To: Aquino, Virginia[Aquino.Virginia@epa.gov]
From: Singhvi, Raj
Sent: Mon 2/24/2014 3:41:15 PM
Subject: pl. print

The following information was generated from the

Hazardous Substances Data Bank (HSDB),

a database of the National Library of Medicine's TOXNET system

(http://toxnet.nlm.nih.gov) on February 24, 2014.

Query: Records containing the term 8182

1

NAME: 4-Methylcyclohexanemethanol

HSN: 8182

RN: 34885-03-5

NOTE:

4-Methylcyclohexanemethanol (MCHM) is the major component of crude MCHM. Crude MCHM is a mixture of various compounds. This record contains information on the title compound, 4-Methylcyclohexanemethanol, unless otherwise noted at the end of an excerpt (Example: /Crude 4-Methylcyclohexanemethanol/). This record contains data available at the time the record was created. The record will be updated with additional information as it becomes available.

HUMAN HEALTH EFFECTS:

SKIN, EYE AND RESPIRATORY IRRITATIONS:

A strong skin irritant[Eastman Kodak Company; Acute toxicity of 4-methylcyclohexane methanol p. 13 (1990). Available from, as of January 17, 2014 http://www.eastman.com/Pages/Eastman-Crude-MCHM-Studies.aspx] **PEER REVIEWED**

A moderate eye irritant[Eastman Kodak Company; Acute toxicity of 4-methylcyclohexane methanol p. 13 (1990). Available from, as of January 17, 2014 http://www.eastman.com/Pages/Eastman-Crude-MCHM-Studies.aspx] **PEER REVIEWED**

PROBABLE ROUTES OF HUMAN EXPOSURE:

Occupational exposure to 4-methylcyclohexanemethanol may occur through inhalation and dermal contact with this compound at workplaces where 4-methylcyclohexanemethanol is produced or used. Populations in the vicinity of a spill site may be exposed to 4-methylcyclohexanemethanol via ingestion of and dermal contact with contaminated water. (SRC) **PEER REVIEWED**

EMERGENCY MEDICAL TREATMENT:

ANTIDOTE AND EMERGENCY TREATMENT:

/SRP:/ Immediate first aid: Ensure that adequate decontamination has been carried out. If patient is not breathing, start artificial respiration, preferably with a demand valve resuscitator, bag-valve-mask device, or pocket mask, as trained. Perform CPR if necessary. Immediately flush contaminated eyes with gently flowing water. Do not induce vomiting. If vomiting occurs, lean patient forward or place on the left side (head-down position, if possible) to maintain an open airway and prevent aspiration. Keep patient quiet and maintain normal body temperature. Obtain medical attention. /Poisons A and B/[Currance, P.L. Clements, B., Bronstein, A.C. (Eds).; Emergency Care For Hazardous Materials Exposure. 3Rd edition, Elsevier Mosby, St. Louis, MO 2005, p. 160] **PEER REVIEWED**

/SRP:/ Basic treatment: Establish a patent airway (oropharyngeal or nasopharyngeal airway, if needed). Suction if necessary. Watch for signs of respiratory insufficiency and assist ventilations if needed. Administer oxygen by nonrebreather mask at 10 to 15 L/min. Monitor for pulmonary edema and treat if necessary ... . Monitor for shock and treat if necessary ... . Anticipate seizures and treat if necessary ... . For eye contamination, flush eyes immediately with water. Irrigate each eye continuously with 0.9% saline (NS) during transport ... . Do not use emetics. For ingestion, rinse mouth and administer 5 mL/kg up to 200 mL of water for dilution if the patient can swallow, has a strong gag reflex, and does not drool ... . Cover skin burns with dry sterile dressings after

decontamination ... . /Poisons A and B/[Currance, P.L. Clements, B., Bronstein, A.C. (Eds).; Emergency Care For Hazardous Materials Exposure. 3Rd edition, Elsevier Mosby, St. Louis, MO 2005, p. 160] **PEER REVIEWED**

/SRP:/ Advanced treatment: Consider orotracheal or nasotracheal intubation for airway control in the patient who is unconscious, has severe pulmonary edema, or is in severe respiratory distress. Positive-pressure ventilation techniques with a bag valve mask device may be beneficial. Consider drug therapy for pulmonary edema ... . Consider administering a beta agonist such as albuterol for severe bronchospasm ... . Monitor cardiac rhythm and treat arrhythmias as necessary ... . Start IV administration of D5W /SRP: "To keep open", minimal flow rate/. Use 0.9% saline (NS) or lactated Ringer's if signs of hypovolemia are present. For hypotension with signs of hypovolemia, administer fluid cautiously. Watch for signs of fluid overload ... . Treat seizures with diazepam or lorazepam ... . Use proparacaine hydrochloride to assist eye irrigation ... . /Poisons A and B/[Currance, P.L. Clements, B., Bronstein, A.C. (Eds).; Emergency Care For Hazardous Materials Exposure. 3Rd edition, Elsevier Mosby, St. Louis, MO 2005, p. 160-1] **PEER REVIEWED**

ANIMAL TOXICITY STUDIES:

NON-HUMAN TOXICITY EXCERPTS:

/LABORATORY ANIMALS: Acute Exposure/ Rabbit eye irritation. The test article was a moderate eye irritant.[Eastman Kodak Company; Acute toxicity of 4-methylcyclohexane methanol p. 13 (1990). Available from, as of January 17, 2014: http://www.eastman.com/Pages/Eastman-Crude-MCHM-Studies.aspx] **PEER REVIEWED**

/LABORATORY ANIMALS: Acute Exposure/ Groups of two male and two female rats (CD (SD) BR) were given doses of 200, 400, or 800 mg/kg/day of 4-methylcyclohexane methanol in corn oil for five days as part of a probe study conducted to establish dose levels for the four-week toxicity study. Rats dosed with 800 mg/kg showed signs of /CNS depression/ resulting in decreased activity levels (one male and two females) and ataxia (one female). One of the female rats was subsequently euthanized. One of the 400 mg/kg/day females had decreased activity on days 2 and 3 of the study. The remaining animals did not exhibit clinical abnormalities related to exposure to the test article.[Eastman Kodak Company; Four-week oral toxicity study of 4-methylcyclohexane methanol in the rat. p. 10 (1990). Available from, as of January 17, 2014: http://www.eastman.com/Pages/Eastman-Crude-MCHM-Studies.aspx] **PEER REVIEWED**

/LABORATORY ANIMALS: Acute Exposure/ A single dose of 500 mg/kg of the neat test substance /crude 4-methylcyclohexanemethanol/ was administered by gavage to female /Sprague-Dawley/ rats. Abnormal clinical signs were limited to transient reduced activity for all rats and transient stumbling

for two rats on the day of dosing. No other abnormal clinical signs were noted at any time during the 14-day observation period. No mortality was observed, and all animals gained weight. No treatment-related changes were observed at necroscopy, and no tissues were collected for histological examination. A single oral dose of 500 mg/kg /of/ the test substance did not cause hematuria in female rats of this strain. /Crude 4-methylcyclohexanemethanol/[Eastman Kodak Company; Crude MCHM Acute oral toxicity study in the rat (Final report) p. 6 (1999). Available from, as of January 17, 2014: http://www.eastman.com/Pages/Eastman-Crude-MCHM-Studies.aspx] **PEER REVIEWED**

/LABORATORY ANIMALS: Acute Exposure/ An acute dermal toxicity study was conducted in male and female rats /Sprague-Dawley/ administered a single limit dose of 2000 mg/kg of the test substance /crude 4-methylcyclohexanemethanol/ topically. The test substance, a clear and colorless liquid, was administered neat. One female /rat/ was found dead the day after test substance application (day 1) and a second female rat was found dead on day 3. For male rats, clinical signs observed during the 14-day observation period were limited to erythema (days 1 to 4) and desquamation (days 5 to 14) of the skin at the site of application ... .
For female rats, transient weakness (moderate to severe) was noted on the day following test substance application (day 1). Prostration was noted on day 2 for a single female rat which subsequently died. Stumbling, which was observed for four female rats on the day following test substance

application, was either transient or observed prior to death. For female rats, abnormalities of the skin at the site of application were observed from day 1 through study termination; erythema was observed an days 1 and 2, desquamation was observed on days 6 to 14, and induration was observed on days 2 to 14. Additionally, lack of feces was observed on day 2 and inguinal hair wet with urine was observed on days 1 to 3 for the female rats. Red urine was noted for four female rats on days 1, 2, or 3, therefore, the urine from all animals was tested for the presence of blood using a semi-quantitative dipstick (N-Multistix). The urine from rats with red discolored urine produced a positive response with the N-Multistix for most of the rats on day 1 and approximately half of the rats on day 3. A positive N-Multistix result for animals which did not have red discolored urine was considered indicative of levels of blood in the urine too low to produce visible color changes. All animals which survived to scheduled necropsy gained weight during both weeks of the study. The cause of death for rats which died after treatment with the test substance was not determined. Treatment-related gross or microscopic changes were observed only for female rats. For the two female rats which died, treatment-related gross lesions included distention of the urinary bladder with red urine, and/or hemorrhage in the glandular gastric mucosa. The lesions observed in the glandular gastric mucosa may have been due to consumption of test substance during grooming or may have been due to stress. Darker than normal spleens were observed for the two female rats which had red urine and also died. Microscopic lesions consisted of atrophy and congestion of the splenic red pulp and/or atrophy and necrosis of the splenic white pulp. The white pulp atrophy may have been secondary

to stress and the red pulp atrophy and congestion may have been related to stress and/or hemorrhage. However, splenic effects following dermal application and wrapping are uncommon observations in this laboratory. In addition, splenic effects have not been associated with wrapping... Therefore, the splenic effects may be associated with test substance toxicity. Treatment-related lesions observed for one of the female rats that survived the 14-day observation period consisted of desquamation and minor induration of the skin at the application site grossly and consisted of focal necrosis and eschar formation on the skin at the application site microscopically. The test substance was a dermal irritant as evidenced by focal necrosis and eschar formation on the skin at the application site... /Crude 4-methylcyclohexanemethanol/[Eastman Kodak Company; Crude MCHM Acute dermal toxicity study in the rat (Final report) p. 6 (1998). Available from, as of January 17, 2014: http://www.eastman.com/Pages/Eastman-Crude-MCHM-Studies.aspx] **PEER REVIEWED**

/LABORATORY ANIMALS: Acute Exposure/ Dermal irritation in guinea pigs (24 hr occluded single dose) The test article was a strong skin irritant.[Eastman Kodak Company; Acute toxicity of 4-methylcyclohexane methanol p. 13 (1990). Available from, as of January 17, 2014: http://www.eastman.com/Pages/Eastman-Crude-MCHM-Studies.aspx] **PEER REVIEWED**

/LABORATORY ANIMALS: Acute Exposure/ Skin sensitization study in guinea

pigs. ... No reaction was observed at challenge in any of the animals previously induced with Freund's adjuvant or the test article /4-methylcyclohexane methanol/ in Freund's adjuvant.[Eastman Kodak Company; Acute toxicity of 4-methylcyclohexane methanol p. 13 (1990). Available from, as of January 17, 2014: http://www.eastman.com/Pages/Eastman-Crude-MCHM-Studies.aspx] **PEER REVIEWED**

/LABORATORY ANIMALS: Acute Exposure/ An acute oral toxicity study was conducted in which three groups of five male and five female rats /Sprague-Dawley/ were administered 2000, 1000, or 500 mg/kg of the neat test substance /crude 4-methylcyclohexanemethanol/ by gavage. All animals assigned to the 2000 mg/kg dose groups and three male and four female rats assigned the 1000 mg/kg dose group died within 24 hr of dosing. In addition, one 500 mg/kg female rat was euthanized in extremis on day 2. Clinical signs observed during the 14-day observation period included slight to severe weakness, prostration, stumbling, a reduced amount or lack of feces, inguinal haircoat wet with urine, red urine, dehydration, gasping, and red staining of hair of face, hair of /front legs/, and skin of front paws. Severe weakness and prostration were noted only in animals assigned to the 1000 or 2000 mg/kg dose groups which subsequently died. Transient slight weakness was observed for all 500 mg/kg animals and transient moderate weakness was observed for the surviving 1000 mg/kg animals on the day of dosing (day 0). Stumbling, which was observed for animals from all dose groups on the day of dosing, was either transient or observed prior to death. All surviving male rats appeared clinically

normal by day 2 and all surviving female rats appeared clinically normal by day 4. Since red urine was noted for some animals, urine was tested for the presence of blood using a semi-quantitative dipstick (N-Multistix). The urine from all rats with red discolored urine, produced a positive response with the N-Multistix. The urine from approximately half of the rats which did not have red urine produced a positive response with the N-Multistix. A positive N-Multistix response in the absence of red discolored urine was considered indicative of levels of blood in the urine too low to produce visible color changes. All animals which survived to scheduled necropsy gained weight during both weeks of the study. The test substance was a gastric irritant as evidenced by edema of the glandular gastric mucosa for one 1000 mg/kg rat which died on day 1. In addition, red discoloration of the urine in the urinary bladder observed for four 1000 mg/kg rats which died on day 1 was considered treatment-related, although the source of discoloration was not determined. No other treatment-related changes were detected for the other 1000 mg/kg or for any 500 or 2000 mg/kg rats during the necropsy examinations and no treatment-related changes were observed during the histopathology examinations. /Crude 4-methylcyclohexanemethanol/[Eastman Kodak Company; Crude MCHM Acute oral toxicity study in the rat (Final Report) p. 6 (1998). Available from, as of January 17, 2014: http://www.eastman.com/Pages/Eastman-Crude-MCHM-Studies.aspx] **PEER REVIEWED**

/LABORATORY ANIMALS: Subchronic or Prechronic Exposure/ Dose levels of 0,

25, 100, and 400 mg/kg/day were chosen for the four week study ... . In the four-week study, the test article was administered five days per week by gavage in corn oil to groups of five male and five female rats /(CD (SD) BR) from Charles River Laboratories/. No mortality was observed during this study. Minimal reductions in body weight growth were present for both male and female rats given the high-dose of the test article. These differences were not statistically significant. At lower dose levels, no consistent effect was noted. Males given the lower doses weighed slightly less than their control group while females weighed slightly more. Feed consumption was unaffected by administration of the test material. Sialorrhea after dose administration occurred frequently in the 400 mg/kg male and female dose groups from days 14 to 28. Transient depression of activity occurred in one 400 mg/kg female animal on day 3 of the study. These were the only two treatment-related clinical observations noted. Hematologic changes indicative of minimal anemia were observed in the 400 mg/kg female group. These changes included a significantly decreased mean red blood cell count relative to control group, and lower mean values for hemoglobin and hematocrit. In the absence of evidence of increased red blood cell destruction or turnover, these results suggest an interference with erythropoiesis rather than a direct effect on circulating red blood cells. Male and female rats from the 400 mg/kg dose group had significant increases in mean serum creatinine levels relative to their respective control groups, although the differences were not clearly of biological significance as urea nitrogen levels were not similarly increased. Microscopic examination of the kidneys of the 400 mg/kg animals revealed scattered areas of degeneration of the proximal

convoluted tubules in 2 out of 5 animals of each sex. While mean relative kidney weights of all male treatment groups were statistically significantly heavier than their control group, the difference did not fit a dose-related pattern. Male rats from the 400 mg/kg dose group had significantly higher mean serum aspartate transaminase (AST) and sorbitol dehydrogenase (SDH) levels when compared to their control group. While the high-dose female group did not exhibit similar increases, one of the high-dose females did have a elevated SDH level and the mean relative liver weight for the female high-dose group was statistically significantly increased at the 400 mg/kg dose level. Microscopic examination of the livers from 400 mg/kg animals of both sexes revealed increased severity and wider distribution of chronic focal inflammation in three males and two females when they were compared to their control group. In summary, administration of 400 mg/kg/day of the test article for four weeks was associated with erythropoietic, kidney, and liver effects. None of these effects were indicative of more than minor toxicity, and all were most likely reversible. The no-observed-effect level for this subacute toxicity study was 100 mg/kg/day.[Eastman Kodak Company; Four-week oral toxicity study of 4-methylcyclohexane methanol in the rat. p. 10 (1990). Available from, as of January 17, 2014: http://www.eastman.com/Pages/Eastman-Crude-MCHM-Studies.aspx] **PEER REVIEWED**

/LABORATORY ANIMALS: Subchronic or Prechronic Exposure/ Repeated skin irritation in guinea pigs /nine daily applications over a period of eleven

days/. There was exacerbation of the irritant response with repeated application of the test material.[Eastman Kodak Company; Acute toxicity of 4-methylcyclohexane methanol p. 13 (1990). Available from, as of January 17, 2014: http://www.eastman.com/Pages/Eastman-Crude-MCHM-Studies.aspx]
PEER REVIEWED

/LABORATORY ANIMALS: Subchronic or Prechronic Exposure/ Groups of five male and five female Sprague-Dawley rats were treated topically with 2000, 500, 100, or 0 mg/kg of test substance /crude 4-methylcyclohexanemethanol/ 6 hours per day for 13 consecutive weekdays. The test substance, a clear liquid, was administered as received under a semi-occlusive wrap. Elizabethan collars were placed around each animal's neck immediately after removal of the test substance and the associated wrapping material. The collars were removed the following morning. No mortality was observed. Animals were observed daily for clinical signs of toxicity. Test substance-related clinical abnormalities were limited to erythema, desquamation, and crust/scale formation at the test substance application site with minimal to moderate severities for the high-dose group and minimal to minor severities for the mid- and low-dose groups. Body weights and feed consumption were measured at least weekly. Mean body weights and mean feed consumption were comparable among the groups. On day 13, all animals were placed in metabolism cages for the collection of urine. No blood was detected in the urine, and urine sediment was unremarkable. At study termination, animals were anesthetized with carbon dioxide, and blood was obtained from the posterior vena cava for clinical chemistry and hematology analyses. Fasted body weight and liver, kidney and spleen

weights were measured at necropsy. The mean serum phosphorus level was lower ($p < or = 0.05$) for the high-dose male group, and the mean serum triglyceride level was higher ($p < or = 0.05$) for the high-dose female group when compared with the control group. There were no other differences in hematology or clinical chemistry parameters between treated and control groups. Mean relative (to body weight) liver weights were elevated ($p < or = 0.05$) for the high-dose female group when compared with the control group. The mean terminal body weights and all other organ weights for male and female rats were comparable among the groups. The liver, kidney, spleen, sternum (with bone marrow), and gross lesions were collected in 10% formalin. All tissues collected, except gross lesions of the skin, from the high-dose and control groups were examined microscopically. In addition, all gross lesions, except skin, were examined microscopically for the mid- and low-dose groups. Test substance-related lesions observed at the time of necropsy were limited to erythema and desquamation of the skin at the application site for the high-dose group and desquamation of the skin at the application site for the mid- and low-dose groups. All other lesions were considered incidental to exposure to the test substance. No treatment-related microscopic changes were observed. Based on dermal irritation observed at all treatment levels, a no-observed-effect level (NOEL) was not determined. However, based on the absence of significant histopathologic and serum clinical chemistry changes, 2000 mg/kg was considered to be the no-observed-adverse-effect level (NOAEL) for systemic toxicity /Crude 4-methylcyclohexanemethanol/[Eastman Kodak Company; Crude MCHM A two-week

dermal toxicity study in the rat (Final Report). p. 7 (1999). Available from, as of January 17, 2014: http://www.eastman.com/Pages/Eastman-Crude-MCHM-Studies.aspx] **PEER REVIEWED**

/GENOTOXICITY/ The tester strains used in the mutagenicity study were Salmonella typhimurium tester stains TA98, TA100, TA1535, TA1537, and Escherichia coli tester strain WP2uvrA(pKM101). The assay was conducted with six doses of test article /crude 4-methylcyclohexanemethanol/ in both the presence and absence of S9 mix with concurrent vehicle and positive controls using three plates per dose. The doses tested were 5000, 2500, 1000, 500, 250, and 100 ug per plate in both the presence and absence of S9 mix. The results of the initial mutagenicity assay were confirmed in an independent experiment. The results of the Salmonella-Escherichia coli/Mammalian-Microsome Reverse Mutation Assay with a Confirmatory Assay indicate that under the conditions of this study, /the/ test article did not cause a positive increase in the number of revertants per plate of any of the tester strains either in the presence or absence of microsomal enzymes prepared from Aroclor-induced rat liver (S9). /Crude 4-methylcyclohexanemethanol/[Covance Laboratories, Inc.; Mutagenicity test with EC 97-0216, Crude MCHM in the Salmonella-Escherichia coli/Mammalian microsome reverse mutation assay with a confirmatory assay (Final Report) p. 6 (1997). Available from, as of January 17, 2014: http://www.eastman.com/Pages/Eastman-Crude-MCHM-Studies.aspx] **PEER REVIEWED**

NON-HUMAN TOXICITY VALUES:

LD50 Rats dermal 3.6 mL/kg[Eastman Kodak Company; Acute toxicity of 4-methylcyclohexane methanol p. 13 (1990). Available from, as of January 17, 2014: http://www.eastman.com/Pages/Eastman-Crude-MCHM-Studies.aspx] **PEER REVIEWED**

LD50 Rats female oral 884 mg/kg[Eastman Kodak Company; Acute toxicity of 4-methylcyclohexane methanol p. 13 (1990). Available from, as of January 17, 2014: http://www.eastman.com/Pages/Eastman-Crude-MCHM-Studies.aspx] **PEER REVIEWED**

LD50 Rats male oral 1768 mg/kg[Eastman Kodak Company; Acute toxicity of 4-methylcyclohexane methanol p. 13 (1990). Available from, as of January 17, 2014: http://www.eastman.com/Pages/Eastman-Crude-MCHM-Studies.aspx] **PEER REVIEWED**

LD50 Rats dermal > 2000 mg/kg[Eastman Kodak Company; Crude MCHM Acute dermal toxicity study in the rat (Final report) p. 6 (1998). Available from, as of January 17, 2014: http://www.eastman.com/Pages/Eastman-Crude-MCHM-Studies.aspx] **PEER REVIEWED**

LD50 Rats male oral 933 mg/kg[Eastman Kodak Company; Crude MCHM Acute oral toxicity study in the rat (Final Report) p. 6 (1998). Available from, as of January 17, 2014:

http://www.eastman.com/Pages/Eastman-Crude-MCHM-Studies.aspx] **PEER REVIEWED**

LD50 Rats female oral 707 mg/kg[Eastman Kodak Company; Crude MCHM Acute oral toxicity study in the rat (Final Report) p. 6 (1998). Available from, as of January 17, 2014: http://www.eastman.com/Pages/Eastman-Crude-MCHM-Studies.aspx] **PEER REVIEWED**

LD50 Rats combined sexes oral 825 mg/kg[Eastman Kodak Company; Crude MCHM Acute oral toxicity study in the rat (Final Report) p. 6 (1998). Available from, as of January 17, 2014: http://www.eastman.com/Pages/Eastman-Crude-MCHM-Studies.aspx] **PEER REVIEWED**

ECOTOXICITY VALUES:

LC50; Species: /Pimephales promelas/ (Fathead minnow); Conditions: freshwater, static; Concentration 54.7 mg/L for 96 hr[Eastman Kodak; Crude MCHM An acute aquatic effects test with Fathead minnow, Pimephales prolmelas (Final Report) p.6 (1998). Available from, as of January 17, 2014: http://www.eastman.com/Pages/Eastman-Crude-MCHM-Studies.aspx] **PEER REVIEWED**

EC50; Species: Daphnia magna /(Water flea)/; Conditions: freshwater, static; Concentration: 98.1 mg/L for 48 hr[Eastman Kodak; Crude MCHM An acute aquatic effects test with the Daphnid, Daphnia magna (Final Report)

p.6 (1998). Available from, as of January 17, 2014:

http://www.eastman.com/Pages/Eastman-Crude-MCHM-Studies.aspx] **PEER REVIEWED**

METABOLISM/PHARMACOKINETICS:

PHARMACOLOGY:

ENVIRONMENTAL FATE & EXPOSURE:

ENVIRONMENTAL FATE/EXPOSURE SUMMARY:

4-Methylcyclohexanemethanol's production and use as a frother agent, reagent, and as a byproduct in the production of dimethyl hexahydroterephthalate may result in its release to the environment through various waste streams. If released to air, an estimated vapor pressure of 5.8X10-2 mm Hg at 25 deg C indicates 4-methylcyclohexanemethanol will exist solely as a vapor in the atmosphere. Vapor-phase 4-methylcyclohexanemethanol will be degraded in the atmosphere by reaction with photochemically-produced hydroxyl

radicals; the half-life for this reaction in air is estimated to be 1 day. 4-Methylcyclohexanemethanol does not contain chromophores that absorb at wavelengths > 290 nm and, therefore, is not expected to be susceptible to direct photolysis by sunlight. If released to soil, 4-methylcyclohexanemethanol is expected to have very high mobility based upon an estimated Koc of 34. Volatilization from moist soil surfaces is expected to be an important fate process based upon an estimated Henry's Law constant of 6.4X10-6 atm-cu m/mole. 4-Methylcyclohexanemethanol is not expected to volatilize from dry soil surfaces based upon its vapor pressure. Utilizing the modified Sturm test, 53% biodegradation was obtained in 4 weeks indicating that biodegradation is not an important environmental fate process in soil or water. If released into water, 4-methylcyclohexanemethanol is not expected to adsorb to suspended solids and sediment based upon the estimated Koc. Volatilization from water surfaces is expected to be an important fate process based upon this compound's estimated Henry's Law constant. Estimated volatilization half-lives for a model river and model lake are 7 days and 51 days, respectively. An estimated BCF of 22 suggests the potential for bioconcentration in aquatic organisms is low. Hydrolysis is not expected to be an important environmental fate process since this compound lacks functional groups that hydrolyze under environmental conditions (pH 5 to 9). Occupational exposure to 4-methylcyclohexanemethanol may occur through inhalation and dermal contact with this compound at workplaces where 4-methylcyclohexanemethanol is produced or used. Populations in the vicinity of a spill site may be exposed to 4-methylcyclohexanemethanol via ingestion of and dermal contact with contaminated water. (SRC) **PEER

REVIEWED**

PROBABLE ROUTES OF HUMAN EXPOSURE:

Occupational exposure to 4-methylcyclohexanemethanol may occur through inhalation and dermal contact with this compound at workplaces where 4-methylcyclohexanemethanol is produced or used. Populations in the vicinity of a spill site may be exposed to 4-methylcyclohexanemethanol via ingestion of and dermal contact with contaminated water. (SRC) **PEER REVIEWED**

ARTIFICIAL POLLUTION SOURCES:

4-Methylcyclohexanemethanol's production and use as a mineral frother(1), reagent(2), and as a byproduct in the production of dimethyl hexahydroterephthalate(3) may result in its release to the environment through various waste streams(SRC).[(1) US EPA; Non-Confidential 2006 Inventory Update Reporting. National Chemical Information. Cyclohexanemethanol, 4-methyl- (34885-03-5). Available from, as of Jan 10, 2014: http://cfpub.epa.gov/iursearch/index.cfm (2) Reagent [CIT TCI Europe N.V.; Safety Data Sheet for 4-Methyl-1-cyclohexanemethanol (cis- and trans- mixture) (34885-03-5). Product Code M1412. Revision Number: 5; Revision Date: 12/27/2013. Available from, as of Jan 13, 2014: http://www.tcichemicals.com/en/eu/ (3) Werle P et al; Alcohols, Polyhydric. Ullmann's Encyclopedia of Industrial Chemistry. 7th ed. (1999-2014). New York, NY: John Wiley & Sons. Online Posting Date: 15 Jul 2008]] **PEER REVIEWED**

ENVIRONMENTAL FATE:

TERRESTRIAL FATE: Based on a classification scheme(1), an estimated Koc value of 34(SRC), determined from a structure estimation method(2), indicates that 4-methylcyclohexanemethanol is expected to have very high mobility in soil(SRC). Volatilization of 4-methylcyclohexanemethanol from moist soil surfaces is expected to be an important fate process(SRC) given an estimated Henry's Law constant of 6.4X10-6 atm-cu m/mole(SRC), using a fragment constant estimation method(3). 4-Methylcyclohexanemethanol is not expected to volatilize from dry soil surfaces(SRC) based upon an estimated vapor pressure of 5.8X10-2 mm Hg at 25 deg C(SRC), determined from a fragment constant method(2). Biodegradation data in soil were not available(SRC, 2014). Utilizing the modified Sturm test, 53% biodegradation was obtained in 4 weeks(4) indicating that biodegradation is not an important environmental fate process in soil(SRC).[(1) Swann RL et al; Res Rev 85: 17-28 (1983) (2) US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.1. Nov, 2012. Available from, as of Jan 10, 2014: http://www.epa.gov/oppt/exposure/pubs/episuitedl.htm (3) Meylan WM, Howard PH; Environ Toxicol Chem 10: 1283-93 (1991) (4) Eastman; Eastman Crude MCHM Studies. Available from, as of Jan 16, 2014: http://www.eastman.com/Pages/Eastman-Crude-MCHM-Studies.aspx] **PEER REVIEWED**

AQUATIC FATE: Based on a classification scheme(1), an estimated Koc value of 34(SRC), determined from a structure estimation method(2), indicates that 4-methylcyclohexanemethanol is not expected to adsorb to suspended

solids and sediment(SRC). Volatilization from water surfaces is expected(3) based upon an estimated Henry's Law constant of 6.4X10-6 atm-cu m/mole(SRC), developed using a fragment constant estimation method(4). Using this Henry's Law constant and an estimation method(3), volatilization half-lives for a model river and model lake are 7 and 51 days, respectively(SRC). According to a classification scheme(5), an estimated BCF of 22(SRC), from an estimated log Kow of 2.55(2) and a regression-derived equation(2), suggests the potential for bioconcentration in aquatic organisms is low(SRC). Utilizing the modified Sturm test, 53% biodegradation was obtained in 4 weeks(6) indicating that biodegradation is not an important environmental fate process in water(SRC).[(1) Swann RL et al; Res Rev 85: 17-28 (1983) (2) US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.1. Nov, 2012. Available from, as of Jan 10, 2014: http://www.epa.gov/oppt/exposure/pubs/episuitedl.htm (3) Lyman WJ et al; Handbook of Chemical Property Estimation Methods. Washington, DC: Amer Chem Soc pp. 15-1 to 15-29 (1990) (4) Meylan WM, Howard PH; Environ Toxicol Chem 10: 1283-93 (1991) (5) Franke C et al; Chemosphere 29: 1501-14 (1994) (6) Eastman; Eastman Crude MCHM Studies. Available from, as of Jan 16, 2014: http://www.eastman.com/Pages/Eastman-Crude-MCHM-Studies.aspx] **PEER REVIEWED**

ATMOSPHERIC FATE: According to a model of gas/particle partitioning of semivolatile organic compounds in the atmosphere(1),

4-methylcyclohexanemethanol, which has an estimated vapor pressure of 5.8X10-2 mm Hg at 25 deg C(SRC), determined from a fragment constant method(2), is expected to exist solely as a vapor in the ambient atmosphere. Vapor-phase 4-methylcyclohexanemethanol is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals(SRC); the half-life for this reaction in air is estimated to be 1 day(SRC), calculated from its rate constant of 1.7X10-11 cu cm/molecule-sec at 25 deg C(SRC) that was derived using a structure estimation method(3). 4-Methylcyclohexanemethanol does not contain chromophores that absorb at wavelengths > 290 nm(4) and, therefore, is not expected to be susceptible to direct photolysis by sunlight(SRC).[(1) Bidleman TF; Environ Sci Technol 22: 361-367 (1988) (2) US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.1. Nov, 2012. Available from, as of Jan 10, 2014: http://www.epa.gov/oppt/exposure/pubs/episuitedl.htm (3) Meylan WM, Howard PH; Chemosphere 26: 2293-99 (1993) (4) Lyman WJ et al; Handbook of Chemical Property Estimation Methods. Washington, DC: Amer Chem Soc pp. 8-12 (1990)] **PEER REVIEWED**

ENVIRONMENTAL BIODEGRADATION:

AEROBIC: 4-Methylcyclohexanemethanol as crude material (contains a high amount of impurities including water), present at 20 mg DOC/L, showed 53% degradation in 4 weeks using an activated sludge inoculum in the OECD 301B (Ready Biodegradabilty test) using the CO2 Evolution Test (Modified Sturm). There was a lag phase of 9 days before biodegradation reached 10% and the test substance did not reach the 60% biodegradation within the first 10 days. Crude 4-methylcyclohexanemethanol exhibited inhibitory

effects using 5- and 20-day BOD tests. Therefore, this compound is not expected to biodegrade rapidly(1).[(1) Eastman; Eastman Crude MCHM Studies. Available from, as of Jan 16, 2014: http://www.eastman.com/Pages/Eastman-Crude-MCHM-Studies.aspx] **PEER REVIEWED**

ENVIRONMENTAL ABIOTIC DEGRADATION:

The rate constant for the vapor-phase reaction of 4-methylcyclohexanemethanol with photochemically-produced hydroxyl radicals has been estimated as 1.7X10-11 cu cm/molecule-sec at 25 deg C(SRC) using a structure estimation method(1). This corresponds to an atmospheric half-life of about 1 day at an atmospheric concentration of 5X10+5 hydroxyl radicals per cu cm(1). 4-Methylcyclohexanemethanol is not expected to undergo hydrolysis in the environment due to the lack of functional groups that hydrolyze under environmental conditions(2). 4-Methylcyclohexanemethanol does not contain chromophores that absorb at wavelengths > 290 nm(2) and, therefore, is not expected to be susceptible to direct photolysis by sunlight(SRC).[(1) US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.1. Nov, 2012. Available from, as of Jan 10, 2014: http://www.epa.gov/oppt/exposure/pubs/episuitedl.htm/ (2) Lyman WJ et al; Handbook of Chemical Property Estimation Methods. Washington, DC: Amer Chem Soc pp. 7-4, 7-5, 8-12 (1990)] **PEER REVIEWED**

ENVIRONMENTAL BIOCONCENTRATION:

An estimated BCF of 22 was calculated in fish for

4-methylcyclohexanemethanol(SRC), using an estimated log Kow of 2.55(1) and a regression-derived equation(1). According to a classification scheme(2), this BCF suggests the potential for bioconcentration in aquatic organisms is low(SRC).[(1) US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.1. Nov, 2012. Available from, as of Jan 10, 2014: http://www.epa.gov/oppt/exposure/pubs/episuitedl.htm/ (2) Franke C et al; Chemosphere 29: 1501-14 (1994)] **PEER REVIEWED**

SOIL ADSORPTION/MOBILITY:

Using a structure estimation method based on molecular connectivity indices(1), the Koc of 4-methylcyclohexanemethanol can be estimated to be 34(SRC). According to a classification scheme(2), this estimated Koc value suggests that 4-methylcyclohexanemethanol is expected to have very high mobility in soil.[(1) US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.1. Nov, 2012. Available from, as of Jan 10, 2014: http://www.epa.gov/oppt/exposure/pubs/episuitedl.htm (2) Swann RL et al; Res Rev 85: 17-28 (1983)] **PEER REVIEWED**

VOLATILIZATION FROM WATER/SOIL:

The Henry's Law constant for 4-methylcyclohexanemethanol is estimated as 6.4X10-6 atm-cu m/mole(SRC) using a fragment constant estimation method(1). This Henry's Law constant indicates that 4-methylcyclohexanemethanol is expected to volatilize from water surfaces(2). Based on this Henry's Law constant, the volatilization half-life from a model river (1 m deep, flowing 1 m/sec, wind velocity of 3 m/sec)(2) is estimated as 7 days(SRC). The volatilization half-life from

a model lake (1 m deep, flowing 0.05 m/sec, wind velocity of 0.5 m/sec)(2) is estimated as 51 days(SRC). 4-Methylcyclohexanemethanol is not expected to volatilize from dry soil surfaces(SRC) based upon an estimated vapor pressure of 5.8X10-2 mm Hg(SRC), determined from a fragment constant method(3).[(1) Meylan WM, Howard PH; Environ Toxicol Chem 10: 1283-93 (1991) (2) Lyman WJ et al; Handbook of Chemical Property Estimation Methods. Washington, DC: Amer Chem Soc pp. 15-1 to 15-29 (1990) (3) US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.1. Nov, 2012. Available from, as of Jan 10, 2014: http://www.epa.gov/oppt/exposure/pubs/episuitedl.htm] **PEER REVIEWED**

ENVIRONMENTAL STANDARDS & REGULATIONS:

CHEMICAL/PHYSICAL PROPERTIES:

MOLECULAR FORMULA:

C8-H16-O[National Library of Medicine, SIS; ChemIDplus Lite Record for 4-Methylcyclohexanemethanol (CAS 34885-03-5). Available from, as of January 10, 2014: http://chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp] **PEER REVIEWED**

MOLECULAR WEIGHT:

128.21[Lide, D.R., G.W.A. Milne (eds.). Handbook of Data on Organic Compounds. Volume I. 3rd ed. CRC Press, Inc. Boca Raton ,FL. 1994., p. V3: 2228] **PEER REVIEWED**

COLOR/FORM:

Clear, colorless liquid[TCI Europe; MSDS 4-Methyl-1-cyclohexanemethanol (cis- and trans- mixture). M1412. (34885-03-5). Available from as of Jan 10, 2014: http://www.tcichemicals.com/en/eu/] **PEER REVIEWED**

ODOR:

Almost odorless[TCI Europe; MSDS 4-Methyl-1-cyclohexanemethanol (cis- and trans- mixture). M1412. (34885-03-5). Available from as of Jan 10, 2014: http://www.tcichemicals.com/en/eu/] **PEER REVIEWED**

DENSITY/SPECIFIC GRAVITY:

0.9074 g/cu cm at 20 deg C[Lide, D.R., G.W.A. Milne (eds.). Handbook of Data on Organic Compounds. Volume I. 3rd ed. CRC Press, Inc. Boca Raton ,FL. 1994., p. V3: 2228] **PEER REVIEWED**

OCTANOL/WATER PARTITION COEFFICIENT:

log Kow = 2.55 (est)[US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.1. Nov, 2012. Available from, as of Jan 10, 2014: http://www.epa.gov/oppt/exposure/pubs/episuitedl.htm] **PEER REVIEWED**

SOLUBILITIES:

In water, 2.024X10+3 mg/L at 25 deg C (est)[US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.1. Nov, 2012. Available from, as of Jan 10, 2014: http://www.epa.gov/oppt/exposure/pubs/episuitedl.htm] **PEER REVIEWED**

VAPOR PRESSURE:

5.8X10-2 mm Hg at 25 deg C (est)[US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.1. Nov, 2012. Available from, as of Jan 10, 2014: http://www.epa.gov/oppt/exposure/pubs/episuitedl.htm] **PEER REVIEWED**

OTHER CHEMICAL/PHYSICAL PROPERTIES:

BP: 75 deg C at 2.5 mm Hg[Lide, D.R., G.W.A. Milne (eds.). Handbook of Data on Organic Compounds. Volume I. 3rd ed. CRC Press, Inc. Boca Raton ,FL. 1994., p. V3: 2228] **PEER REVIEWED**

Straw colored liquid; slight sweet organic odor. BP: > 10 deg C; Specific gravity: 0.9-0.92 at 16 deg C. Slightly soluble in water. Viscosity: 19 cPs at 22 deg C; 45 cPs at 0 deg C /Flottec FX140-04 Frother/[Flottec; Flottec FX 140-04 Frother. Material Safety Data Sheet. March 2, 2013. Available from, as of Jan 14, 2014: http://www.flottec.com/Prd/Default.asp] **PEER REVIEWED**

Henry's Law constant = 6.43X10-6 atm-cu m/mol at 25 deg C (est)[US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.1. Nov, 2012. Available from, as of Jan 10, 2014:

http://www.epa.gov/oppt/exposure/pubs/episuitedl.htm] **PEER REVIEWED**

Hydroxyl radical reaction rate constant = 1.65X10-11 cu cm/molec-sec at 25 deg C (est)[US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.1. Nov, 2012. Available from, as of Jan 10, 2014: http://www.epa.gov/oppt/exposure/pubs/episuitedl.htm] **PEER REVIEWED**

CHEMICAL SAFETY & HANDLING:

SKIN, EYE AND RESPIRATORY IRRITATIONS:

A strong skin irritant[Eastman Kodak Company; Acute toxicity of 4-methylcyclohexane methanol p. 13 (1990). Available from, as of January 17, 2014 http://www.eastman.com/Pages/Eastman-Crude-MCHM-Studies.aspx] **PEER REVIEWED**

A moderate eye irritant[Eastman Kodak Company; Acute toxicity of 4-methylcyclohexane methanol p. 13 (1990). Available from, as of January 17, 2014 http://www.eastman.com/Pages/Eastman-Crude-MCHM-Studies.aspx] **PEER REVIEWED**

FLASH POINT:

112.8 deg C (Setaflash Closed Cup) /Crude 4-methylcyclohexanemethanol/[Eastman Chemical Company; Safety Data Sheet for Crude MCHM. Product Identification Number EAN 972790. 18717-00,

P1871700, P18717ET, P18717YZ. Revision Date 8/18/2011; Version 2.0.

Available from, as of January 17, 2014:

http://ws.eastman.com/ProductCatalogApps/PageControllers/MSDSAll_PC.aspx?product=71014291]

PEER REVIEWED

FIRE FIGHTING PROCEDURES:

When extinguishing fire, be sure to wear personal protective

equipment.[TCI Europe N.V.; Safety Data Sheet for

4-Methyl-1-cyclohexanemethanol (cis- and trans- mixture) (34885-03-5).

Product Code M1412. Revision Number: 5; Revision Date: 12/27/2013.

Available from, as of January 13, 2014:

http://www.tcichemicals.com/en/eu/] **PEER REVIEWED**

Fire-extinguishing work is done from the windward and the suitable

fire-extinguishing method according to the surrounding situation is used.

Uninvolved persons should evacuate to a safe place. In case of fire in the

surroundings: Remove movable containers if safe to do so.[TCI Europe N.V.;

Safety Data Sheet for 4-Methyl-1-cyclohexanemethanol (cis- and trans-

mixture) (34885-03-5). Product Code M1412. Revision Number: 5; Revision

Date: 12/27/2013. Available from, as of January 13, 2014:

http://www.tcichemicals.com/en/eu/] **PEER REVIEWED**

Dry chemical, foam, water spray, carbon dioxide.[TCI Europe N.V.; Safety

Data Sheet for 4-Methyl-1-cyclohexanemethanol (cis- and trans- mixture)

(34885-03-5). Product Code M1412. Revision Number: 5; Revision Date:

12/27/2013. Available from, as of January 13, 2014:

http://www.tcichemicals.com/en/eu/] **PEER REVIEWED**

TOXIC COMBUSTION PRODUCTS:

Carbon monoxide, Carbon dioxide[TCI Europe N.V.; Safety Data Sheet for

4-Methyl-1-cyclohexanemethanol (cis- and trans- mixture) (34885-03-5).

Product Code M1412. Revision Number: 5; Revision Date: 12/27/2013.

Available from, as of January 13, 2014:

http://www.tcichemicals.com/en/eu/] **PEER REVIEWED**

HAZARDOUS REACTIVITIES & INCOMPATIBILITIES:

Oxidizing agents[TCI Europe N.V.; Safety Data Sheet for

4-Methyl-1-cyclohexanemethanol (cis- and trans- mixture) (34885-03-5).

Product Code M1412. Revision Number: 5; Revision Date: 12/27/2013.

Available from, as of January 13, 2014:

http://www.tcichemicals.com/en/eu/] **PEER REVIEWED**

OTHER HAZARDOUS REACTION:

/Conditions to avoid/ Open flame[TCI Europe N.V.; Safety Data Sheet for

4-Methyl-1-cyclohexanemethanol (cis- and trans- mixture) (34885-03-5).

Product Code M1412. Revision Number: 5; Revision Date: 12/27/2013.

Available from, as of January 13, 2014:

http://www.tcichemicals.com/en/eu/] **PEER REVIEWED**

PROTECTIVE EQUIPMENT & CLOTHING:

Protective clothing. Protective boots, if the situation requires.[TCI

Europe N.V.; Safety Data Sheet for 4-Methyl-1-cyclohexanemethanol (cis- and trans- mixture) (34885-03-5). Product Code M1412. Revision Number: 5; Revision Date: 12/27/2013. Available from, as of January 13, 2014: http://www.tcichemicals.com/en/eu/] **PEER REVIEWED**

Safety glasses. A face-shield, if the situation requires.[TCI Europe N.V.; Safety Data Sheet for 4-Methyl-1-cyclohexanemethanol (cis- and trans- mixture) (34885-03-5). Product Code M1412. Revision Number: 5; Revision Date: 12/27/2013. Available from, as of January 13, 2014: http://www.tcichemicals.com/en/eu/] **PEER REVIEWED**

Protective gloves.[TCI Europe N.V.; Safety Data Sheet for 4-Methyl-1-cyclohexanemethanol (cis- and trans- mixture) (34885-03-5). Product Code M1412. Revision Number: 5; Revision Date: 12/27/2013. Available from, as of January 13, 2014: http://www.tcichemicals.com/en/eu/] **PEER REVIEWED**

Vapor respirator.[TCI Europe N.V.; Safety Data Sheet for 4-Methyl-1-cyclohexanemethanol (cis- and trans- mixture) (34885-03-5). Product Code M1412. Revision Number: 5; Revision Date: 12/27/2013. Available from, as of January 13, 2014: http://www.tcichemicals.com/en/eu/] **PEER REVIEWED**

Use personal protective equipment. Keep people away from and upwind of spill/leak. Ensure adequate ventilation. Entry to non-involved personnel

should be controlled around the leakage area by roping off...[TCI Europe N.V.; Safety Data Sheet for 4-Methyl-1-cyclohexanemethanol (cis- and trans- mixture) (34885-03-5). Product Code M1412. Revision Number: 5; Revision Date: 12/27/2013. Available from, as of January 13, 2014: http://www.tcichemicals.com/en/eu/] **PEER REVIEWED**

PREVENTIVE MEASURES:

Remove all sources of ignition. Fire-extinguishing devices should be prepared in case of a fire. Use sparkproof tools and explosion-proof equipment.[TCI Europe N.V.; Safety Data Sheet for 4-Methyl-1-cyclohexanemethanol (cis- and trans- mixture) (34885-03-5). Product Code M1412. Revision Number: 5; Revision Date: 12/27/2013. Available from, as of January 13, 2014: http://www.tcichemicals.com/en/eu/] **PEER REVIEWED**

Install a closed system or local exhaust as possible so that workers should not be exposed directly. Also install safety shower and eye bath.[TCI Europe N.V.; Safety Data Sheet for 4-Methyl-1-cyclohexanemethanol (cis- and trans- mixture) (34885-03-5). Product Code M1412. Revision Number: 5; Revision Date: 12/27/2013. Available from, as of January 13, 2014: http://www.tcichemicals.com/en/eu/] **PEER REVIEWED**

Use personal protective equipment. Keep people away from and upwind of spill/leak. Ensure adequate ventilation. Entry to non-involved personnel should be controlled around the leakage area by roping off...[TCI Europe

N.V.; Safety Data Sheet for 4-Methyl-1-cyclohexanemethanol (cis- and trans- mixture) (34885-03-5). Product Code M1412. Revision Number: 5; Revision Date: 12/27/2013. Available from, as of January 13, 2014: http://www.tcichemicals.com/en/eu/] **PEER REVIEWED**

Avoid contact with skin, eyes and clothing.[TCI Europe N.V.; Safety Data Sheet for 4-Methyl-1-cyclohexanemethanol (cis- and trans- mixture) (34885-03-5). Product Code M1412. Revision Number: 5; Revision Date: 12/27/2013. Available from, as of January 13, 2014: http://www.tcichemicals.com/en/eu/] **PEER REVIEWED**

Handling is performed in a well ventilated place. Wear suitable protective equipment. Prevent generation of vapour or mist. Keep away from flames and hot surfaces. Take measures to prevent the build up of electrostatic charge. Use explosion-proof equipment. Wash hands and face thoroughly after handling. Use a closed system, ventilation.[TCI Europe N.V.; Safety Data Sheet for 4-Methyl-1-cyclohexanemethanol (cis- and trans- mixture) (34885-03-5). Product Code M1412. Revision Number: 5; Revision Date: 12/27/2013. Available from, as of January 13, 2014: http://www.tcichemicals.com/en/eu/] **PEER REVIEWED**

SRP: The scientific literature for the use of contact lenses by industrial workers is inconsistent. The benefits or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the

exposure, the uses of other eye protection equipment, and the hygiene of the lenses. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases, contact lenses should not be worn. In any event, the usual eye protection equipment should be worn even when contact lenses are in place. **PEER REVIEWED**

SRP: Local exhaust ventilation should be applied wherever there is an incidence of point source emissions or dispersion of regulated contaminants in the work area. Ventilation control of the contaminant as close to its point of generation is both the most economical and safest method to minimize personnel exposure to airborne contaminants. Ensure that the local ventilation moves the contaminant away from the worker. **PEER REVIEWED**

STABILITY/SHELF LIFE:

Stable under proper conditions.[TCI Europe N.V.; Safety Data Sheet for 4-Methyl-1-cyclohexanemethanol (cis- and trans- mixture) (34885-03-5). Product Code M1412. Revision Number: 5; Revision Date: 12/27/2013. Available from, as of January 13, 2014: http://www.tcichemicals.com/en/eu/] **PEER REVIEWED**

STORAGE CONDITIONS:

Store away from incompatible materials such as oxidizing agents.[TCI Europe N.V.; Safety Data Sheet for 4-Methyl-1-cyclohexanemethanol (cis- and trans- mixture) (34885-03-5). Product Code M1412. Revision Number: 5;

Revision Date: 12/27/2013. Available from, as of January 13, 2014: http://www.tcichemicals.com/en/eu/] **PEER REVIEWED**

Keep container tightly closed. Store in a cool, dark and well-ventilated place.[TCI Europe N.V.; Safety Data Sheet for 4-Methyl-1-cyclohexanemethanol (cis- and trans- mixture) (34885-03-5). Product Code M1412. Revision Number: 5; Revision Date: 12/27/2013. Available from, as of January 13, 2014: http://www.tcichemicals.com/en/eu/] **PEER REVIEWED**

CLEANUP METHODS:

Prevent product from entering drains.[TCI Europe N.V.; Safety Data Sheet for 4-Methyl-1-cyclohexanemethanol (cis- and trans- mixture) (34885-03-5). Product Code M1412. Revision Number: 5; Revision Date: 12/27/2013. Available from, as of January 13, 2014: http://www.tcichemicals.com/en/eu/] **PEER REVIEWED**

Absorb spilled material in a suitable absorbent (e.g. rag, dry sand, earth, saw-dust). In case of large amount of spillage, contain a spill by bunding. Adhered or collected material should be promptly disposed of, in accordance with appropriate laws and regulations.[TCI Europe N.V.; Safety Data Sheet for 4-Methyl-1-cyclohexanemethanol (cis- and trans- mixture) (34885-03-5). Product Code M1412. Revision Number: 5; Revision Date: 12/27/2013. Available from, as of January 13, 2014: http://www.tcichemicals.com/en/eu/] **PEER REVIEWED**

DISPOSAL METHODS:

SRP: The most favorable course of action is to use an alternative chemical product with less inherent propensity for occupational harm/injury/toxicity or environmental contamination. Recycle any unused portion of the material for its approved use or return it to the manufacturer or supplier. Ultimate disposal of the chemical must consider: the material's impact on air quality; potential migration in soil or water; effects on animal and plant life; and conformance with environmental and public health regulations. **PEER REVIEWED**

SRP: Wastewater from contaminant suppression, cleaning of protective clothing/equipment, or contaminated sites should be contained and evaluated for subject chemical or decomposition product concentrations. Concentrations shall be lower than applicable environmental discharge or disposal criteria. Alternatively, pretreatment and/or discharge to a permitted wastewater treatment facility is acceptable only after review by the governing authority and assurance that "pass through" violations will not occur. Due consideration shall be given to remediation worker exposure (inhalation, dermal and ingestion) as well as fate during treatment, transfer and disposal. If it is not practicable to manage the chemical in this fashion, it must be evaluated in accordance with EPA 40 CFR Part 261, specifically Subpart B, in order to determine the appropriate local, state and federal requirements for disposal. **PEER REVIEWED**

OCCUPATIONAL EXPOSURE STANDARDS:

MANUFACTURING/USE INFORMATION:

MAJOR USES:

Industrial Function: flotation agent. /SRP: Used in the separation of usable coal from rocks, debris and cold dust./[US EPA; Non-Confidential 2006 Inventory Update Reporting. National Chemical Information. Cyclohexanemethanol, 4-methyl- (34885-03-5). Available from, as of January 10, 2014: http://cfpub.epa.gov/iursearch/index.cfm] **PEER REVIEWED**

Reagent[TCI Europe N.V.; Safety Data Sheet for 4-Methyl-1-cyclohexanemethanol (cis- and trans- mixture) (34885-03-5). Product Code M1412. Revision Number: 5; Revision Date: 12/27/2013. Available from, as of January 13, 2014: http://www.tcichemicals.com/en/eu/] **PEER REVIEWED**

MANUFACTURERS:

Eastman Chemical Co, Inc; 200 South Wilcox Dr., Kingsport, TN 37660-5147[US EPA; Chemical Data Reporting (CDR). Non-confidential 2012 Chemical Data Reporting information on chemical production and use in the

United Sates. Available from, as of Jan 10, 2014:
http://www.epa.gov/oppt/cdr/index.html] **PEER REVIEWED**

TCI Europe N.V., Boerenveldseweg 6, Haven 1063, B-2070 Zwijndrecht, The Netherlands[TCI Europe; MSDS 4-Methyl-1-cyclohexanemethanol (cis- and trans- mixture). M1412. (34885-03-5). Available from as of Jan 10, 2014:
http://www.tcichemicals.com/en/eu/] **PEER REVIEWED**

Flottec, LLC, 338 West Maint St, Boonton, NJ 07005 /Formulator/[Flottec; Flottec FX 140-04 Frother. Material Safety Data Sheet. March 2, 2013. Available from, as of Jan 14, 2014:
http://www.flottec.com/Prd/Default.asp] **PEER REVIEWED**

GENERAL MANUFACTURING INFORMATION:

/Byproduct in the production of/ dimethyl hexahydroterephthalate.[Werle P et al; Alcohols, Polyhydric. Ullmann's Encyclopedia of Industrial Chemistry. 7th ed. (1999-2014). New York, NY: John Wiley & Sons. Online Posting Date: 15 Jul 2008] **PEER REVIEWED**

FORMULATIONS/PREPARATIONS:

Flottec FX-140-04 Frother /Mixture of 10-20 weight, % of 4-Methylcyclohexanemethanol with other alcohols/[Flottec; Material Safety Data Sheet for Flottec FX-140-04 Frother, March 2, 2012; Available from, as of January 13, 2014 http://www.flottec.com/Prd/Default.asp] **PEER REVIEWED**

Crude MCHM (68-89% 4-methylcyclohexanemethanol; 4-22% 4-(methoxymethyl)cyclohexanemethanol; 4-10% water; 5% methyl 4-methylcyclohexanecarboxylate; 1% dimethyl 1,4-cyclohexanedicarboxylate; 1% methanol; 1-2% 1,4-cyclohexanedimethanol).[Eastman Chemical Company; Safety Data Sheet for Crude MCHM. Product Identification Number EAN 972790. 18717-00, P1871700, P18717ET, P18717YZ. Revision Date 8/18/2011; Version 2.0. Available from, as of January 17, 2014: http://ws.eastman.com/ProductCatalogApps/PageControllers/MSDSAll_PC.aspx?product=71014291] **PEER REVIEWED**

U. S. PRODUCTION:

Production volumes for non-confidential chemicals reported under the Inventory Update Rule.Year Production Range (pounds) 1986 No Reports 1990 No Reports 1994 No Reports 1998 No Reports 2002 > 1 million - 10 million [US EPA; Chemical Data Reporting. Non-confidential IUR Production Volume Information Submitted by Companies for Chemicals Under the 1986-2002 Inventory Update Rule (IUR). Cyclohexanemethanol, 4-methyl- (34885-03-5). Available from, as of January 10, 2014: http://epa.gov/cdr/tools/data/2002-vol.html] **PEER REVIEWED**

Production volume for non-confidential chemicals reported under the 2006 Inventory Update Rule. Chemical: Cyclohexanemethanol, 4-methyl-. Aggregated National Production Volume: 1 to < 10 million pounds.[US EPA; Non-Confidential 2006 Inventory Update Reporting. National Chemical Information. Cyclohexanemethanol, 4-methyl- (34885-03-5). Available from,

as of January 10, 2014: http://cfpub.epa.gov/iursearch/index.cfm] **PEER REVIEWED**

Non-confidential 2012 Chemical Data Reporting (CDR) information on the production and use of chemicals manufactured or imported into the United States. Chemical: Cyclohexanemethanol, 4-methyl-. National Production Volume: Withheld.[USEPA/Pollution Prevention and Toxics; 2012 Chemical Data Reporting Database. Cyclohexanemethanol, 4-methyl- (34885-03-5). Available from, as of January 13, 2014: http://java.epa.gov/oppt_chemical_search/] **PEER REVIEWED**

LABORATORY METHODS:

SPECIAL REFERENCES:

SYNONYMS AND IDENTIFIERS:

RELATED HSDB RECORDS:

5364 [1,4-CYCLOHEXANEDIMETHANOL]

5284 [DIMETHYL HEXAHYDROTEREPHTHALATE]

SYNONYMS:

Hexahydro-p-methylbenzyl alcohol[National Library of Medicine, SIS; ChemIDplus Lite Record for 4-Methylcyclohexanemethanol (CAS 34885-03-5). Available from, as of January 10, 2014: http://chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp] **PEER REVIEWED**

4-Methylcyclohexylcarbinol[National Library of Medicine, SIS; ChemIDplus Lite Record for 4-Methylcyclohexanemethanol (CAS 34885-03-5). Available from, as of January 10, 2014: http://chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp] **PEER REVIEWED**

4-Methylcyclohexane methanol[National Library of Medicine, SIS; ChemIDplus Lite Record for 4-Methylcyclohexanemethanol (CAS 34885-03-5). Available from, as of January 18, 2014: http://chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp] **PEER REVIEWED**

MCHM[National Library of Medicine, SIS; ChemIDplus Lite Record for 4-Methylcyclohexanemethanol (CAS 34885-03-5). Available from, as of January 10, 2014: http://chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp] **PEER REVIEWED**

(4-Methylcyclohexyl)methanol[National Library of Medicine, SIS; ChemIDplus Lite Record for 4-Methylcyclohexanemethanol (CAS 34885-03-5). Available

from, as of January 10, 2014:

http://chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp] **PEER REVIEWED**

p-Methylcyclohexanemethanol[National Library of Medicine, SIS; ChemIDplus Lite Record for 4-Methylcyclohexanemethanol (CAS 34885-03-5). Available from, as of January 10, 2014:

http://chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp] **PEER REVIEWED**

ASSOCIATED CHEMICALS:

4-(methoxymethyl)cyclohexanedimethanol; 98955-27-2

Methyl 4-methylcyclohexanecarboxylate; 51181-40-9

FORMULATIONS/PREPARATIONS:

Flottec FX-140-04 Frother /Mixture of 10-20 weight, % of 4-Methylcyclohexanemethanol with other alcohols/[Flottec; Material Safety Data Sheet for Flottec FX-140-04 Frother, March 2, 2012; Available from, as of January 13, 2014 http://www.flottec.com/Prd/Default.asp] **PEER REVIEWED**

Crude MCHM (68-89% 4-methylcyclohexanemethanol; 4-22% 4-(methoxymethyl)cyclohexanemethanol; 4-10% water; 5% methyl 4-methylcyclohexanecarboxylate; 1% dimethyl 1,4-cyclohexanedicarboxylate; 1% methanol; 1-2% 1,4-cyclohexanedimethanol).[Eastman Chemical Company; Safety Data Sheet for Crude MCHM. Product Identification Number EAN 972790. 18717-00, P1871700, P18717ET, P18717YZ. Revision Date 8/18/2011;

Version 2.0. Available from, as of January 17, 2014:

http://ws.eastman.com/ProductCatalogApps/PageControllers/MSDSAll_PC.aspx?product=71014291]

PEER REVIEWED

ADMINISTRATIVE INFORMATION:

HAZARDOUS SUBSTANCES DATABANK NUMBER: 8182

LAST REVISION DATE: 20140118

LAST REVIEW DATE: Reviewed by SRP on 1/17/2014

UPDATE HISTORY:

Field Update on 2014-01-29, 2 fields added/edited/deleted

Complete Update on 2014-01-18, 2 fields added/edited/deleted

Complete Update on 2014-01-17, 40 fields added/edited/deleted

Created 20140110