Product Stewardship Summary
ORGANOSULFUR SPECIALTY PRODUCTS

The product stewardship summary is intended to give general information about the chemical or categories of chemicals addressed. It is not intended to provide an in-depth discussion of all health and safety information. Additional information is available through the applicable Material Safety Data Sheet (MSDS) which should be consulted before use of any chemical. This product stewardship summary does not supplant or replace required regulatory and/or legal communication documents.

Chemical Identity:

The products in the organosulfur specialty group are organic compounds with varied sulfur-containing functional groups. They are mostly colorless liquids, except for sulfolene, which is a crystalline solid. These products tend to have a strong, objectionable, and pungent odor and are typically transported in well sealed drums and isocontainers. The one exception is Sulfolene, which is a solid and is packaged in plastic lined paper sacks. The ten (10) products included in the organosulfur specialty group are listed below, along with their common synonyms and CAS numbers.

Product	Synonym	CAS No.
2-Mercaptoethanol	BME, Beta Mercaptoethanol	60-24-2
Sodium 2-Hydroxyethanethiolate	Mercasol L ™Salt	Mixture
Ethylthioethanol	ETE, 2-Ethylthioethanol	110-77-0
Methyl 3-Mercaptopropionate	MMP	2939-90-2
Sulfolane	Tetrahydrothiophene 1,1-Dioxide	126-33-0
Sulfolene	2,5-Dihydrothiophene 1,1-Dioxide	77-79-2
2-Octylthioethanol	HENOS	357-33-9
Dimethyl 3,3-Thiodipropionate	Bis 3,3'-Methoxpropyl Sulfide	4131-74-2
Mercaptopropanol	Propanol, Mercapto	63947-56-8
Phenylthioethanol	2-Hydroxyethyl phenyl sulfide	699-12-7

Category Justification:

The organosulfur products are sulfur-containing organic compounds. In general, they exhibit some similar physical and chemical characteristics. These products generally tend to have low to moderate volatility, flammability, and combustible characteristics, and are typically not reactive products. They are generally incompatible with oxygen and strong oxidizing agents such as chlorates, nitrates, and peroxides. Products within this group exhibit some similar health and environmental hazards; however, the severity of toxic effects tends to be widely varied.

Product Uses:

The organosulfur specialty products are primarily used as solvents or chemical intermediates in wide ranging applications; some other common uses of these products are: cementing agent for drilling and operating oil and gas wells, , automotive transmission fluid additive, production of PVC stabilizers, water treatment chemical (corrosive inhibitor), polymerization chain transfer agent, and depilatory or hair removing agent. Products in this group are commercially available to industrial customers only, which typically include Chemical Manufacturing, Cleaning, and Extraction Facilities, Agricultural Products Manufacturers, Leather and Textile Industries, and Health and Pharmaceutical Companies.

Physical/Chemical Properties:

Organosulfur products are not self –igniting, however, to varying degrees, the organosulfur products have the potential to cause fires if they are exposed to an ignitable source. The formation of hazardous combustible or decomposition byproducts such as hydrogen sulfide, and sulfur and carbon oxides is possible for these products. Bonding and grounding are recommended to prevent electrostatic hazards. Containers can explode under pressurized conditions. However, it should be noted that these products are typically stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

Health Information:

In general, the organosulfur specialty products can be expected to have low to severe acute toxicity in humans, with the primary acute health effects impacting the eyes, skin, and respiratory tract. Acute effects on the eye may include mild to severe irritation, corrosive and permanent (irreversible) damage (such as blindness). Repeated dermal contact with some of these products may cause varying degrees of irritation, defatting of the skin, and skin sensitization. Prolonged exposure to high vapor concentrations of some these products may cause respiratory irritation, central nervous system (CNS) effects, coma, and death. If ingested, these products may be aspired into the lungs, which can result in severe pulmonary injury or can be fatal. The kidney, liver, and heart were indicated as potential target organs in oral animal toxicity studies. Potential reproductive and development toxicity effects were indicated in animal studies following oral exposures to some of these products. Data are limited to characterize their potential to cause cancer in humans; however, genetic toxicity data were overall negative for the products tested.

Environmental Information:

The environmental hazard potential for the products in the organosulfur specialty group is expected to be diverse (i.e., range from low to high toxicity). Some of these products are highly toxic to aquatic organisms; hence, care should be taken to avoid releases of these products to sewage, drainage systems, and water bodies. Overall, the available data suggest the bioaccumulation potential of these products is expected to be low. In general, these products are not expected to readily biodegrade.

Exposure Potential:

The most likely routes of exposure to the organosulfur products are eye and skin contact, and inhalation exposures.

Workplace use: The potentially exposed populations include: (1) workers who manufacture these products; (2) quality assurance workers who sample and analyze the products to ensure that they meet specifications; (3) workers involved in distribution and storage of these products; and (4) commercial consumers, in occupational settings, that use these products in intended applications. The most likely routes of exposure to the organosulfur products in a workplace setting are eye and dermal contact, and inhalation exposure. The probability of exposure to personnel is expected to be low because the organosulfur products are generally produced in enclosed, controlled environments, and are typically transported in well sealed drums and isocontainers. These products generally have low odor thresholds and, hence, leaks can be detected quickly, and prolonged exposures can be avoided. They are sold to sophisticated industrial customers that are familiar with their intended applications, safe handling, storage, and disposal requirements. Manufacturing, quality assurance, and transportation workers are required to adhere to safe handling practices, wear appropriate personal protective equipment (PPE), and have access to exposure prevention measures (e.g., engineering controls). Customers are also required to use

appropriate PPE during handling and use. In addition, customer facilities have risk mitigation measures in place to address potential physical hazards or accidental releases.

Consumer use: Potential exposure to the general public is not anticipated for these products as they are not sold to the general population. If a large scale spill or fire occurred near a residential setting, odor complaints from the general population are possible.

Potential Environmental Release: There may be some potential for exposure to the environment from accidental releases of these products during transportation of large quantities over long distances via truck trailers, railcars, or container ships; however, available data indicate that the frequency of distribution incidents involving accidental releases of these products has been low, and overall reported product volumes spilled have been minimal. Chevron Philips Chemical Company LP is committed to operating in an environmentally responsible manner and has adopted the American Chemical Council's Responsible Care® initiative.

Risk Management:

Chevron Phillips Chemical Company LP is committed to Product Stewardship and doing business responsibly. We endeavor to provide sufficient information for the safe use and handling of all our products. We begin by ensuring that all of our customers, distributors, carriers, and users of these products are well informed about the properties of each product. To that end, a Material Safety Data Sheet and a certificate of analysis accompany each shipment from our manufacturing plant. In addition, Product Usage Bulletins have been created and Hazard and Exposure Risk Characterization (HERC) reviews have been conducted for organosulfur products to evaluate the potential risks associated with their distribution and use.

Regulatory Information:

Regulations exist that govern the manufacture, sale, transportation, use, and disposal of these organosulfur products. These regulations may vary by city, state, country or geographic region. Additional relevant information may be found by consulting the applicable product Material Safety Data Sheets.

Sources of Additional Information:

- Chevron Phillips Chemical LP (CPChem). 2002. Product Usage Bulletin. 2-Mercaptoethanol (BME). Specialty Chemical. July 2002.
- CPChem. 2005a. Sodium 2-Hydroxyethanethiolate (Mercasol L™ Salt). *MSDS # E004*. Revision 2. Dated 11/08/2005. http://www.cpchem.com/enu/products_product_index.asp
- CPChem. 2005b. Phenylthioethanol. *MSDS # 75260*. Revision 3. Dated 11/08/2005. http://www.cpchem.com/enu/products_product_index.asp
- CPChem. 2005c. Mercaptopropanol. *MSDS # 697570*. Revision 2. Dated 12/30/2005. http://www.cpchem.com/enu/products_product_index.asp
- CPChem. 2006a. Dimethyl 3,3'-Thiodipropionate. MSDS # 644740. Revision 3. Dated 01/24/2006. http://www.cpchem.com/enu/products_product_index.asp
- CPChem. 2006b. High Production Volume Challenge Program. Revised Test Plan for 2,5-Dihydrothiophene 1,1-dioxide (Sulfolene). CAS Number 77-79-2. November 16.
- CPChem. 2007. Sulfolane-A, Low Color. *MSDS# 646050*. Revision 4.00. Dated 12/20/2007. http://www.cpchem.com/enu/products_product_index.asp
- CPChem. 2008a. Methyl 3-Mercaptopropionate. *MSDS # 75720*. Revision 6.00. Dated 01/17/2008. http://www.cpchem.com/enu/products_product_index.asp

- CPChem. 2008b. Sulfolane W. *MSDS# 2073*. Revision 7.01. Dated 7/16/2008. http://www.cpchem.com/enu/products_product_index.asp
- CPChem. 2008c. 2-Mercaptoethanol (BME). *MSDS # 26290*. Revision 6.00. Dated 10/17/2008. http://www.cpchem.com/enu/products_product_index.asp
- CPChem. 2009a. Sulfolene. *MSDS # 25500*. Revision No. 4.02. Dated 02/12/2009. http://www.cpchem.com/enu/products_product_index.asp
- CPChem. 2009b. Sulfolane-A, Anhydrous. *MSDS# 34190*. Revision 8.00. Dated 6/25/2009. http://www.cpchem.com/enu/products_product_index.asp
- CPChem. 2009c. Ethylthioethanol. *MSDS # 44020*. Revision 5.02. Dated 07/09/2009. http://www.cpchem.com/enu/products_product_index.asp
- CPChem. 2009d. Extended High Production Volume Chemical Challenge Program. Robust Summaries and Test Plan for Ethanol, 2-(Octylthio). CAS Number 3547-33-9. June 17.
- Hazardous Substance Data Bank (HSDB). 2009a. 2-Mercaptoethanol. Data retrieved on November 18, 2009. Available on the Internet at http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB
- HSDB. 2009b. Sulfolane. Data retrieved on December 15, 2009. Available on the Internet at http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB.
- HSDB. 2009c. Sulfolene. Data retrieved on December 15, 2009. Available online at http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB
- HSDB. 2009c. 2-Ethylthioethanol. Data retrieved on December 21, 2009. Available online at http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB
- Organization for Economic Co-Operation and Development (OCED) SIDS. 2005a. SIDS Initial Assessment Report for SIAM 19. Tetraahyrothiophene-1,1-Dioxide (Sulfolane). CAS Number 126-33-0. January 14. Available online at http://www.chem.unep.ch/irptc/sids/oecdsids/126330.pdf
- OCED SIDS. 2005b. SIDS Initial Assessment Report for SIAM 20. 2- Mercapotethanol. CAS Number 60-24-2. Submitted January 21.
- OCED SIDS. 2009. SIDS Initial Assessment Report for SIAM 28. Mercaptopropanoic acid (3-MPA) and 3-Mercaptopropanoic acid methyl ester (MMP). Submitted January.

Conclusion:

The organosulfur specialty products are classified as hazardous chemicals. Efforts should be taken to minimize eye, dermal and inhalation exposures to these products by adhering to safe handling procedures, designated applications and uses, appropriate personal protective equipment practices, and labeling, storage, and transportation procedures and requirements. The relevant product Material Safety Data Sheets and applicable regulatory guidelines and requirements, including, but not limited to, Occupational Health and Safety Administration (OSHA) guidelines, should be consulted prior to the use or handling of these products.

Contact Information:

http://www.cpchem.com/