the emissions standards or other terms or conditions of the permit.

(2) The existence at the source of unresolved noncompliance with applicable requirements or a term or condition of the permit, and refusal of the owner or operator to agree to an enforceable schedule of compliance to resolve the noncompliance;

(3) The submittal by the owner or operator of false, incomplete, or misleading information to the Department or EPA;

(4) A determination by the Director that the source or activity endangers human health or the environment and that the danger cannot be removed by a revision of the permit; or

(5) The failure of the owner or operator to pay a penalty owed pursuant to court order, stipulation and agreement, or order issued by the Administrator of the EPA.

## II. SPECIFIC CONDITIONS

(A) Recordkeeping: Records of all measurements, results, inspections, and observations as required to ensure compliance with all applicable requirements shall be maintained on-site as follows:

(1) All calculations and records required throughout this permit shall be completed no later than the fifteenth ($15^{th}$) day of each calendar month and shall include all information through the previous calendar month, unless otherwise specified in this permit.

(2) All records required throughout this permit shall be kept for a minimum of five years and shall be clear and readily accessible to Department representatives, unless otherwise specified in this permit.

(3) Copies of all notifications, reports, test results, and plans.

(4) Calibration records for all operating parameter monitoring equipment.

(5) Operation and Maintenance manuals detailing proper operation and maintenance of all permitted emission units, required control equipment, and required monitoring equipment shall be kept for the life of the equipment.

(6) Records documenting equipment failures, malfunctions, or other variations, including date and time of occurrence, remedial action taken, and when corrections were made to each piece of permitted equipment, required control equipment, and required monitoring equipment.

(7) The owner or operator shall maintain records of daily anhydrous ethanol production.

(B) All permitted emission units, control equipment, and monitoring equipment shall be properly installed, operated, and maintained.

## I. GENERAL CONDITIONS

(A) This permit is not transferable to another source or location. {Chapter 17}

(B) Holding of this permit does not relieve the owner or operator of the source from the responsibility to comply with all applicable portions of the Nebraska Air Quality Regulations and any other requirements under local, State, or Federal law. Any permit noncompliance shall constitute a violation of the Nebraska Environmental Protection Act and the Federal Clean Air Act, and is grounds for enforcement action or permit revocation. {Chapter 41 & Chapter 17, Section 011}

(C) Application for review of plans or advice furnished by the Director will not relieve the owner or operator of legal compliance with any provision of these regulations, or prevent the Director from enforcing or implementing any provision of these regulations. {Chapter 37}

(D) Any owner or operator who failed to submit any relevant facts or who submitted incorrect information in a permit application shall, upon becoming aware of such failure or incorrect submittal, promptly submit such supplementary facts or corrected information. If the owner or operator wishes to make changes at the source that will result in change(s) to values, specifications, and/or locations of emission points that were indicated in the permit application (or other supplemental information provided by the owner or operator and reviewed by the Department in issuance of this permit), the owner or operator must receive approval from the Department before the change(s) can be made. In addition, any modification which may result in an adverse change to the air quality impacts predicted by atmospheric dispersion modeling (such as changes in stack parameters or increases in emission rates, potential emissions, or actual emissions) shall have prior approval from the Department. The owner or operator shall provide all necessary information to verify that there are no substantive changes affecting the basis upon which this permit was issued. Information may include, but not be limited to, additional engineering, modeling and ambient air quality studies. {Chapter 17, Section 006, 007, & 008}

(E) Approval to construct, reconstruct and/or modify the source will become invalid if a continuous program of construction is not commenced within 18 months after the date of issuance of the construction permit, if construction is discontinued for a period of 18 months or more, or if construction is not completed within a reasonable period of time. {Chapter 17, Section 012}

(F) The owner/operator of the source shall provide the following notifications to the Department:

(1) The date construction, reconstruction or modification commenced as defined in Chapter 1, Section 031. Notification shall be postmarked no later than 30 days after such date and include a summary description of whether the requirement was met through: {Chapter 17, Section 012}

(a) Initiating physical on-site construction activities of a permanent nature that meet the definition of "begin actual construction", or

(b) Entering into binding agreements or contractual obligations. If this option is used, the notice shall also include a brief summary of each binding agreement or contractual obligation entered into, the date of the agreement or contract, and why it cannot be cancelled or modified without substantial loss to the owner or operator.

(M) Haul Roads
F1000 and F1001 ..... M-1

Permit Attachments:

IV. HAP Emission Calculation Methodology (<200k/day) ..... IV-1

V. HAP Emission Calculation Methodology ..... V-1