



Sterigenics Failure to Report.pdf

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GEORGIA

DEPARTMENT OF NATURAL RESOURCES

ENVIRONMENTAL PROTECTION DIVISION

Richard E. Dunn, Director

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OCT 15 2018

CERTIFIED MAIL
70180680000123045368

Laura Hartman EHS Manager
Sterigenics
2971 Olympic Industrial Dr. S.E.
Atlanta Ga., 30339

RE: Failure To Report
Hazardous Material Release
Cobb County

Dear Mrs. Hartman,

The Georgia Oil or Hazardous Material Spills or Release Act (Act), Official Code of Georgia Annotated (O.C.G.A.) 12-14-3 (a) requires "Any person owning or having control over any oil or hazardous substance who has knowledge of any spill or release of such oil or who has knowledge of any spill or release of such hazardous substance in a quantity equal to or exceeding the reportable quantity or who has knowledge of a spill or release of an unknown quantity of oil or a hazardous substance shall immediately notify the division through the Department of Natural Resources Emergency Operations Center as soon as that person knows of the spill or release." In the event that the quantity of a hazardous material release cannot be determined within 15 minutes of the release, the Act requires that it be reported regardless of the quantity.

The Environmental Protection Division has determined that you failed to report a release of Ethylene Oxide on April 2, 2018. Spills or releases subject to the Act should be reported immediately to 1-800-241-4113. Failure to report future releases will result in the Division seeking enforcement action which could include monetary penalties.

Sincerely,

Jason Pietras
Environmental Compliance Specialist



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Sincerely,

Jason Pietras
Environmental Compliance Specialist

SAFETY DATA SHEET

Ethylene Oxide

Airgas
an Air Liquide company

Section 1. Identification

GHS product identifier : Ethylene Oxide
Chemical name : ethylene oxide
Other means of identification : oxirane; Oxirane (ethylene oxide)
Product use : Synthetic/Analytical chemistry.
Synonym : oxirane; Oxirane (ethylene oxide)
SDS # : 001081
Supplier's details : Airgas USA, LLC and its affiliates
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253
24-hour telephone : 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 GASES - Category 1
GASES UNDER PRESSURE - Liquefied gas
ACUTE TOXICITY (inhalation) - Category 3
SKIN CORROSION/IRRITATION - Category 2
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2A
GERM CELL MUTAGENICITY - Category 1B
CARCINOGENICITY - Category 1B
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) - Category 3

GHS label elements

Hazard pictograms :



Signal word :

Danger

Hazard statements :

Extremely flammable gas.
May form explosive mixtures with air.
Contains gas under pressure; may explode if heated.
May cause frostbite.
Toxic if inhaled.
Causes serious eye irritation.
Causes skin irritation.
May cause genetic defects.
May cause cancer.
May cause respiratory irritation.

Precautionary statements

General :

Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Always keep container in upright position. Approach

Section 2. Hazards identification

Prevention	: Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves. Wear eye or face protection. Wear protective clothing. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Use only outdoors or in a well-ventilated area. Avoid breathing gas. Wash hands thoroughly after handling.
Response	: IF exposed or concerned: Get medical attention. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or physician. IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing and wash it before reuse. If skin irritation occurs: Get medical attention. 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. Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.
Storage	: Store locked up. Protect from sunlight when ambient temperature exceeds 52°C/125°F. Store in a well-ventilated place.
Disposal	: Dispose of contents and container in accordance with all local, regional, national and international regulations.
Hazards not otherwise classified	: Liquid can cause burns similar to frostbite.

Section 3. Composition/information on ingredients

Substance/mixture	: Substance
Chemical name	: ethylene oxide
Other means of identification	: oxirane; Oxirane (ethylene oxide)

CAS number/other identifiers

CAS number	: 75-21-8
Product code	: 001081

Ingredient name	%	CAS number
ethylene oxide	100	75-21-8

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

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 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. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Continue to rinse for at least 10 minutes. Get medical attention. In case of contact with liquid, warm frozen tissues

Section 4. First aid measures

Ingestion : Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention. Ingestion of liquid can cause burns similar to frostbite. If frostbite occurs, get medical attention. 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. As this product rapidly becomes a gas when released, refer to the inhalation section.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Causes serious eye irritation. Liquid can cause burns similar to frostbite.
Inhalation : Toxic if inhaled. May cause respiratory irritation.
Skin contact : Causes skin irritation. Dermal contact with rapidly evaporating liquid could result in freezing of the tissues or frostbite.
Frostbite : Try to warm up the frozen tissues and seek medical attention.
Ingestion : Ingestion of liquid can cause burns similar to frostbite.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following: pain or irritation, watering, redness, frostbite
Inhalation : Adverse symptoms may include the following: respiratory tract irritation, coughing
Skin contact : Adverse symptoms may include the following: irritation, redness, frostbite
Ingestion : Adverse symptoms may include the following: frostbite

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. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.
Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : Contains gas under pressure. Extremely flammable gas. 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. Gas may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back, causing fire or explosion.

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

Section 5. Fire-fighting measures

- 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. Contact supplier immediately for specialist advice. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool. If involved in fire, shut off flow immediately if it can be done without risk. If this is impossible, withdraw from area and allow fire to burn. Fight fire from protected location or maximum possible distance. Eliminate all ignition sources if safe to do so.
- 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. For incidents involving large quantities, thermally insulated undergarments and thick textile or leather gloves should be worn.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : Accidental releases pose a serious fire or explosion hazard. 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. Do not breathe gas. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
- For emergency responders** : If specialized 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** : Ensure emergency procedures to deal with accidental gas releases are in place to avoid contamination of the environment. 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** : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment.
- Large spill** : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. 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). Contains gas under pressure. Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe gas. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. 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. Empty containers retain product residue and can be hazardous. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.
- 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.

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 away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Store locked up. Eliminate all ignition sources. Keep container tightly closed and sealed until ready for use. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
ethylene oxide	<p>ACGIH TLV (United States, 3/2015). TWA: 1.8 mg/m³ 8 hours. TWA: 1 ppm 8 hours.</p> <p>NIOSH REL (United States, 10/2013). CEIL: 9 mg/m³ 10 minutes. CEIL: 5 ppm 10 minutes. TWA: 0.18 mg/m³ 10 hours. TWA: 0.1 ppm 10 hours.</p> <p>OSHA PEL (United States, 2/2013). STEL: 5 ppm 15 minutes. TWA: 1 ppm 8 hours.</p> <p>OSHA PEL 1989 (United States, 3/1989). STEL: 5 ppm 15 minutes. TWA: 1 ppm 8 hours.</p>

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

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. If contact with the liquid is possible, insulated gloves suitable for low temperatures should be worn. 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.

Section 8. Exposure controls/personal protection

- 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** : Gas. [Liquefied compressed gas.]
- Color** : Colorless.
- Molecular weight** : 44.06 g/mole
- Molecular formula** : C₂H₄O
- Boiling/condensation point** : 10.7°C (51.3°F)
- Melting/freezing point** : -111.7°C (-169.1°F)
- Critical temperature** : 195.85°C (384.5°F)
- Odor** : Characteristic.
- Odor threshold** : Not available.
- pH** : Not available.
- Flash point** : Closed cup: -29°C (-20.2°F)
Open cup: -29.15°C (-20.5°F)
- Burning time** : Not applicable.
- Burning rate** : Not applicable.
- Evaporation rate** : 109.5 (butyl acetate = 1)
- Flammability (solid, gas)** : Not available.
- Lower and upper explosive (flammable) limits** : Lower: 3%
Upper: 100%
- Vapor pressure** : 22 (psia)
- Vapor density** : 1.5 (Air = 1)
- Specific Volume (ft³/lb)** : 8.7719
- Gas Density (lb/ft³)** : 0.114
- Relative density** : Not applicable.
- Solubility** : Not available.
- Solubility in water** : Not available.
- Partition coefficient: n-octanol/water** : -0.3
- Auto-ignition temperature** : 429°C (804.2°F)
- Decomposition temperature** : Not available.
- SADT** : Not available.
- Viscosity** : Not applicable.

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 gas to accumulate in low or confined areas.
- Incompatible materials** : Oxidizers
- 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
ethylene oxide	LC50 Inhalation Gas.	Rat	800 ppm	4 hours

IDLH : 800 ppm

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
ethylene oxide	Eyes - Moderate irritant	Rabbit	-	6 hours 18 milligrams	-

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Classification

Product/ingredient name	OSHA	IARC	NTP
ethylene oxide	+	1	Known to be a human carcinogen.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Section 11. Toxicological information

Name	Category	Route of exposure	Target organs
ethylene oxide	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** : Causes serious eye irritation. Liquid can cause burns similar to frostbite.
- Inhalation** : Toxic if inhaled. May cause respiratory irritation.
- Skin contact** : Causes skin irritation. Dermal contact with rapidly evaporating liquid could result in freezing of the tissues or frostbite.
- Ingestion** : Ingestion of liquid can cause burns similar to frostbite.

Symptoms related to the physical, chemical and toxicological characteristics

- Eye contact** : Adverse symptoms may include the following:., pain or irritation, watering, redness, frostbite
- Inhalation** : Adverse symptoms may include the following:., respiratory tract irritation, coughing
- Skin contact** : Adverse symptoms may include the following:., irritation, redness, frostbite
- Ingestion** : Adverse symptoms may include the following:., frostbite

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** : May cause cancer. Risk of cancer depends on duration and level of exposure.
- Mutagenicity** : May cause genetic defects.
- 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.

Ethylene Oxide

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
ethylene oxide	Acute LC50 490000 µg/l Marine water Acute LC50 300000 µg/l Fresh water Acute LC50 84000 to 96000 µg/l Fresh water	Crustaceans - Artemia sp. Daphnia - Daphnia magna Fish - Pimephales promelas	48 hours 48 hours 96 hours

Persistence and degradability

Not available.

Bioaccumulative potential

Product/ingredient name	LogP _{ow}	BCF	Potential
ethylene oxide	-0.3	-	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. Empty Airgas-owned pressure vessels should be returned to Airgas. 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. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

United States - RCRA Toxic hazardous waste "U" List

Ingredient	CAS #	Status	Reference number
Ethylene oxide (I,T); Oxirane (I,T)	75-21-8	Listed	U115

Section 14. Transport information

	DOT	TDG	Mexico	IMDG	IATA
UN number	UN1040	UN1040	UN1040	UN1040	UN1040
UN proper shipping name	Ethylene Oxide	Ethylene Oxide	Ethylene Oxide	ETHYLENE OXIDE	ETHYLENE OXIDE
Transport hazard class(es)	2.3 (2.1) 	2.3 (2.1) 	2.3 (2.1) 	2.3 (2.1) 	2.3 (2.1) 
Packing group	-	-	-	-	-
Environment	No.	No.	No.	No.	No.

Section 14. Transport information

Additional information	Toxic - Inhalation hazard Zone C Reportable quantity 10 lbs / 4.54 kg Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.	Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.13-2.17 (Class 2), 2.13-2.17 (Class 2). Explosive Limit and Limited Quantity Index 0 ERAP Index 500 Passenger Carrying Ship Index Forbidden Passenger Carrying Road or Rail Index Forbidden	-	-	Passenger and Cargo Aircraft Quantity limitation: 0 Forbidden Cargo Aircraft Only Quantity limitation: Forbidden
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“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 and the IBC Code : Not available.

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 (CAA) 112 regulated toxic substances: ethylene oxide

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

Name	%	EHS	SARA 302 TPQ		SARA 304 RQ	
			(lbs)	(gallons)	(lbs)	(gallons)
ethylene oxide	100	Yes.	1000	-	10	-

SARA 304 RQ : 10 lbs / 4.5 kg

SARA 311/312

Section 15. Regulatory information

Classification : Refer to Section 2: Hazards Identification of this SDS for classification of substance.

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	ethylene oxide	75-21-8	100
Supplier notification	ethylene oxide	75-21-8	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.

California Prop. 65

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

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

International regulations

Rotterdam Convention on Prior Informed Consent (PIC)

Ingredient name	List name	Status
Ethylene oxide (ISO); Amprolene; Oxirane; 1, 2-Epoxyethane; EO	Rotterdam Convention on Prior Informed Consent (PIC)	Pesticide

International lists

National inventory

Australia : This material is listed or exempted.

Canada : This material is listed or exempted.

China : This material is listed or exempted.

Europe : This material is listed or exempted.

Japan : This material is listed or exempted.

Malaysia : This material is listed or exempted.

New Zealand : This material is listed or exempted.

Philippines : This material is listed or exempted.

Republic of Korea : This material is listed or exempted.

Taiwan : This material is listed or exempted.

Canada

WHMIS (Canada) : Class A: Compressed gas.
 Class B-1: Flammable gas.
 Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
 Class D-2A: Material causing other toxic effects (Very toxic).
 Class E: Corrosive material
 Class F: Dangerously reactive material.

Section 15. Regulatory information

CEPA Toxic substances: This material is 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 A: Compressed gas.
- Class B-1: Flammable gas.
- Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
- Class D-2A: Material causing other toxic effects (Very toxic).
- Class E: Corrosive material
- Class F: Dangerously reactive material.

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

Health	*	2
Flammability		4
Physical hazards		3

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.

Procedure used to derive the classification

Classification	Justification
Flam. Gas 1, H220	Expert judgment
Press. Gas Liq. Gas, H280	Expert judgment
Acute Tox. 3, H331	Expert judgment
Skin Irrit. 2, H315	Expert judgment
Eye Irrit. 2A, H319	Expert judgment
Muta. 1B, H340	Expert judgment
Carc. 1B, H350	Expert judgment
STOT SE 3, H335	Expert judgment

History

Date of printing

: 9/12/2017

Section 16. Other information

Date of issue/Date of revision

Date of previous issue : 9/30/2016

Version : 1

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 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

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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1. IDENTIFICATION OF THE SUBSTANCE OR MIXTURE AND OF THE SUPPLIER	
1.1. GHS product identifier.	Ethylene Oxide
Other means of identification.	Oxirane
1.2. Recommended use and restrictions on use.	Recommended: Chemical intermediate for production of anti-freeze, polyester resins, non-ionic surfactants and specialty solvents; sterilizing agent for controlling microorganisms in health care applications; fumigant for controlling insect infestation in whole and ground spices and cosmetics; sterilization of musical wind instruments. Advised Against: Consumer use.
1.3. Supplier's details.	Name: ARC Specialty Products c/o Balchem Corporation Address: 52 Sunrise Park Road New Hampton, NY 10958 USA Phone number: +1 845-326-5611 Fax number: +1 845-326-5706 Internet: www.arcspecialtyproducts.com Email: sds@balchem.com
1.4. Emergency phone number.	EMERGENCY TELEPHONE (24 hrs. / 7 days per week) In US: CHEMTREC (800) 424-9300 Outside US & Canada: CHEMTREC (703) 527-3887

2. HAZARDS IDENTIFICATION	
2.1. GHS classification of the substance or mixture and any national or regional information.	Flammable Gas 1 Pressurized Gas (Liquefied Gas) Carcinogen Category 1B Mutagen Category 1B Acute Toxicity Category 3 (Inhalation); Category 4(oral) Eye Irritant Category 2A Specific Target Organ Toxicity – Single Exposure 3 Skin Irritant 2
2.2. GHS label elements, including precautionary statements.	Product Label Name: ETHYLENE OXIDE Signal Word: DANGER  Hazard statement: H220: Extremely flammable gas. H280: Contains gas under pressure; may explode if heated H302: Harmful if swallowed H315: Causes skin irritation H319: Causes serious eye irritation H331: Toxic if inhaled H335: May cause respiratory irritation H340: May cause genetic defects

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	<p>H350: May cause cancer</p> <p>Precautionary statement:</p> <p>P201: Obtain special instructions before use.</p> <p>P202: Do not handle until all safety precautions have been read and understood.</p> <p>P210: Keep away from heat/sparks/open flames/hot surfaces. — No smoking.</p> <p>P261: Avoid breathing gas/vapours.</p> <p>P264: Wash hands thoroughly after handling.</p> <p>P270: Do not eat, drink or smoke when using this product.</p> <p>P271: Use only outdoors or in a well-ventilated area.</p> <p>P280: Wear protective gloves/protective clothing/ eye protection/face protection.</p> <p>P281: Use personal protective equipment as required.</p> <p>P301;P312: IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.</p> <p>P330: Rinse mouth.</p> <p>P302;P352: IF ON SKIN: Wash with plenty of soap and water.</p> <p>P362: Take off contaminated clothing and wash before reuse.</p> <p>P332;P313: If skin irritation occurs: Get medical advice/attention.</p> <p>P304;P340: IF INHALED: Remove person to fresh air and keep comfortable for breathing.</p> <p>P305;P351;P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</p> <p>P337;P313: If eye irritation persists: Get medical advice/attention.</p> <p>P312: Call a POISON CENTER or doctor/physician if you feel unwell.</p> <p>P308;P313: IF exposed or concerned: Get medical advice/attention.</p> <p>P321: Specific treatment: See first aid section of SDS.</p> <p>P377: Leaking gas fire: Do not extinguish, unless leak can be stopped safely.</p> <p>P381: Eliminate all ignition sources if safe to do so.</p> <p>P403;P233: Store in a well-ventilated</p>
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	<p>P405: P410;P403: P501:</p>	<p>place. Keep container tightly closed. Store locked up. Protect from sunlight. Store in a well-ventilated place. Dispose of contents/container in accordance with local/regional/national/international regulation.</p>
2.3. Other hazards which do not result in classification or are not covered by the GHS.	EUH006:	Explosive with or without contact with air.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1. Substance:

Chemical identity.	Ethylene Oxide
Common name, synonyms, etc.	Oxirane, EO, EtO, Dihydroxirene, 1-2 Epoxyethane, Dimethylene Oxide, Oxane, Oxirane, Alpha/Beta-Oxidoethane, Oxacyclopropane
CAS number, EC number, etc.	CAS#: 75-21-8; EC#: 200-849-9 (from EINECS) Chemical Family: Epoxide Formula: (CH ₂) ₂ O Molecular Weight: 44.053 g/mol
Impurities and stabilizing additives which are themselves classified and which contribute to the classification of the substance.	Contains no other components or impurities which will influence the classification of the product.

3.2. Mixture:

The chemical identity and concentration or concentration ranges of all ingredients which are hazardous within the meaning of the GHS and are present above their cutoff levels.	Chemical Identity:	Concentration:	CAS No.:
	No applicable information found (i.e. material is not a mixture).		

4. FIRST AID MEASURES

4.1. Description of first aid measures.	<p>EYE CONTACT: Immediately flush eyes, including the entire surface of the eyes and under the eyelids, gently but thoroughly with plenty of running water for at least 15 minutes. Obtain medical attention immediately. NOTE: Never wear contact lenses when working with ethylene oxide.</p> <p>SKIN CONTACT: Immediately flush skin thoroughly with water for at least 15 minutes while removing contaminated clothing and shoes. Obtain medical attention immediately. Treat for possible cryogenic injury, if needed by warming affected areas with tepid water (wrap with a blanket if lukewarm water is not available). Wash clothing before reuse and discard contaminated leather articles such as shoes and belts.</p> <p>INHALATION: Remove exposed person to fresh air. If</p>
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	<p>breathing has stopped, give artificial respiration then have qualified personnel administer oxygen, if needed. Get immediate medical attention.</p> <p>INGESTION: If patient is conscious give plenty of water (minimum of two glasses) but DO NOT INDUCE VOMITING. This material is corrosive. Keep head lower than hips to avoid aspiration, should vomiting occur. Get medical attention immediately.</p> <p>MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Preexisting skin, eye and respiratory disorders; lung, blood, nervous system and peripheral nerve disorders.</p>
4.2. Most important symptoms/effects.	<p>SIGNS AND SYMPTOMS OF OVEREXPOSURE: Effects include skin, eye and respiratory tract irritation or burns. Central nervous system effects initially cause headache, dizziness and nausea and in extreme cases, unconsciousness and death. Peripheral nerve damage may result in muscular weakness, giddiness, irrational behavior and loss of sensation in the extremities. Dulling of the sense of smell may occur.</p>
4.3. Indication of immediate medical attention and special treatment needed, if necessary.	<p>NOTE TO PHYSICIANS: Respiratory symptoms include nausea, vomiting and irritation of the nose and throat. Pulmonary edema may occur. Respiratory effects may be delayed. Consider oxygen administration. If a chemical burn is present, decontaminate skin and treat as any thermal burn. No specific antidote is known, however consider gastric lavage and administration of a charcoal slurry.</p>

5. FIREFIGHTING MEASURES	
5.1. Suitable (and unsuitable) extinguishing media.	<p>EXTINGUISHING MEDIA: Carbon dioxide, dry chemical or water spray for small fires. Water spray, polymer or alcohol resistant foams for large fires. Dilution of liquid ethylene oxide with 22 volumes of water should render it non-flammable. Dilution with 100 parts water to one part of ethylene oxide vapor may be required to control build up of flammable vapors in closed systems. Water spray can be used to reduce flame intensity, cool fire-exposed containers and dilute spills to render non-flammable.</p>
5.2. Specific hazards arising from the chemical.	<p>EMERGENCY OVERVIEW: Colorless liquid or heavier-than-air gas with a sweet, ether-like odor. Extremely flammable liquefied gas which burns in the absence of oxygen and can explode when exposed to elevated temperatures. Toxic when inhaled. Causes severe skin and eye irritation or burns and respiratory tract irritation; effects may be delayed. Harmful if swallowed or absorbed through the skin. Contact with liquid may cause frostbite.</p> <p>Statement of Hazards: DANGER! Extremely flammable</p>



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	<p>liquid and gas under pressure. May form explosive mixtures with air. Highly Reactive. Harmful or fatal if inhaled and may cause delayed lung injury, respiratory system and nervous system damage. Inhalation may cause dizziness or drowsiness. Liquid contact may cause frostbite. May cause allergic skin reaction. Harmful if swallowed. May cause adverse blood effects, liver and kidney damage based on animal data. Cancer and reproductive hazard.</p> <p>HAZARD RATINGS: (0 = minimum; 4 = maximum)</p> <p><u>HMS Rating:</u> Health = 3 Flammability = 4 Reactivity = 3 Personal Protection Code = X (Consult your supervisor or standard operating procedures for special handling directions.)</p> <p><u>NFPA Rating:</u> Health = 3 Flammability = 4 Reactivity = 3</p> <p><u>UNUSUAL FIRE AND EXPLOSION HAZARDS:</u> Ethylene oxide is dangerously explosive under fire conditions; it is flammable over an extremely large range of concentrations in air and burns in the absence of oxygen. Liquid ethylene oxide is lighter than water (floats) and vapors are heavier than air and may travel along ground long distances to sources of ignition, and then flash back. Avoid storage at warm temperatures [around 100 °F (38 °C)] in order to prevent polymerization. Do not store at temperatures above 125 °F (52 °C) under any circumstances. Containers are fitted with metallic plugs which melt and release contents when temperature increases to a range of 157-170 °F (69-77 °C). Vapors are extremely flammable and are readily ignited by static charge, sparks and flames at concentrations above 2.6%.</p>
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<p>5.3. Special protective equipment and precautions for firefighters.</p>	<p>SPECIAL FIRE-FIGHTING PROCEDURES: Wear NIOSH-approved self-contained breathing apparatus (SCBA) operated in the pressure-demand mode and full chemical-resistant protective clothing. Evacuate all personnel from danger area and keep upwind. Immediately cool containers with water spray from maximum safe distance. Stop flow of gas, if without risk, while continuously cooling containers with water. Do not extinguish flames unless flow is stopped, since explosive re-ignition can occur. Remove containers from fire area, if without risk. Refer to the most current edition of the "North American Emergency Response Guidebook" for isolation and evacuation distances.</p>
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6. ACCIDENTAL RELEASE MEASURES	
<p>6.1. Personal precautions, protective equipment and emergency procedures.</p>	<p>PRECAUTIONS: Treat any ethylene oxide leak as an emergency. All cleanup personnel must wear full protective equipment. Evacuate all personnel from the area except those directly engaged in stopping the leak or in cleaning up.</p>
<p>6.2. Environmental precautions.</p>	<p>ENVIRONMENTAL: Dike runoff water, if possible, to prevent contaminated water from entering sewers, ditches, streams and ponds. It is mandatory to call the National Response Center (800-424-8802) if 10 pounds (4.54 kg) or more is spilled or released to the environment.</p>
<p>6.3. Methods and materials for containment and cleaning up.</p>	<p>SPILL CLEANUP: Eliminate all ignition sources if this can be done safely. Ethylene oxide/air mixtures ignite readily and may detonate. Use water fog or spray to disperse vapors. Flood spill with water spray to dilute and render non-flammable.</p>

7. HANDLING AND STORAGE	
<p>7.1. Precautions for safe handling.</p>	<p>HANDLING AND STORAGE PRECAUTIONS: Wear all recommended protective clothing and devices when handling this material. Have established handling and emergency response procedures in place prior to use. Ground and bond shipping container, transfer line, and receiving container. Protect containers from physical damage and regularly inspect them for cracks, leaks or faulty valves.</p>
<p>7.2. Conditions for safe storage, including any incompatibilities.</p>	<p>STORAGE SEGREGATION: Store ethylene oxide in a cool, dry, well-ventilated area away from incompatible chemicals and sources of ignition. Store cylinders and drums upright; secure containers tightly; do not drag or slide; and move in a carefully supervised manner with a suitable hand truck. DO NOT STORE IN DIRECT SUNLIGHT.</p> <p>SHIPPING AND STORAGE CONTAINERS: (See 49 CFR 173.323) Ethylene oxide is shipped and stored in UN 1A1 specification drums and DOT specification drums and cylinders. Nitrogen must be charged into the container after filling with ethylene oxide, bringing the</p>

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	<p>total container pressure up to 50 psig. Before returning container to supplier, pressurize container with nitrogen to 50 psig total pressure; close valves and replace valve plugs tightly in outlets. Check container valves and plugs for leaks prior to shipment. In addition, please refer to the most current edition of NFPA Publication 55, 'Compressed Gases and Cryogenic Fluids Code.'</p> <p><u>INCOMPATIBILITIES:</u> Ethylene oxide is very reactive. Runaway exothermic polymerization reactions can result from contamination with amines, ammonia, water, acids, bases, metal chlorides, metal oxides, metallic potassium, mercaptans, alcohols, oxidizers and many other organic and inorganic materials.</p>
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8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters.	Exposure Limits			
	<u>SOURCE</u>	<u>TWA (8-hr)</u>	<u>STEL (15-min)</u>	<u>OTHER</u>
	OSHA	1 ppm	5 ppm (9 mg/m ³)	0.5 ppm action level (8-hr TWA)
	ACGIH	1 ppm (1.8 mg/m ³)	No applicable information found	800 ppm IDLH
8.2. Appropriate engineering controls.	<p><u>ENGINEERING CONTROLS:</u> Ethylene oxide, a major fire hazard, can burn in the absence of oxygen. All electrical devices used in areas processing or handling ethylene oxide must be engineered and designed to the applicable local electrical/fire codes. Safeguards can include designing electrical devices as explosion-proof and/or intrinsically safe. When considering engineering controls, users of ethylene oxide should consult the current edition of NFPA 55 (Compressed Gases and Cryogenic Fluids Code, Section 14: Storage, Handling and Use of Ethylene Oxide for Sterilization and Fumigation). Sterilization facilities should consult NIOSH Publication NO. 2007-164 (Alert: Preventing Worker Injuries and Deaths from Explosions in Industrial Ethylene Oxide Sterilization Facilities).</p> <p><u>VENTILATION:</u> Install and operate general and local exhaust ventilation systems powerful enough to maintain airborne levels of ethylene oxide below the OSHA PEL in the worker's breathing area. Ventilation systems must be of maximum explosion-proof design. Emission controls must be in compliance with Federal, State and local regulations.</p> <p><u>SAFETY SHOWERS:</u> Have eyewash stations, emergency deluge showers, and washing facilities available in all work areas.</p>			

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	<p>OTHER PROTECTION: Design all engineering systems to be explosion-proof in any area where this gas may be present. Container and system must be electrically grounded/bonded before unloading. Practice good personal hygiene; always wash thoroughly after using this material. Do not eat, drink or smoke in work area.</p>
8.3. Individual protection measures, such as personal protective equipment.	<p>RESPIRATORY PROTECTION: Refer to OSHA respirator regulations cited at 29 CFR 1910.134 and 29 CFR 1910.1047. Wear a NIOSH-approved full facepiece respirator for routine use situations where atmosphere is at or above OSHA's Action Level. Do not exceed the maximum use conditions of the respirator. For emergency or non-routine uses where concentrations are unknown, wear an SCBA with a full facepiece operated in the pressure-demand or positive pressure mode.</p> <p>EYE PROTECTION: Always wear chemical safety glasses. If splashing may occur, wear a full face shield as a supplementary protective measure over safety glasses. NEVER WEAR CONTACT LENSES when working with ethylene oxide.</p> <p>SKIN PROTECTION: Wear impervious gloves (see www.ethyleneoxide.com for permeation data); boots; aprons; head cover; and clean impervious body-covering clothing to prevent any possibility of skin contact. Launder contaminated clothing and discard contaminated leather shoes, belts, etc.</p>

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties.	
Appearance (physical state, color, etc.).	Colorless liquid or gas
Corrosivity	Not Corrosive
Odor.	Sweet ether-like
Odor threshold.	261 ppm – detectable 500 to 700 ppm - recognizable
pH.	7, neutral (100 g/L in water)
Melting point/freezing point.	-169 °F (-112 °C)
Initial boiling point and boiling range.	50.7 °F (10.4 °C)
Flash point.	Tag Closed Cup: < 0 °F (< -18 °C)
Evaporation rate.	100% volatile by volume
Flammability (solid, gas).	Flammable
Upper/lower flammability or explosive limits.	Upper flammable limit: 100% vol/vol Lower flammable limit: 2.6% vol/vol
Vapor pressure.	1095 mmHg @ 20 °C
Vapor density.	1.5 (Air = 1)
Relative density.	0.875 at 20 °C
Solubility (ies).	100% in water
Partition coefficient: n-octanol/water.	-0.3
Autoignition temperature.	833 °F (445 °C); Burns in the absence of air
Decomposition temperature.	~932 °F (~773 °K)
Viscosity.	0.255 centipoise at 80 °F

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Oxidizing properties.	Not an oxidizer
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10. STABILITY AND REACTIVITY	
10.1. Reactivity.	Not reactive under normal conditions. Under abnormal conditions (for example external heating, contamination), thermal decomposition and runaway polymerization can occur and may lead to explosion.
10.2. Chemical stability.	STABILITY: Material is stable for extended periods in closed, airtight, pressurized containers at room temperature, under normal storage and handling conditions. Vapors may explode when exposed to common ignition sources. In the presence of catalysts, polymerization and decomposition of liquid may occur and is accelerated at temperatures above 800 °F (426 °C).
10.3. Possibility of hazardous reactions.	HAZARDOUS POLYMERIZATION: Dangerous exothermic polymerization reaction can occur when ethylene oxide is contaminated or when heated.
10.4. Conditions to avoid (e.g., static discharge, shock or vibration).	CONDITIONS TO AVOID: Avoid storage at warm temperatures [around 100 °F (38 °C)] in order to prevent polymerization. Do not store at temperatures above 125 °F (52 °C) under any circumstances. Avoid contact of ethylene oxide with incompatible chemicals to avoid highly exothermic polymerization reaction. Prevent exposure to all sources of ignition such as heat, flame, lighted tobacco products or electrical or mechanical sparks.
10.5. Incompatible materials.	See section 7.2
10.6. Hazardous decomposition products.	HAZARDOUS DECOMPOSITION PRODUCTS: Ethylene oxide undergoes thermal decomposition to form carbon dioxide and carbon monoxide gases.

11. TOXICOLOGICAL INFORMATION	
11.1. Information on the likely routes of exposure (inhalation, ingestion, skin and eye contact);	PRIMARY ROUTES OF EXPOSURE: Inhalation; eye contact; skin contact/absorption.
11.2. Symptoms related to the physical, chemical and toxicological characteristics;	<p>ACUTE HEALTH EFFECTS:</p> <p>INHALATION: Inhaling concentrated vapor may cause serious health effects, possibly death. Inhalation may progressively cause mucous membrane and respiratory irritation, headache, vomiting, cyanosis, drowsiness, weakness, loss of coordination, CNS depression, lachrymation, nasal discharge and salivation, gasping, and labored breathing. Delayed effects may include nausea, diarrhea, edema of the lungs, paralysis, convulsions and possibly death. NOTE: Ethylene oxide has a high odor threshold (> 250 ppm) and the sense of smell does not provide adequate protection against its toxic effects.</p> <p>EYE CONTACT: Liquid ethylene oxide is severely irritating and corrosive to the eyes and contact can cause swelling of the conjunctiva and irreversible corneal injury.</p>

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	<p>Contact with liquid ethylene oxide can cause frostbite. Vapors may cause eye irritation, tearing, redness and swelling of the conjunctiva.</p> <p>SKIN CONTACT: Prolonged contact with liquid ethylene oxide can cause a local erythema, edema, and formation of blisters. Response is more severe on damp skin. There may be a latency period of several hours prior to the onset of symptoms. Ethylene oxide may be absorbed by the skin, and sustained contact may produce adverse effects such as headache, dizziness, nausea and vomiting. Ethylene oxide is a skin sensitizer and some individuals may suffer an allergic skin reaction. Skin contact may also cause allergic contact dermatitis in some exposed individuals. Liquid ethylene oxide evaporates rapidly and may chill the skin causing frostbite.</p> <p>INGESTION: This relatively unlikely route of exposure is expected to cause severe irritation and burns of the mouth and throat, abdominal pain, nausea, vomiting, collapse and coma. Aspiration may occur during swallowing or vomiting, resulting in lung damage.</p>
11.3. Delayed and immediate effects and also chronic effects from short- and long-term exposure;	<p>CHRONIC HEALTH EFFECTS:</p> <p>SKIN CONTACT: Long term effects are unknown but are expected to be similar to acute effects of skin exposure.</p> <p>EYE CONTACT: Some cases of cataract formation have been reported.</p> <p>INHALATION: Respiratory irritation which can result in permanent lung injury, chromosomal aberrations and peripheral neurotoxic effects with a numbing of the sense of smell. Cognitive and CNS impairment may result from long term exposures.</p> <p>INGESTION: May cause anemia, gastrointestinal irritation, effects on liver, kidneys, and adrenal glands.</p> <p>CARCINOGENICITY: OSHA classifies ethylene oxide as a cancer/reproductive hazard and considers that, at excessive levels, ethylene oxide may present reproductive, mutagenic, genotoxic, neurologic and skin sensitization hazards. ACGIH classifies ethylene oxide as "A2" - suspected human carcinogen. NTP classifies ethylene oxide as a known human carcinogen. IARC classifies ethylene oxide in Group I (carcinogenic to humans). NIOSH classifies ethylene oxide as a potential human carcinogen.</p>

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<p>11.4. Numerical measures of toxicity (such as acute toxicity estimates).</p>	<p><u>TOXICOLOGICAL - ACUTE INHALATION:</u> LC₅₀ (1 hr. exposure) 5748 ppm (male rat) 4439 ppm (female rat) 5029 ppm (rat - combined sexes) Various mammalian species exposed to lethal concentrations of ethylene oxide had symptoms of mucous membrane irritation, central nervous system depression, lacrimation, nasal discharge, salivation, nausea, vomiting, diarrhea, respiratory irritation, loss of coordination and convulsions.</p> <p><u>TOXICOLOGICAL - CHRONIC INHALATION:</u> Symptoms of chronic exposure are similar to those observed in acute studies, including lung, kidney and liver damage and testicular tubule degeneration in some species. Studies demonstrated neuromuscular effects as the most sensitive indicator of ethylene oxide overexposure.</p> <p><u>TOXICOLOGICAL - ACUTE DERMAL:</u> No dermal LD₅₀ information is available on this product. It is expected to be corrosive to rabbit skin.</p> <p><u>TOXICOLOGICAL - CHRONIC DERMAL:</u> No chronic dermal toxicity data are available on this product.</p> <p><u>TOXICOLOGICAL - EYE:</u> No eye irritation animal data are available on this product; however, it is expected to be extremely irritating to rabbit eyes.</p> <p><u>TOXICOLOGICAL - ACUTE INGESTION:</u> The acute oral LD₅₀ for this product is: 330 mg/kg, rat.</p> <p><u>TOXICOLOGICAL - CHRONIC INGESTION:</u> The effects of chronic ingestion of this product are unknown.</p> <p><u>CARCINOGENICITY:</u> A recent assessment of available epidemiology studies related to ethylene oxide concluded that the evidence indicates that ethylene oxide does not cause heart disease, an excess of cancers overall, or brain, stomach or pancreatic cancers which were seen in some animal and isolated human studies. The findings with respect to leukemia and non-Hodgkin's lymphoma are less definitive. While the majority of the evidence does not indicate that ethylene oxide causes these cancers, there are some suggestive trends. A longer follow-up of ethylene oxide was completed in 2004 to better clarify these relationships. NIOSH reported no overall elevated risk for any type of cancer or other diseases as compared to the general population, however, among those workers with very high ethylene oxide exposure (combination of exposure level and years worked); there was evidence of an elevated risk for blood</p>
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	<p>cancers among men and breast cancer among women. Two inhalation studies with rats demonstrated carcinogenic responses consisting of increased incidences of mononuclear cell leukemia, peritoneal mesotheliomas, and primary brain tumors. In 2-year inhalation studies with mice there was evidence of carcinogenic activity as indicated by dose-related incidences of benign or malignant neoplasms of the uterus, mammary gland, and hematopoietic system (lymphoma).</p> <p>MUTAGENICITY: While ethylene oxide has demonstrated, in epidemiological studies with exposed workers, an increased incidence of chromosomal aberrations and sister chromatid exchanges, the relevance of such effects to human health hazard evaluation is currently uncertain. In rodent studies, dose related exposure to ethylene oxide induces increases in numbers of adducts in DNA and hemoglobin. Laboratory studies with mice have shown that acute exposure to ethylene oxide at 300 ppm and above caused testicular injury as evidenced by concentration-related increased embryonic deaths following mating of exposed males to non-exposed females (Dominant-Lethal Test).</p> <p>NEUROTOXICITY: Effects are similar to those of acute (short term) exposure, namely, headaches, nausea, diarrhea, lethargy and irrational behavior. Muscle weakness, loss of sensation in the extremities and a reduction in the sense of smell and/or taste may also result. Studies on workers indicate that CNS and cognitive impairment may result from chronic exposures to ethylene oxide.</p> <p>REPRODUCTIVE EFFECTS: Some limited epidemiological data suggests that women exposed to ethylene oxide have a greater incidence of miscarriage. A one-generation reproduction study in rats showed decreased numbers of pups at 100 ppm but not at 33 ppm. In a two-generation reproduction study involving exposure of rats to ethylene oxide vapor for 6 hrs/day, 5 days/week, there was parental toxicity at 33 ppm and 100 ppm. Post implantation losses with reduction in litter size and offspring body weight were found at 33 ppm and 100 ppm. The no-observable effect concentration for adult toxicity, offspring effect and reproductive effect was 10 ppm.</p> <p>TERATOLOGY: Inhalation development toxicity studies with rats exposed to ethylene oxide vapor at concentrations of 50 ppm, 125 ppm and 225 ppm showed that maternal toxicity occurred at 125 and 225 ppm. Fetotoxicity, evidenced by reduced fetal body weight, occurred at all concentrations. At 225 ppm and</p>
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	<p>to a lesser extent at 125 ppm an increased incidence of skeletal variants was found. There was no evidence of embryotoxicity or malformations.</p> <p>TARGET ORGANS: Overexposure to this product may affect the skin, eyes, respiratory system, liver, kidneys, brain, blood, reproductive system and central nervous system.</p>
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12. ECOLOGICAL INFORMATION	
12.1. Ecotoxicity (aquatic and terrestrial, where available).	<p>AQUATIC TOXICITY: Acute 96-hr. LC₅₀ data: 57-84 mg/L, fathead minnow (<i>Pimephales promelas</i>) 90 mg/L, goldfish (<i>Carassius auratus</i>) 137-300 mg/L, water flea (<i>Daphnia magna</i>) Material is slightly toxic to marine invertebrates. 48 hr. LC₅₀ in brine shrimp: 490 mg/L</p>
12.2. Persistence and degradability.	<p>CHEMICAL FATE INFORMATION: BOD₅: 0.35 p/p. BOD₁₀: 1.1 p/p. BOD₂₀: 1.3 p/p.</p>
12.3. Bioaccumulative potential.	<p>Log octanol/water partition coefficient (log Kow) is low. Partitioning from water to oil is low. Bioconcentration is not expected to occur due to high water solubility and a low log Kow. Ethylene oxide hydrolyzes to ethylene glycol. Biodegradation of ethylene oxide occurs at a moderate rate after acclimation (3-20% degradation after 5 days; 70% after 20 days). Biodegradation is expected in a wastewater treatment plant. Ethylene oxide has an estimated half life in the atmosphere of 105 days. EO does not readily absorb into sediments or soils and does not persist in soils; if absorbed, soil organisms will over time convert EO to glycols eliminating any persistence in the soil.</p>
12.4. Mobility in soil.	EO does not readily absorb into sediments or soils.
12.5. Results of PBT and vPvB	No applicable information found.
12.6. Other adverse effects.	No applicable information found.

13. DISPOSAL CONSIDERATIONS	
13.1. Description of waste residues and information on their safe handling and methods of disposal, including the disposal of any contaminated packaging.	<p>WASTE MANAGEMENT/DISPOSAL: When disposed, ethylene oxide is a RCRA hazardous waste with waste code U115 (Commercial chemical product - listed for toxicity and ignitability). Waste ethylene oxide may be incinerated in an approved hazardous waste incinerator or can be biologically treated in an approved facility. DO NOT INCINERATE ANY ETHYLENE OXIDE CONTAINERS. Ethylene oxide is banned from land disposal. Dispose of waste materials in accordance with all applicable Federal, State and local laws and regulations.</p>

14. TRANSPORT INFORMATION	
14.1. UN number.	UN 1040
14.2. UN proper shipping name.	Ethylene Oxide

SAFETY DATA SHEET

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14.3. Transport hazard class (es).	<p><u>DOT</u> Primary: 2.3 (Poison Gas); Secondary: 2.1 (Flammable Gas) Poison-Inhalation Hazard Zone D Reportable Quantity 10 lb (4.54 kg)</p> <p><u>IMO</u> Primary: 2.3 (Toxic Gas); Secondary: 2.1 (Flammable Gas)</p> <p><u>TDG (from or within Canada)</u> Primary: 2.3 (Toxic Gas); Secondary: 2.1 (Flammable Gas)</p> <p>Shipments of residual amounts of ethylene oxide are considered hazardous material. All facilities shipping or receiving ethylene oxide are subject to registration as a shipper of hazardous material (49 CFR 107, Subpart G). All facilities handling ethylene oxide must also maintain a written security plan (49 CFR 172.00 – 804, 49 CFR 172.704)</p>
14.4. Packing group, if applicable.	Not applicable
14.5. Marine pollutant (Yes/No).	No
14.6. Special precautions which a user needs to be aware of or needs to comply with in connection with transport or conveyance either within or outside their premises.	See Section 7.2
14.7. Transportation in bulk according to Annex II of MARPOL 73/78 and the IBC Code.	Product is not supplied in bulk

15. REGULATORY INFORMATION

15.1. Safety, health and environmental regulations specific for the product in question.		
US Federal:	CERCLA:	Section 103: Reportable Quantity – 10 lb (40 CFR 302.4)
	CWA:	Release into a waterway may require reporting to the National Response Center @ 800-424-8802 (40 CFR 116.4).
	FIFRA	<p>If this chemical is a pesticide product registered by the United States Environmental Protection Agency, it is subject to certain labeling requirements under federal pesticide law. These requirements differ from the classification criteria and hazard information required for safety data sheets (SDS), and for workplace labels of non-pesticide chemicals. The hazard information required on the pesticide label is reproduced below. The pesticide label also includes other important information, including directions for use.</p> <p><u>EPA Registration No. 36736-2 and EPA Registration No. 36736-8</u> DANGER! Causes eye and skin burns. Harmful if inhaled. May cause nervous system damage. Cancer hazard and reproductive hazard. May be fatal if inhaled in high concentrations. May cause irritation of the respiratory tract. May cause immediate or delayed skin irritation or blisters. May cause allergic skin reaction. Do not breathe vapor. Highly flammable liquid and gas under pressure.</p>
	RCRA:	If discarded in purchased form, this product is a listed and characteristic hazardous waste. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal whether a material containing the product or derived from the product should be classified

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		as a hazardous waste (40 CFR 261.20-24).
	RMP:	Listed under the EPA Chemical Accidental Prevention Provisions (Risk Management Plan: 40 CFR 68.130) as a Toxic with a 10000 lb Threshold Quantity
	SARA TITLE III:	Section 302 Extremely Hazardous Substances – Listed; 1000 lb Threshold Planning Quantity (40 CFR 355 Appendix A) Section 304 – Listed 10 lb Reportable Quantity (40 CFR 302.4) Section 311/312 Hazard Categories – Acute, Chronic, Fire, Reactive, Sudden Release (40 CFR 370.66) Section 313 Toxic Chemicals – Listed (40 CFR 372.65)
	TSCA:	On TSCA inventory.
	Other EPA	EPA list of Hazardous Air Contaminants: Listed EPA Organic Hazardous Air Pollutant (HAP) list (40 CFR 61.01): Listed EPA list of Pesticide Chemicals (40 CFR 180.151): Listed EPA NESHAPS (40 CFR 63.360) VOC Rule: 100% VOC
	FDA/USDA:	Not applicable.
	OSHA:	This product is hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200. Ethylene Oxide Standard 29 CFR 1910.1047
	Other OSHA:	Listed under the Process Safety Management standard (29 CFR 1910.119) with 5000 lb Threshold Quantity.
US State:		California Proposition 65: Listed; cancer hazard; reproductive hazard California Director's List: Listed Florida Hazardous Substance List: Listed Massachusetts Extraordinarily Hazardous Substance List: Listed Minnesota Hazardous Substance List: Listed New Jersey Hazardous Substance List: Listed sn 0882 (Special Hazardous Substance; Environmental Hazardous Substance) Pennsylvania Right-to-know List: Listed
Canadian:	DSL:	Listed as Oxirane (published 5 April 1994)
	WHMIS:	Ingredient Disclosure List: Listed 0.1%, item 725 (1310) Classification: A; B1; D1A; D2A; D2B; F This MSDS complies with the Canadian Controlled Product Regulations.
EU:	CLP:	This product is not sold into the European Union.
	EINECS:	
	REACH:	
	Safety Data Sheets:	

16. OTHER INFORMATION INCLUDING INFORMATION ON PREPARATION AND REVISION		
Last Revision Date:	See top of each page under 'Effective Date'	
Reason for Issue:	Rev A supersedes Rev. 22 Jul 2009	Reformatted per OSHA GHS. Added part 10.1. Changed 11.4 Acute Ingestion LD50 from 72 to 330 mg/kg (no evidence located to support 72; web review, including IPCS. 2003. Ethylene Oxide. Geneva, World Health Organization, International Program on Chemical Safety, Concise International Chemical Assessment Document 54, p 1-57. http://www.inchem.org/documents/cicads/cicads/cicad54.htm .
	B	Correct flash point temperature from 18°C to -18°C
	C	Remove Canutec phone contact information
	D	Added Corrosivity to section 9 physical and chemical properties to support 29 CFR 1910.119(d)(1)
Risk Phrases Used:	See Section 2.	

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Effective Date: 05-09-2014	Revision: D	ARC	Language: EN
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Hazard Ratings:	See Section 5.2
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THE FOLLOWING ABBREVIATIONS MAY BE USED IN THIS DOCUMENT:	
ACGIH	American Council of Governmental Industrial Hygienists
AICS	Australian Inventory of Chemical Substances
BOD 5, 10, 20	Biochemical Oxygen Demand, 5, 10 or 20 day
CAS	Chemical Abstract Service
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CLP	Classification, Labeling and Packaging
CNS	Central nervous system
CWA	Clean Water Act
D.O.T. or DOT	Department of Transportation
DSL	Domestic Substance List (Canada)
EC ₅₀	Effective concentration which induces a response halfway between the baseline and maximum.
EC	European Community
ECL	Existing Chemicals List (Korea)
EINECS	European Inventory of Existing Commercial Substances
EPA	Environmental Protection Agency
EU	European Union
FDA	Food and Drug Administration
FIFRA	Federal Insecticide, Fungicide and Rodenticide Act
GHS	Globally Harmonized System
HAP	Hazardous Air Pollutant
HMIS	Hazardous Materials Information System
IARC	International Agency for Research on Cancer
IBC	International Bulk Chemical Code
IDL	Ingredient disclosure list
IDLH	Immediately Dangerous to Life and Health
IMO	International Maritime Organization
K _{st}	Deflagration Index
LC ₅₀	Median lethal concentration for 50% mortality of subject species by the inhalation route
LD ₅₀	Median lethal dose for 50% mortality of subject species by the oral or dermal route
LD _{Lo}	Median lethal dose low; the lowest dose of a substance introduced by any route other than inhalation reported to have caused death in humans or animals.
LEL / LFL	Lower Explosive Limit / Lower Flammable Limit
MARPOL	International Convention for the Prevention of Pollution from Ships
MSHA	Mine Safety Health Administration
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
NIOSH	National Institute of Occupational Safety and Health
NTP	National Toxicology Program
OSHA	Occupational Safety and Health Administration
PBT	Persistent Bioaccumulative Toxic
PEL	Permissible Exposure Limit (default 8 hour day, 40 hour week TWA)
p/p	Parts per part
Ppm	Parts per million
p.s.i.g. or psig	Pounds per square inch (gauge pressure)
PSM	Process Safety Management
PVC	Polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
REACH	Registration, Evaluation, Authorization and Restriction of Chemical Substances

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REL	Recommended Exposure Limit (default 10 hour day, 40 hour week TWA)
RMP	Risk Management Plan
SARA	Superfund Amendment and Reauthorization Act of 1990
SCBA	Self-contained breathing apparatus
STEL	Short Term Exposure Limit (default 15 minute TWA)
TD _{Lo}	Lowest dose to which humans or animals have been exposed and reported to produce a toxic effect other than cancer
TDG	Transportation of Dangerous Goods
TLV	Threshold limit value
TSCA	Toxic Substance Control Act
TWA	Time Weighted Average
UFL	Upper Flammable Limit
USDA	United States Department of Agriculture
VOC	Volatile organic chemical
vPvB	Very Persistent, Very Bioaccumulative
WHMIS	Workplace Hazardous Material Information System Regulations

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Pietras, Jason

From: Hartman, Laura <lhartman@sterigenics.com>
Sent: Wednesday, April 18, 2018 12:05 PM
To: Pietras, Jason
Cc: Jagonase, Christina; Mosby, Daryl; Wagner, Kevin
Subject: Sterigenics Atlanta follow up to CTS#85858
Attachments: Sterigenics Atlanta Follow up report-April 2018.pdf

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hello Mr. Pietras

Please find attached the follow up letter for a release that occurred at our Sterigenics Facility in Atlanta. I will also place this in the mail today.

Please let me know if you have any questions.

Warm Regards,

[Laura Hartman](#)

EHS Manager

Sterigenics, A Sotera Health Company

2015 Spring Road, Suite 650

Oak Brook, IL 60523

LHartman@Sterigenics.com

O: 630-928-1724

C: 847-212-5305



This e-mail and any files transmitted with it may contain privileged and/or confidential information. If you believe this e-mail or any of its attachments were not intended for you, you must not use, distribute, forward, print or copy this e-mail or any attached files. If you have received this e-mail in error, please notify the sender by reply e-mail and then immediately delete the email and all attachments.



April 18, 2018

Georgia Environmental Protection Department
Emergency Response
Attn: Jason Pietras
16 Center Road
Cartersville, Georgia 30121

Cobb County Resource Council / LEPC
P.O. Box 6010
Marietta, Georgia 30065

RE: Follow up Notification of Reported Release at Sterigenics' Atlanta, Georgia Facility

To whom it may concern:

The purpose of this letter is to provide follow-up notification information regarding a reportable release of ethylene oxide (EO) which occurred at our facility located at 2971 Olympic Industrial Boulevard in Atlanta, Georgia. The release occurred on April 2, 2018. After the initial investigation into the facility alarms and process information, we estimated on Wednesday, April 4, 2018, that the release may have been greater than 10 pounds. After additional investigation into the incident, the amount of release was calculated to be 2.6 pounds of EO which is less than the reportable quantity of 10 pounds. Therefore we conclude this was not a reportable quantity release under 40 CFR §355.33. However, following the initial investigation and in accordance with notification requirements in 40 CFR §302.6 and 40 CFR §355.40, personnel immediately notified the following agencies of the release:

- National Response Center (NRC) (Case # 1208494)
- Cobb County Emergency Operations Center (LEPC), and
- Georgia Environmental Protection Division (SERD)(CTS #85858)

After the immediate notification, additional information was collected regarding the equipment condition and operations during the incident. At this time, we confirmed the condition of the anti-cavitation pipe was a crack at the threading between pipes instead of the initial assumption that the pipe was fully severed. The piping separation occurred after the sterilization cycle was stopped and no EO was flowing through the pump. This information allowed a final determination that the EO release did not exceed the reporting threshold of 10 pounds. Following is the requested immediate information for the release in accordance with 40 CFR §355.40(a):

- 1) **Chemical name or identity of any substance involved in the release:** The chemical substance released was gaseous ethylene oxide (CAS #75-21-8).
- 2) **Indication of whether the substance is an extremely hazardous substance (EHS):** Ethylene oxide (EO) is listed as an extremely hazardous substance.

Sterigenics US LLC
2015 Spring Road, Suite 650 · Oakbrook, IL 60523
Fax 630-928-1701 · www.sterigenics.com

- 3) **Estimate of the quantity released into the environment:** An estimated 2.4 pounds of EO was released into the environment.
- 4) **The time and duration of the release:** The release began at approximately 9:00 am and ended at 9:12 am on April 2, 2018. The total duration of the release was no more than 12 minutes.
- 5) **The medium or media into which the release occurred:** We estimate that about 2.6 pounds of EO vapor was released inside the facility from the sterilization Chamber 10 vacuum pump piping. The facility has exhaust fans that vent indoor air directly to atmosphere. In addition, the chamber room has some fans that vent to an existing AAT Scrubber control device. We estimate approximately 2.6 pounds of EO exhausted from the chamber through a crack in the anti-cavitation pipe. We are estimating approximately 10% of the EO released into the chamber room exhausted through the AAT Scrubber. Therefore, the company estimates that the total EO released to the atmosphere would be about 2.4 pounds to the outside environment via the exhaust fans.
- 6) **Any known or anticipated acute or chronic health risks associated with the emergency and, where appropriate, advice regarding medical attention necessary for exposed individuals:** Acute exposure to EO can result in irritation of the eyes, nose, and lungs and delayed effects may include nausea and headaches. EO chronic health risks include cancer and reproductive harm. Sterigenics has EO measurement devices and alarms in the chamber room to protect its employees. During this release, Sterigenics employees were evacuated from the area when the EO concentration levels were elevated so no employees were exposed to high EO concentrations. Because of the time of the release and the release point elevation levels, there are also no anticipated adverse health impacts to employees or the general public as a result of this release. The company received no information suggesting that anyone was impacted outside of the facility.
- 7) **Proper precautions to take as a result of the release, including evacuation:** As mentioned above, the Atlanta facility was evacuated from the area as a precaution during this release event. No other special precautions are suggested.
- 8) **The names and telephone number of the person or persons to be contacted for further information:** Further information on this release can be obtained from Laura Hartman at 630-928-1724 or lhartman@sterigenics.com.

Following is the information requested for the written follow-up notification in accordance with 40 CFR §355.40 (b):

- 1) **Actions taken to respond to and contain the release:** The release was caused by a crack in a pipe. The cycle was operating per design and progressed to the vacuum pump stage where EO is first exhausted from the chamber. During the vacuum pump phase of the cycle, a crack developed in the anti-cavitation piping following the booster pump for the vacuum pump. This caused EO to leak into the chamber room. The EO activated a local monitoring alarm and notified personnel to evacuate the area. Responding facility employees donned proper personal protective equipment (PPE) and re-entered the area to investigate. Levels were detected near the vacuum pump for Chamber 10 and the cycle was stopped to prevent any additional EO from escaping. After the cycle was stopped, the piping severed completely during further inspection and the piping was then replaced.

- 2) **Any known or anticipated acute or chronic health risks associated with the release:** No known or anticipated acute or chronic health risks are associated with this EO release.
- 3) **Where appropriate, advice regarding medical attention necessary for exposed individuals.** Since no one was injured or exposed during the release (without appropriate PPE), there was no need for medical attention.

We are in the process of completing the investigation for this EO release and will implement the necessary corrective actions to prevent it from happening again. If you need further information concerning this incident or report, please contact me at 630-928-1724 or lhartman@sterigenics.com.

Sincerely,



Laura Hartman
Manager, EH&S

Cc: Christina Jagonase –Environmental Compliance Specialist, RMP, Georgia DNR
Daryl Mosby– Atlanta General Manager



An official website of the United States government.



We've made some changes to EPA.gov. If the information you are looking for is not here, you may be able to find it on the EPA Web Archive or the January 19, 2017 Web Snapshot.

Close X



Hospital Ethylene Oxide Sterilizers: National Emission Standards for Hazardous Air Pollutants (NESHAP)

Basic Information

Legal Authority

- 42 U.S.C. §7401

Federal Register Citations:

- 72 FR 73611
- 71 FR 64907

Code of Federal Regulations Citation

- 40 CFR Part 63 Subpart WWWW

Docket Number

- EPA-HQ-OAR-2005-0171

On this page:

- [Rule Summary](#)
- [Rule History](#)
- [Additional Resources](#)
- [Compliance](#)

Rule Summary

This final rule applies to any existing or new hospital ethylene oxide sterilization facility that is an area source of hazardous air pollutants (HAP). The owner or operator of an existing area source must comply with this area source National Emission Standards for Hazardous Air Pollutants (NESHAP) by December 29, 2008. The owner or operator of a new area source must comply with this area source NESHAP by December 28, 2007 or upon initial startup, whichever is later.

Rule History

12/28/2007 – [Final Rule](#)

11/06/2006 – [Proposed Rule](#)

Additional Resources

[Fact Sheets: Proposed and Final Air Toxics Standards for Hospital Sterilizers](#)

View the [supporting documents in the docket folder](#) to find additional related documents to this rule.

Related Rules:

[Alternative Control Technology Document: Ethylene Oxide Sterilization/Fumigation Operations](#)

[Ethylene Oxide Emissions Standards for Sterilization Facilities: National Emission Standards for Hazardous Air Pollutants \(NESHAP\)](#)

Compliance

[Summary of Regulations Controlling Air Emissions from the Hospital Sterilizers using Ethylene Oxide National Emission Standards for Hazardous Air Pollutants \(NESHAP\) Subpart WWWW Final Rule](#)

[Example Initial Notification of Compliance Status: National Emission Standards for Hospital Ethylene Oxide Sterilization \(40 CFR 63, subpart WWWW\) \(2 pp, 79 K, August 2008\)](#)

[Applicability Determination Index \(ADI\)](#). The ADI is maintained by EPA's Office of Enforcement and Compliance Assurance (OECA) and provides a data base of memoranda dealing with applicability issues. The database is searchable by Subpart.

LAST UPDATED ON MARCH 22, 2017

Pietras, Jason

From: Jagonase, Christina
Sent: Tuesday, August 21, 2018 10:02 AM
To: Pietras, Jason
Subject: RE: Questions CTS 85858

Follow Up Flag: Follow up
Flag Status: Completed

Hi Jason,

I apologize for not getting back to you yesterday! I wanted to go ahead and give you a copy of the RMP list that I updated yesterday. It includes all the facilities that are covered under RMP, and lists their respective chemicals. I'm not sure which version of the list you referenced before, but Sterigenics is definitely covered under RMP for ethylene oxide (EO), so thank you for letting me know about it.

As for releases, I appreciate knowing about any releases from RMP covered facilities on the list. There are times when a release might occur at a RMP facility, but it is not involving any of the listed chemicals (for example, an oil spill). For these, I would not necessarily need to know. Especially if it's oil or other non-chemical releases. But if there is any doubt as to whether it might involve a covered chemical, feel free to ask.

There are also times when releases occur at facilities that are not covered under RMP (not on the list), but it's a RMP chemical of interest, such ammonia or chlorine, so I also appreciate knowing about these as well. This way I can check into it make sure they are not supposed to be covered under RMP.

Thanks again for keeping me in the loop, and forwarding me copies of the follow up reports that are sent to you. Sometimes, depending on the info in the follow up report, I may request additional information, required under the RMP rule, so that I can further investigate the release.

I hope this helps. If you need further clarification, or want to chat, just let me know. I'm in the office all day today.

Thanks,

Christina Jagonase
Environmental Compliance Specialist
Risk Management Program 112(r)
Air Protection Branch
4244 International Parkway, Ste 120
Atlanta, GA 30354
Office: (404) 363-7101
Fax: (678) 692-6842



From: Pietras, Jason
Sent: Thursday, August 16, 2018 1:57 PM

To: Jagonase, Christina
Subject: Re: Questions CTS 85858

Thank you very much.

Sent from my iPhone

On Aug 16, 2018, at 1:54 PM, Jagonase, Christina <Christina.Jagonase@dnr.ga.gov> wrote:

Hi Jason,

I'd be happy to help you with any questions you might have. I'm out of the office today, and tomorrow, but I will give you a call on Monday morning.

Thanks,

Christina Jagonase
Environmental Compliance Specialist
Risk Management Program 112(r)
Air Protection Branch
4244 International Parkway, Ste 120
Atlanta, GA 30354
Office: (404) 363-7101
Fax: (678) 692-6842

From: Pietras, Jason
Sent: Wednesday, August 15, 2018 1:06:41 PM
To: Jagonase, Christina
Subject: Questions CTS 85858

Christina,

I know you are incredibly busy, I am still learning and green I would like to learn and gain insight from you in this area of our industry. My question involves CTS #85858 Sterigenics, EO release I received in April. At the time, I do not believe this was on the RMP list as one of your facilities and I am just seeking your guidance and thoughts on procedure, involvement (what is your role after we report and how I should proceed with future releases. I am trying to close the report and could use your experience and advice. Thank you kindly for your time.

Respectfully,

Jason R. Pietras
Georgia Environmental Protection Division
Environmental Compliance Specialist
Emergency Response Team
State On Scene Coordinator
16 Center Rd. Cartersville, GA 30121
M.D.O. (770) 387-4900
Report Spills: 1-800-241-4113 (24 Hours)
<image001.png>



April 18, 2018

Georgia Environmental Protection Department
Emergency Response
Attn: Jason Pietras
16 Center Road
Cartersville, Georgia 30121

Cobb County Resource Council / LEPC
P.O. Box 6010
Marietta, Georgia 30065

APR 19 2018

RE: Follow up Notification of Reported Release at Sterigenics' Atlanta, Georgia Facility

To whom it may concern:

The purpose of this letter is to provide follow-up notification information regarding a reportable release of ethylene oxide (EO) which occurred at our facility located at 2971 Olympic Industrial Boulevard in Atlanta, Georgia. The release occurred on April 2, 2018. After the initial investigation into the facility alarms and process information, we estimated on Wednesday, April 4, 2018, that the release may have been greater than 10 pounds. After additional investigation into the incident, the amount of release was calculated to be 2.6 pounds of EO which is less than the reportable quantity of 10 pounds. Therefore we conclude this was not a reportable quantity release under 40 CFR §355.33. However, following the initial investigation and in accordance with notification requirements in 40 CFR §302.6 and 40 CFR §355.40, personnel immediately notified the following agencies of the release:

- National Response Center (NRC) (Case # 1208494)
- Cobb County Emergency Operations Center (LEPC), and
- Georgia Environmental Protection Division (SERC) (CTS #85858)

After the immediate notification, additional information was collected regarding the equipment condition and operations during the incident. At this time, we confirmed the condition of the anti-cavitation pipe was a crack at the threading between pipes instead of the initial assumption that the pipe was fully severed. The piping separation occurred after the sterilization cycle was stopped and no EO was flowing through the pump. This information allowed a final determination that the EO release did not exceed the reporting threshold of 10 pounds. Following is the requested immediate information for the release in accordance with 40 CFR §355.40(a):

- 1) **Chemical name or identity of any substance involved in the release:** The chemical substance released was gaseous ethylene oxide (CAS #75-21-8).
- 2) **Indication of whether the substance is an extremely hazardous substance (EHS):** Ethylene oxide (EO) is listed as an extremely hazardous substance.

Sterigenics US LLC
2015 Spring Road, Suite 650 · Oakbrook, IL 60523
Fax 630-928-1701 · www.sterigenics.com

- 3) **Estimate of the quantity released into the environment:** An estimated 2.4 pounds of EO was released into the environment.
- 4) **The time and duration of the release:** The release began at approximately 9:00 am and ended at 9:12 am on April 2, 2018. The total duration of the release was no more than 12 minutes.
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- 7) **Proper precautions to take as a result of the release, including evacuation:** As mentioned above, the Atlanta facility was evacuated from the area as a precaution during this release event. No other special precautions are suggested.
- 8) **The names and telephone number of the person or persons to be contacted for further information:** Further information on this release can be obtained from Laura Hartman at 630-928-1724 or lhartman@sterigenics.com.

Following is the information requested for the written follow-up notification in accordance with 40 CFR §355.40 (b):

- 1) **Actions taken to respond to and contain the release:** The release was caused by a crack in a pipe. The cycle was operating per design and progressed to the vacuum pump stage where EO is first exhausted from the chamber. During the vacuum pump phase of the cycle, a crack developed in the anti-cavitation piping following the booster pump for the vacuum pump. This caused EO to leak into the chamber room. The EO activated a local monitoring alarm and notified personnel to evacuate the area. Responding facility employees donned proper personal protective equipment (PPE) and re-entered the area to investigate. Levels were detected near the vacuum pump for Chamber 10 and the cycle was stopped to prevent any additional EO from escaping. After the cycle was stopped, the piping severed completely during further inspection and the piping was then replaced.

Sterigenics US LLC

2015 Spring Road, Suite 650 · Oakbrook, IL 60523

Fax 630-928-1701 · www.sterigenics.com

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- 3) **Where appropriate, advice regarding medical attention necessary for exposed individuals.** Since no one was injured or exposed during the release (without appropriate PPE), there was no need for medical attention.

We are in the process of completing the investigation for this EO release and will implement the necessary corrective actions to prevent it from happening again. If you need further information concerning this incident or report, please contact me at 630-928-1724 or lhartman@sterigenics.com.

Sincerely,



Laura Hartman
Manager, EH&S

Cc: Christina Jagonase –Environmental Compliance Specialist, RMP, Georgia DNR
Daryl Mosby– Atlanta General Manager

Pietras, Jason

From: Mosby, Daryl <DMosby@sterigenics.com>
Sent: Wednesday, April 11, 2018 6:06 PM
To: Pietras, Jason
Subject: RE: Case #85858

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Jason,

An update is that the evaluation is still ongoing.

Regards,
Daryl-

From: Mosby, Daryl
Sent: Wednesday, April 04, 2018 6:48 PM
To: Pietras, Jason
Subject: RE: Case #85858

Jason,

I apologize. I attached the incorrect SDS. Attached is the correct SDS.

Regards,
Daryl-

From: Pietras, Jason [<mailto:jason.pietras@dnr.ga.gov>]
Sent: Wednesday, April 04, 2018 6:42 PM
To: Mosby, Daryl
Subject: RE: Case #85858

Thank you Sir,

Jason R. Pietras
Georgia Environmental Protection Division
Environmental Compliance Specialist
Emergency Response Team
State On Scene Coordinator
16 Center Rd. Cartersville, GA 30121
M.D.O. (770) 387-4900
Report Spills: 1-800-241-4113 (24 Hours)



Pietras, Jason

From: Pietras, Jason
Sent: Thursday, April 5, 2018 9:17 AM
To: Jagonase, Christina
Subject: RE: Case #85858

Tracking:	Recipient	Read
	Jagonase, Christina	Read: 4/5/2018 9:40 AM

You are welcome.

From: Jagonase, Christina
Sent: Thursday, April 5, 2018 9:13 AM
To: Pietras, Jason
Subject: RE: Case #85858

Jason,

Thanks for letting me know about this incident. I will follow up with my contact at the facility to get more info.

Christina Jagonase
Environmental Compliance Specialist
Risk Management Program 112(r)
Air Protection Branch
4244 International Parkway, Ste 120
Atlanta, GA 30354
Office: (404) 363-7101
Fax: (678) 692-6842



ENVIRONMENTAL PROTECTION DIVISION

From: Pietras, Jason
Sent: Wednesday, April 04, 2018 6:50 PM
To: Jagonase, Christina
Subject: FW: Case #85858

Mr. Mosby, attached the correct SDS sheet.

From: Mosby, Daryl [<mailto:DMosby@sterigenics.com>]
Sent: Wednesday, April 4, 2018 6:48 PM
To: Pietras, Jason
Subject: RE: Case #85858

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Pietras, Jason

From: Pietras, Jason
Sent: Wednesday, April 4, 2018 6:42 PM
To: Mosby, Daryl
Subject: RE: Case #85858

Thank you Sir,

Jason R. Pietras
Georgia Environmental Protection Division
Environmental Compliance Specialist
Emergency Response Team
State On Scene Coordinator
16 Center Rd. Cartersville, GA 30121
M.D.O. (770) 387-4900
Report Spills: 1-800-241-4113 (24 Hours)



I am reviewing the information now.

Regards,

From: Mosby, Daryl [<mailto:DMosby@sterigenics.com>]
Sent: Wednesday, April 4, 2018 6:40 PM
To: Pietras, Jason
Subject: RE: Case #85858

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Jason,

The incident happened around 9 am EST on 02 April 2018.

Regards,
Daryl-

From: Mosby, Daryl
Sent: Wednesday, April 04, 2018 6:29 PM
To: jason.pietras@DNR.GA.GOV
Subject: Case #85858

Pietras, Jason

From: Pietras, Jason
Sent: Wednesday, April 4, 2018 6:46 PM
To: Jagonase, Christina (Christina.Jagonase@dnr.ga.gov)
Subject: FW: Case #85858
Attachments: EO.pdf

Tracking:	Recipient	Read
	Jagonase, Christina (Christina.Jagonase@dnr.ga.gov)	Read: 4/4/2018 10:47 PM

Christina,

Below is the brief description I have received from Sternogenics (Medical Equipment Sterilization Company) and it is on the RMP list as a level 3. I just received an updated email stating that the incident occurred on 2 April, 2018 0900. Do you have any questions or concerns? Please contact me if you do. Thank you.

Regards,

Jason R. Pietras
Georgia Environmental Protection Division
Environmental Compliance Specialist
Emergency Response Team
State On Scene Coordinator
16 Center Rd. Cartersville, GA 30121
M.D.O. (770) 387-4900
Report Spills: 1-800-241-4113 (24 Hours)



From: Mosby, Daryl [<mailto:DMosby@sterigenics.com>]
Sent: Wednesday, April 4, 2018 6:34 PM
To: Pietras, Jason
Subject: Case #85858

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Hi Jason,

The SDS is attached. Listed below is a recap of the incident:

SRI port #6 detected rogue levels in the area reading 240ppm. Maintenance / Operations donned the proper PPE and handhelds PID's and began surveying the area and found the exhaust pipe for the booster pump for chamber 10 had become slightly detached. The chamber was then stopped and maintenance completed the repair before the chamber

Hi Jason,

The SDS is attached. Listed below is a recap of the incident:

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Let me know if you have any other questions.

Regards,
Daryl-

[Daryl Mosby](#)

General Manager

Sterigenics

2971 Olympic Ind. Drive, Ste. 116

Atlanta, Ga. 30339

dmosby@sterigenics.com

F: 404-355-4852

C: 336-302-2996



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Pietras, Jason

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Daryl-

Daryl Mosby

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Pietras, Jason

From: Pietras, Jason
Sent: Wednesday, April 4, 2018 6:37 PM
To: Cortes, Michelle
Subject: FW: Case #85858
Attachments: EO.pdf

Tracking:	Recipient	Read
	Cortes, Michelle	Read: 4/4/2018 7:55 PM

From: Mosby, Daryl [<mailto:DMosby@sterigenics.com>]
Sent: Wednesday, April 4, 2018 6:34 PM
To: Pietras, Jason
Subject: Case #85858

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Daryl-

Daryl Mosby

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2971 Olympic Ind. Drive, Ste. 116
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I am reviewing the information now.

Regards,

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Subject: RE: Case #85858

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Regards,
Daryl-

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Sent: Wednesday, April 04, 2018 6:29 PM
To: jason.pietras@DNR.GA.GOV
Subject: Case #85858

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Jason,

I apologize. I attached the incorrect SDS. Attached is the correct SDS.

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Daryl-

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Sent: Wednesday, April 04, 2018 6:42 PM
To: Mosby, Daryl
Subject: RE: Case #85858

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Pietras, Jason

From: Pietras, Jason
Sent: Wednesday, April 4, 2018 6:50 PM
To: Jagonase, Christina (Christina.Jagonase@dnr.ga.gov)
Subject: FW: Case #85858
Attachments: SDS_ARC_Ethylene Oxide 2014-05-09(1).pdf

Tracking:	Recipient	Read
	Jagonase, Christina (Christina.Jagonase@dnr.ga.gov)	Read: 4/4/2018 10:47 PM

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