CLASS II ADMINISTRATIVE UPDATE APPLICATION FOR OPTIMA BELLE, LLC FOR PERMITS R13-0882N AND R30-03900001

REDACTED APPLICATION

Prepared for:

Optima Belle, LLC
901 W. DuPont Avenue
Belle, West Virginia 25015

Prepared by:

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Project No. 0101-14-0162-013

March 2017

POTESTA

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SECTION I - III

GENERAL APPLICANT INFORMATION

WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION

DIVISION OF AIR QUALITY

601 57th Street, SE
Charleston, WV 25304
(304) 926-0475
www.dep.wv.gov/daq

APPLICATION FOR NSR PERMIT AND TITLE V PERMIT REVISION (OPTIONAL)

PLEASE CHECK ALL THAT APPLY TO **NSR (45CSR13)** (IF KNOWN):

☐ **CONSTRUCTION** ☐ **MODIFICATION** ☐ **RELOCATION**
☐ **CLASS I ADMINISTRATIVE UPDATE** ☐ **TEMPORARY**
☒ **CLASS II ADMINISTRATIVE UPDATE** ☐ **AFTER-THE-FACT**

PLEASE CHECK TYPE OF **45CSR30 (TITLE V)** REVISION (IF ANY):

☐ **ADMINISTRATIVE AMENDMENT** ☒ **MINOR MODIFICATION**
☐ **SIGNIFICANT MODIFICATION**

IF ANY BOX ABOVE IS CHECKED, INCLUDE TITLE V REVISION INFORMATION AS **ATTACHMENT S** TO THIS APPLICATION

FOR TITLE V FACILITIES ONLY: Please refer to "Title V Revision Guidance" in order to determine your Title V Revision options (Appendix A, "Title V Permit Revision Flowchart") and ability to operate with the changes requested in this Permit Application.

Section I. General

1. Name of applicant *(as registered with the WV Secretary of State's Office):*
Optima Belle, LLC

2. Federal Employer ID No. ***(FEIN):***
465403006

3. Name of facility *(if different from above):*
Optima Belle Plant

4. The applicant is the:
☐ **OWNER** ☐ **OPERATOR** ☒ **BOTH**

5A. Applicant's mailing address:
901 W. DuPont Avenue
Belle, West Virginia 25015

5B. Facility's present physical address:
901 W. DuPont Avenue
Belle, West Virginia 25015

6. **West Virginia Business Registration.** Is the applicant a resident of the State of West Virginia? ☒ **YES** ☐ **NO**

➪ If **YES,** provide a copy of the **Certificate of Incorporation/Organization/Limited Partnership** (one page) including any name change amendments or other Business Registration Certificate as **Attachment A.**

➪ If **NO,** provide a copy of the **Certificate of Authority/Authority of L.L.C./Registration** (one page) including any name change amendments or other Business Certificate as **Attachment A.**

7. If applicant is a subsidiary corporation, please provide the name of parent corporation: NA

8. Does the applicant own, lease, have an option to buy or otherwise have control of the *proposed site?* ☒ **YES** ☐ **NO**

➪ If **YES,** please explain: The site is owned and operated by the applicant.

➪ If **NO,** you are not eligible for a permit for this source.

9. Type of plant or facility (stationary source) to be **constructed, modified, relocated, administratively updated** or **temporarily permitted** (e.g., coal preparation plant, primary crusher, etc.): Chemical Manufacturing

10. North American Industry Classification System **(NAICS)** code for the facility:
325199

11A. DAQ Plant ID No. (for existing facilities only):
039-00663

11B. List all current 45CSR13 and 45CSR30 (Title V) permit numbers associated with this process (for existing facilities only):
R13-0882N, R30-03900001

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

12A.

- ➪ For **Modifications, Administrative Updates** or **Temporary permits** at an existing facility, please provide directions to the *present location* of the facility from the nearest state road;
- ➪ For **Construction** or **Relocation permits,** please provide directions to the *proposed new site location* from the nearest state road. Include a **MAP** as **Attachment B**.

I-64 to Belle exit, then Rt. 60 East to Belle exit, turn right onto DuPont Avenue, travel approximately 500 feet and the plant entrance is on the left.

12.B. New site address (if applicable):	12C. Nearest city or town:	12D. County:
Same	Belle	Kanawha
12.E. UTM Northing (KM): 4,232.60	12F. UTM Easting (KM): 451.90	12G. UTM Zone: 17

13. Briefly describe the proposed change(s) at the facility:
The facility proposes equipment and process modifications and an increase in production for dried and undried L-Alanine Methyl Ester (LAME).

14A. Provide the date of anticipated installation or change: May 15, 2017 ➪ If this is an **After-The-Fact** permit application, provide the date upon which the proposed change did happen: NA	14B. Date of anticipated Start-Up if a permit is granted: May 15, 2017

14C. Provide a **Schedule** of the planned **Installation** of/**Change** to and **Start-Up** of each of the units proposed in this permit application as **Attachment C** (if more than one unit is involved).

15. Provide maximum projected **Operating Schedule** of activity/activities outlined in this application:
Hours Per Day 24 Days Per Week 7 Weeks Per Year 52

16. Is demolition or physical renovation at an existing facility involved? ☐ **YES** ☒ **NO**

17. **Risk Management Plans.** If this facility is subject to 112(r) of the 1990 CAAA, or will become subject due to proposed changes (for applicability help see www.epa.gov/ceppo), submit your **Risk Management Plan (RMP)** to U. S. EPA Region III.

18. **Regulatory Discussion.** List all Federal and State air pollution control regulations that you believe are applicable to the proposed process *(if known)*. A list of possible applicable requirements is also included in Attachment S of this application (Title V Permit Revision Information). Discuss applicability and proposed demonstration(s) of compliance *(if known)*. Provide this information as **Attachment D.**

Section II. Additional attachments and supporting documents.

19. Include a check payable to WVDEP – Division of Air Quality with the appropriate **application fee** (per 45CSR22 and 45CSR13).

20. Include a **Table of Contents** as the first page of your application package.

21. Provide a **Plot Plan,** e.g. scaled map(s) and/or sketch(es) showing the location of the property on which the stationary source(s) is or is to be located as **Attachment E** (Refer to ***Plot Plan Guidance***) .
➪ Indicate the location of the nearest occupied structure (e.g. church, school, business, residence).

22. Provide a **Detailed Process Flow Diagram(s)** showing each proposed or modified emissions unit, emission point and control device as **Attachment F.**

23. Provide a **Process Description** as **Attachment G.**
➪ Also describe and quantify to the extent possible all changes made to the facility since the last permit review (if applicable).

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

24. Provide **Material Safety Data Sheets (MSDS)** for all materials processed, used or produced as **Attachment H.**

➪ For chemical processes, provide a MSDS for each compound emitted to the air.

25. Fill out the **Emission Units Table** and provide it as **Attachment I.**

26. Fill out the **Emission Points Data Summary Sheet (Table 1 and Table 2)** and provide it as **Attachment J.**

27. Fill out the **Fugitive Emissions Data Summary Sheet** and provide it as **Attachment K.**

28. Check all applicable **Emissions Unit Data Sheets** listed below:

☐ Bulk Liquid Transfer Operations	☐ Haul Road Emissions	☐ Quarry
☐ Chemical Processes	☐ Hot Mix Asphalt Plant	☐ Solid Materials Sizing, Handling and Storage Facilities
☐ Concrete Batch Plant	☐ Incinerator	
☐ Grey Iron and Steel Foundry	☐ Indirect Heat Exchanger	☐ Storage Tanks

☒ General Emission Unit, specify: LAME production

Fill out and provide the **Emissions Unit Data Sheet(s)** as **Attachment L.**

29. Check all applicable **Air Pollution Control Device Sheets** listed below:

☐ Absorption Systems	☐ Baghouse	☐ Flare
☐ Adsorption Systems	☐ Condenser	☐ Mechanical Collector
☐ Afterburner	☐ Electrostatic Precipitator	☒ Wet Collecting System

☐ Other Collectors, specify:

Fill out and provide the **Air Pollution Control Device Sheet(s)** as **Attachment M.**

30. Provide all **Supporting Emissions Calculations** as **Attachment N,** or attach the calculations directly to the forms listed in Items 28 through 31.

31. **Monitoring, Recordkeeping, Reporting and Testing Plans.** Attach proposed monitoring, recordkeeping, reporting and testing plans in order to demonstrate compliance with the proposed emissions limits and operating parameters in this permit application. Provide this information as **Attachment O.**

➢ Please be aware that all permits must be practically enforceable whether or not the applicant chooses to propose such measures. Additionally, the DAQ may not be able to accept all measures proposed by the applicant. If none of these plans are proposed by the applicant, DAQ will develop such plans and include them in the permit.

32. **Public Notice.** At the time that the application is submitted, place a **Class I Legal Advertisement** in a newspaper of general circulation in the area where the source is or will be located (See 45CSR§13-8.3 through 45CSR§13-8.5 and ***Example Legal Advertisement*** for details). Please submit the **Affidavit of Publication** as **Attachment P** immediately upon receipt.

33. **Business Confidentiality Claims.** Does this application include confidential information (per 45CSR31)?

☒ **YES** ☐ **NO**

➢ If **YES,** identify each segment of information on each page that is submitted as confidential and provide justification for each segment claimed confidential, including the criteria under 45CSR§31-4.1, and in accordance with the DAQ's ***"Precautionary Notice – Claims of Confidentiality"*** guidance found in the ***General Instructions*** as **Attachment Q.**

Section III. Certification of Information

34. **Authority/Delegation of Authority.** Only required when someone other than the responsible official signs the application. Check applicable **Authority Form** below:

☐ Authority of Corporation or Other Business Entity	☐ Authority of Partnership
☐ Authority of Governmental Agency	☐ Authority of Limited Partnership

Submit completed and signed **Authority Form** as **Attachment R.**

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

35A. **Certification of Information.** To certify this permit application, a Responsible Official (per 45CSR§13-2.22 and 45CSR§30-2.28) or Authorized Representative shall check the appropriate box and sign below.

Certification of Truth, Accuracy, and Completeness

I, the undersigned ☒ **Responsible Official** / ☐ **Authorized Representative,** hereby certify that all information contained in this application and any supporting documents appended hereto, is true, accurate, and complete based on information and belief after reasonable inquiry I further agree to assume responsibility for the construction, modification and/or relocation and operation of the stationary source described herein in accordance with this application and any amendments thereto, as well as the Department of Environmental Protection, Division of Air Quality permit issued in accordance with this application, along with all applicable rules and regulations of the West Virginia Division of Air Quality and W.Va. Code § 22-5-1 et seq. (State Air Pollution Control Act). If the business or agency changes its Responsible Official or Authorized Representative, the Director of the Division of Air Quality will be notified in writing within 30 days of the official change.

Compliance Certification

Except for requirements identified in the Title V Application for which compliance is not achieved, I, the undersigned hereby certify that, based on information and belief formed after reasonable inquiry, all air contaminant sources identified in this application are in compliance with all applicable requirements.

SIGNATURE _____ DATE: 3/30/17
(Please use blue ink) *(Please use blue ink)*

35B. Printed name of signee: K. Gene Williams		35C. Title: President
35D. E-mail: gwilliams@optimachem.com	36E. Phone: (912) 384-6330	36F. FAX: Use email
36A. Printed name of contact person (if different from above): Tim Ryan		36B. Title: EHS Manager
36C. E-mail: tryan@optimachem.com	36D. Phone: (304) 949-7162	36E. FAX: Use email

PLEASE CHECK ALL APPLICABLE ATTACHMENTS INCLUDED WITH THIS PERMIT APPLICATION:

- ☒ **Attachment A: Business Certificate**
- ☒ **Attachment B: Map(s)**
- ☒ **Attachment C: Installation and Start Up Schedule**
- ☒ **Attachment D: Regulatory Discussion**
- ☒ **Attachment E: Plot Plan**
- ☒ **Attachment F: Detailed Process Flow Diagram(s)**
- ☒ **Attachment G: Process Description**
- ☒ **Attachment H: Material Safety Data Sheets (MSDS)**
- ☒ **Attachment I: Emission Units Table**
- ☒ **Attachment J: Emission Points Data Summary Sheet**
- ☒ **Attachment K: Fugitive Emissions Data Summary Sheet**
- ☒ **Attachment L: Emissions Unit Data Sheet(s)**
- ☐ **Attachment M: Air Pollution Control Device Sheet(s)**
- ☒ **Attachment N: Supporting Emissions Calculations**
- ☒ **Attachment O: Monitoring/Recordkeeping/Reporting/Testing Plans**
- ☒ **Attachment P: Public Notice**
- ☒ **Attachment Q: Business Confidential Claims**
- ☐ **Attachment R: Authority Forms**
- ☒ **Attachment S: Title V Permit Revision Information**
- ☒ **Application Fee**

Please mail an original and three (3) copies of the complete permit application with the signature(s) to the DAQ, Permitting Section, at the address listed on the first page of this application. Please DO NOT fax permit applications.

FOR AGENCY USE ONLY – IF THIS IS A TITLE V SOURCE:

- ☐ ***Forward 1 copy of the application to the Title V Permitting Group and:***
- ☐ ***For Title V Administrative Amendments:***
  - ☐ ***NSR permit writer should notify Title V permit writer of draft permit,***
- ☐ ***For Title V Minor Modifications:***
  - ☐ ***Title V permit writer should send appropriate notification to EPA and affected states within 5 days of receipt,***
  - ☐ ***NSR permit writer should notify Title V permit writer of draft permit.***
- ☐ ***For Title V Significant Modifications processed in parallel with NSR Permit revision:***
  - ☐ ***NSR permit writer should notify a Title V permit writer of draft permit,***
  - ☐ ***Public notice should reference both 45CSR13 and Title V permits,***
  - ☐ ***EPA has 45 day review period of a draft permit.***

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

ATTACHMENT A

BUSINESS CERTIFICATE

WEST VIRGINIA
STATE TAX DEPARTMENT
BUSINESS REGISTRATION CERTIFICATE

ISSUED TO:
OPTIMA BELLE LLC
901 W DUPONT AVE
BELLE, WV 25015-1555

BUSINESS REGISTRATION ACCOUNT NUMBER: **2298-1773**

This certificate is issued on: 05/8/2015

This certificate is issued by
the West Virginia State Tax Commissioner
in accordance with Chapter 11, Article 12, of the West Virginia Code

The person or organization identified on this certificate is registered to conduct business in the State of West Virginia at the location above.

This certificate is not transferrable and must be displayed at the location for which issued

This certificate shall be permanent until cessation of the business for which the certificate of registration was granted or until it is suspended, revoked or cancelled by the Tax Commissioner.

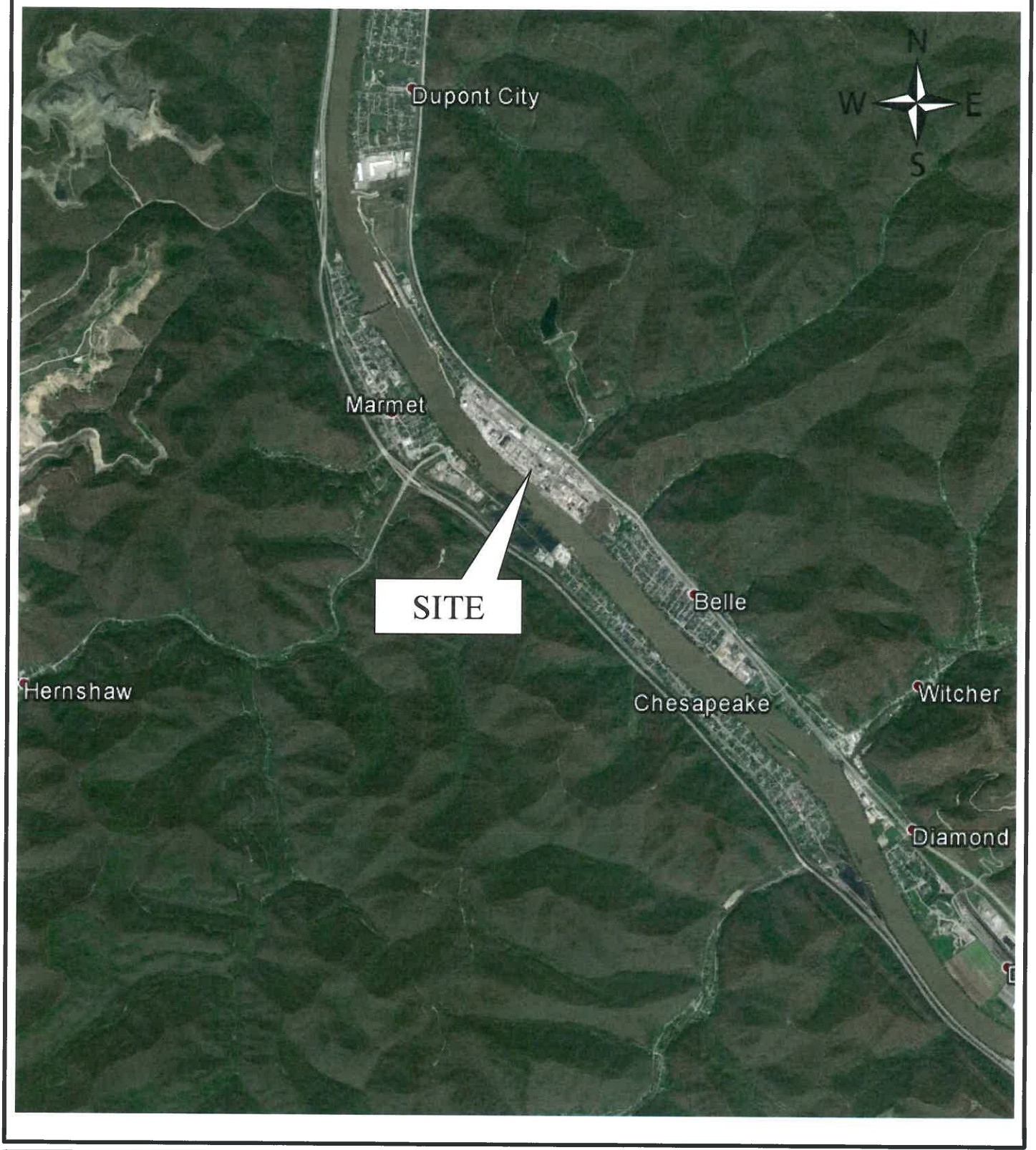
Change in name or change of location shall be considered a cessation of the business and a new certificate shall be required.

TRAVELING/STREET VENDORS: Must carry a copy of this certificate in every vehicle operated by them. CONTRACTORS, DRILLING OPERATORS, TIMBER/LOGGING OPERATIONS: Must have a copy of this certificate displayed at every job site within West Virginia.

atL006 v.4
L1970489664

ATTACHMENT B

AREA MAP



POTESTA
Engineers and Environmental Consultants

DATE: March 2017

PROJECT NO. 0101-14-0162

MAPPING FOR VISUAL REPRESENTATION ONLY

SITE LOCATION MAP 1 of 2
OPTIMA BELLE, LLC
BELLE, KANAWHA COUNTY, WV

NOT TO SCALE

POTESTA
Engineers and Environmental Consultants

DATE: March 2017

PROJECT NO. 0101-14-0162

MAPPING FOR VISUAL REPRESENTATION ONLY

SITE LOCATION MAP 2 of 2
OPTIMA BELLE, LLC
BELLE, KANAWHA COUNTY, WV

NOT TO SCALE

ATTACHMENT C

INSTALLATION AND START UP SCHEDULE

ATTACHMENT C

SCHEDULE OF INSTALLATION

Optima Belle, LLC (Optima) anticipates startup of operations to begin on May 15, 2017 and after approval of the permit.

ATTACHMENT D

REGULATORY DISCUSSION

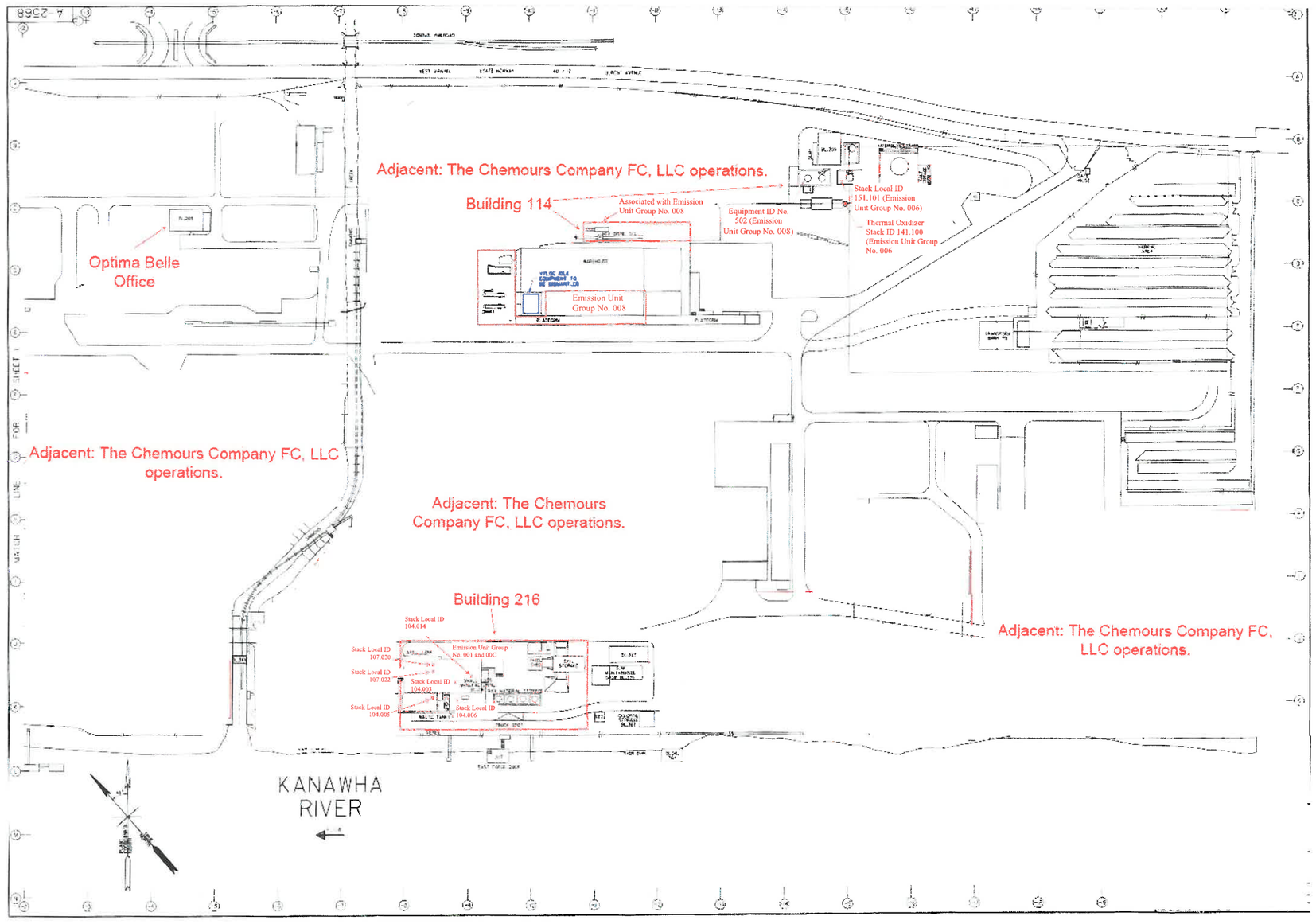
ATTACHMENT D

REGULATORY DISCUSSION

The proposed changes to the L-alanine methyl ester ("LAME") manufacturing process do not modify the regulatory basis for the permit. The equipment being utilized to manufacture LAME is existing permitted equipment with controls which are specified in the permit. No new pollution control equipment will be added.

ATTACHMENT E

PLOT PLAN



POTESTA
Engineers and Environmental Consultants

7012 MacCorkle Avenue, S.E
Charleston, West Virginia 25304
Phone: (304) 342-1400
Fax: (304) 343-9031

Optima Belle, LLC
Kanawha County, West Virginia
Project No. 0101-14-0162

ATTACHMENT F

DETAILED PROCESS FLOW DIAGRAM

L-Alanine Methyl Ester
Process
(Dried)

Optima Belle Confidential

Rev2 JBW 1/10/17

REDACTED
Information Claimed Confidential by Optima Belle, LLC April 22, 2016.

L-Alanine Methyl Ester
Process
(Undried)

Optima Belle Confidential

Rev2 JBW 1/10/17

REDACTED
Information Claimed Confidential by Optima Belle, LLC April 22, 2016.

ATTACHMENT G

PROCESS DESCRIPTION

REDACTED
Information claimed confidential by
Optima Belle, LLC April 22, 2016.

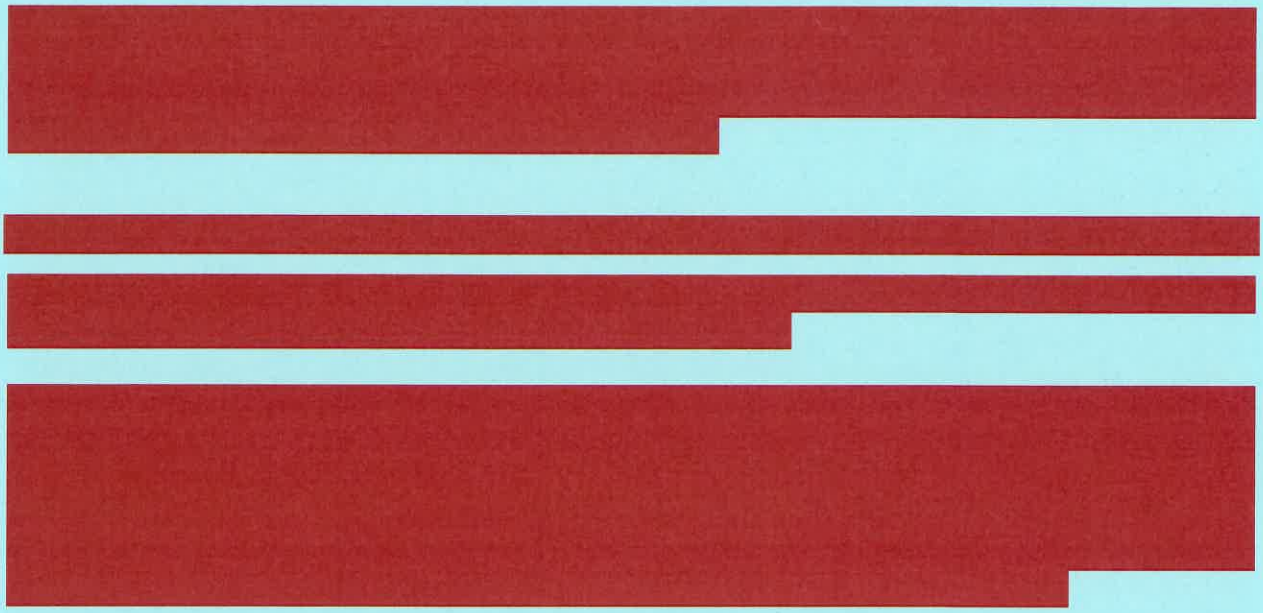
Process Description – LAME

L-alanine methyl ester ("LAME") is a crystalline solid used as a food additive. LAME can be dried at the facility or shipped off site as a wet material. The facility proposes equipment and process modifications and an increase in production for dried and undried LAME. The process modification is to allow greater flexibility to use different reactors during production.

Process Summary:

Varying amounts of the required components are charged to reactors then agitated for mixing. These mixtures are then combined and react to form the final product. Through decanting, stripping, and drying, the final product is isolated and purified from the reaction mixtures and solvents. Waste materials are loaded to totes and tanker trucks for off-site disposal.

REDACTED
Information claimed confidential by
Optima Belle, LLC April 22, 2016.



ATTACHMENT H

MATERIAL SAFETY DATA SHEETS (MSDS)

SAFETY DATA SHEET

Acetonitrile

Section 1. Identification

GHS product identifier : Acetonitrile

Chemical name : acetonitrile

Other means of identification : cyanomethane; Methylcyanide

Product use : Synthetic/Analytical chemistry.

Synonym : cyanomethane; Methylcyanide

SDS # : 001102

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

Emergency telephone number (with hours of operation) : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE LIQUIDS - Category 2
ACUTE TOXICITY (inhalation) - Category 4
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : Highly flammable liquid and vapor.
May form explosive mixtures with air.
Harmful if inhaled.
Causes serious eye irritation.

Precautionary statements

General : Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand.

Prevention : Wear protective gloves. Wear eye or face protection. Keep away from heat, sparks, open flames and hot surfaces. - No smoking. Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Keep container tightly closed. Use only outdoors or in a well-ventilated area. Avoid breathing vapor. Wash hands thoroughly after handling.

Response : IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or physician if you feel unwell. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.

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Section 2. Hazards identification

Storage : Store in a well-ventilated place. Keep cool.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazards not otherwise classified : None known.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : acetonitrile

Other means of identification : cyanomethane; Methylcyanide

CAS number/other identifiers

CAS number : 75-05-8

Product code : 001102

Ingredient name	%	CAS number
acetonitrile	100	75-05-8

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention if adverse health effects persist or are severe. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

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Section 4. First aid measures

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : Harmful if inhaled. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

Skin contact : No known significant effects or critical hazards.

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Ingestion : Irritating to mouth, throat and stomach.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use dry chemical, CO_2, water spray (fog) or foam.

Unsuitable extinguishing media : Do not use water jet.

Specific hazards arising from the chemical : Highly flammable liquid and vapor. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
nitrogen oxides

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

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Section 5. Fire-fighting measures

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

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Section 7. Handling and storage

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
acetonitrile	**ACGIH TLV (United States, 6/2013).** **Absorbed through skin.** TWA: 20 ppm 8 hours. **NIOSH REL (United States, 10/2013).** TWA: 34 mg/m³ 10 hours. TWA: 20 ppm 10 hours. **OSHA PEL (United States, 2/2013).** TWA: 70 mg/m³ 8 hours. TWA: 40 ppm 8 hours. **OSHA PEL 1989 (United States, 3/1989).** STEL: 105 mg/m³ 15 minutes. STEL: 60 ppm 15 minutes. TWA: 70 mg/m³ 8 hours. TWA: 40 ppm 8 hours.

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.

Skin protection

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Section 8. Exposure controls/personal protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Liquid. [COLORLESS LIQUID WITH A SWEET, ETHER-LIKE ODOR [NOTE:FORMS CYANIDE IN THE BODY]]

Color : Colorless.

Molecular weight : 41.06 g/mole

Molecular formula : C2-H3-N

Boiling/condensation point : 81.6°C (178.9°F)

Melting/freezing point : -45.7°C (-50.3°F)

Critical temperature : 274.75°C (526.5°F)

Odor : Characteristic.

Odor threshold : Not available.

pH : Not available.

Flash point : Closed cup: 12.8°C (55°F)

Burning time : Not applicable.

Burning rate : Not applicable.

Evaporation rate : 2.33 (butyl acetate = 1)

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Lower: 3%
Upper: 16%

Vapor pressure : 9.5 kPa (70.89 mm Hg) [room temperature]

Vapor density : 1.4 (Air = 1)

Specific Volume (ft^3/lb) : 1.271

Gas Density (lb/ft^3) : 0.7868 (20°C / 68 to °F)

Relative density : 0.8

Solubility : Not available.

Solubility in water : 1000 g/l

Partition coefficient: n-octanol/water : -0.34

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Section 9. Physical and chemical properties

Auto-ignition temperature : 524°C (975.2°F)

Decomposition temperature : Not available.

SADT : Not available.

Viscosity : Not available.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas.

Incompatibility with various substances : Highly reactive or incompatible with the following materials: oxidizing materials.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
acetonitrile	LC50 Inhalation Gas. LC50 Inhalation Gas. LD50 Dermal LD50 Oral	Rat Rat Rabbit Rat	21354 ppm 17100 ppm 980 mg/kg 2460 mg/kg	1 hours 4 hours - -

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
acetonitrile	Eyes - Moderate irritant Skin - Mild irritant	Rabbit Rabbit	- -	24 hours 100 microliters 500 milligrams	- -

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

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Section 11. Toxicological information

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Routes of entry anticipated: Dermal, Inhalation.

Potential acute health effects

Eye contact : Causes serious eye irritation.

Inhalation : Harmful if inhaled. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

Skin contact : No known significant effects or critical hazards.

Ingestion : Irritating to mouth, throat and stomach.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
pain or irritation
watering
redness

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

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Section 11. Toxicological information

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
acetonitrile	-0.34	-	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

United States - RCRA Toxic hazardous waste "U" List

Ingredient	CAS #	Status	Reference number
Acetonitrile (I,T)	75-05-8	Listed	U003

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Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1648	UN1648	UN1648	UN1648	UN1648
UN proper shipping name	ACETONITRILE	ACETONITRILE	ACETONITRILE	ACETONITRILE	ACETONITRILE
Transport hazard class(es)	3	3	3	3	3
Packing group	II	II	II	II	II
Environment	No.	No.	No.	No.	No.
Additional information	The marine pollutant mark is not required when transported on inland waterways in sizes of ≤5 L or ≤5 kg or by road, rail, or inland air in non-bulk sizes. **Reportable quantity** 5000 lbs / 2270 kg [762.16 gal / 2885.1 L] Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements. **Limited quantity** Yes. **Packaging instruction** **Passenger aircraft** Quantity limitation: 5 L **Cargo aircraft** Quantity limitation: 60 L **Special provisions** IB2, T7, TP2	**Explosive Limit and Limited Quantity Index** 1 **Passenger Carrying Road or Rail Index** 5	-	-	The environmentally hazardous substance ***mark may appear if*** required by other transportation regulations. **Passenger and Cargo Aircraft**Quantity limitation: 5 L **Cargo Aircraft Only** Quantity limitation: 60 L **Limited Quantities - Passenger Aircraft** Quantity limitation: 1 L

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

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Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) PAIR**: acetonitrile
TSCA 8(a) CDR Exempt/Partial exemption: Not determined
United States inventory (TSCA 8b): This material is listed or exempted.
Clean Water Act (CWA) 307: acetonitrile

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Fire hazard
Immediate (acute) health hazard

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
acetonitrile	100	Yes.	No.	No.	Yes.	No.

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	acetonitrile	75-05-8	100
Supplier notification	acetonitrile	75-05-8	100

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : This material is listed.
New York : This material is listed.
New Jersey : This material is listed.
Pennsylvania : This material is listed.

Canada inventory : This material is listed or exempted.

International regulations

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Section 15. Regulatory information

International lists : **Australia inventory (AICS)**: This material is listed or exempted.
China inventory (IECSC): This material is listed or exempted.
Japan inventory: This material is listed or exempted.
Korea inventory: This material is listed or exempted.
Malaysia Inventory (EHS Register): Not determined.
New Zealand Inventory of Chemicals (NZIoC): This material is listed or exempted.
Philippines inventory (PICCS): This material is listed or exempted.
Taiwan inventory (CSNN): Not determined.

Chemical Weapons Convention List Schedule I Chemicals : Not listed

Chemical Weapons Convention List Schedule II Chemicals : Not listed

Chemical Weapons Convention List Schedule III Chemicals : Not listed

Canada

WHMIS (Canada) : Class B-2: Flammable liquid
Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).

CEPA Toxic substances: This material is not listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

Section 16. Other information

Canada Label requirements : Class B-2: Flammable liquid
Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).

Hazardous Material Information System (U.S.A.)

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)

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Section 16. Other information

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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

History

Date of printing : 4/26/2015.

Date of issue/Date of revision : 4/26/2015.

Date of previous issue : 10/28/2014.

Version : 0.02

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United NationsACGIH – American Conference of Governmental Industrial Hygienists
AIHA – American Industrial Hygiene Association
CAS – Chemical Abstract Services
CEPA – Canadian Environmental Protection Act
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act (EPA)
CFR – United States Code of Federal Regulations
CPR – Controlled Products Regulations
DSL – Domestic Substances List
GWP – Global Warming Potential
IARC – International Agency for Research on Cancer
ICAO – International Civil Aviation Organisation
Inh – Inhalation
LC – Lethal concentration
LD – Lethal dosage
NDSL – Non-Domestic Substances List
NIOSH – National Institute for Occupational Safety and Health
TDG – Canadian Transportation of Dangerous Goods Act and Regulations
TLV – Threshold Limit Value
TSCA – Toxic Substances Control Act
WEEL – Workplace Environmental Exposure Level
WHMIS – Canadian Workplace Hazardous Material Information System

References : Not available.

Indicates information that has changed from previously issued version.

Notice to reader

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Section 16. Other information

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

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SAFETY DATA SHEET

1. Identification

Product identifier L-Alanine

Other means of identification

Catalog number 1012509

Chemical name L-alpha-Aminopropanoic acid

Synonym(s) Alanine

Recommended use Specified quality tests and assay use only.

Recommended restrictions Not for use as a drug. Not for administration to humans or animals.

Manufacturer/Importer/Supplier/Distributor information

Company name	U. S. Pharmacopeia	
Address	12601 Twinbrook Parkway Rockville MD 20852-1790 US	
Telephone	RS Technical Services	301-816-8129
Website	www.usp.org	
E-mail	RSTECH@usp.org	
Emergency phone number	CHEMTREC within US & Canada	1-800-424-9300
	CHEMTREC outside US & Canada	+1 703-527-3887

2. Hazard(s) identification

Physical hazards Not classified.

Health hazards Not classified.

OSHA hazard(s) Not classified.

Label elements

Hazard symbol No symbol.

Signal word Not available.

Hazard statement Not available.

Precautionary statement

Prevention Not available.

Response Not available.

Storage Not available.

Disposal Not available.

Hazard(s) not otherwise classified (HNOC) Not classified.

3. Composition/information on ingredients

Substance

Non-hazardous components

Chemical name	Common name and synonyms	CAS number	%
L-Alanine	Alanine	56-41-7	100

4. First-aid measures

Inhalation If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing. Call a physician if symptoms develop or persist.

Skin contact Rinse skin with water/shower. Get medical attention if irritation develops and persists.

Eye contact Rinse with water. Get medical attention if irritation develops and persists.

Ingestion Rinse mouth. If ingestion of a large amount does occur, call a poison control center immediately.

Most important symptoms/effects, acute and delayed	Not available.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically.
General information	Remove from exposure. Remove contaminated clothing. For treatment advice, seek guidance from an occupational health physician or other licensed health-care provider familiar with workplace chemical exposures. In the United States, the national poison control center phone number is 1-800-222-1222. If person is not breathing, give artificial respiration. If breathing is difficult, give oxygen if available. Persons developing serious hypersensitivity (anaphylactic) reactions must receive immediate medical attention.

5. Fire-fighting measures

Suitable extinguishing media	Water spray, dry chemical, carbon dioxide, or foam as appropriate for surrounding fire and materials.
Unsuitable extinguishing media	None known.
Specific hazards arising from the chemical	No unusual fire or explosion hazards noted.
Special protective equipment and precautions for firefighters	Wear suitable protective equipment.
Fire-fighting equipment/instructions	As with all fires, evacuate personnel to a safe area. Firefighters should use self-contained breathing equipment and protective clothing.
Specific methods	Cool containers exposed to flames with water until well after the fire is out.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Avoid inhalation of dust from the spilled material. Ensure adequate ventilation. Wear appropriate personal protective equipment.
Methods and materials for containment and cleaning up	Sweep up or vacuum up spillage and collect in suitable container for disposal. Avoid the generation of dusts during clean-up. For waste disposal, see section 13 of the SDS. Wash spill site.

7. Handling and storage

Precautions for safe handling	As a general rule, when handling USP Reference Standards, avoid all contact and inhalation of dust, mists, and/or vapors associated with the material. Clean equipment and work surfaces with suitable detergent or solvent after use. After removing gloves, wash hands and other exposed skin thoroughly.
Conditions for safe storage, including any incompatibilities	Store in tight container as defined in the USP-NF. This material should be handled and stored per label instructions to ensure product integrity.

8. Exposure controls/personal protection

Biological limit values	No biological exposure limits noted for the ingredient(s).
Exposure guidelines	No exposure standards allocated.
Appropriate engineering controls	Airborne exposure should be controlled primarily by engineering controls such as general dilution ventilation, local exhaust ventilation, or process enclosure. Local exhaust ventilation is generally preferred to general exhaust because it can control the contaminant at its source, preventing dispersion into the work area. An industrial hygiene survey involving air monitoring may be used to determine the effectiveness of engineering controls. Effectiveness of engineering controls intended for use with highly potent materials should be assessed by use of nontoxic surrogate materials.

Individual protection measures, such as personal protective equipment

Eye/face protection	Safety glasses with sideshields are recommended. Face shields or goggles may be required if splash potential exists or if corrosive materials are present. Approved eye protection (e.g., bearing the ANSI Z87 or CSA stamp) is preferred. Maintain eyewash facilities in the work area.
Skin protection	
Hand protection	Chemically compatible gloves. For handling solutions, ensure that the glove material is protective against the solvent being used. Use handling practices that minimize direct hand contact. Employees who are sensitive to natural rubber (latex) should use nitrile or other synthetic nonlatex gloves. Use of powdered latex gloves should be avoided due to the risk of latex allergy.
Other	For handling of laboratory scale quantities, a cloth lab coat is recommended. Where significant quantities are handled, work clothing may be necessary to prevent take-home contamination.
Respiratory protection	Where respirators are deemed necessary to reduce or control occupational exposures, use NIOSH-approved respiratory protection and have an effective respirator program in place (applicable U.S. regulation OSHA 29 CFR 1910.134).

Thermal hazards	Not available.
General hygiene considerations	Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Appearance	White crystals or crystalline powder.
Physical state	Solid.
Form	Powder.
Odor	Odorless..
Odor threshold	Not available.
pH	5.5 - 7 (5% aqueous solution)
Melting point/freezing point	566.6 °F (297 °C) (decomposes); also reported as 314.5 °C
Initial boiling point and boiling range	482 °F (250 °C) (sublimes)
Flash point	Not available.
Evaporation rate	Not available.
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	< 0.0000001 kPa at 25 °C
Vapor density	Not available.
Relative density	Not available.
Solubility in water	Freely soluble.
Partition coefficient (n-octanol/water)	-2.85
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.
Other information	
Chemical family	Alpha-amino acid.
Molecular formula	C3H7NO2
Molecular weight	89.09
Solubility (other)	Slightly soluble in 80% alcohol and in pyridine; insoluble in ether and in acetone.
Specific gravity	1.432 at 22 °C

10. Stability and reactivity

Reactivity	No reactivity hazards known.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
Conditions to avoid	None known.
Incompatible materials	None known.
Hazardous decomposition products	NOx. Irritating and/or toxic fumes or gases. Emits toxic fumes under fire conditions.

11. Toxicological information

Information on likely routes of exposure

Ingestion	Due to lack of data the classification is not possible.
Inhalation	Due to lack of data the classification is not possible.
Skin contact	Due to lack of data the classification is not possible.
Eye contact	Due to lack of data the classification is not possible.

Symptoms related to the physical, chemical, and toxicological characteristics	Not available.
Acute toxicity	Due to lack of data the classification is not possible.
Skin corrosion/irritation	Due to lack of data the classification is not possible.
Serious eye damage/eye irritation	Due to lack of data the classification is not possible.
Respiratory sensitization	Due to lack of data the classification is not possible.
Skin sensitization	Due to lack of data the classification is not possible.
Germ cell mutagenicity	Due to lack of data the classification is not possible.
Carcinogenicity	Due to lack of data the classification is not possible. This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.
Reproductive toxicity	Due to lack of data the classification is not possible.
Specific target organ toxicity - single exposure	Due to lack of data the classification is not possible.
Specific target organ toxicity - repeated exposure	Due to lack of data the classification is not possible.
Aspiration hazard	Based on available data, the classification criteria are not met.

12. Ecological information

Ecotoxicity	No ecotoxicity data noted for the ingredient(s).
Persistence and degradability	No data is available on the degradability of this product.
Bioaccumulative potential	Not available.
Mobility in soil	Not available.
Other adverse effects	Not available.

13. Disposal considerations

Disposal instructions	This product, in its present state, when discarded or disposed of, is not a hazardous waste according to Federal regulations (40 CFR 261.4 (b)(4)). Under RCRA, it is the responsibility of the user of the product to determine, at the time of disposal, whether the product meets RCRA criteria for hazardous waste. Dispose in accordance with all applicable regulations.
Local disposal regulations	Not available.
Hazardous waste code	Not regulated.
Waste from residues / unused products	Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated packaging	Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT

Not regulated as a hazardous material by DOT.

IATA

Not regulated as a dangerous good.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	No information available.

15. Regulatory information

US federal regulations	CERCLA/SARA Hazardous Substances - Not applicable. All components are on the U.S. EPA TSCA Inventory List.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories	Immediate Hazard - No Delayed Hazard - No Fire Hazard - No Pressure Hazard - No Reactivity Hazard - No
SARA 302 Extremely hazardous substance	No

SARA 311/312 Hazardous chemical	No

Other federal regulations

Safe Drinking Water Act (SDWA)	Not regulated.
Food and Drug Administration (FDA)	Not regulated.
US state regulations	California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

16. Other information, including date of preparation or last revision

Issue date	11-13-2009
Revision date	10-18-2013
Version #	02
Further information	Not available.
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Revision Information	This document has undergone significant changes and should be reviewed in its entirety.

SAFETY DATA SHEET

Methanol (Methyl Alcohol)

Section 1. Identification

GHS product identifier : Methanol (Methyl Alcohol)

Chemical name : methanol

Other means of identification : Methyl alcohol

Product use : Synthetic/Analytical chemistry.

Synonym : Methyl alcohol

SDS # : 001065

Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

Emergency telephone number (with hours of operation) : 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE LIQUIDS - Category 2
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (respiratory tract) - Category 1

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : Highly flammable liquid and vapor.
May displace oxygen and cause rapid suffocation.
Corrosive to the respiratory tract.

Precautionary statements

General : Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand.

Prevention : Wear protective gloves. Wear eye or face protection. Keep away from heat, sparks, open flames and hot surfaces. - No smoking. Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Keep container tightly closed. Use only outdoors or in a well-ventilated area. Avoid breathing vapor.

Response : IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or physician if you feel unwell. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower.

Storage : Store locked up. Store in a well-ventilated place. Keep cool.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

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Section 2. Hazards identification

Hazards not otherwise classified : None known.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : methanol

Other means of identification : Methyl alcohol

CAS number/other identifiers

CAS number : 67-56-1

Product code : 001065

Ingredient name	%	CAS number
methanol	100	67-56-1

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention if adverse health effects persist or are severe. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : May cause respiratory irritation.

Skin contact : No known significant effects or critical hazards.

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Section 4. First aid measures

Frostbite : Try to warm up the frozen tissues and seek medical attention.

Ingestion : No known significant effects or critical hazards.

Over-exposure signs/symptoms

Eye contact : No specific data.

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing

Skin contact : No specific data.

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use dry chemical, CO_2, water spray (fog) or foam.

Unsuitable extinguishing media : Do not use water jet.

Specific hazards arising from the chemical : Highly flammable liquid and vapor. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

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Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

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Section 7. Handling and storage

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
methanol	**ACGIH TLV (United States, 3/2012).** **Absorbed through skin.** STEL: 328 mg/m³ 15 minutes. STEL: 250 ppm 15 minutes. TWA: 262 mg/m³ 8 hours. TWA: 200 ppm 8 hours. **NIOSH REL (United States, 1/2013).** **Absorbed through skin.** STEL: 325 mg/m³ 15 minutes. STEL: 250 ppm 15 minutes. TWA: 260 mg/m³ 10 hours. TWA: 200 ppm 10 hours. **OSHA PEL (United States, 6/2010).** TWA: 260 mg/m³ 8 hours. TWA: 200 ppm 8 hours. **OSHA PEL 1989 (United States, 3/1989).** **Absorbed through skin.** STEL: 325 mg/m³ 15 minutes. STEL: 250 ppm 15 minutes. TWA: 260 mg/m³ 8 hours. TWA: 200 ppm 8 hours.

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

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Section 8. Exposure controls/personal protection

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Liquid. [CLEAR, COLORLESS, FLAMMABLE, POISONOUS LIQUID WITH CHARACTERISTIC PUNGENT ODOR]

Color : Colorless. Clear.

Molecular weight : 32.05 g/mole

Molecular formula : C-H4-O

Boiling/condensation point : 64.7°C (148.5°F)

Melting/freezing point : -97.8°C (-144°F)

Critical temperature : Not available.

Odor : Characteristic.

Odor threshold : Not available.

pH : Not available.

Flash point : Closed cup: 9.7°C (49.5°F)

Burning time : Not applicable.

Burning rate : Not applicable.

Evaporation rate : 2.1 (butyl acetate = 1)

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Lower: 6%
Upper: 44%

Vapor pressure : 16.9 kPa (126.963291808 mm Hg) [room temperature]

Vapor density : 1.1 (Air = 1)

Specific Volume (ft^3/lb) :

Gas Density (lb/ft^3) : Not available.

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Section 9. Physical and chemical properties

Relative density : 0.79

Solubility : Not available.

Solubility in water : 1000 g/l

Partition coefficient: n-octanol/water : -0.77

Auto-ignition temperature : 455°C (851°F)

Decomposition temperature : Not available.

SADT : Not available.

Viscosity : Dynamic (room temperature): 0.544 to 0.59 mPa·s (0.544 to 0.59 cP)

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas.

Incompatibility with various substances : Extremely reactive or incompatible with the following materials: oxidizing materials.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
methanol	LC50 Inhalation Gas. LC50 Inhalation Gas.	Rat Rat	145000 ppm 64000 ppm	1 hours 4 hours

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
methanol	Eyes - Moderate irritant Eyes - Moderate irritant Skin - Moderate irritant	Rabbit Rabbit Rabbit	- - -	24 hours 100 milligrams 40 milligrams 24 hours 20 milligrams	- - -

Sensitization

Not available.

Mutagenicity

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Section 11. Toxicological information

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
methanol	Category 3	Not applicable.	Respiratory tract irritation

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : May cause respiratory irritation.

Skin contact : No known significant effects or critical hazards.

Ingestion : No known significant effects or critical hazards.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : No specific data.

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing

Skin contact : No specific data.

Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

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Section 11. Toxicological information

General : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
methanol	-0.77	<10	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

United States - RCRA Toxic hazardous waste "U" List

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Section 13. Disposal considerations

Ingredient	CAS #	Status	Reference number
Methanol (l); Methyl alcohol (l)	67-56-1	Listed	U154

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1230	UN1230	UN1230	UN1230	UN1230
UN proper shipping name	METHANOL	METHANOL	METHANOL	METHANOL	METHANOL
Transport hazard class(es)	3	3	3	3 (6.1)	3 (6.1)
Packing group	II	II	-	II	II
Environment	No.	No.	No.	No.	No.
Additional information	**Reportable quantity** 5000 lbs / 2270 kg [759.08 gal / 2873.4 L] Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements. **Limited quantity** Yes. **Packaging instruction** **Passenger aircraft** Quantity limitation: 1 L **Cargo aircraft** Quantity limitation: 60 L **Special provisions** IB2, T7, TP2	**Explosive Limit and Limited Quantity Index** 1 **Passenger Carrying Road or Rail Index** 1 **Special provisions** 43	-	-	**Passenger and Cargo Aircraft**Quantity limitation: 1 L **Cargo Aircraft Only** Quantity limitation: 60 L **Limited Quantities - Passenger Aircraft** Quantity limitation: 1 L

"Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product."

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

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Section 15. Regulatory information

U.S. Federal regulations : **TSCA 8(a) CDR Exempt/Partial exemption**: Not determined
United States inventory (TSCA 8b): This material is listed or exempted.

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Fire hazard
Immediate (acute) health hazard

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
methanol	100	Yes.	No.	No.	Yes.	No.

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	methanol	67-56-1	100
Supplier notification	methanol	67-56-1	100

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : This material is listed.
New York : This material is listed.
New Jersey : This material is listed.
Pennsylvania : This material is listed.

California Prop. 65

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

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Section 15. Regulatory information

Ingredient name	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
methanol	No.	Yes.	No.	No.

Canada inventory : This material is listed or exempted.

International regulations

International lists : **Australia inventory (AICS)**: This material is listed or exempted.
China inventory (IECSC): This material is listed or exempted.
Japan inventory: This material is listed or exempted.
Korea inventory: This material is listed or exempted.
Malaysia Inventory (EHS Register): Not determined.
New Zealand Inventory of Chemicals (NZIoC): This material is listed or exempted.
Philippines inventory (PICCS): This material is listed or exempted.
Taiwan inventory (CSNN): Not determined.

Chemical Weapons Convention List Schedule I Chemicals : Not listed

Chemical Weapons Convention List Schedule II Chemicals : Not listed

Chemical Weapons Convention List Schedule III Chemicals : Not listed

Canada

WHMIS (Canada) : Class B-2: Flammable liquid
Class D-1B: Material causing immediate and serious toxic effects (Toxic).
Class D-2A: Material causing other toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).

CEPA Toxic substances: This material is not listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

Section 16. Other information

Canada Label requirements : Class B-2: Flammable liquid
Class D-1B: Material causing immediate and serious toxic effects (Toxic).
Class D-2A: Material causing other toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).

Hazardous Material Information System (U.S.A.)

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Section 16. Other information

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)

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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

History

Date of printing	:	5/20/2015.
Date of issue/Date of revision	:	5/20/2015.
Date of previous issue	:	10/16/2014.
Version	:	0.04
Key to abbreviations	:	ATE = Acute Toxicity Estimate BCF = Bioconcentration Factor GHS = Globally Harmonized System of Classification and Labelling of Chemicals IATA = International Air Transport Association IBC = Intermediate Bulk Container IMDG = International Maritime Dangerous Goods LogPow = logarithm of the octanol/water partition coefficient MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution) UN = United NationsACGIH – American Conference of Governmental Industrial Hygienists AIHA – American Industrial Hygiene Association CAS – Chemical Abstract Services CEPA – Canadian Environmental Protection Act CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act (EPA) CFR – United States Code of Federal Regulations CPR – Controlled Products Regulations DSL – Domestic Substances List GWP – Global Warming Potential IARC – International Agency for Research on Cancer ICAO – International Civil Aviation Organisation Inh – Inhalation LC – Lethal concentration LD – Lethal dosage NDSL – Non-Domestic Substances List NIOSH – National Institute for Occupational Safety and Health

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Section 16. Other information

TDG – Canadian Transportation of Dangerous Goods Act and Regulations
TLV – Threshold Limit Value
TSCA – Toxic Substances Control Act
WEEL – Workplace Environmental Exposure Level
WHMIS – Canadian Workplace Hazardous Material Information System

References : Not available.

Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

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Safety Data Sheet

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

Material Name	:	**MTBE**
Other Names / Synonyms	:	tert-butyl methyl ether
Recommended Use / Restrictions of Use	:	Fuel additive component. Chemical feedstock and component of motor gasoline. For use only in industrial processes.
Supplier	:	**Shell Eastern Trading (PTE) Ltd** 9 North Buona Vista Drive, #07-01, Tower 1, The Metropolis Singapore 138588 Singapore
Telephone	:	+65-6384 8000
Emergency Telephone Number	:	+44 (0) 151 350 4595

2. HAZARDS IDENTIFICATION

GHS Classification	:	Flammable liquids, Category 2 Skin corrosion/irritation, Category 2 Acute toxicity, Category 5 Aspiration hazard, Category 2
GHS Label Elements Symbol(s)	:	
Signal Words	:	Danger
Hazard Statement	:	PHYSICAL HAZARDS: H225: Highly flammable liquid and vapour. HEALTH HAZARDS: H315: Causes skin irritation. H303: May be harmful if swallowed. H305: May be harmful if swallowed and enters airways. ENVIRONMENTAL HAZARDS:

Not classified as an environmental hazard under GHS criteria.

GHS Precautionary Statements

Prevention : P210: Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P243: Take precautionary measures against static discharge.
P261: Avoid breathing dust/fume/gas/mist/vapours/spray.
P271: Use only outdoors or in a well-ventilated area.

Response : P304+P340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

Storage : P403+P235: Store in a well-ventilated place. Keep cool.

Other Hazards which do not result in classification : This material is a static accumulator. Even with proper grounding and bonding, this material can still accumulate an electrostatic charge. If sufficient charge is allowed to accumulate, electrostatic discharge and ignition of flammable air-vapour mixtures can occur.
In use, may form flammable/explosive vapour-air mixture.

Additional Information : This product is intended for use in closed systems only.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Mixture Description : Product is not a mixture according to regulation 1907/2006/EC.
Synonyms : tert-butyl methyl ether
2-methoxy-2-methylpropane
CAS No. : 1634-04-4

Classification of components according to GHS

Chemical Identity	Synonyms	CAS	Hazard Class (category)	Hazard Statement	Conc.
Methyl tertiary butyl ether	Methyl tertiary butyl ether	1634-04-4	Flam. Liq., 2; Skin Corr., 3; Acute Tox., 5; Asp. Tox., 2;	H225; H316; H303; H305;	100.00 %

Additional Information : Refer to Ch 16 for full text of H phrases.

4. FIRST-AID MEASURES

Inhalation : Remove to fresh air. Do not attempt to rescue the victim unless

		proper respiratory protection is worn. If the victim has difficulty breathing or tightness of the chest, is dizzy, vomiting, or unresponsive, give 100% oxygen with rescue breathing or Cardiopulmonary Resuscitation (CPR) as required and transport to the nearest medical facility.
Skin Contact	:	Contaminated clothing may be a fire hazard and therefore should be soaked with water before being removed. Wash skin with water using soap if available.
Eye Contact	:	Flush eye with copious quantities of water. If persistent irritation occurs, obtain medical attention.
Ingestion	:	If swallowed, do not induce vomiting: transport to nearest medical facility for additional treatment. If vomiting occurs spontaneously, keep head below hips to prevent aspiration. If vomiting occurs spontaneously, keep head below hips to prevent aspiration.
Most Important Symptoms/Effects, Acute & Delayed	:	Skin irritation signs and symptoms may include a burning sensation, redness, swelling, and/or blisters. Breathing of high vapour concentrations may cause central nervous system (CNS) depression resulting in dizziness, light-headedness, headache, nausea and loss of coordination. Continued inhalation may result in unconsciousness and death. If material enters lungs, signs and symptoms may include coughing, choking, wheezing, difficulty in breathing, chest congestion, shortness of breath, and/or fever. The onset of respiratory symptoms may be delayed for several hours after exposure.
Immediate medical attention, special treatment	:	Call a doctor or poison control center for guidance. Potential for chemical pneumonitis.

5. FIRE-FIGHTING MEASURES

Clear fire area of all non-emergency personnel.

Specific hazards arising from Chemicals	:	Hazardous combustion products may include: Carbon monoxide may be evolved if incomplete combustion occurs. Will float and can be reignited on surface water. The vapour is heavier than air, spreads along the ground and distant ignition is possible.
Suitable Extinguishing Media	:	Use foam, water fog for major fires. Use dry chemical powder, carbon dioxide, sand or earth for minor fires.
Unsuitable Extinguishing Media	:	Do not use direct water jets on the burning product as they could cause a steam explosion and spread of the fire. Simultaneous use of foam and water on the same surface is to be avoided as water destroys the foam.
Protective Equipment &	:	Proper protective equipment including chemical resistant

Precautions for Fire Fighters		gloves are to be worn; chemical resistant suit is indicated if large contact with spilled product is expected. Self-Contained Breathing Apparatus must be worn when approaching a fire in a confined space. Select fire fighter's clothing approved to relevant Standards (e.g. Europe: EN469).
Additional Advice	:	Keep adjacent containers cool by spraying with water.

6. ACCIDENTAL RELEASE MEASURES

Observe the relevant local and international regulations.

Personal Precautions, Protective Equipment and Emergency Procedures	:	Do not breathe fumes, vapour. Do not operate electrical equipment. Shut off leaks, if possible without personal risks. Remove all possible sources of ignition in the surrounding area and evacuate all personnel. Attempt to disperse the gas or to direct its flow to a safe location for example by using fog sprays. Take precautionary measures against static discharge. Ensure electrical continuity by bonding and grounding (earthing) all equipment. Monitor area with combustible gas meter. Vapour can travel for considerable distances both above and below the ground surface. Underground services (drains, pipelines, cable ducts) can provide preferential flow paths.
Environmental Precautions	:	Take measures to minimise the effects on groundwater. Prevent from spreading or entering into drains, ditches or rivers by using sand, earth, or other appropriate barriers. Contain residual material at affected sites to prevent material from entering drains (sewers), ditches, and waterways.
Methods and Material for Containment and Cleaning Up	:	Take precautionary measures against static discharges. For large liquid spills (> 1 drum), transfer by mechanical means such as vacuum truck to a salvage tank for recovery or safe disposal. Do not flush away residues with water. Retain as contaminated waste. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely. Remove contaminated soil and dispose of safely. For small liquid spills (< 1 drum), transfer by mechanical means to a labelled, sealable container for product recovery or safe disposal. Allow residues to evaporate or soak up with an appropriate absorbent material and dispose of safely. Remove contaminated soil and dispose of safely.
Additional Advice	:	Risk of explosion. Inform the emergency services if product enters surface water drains. Vapour may form an explosive mixture with air. Local authorities should be advised if significant spillages cannot be contained. To the extent that this product, including its chemical components (e.g. methyl

tertiary butyl ether) may impact surface or groundwater, appropriate assessment and remediation (if necessary) should be implemented.

7. HANDLING AND STORAGE

General Precautions : Avoid breathing vapours or contact with material. Only use in well ventilated areas. Wash thoroughly after handling. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet.
Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material. Air-dry contaminated clothing in a well-ventilated area before laundering. Prevent spillages. Contaminated leather articles including shoes cannot be decontaminated and should be destroyed to prevent reuse.

Precautions for Safe Handling : Avoid inhaling vapour and/or mists. Avoid contact with skin, eyes and clothing. Extinguish any naked flames. Do not smoke. Remove ignition sources. Avoid sparks. Handling Temperature: Ambient. Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Properly dispose of any contaminated rags or cleaning materials in order to prevent fires.

Conditions for Safe Storage : Keep away from aerosols, flammables, oxidizing agents, corrosives and from other flammable products which are not harmful or toxic to man or to the environment. Keep container tightly closed. Must be stored in a diked (bunded) well-ventilated area, away from sunlight, ignition sources and other sources of heat. Vapours from tanks should not be released to atmosphere. Breathing losses during storage should be controlled by a suitable vapour treatment system. Storage Temperature: Ambient. Tank storage: Tanks must be specifically designed for use with this product. Bulk storage tanks should be diked (bunded). Locate tanks away from heat and other sources of ignition. Cleaning, inspection and maintenance of storage tanks is a specialist operation, which requires the implementation of strict procedures and precautions. Electrostatic charges will be generated during pumping. Electrostatic discharge may cause fire. Ensure electrical continuity by bonding and grounding (earthing) all equipment to reduce the risk. The vapours in the head space of the storage vessel may lie in the flammable/explosive range and hence may be flammable. Refer to section 15 for any additional specific legislation covering the packaging and

storage of this product.

Product Transfer : Wait 2 minutes after tank filling (for tanks such as those on road tanker vehicles) before opening hatches or manholes. Wait 30 minutes after tank filling (for large storage tanks) before opening hatches or manholes. Even with proper grounding and bonding, this material can still accumulate an electrostatic charge. If sufficient charge is allowed to accumulate, electrostatic discharge and ignition of flammable air-vapour mixtures can occur. Be aware of handling operations that may give rise to additional hazards that result from the accumulation of static charges. These include but are not limited to pumping (especially turbulent flow), mixing, filtering, splash filling, cleaning and filling of tanks and containers, sampling, switch loading, gauging, vacuum truck operations, and mechanical movements. These activities may lead to static discharge e.g. spark formation. Restrict line velocity during pumping in order to avoid generation of electrostatic discharge (<= 1 m/s until fill pipe submerged to twice its diameter, then <= 7 m/s). Avoid splash filling. Do NOT use compressed air for filling, discharging, or handling operations.

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Recommended Materials	:	For container paints, use epoxy paint, zinc silicate paint. For containers, or container linings use mild steel, stainless steel.
Unsuitable Materials	:	Most plastics. Natural, neoprene or nitrile rubbers.
Container Advice	:	Containers, even those that have been emptied, can contain explosive vapours. Do not cut, drill, grind, weld or perform similar operations on or near containers.
Other Advice	:	Ensure that all local regulations regarding handling and storage facilities are followed. See additional references that provide safe handling practices for liquids that are determined to be static accumulators: American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practices on Static Electricity). CENELEC CLC/TR 50404 (Electrostatics – Code of practice for the avoidance of hazards due to static electricity).

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

If the American Conference of Governmental Industrial Hygienists (ACGIH) value is provided on this document, it is provided for information only.

Occupational Exposure Limits

Material	Source	Type	ppm	mg/m3	Notation
Methyl tertiary butyl ether	ACGIH	TWA	50 ppm		
	SG OEL	TWA	40 ppm	144 mg/m3	

Biological Exposure Index (BEI)

No biological limit allocated.

Appropriate Engineering Controls	:	Read in conjunction with the Exposure Scenario for your specific use contained in the Annex. The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. Appropriate measures include: Use sealed systems as far as possible. Adequate explosion-proof ventilation to control airborne concentrations below the exposure guidelines/limits. Local exhaust ventilation is recommended.
Individual Protection Measures	:	Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.
Respiratory Protection	:	If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation. Check with respiratory protective equipment suppliers. Where air-filtering respirators are suitable, select an appropriate combination of mask and filter. Where air-filtering respirators are unsuitable (e.g. airborne concentrations are high, risk of oxygen deficiency, confined space) use appropriate positive pressure breathing apparatus. All respiratory protection equipment and use must be in accordance with local regulations. Select a filter suitable for combined particulate/organic gases and vapours [boiling point >65°C(149 °F)].
Hand Protection	:	Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739, AS/NZS:2161) made from the following materials may provide suitable chemical protection: Longer term protection: Viton. Incidental contact/Splash protection: Nitrile rubber. PVC. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended. For continuous contact we recommend gloves with breakthrough time of more than 240 minutes with preference for > 480 minutes where

		suitable gloves can be identified. For short-term/splash protection we recommend the same, but recognise that suitable gloves offering this level of protection may not be available and in this case a lower breakthrough time may be acceptable so long as appropriate maintenance and replacement regimes are followed. Glove thickness is not a good predictor of glove resistance to a chemical as it is dependent on the exact composition of the glove material.
Eye Protection	:	Chemical splash goggles (chemical monogoggles). If a local risk assessment deems it so, then chemical splash goggles may not be required and safety glasses may provide adequate eye protection.
Protective Clothing	:	Chemical resistant gloves/gauntlets, boots, and apron (where risk of splashing). Chemical resistant gloves/gauntlets, boots, and apron. For spillage clean up use chemical resistant knee length boots. Where risk of splashing or in spillage clean up, use chemical resistant one-piece overall with integral hood.
Thermal Hazards	:	Not applicable.
Monitoring Methods	:	Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate. Validated exposure measurement methods should be applied by a competent person and samples analysed by an accredited laboratory. Examples of sources of recommended exposure measurement methods are given below or contact the supplier. Further national methods may be available. National Institute of Occupational Safety and Health (NIOSH), USA: Manual of Analytical Methods http://www.cdc.gov/niosh/ Occupational Safety and Health Administration (OSHA), USA: Sampling and Analytical Methods http://www.osha.gov/
Environmental Exposure Controls	:	Local guidelines on emission limits for volatile substances must be observed for the discharge of exhaust air containing vapour. Information on accidental release measures are to be found in section 6.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Clear colourless. Liquid.
Odour	:	Ethereal
Odour threshold	:	0.053
pH	:	Not applicable
Initial Boiling Point and Boiling Range	:	55 °C / 131 °F
Melting / freezing point	:	-109 °C / -164 °F

Flash point	:	-34 °C / -29 °F
Upper / lower Flammability or Explosion limits	:	1 - 8 %(V)
Auto-ignition temperature	:	460 °C / 860 °F (ASTM E-659)
Vapour pressure	:	25 kPa at 20 °C / 68 °F
Relative Density	:	0.75 at 15 °C / 59 °F
Density	:	745 kg/m3 at 20 °C / 68 °F
Water solubility	:	48 g/l at 20 °C / 68 °F
Solubility in other solvents	:	Data not available
n-octanol/water partition coefficient (log Pow)	:	0.94 at 20 °C / 68 °F
Dynamic viscosity	:	0.35 mPa.s at 20 °C / 68 °F
Kinematic viscosity	:	Typical 0.53 mm2/s at 20 °C / 68 °F Typical 0.47 mm2/s at 40 °C / 104 °F
Vapour density (air=1)	:	3.23 at 20 °C / 68 °F
Electrical conductivity	:	Low conductivity: < 100 pS/m, The conductivity of this material makes it a static accumulator., A liquid is typically considered nonconductive if its conductivity is below 100 pS/m and is considered semi-conductive if its conductivity is below 10 000 pS/m., Whether a liquid is nonconductive or semi-conductive, the precautions are the same., A number of factors, for example liquid temperature, presence of contaminants, and anti-static additives can greatly influence the conductivity of a liquid.
Evaporation rate (nBuAc=1)	:	1.6 (DIN 53170, di-ethyl ether=1)
Surface tension	:	Typical 72.1 mN/m at 21 °C / 70 °F 21.5 mN/m at 25 °C / 77 °F 19 mN/m at 40 °C / 104 °F
Molecular weight	:	102.18 g/mol
Flammability	:	Not applicable.

10. STABILITY AND REACTIVITY

Chemical stability	:	No hazardous reaction is expected when handled and stored according to provisions. Reacts violently with strong oxidising agents.
Possibility of Hazardous Reactions	:	No, hazardous, exothermic polymerization cannot occur.
Conditions to Avoid	:	Avoid heat, sparks, open flames and other ignition sources.
Incompatible Materials	:	Strong oxidising agents. Strong acids. Strong bases.
Hazardous *Decomposition Products*	:	May form explosive peroxides. Thermal decomposition is highly dependent on conditions. A complex mixture of airborne solids,

		liquids and gases, including carbon monoxide, carbon dioxide and other organic compounds will be evolved when this material undergoes combustion or thermal or oxidative degradation. peroxides
Hazardous Polymerisation	:	No, hazardous, exothermic polymerization cannot occur.
Sensitivity to Mechanical Impact	:	Not applicable.
Sensitivity to Static Discharge	:	Yes, in certain circumstances product can ignite due to static electricity.

11. TOXICOLOGICAL INFORMATION

Information on Toxicological effects

Basis for Assessment	:	Information given is based on product testing, and/or similar products, and/or components.
Likely Routes of Exposure	:	Exposure may occur via inhalation, ingestion, skin absorption and skin or eye contact.
Acute Oral Toxicity	:	May be harmful if swallowed. LD50 > 2000 - <= 5000 mg/kg
Acute Dermal Toxicity	:	Low toxicity: LD50 > 5000 mg/kg
Acute Inhalation Toxicity	:	Low toxicity by inhalation.
Skin corrosion/irritation	:	Causes skin irritation.
Serious eye damage/irritation	:	Expected to be non-irritating to eyes.
Respiratory Irritation	:	Not expected to be a respiratory irritant.
Respiratory or skin sensitisation	:	Not expected to be a sensitiser.
Aspiration Hazard	:	Aspiration into the lungs when swallowed or vomited may cause chemical pneumonitis which can be fatal.
Germ cell mutagenicity	:	Not mutagenic.
Carcinogenicity	:	Not expected to be carcinogenic.

Material	:	**Carcinogenicity Classification**
Methyl tertiary butyl ether	:	ACGIH Group A3: Confirmed animal carcinogen with unknown relevance to humans.
Methyl tertiary butyl ether	:	IARC 3: Not classifiable as to carcinogenicity to humans.

Methyl tertiary butyl ether	:	GHS / CLP: No carcinogenicity classification

Reproductive and Developmental Toxicity	:	Does not impair fertility. Not a developmental toxicant.
Specific target organ toxicity - single exposure	:	Not expected to be a hazard.
Specific target organ toxicity - repeated exposure	:	Not expected to be a hazard. Kidney: caused kidney effects in male rats which are not considered relevant to humans
Additional Information	:	Not expected to be a hazard.

12. ECOLOGICAL INFORMATION

Basis for Assessment	:	Incomplete ecotoxicological data are available for this product. The information given below is based partly on a knowledge of the components and the ecotoxicology of similar products. Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s).
Acute Toxicity	:	Information given is based on product data.
Fish	:	Practically non toxic: LL/EL/IL50 > 100 mg/l
Aquatic crustacea	:	Practically non toxic: LL/EL/IL50 > 100 mg/l
Algae/aquatic plants	:	Practically non toxic: LL/EL/IL50 > 100 mg/l
Microorganisms	:	Practically non toxic: LL/EL/IL50 > 100 mg/l
Chronic Toxicity		
Fish	:	NOEC/NOEL > 100 mg/l
Aquatic crustacea	:	NOEC/NOEL > 10 - <=100 mg/l
Mobility	:	Floats on water. If product enters soil, it will be highly mobile and may contaminate groundwater. Methyl tertiary butyl ether degradation may result in the formation of tert-butyl alcohol (TBA).
Persistence/degradability	:	Not readily biodegradable. Oxidises rapidly by photo-chemical reactions in air. Expected to be inherently biodegradable. While biodegradation of Methyl tertiary butyl ether has been documented, it is generally less biodegradable than many petroleum hydrocarbons and has a potential to migrate relatively longer distances in groundwater.
Bioaccumulative Potential	:	Does not bioaccumulate significantly.
Other Adverse Effects	:	Not applicable

13. DISPOSAL CONSIDERATIONS

Material Disposal	:	It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations. Waste arising from a spillage or tank cleaning should be disposed of in accordance with prevailing regulations, preferably to a recognised collector or contractor. The competence of the collector or contractor should be established beforehand. Do not dispose into the environment, in drains or in water courses. Given the nature and uses of this product, the need for disposal seldom arises. If necessary, dispose by controlled combustion in purpose-designed equipment. If this is not possible, contact the supplier.
Container Disposal	:	Drain container thoroughly. After draining, vent in a safe place away from sparks and fire. Residues may cause an explosion hazard. Do not puncture, cut, or weld uncleaned drums. Send to drum recoverer or metal reclaimer. Do not pollute the soil, water or environment with the waste container. For tanks seek specialist advice from suppliers. Dispose in accordance with prevailing regulations, preferably to a recognised collector or contractor. The competence of the collector or contractor should be established beforehand.
Local Legislation	:	Disposal should be in accordance with applicable regional, national, and local laws and regulations. Local regulations may be more stringent than regional or national requirements and must be in compliance.

14. TRANSPORT INFORMATION

Land (as per ADR classification): Regulated

Class	:	3
Packing group	:	II
Hazard indentification no.	:	33
UN number	:	2398
Danger label (primary risk)	:	3
Proper shipping name	:	METHYL tert-BUTYL ETHER
Environmentally Hazardous	:	No

IMDG

Identification number	UN 2398

Proper shipping name	METHYL tert-BUTYL ETHER
Class / Division	3
Packing group	II
Marine Pollutant:	No

IATA (Country variations may apply)

UN number	:	2398
Proper shipping name	:	Methyl tert-butyl ether
Class / Division	:	3
Packing group	:	II

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Pollution Category	:	Z
Ship Type	:	3
Product Name	:	tert-butyl methyl ether
Special Precaution	:	Special Precautions: Refer to Chapter 7, Handling & Storage, for special precautions which a user needs to be aware of or needs to comply with in connection with transport.

15. REGULATORY INFORMATION

The regulatory information is not intended to be comprehensive. Other regulations may apply to this material.

Local Regulations

Workplace Safety and Health Act & Workplace Safety and Health (General Provision) Regulations	:	This product is not subject to the requirement in the Act/Regulations.
Environmental Protection and Management Act and Environmental Protection and Management (Hazardous Substances) Regulations	:	This product is not subject to the requirement in the Act/Regulations.
Maritime and Port Authority of Singapore (Dangerous Goods, Petroleum and Explosives) Regulations	:	This product is not subject to the requirement in the Act/Regulations.
Fire Safety Act and Fire Safety (Petroleum & Flammable Materials) Regulations	:	This product is subject to the requirement in the Act/ Regulations.

Safety Data Sheet

Chemical Inventory Status

TSCA	:	All components listed.
PICCS (PH)	:	All components listed.
NZIOC	:	All components listed.
KECI (KR)	:	All components listed.
CHINA INV	:	All components listed.
DSL	:	All components listed.
EINECS	:	All components listed.

Other Information : Environmental Protection and Management Act. Workplace Safety and Health Act 2006.

16. OTHER INFORMATION

Hazard Statement

H225	Highly flammable liquid and vapour.
H303	May be harmful if swallowed.
H305	May be harmful if swallowed and enters airways.
H316	Causes mild skin irritation.

Additional Information : This document contains important information to ensure the safe storage, handling and use of this product. The information in this document should be brought to the attention of the person in your organisation responsible for advising on safety matters.

SDS Version Number : 1.0

SDS Effective Date : 10.03.2014

SDS Revisions : A vertical bar (|) in the left margin indicates an amendment from the previous version.

Uses and Restrictions : This product must not be used in applications other than those recommended in Section 1, without first seeking the advice of the supplier.

SDS Distribution : The information in this document should be made available to all who may handle the product.

Key/Legend to Abbrevations used in this : The standard abbreviations and acronyms used in this document can be looked up in

Safety Data Sheet

SDS		reference literature (e.g. scientific dictionaries) and/or websites.
	Flam. Liq.	Flammable liquids
	Asp. Tox.	Aspiration hazard
	STOT SE	Specific target organ toxicity - single exposure

Key Literature References : The quoted data are from, but not limited to, one or more sources of information (e.g. toxicological data from Shell Health Services, material suppliers' data, CONCAWE, EU IUCLID date base, EC 1272 regulation, etc).

Disclaimer : This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.

Section 1 – Chemical Product and Company Identification

SDS Name: L-Alanine methyl ester hydrochloride

Use: Industrial chemical intermediate

Company: Optima Chemicals Group, LLC
200 Willacoochee Hwy.
Douglas, Georgia 31533
Telephone (912) 384-5101 FAX (912) 384-6330
Emergencies: Telephone (912) 384-5101

Section 2 – Hazards Identification

No known OSHA Hazards.

Section 2 – Hazards Identification

OSHA Hazards: No known OSHA hazards

GHS Label Elements:

Signal Word: Warning

Hazard Statements:
H316 – Causes mild skin irritation
H320 – Causes eye irritation
H333 – May be harmful if inhaled

Precautionary Statements:
P264 - Wash thoroughly after handling
P332– If skin irritation occurs: Get medical attention
P305– If in eyes rinse with water for several minutes.
P337– If eye irritation persists, get medical attention

Avoid generating dust. This material is considered to be a mildly combustible dust.

NFPA Rating: Health: 0 Flammability: 0 Reactivity: 0

Section 3 – Composition, Information on Ingredients

CAS #	EC-No.	Chemical Name	OSHA-PEL
2491-20-5	219-652-4	L-Alanine methyl ester hydrochloride	NA

Section 4 – First Aid Measures

Eyes: Flush eyes with plenty of water for at least 15 minutes, lifting upper and lower lids. Seek medical attention.

Skin: Flush skin with plenty of water and soap for at least 15 minutes while removing contaminated clothing.

Ingestion: Get medical aid. Wash mouth out with water.

Inhalation: Remove from exposure, to fresh air immediately. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

Section 5 – Fire Fighting Measures

Fire Extinguishing Agents Recommended: Water Fog, CO2, dry chemical powder, or appropriate foam.

Fire Extinguishing Agents to Avoid: None

Special Fire fighting Procedures: Avoid generating dust, fine dust dispersed in air in sufficient concentrations and in the presence of an ignition source is a potential dust explosion hazard. Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.

Unusual Fire and Explosion Hazards: May emit irritating fumes under fire conditions.

Section 6 – Accidental Release Measures

Large Spills: Contain the spill, wet the material with a light water spray, and place into appropriate containers for disposal.

Small Spills: Contain the spill, wet the material with a light water spray, and place into appropriate containers for disposal.

Disposal should be done only through an approved waste disposal facility.

Section 7 - Handling and Storage

Handling: Minimize dust generation and accumulation. Avoid breathing dust, vapor, or mist. Avoid contact with skin and eyes.

Storage: Store in a cool dry place, with lids on containers.

Section 8 – Exposure Controls, Personal Protection

Engineering Controls: Use adequate ventilation to keep airborne concentrations low.

Eyes: Wear appropriate protective chemical goggles.

Skin: Wear appropriate protective clothing and gloves to prevent skin exposure.

Respiratory: None required.

Section 9 – Physical and Chemical Properties

Appearance and Odor: Crystalline, essentially no odor

Melting Point: N/A

Boiling Point: Unknown

Flash Point: 109 – 111 degrees C

Vapor Pressure: N/A

Specific Gravity: N/A

pH: N/A

Water Solubility: N/A

Section 10 – Stability and Reactivity

Stability: stable under normal handling conditions.

Incompatibility: Strong oxidizing agents.

Hazardous Polymerization: Will not occur.

Hazardous Decomposition Products: None expected.

Conditions to Avoid: Incompatibilities. Avoid dust generation, due to potential dust combustibility.

Section 11 – Toxicological Information

Acute Toxicity: Potentially irritating to the eyes and skin.

Chronic Toxicity: Not listed as a Carcinogen by ACGIH, IARC, NIOSH, NTP, or OSHA.

Section 12 – Ecological Information

No information available.

Section 13 – Disposal Considerations

This material must be disposed of in accordance with federal, state, and local regulations.

Section 14 – Transport Information

DOT Transportation Information: Not dangerous goods.

Section 15 – Regulatory Information

TSCA: Not listed on inventory (FDA exempt), each component is listed separately on TSCA.

SARA Title III Reporting Requirements:

Section 311/312 Inventory reporting hazard categories: Acute

Section 313 Release reporting: Not required

Reportable Quantity: No RQ.

Section 16 – Additional Information

Refer to NFPA 654, Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids, for safe handling.

Creation Date: 5/11/2010 Revision: 06/04/2013

This information is believed to be accurate and represents the best information currently available to Optima Chemicals, Incorporated. However, we make no warranty of merchantability, express or implied, with respect to such information and assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes.

SAFETY DATA SHEET

Version 4.7
Revision Date 11/17/2014
Print Date 12/22/2015

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Sodium methoxide

Product Number : 164992
Brand : Sigma-Aldrich
Index-No. : 603-040-00-2

CAS-No. : 124-41-4

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Self-heating substances and mixtures (Category 1), H251
Acute toxicity, Oral (Category 4), H302
Skin corrosion (Category 1B), H314
Serious eye damage (Category 1), H318

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)
H251 Self-heating: may catch fire.
H302 Harmful if swallowed.
H314 Causes severe skin burns and eye damage.
H318 Causes serious eye damage.

Precautionary statement(s)
P235 + P410 Keep cool. Protect from sunlight.
P260 Do not breathe dust or mist.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P280 Wear protective gloves/ protective clothing/ eye protection/ face

	protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell. Rinse mouth.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P310	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or doctor/ physician.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/ physician.
P363	Wash contaminated clothing before reuse.
P405	Store locked up.
P407	Maintain air gap between stacks/ pallets.
P413	Store bulk masses greater than .? kg/ .? lbs at temperatures not exceeding .? °C/ .? °F.
P420	Store away from other materials.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Reacts violently with water.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms	:	Sodium methylate
Formula	:	CH_3NaO
Molecular weight	:	54.02 g/mol
CAS-No.	:	124-41-4
EC-No.	:	204-699-5
Index-No.	:	603-040-00-2

Hazardous components

Component	Classification	Concentration
Sodium methanolate		
	Self-heat. 1; Acute Tox. 4; Skin Corr. 1B; Eye Dam. 1; H251, H302, H314, H318	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.

In case of eye contact
Continue rinsing eyes during transport to hospital.Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed
The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed
No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Dry powder

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Sodium oxides

5.3 Advice for firefighters
Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information
No data available

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
For personal protection see section 8.

6.2 Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up
Sweep up and shovel. Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Do not flush with water. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections
For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Further processing of solid materials may result in the formation of combustible dusts. The potential for combustible dust formation should be taken into consideration before additional processing occurs.Avoid contact with skin and eyes. Avoid formation of dust and aerosols.
Provide appropriate exhaust ventilation at places where dust is formed.Keep away from sources of ignition - No smoking.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place.
Never allow product to get in contact with water during storage.

Moisture sensitive. Store under inert gas. Keep in a dry place.
Storage class (TRGS 510): Pyrophoric and self-heating hazardous materials

7.3 Specific end use(s)
Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls
Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection
Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, Flame retardant protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: powder Colour: white
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	13 at 10 g/l at 20 °C (68 °F)
e)	Melting point/freezing point	No data available
f)	Initial boiling point and boiling range	No data available
g)	Flash point	33 °C (91 °F) - closed cup

h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 36 %(V) Lower explosion limit: 7.3 %(V)
k)	Vapour pressure	67 hPa (50 mmHg) at 20 °C (68 °F) 128 hPa (96 mmHg) at 25 °C (77 °F)
l)	Vapour density	1.87 - (Air = 1.0)
m)	Relative density	0.970 g/cm3
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	25 - 50 °C (77 - 122 °F) at 1,013 hPa (760 mmHg)The substance or mixture is classified as self heating with the category 1.
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information

Bulk density	500 - 600 kg/m3
Relative vapour density	1.87 - (Air = 1.0)

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Reacts violently with water.

10.4 Conditions to avoid
Exposure to moisture.

10.5 Incompatible materials
acids, Chlorinated solvents, Water

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 800 mg/kg

Inhalation: No data available

LD50 Dermal - Rat - > 2,000 mg/kg

No data available

Skin corrosion/irritation
Skin - Rabbit
Result: Corrosive

Serious eye damage/eye irritation
Eyes - Rabbit
Result: Corrosive to eyes

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: Not available

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea, Vomiting, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Liver - Irregularities - Based on Human Evidence
Liver - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to fish	LC50 - Leuciscus idus (Golden orfe) - 346 mg/l - 48 h (DIN 38412)

12.2 Persistence and degradability

Biodegradability	Result: - Not readily biodegradable.

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1431 Class: 4.2 (8) Packing group: II
Proper shipping name: Sodium methylate
Reportable Quantity (RQ): 1000 lbs

Poison Inhalation Hazard: No

IMDG
UN number: 1431 Class: 4.2 (8) Packing group: II EMS-No: F-A, S-L
Proper shipping name: SODIUM METHYLATE

IATA
UN number: 1431 Class: 4.2 (8) Packing group: II
Proper shipping name: Sodium methylate

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SARA 311/312 Hazards
Reactivity Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Sodium methanolate	124-41-4	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Sodium methanolate	124-41-4	2007-03-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Sodium methanolate	124-41-4	2007-03-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Eye Dam.	Serious eye damage
H251	Self-heating: may catch fire.
H302	Harmful if swallowed.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
Self-heat.	Self-heating substances and mixtures
Skin Corr.	Skin corrosion

HMIS Rating

Health hazard:	3
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	2

NFPA Rating

Health hazard:	3
Fire Hazard:	3
Reactivity Hazard:	2

Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.7 Revision Date: 11/17/2014 Print Date: 12/22/2015

SAFETY DATA SHEET

Version 4.9
Revision Date 02/26/2015
Print Date 12/22/2015

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product name : Thionyl chloride

Product Number : 320536
Brand : Sigma-Aldrich
Index-No. : 016-015-00-0

CAS-No. : 7719-09-7

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich
3050 Spruce Street
SAINT LOUIS MO 63103
USA

Telephone : +1 800-325-5832
Fax : +1 800-325-5052

1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Acute toxicity, Oral (Category 4), H302
Acute toxicity, Inhalation (Category 3), H331
Skin corrosion (Category 1A), H314
Serious eye damage (Category 1), H318

For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)
H302 Harmful if swallowed.
H314 Causes severe skin burns and eye damage.
H318 Causes serious eye damage.
H331 Toxic if inhaled.

Precautionary statement(s)
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear protective gloves/ protective clothing/ eye protection/ face

	protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell. Rinse mouth.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or doctor/ physician.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/ physician.
P363	Wash contaminated clothing before reuse.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

Reacts violently with water., Contact with water liberates toxic gas.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Formula	:	Cl_2OS
Molecular weight	:	118.97 g/mol
CAS-No.	:	7719-09-7
EC-No.	:	231-748-8
Index-No.	:	016-015-00-0

Hazardous components

Component	Classification	Concentration
Thionyl chloride		
	Acute Tox. 4; Acute Tox. 3; Skin Corr. 1A; Eye Dam. 1; H302, H314, H318, H331	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.Continue rinsing eyes during transport to hospital.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media
Dry powder

5.2 Special hazards arising from the substance or mixture

Sulphur oxides, Hydrogen chloride gas
Container explosion may occur under fire conditions.

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

Water hydrolyzes material liberating acidic gas which in contact with metal surfaces can generate flammable and/or explosive hydrogen gas.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.
For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Soak up with inert absorbent material and dispose of as hazardous waste. Do not flush with water. Keep in suitable, closed containers for disposal.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Keep away from water.Never allow product to get in contact with water during storage.

Handle and store under inert gas.
Storage class (TRGS 510): Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Component	CAS-No	Value	Control parameters	Basis
Thionyl chloride	7719-09-7	C	0.200000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Upper Respiratory Tract irritation		
		C	0.2 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Upper Respiratory Tract irritation		

		C	1.000000 ppm 5.000000 mg/m3	USA. NIOSH Recommended Exposure Limits

8.2 Exposure controls

Appropriate engineering controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/face protection
Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: Fluorinated rubber
Minimum layer thickness: 0.7 mm
Break through time: 480 min
Material tested:Vitoject® (KCL 890 / Aldrich Z677698, Size M)

Splash contact
Material: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: 101 min
Material tested:Butoject® (KCL 897 / Aldrich Z677647, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection
Complete suit protecting against chemicals, Flame retardant protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	pH	No data available
e)	Melting point/freezing point	Melting point/range: -105 °C (-157 °F)
f)	Initial boiling point and boiling range	79 °C (174 °F)

g)	Flash point	Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	129 hPa (97 mmHg) at 20 °C (68 °F)
l)	Vapour density	No data available
m)	Relative density	1.631 g/mL at 25 °C (77 °F)
n)	Water solubility	No data available
o)	Partition coefficient: n-octanol/water	No data available
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available

9.2 Other safety information
No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions
Reacts violently with water.

10.4 Conditions to avoid
Do not allow water to enter container because of violent reaction.
Exposure to moisture

10.5 Incompatible materials
Alcohols, Amines, Metals, Reacts violently with water.

10.6 Hazardous decomposition products
Other decomposition products - No data available
In the event of fire: see section 5

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
LD50 Oral - Rat - 324 mg/kg
(Directive 67/548/EEC, Annex V, B.1.)

LC50 Inhalation - Rat - 4 h - 2.72 mg/l
(OECD Test Guideline 403)

Dermal: No data available

No data available

Skin corrosion/irritation
No data available

Serious eye damage/eye irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity
No data available

No data available

Specific target organ toxicity - single exposure
No data available

Specific target organ toxicity - repeated exposure
No data available

Aspiration hazard
No data available

Additional Information
RTECS: XM5150000

Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin.

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

12.6 Other adverse effects

No data available

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product
Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1836 Class: 8 Packing group: I
Proper shipping name: Thionyl chloride
Reportable Quantity (RQ):

Poison Inhalation Hazard: No

IMDG
UN number: 1836 Class: 8 Packing group: I EMS-No: F-A, S-B
Proper shipping name: THIONYL CHLORIDE

IATA
UN number: 1836 Class: 8
Proper shipping name: Thionyl chloride
IATA Passenger: Not permitted for transport
IATA Cargo: Not permitted for transport

15. REGULATORY INFORMATION

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Thionyl chloride	7719-09-7	2007-03-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Thionyl chloride	7719-09-7	2007-03-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Thionyl chloride	7719-09-7	2007-03-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Eye Dam.	Serious eye damage
H302	Harmful if swallowed.

H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H331	Toxic if inhaled.
Skin Corr.	Skin corrosion

HMIS Rating

Health hazard:	3
Chronic Health Hazard:	
Flammability:	0
Physical Hazard	0

NFPA Rating

Health hazard:	3
Fire Hazard:	0
Reactivity Hazard:	0

Further information

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Preparation Information

Sigma-Aldrich Corporation
Product Safety – Americas Region
1-800-521-8956

Version: 4.9 Revision Date: 02/26/2015 Print Date: 12/22/2015

ATTACHMENT I

EMISSION UNITS TABLE

Attachment I
Emission Units Table
(includes all emission units and air pollution control devices
that will be part of this permit application review, regardless of permitting status)

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type[3] and Date of Change	Control Device[4]
003	104.014	Main Scrubber	2007	60 gpm	Existing	Incinerator, Incinerator Scrubber
009	104.014	Incinerator	1977	10 MMBtu/hr	Existing	Incinerator Scrubber
010	104.014	Incinerator Scrubber	1977	80 gpm	Existing	None
103	104.014	BI Tank	2002	7,400 gal	Existing	Main Scrubber Incinerator Incinerator Scrubber
108	104.014	Flammable Waste Tank	1961	1,900 gal	Existing	Main Scrubber Incinerator Incinerator Scrubber
112	104.014	J Tank	1951	8,000 gal	Existing	Incinerator Incinerator Scrubber
115A	104.003B	Reactor 6 Charge Hopper	NA	NA	Existing	Dust Collector (115)
201	104.014	Centrifuge	1961	500 pph	Existing	Incinerator Incinerator Scrubber
201A	104.014	Wet Cake Bin	NA	NA	Existing	Incinerator Incinerator Scrubber
202	104.014	M/L Disengaging Tank	1988	925 gal	Existing	Incinerator Incinerator Scrubber
203	104.014	Reactor #3	NA	2,000 gal	Existing	Incinerator Incinerator Scrubber
205	104.014	Reactor #1	1988	750 gal	Existing	Main Scrubber Incinerator Incinerator Scrubber
206	104.014	Reactor #2	1977	2,000 gal	Existing	Incinerator Incinerator Scrubber
206PC	104.014	Reactor #2 Primary Condenser*	1980	NA	Existing/New	Incinerator Incinerator Scrubber

1 For Emission Units (or Sources) use the following numbering system: 1S, 2S, 3S,or other appropriate designation.
2 For Emission Points use the following numbering system: 1E, 2E, 3E, or other appropriate designation.
3 New, modification, removal
4 For Control Devices use the following numbering system: 1C, 2C, 3C, or other appropriate designation.

*Reactor #2 Primary Condenser, Reactor #2 Secondary Condenser, and Reactor #5 Condenser are existing condensers that are used; however, have not been identified within the permit as individual pieces of equipment. This revision requests they be added as individual emission sources.

Attachment I
Emission Units Table
(includes all emission units and air pollution control devices that will be part of this permit application review, regardless of permitting status)

Emission Unit ID[1]	Emission Point ID[2]	Emission Unit Description	Year Installed/ Modified	Design Capacity	Type[3] and Date of Change	Control Device[4]
206SC	104.014	Reactor #2 Secondary Condenser*	1983	NA	Existing/New	Incinerator Incinerator Scrubber
208	104.014	Reactor #6	1977	4,000 gal	Existing	Main Scrubber (During Reaction Step Only) Incinerator Incinerator Scrubber
208C	104.014	Reactor #6 Condenser	NA	NA	Existing	Main Scrubber Incinerator Incinerator Scrubber
209	104.014	Reactor #8	1977	4,000 gal	Existing	Main Scrubber Incinerator Incinerator Scrubber
219	104.014	Reactor #5	1984	2,000 gal	Existing	Main Scrubber Incinerator Incinerator Scrubber
219C	104.014	Reactor #5 Condenser*	1987	NA	Existing/New	Main Scrubber Incinerator Incinerator Scrubber
226	104.014	ISO Tank	1988	8,000 gal	Existing	Incinerator Incinerator Scrubber
227	104.014	CWT Tank	2005	8,000 gal	Existing	Incinerator Incinerator Scrubber
229	104.014	Tanker Truck	2016	NA	Existing	Incinerator Scrubber
230	104.014	Double Cone Dryer (DURING Dried LAME Process only)	2016	165 CF	Existing	Incinerator Incinerator Scrubber
234	107.03	DCD Super Sack/Drum Loading (during Dried LAME Process only)	2016	NA	Existing	Dust Collector (117)
Fugitive	Fugitive	One (1) Filter	2016	NA	Existing	None

1 For Emission Units (or Sources) use the following numbering system:1S, 2S, 3S,... or other appropriate designation.
2 For Emission Points use the following numbering system:1E, 2E, 3E, ... or other appropriate designation.
3 New, modification, removal
4 For Control Devices use the following numbering system: 1C, 2C, 3C,... or other appropriate designation.

*Reactor #2 Primary Condenser, Reactor #2 Secondary Condenser, and Reactor #5 Condenser are existing condensers that are used; however, have not been identified within the permit as individual pieces of equipment. This revision requests they be added as individual emission sources.

ATTACHMENT J

EMISSION POINTS DATA SUMMARY SHEET

Attachment J
Emission Points Data Summary Sheet
DRIED LAME

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table-& Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(chemical processes only)*		All Regulated Pollutants Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] (ppmv or mg/m[4])
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
104.014	Upward Vertical	*	Various	003, 009, 010	Main Scrubber**, Incinerator, Incinerator Scrubber	NA	NA	VOC SO2 Acetonitrile Hydrogen Chloride Methanol Methyl Tert-Butyl Ether Total HAPs	23.43 118.88 0.61 67.75 1.88 20.93 91.18	1.22 19.02 0.02 10.84 0.37 0.83 12.06	0.43 0.01 0.02 0.01 0.02 0.39 0.44	0.04 0.01 0.01 0.01 0.01 0.02 0.05	Gas	EE	NA
104.003B	Upward Vertical	115A	Reactor 6 Charge Hopper	115	Dust Collector	NA	NA	PM PM10 PM2.5	0.32 0.15 0.02	0.01 0.01 0.01	0.32 0.15 0.02	0.01 0.01 0.01	Solid	AP-42	NA
107.03	Upward Vertical	234	DCD Super Sack/Drum Loading	117	Dust Collector	NA	NA	PM PM10 PM2.5	0.43 0.20 0.03	0.01 0.01 0.01	0.43 0.20 0.03	0.01 0.01 0.01	Solid	AP-42	NA

* - Sources venting through this emission point during LAME production include 003, 009, 010, 103, 108, 112, 201, 201A, 202, 203, 205, 206, 206PC, 206SC, 208, 208C, 209, 219, 219C, 226, 227, 229, and 230.

** - Only Sources 208 (only during its reaction step), 208C, 103, 108, 205, 209, and 219 feed to the Main Scrubber.

The EMISSION POINTS DATA SUMMARY SHEET provides a summation of emissions by emission unit. Note that uncaptured process emission unit emissions are not typically considered to be fugitive and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET. Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions). Please complete the FUGITIVE EMISSIONS DATA SUMMARY SHEET for fugitive emission activities.

1 Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.

2 Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (i.e., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).

3 List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS2, VOCs, H2S, Inorganics, Lead, Organics, O3, NO, NO2, SO2, SO3, all applicable Greenhouse Gases (including CO2 and methane), etc. DO NOT LIST H2, H2O, N2, O2, and Noble Gases.

4 Give maximum potential emission rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

5 Give maximum potential emission rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

6 Indicate the method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

7 Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmv) are used. If the emission is a mineral acid (sulfuric, nitric, hydrochloric or phosphoric) use units of milligram per dry cubic meter (mg/m3) at standard conditions (68 °F and 29.92 inches Hg) (see 45CSR7). If the pollutant is SO2, use units of ppmv (See 45CSR10).

Attachment J
Emission Points Data Summary Sheet
UNDRIED LAME

Table 1: Emissions Data

Emission Point ID No. *(Must match Emission Units Table-& Plot Plan)*	Emission Point Type[1]	Emission Unit Vented Through This Point *(Must match Emission Units Table & Plot Plan)*		Air Pollution Control Device *(Must match Emission Units Table & Plot Plan)*		Vent Time for Emission Unit *(chemical processes only)*		All Regulated Pollutants Chemical Name/CAS[3] *(Speciate VOCs & HAPS)*	Maximum Potential Uncontrolled Emissions[4]		Maximum Potential Controlled Emissions[5]		Emission Form or Phase *(At exit conditions, Solid, Liquid or Gas/Vapor)*	Est. Method Used[6]	Emission Concentration[7] (ppmv or mg/m^4)
		ID No.	Source	ID No.	Device Type	Short Term[2]	Max (hr/yr)		lb/hr	ton/yr	lb/hr	ton/yr			
104.014	Upward Vertical	*	Various	003, 009, 010	Main Scrubber**, Incinerator, Incinerator Scrubber	NA	NA	VOC SO2 Acetonitrile Hydrogen Chloride Methanol Methyl Tert-Butyl Ether Total HAPs	23.43 118.88 0.61 67.75 1.88 20.93 91.18	0.82 19.02 0.02 10.84 0.37 0.43 11.66	0.43 0.01 0.02 0.01 0.02 0.39 0.44	0.03 0.01 0.01 0.01 0.01 0.01 0.04	Gas	EE	NA
104.003B	Upward Vertical	115A	Reactor 6 Charge Hopper	115	Dust Collector	NA	NA	PM PM10 PM2.5	0.32 0.15 0.02	0.01 0.01 0.01	0.32 0.15 0.02	0.01 0.01 0.01	Solid	AP-42	NA

* - Sources venting through this emission point during LAME production include 003, 009, 010, 103, 108, 112, 201, 201A, 202, 203, 205, 206, 206PC, 206SC, 208, 208C, 209, 219, 219C, 226, 227, and 229.

** - Only Sources 208 (only during its reaction step), 208C, 103, 108, 205, 209, and 219 feed to the Main Scrubber.

The EMISSION POINTS DATA SUMMARY SHEET provides a summation of emissions by emission unit. Note that uncaptured process emission unit emissions are not typically considered to be fugitive and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET. Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions). Please complete the FUGITIVE EMISSIONS DATA SUMMARY SHEET for fugitive emission activities.

1 Please add descriptors such as upward vertical stack, downward vertical stack, horizontal stack, relief vent, rain cap, etc.

2 Indicate by "C" if venting is continuous. Otherwise, specify the average short-term venting rate with units, for intermittent venting (i.e., 15 min/hr). Indicate as many rates as needed to clarify frequency of venting (e.g., 5 min/day, 2 days/wk).

3 List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS2, VOCs, H2S, Inorganics, Lead, Organics, O3, NO, NO2, SO2, SO3, all applicable Greenhouse Gases (including CO2 and methane), etc. DO NOT LIST H2, H2O, N2, O2, and Noble Gases.

4 Give maximum potential emission rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

5 Give maximum potential emission rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

6 Indicate the method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

7 Provide for all pollutant emissions. Typically, the units of parts per million by volume (ppmv) are used. If the emission is a mineral acid (sulfuric, nitric, hydrochloric or phosphoric) use units of milligram per dry cubic meter (mg/m3) at standard conditions (68 °F

Table 2: Release Parameter Data								
Emission Point ID No. *(Must match Emission Units Table)*	Inner Diameter (ft.)	Exit Gas			Emission Point Elevation (ft)		UTM Coordinates (km)	
		Temp. (°F)	Volumetric Flow [1] (acfm) *at operating conditions*	Velocity (fps)	Ground Level *(Height above mean sea level)*	Stack Height [2] *(Release height of emissions above ground level)*	Northing	Easting
104.014*	0.875	169	2,000	56	642	80	4,232.60	451.90
104.003B	0.83	75	1,300	1.8	637	30	4,232.60	451.90
107.03	NA	NA	1,200	3.1	NA	NA	4,232.60	451.90

[1] Give at operating conditions. Include inerts.
[2] Release height of emissions above ground level.

*NOTE: Information from stack test conducted in 2008.

ATTACHMENT K

FUGITIVE EMISSIONS DATA SUMMARY SHEET

Attachment K – Fugitive Emissions Data Summary Sheet

The FUGITIVE EMISSIONS SUMMARY SHEET provides a summation of fugitive emissions. Fugitive emissions are those emissions which could not reasonably pass through a stack, chimney, vent or other functionally equivalent opening. Note that uncaptured process emissions are not typically considered to be fugitive, and must be accounted for on the appropriate EMISSIONS UNIT DATA SHEET and on the EMISSION POINTS DATA SUMMARY SHEET.

Please note that total emissions from the source are equal to all vented emissions, all fugitive emissions, plus all other emissions (e.g. uncaptured emissions).

APPLICATION FORMS CHECKLIST - FUGITIVE EMISSIONS
1.) Will there be haul road activities? ☐ Yes ☒ No ☐ If YES, then complete the HAUL ROAD EMISSIONS UNIT DATA SHEET.
2.) Will there be Storage Piles? ☐ Yes ☒ No ☐ If YES, complete Table 1 of the NONMETALLIC MINERALS PROCESSING EMISSIONS UNIT DATA SHEET.
3.) Will there be Liquid Loading/Unloading Operations? ☐ Yes ☒ No ☐ If YES, complete the BULK LIQUID TRANSFER OPERATIONS EMISSIONS UNIT DATA SHEET.
4.) Will there be emissions of air pollutants from Wastewater Treatment Evaporation? ☐ Yes ☒ No ☐ If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.
5.) Will there be Equipment Leaks (e.g. leaks from pumps, compressors, in-line process valves, pressure relief devices, open-ended valves, sampling connections, flanges, agitators, cooling towers, etc.)? ☐ Yes ☒ No ☐ If YES, complete the LEAK SOURCE DATA SHEET section of the CHEMICAL PROCESSES EMISSIONS UNIT DATA SHEET.
6.) Will there be General Clean-up VOC Operations? ☒ Yes ☐ No ☐ If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET.
7.) Will there be any other activities that generate fugitive emissions? ☐ Yes ☒ No ☐ If YES, complete the GENERAL EMISSIONS UNIT DATA SHEET or the most appropriate form.
If you answered "NO" to all of the items above, it is not necessary to complete the following table, "Fugitive Emissions Summary."

FUGITIVE EMISSIONS SUMMARY	All Regulated Pollutants - Chemical Name/CAS [1]	Maximum Potential Uncontrolled Emissions [2]		Maximum Potential Controlled Emissions [3]		Est. Method Used [4]
		lb/hr	ton/yr	lb/hr	ton/yr	
Haul Road/Road Dust Emissions Paved Haul Roads	NA					
Unpaved Haul Roads	NA					
Storage Pile Emissions	NA					
Loading/Unloading Operations	NA					
Wastewater Treatment Evaporation & Operations	NA					
Equipment Leaks	NA					
General Clean-up VOC Emissions	Filter Cleaning/Changeout VOC Methanol	 1.21 1.21	 0.01 0.01	 1.21 1.21	 0.01 0.01	EE
Other	NA					

[1] List all regulated air pollutants. Speciate VOCs, including all HAPs. Follow chemical name with Chemical Abstracts Service (CAS) number. LIST Acids, CO, CS_2, VOCs, H_2S, Inorganics, Lead, Organics, O_3, NO, NO_2, SO_2, SO_3, all applicable Greenhouse Gases (including CO_2 and methane), etc. DO NOT LIST H_2, H_2O, N_2, O_2, and Noble Gases.

[2] Give rate with no control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[3] Give rate with proposed control equipment operating. If emissions occur for less than 1 hr, then record emissions per batch in minutes (e.g. 5 lb VOC/20 minute batch).

[4] Indicate method used to determine emission rate as follows: MB = material balance; ST = stack test (give date of test); EE = engineering estimate; O = other (specify).

ATTACHMENT L

EMISSION UNIT DATA SHEETS

REDACTED
Information claimed confidential by
Optima Belle, LLC April 22, 2016.

Attachment L
EMISSIONS UNIT DATA SHEET
GENERAL

To be used for affected sources other than asphalt plants, foundries, incinerators, indirect heat exchangers, and quarries.

Identification Number (as assigned on *Equipment List Form*): Various (See Attachment I)

1. Name or type and model of proposed affected source:

LAME production is being proposed for the Small Lots Manufacturing (SLM) Building 216. This process will use the existing permitted equipment that is listed in Attachment I. [redacted]

2. On a separate sheet(s), furnish a sketch(es) of this affected source. If a modification is to be made to this source, clearly indicated the change(s). Provide a narrative description of all features of the affected source which may affect the production of air pollutants.

3. Name(s) and maximum amount of proposed process material(s) charged per hour:

LAME
Total Batches Per Year: 20
Single Batch Time: [redacted] hours (Dried LAME) or [redacted] (Undried LAME)
[redacted]

4. Name(s) and maximum amount of proposed material(s) produced per hour:

L-Alanine Methyl Ester (LAME): [redacted] lb
Hydrogen Chloride: [redacted] lb
SO2: [redacted] lb

5. Give chemical reactions, if applicable, that will be involved in the generation of air pollutants:

[redacted]

* The identification number which appears here must correspond to the air pollution control device identification number appearing on the *List Form*.

6. Combustion Data (if applicable):

(a) Type and amount in appropriate units of fuel(s) to be burned:

N/A

(b) Chemical analysis of proposed fuel(s), excluding coal, including maximum percent sulfur and ash:

(c) Theoretical combustion air requirement (ACF/unit of fuel):

@ °F and psia.

(d) Percent excess air:

(e) Type and BTU/hr of burners and all other firing equipment planned to be used:

(f) If coal is proposed as a source of fuel, identify supplier and seams and give sizing of the coal as it will be fired:

(g) Proposed maximum design heat input: $\times 10^6$ BTU/hr.

7. Projected operating schedule:

Hours/Day	24	Days/Week	7	Weeks/Year	52

8. Projected amount of pollutants that would be emitted from this affected source if no control devices were used:			
@		°F and	psia
a.	NO_X	lb/hr	grains/ACF
b.	SO_2	118.88 lb/hr	grains/ACF
c.	CO	lb/hr	grains/ACF
d.	PM_{10}	0.36 (Dried LAME) 0.15 (Undried LAME) lb/hr	grains/ACF
e.	Hydrocarbons	lb/hr	grains/ACF
f.	VOCs	24.63 lb/hr	grains/ACF
g.	Pb	lb/hr	grains/ACF
h.	Specify other(s)		
	HAPS	92.38 lb/hr	grains/ACF
		lb/hr	grains/ACF
		lb/hr	grains/ACF
		lb/hr	grains/ACF

NOTE: (1) An Air Pollution Control Device Sheet must be completed for any air pollution device(s) used to control emissions from this affected source.

(2) Complete the Emission Points Data Sheet.

9. Proposed Monitoring, Recordkeeping, Reporting, and Testing
Please propose monitoring, recordkeeping, and reporting in order to demonstrate compliance with the proposed operating parameters. Please propose testing in order to demonstrate compliance with the proposed emissions limits.

MONITORING	RECORDKEEPING
None	Amount of LAME produced.
REPORTING	**TESTING**
None	None

MONITORING. PLEASE LIST AND DESCRIBE THE PROCESS PARAMETERS AND RANGES THAT ARE PROPOSED TO BE MONITORED IN ORDER TO DEMONSTRATE COMPLIANCE WITH THE OPERATION OF THIS PROCESS EQUIPMENT OPERATION/AIR POLLUTION CONTROL DEVICE.

RECORDKEEPING. PLEASE DESCRIBE THE PROPOSED RECORDKEEPING THAT WILL ACCOMPANY THE MONITORING.

REPORTING. PLEASE DESCRIBE THE PROPOSED FREQUENCY OF REPORTING OF THE RECORDKEEPING.

TESTING. PLEASE DESCRIBE ANY PROPOSED EMISSIONS TESTING FOR THIS PROCESS EQUIPMENT/AIR POLLUTION CONTROL DEVICE.

10. Describe all operating ranges and maintenance procedures required by Manufacturer to maintain warranty

This is existing equipment that has been in place for years.

ATTACHMENT N

SUPPORTING EMISSIONS CALCULATIONS

By: JJD
Date: 2/13/2017

Checked By: ADM
Date: 3/28/2017

Total Emissions Estimate for a Campaign of Dried LAME*

Number of Batches in Process (1) 1 No.
Number of Batches Per Year 20 No.

Total Emissions

Pollutant	Uncontrolled		Controlled	
	pph (Max Rate)(1)	tpy (20 batches)	pph (Max Rate)(1)	tpy (20 batches)
PM	0.75	0.02	0.75	0.02
PM10	0.36	0.02	0.36	0.02
PM2.5	0.05	0.02	0.05	0.02
SO2	118.88	19.02	0.012	0.002
VOC - Process	23.43	1.22	0.43	0.03
VOC - Filter Changeout (Fugitive)	1.21	0.01	1.21	0.01
Total VOC	24.63	1.23	1.63	0.04
HAPS (Process)				
Acetonitrile	0.61	0.02	0.02	0.0008
Hydrogen Chloride	67.75	10.84	0.01	0.001
Methanol	1.88	0.37	0.02	0.007
Methyl Tert-Butyl Ether	20.93	0.83	0.39	0.02
Total Process HAPS	91.18	12.06	0.44	0.03
HAPS (Filter Changeout)				
Methanol	1.21	0.01	1.21	0.01
Total HAPS (Filter Changeout and Process)	92.38	12.07	1.65	0.04

Requested Permit Limits

Pollutant	Uncontrolled		Controlled	
	pph (Max Rate)(1)	tpy (20 batches)	pph (Max Rate)(1)	tpy (20 batches)
PM	0.75	0.02	0.75	0.02
PM10	0.36	0.02	0.36	0.02
PM2.5	0.05	0.02	0.05	0.02
SO2	118.88	19.02	0.01	0.01
VOC - Process	23.43	1.22	0.43	0.04
VOC - Filter Changeout	1.21	0.01	1.21	0.01
Total VOC	24.63	1.23	1.63	0.05
HAPS (Process)				
Acetonitrile	0.61	0.02	0.02	0.01
Hydrogen Chloride	67.75	10.84	0.01	0.01
Methanol	1.88	0.37	0.02	0.01
Methyl Tert-Butyl Ether	20.93	0.83	0.39	0.02
Total HAPS	91.18	12.06	0.44	0.05
HAPS (Filter Changeout - Fugitive)				
Methanol	1.21	0.01	1.21	0.01
Total HAPS (Filter Changeout and Process)	92.38	12.07	1.65	0.06

* Optima Belle, LLC is updating both the dried and undried LAME processes. Emissions for both dried and undried LAME are based on 20 batches per year each. However, the sum of all batches of both dried and undried LAME produced per year will not exceed 20.

By: JJD
Date: 2/13/2017

Checked By: ADM
Date: 3/28/2017

Current Emissions

Pollutant	Uncontrolled		Controlled	
	pph (Max Rate)(1)	tpy (10 batches)	pph (Max Rate)(1)	tpy (10 batches)
PM	0.45	0.02	0.45	0.02
PM10	0.21	0.02	0.21	0.02
PM2.5	0.03	0.02	0.03	0.02
SO2	1,913.47	9.57	19.13	0.10
VOC - Process	74.72	3.35	0.01	0.03
VOC - Filter Changeout	1.21	0.01	1.21	0.01
Total VOC	75.92	3.36	1.22	0.04

HAPS (Process)				
Acetonitrile	1.58	0.04	0.01	0.01
Hydrogen Chloride	1,088.96	5.44	0.11	0.01
Methanol	25.38	0.53	0.01	0.01
Methyl Tert-Butyl Ether	47.76	2.78	0.01	0.01
Total HAPS	1,163.68	8.79	0.14	0.04

HAPS (Filter Changeout)				
Methanol	1.21	0.01	1.21	0.01
Total HAPS (Filter Changeout and Process)	1,164.88	8.80	1.35	0.05

Change in Emissions

Pollutant	Uncontrolled		Controlled	
	pph (Max Rate)(1)	tpy (20 batches)	pph (Max Rate)(1)	tpy (20 batches)
PM	0.30	0.00	0.30	0.00
PM10	0.15	0.00	0.15	0.00
PM2.5	0.02	0.00	0.02	0.00
SO2	-1,794.60	9.45	-19.12	-0.09
VOC - Process	-51.29	-2.13	0.42	0.01
VOC - Filter Changeout	0.00	0.00	0.00	0.00
Total VOC	-51.29	-2.13	0.41	0.01

HAPS (Process)

Acetonitrile	-0.97	-0.02	0.01	0.00
Hydrogen Chloride	-1,021.21	5.40	-0.10	0.00
Methanol	-23.50	-0.16	0.01	0.00
Methyl Tert-Butyl Ether	-26.83	-1.95	0.38	0.01
Total HAPS	-1,072.50	3.27	0.30	0.01

HAPS (Filter Changeout - Fugitive)

Methanol	0.00	0.00	0.00	0.00
Total HAPS (Filter Changeout and Process)	-1,072.50	3.27	0.30	0.01

Product: LAME (Dried)
Process Name: LAME via SOCL2 Route
Production Quantity: 3545.0 lb
Process Cycle Time: [redacted]
Date: 1/13/2017
File: N:\Emission Master Files\Ajinomoto\Bell EM Files\LAME Belle Dried R_2.emm
Comments:

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Information claimed confidential by
Optima Belle, LLC February 13, 2017.

Compound	Activities Emitting	Emissions Uncontrolled (lb)	Emissions Controlled (lb)	Emissions Percent Removal
Acetonitrile	15	1.854727081	0.078727249	95.75531895
Hydrogen Chloride	1	1084	0.1084	99.99
[redacted]	8	0	0	
[redacted]	23	0	0	
Methanol	39	37.23281148	0.74504532	97.99895498
MTBE	11	82.80921882	2.279066123	97.24781111
[redacted]	56	849.6539181	849.6539181	0
[redacted]	5	0	0	
[redacted]	2	0	0	
[redacted]	52	0	0	
[redacted]	2	0	0	
Sulfur Dioxide	1	1902	0.1902	99.99
[redacted]	18	6.585420112	6.21904E-05	99.99905564
Water	54	0.039294492	11.62310498	-29479.47639

Compound	Process Cycle Average (lb/hr)	Compound Emission Hours	Compound Emission Average (lb/hr)	Uncontrolled (lb/hr)	Max Rate (lb/hr) Within 1 hour
Acetonitrile	0.000630575	39.99694444	0.001968332	0.61302	0.019792253
Hydrogen Chloride	0.000868242	16	0.006775	67.75	0.006775
[redacted]	0	9.75	0		0
[redacted]	0	115.0988889	0		0
Methanol	0.005967524	122.5933333	0.006077372	1.87856	0.018785529
MTBE	0.018254434	37.9975	0.05997937	20.9347	0.389704398
[redacted]	6.805397822	124.8372222	6.806094392		39.31900572
[redacted]	0	8.999444444	0		0
[redacted]	0	6.5	0		0
[redacted]	0	124.8380556	0		0
[redacted]	0	10	0		0
Sulfur Dioxide	0.001523428	16	0.0118875	118.875	0.0118875
[redacted]	4.98121E-07	63.09805556	9.85615E-07		3.7953E-05
Water	0.093096556	124.8377778	0.09310567		0.325096409

(1) Process Cycle Average = Compound emission quantity / Total process cycle time in hours.
(2) Compound Emission Average = Compound emission quantity / Compound emission time in hours.

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Information claimed confidential by
Optima Belle, LLC February 13, 2017.

Dried LAME

Classification	Activities Emitting	Emissions Uncontrolled (lb)	Emissions Controlled (lb)	Emissions Percent Removal
All Emissions	56	3964.17539	864.6785239	78.18768246
Acid	0	0	0	
Acid Gases	1	1084	0.1084	99.99
Hydrogen Chloride	1	1084	0.1084	99.99
Asbestos	0	0	0	
Base	0	0	0	
Biological	0	0	0	
CATEGORY I	0	0	0	
ASBESTOS	0	0	0	
BIOLOGICAL	0	0	0	
Cr(+6)	0	0	0	
DIOXIN	0	0	0	
HAP-PARTICULATE	0	0	0	
METAL	0	0	0	
OTHER PARTICULATE	0	0	0	
RADIONUCLIDE	0	0	0	
CATEGORY II	0	0	0	
HAP-VOC	0	0	0	
OTHER VOC	0	0	0	
CATEGORY III	0	0	0	
ACID	0	0	0	
HAP-ACID	0	0	0	
CATEGORY IV	0	0	0	
CATEGORY V (CO)	0	0	0	
CATEGORY VI (NOx)	0	0	0	
CATEGORY VII (SO2)	0	0	0	
CATEGORY VIII	0	0	0	
CO	0	0	0	
CR+6	0	0	0	
Dioxin	0	0	0	
ETG	0	0	0	
EVOS	0	0	0	
Gas	0	0	0	
HAP	40	1205.696757	3.211238692	99.73370534
Acetonitrile	15	1.854727081	0.078727249	95.75531895
Hydrogen Chloride	1	1084	0.1084	99.99
Methanol	39	37.23281148	0.74504532	97.99895498
MTBE	11	82.80921882	2.279066123	97.24781111
Hydrogen	0	0	0	
LOC	0	0	0	
Metal	0	0	0	
NOx	0	0	0	
Particulate	0	0	0	
Pb	0	0	0	
PM10	0	0	0	
Radionuclide	0	0	0	
SO2	1	1902	0.1902	99.99
Sulfur Dioxide	1	1902	0.1902	99.99
TSP	0	0	0	
TVOS	0	0	0	
VCM	0	0	0	
VOC	39	39.08753856	0.823772569	97.89249311
Acetonitrile	15	1.854727081	0.078727249	95.75531895
Methanol	39	37.23281148	0.74504532	97.99895498
Unclassified	56	856.2786327	881.2770852	-0.583741363
[redacted]	8	0	0	
[redacted]	23	0	0	
[redacted]	56	849.6539181	849.6539181	0
[redacted]	5	0	0	
[redacted]	2	0	0	
[redacted]	52	0	0	
[redacted]	2	0	0	
[redacted]	18	6.585420112	6.21904E-05	99.99905564
Water	54	0.039294492	11.62310498	-29479.47639

Dried LAME

Classification	Process Cycle Average (lb/hr)	Emission Hours	Emission Average (lb/hr)	Max Rate (lb/hr) Within 1 hour
All Emissions	6.925739078	124.8372222	6.926447966	39.71407073
Acid	0	0	0	0
Acid Gases	0.000868242	16	0.006775	0.006775
Asbestos	0	0	0	0
Base	0	0	0	0
Biological	0	0	0	0
CATEGORY I	0	0	0	0
ASBESTOS	0	0	0	0
BIOLOGICAL	0	0	0	0
Cr(+6)	0	0	0	0
DIOXIN	0	0	0	0
HAP-PARTICULATE	0	0	0	0
METAL	0	0	0	0
OTHER PARTICULATE	0	0	0	0
RADIONUCLIDE	0	0	0	0
CATEGORY II	0	0	0	0
HAP-VOC	0	0	0	0
OTHER VOC	0	0	0	0
CATEGORY III	0	0	0	0
ACID	0	0	0	0
HAP-ACID	0	0	0	0
CATEGORY IV	0	0	0	0
CATEGORY V (CO)	0	0	0	0
CATEGORY VI (NOx)	0	0	0	0
CATEGORY VII (SO2)	0	0	0	0
CATEGORY VIII	0	0	0	0
CO	0	0	0	0
CR+6	0	0	0	0
Dioxin	0	0	0	0
ETG	0	0	0	0
EVOS	0	0	0	0
Gas	0	0	0	0
HAP	0.025720774	122.5927778	0.026194355	0.390163284
Hydrogen	0	0	0	0
LOC	0	0	0	0
Metal	0	0	0	0
NOx	0	0	0	0
Particulate	0	0	0	0
Pb	0	0	0	0
PM10	0	0	0	0
Radionuclide	0	0	0	0
SO2	0.001523428	16	0.0118875	0.0118875
TSP	0	0	0	0
TVOS	0	0	0	0
VCM	0	0	0	0
VOC	0.006598098	122.5933333	0.006719554	0.022484757
Unclassified	6.898494876	124.8372222	6.899200975	39.56575669

(1) Process Cycle Average = Classification emission quantity / Total process cycle time in hours.
(2) Emission Average = Classification emission quantity / Classification emission time in hours.

Dried LAME

Vessel	Vent ID	Device # 1	Device # 2	Device # 3	Device # 4
CWT Belle	CWT-XX-TO	Incinerator Belle	Scrubber Incinerator Belle		
Drum					
Hastelloy Double Cone - Belle		RX-7	Incinerator Belle	Scrubber Incinerator Belle	
Hastelloy Double Cone - Belle	DC-XX-TO	RX-7	Incinerator Belle	Scrubber Incinerator Belle	
Isocontainer		Incinerator Belle	Scrubber Incinerator Belle		
J Tank Belle	J-TK-XX-TO	Incinerator Belle	Scrubber Incinerator Belle		
RX-1 Belle	RX-1-TO	Scrubber Main Belle	Incinerator Belle	Scrubber Incinerator Belle	
RX-1 Belle	RX-1-TO	Scrubber Main Belle	Scrubber Incinerator Belle	Scrubber Incinerator Belle	
RX-2 Belle	RX-2-TO	Condenser RX-2 Hast C	Incinerator Belle	Scrubber Incinerator Belle	
RX-3 Belle	RX-3-TO	Condenser RX-3 Hast C	Incinerator Belle	Scrubber Incinerator Belle	
RX-5 Belle	RX-5-TO	Condenser RX-5 Hast C	Scrubber Main Belle	Incinerator Belle	Scrubber Incinerator Belle
RX-6 Belle	RX-6-TO	Condenser RX-6 Hast C	Scrubber Main Belle	Incinerator Belle	Scrubber Incinerator Belle
Virtual MLDT Belle	Cent-XX-TO	Incinerator Belle	Scrubber Incinerator Belle		
Virtual Tanker		Belle Vapor Return Loop			
Virtual Wet Cake Bin Belle	Cent-XX-TO	Incinerator Belle	Scrubber Incinerator Belle		

Uncontrolled Emissions

Process: LAME (Dried) via SOCL2 Route
Emissions reported in Pounds.

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Information claimed confidential by
Optima Belle, LLC February 13, 2017.

Activity	Recipe Step	Step Duration	Vessel	Acetonitrile	Acetonitrile (lb/hr)	Hydrogen Chloride	HCl (lb/hr)	
1			RX-6 Belle					0
2			RX-1 Belle					
3			RX-6 Belle					0
4			RX-6 Belle					0
5			RX-6 Belle					0
6			RX-1 Belle					
7			RX-6 Belle					0
8			RX-6 Belle					0
9			RX-1 Belle					
10			RX-1 Belle					
10			RX-6 Belle					0
11			RX-6 Belle					0
12			RX-6 Belle			1084	67.75	
13			RX-6 Belle					
14			RX-6 Belle					
15			RX-6 Belle					
16			RX-6 Belle					
17			RX-6 Belle					
17			RX-5 Belle					
18			RX-6 Belle					
19			RX-6 Belle					
19			RX-3 Belle					
20			RX-3 Belle					
21			RX-5 Belle					
22			RX-5 Belle					
23			RX-3 Belle					
24			RX-3 Belle					
24			RX-2 Belle					
25			RX-5 Belle					
25			Isocontainer					
26			RX-2 Belle					
27			RX-2 Belle					
27			RX-5 Belle					
28			RX-2 Belle	0.17104	0.114026667			
29			RX-2 Belle	0				
29			RX-5 Belle	0.30651	0.61302			
30			RX-2 Belle	6.47E-02	0.0323425			
31			RX-5 Belle					
31			Isocontainer	4.77E-02	0.047729			
32			RX-2 Belle	7.06E-02	0.017651			
33			CWT Belle					
34			RX-2 Belle	0				
34			Virtual MLDT Belle	0.75575	0.047234375			
35			RX-2 Belle					
35			Virtual Wet Cake Bin Belle	0.12474	0.06237			
36			Virtual Wet Cake Bin Belle					
36			Drum	4.37E-02	0.021853			
37			Isocontainer					
37			Virtual Tanker	1.32E-02	0.013198			
38			Drum					
38			Hastelloy Double Cone - Belle	6.80E-06	6.7977E-06			
39			Hastelloy Double Cone - Belle	5.48E-03	0.00045665			
40			Virtual MLDT Belle					
40			J Tank Belle	0.14458	0.14458			
41			J Tank Belle					
41			Virtual Tanker	0.10668	0.10668			
			Max Uncontrolled	0.75575	0.61302	1084	67.75	0
			Max Uncontrolled divided by step duration	0.047234375	0.61302	67.75	67.75	
			Lb/hr	0.61302		67.75		

Uncontrolled Emissions

LAME (Dried) via SOCL2 Route
Emissions reported in Pounds.

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Information claimed confidential by
Optima Belle, LLC February 13, 2017.

Step Duration	Vessel	[redacted]	Methanol	Methanol (lb/hr)	MTBE	MTBE (lb/hr)	[redacted]
	RX-6 Belle						6.8963
	RX-1 Belle						2.1974
	RX-6 Belle						2.3409
	RX-6 Belle						0
	RX-6 Belle		8.63E-02	0.086305			11.5937
	RX-1 Belle						7.8564
	RX-6 Belle		0	0			0
	RX-6 Belle		6.11E-02	0.015275			8.2079
	RX-1 Belle		0.93928	1.87856			3.1494
	RX-1 Belle						0
	RX-6 Belle		3.68E-02	0.036816			8.9993
	RX-6 Belle		0	0			0
	RX-6 Belle	0	6.7553	0.42220625			74.9079
	RX-6 Belle	0	6.7483	0.42176875			74.9079
	RX-6 Belle	0	4.52E-03	0.04515			0.60653
	RX-6 Belle	0	0.17551	0.058503333			23.5787
	RX-6 Belle	0	0	0			0
	RX-6 Belle	0	0				0
	RX-5 Belle		7.1937	0.2997375			113.5422
	RX-6 Belle	0	3.82E-02	0.038151			5.1251
	RX-6 Belle						0
	RX-3 Belle	0	0.32308	0.32308			14.6674
	RX-3 Belle	0	0.44876	0.11219			20.373
	RX-5 Belle		5.71E-02	0.114294			2.5374
	RX-5 Belle		0	0			0
	RX-3 Belle	0	0	0			0
	RX-3 Belle						0
	RX-2 Belle	0	0.89138	0.148563333			40.4662
	RX-5 Belle						0
	Isocontainer		6.30E-02	0.062995			11.7003
	RX-2 Belle	0	0.10582	0.10582			4.8041
	RX-2 Belle	0	0				0
	RX-5 Belle		11.8789	0.989908333			57.3277
	RX-2 Belle	0	7.47E-02	0.049791333			9.3883
	RX-2 Belle	0	0				0
	RX-5 Belle		0.28316	0.56632			2.5072
	RX-2 Belle	0	1.32E-02	0.006621	2.1864	1.0932	14.906
	RX-5 Belle						0
	Isocontainer		0.35046	0.35046			17.15
	RX-2 Belle	0	1.41E-02	0.00351325	2.3763	0.594075	16.1959
	CWT Belle				20.9347	20.9347	11.2719
	RX-2 Belle	0	0		0		0
	Virtual MLDT Belle		0.10281	0.006425625	11.3148	0.707175	87.2335
	RX-2 Belle	0					0
	Virtual Wet Cake Bin Belle	0	1.70E-02	0.008485	1.8676	0.9338	14.3987
	Virtual Wet Cake Bin Belle						0
	Drum	0	5.95E-03	0.0029728	0.65187	0.325935	5.0321
	Isocontainer						0
	Virtual Tanker		0.1518	0.1518			24.3395
	Drum						0
	Hastelloy Double Cone - Belle	0	1.11E-06	1.1124E-06	3.1614	3.1614	9.7053
	Hastelloy Double Cone - Belle	0	8.22E-04	6.84767E-05	36.5592	3.0466	112.3618
	Virtual MLDT Belle						0
	J Tank Belle		1.97E-02	0.019689	2.162	2.162	17.8653
	J Tank Belle						0
	Virtual Tanker		0.39197	0.39197	1.5948	1.5948	11.513
	Max Uncontrolled	0	11.8789	1.87856	36.5592	20.9347	
	Max Uncontrolled divided by step duration		0.989908333	1.87856	3.0466	20.9347	
	Lb/hr		1.87856		20.9347		

Uncontrolled Emissions

LAME (Dried) via SOCL2 Route
Emissions reported in Pounds.

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Information claimed confidential by
Optima Belle, LLC February 13, 2017.

Step Duration	Vessel					Sulfur Dioxide	SO2 (lb/hr)		Water
	RX-6 Belle								
	RX-1 Belle							2.241	
	RX-6 Belle								
	RX-6 Belle								
	RX-6 Belle								
	RX-1 Belle							3.7876	
	RX-6 Belle								
	RX-6 Belle								
	RX-1 Belle							0.37006	
	RX-1 Belle								
	RX-6 Belle							0.17649	
	RX-6 Belle							0	
	RX-6 Belle							3.45E-03	
	RX-6 Belle					1902	118.875	3.44E-03	
	RX-6 Belle							3.14E-07	
	RX-6 Belle							7.20E-05	
	RX-6 Belle							0	
	RX-6 Belle							0	
	RX-5 Belle							3.20E-03	
	RX-6 Belle							5.44E-06	
	RX-6 Belle								
	RX-3 Belle							2.16E-05	
	RX-3 Belle				0			2.71E-05	
	RX-5 Belle		0					3.07E-05	3.04E-02
	RX-5 Belle		0					0	0
	RX-3 Belle				0			0	
	RX-3 Belle	0							
	RX-2 Belle								
	RX-5 Belle								
	Isocontainer	0							1.23E-03
	RX-2 Belle								
	RX-2 Belle								
	RX-5 Belle								
	RX-2 Belle								
	RX-2 Belle								
	RX-5 Belle								
	RX-2 Belle								
	RX-5 Belle								
	Isocontainer	0							1.31E-03
	RX-2 Belle								
	CWT Belle								
	RX-2 Belle								
	Virtual MLDT Belle								
	RX-2 Belle								
	Virtual Wet Cake Bin Belle								
	Virtual Wet Cake Bin Belle								
	Drum								
	Isocontainer								
	Virtual Tanker	0							1.35E-03
	Drum								
	Hastelloy Double Cone - Belle								
	Hastelloy Double Cone - Belle								
	Virtual MLDT Belle								
	J Tank Belle								
	J Tank Belle								
	Virtual Tanker	0							4.97E-03
	Max Uncontroiled					1902	118.875	3.7876	0.030443
	Max Uncontrolled divided by step duration					118.875	118.875	3.7876	0.030443
	Lb/hr					118.875			

Controlled Emissions

Process: LAME (Dried) via SOCL2 Route
Emissions reported in Pounds.

REDACTED
Information claimed confidential by
Optima Belle, LLC February 13, 2017.

Activity	Recipe Step	Vessel	Acetonitrile	Hydrogen Chloride			Methanol	MTBE	
1		RX-6 Belle			0				6.8963
2		RX-1 Belle							2.1974
3		RX-6 Belle			0				2.3409
4		RX-6 Belle			0				0
5		RX-6 Belle			0		1.73E-03		11.5937
6		RX-1 Belle							7.8564
7		RX-6 Belle			0		0		0
8		RX-6 Belle			0		1.22E-03		8.2079
9		RX-1 Belle					1.88E-02		3.1494
10		RX-1 Belle							0
10		RX-6 Belle			0		7.36E-04		8.9993
11		RX-6 Belle			0		0		0
12		RX-6 Belle		0.1084		0	0.13511		74.9079
13		RX-6 Belle				0	0.13497		74.9079
14		RX-6 Belle				0	9.03E-05		0.60653
15		RX-6 Belle				0	3.51E-03		23.5787
16		RX-6 Belle				0	0		0
17		RX-6 Belle				0	0		0
17		RX-5 Belle					0.14387		113.5422
18		RX-6 Belle				0	7.63E-04		5.1251
19		RX-6 Belle							0
19		RX-3 Belle				0	6.46E-03		14.6674
20		RX-3 Belle				0	8.98E-03		20.373
21		RX-5 Belle					1.14E-03		2.5374
22		RX-5 Belle					0		0
23		RX-3 Belle				0	0		0
24		RX-3 Belle							0
24		RX-2 Belle				0	1.78E-02		40.4662
25		RX-5 Belle							0
25		Isocontainer					1.26E-03		11.7003
26		RX-2 Belle				0	2.12E-03		4.8041
27		RX-2 Belle				0	0		0
27		RX-5 Belle					0.23758		57.3277
28		RX-2 Belle	0.003421			0	1.49E-03		9.3883
29		RX-2 Belle	0.000000			0	0		0
29		RX-5 Belle	0.006130				5.66E-03		2.5072
30		RX-2 Belle	0.001294			0	2.65E-04	4.37E-02	14.906
31		RX-5 Belle							0
31		Isocontainer	0.000955				7.01E-03		17.15
32		RX-2 Belle	0.001412			0	2.81E-04	4.75E-02	16.1959
33		CWT Belle						0.41869	11.2719
34		RX-2 Belle	0.000000			0	0	0	0
34		Virtual MLDT Belle	0.015115				2.06E-03	0.2263	87.2335
35		RX-2 Belle				0			0
35		Virtual Wet Cake Bin Be	0.002495			0	3.39E-04	3.74E-02	14.3987
36		Virtual Wet Cake Bin Belle							0
36		Drum	0.043706			0	5.95E-03	0.65187	5.0321
37		Isocontainer							0
37		Virtual Tanker	0.000132				1.52E-03		24.3395
38		Drum							0
38		Hastelloy Double Cone -	0.000000			0	2.22E-08	6.32E-02	9.7053
39		Hastelloy Double Cone -	0.000110			0	1.64E-05	0.73118	112.3618
40		Virtual MLDT Belle							0
40		J Tank Belle	0.002892				3.93E-04	4.32E-02	17.8653
41		J Tank Belle							0
41		Virtual Tanker	0.001067				3.92E-03	1.59E-02	11.513
			0.043706	0.1084	0	0	0.23758	0.73118	113.5422

Controlled Emissions

Process: LAME (Dried) via SOCL2 Route
Emissions reported in Pounds.

REDACTED
Information claimed confidential by
Optima Belle, LLC February 13, 2017.

Activity	Recipe Step	Vessel	[redacted]	[redacted]	[redacted]	[redacted]	Sulfur Dioxide	[redacted]	Water
1		RX-6 Belle			0				9.89E-02
2		RX-1 Belle			0			2.24E-06	3.15E-02
3		RX-6 Belle			0				3.36E-02
4		RX-6 Belle			0				0
5		RX-6 Belle			0				0.16636
6		RX-1 Belle			0			3.79E-06	0.11272
7		RX-6 Belle			0				0
8		RX-6 Belle			0				0.11778
9		RX-1 Belle			0			3.70E-05	4.54E-02
10		RX-1 Belle			0				0
10		RX-6 Belle			0			1.76E-05	0.12913
11		RX-6 Belle			0			0	0
12		RX-6 Belle			0			3.45E-07	1.0776
13		RX-6 Belle			0		0.1902	3.44E-07	1.0776
14		RX-6 Belle			0			0	8.70E-03
15		RX-6 Belle			0			7.20E-09	0.33834
16		RX-6 Belle			0			0	0
17		RX-6 Belle			0			0	0
17		RX-5 Belle			0			3.20E-07	1.6308
18		RX-6 Belle			0			5.44E-10	7.35E-02
19		RX-6 Belle			0				0
19		RX-3 Belle			0			2.16E-07	0.21052
20		RX-3 Belle			0	0		2.71E-07	0.29241
21		RX-5 Belle		0	0			3.07E-09	3.64E-02
22		RX-5 Belle		0	0			0	0
23		RX-3 Belle			0	0		0	0
24		RX-3 Belle	0		0				0
24		RX-2 Belle			0				0.58081
25		RX-5 Belle			0				0
25		Isocontainer	0		0				0.16788
26		RX-2 Belle			0				6.90E-02
27		RX-2 Belle			0				0
27		RX-5 Belle			0				0.82549
28		RX-2 Belle			0				0.13475
29		RX-2 Belle			0				0
29		RX-5 Belle			0				3.61E-02
30		RX-2 Belle			0				0.21408
31		RX-5 Belle			0				0
31		Isocontainer	0		0				0.24616
32		RX-2 Belle			0				0.2326
33		CWT Belle			0				0.16363
34		RX-2 Belle			0				0
34		Virtual MLDT Belle			0				1.2528
35		RX-2 Belle			0				0
35		Virtual Wet Cake Bin Be			0				0.20678
36		Virtual Wet Cake Bin Be			0				0
36		Drum							
37		Isocontainer			0				0
37		Virtual Tanker	0						1.35E-05
38		Drum							
38		Hastelloy Double Cone -			0				0.13953
39		Hastelloy Double Cone -			0				1.6154
40		Virtual MLDT Belle			0				0
40		J Tank Belle			0				0.25655
41		J Tank Belle			0				0
41		Virtual Tanker	0						4.97E-05
			0	0	0	0	0.1902	3.7E-05	1.6308

Optima Belle, LLC
LAME (Dried)
PM Drop Emissions

REDACTED
Information claimed confidential by
Optima Belle, LLC February 13, 2017.

Description: Particulate emissions are generated through the drop of solid materials into process vessels.

Basis: AP-42 Equation 13.2.4-3 is used to generate emissions from this operation. No control factor for the building enclosure and dust collector is being claimed at this time without guidance from the WVDEP.

Compound	Number of Batches	Pounds per Batch	Tons per Campaig	U (mph) (1)	M (%)	Emissions (lb/ton)			Emissions (lb/hr)			Emissions (tpy)		
						PM	PM10	PM2.5	PM	PM10	PM2.5	PM	PM10	PM2.5
	20	2,646	26.46	7.0	0.1	0.2431	0.1150	0.0174	0.32	0.15	0.02	0.01	0.01	0.01
	20	3,545	35.45	7.0	0.1	0.2431	0.1150	0.0174	0.43	0.20	0.03	0.01	0.01	0.01
Total Emissions									0.75	0.36	0.05	0.02	0.02	0.02

(1) WVDEP allows for 7 mph to be claimed for wind speed.

From AP-42:

$$E = k(0.0032)\frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}} \text{ (pound [lb]/ton)}$$

where:

E = emission factor
k = particle size multiplier (dimensionless)
U = mean wind speed, meters per second (m/s) (miles per hour [mph])
M = material moisture content (%)

From AP-42:

The particle size multiplier in the equation, k, varies with aerodynamic particle size range, as follows:

Aerodynamic Particle Size Multiplier (k) For Equation 1				
< 30 µm	< 15 µm	< 10 µm	< 5 µm	< 2.5 µm
0.74	0.48	0.35	0.20	0.053*

*Multiplier for < 2.5 µm taken from Reference 14.

Optima Belle, LLC
LAME Emissions
Filter Changeouts

Process: The filter is opened to atmosphere for cleaning.

Basis: It is assumed that the liquids have been

Equation: PV = nRT

Item	Value	Unit	Source
Filter Size	3.200	m3	Per OLSA
Temperature	20	°C	Operators
Temperature	293.15	K	–
VP Methanol	13.00	kPa	NIST
R	8.314	J / K * mol	Constant
n	17.0632	mol	Calculated
MW	32.04	g/mol	-
Conversion	0.0022	lb/g	-
Mass Emitted	1.21	lb	-
Estimated Time	1	hr	-
Hourly Emissions	1.21	lb/hr	-
Number of Changes	20	changes/yr	-
Total Emissions	24.11	lb/yr	-
	0.012	tpy	-

By: JJD
Date: 2/13/2017

Checked By: ADM
Date: 3/28/2017

Total Emissions Estimate for a Campaign of Undried LAME*

Number of Batches in Process (1) 1 No.
Number of Batches Per Year 20 No.

Total Emissions

Pollutant	Uncontrolled		Controlled	
	pph (Max Rate)(1)	tpy (20 batches)	pph (Max Rate)(1)	tpy (20 batches)
PM	0.32	0.01	0.32	0.01
PM10	0.15	0.01	0.15	0.01
PM2.5	0.02	0.01	0.02	0.01
SO2	118.88	19.02	0.012	0.002
VOC - Process	23.43	0.82	0.43	0.02
VOC - Filter Changeout (Fugitive)	1.21	0.01	1.21	0.01
Total VOC	24.63	0.83	1.63	0.04
HAPS (Process)				
Acetonitrile	0.61	0.02	0.02	0.0008
Hydrogen Chloride	67.75	10.84	0.01	0.001
Methanol	1.88	0.37	0.02	0.007
Methyl Tert-Butyl Ether	20.93	0.43	0.39	0.01
Total Process HAPS	91.18	11.66	0.44	0.02
HAPS (Filter Changeout)				
Methanol	1.21	0.01	1.21	0.01
Total HAPS (Filter Changeout and Process)	92.38	11.67	1.64	0.03

Requested Permit Limits

Pollutant	Uncontrolled		Controlled	
	pph (Max Rate)(1)	tpy (20 batches)	pph (Max Rate)(1)	tpy (20 batches)
PM	0.32	0.01	0.32	0.01
PM10	0.15	0.01	0.15	0.01
PM2.5	0.02	0.01	0.02	0.01
SO2	118.88	19.02	0.01	0.01
VOC - Process	23.43	0.82	0.43	0.03
VOC - Filter Changeout	1.21	0.01	1.21	0.01
Total VOC	24.63	0.83	1.63	0.04
HAPS (Process)				
Acetonitrile	0.61	0.02	0.02	0.01
Hydrogen Chloride	67.75	10.84	0.01	0.01
Methanol	1.88	0.37	0.02	0.01
Methyl Tert-Butyl Ether	20.93	0.43	0.39	0.01
Total HAPS	91.18	11.66	0.44	0.04
HAPS (Filter Changeout - Fugitive)				
Methanol	1.21	0.01	1.21	0.01
Total HAPS (Filter Changeout and Process)	92.38	11.67	1.64	0.05

* Optima Belle, LLC is updating both the dried and undried LAME processes. Emissions for both dried and undried LAME are based on 20 batches per year each. However, the sum of all batches of both dried and undried LAME produced per year will not exceed 20.

By: JJD
Date: 2/13/2017

Checked By: ADM
Date: 3/28/2017

Current Emissions

Pollutant	Uncontrolled		Controlled	
	pph (Max Rate)(1)	tpy (10 batches)	pph (Max Rate)(1)	tpy (10 batches)
PM	0.18	0.01	0.18	0.01
PM10	0.08	0.01	0.08	0.01
PM2.5	0.01	0.01	0.01	0.01
SO2	1,913.47	9.57	1.91	0.01
VOC - Process	45.63	1.90	1.25	0.03
VOC - Filter Changeout	1.21	0.01	1.21	0.01
Total VOC	46.83	1.90	2.46	0.04
HAPS (Process)				
Acetonitrile	1.58	0.03	0.01	0.01
Hydrogen Chloride	1,088.96	5.44	0.01	0.01
Methanol	25.38	0.52	0.01	0.01
Methyl Tert-Butyl Ether	18.67	1.35	1.23	0.01
Total HAPS	1,134.58	7.34	1.26	0.04
HAPS (Filter Changeout)				
Methanol	1.21	0.01	1.21	0.01
Total HAPS (Filter Changeout and Process)	1,135.79	7.35	2.47	0.05

Change in Emissions

Pollutant	Uncontrolled		Controlled	
	pph (Max Rate)(1)	tpy (20 batches)	pph (Max Rate)(1)	tpy (20 batches)
PM	0.14	0.00	0.14	0.00
PM10	0.07	0.00	0.07	0.00
PM2.5	0.01	0.00	0.01	0.00
SO2	-1,794.60	9.45	-1.90	0.00
VOC - Process	-22.20	-1.08	-0.82	0.00
VOC - Filter Changeout	0.00	0.01	0.00	0.00
Total VOC	-22.20	-1.07	-0.82	0.00
HAPS (Process)				
Acetonitrile	-0.97	-0.01	0.01	0.00
Hydrogen Chloride	-1,021.21	5.40	0.00	0.00
Methanol	-23.50	-0.15	0.01	0.00
Methyl Tert-Butyl Ether	2.27	-0.91	-0.84	0.00
Total HAPS	-1,043.41	4.32	-0.82	0.00
HAPS (Filter Changeout - Fugitive)				
Methanol	0.00	0.01	0.00	0.00
Total HAPS (Filter Changeout and Process)	-1,043.41	4.32	-0.82	0.00

REDACTED
Information claimed confidential by
Optima Belle, LLC February 13, 2017.

Product: LAME (Undried)
Process Name: LAME via SOCL2 Route
Production Quantity: 3545.0 lb
Process Cycle Time: [redacted]
Date: 1/13/2017
File: N:\Emission Master Files\Ajinomoto\Bell EM Files\LAME Belle Undried R_3.emm
Comments:

Compound	Activities Emitting	Emissions Uncontrolled (lb)	Emissions Controlled (lb)	Emissions Percent Removal
Acetonitrile	13	1.849240484	0.078617517	95.74865911
Hydrogen Chloride	1	1084	0.1084	99.99
[redacted]	8	0	0	
[redacted]	21	0	0	
Methanol	37	37.23198865	0.745028863	97.99895496
MTBE	9	43.08860622	1.484653871	96.55441658
[redacted]	53	727.5868376	727.5868376	0
[redacted]	5	0	0	
[redacted]	2	0	0	
[redacted]	50	0	0	
[redacted]	2	0	0	
Sulfur Dioxide	1	1902	0.1902	99.99
[redacted]	18	6.585420112	6.21904E-05	99.99905564
Water	52	0.039294492	9.879804701	-25042.97603

Compound	Process Cycle Average (lb/hr)	Compound Emission Hours	Compound Emission Average (lb/hr)	Uncontrolled (lb/hr)	Max Rate (lb/hr) Within 1 hour
Acetonitrile	0.000678615	30.99888889	0.00253614	0.61302	0.019792253
Hydrogen Chloride	0.000935693	16	0.006775	67.75	0.006775
[redacted]	0	9.75	0		0
[redacted]	0	103.0994444	0		0
Methanol	0.006430979	113.5952778	0.006558625	1.87856	0.018785529
MTBE	0.012815312	27.99916667	0.053024931	20.9347	0.389704398
[redacted]	6.280421559	115.8391667	6.281008907		23.3683359
[redacted]	0	8.999444444	0		0
[redacted]	0	6.5	0		0
[redacted]	0	115.84	0		0
[redacted]	0	10	0		0
Sulfur Dioxide	0.001641778	16	0.0118875	118.875	0.0118875
[redacted]	5.36818E-07	63.09805556	9.85615E-07		3.7953E-05
Water	0.085281007	115.8394444	0.085288778		0.325096409

(1) Process Cycle Average = Compound emission quantity / Total process cycle time in hours.
(2) Compound Emission Average = Compound emission quantity / Compound emission time in hours.

Undried LAME

REDACTED
Information claimed confidential by
Optima Belle, LLC February 13, 2017.

Classification	Activities Emitting	Emissions Uncontrolled (lb)	Emissions Controlled (lb)	Emissions Percent Removal
All Emissions	53	3802.381388	740.0736048	80.53657618
Acid	0	0	0	
Acid Gases	1	1084	0.1084	99.99
Hydrogen Chloride	1	1084	0.1084	99.99
Asbestos	0	0	0	
Base	0	0	0	
Biological	0	0	0	
CATEGORY I	0	0	0	
ASBESTOS	0	0	0	
BIOLOGICAL	0	0	0	
Cr(+6)	0	0	0	
DIOXIN	0	0	0	
HAP-PARTICULATE	0	0	0	
METAL	0	0	0	
OTHER PARTICULATE	0	0	0	
RADIONUCLIDE	0	0	0	
CATEGORY II	0	0	0	
HAP-VOC	0	0	0	
OTHER VOC	0	0	0	
CATEGORY III	0	0	0	
ACID	0	0	0	
HAP-ACID	0	0	0	
CATEGORY IV	0	0	0	
CATEGORY V (CO)	0	0	0	
CATEGORY VI (NOx)	0	0	0	
CATEGORY VII (SO2)	0	0	0	
CATEGORY VIII	0	0	0	
CO	0	0	0	
CR+6	0	0	0	
Dioxin	0	0	0	
ETG	0	0	0	
EVOS	0	0	0	
Gas	0	0	0	
HAP	38	1166.169935	2.416700252	99.79276601
Acetonitrile	13	1.849240484	0.078617517	95.74865911
Hydrogen Chloride	1	1084	0.1084	99.99
Methanol	37	37.23198865	0.745028863	97.99895496
MTBE	9	43.08860622	1.484653871	96.55441658
Hydrogen	0	0	0	
LOC	0	0	0	
Metal	0	0	0	
NOx	0	0	0	
Particulate	0	0	0	
Pb	0	0	0	
PM10	0	0	0	
Radionuclide	0	0	0	
SO2	1	1902	0.1902	99.99
Sulfur Dioxide	1	1902	0.1902	99.99
TSP	0	0	0	
TVOS	0	0	0	
VCM	0	0	0	
VOC	37	39.08122913	0.82364638	97.89247575
Acetonitrile	13	1.849240484	0.078617517	95.74865911
Methanol	37	37.23198865	0.745028863	97.99895496
Unclassified	53	734.2115522	737.4667045	-0.443353456
[redacted]	3	0	0	
[redacted]	21	0	0	
[redacted]	53	727.5868376	727.5868376	0
[redacted]	5	0	0	
[redacted]	2	0	0	
[redacted]	50	0	0	
[redacted]	2	0	0	
[redacted]	18	6.585420112	6.21904E-05	99.99905564
Water	52	0.039294492	9.879804701	-25042.97603

Undried LAME

Classification	Process Cycle Average (lb/hr)	Emission Hours	Emission Average (lb/hr)	Max Rate (lb/hr) Within 1 hour
All Emissions	6.388205479	115.8391667	6.388802907	23.41521147
Acid	0	0	0	0
Acid Gases	0.000935693	16	0.006775	0.006775
Asbestos	0	0	0	0
Base	0	0	0	0
Biological	0	0	0	0
CATEGORY I	0	0	0	0
ASBESTOS	0	0	0	0
BIOLOGICAL	0	0	0	0
Cr(+6)	0	0	0	0
DIOXIN	0	0	0	0
HAP-PARTICULATE	0	0	0	0
METAL	0	0	0	0
OTHER PARTICULATE	0	0	0	0
RADIONUCLIDE	0	0	0	0
CATEGORY II	0	0	0	0
HAP-VOC	0	0	0	0
OTHER VOC	0	0	0	0
CATEGORY III	0	0	0	0
ACID	0	0	0	0
HAP-ACID	0	0	0	0
CATEGORY IV	0	0	0	0
CATEGORY V (CO)	0	0	0	0
CATEGORY VI (NOx)	0	0	0	0
CATEGORY VII (SO2)	0	0	0	0
CATEGORY VIII	0	0	0	0
CO	0	0	0	0
CR+6	0	0	0	0
Dioxin	0	0	0	0
ETG	0	0	0	0
EVOS	0	0	0	0
Gas	0	0	0	0
HAP	0.020860598	113.5947222	0.021274758	0.390163284
Hydrogen	0	0	0	0
LOC	0	0	0	0
Metal	0	0	0	0
NOx	0	0	0	0
Particulate	0	0	0	0
Pb	0	0	0	0
PM10	0	0	0	0
Radionuclide	0	0	0	0
SO2	0.001641778	16	0.0118875	0.0118875
TSP	0	0	0	0
TVOS	0	0	0	0
VCM	0	0	0	0
VOC	0.007109593	113.5952778	0.00725071	0.022484757
Unclassified	6.365703103	115.8391667	6.366298427	23.40683014

(1) Process Cycle Average = Classification emission quantity / Total process cycle time in hours.
(2) Emission Average = Classification emission quantity / Classification emission time in hours.

Undried LAME

Vessel	Vent ID	Device # 1	Device # 2	Device # 3	Device # 4
CWT Belle	CWT-XX-TO	Incinerator Belle	Scrubber Incinerator Belle		
Drum					
Isocontainer		Incinerator Belle	Scrubber Incinerator Belle		
J Tank Belle	J-TK-XX-TO	Incinerator Belle	Scrubber Incinerator Belle		
RX-1 Belle	RX-1-TO	Incinerator Belle	Scrubber Main Belle	Scrubber Main Belle	
RX-1 Belle	RX-1-TO	Scrubber Main Belle	Scrubber Incinerator Belle	Scrubber Incinerator Belle	
RX-2 Belle	RX-2-TO	Condenser RX-2 Hast C	Incinerator Belle	Scrubber Incinerator Belle	
RX-3 Belle	RX-3-TO	Condenser RX-3 Hast C	Incinerator Belle	Scrubber Incinerator Belle	
RX-5 Belle	RX-5-TO	Condenser RX-5 Hast C	Scrubber Main Belle	Incinerator Belle	Scrubber Incinerator Belle
RX-6 Belle	RX-6-TO	Condenser RX-6 Hast C	Scrubber Main Belle	Incinerator Belle	Scrubber Incinerator Belle
Virtual MLDT Belle	Cent-XX-TO	Incinerator Belle	Scrubber Incinerator Belle		
Virtual Tanker		Belle Vapor Return Loop			
Virtual Wet Cake Bin Belle	Cent-XX-TO	Incinerator Belle	Scrubber Incinerator Belle		

Uncontrolled Emissions

Process: LAME (Undried) via SOCL2 Route
Emissions reported in Pounds.

REDACTED
Information claimed confidential by
Optima Belle, LLC February 13, 2017.

Activity	Recipe Step	Vessel	Acetonitrile	Acetonitrile lb/hr	Hydrogen Chloride	Hydrogen Chloride lb/hr		
1		RX-6 Belle					0	
2		RX-1 Belle						
3		RX-6 Belle					0	
4		RX-6 Belle					0	
5		RX-6 Belle					0	
6		RX-1 Belle						
7		RX-6 Belle					0	
8		RX-6 Belle					0	
9		RX-1 Belle						
10		RX-1 Belle						
10		RX-6 Belle					0	
11		RX-6 Belle					0	
12		RX-6 Belle			1084	67.75		0
13		RX-6 Belle						0
14		RX-6 Belle						0
15		RX-6 Belle						0
16		RX-6 Belle						0
17		RX-6 Belle						0
17		RX-5 Belle						
18		RX-6 Belle						0
19		RX-6 Belle						
19		RX-3 Belle						0
20		RX-3 Belle						0
21		RX-5 Belle						
22		RX-5 Belle						
23		RX-3 Belle						0
24		RX-3 Belle						
24		RX-2 Belle						0
25		RX-5 Belle						
25		Isocontainer						
26		RX-2 Belle						0
27		RX-2 Belle						0
27		RX-5 Belle						
28		RX-2 Belle	0.17104	0.114026667				0
29		RX-2 Belle	0					0
29		RX-5 Belle	0.30651	0.61302				
30		RX-2 Belle	6.47E-02	0.0323425				0
31		RX-5 Belle						
31		Isocontainer	4.77E-02	0.047729				
32		RX-2 Belle	7.06E-02	0.017651				0
33		CWT Belle						
34		RX-2 Belle	0					0
34		Virtual MLDT Belle	0.75575	0.047234375				
35		RX-2 Belle						0
35		Virtual Wet Cake Bin Be	0.12474	0.06237				0
36		Virtual Wet Cake Bin Belle						
36		Drum	4.37E-02	0.021853				0
37		Isocontainer						
37		Virtual Tanker	1.32E-02	0.013198				
38		Virtual MLDT Belle						
38		J Tank Belle	0.14458	0.14458				
39		J Tank Belle						
39		Virtual Tanker	0.10668	0.10668				
				0.61302		67.75		

Uncontrolled Emissions

Process: LAME (Undried) via SOCL2 Route
Emissions reported in Pounds.

REDACTED
Information claimed confidential by
Optima Belle, LLC February 13, 2017.

Activity	Recipe Step	Vessel	Methanol	Methanol lb/hr	MTBE	MTBE lb/hr			
1		RX-6 Belle					6.8963		
2		RX-1 Belle					2.1974		
3		RX-6 Belle					2.3409		
4		RX-6 Belle					0		
5		RX-6 Belle	8.63E-02	0.086305			11.5937		
6		RX-1 Belle					7.8564		
7		RX-6 Belle	0	0			0		
8		RX-6 Belle	6.11E-02	0.015275			8.2079		
9		RX-1 Belle	0.93928	1.87856			3.1494		
10		RX-1 Belle					0		
10		RX-6 Belle	3.68E-02	0.036816			8.9993		
11		RX-6 Belle	0	0			0		
12		RX-6 Belle	6.7553	0.42220625			74.9079		
13		RX-6 Belle	6.7483	0.42176875			74.9079		
14		RX-6 Belle	4.52E-03	0.04515			0.60653		
15		RX-6 Belle	0.17551	0.058503333			23.5787		
16		RX-6 Belle	0	0			0		
17		RX-6 Belle	0				0		
17		RX-5 Belle	7.1937	0.2997375			113.5422		
18		RX-6 Belle	3.82E-02	0.038151			5.1251		
19		RX-6 Belle					0		
19		RX-3 Belle	0.32308	0.32308			14.6674		
20		RX-3 Belle	0.44876	0.11219			20.373		
21		RX-5 Belle	5.71E-02	0.114294			2.5374		0
22		RX-5 Belle	0	0			0		0
23		RX-3 Belle	0	0			0		
24		RX-3 Belle					0	0	
24		RX-2 Belle	0.89138	0.148563333			40.4662		
25		RX-5 Belle					0		
25		Isocontainer	6.30E-02	0.062995			11.7003	0	
26		RX-2 Belle	0.10582	0.10582			4.8041		
27		RX-2 Belle	0				0		
27		RX-5 Belle	11.8789	0.989908333			57.3277		
28		RX-2 Belle	7.47E-02	0.049791333			9.3883		
29		RX-2 Belle	0				0		
29		RX-5 Belle	0.28316	0.56632			2.5072		
30		RX-2 Belle	1.32E-02	0.006621	2.1864	1.0932	14.906		
31		RX-5 Belle					0		
31		Isocontainer	0.35046	0.35046			17.15	0	
32		RX-2 Belle	1.41E-02	0.00351325	2.3763	0.594075	16.1959		
33		CWT Belle			20.9347	20.9347	11.2719		
34		RX-2 Belle	0		0		0		
34		Virtual MLDT Belle	0.10281	0.006425625	11.3148	0.707175	87.2335		
35		RX-2 Belle					0		
35		Virtual Wet Cake Bin Be	1.70E-02	0.008485	1.8676	0.9338	14.3987		
36		Virtual Wet Cake Bin Be					0		
36		Drum	5.95E-03	0.0029728	0.65187	0.325935	5.0321		
37		Isocontainer					0		
37		Virtual Tanker	0.1518	0.1518			24.3395	0	
38		Virtual MLDT Belle					0		
38		J Tank Belle	1.97E-02	0.019669	2.162	2.162	17.8653		
39		J Tank Belle					0		
39		Virtual Tanker	0.39197	0.39197	1.5948	1.5948	11.513	0	
				1.87856		20.9347			

Uncontrolled Emissions

Process: LAME (Undried) via SOCL2 Route
Emissions reported in Pounds.

REDACTED
Information claimed confidential by
Optima Belle, LLC February 13, 2017.

Activity	Recipe Step	Vessel			Sulfur Dioxide	Sulfur Dioxide lb/hr		Water
1		RX-6 Belle						
2		RX-1 Belle					2.241	
3		RX-6 Belle						
4		RX-6 Belle						
5		RX-6 Belle						
6		RX-1 Belle					3.7876	
7		RX-6 Belle						
8		RX-6 Belle						
9		RX-1 Belle					0.37006	
10		RX-1 Belle						
10		RX-6 Belle					0.17649	
11		RX-6 Belle					0	
12		RX-6 Belle					3.45E-03	
13		RX-6 Belle			1902	118.875	3.44E-03	
14		RX-6 Belle					3.14E-07	
15		RX-6 Belle					7.20E-05	
16		RX-6 Belle					0	
17		RX-6 Belle					0	
17		RX-5 Belle					3.20E-03	
18		RX-6 Belle					5.44E-06	
19		RX-6 Belle						
19		RX-3 Belle					2.16E-05	
20		RX-3 Belle		0			2.71E-05	
21		RX-5 Belle					3.07E-05	3.04E-02
22		RX-5 Belle					0	0
23		RX-3 Belle		0			0	
24		RX-3 Belle						
24		RX-2 Belle						
25		RX-5 Belle						
25		Isocontainer						1.23E-03
26		RX-2 Belle						
27		RX-2 Belle						
27		RX-5 Belle						
28		RX-2 Belle						
29		RX-2 Belle						
29		RX-5 Belle						
30		RX-2 Belle						
31		RX-5 Belle						
31		Isocontainer						1.31E-03
32		RX-2 Belle						
33		CWT Belle						
34		RX-2 Belle						
34		Virtual MLDT Belle						
35		RX-2 Belle						
35		Virtual Wet Cake Bin Be						
36		Virtual Wet Cake Bin Be						
36		Drum						
37		Isocontainer						
37		Virtual Tanker						1.35E-03
38		Virtual MLDT Belle						
38		J Tank Belle						
39		J Tank Belle						
39		Virtual Tanker						4.97E-03
						118.875		

Controlled Emissions

Process: LAME (Undried) via SOCL2 Route
Emissions reported in Pounds.

REDACTED
Information claimed confidential by
Optima Belle, LLC February 13, 2017.

Activity	Recipe Step	Vessel	Acetonitrile	Hydrogen Chloride			Methanol	MTBE		
1		RX-6 Belle			0				6.8963	
2		RX-1 Belle							2.1974	
3		RX-6 Belle			0				2.3409	
4		RX-6 Belle			0				0	
5		RX-6 Belle			0		1.73E-03		11.5937	
6		RX-1 Belle							7.8564	
7		RX-6 Belle			0		0		0	
8		RX-6 Belle			0		1.22E-03		8.2079	
9		RX-1 Belle					1.88E-02		3.1494	
10		RX-1 Belle							0	
10		RX-6 Belle			0		7.36E-04		8.9993	
11		RX-6 Belle			0		0		0	
12		RX-6 Belle		0.1084		0	0.13511		74.9079	
13		RX-6 Belle				0	0.13497		74.9079	
14		RX-6 Belle				0	9.03E-05		0.60653	
15		RX-6 Belle				0	3.51E-03		23.5787	
16		RX-6 Belle				0	0		0	
17		RX-6 Belle				0	0		0	
17		RX-5 Belle					0.14387		113.5422	
18		RX-6 Belle				0	7.63E-04		5.1251	
19		RX-6 Belle							0	
19		RX-3 Belle				0	6.46E-03		14.5674	
20		RX-3 Belle				0	8.98E-03		20.373	
21		RX-5 Belle					1.14E-03		2.5374	
22		RX-5 Belle					0		0	
23		RX-3 Belle				0	0		0	
24		RX-3 Belle							0	0
24		RX-2 Belle				0	1.78E-02		40.4662	
25		RX-5 Belle							0	
25		Isocontainer					1.26E-03		11.7003	0
26		RX-2 Belle				0	2.12E-03		4.8041	
27		RX-2 Belle				0	0		0	
27		RX-5 Belle					0.23758		57.3277	
28		RX-2 Belle	3.42E-03			0	1.49E-03		9.3883	
29		RX-2 Belle	0			0	0		0	
29		RX-5 Belle	6.13E-03				5.66E-03		2.5072	
30		RX-2 Belle	1.29E-03			0	2.65E-04	4.37E-02	14.906	
31		RX-5 Belle							0	
31		Isocontainer	9.55E-04				7.01E-03		17.15	0
32		RX-2 Belle	1.41E-03			0	2.81E-04	4.75E-02	16.1959	
33		CWT Belle						0.41869	11.2719	
34		RX-2 Belle	0			0	0	0	0	
34		Virtual MLDT Belle	1.51E-02				2.06E-03	0.2263	87.2335	
35		RX-2 Belle				0			0	
35		Virtual Wet Cake Bin Belle	2.49E-03			0	3.39E-04	3.74E-02	14.3987	
36		Virtual Wet Cake Bin Belle							0	
36		Drum	4.37E-02			0	5.95E-03	0.65187	5.0321	
37		Isocontainer							0	
37		Virtual Tanker	1.32E-04				1.52E-03		24.3395	0
38		Virtual MLDT Belle							0	
38		J Tank Belle	2.89E-03				3.93E-04	4.32E-02	17.8853	
39		J Tank Belle							0	
39		Virtual Tanker	1.07E-03				3.62E-03	1.59E-02	11.513	0

Controlled Emissions

Process: LAME (Undried) via SOCL2 Route
Emissions reported in Pounds.

REDACTED
Information claimed confidential by
Optima Belle, LLC February 13, 2017.

Activity	Recipe Step	Vessel	[redacted]	[redacted]	[redacted]	Sulfur Dioxide	[redacted]	Water
1		RX-6 Belle		0				9.89E-02
2		RX-1 Belle		0			2.24E-06	3.15E-02
3		RX-6 Belle		0				3.36E-02
4		RX-6 Belle		0				0
5		RX-6 Belle		0				0.16636
6		RX-1 Belle		0			3.79E-06	0.11272
7		RX-6 Belle		0				0
8		RX-6 Belle		0				0.11778
9		RX-1 Belle		0			3.70E-05	5.71E-02
10		RX-1 Belle		0				0
10		RX-6 Belle		0			1.76E-05	0.12913
11		RX-6 Belle		0			0	0
12		RX-6 Belle		0			3.45E-07	1.0776
13		RX-6 Belle		0		0.1902	3.44E-07	1.0776
14		RX-6 Belle		0			0	8.70E-03
15		RX-6 Belle		0			7.20E-09	0.33834
16		RX-6 Belle		0			0	0
17		RX-6 Belle		0			0	0
17		RX-5 Belle		0			3.20E-07	1.6308
18		RX-6 Belle		0			5.44E-10	7.35E-02
18		RX-6 Belle		0				0
19		RX-3 Belle		0			2.16E-07	0.21052
20		RX-3 Belle		0	0		2.71E-07	0.29241
21		RX-5 Belle	0	0			3.07E-09	3.84E-02
22		RX-5 Belle	0	0			0	0
23		RX-3 Belle		0	0		0	0
24		RX-3 Belle		0				0
24		RX-2 Belle		0				0.58081
25		RX-5 Belle		0				0
25		Isocontainer		0				0.16788
26		RX-2 Belle		0				6.90E-02
27		RX-2 Belle		0				0
27		RX-5 Belle		0				0.82549
28		RX-2 Belle		0				0.13475
29		RX-2 Belle		0				0
29		RX-5 Belle		0				3.61E-02
30		RX-2 Belle		0				0.21408
31		RX-5 Belle		0				0
31		Isocontainer		0				0.24616
32		RX-2 Belle		0				0.2326
33		CWT Belle		0				0.16363
34		RX-2 Belle		0				0
34		Virtual MLDT Belle		0				1.2528
35		RX-2 Belle		0				0
35		Virtual Wet Cake Bin Belle		0				0.20678
36		Virtual Wet Cake Bin Belle		0				0
36		Drum						
37		Isocontainer		0				0
37		Virtual Tanker						1.35E-05
38		Virtual MLDT Belle		0				0
38		J Tank Belle		0				0.25655
39		J Tank Belle		0				0
39		Virtual Tanker						4.97E-05

Optima Belle, LLC
LAME (Undried)
PM Drop Emissions

REDACTED
Information claimed confidential by
Optima Belle, LLC February 13, 2017.

Description: Particulate emissions are generated through the drop of solid materials into process vessels.

Basis: AP-42 Equation 13.2.4-3 is used to generate emissions from this operation. No control factor for the building enclosure and dust collector is being claimed at this time without guidance from the WVDEP.

Compound	Number of Batches	Pounds per Batch	Tons per Campaig	U (mph) (1)	M (%)	Emissions (lb/ton)			Emissions (lb/hr)			Emissions (tpy)		
						PM	PM10	PM2.5	PM	PM10	PM2.5	PM	PM10	PM2.5
[redacted]	20	2,646	26.46	7.0	0.1	0.2431	0.1150	0.0174	0.32	0.15	0.02	0.01	0.01	0.01
Total Emissions									0.32	0.15	0.02	0.01	0.01	0.01

(1) WVDEP allows for 7 mph to be claimed for wind speed.

From AP-42:

$$E = k(0.0032)\frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}} \text{ (pound [lb]/ton)}$$

where:

E = emission factor
k = particle size multiplier (dimensionless)
U = mean wind speed, meters per second (m/s) (miles per hour [mph])
M = material moisture content (%)

From AP-42:

The particle size multiplier in the equation, k, varies with aerodynamic particle size range, as follows:

Aerodynamic Particle Size Multiplier (k) For Equation 1				
< 30 µm	< 15 µm	< 10 µm	< 5 µm	< 2.5 µm
0.74	0.48	0.35	0.20	0.053[a]

[a] Multiplier for < 2.5 µm taken from Reference 14.

Optima Belle, LLC
LAME Emissions (Undried)
Filter Changeouts

Process: The filter is opened to atmosphere for cleaning.

Basis: It is assumed that the liquids have been

Equation: PV = nRT

Item	Value	Unit	Source
Filter Size	3.200	m3	Per OLSA
Temperature	20	°C	Operators
Temperature	293.15	K	–
VP Methanol	13.00	kPa	NIST
R	8.314	J / K * mol	Constant
n	17.0632	mol	Calculated
MW	32.04	g/mol	-
Conversion	0.0022	lb/g	-
Mass Emitted	1.21	lb	-
Estimated Time	1	hr	-
Hourly Emissions	1.21	lb/hr	-
Number of Changes	20	changes/yr	-
Total Emissions	24.11	lb/yr	-
	0.012	tpy	-

ATTACHMENT O

MONITORING/RECORDKEEPING/REPORTING/TESTING PLANS

ATTACHMENT O

MONITORING/RECORDKEEPING/ REPORTING/TESTING PLANS

Optima Belle, LLC plans to follow the monitoring, recordkeeping, reporting, and testing required by the issued permit.

ATTACHMENT P

PUBLIC NOTICE

AIR QUALITY PERMIT NOTICE

Notice of Application

Notice is given that Optima Belle, LLC has applied to the West Virginia Department of Environmental Protection, Division of Air Quality, for a Regulation 13 Class II Administrative Update to revise the existing LAME process production and equipment at the facility on W. DuPont Avenue near Belle, Kanawha County, West Virginia. The latitude and longitude coordinates are: 38.239659 and -81.551886.

The applicant estimates the change in potential to discharge the following Regulated Air Pollutants from the facility will be: SO2 of -0.09 tons per year (tpy); VOC of 0.01 tpy; and HAPS of 0.01 tpy.

Startup of operation is planned to begin on or about the 15th day of May, 2017. Written comments will be received by the West Virginia Department of Environmental Protection, Division of Air Quality, 601 57th Street, SE, Charleston, WV 25304, for at least 30 calendar days from the date of publication of this notice.

Any questions regarding this permit application should be directed to the DAQ at (304) 926-0499, Extension 1250, during normal business hours.

Dated this the (PLEASE INSERT DAY) day of April, 2017.

By: Optima Chemical Group, LLC
K. Gene Williams
President
200 Willacoochee Highway
Douglas, Georgia 31535

ATTACHMENT Q

BUSINESS CONFIDENTIAL CLAIMS

Precautionary Notice Claims of Confidentiality

The person submitting this information may assert that some or all of the information submitted is entitled to confidential treatment as provided by West Virginia Legislative Rule 45CSR31, entitled Confidential Information. Information covered by such a claim will be disclosed by the Division of Air Quality (DAQ) only to the extent, and by means of the procedures, set forth in 45CSR31. Please contact the West Virginia Secretary of State's Office at 304/558-6000 to obtain a copy of 45CSR31 in order to ensure that all required procedures are followed.

Information concerning the types and amounts of air pollutants discharged as that term is defined in WVCSR §45-31-2.4, shall not be claimed as confidential.

Any claim of confidentiality shall be made in accordance with the requirements of 45CSR31 and must accompany the information at the time it is submitted to the DAQ. **If no claim of confidentiality is made at the time of submission or is not made in accordance with the requirements of 45CSR31, the DAQ may make the information available to the public without further notice.**

Included below are procedures to be followed in submitting information claimed as confidential. This information is intended to assist a person with claiming confidential information and is not meant to relieve a person of his/her obligation to review the provisions of 45CSR31 and to comply with such rule. The procedures are as follows:

1. Indicate clearly the items of information claimed confidential by marking each page with the term Claimed Confidential, with the date of such claim of confidentiality. With the exception of documents of a size greater than 8½" x 14", information claimed confidential must be submitted on colored paper.

2. Include a cover document which justifies the claim of confidentiality in accordance with the specific criteria under WVCSR §45-31-4.1. A sample cover document is attached for your information and use. The cover document will be available for public disclosure and must include the following information:

   (a) The identity of the person making the submission of information claimed confidential;

   (b) The reason for the submission of information;

   (c) The name, an address in the State of West Virginia and telephone number of the designee who shall be contacted in accordance with 45CSR31;

   (d) Identification of each segment of information within each page that is submitted as confidential and the justification for each segment claimed confidential, including the criteria under WVCSR 45-31-4.1;

(e) The period of time for which confidential treatment is desired (e.g., until a certain date, until the occurrence of a specified event or permanently); and,

(f) Signature of a responsible official or an authorized representative of such person.

3. At the same time as the information claimed confidential is submitted to the DAQ on colored paper, a complete set of the information, including the cover document previously required under paragraph 2, must be submitted on white paper with the information claimed to be confidential blacked or whited out and the words Redacted Copy Claim of Confidentiality marked clearly on each such page, so that the information is suitable for public disclosure. In the case of drawings and blueprints, mark each page with the words Redacted Copy Claim of Confidentiality, include the title or legend of the drawing, and black or white out the information claimed confidential. The redacted page may be 8½" x 11" in size.

4. In the case of a permit application or supplemental information to an application, DAQ requires an applicant to submit three (3) copies of the application. Of those three (3) copies, one (1) must be a complete set of the application containing the information claimed confidential on colored paper and two (2) must be redacted copies. The DAQ reserves the right, however, to request additional copies of the information containing the confidential material.

Attachment

Attachment Q
Business Confidential Claim

Company Name	Optima Belle, LLC	**Responsible Official**		
Company Address	900 W. DuPont Avenue	**Confidential Information Designee in State of WV**	**Name**	K. Gene Williams
	Belle, WV 25015		**Title**	President
			Address	200 Willacoochee Highway
Person/Title Submitting Confidential Information	K. Gene Williams			Douglas, GA 31535
	President		**Phone**	(912) 384-5101
			Fax	(912) 384-6330

Reason for Submittal Of Confidential Information : R13 Class II Administrative Update

Identification of Confidential Information	**Rationale for Confidential Claim 45CSR31-4.1a-e**	**Confidential Treatment Time Period**
-Equipment design and capacity information -Process descriptions -Process flow diagrams -Site Map	a. Information initially claimed confidential by E.I. Dupont De Nemours and Company, Inc. and The Chemours Company FC, LLC. Information continues to be confidential under Optima Belle, LLC. The claim has not expired by its term, or been waived or withdrawn. The confidential information should continue to be maintained as such for an indefinite time period. See attached for b-e	Permanent

Responsible Official Signature:	
Responsible Official Title:	President
Date Signed:	3/31/17

NOTE: Must be signed and dated in **BLUE INK**.

Rationale for Confidentiality Claim (Cont.)

b. Information claimed confidential is not available to the general public. Within the company, Optima Belle, LLC (Optima) distributes technical information on a need-to-know basis and has used its business confidentiality policy to prevent inadvertent dissemination of information. This policy includes:

   * Marking of business confidential documents,
   * Limited distribution of documents,
   * Shredding of confidential documents before disposal.

   Employees are aware of the competitive nature of their business and are trained in guarding confidential information.

c. Information revealing the process technology in this submittal is not reasonably obtainable by persons other than Optima employees who need to know. To maintain the confidentiality of such information, Optima employees involved with confidential information sign a confidentiality agreement.

d. There is no statute that has been reviewed that requires disclosure of information claimed to be confidential.

e. Optima claims business confidentiality protection for the information submitted since disclosure would allow competent engineers within a competitor's company to determine the manner or process by which Optima produces this product and would provide competitors information without paying for technology or conducting research and development necessary to obtain the technology.

ATTACHMENT S

TITLE V PERMIT REVISION INFORMATION

Attachment S

Title V Permit Revision Information

1. New Applicable Requirements Summary	
Mark all applicable requirements associated with the changes involved with this permit revision:	
☐ SIP	☐ FIP
☒ Minor source NSR (45CSR13)	☐ PSD (45CSR14)
☐ NESHAP (45CSR15)	☐ Nonattainment NSR (45CSR19)
☐ Section 111 NSPS (Subpart(s)_____)	☐ Section 112(d) MACT standards (Subpart(s)_____)
☐ Section 112(g) Case-by-case MACT	☐ 112(r) RMP
☐ Section 112(i) Early reduction of HAP	☐ Consumer/commercial prod. reqts., section 183(e)
☐ Section 129 Standards/Reqts.	☐ Stratospheric ozone (Title VI)
☐ Tank vessel reqt., section 183(f)	☐ Emissions cap 45CSR§30-2.6.1
☐ NAAQS, increments or visibility (temp. sources)	☐ 45CSR27 State enforceable only rule
☐ 45CSR4 State enforceable only rule	☐ Acid Rain (Title IV, 45CSR33)
☐ Emissions Trading and Banking (45CSR28)	☐ Compliance Assurance Monitoring (40CFR64) (1)
☐ NO_x Budget Trading Program Non-EGUs (45CSR1)	☐ NO_x Budget Trading Program EGUs (45CSR26)

(1) If this box is checked, please include **Compliance Assurance Monitoring (CAM) Form(s)** for each Pollutants Specific Emission Unit (PSEU) (See Attachment H to Title V Application). If this box is not checked, please explain why **Compliance Assurance Monitoring** is not applicable:

2. Non Applicability Determinations

List all requirements, which the source has determined not applicable to this permit revision and for which a permit shield is requested. The listing shall also include the rule citation and a rationale for the determination.

☐ **Permit Shield Requested** *(not applicable to Minor Modifications)*

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

3. Suggested Title V Draft Permit Language

Are there any changes involved with this Title V Permit revision outside of the scope of the NSR Permit revision? ☐ Yes ☒ No If Yes, describe the changes below.

Also, please provide **Suggested Title V Draft Permit language** for the proposed Title V Permit revision (including all applicable requirements associated with the permit revision and any associated monitoring /recordkeeping/ reporting requirements), OR attach a marked up pages of current Title V Permit. Please include appropriate citations (Permit or Consent Order number, condition number and/or rule citation (e.g. 45CSR§7-4.1)) for those requirements being added / revised.

4. Active NSR Permits/Permit Determinations/Consent Orders Associated With This Permit Revision

Permit or Consent Order Number	Date of Issuance	Permit/Consent Order Condition Number
R13-0882N	03/20/2017	CO-R21-97-31
R13-0882M	12/16/2016	NA

5. Inactive NSR Permits/Obsolete Permit or Consent Orders Conditions Associated With This Revision

Permit or Consent Order Number	Date of Issuance	Permit/Consent Order Condition Number
R13-0882 (previous versions)	Various	None
	/ /	

6. Change in Potential Emissions

Pollutant	Change in Potential Emissions (+ or -), TPY
VOC	0.01
SO2	-0.09
Methyl Tert-Butyl Ether (HAP)	0.01
Total HAPs	0.01

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.

7. Certification For Use Of Minor Modification Procedures ***(Required Only for Minor Modification Requests)***

Note:	*This certification must be signed by a responsible official. Applications without a signed certification will be returned as incomplete. The criteria for allowing the use of Minor Modification Procedures are as follows:*

i. Proposed changes do not violate any applicable requirement;

ii. Proposed changes do not involve significant changes to existing monitoring, reporting, or recordkeeping requirements in the permit;

iii. Proposed changes do not require or change a case-by-case determination of an emission limitation or other standard, or a source-specific determination for temporary sources of ambient air quality impacts, or a visibility increment analysis;

iv. Proposed changes do not seek to establish or change a permit term or condition for which there is no underlying applicable requirement and which permit or condition has been used to avoid an applicable requirement to which the source would otherwise be subject (synthetic minor). Such terms and conditions include, but are not limited to a federally enforceable emissions cap used to avoid classification as a modification under any provision of Title I or any alternative emissions limit approved pursuant to regulations promulgated under § 112(j)(5) of the Clean Air Act;

v. Proposed changes do not involve preconstruction review under Title I of the Clean Air Act or 45CSR14 and 45CSR19;

vi. Proposed changes are not required under any rule of the Director to be processed as a significant modification;

Notwithstanding subparagraph 45CSR§30-6.5.a.1.A. (items i through vi above), minor permit modification procedures may be used for permit modifications involving the use of economic incentives, marketable permits, emissions trading, and other similar approaches, to the extent that such minor permit modification procedures are explicitly provided for in rules of the Director which are approved by the U.S. EPA as a part of the State Implementation Plan under the Clean Air Act, or which may be otherwise provided for in the Title V operating permit issued under 45CSR30.

Pursuant to 45CSR§30-6.5.a.2.C., the proposed modification contained herein meets the criteria for use of Minor permit modification procedures as set forth in Section 45CSR§30-6.5.a.1.A. The use of Minor permit modification procedures are hereby requested for processing of this application.

(Signed): _____ *(Please use blue ink)* Date: 3 / 31 / 17 *(Please use blue ink)*

Named (typed): K. Gene Williams Title: President

Note: Please check if the following included (if applicable):

☐	Compliance Assurance Monitoring Form(s)
☐	Suggested Title V Draft Permit Language

All of the required forms and additional information can be found under the Permitting Section of DAQ's website, or requested by phone.