

Safety of Checkmate Chemicals Review of Material Safety Data Sheets (MSDS)

Checkmate LBAM-F is a biochemical pesticide designed for mating disruption of the light brown apple moth. In early November 2007 aerial spraying of the pesticide was conducted over residential areas in Santa Cruz County as part of an ongoing "eradication" program. Aerial sprayings in Monterey County in September, October and November of 2007 included the use of a similar pheromone pesticide Checkmate OLR-F. Neither product is registered with the EPA's Office of Pesticides for residential use but was granted an exemption from formal approval and safety studies through an emergency declaration under Section 18 of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and under the Code of Federal Regulations (CFR) part 166 (ref 10).

The Checkmate LBAM-F formulation includes two types of synthetic moth pheromones, as well as a variety of "inert" ingredients. Numerous safety and environmental concerns have been raised in relation to several of the "inert" ingredients in the formula. The following information was extracted directly from a variety of material safety data sheets (MSDS) and from other select sources as noted.

Polymethylene Polyphenyl Isocyanate (PPI): A starter ingredient for the crosslinked polyurea polymer according to Suterra is a respiratory irritant associated with occupational asthma (Haz-Map.com). Following the sprayings in Monterey and Santa Cruz Counties there were numerous reports of respiratory and asthma-like symptoms (HOPE website).

Tricapryl Methyl Ammonium Chloride: A surfactant used to change the surface tension of water to allow for the flow of the solution through the aerial spray nozzles. This material has been associated with increased blooming of zooplankton that gives rise to red tide. Following the spraying, hundreds of seabirds found dead or dying in the Monterey Bay were found to be covered with a waxy substance, which was determined by testing to be a surfactant protein. According to SIMoN (Sanctuary Integrated Monitoring Network for the Monterey Bay) surfactants act like a detergent to reduce the waterproofing ability of feathers. This same protein has also been associated with the recent red tide in the Monterey Bay. (www.mbnms-simon.org)

Sodium Phosphate: A pH buffer. This compound also has the potential to algal blooms if runoff concentrations are high enough. Following the spraying, a harmful algal bloom (red tide) described by a water specialist with the Santa Cruz County Environmental Health Services as "one of the more dramatic ones in recent memory", hit the Monterey Bay (11/13/07 Tom Ragan - Santa Cruz Sentinel Article)

Ammonium Phosphate: A pH buffer. This compound also has the potential to cause algal blooms if runoff concentrations are high enough. Also implicated in fish die-offs, including one that killed 20,000 fish following the accidental dropping of an ammonium phosphate based fire retardant in an Oregon river (Barnard 2007). Following the spraying, a harmful algal bloom (red tide) described by a water specialist with the Santa Cruz County Environmental Health Services as “one of the more dramatic ones in recent memory”, hit the Monterey Bay (11/13/07 Tom Ragan - Santa Cruz Sentinel Article)

1,2-benzisothiazolin-3-one: A preservative associated with occupational asthma (Haz-Map.com). Following the sprayings in Monterey and Santa Cruz Counties there were numerous reports of respiratory and asthma-like symptoms.

Checkmate LBAM-F Review of MSDS Sheets

Class

LD50

As stated on Suterra MSDS Product Sheet: the toxicity of the product is determined by the toxicity of the pheromone active ingredient. The toxicity of this pheromone will be similar to the toxicity of other lepidopteran pheromones, ie:

- Rat, oral, LD50: >5000 mg/Kg (*Suterra MSDS*)
- Rabbit, dermal, LD50: >2000 mg/Kg (*Suterra MSDS*)
- Rat, acute inhalation, LC50: >5 mg/L (*Suterra MSDS*)
- Rabbit, primary eye irritation: mildly irritating (*Suterra MSDS*)
- Rabbit, primary skin irritation: moderately irritating (*Suterra MSDS*)

Potential Health Effects (Warnings)

- **Inhalation** – due to product form exposure not expected (*Suterra MSDS*)
- **Eye** – may cause transient irritation (*Suterra MSDS*)
- **Skin** – may cause transient irritation (*Suterra MSDS*)
- **Ingestion** – may cause upset stomach in large doses (*Suterra MSDS*)
- **Chronic** – long-term studies on the active ingredients have not been done, however, no adverse effects expected (*Suterra MSDS*)
- **Recommended Exposure Limits** – none established (*Suterra MSDS*)
- **Listed as Carcinogen** – no (*Suterra MSDS*)
- **Other Health Effects** – no known adverse effects expected (*Suterra MSDS*)
- **Health Hazard Categories** – EPA Toxicity Category III – Caution (*Suterra MSDS*)

Ecological Toxicity

- none listed on Suterra MSDS
- Suterra product information states the following:

ENVIRONMENTAL HAZARD

For terrestrial uses: For purposes of this Section 18 use only, this product may be applied in Riparian habitats, over water that is covered or partially

covered by tree canopies, or over uncovered water that is close to such water bodies. Otherwise, do not apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment washwaters or rinsate.

(E)-11-Tetradecenyl Acetate

(E)-11-Tetradecen-1-yl Acetate (As Listed on Checkmate LBAM-F MSDS)

CAS Number - 33189-72-9

Class

- use type – pheromone (*PAN Database*)
- chem class – pheromone (*PAN Database*)

LD50

- no available weight-of-the-evidence summary assessment (*PAN Database*).

Potential Health Effects (Warnings)

- Based on low toxicity in animal testing, and expected low exposure to humans, no risk to human health is expected from the use of these pheromones. During more than 10 years of use of lepidopteran pheromones as pesticides, no adverse effects have been reported (*EPA.gov website*).
- The safety record for lepidopteran pheromones has allowed the Agency to conclude that consumption of food containing residues of the pheromones presents no risk. In addition, these pheromones can be used experimentally without a permit on up to 250 acres, versus the 10-acre limit imposed on other pesticides (*EPA.gov website*).
- **Carcinogenicity** - no available weight-of-the-evidence summary assessment (*PAN Database*).
- **Developmental or Reproductive Toxin** - no available weight-of-the-evidence summary assessment (*PAN Database*).
- **Endocrine Disruptor** - no available weight-of-the-evidence summary assessment (*PAN Database*).

Ecological Toxicity

- Adverse effects on non target organisms (mammals, birds, and aquatic organisms) are not expected because these pheromones are released in very small amounts to the environment and act on a select group of insects (*EPA.gov website*).
- **ground water contaminant** - no available weight-of-the-evidence summary assessment (*PAN Database*).

(E,E)-9,11-Tetradecadienyl Acetate

(E,E)-9,11-Tetradecadien-1-yl Acetate (As Listed on Checkmate LBAM-F MSDS)

CAS Number - 54664-98-1

Class

- use type – information not available

- chem class – information not available

LD50

- information not available

Potential Health Effects (Warnings)

- information not available

Ecological Toxicity

- information not available

Crosslinked Polyurea Polymer

(generic term, actual chemical name unknown)

CAS Number – information not available

- Disputed ingredient polymethylene polyphenyl isocyanate is said to be the starting material for this ingredient. Checkmate manufacturer Suterra says that the PPI starter compound is transformed during manufacturing into the polyurea polymer ingredient (*10/22 Monterey Herald Article – Spray Ingredients Released*).
- Polyurea definition from Polyurea Development Association:
A polyurea coating / elastomer is that derived from the reaction product of an isocyanate component and a resin blend component. The isocyanate can be aromatic or aliphatic in nature. It can be monomer, polymer, or any variant reaction of isocyanates, quasi-prepolymer or a prepolymer. The prepolymer, or quasi-prepolymer, can be made of an amine-terminated polymer resin, or a hydroxyl-terminated polymer resin.

Class

- use type – information not available
- chem class – information not available

LD50

- information not available

Human Toxicity

- information not available

Ecological Toxicity

- no information available regarding “crosslinked polyurea polymer”, however, information regarding the link between “urea” and “harmful algal blooms” (HAB’s) is summarized below:
 - research published by scientists at San Francisco State University indicates that urea fuels the growth of potentially toxic algal blooms (*SFSU Press Release*)
 - various studies have shown that urea increases levels of domoic acid (DA), a toxin occurring in several species of *Pseudo-nitzschia* algae (Cochlan et al., Armstrong et al., Thessen et al.)
 - *Pseudo-nitzschia australis* is present in the waters of the Monterey Bay (Fire & Silver 2005)
 - domoic acid has been linked to illness and mortality in a variety of species including birds, sea lions, seals, dolphins, and whales (Science Daily News Releases 1/11/2001, 4/28/07, Cempa 2000, *SFSU Press Release*)

- domoic acid from *Pseudo-nitzschia* has also been implicated in sickness/death in humans (<http://www.nwfsc.noaa.gov/>)

Polymethylene Polyphenyl Isocyanate (disputed ingredient)

CAS Number – 9016-87-9

Class

- use type – none listed (*PAN Database*)
- chem class – polymer (*PAN Database*)

LD50

Acute toxicity - no available weight-of-the-evidence summary assessment (*PAN Database*).

- Rat, inhalation, TC_{Lo}: 490 mg/m³ per 4 hours (respirable aerosol) (*MSDS No. 30551*)
- Rat, oral, LD₅₀: >5000 mg/kg (*MSDS No. 30551*)

Potential Health Effects (Warnings)

- **Inhalation** – irritation of upper respiratory tract and lungs, respiratory sensitization with asthma-like symptoms, pulmonary edema (with severe overexposure), allergic respiratory reactions; symptoms including coughing, dryness of throat, headache, nausea, breathing difficulty, tightness in the chest; impaired lung function (associated with overexposure to isocyanates) (*MSDS No. 30551*)
- **Eye** – irritation, inflammation, damage to sensitive eye tissue; symptoms including watering or discomfort to eyes (*MSDS No. 30551*)
- **Skin** – irritation, reddening, dermatitis, sensitization (with prolonged or repeated exposure); allergic skin reactions (*MSDS No. 30551*)
- **Carcinogenicity** – lung tumors observed in lab animals exposed to aerosol droplets of MDI/Polymeric MDI (6 mg/m³) for their lifetime. Tumors occurred concurrently with respiratory irritation and lung injury. (*MSDS No. 30551*); unclassifiable (because the data are incomplete or ambiguous) (*PAN Database*).
- **Developmental or Reproductive Toxin** - no available weight-of-the-evidence summary assessment (*PAN Database*).
- **Endocrine Disruptor** - no available weight-of-the-evidence summary assessment (*PAN Database*).

Ecological Toxicity

- Isocyanates will react with water and generate carbon dioxide (*MSDS No. 30551*).
- Hazardous decomposition products: isocyanate vapor and mist, carbon dioxide, carbon dioxide, nitrogen oxides, traces of hydrogen cyanide (*MSDS No. 30551*).
- **ground water contaminant** - no available weight-of-the-evidence summary assessment (*PAN Database*).

Butylated Hydroxytoluene (BHT)

CAS Number – 128-37-0

Class

- use type – preservative (*PAN Database*)
- chem class – phenol (*PAN Database*)

LD50

Acute toxicity – slight (*PAN Database*)

Acute oral toxicity LD₅₀

- Rat, 890 mg/kg (*Science Lab MSDS*)
- Mouse, 650 mg/kg (*Science Lab MSDS*)
- Guinea Pig, 10700 mg/kg (*Science Lab MSDS*)

Potential Health Effects (Warnings)

- **Inhalation** – lung and respiratory tract irritant (*Science Lab MSDS*); acute symptoms include cough, sore throat (*ICSC 0841; PAN Database*)
- **Eye** – irritant (*Science Lab MSDS*); redness, pain (*PAN Database*)
- **Skin** – irritant (*Science Lab MSDS*); contact dermatitis, contact urticaria (diseases associated with exposure to this agent) (*HAZ-MAP listing*); redness (*PAN database*)
- **Carcinogenicity** – not classifiable for human. May cause cancer based on animal test data (*Science Lab MSDS*); unclassifiable (because the data are incomplete or ambiguous) (*PAN Database*).
- **Mutagenicity** – mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. (*Science Lab MSDS*);
- **Teratogenicity** – may cause adverse reproductive effects and birth defects (*Science Lab MSDS*)
- **General** – may be toxic to blood, liver, central nervous system (CNS). Repeated or prolonged exposure can produce target organs damage (*Science Lab MSDS*)
- **Developmental or Reproductive Toxin** - no available weight-of-the-evidence summary assessment (*PAN Database*).
- **Endocrine Disruptor** - no available weight-of-the-evidence summary assessment (*PAN Database*).

Ecological Toxicity

- harmful to aquatic organisms(*ICSC 0841*)
- **ground water contaminant** - no available weight-of-the-evidence summary assessment (*PAN Database*).
- aquatic ecotoxicity
 - fish – effects noted: accumulation, growth, histology, morphology, mortality (*PAN Database*)
 - mollusks – effects noted: behavior (*PAN Database*)
 - zooplankton – effects noted: growth, intoxication (*PAN Database*)

Polyvinyl Alcohol (PVA)

CAS Number – 9002-89-5

Class

- use type – none listed (*PAN Database*)
- chem class – polymer (*PAN Database*)

LD50

Acute toxicity – not acutely toxic (*PAN Database*)

Acute oral toxicity LD₅₀

- mouse – 14700 mg/kg (*Science Lab MSDS*)
- rat – 20000 mg/kg (*Science Lab MSDS*)

Potential Health Effects (Warnings)

- **Inhalation** – cough (*ICSC 1489*); respiratory tract irritation (*Science Lab MSDS*)
- **Eye** – redness (*ICSC 1489*); irritant (*Science Lab MSDS*)
- **Skin** – irritant (*Science Lab MSDS*)
- **Carcinogenicity** - not classifiable for human (*Science Lab MSDS*); may cause cancer (tumorigenic) based on animal studies (*Science Lab MSDS*); unclassifiable (because the data are incomplete or ambiguous) (*PAN Database*).
- **General** – inhalation or ingestion for prolonged periods of time may affect blood and metabolism, and behavior (*Science Lab MSDS*); animal studies showed a drop in hemoglobin and erythrocyte number with eventual complete coagulation inhibition (with chronic exposure) (*MSDS P5282*)
- **Developmental or Reproductive Toxin** - no available weight-of-the-evidence summary assessment (*PAN Database*).
- **Endocrine Disruptor** - no available weight-of-the-evidence summary assessment (*PAN Database*).

Ecological Toxicity

- may be hazardous in the environment, special attention should be given to fish (*ICSC 1489*)
- ecotoxicity in water (LC₅₀):
 - bluegill -10000 mg/l 96 hours (*Science Lab MSDS*).
 - fathead minnow - >40000 mg/l 96 hours (*Science Lab MSDS*).
- **ground water contaminant** - no available weight-of-the-evidence summary assessment (*PAN Database*).
- aquatic ecotoxicity
 - fish – effects noted: mortality (*PAN Database*)

Tricapryl Methyl Ammonium Chloride

Tricaprylyl Methyl Ammonium Chloride (as reported by CDFA)

CAS Number - 5137-55-3

Class

- use type – adjuvant (used in pesticide products to increase the effectiveness of the active ingredients, make the product easier to apply, or to allow several active ingredients to mix in one solution. Solvents, emulsifiers, and spreaders fall in this category.) (*PAN Database*)
- chem class – quaternary ammonium compound (ammonium salts with four alkyl or aryl groups, typically used as microbiocides or algaecides) (*PAN Database*)
- WHMIS (Canada), Class D-1B: material causing immediate and serious toxic effects (*Science Lab MSDS*)

LD50

Acute toxicity - no available weight-of-the-evidence summary assessment (*PAN Database*).

Acute oral toxicity LD₅₀

- rat – 223 mg/kg (*Science Lab MSDS*)
- mouse – 280 mg/kg (*Science Lab MSDS*)

Potential Health Effects (Warnings)

- **Inhalation** – lung irritant (*Science Lab MSDS*)
- **Eye** – irritant, inflammation characterized by redness, watering, itching (*Science Lab MSDS*); DSCL (EEC), R41 – risk of serious damage to eyes (*Science Lab MSDS*); causes severe eye burns (*MSDS T4770*)
- **Skin** – irritant, extremely hazardous (corrosive, permeator); inflammation characterized by itching, scaling, reddening, occasionally blistering (*Science Lab MSDS*); causes severe skin burns (*MSDS T4770*)
- **Carcinogenicity**- no available weight-of-the-evidence summary assessment (*PAN Database*).
- **Developmental or Reproductive Toxin** - no available weight-of-the-evidence summary assessment (*PAN Database*).
- **Endocrine Disruptor** - no available weight-of-the-evidence summary assessment (*PAN Database*).

Ecological Toxicity

- long term degradation products may arise, *products* of degradation more toxic (*Science Lab MSDS*)
- Hazardous decomposition products: carbon dioxide, carbon dioxide, oxides of nitrogen, hydrogen chloride gas (*MSDS T4770*)
- **ground water contaminant** - no available weight-of-the-evidence summary assessment (*PAN Database*).
- aquatic ecotoxicity
 - fish – effects noted: mortality (*PAN Database*)
 - insects – effects noted: mortality (*PAN Database*)
 - phytoplankton - effects noted: growth, physiology, population (*PAN Database*)
 - zooplankton – effects noted: intoxication, mortality (*PAN Database*)

Sodium Phosphate

(type of sodium phosphate not specified, PAN database lists 7 compounds with sodium phosphate in the name, could be any of the following or others)

Sodium Phosphate (Disodium Phosphate): CAS Number - 7558-79-4

Sodium Acid Phosphate (Monosodium Phosphate): CAS Number – 7558-80-7

Trisodium Phosphate (Sodium Phosphate): CAS Number – 7601-54-9

Class

- use type (same for all three) – pH adjustment, fungicide, herbicide, microbiocide (*PAN Database*)
- chem class (same for all three) – inorganic (any chemical compound not containing hydrocarbon moieties *and* not one of the toxic metals) (*PAN Database*)

LD50

Acute toxicity -

- SP: slight (*PAN Database*)
- SAP: no available weight-of-the-evidence summary assessment (*PAN Database*)
- TSP: no available weight-of-the-evidence summary assessment (*PAN Database*)

Potential Health Effects (Warnings)

- **Inhalation**
 - SP: throat irritation(*PAN Database*)
 - SAP: none listed (*PAN Database*)
 - TSP: burning sensation, cough, shortness of breath, sore throat (*PAN Database*)
- **Eye**
 - SP: eye contact with concentrated alkali causes conjunctival edema and cornea destruction(*PAN Database*)
 - SAP: none listed (*PAN Database*)
 - TSP: redness, pain, severe deep burns (*PAN Database*)
- **Skin**
 - SP: skin and mucous membrane irritation (*PAN Database*)
 - SAP: none listed (*PAN Database*)
 - TSP: skin burns, pain, blisters (*PAN Database*)
- **Carcinogenicity** (same for all three) - no available weight-of-the-evidence summary assessment (*PAN Database*).
- **Developmental or Reproductive Toxin** (same for all three) - no available weight-of-the-evidence summary assessment (*PAN Database*).
- **Endocrine Disruptor** (same for all three) - no available weight-of-the-evidence summary assessment (*PAN Database*).

Ecological Toxicity

- **ground water contaminant** - no available weight-of-the-evidence summary assessment (*PAN Database*).
- aquatic ecotoxicity
 - crustaceans – effects noted:
 - SP: none listed (*PAN Database*)
 - SAP: mortality (*PAN Database*)
 - TSP: none listed (*PAN Database*)
 - fish – effects noted:
 - SP: biochemistry, feeding behavior, growth, mortality (*PAN Database*)
 - SAP: biochemistry, feeding behavior, growth, mortality (*PAN Database*)
 - TSP: mortality (*PAN Database*)
 - mollusks – effects noted
 - SP: none listed (*PAN Database*)
 - SAP: development, mortality, physiology (*PAN Database*)
 - TSP: none listed (*PAN Database*)
 - phytoplankton - effects noted:

- SP: biochemistry, population (*PAN Database*)
 - SAP: biochemistry, population (*PAN Database*)
 - TSP: biochemistry, population (*PAN Database*)
- zooplankton – effects noted: (*PAN Database*)
 - SP: intoxication, mortality (*PAN Database*)
 - SAP: intoxication (*PAN Database*)
 - TSP: intoxication (*PAN Database*)
- research indicates that phosphate levels contribute to the occurrence of red tide (Feyzioglu & Ogut 2006)

Ammonium Phosphate

(type of ammonium phosphate not specified, could be either of the following)

Monoammonium Phosphate: CAS Number – 7722-76-1

Diammonium Phosphate: CAS Number – 7783-28-0

Class

- use type –
 - Mono: not listed (*PAN Database*)
 - Di: fungicide, herbicide, insecticide, microbiocide, pH adjustment (*PAN Database*)
- chem class –
 - Mono: inorganic (any chemical compound not containing hydrocarbon moieties *and* not one of the toxic metals) (*PAN Database*)
 - Di: inorganic (any chemical compound not containing hydrocarbon moieties *and* not one of the toxic metals) (*PAN Database*)
- Mono: WHMIS (Canada): not controlled under WHMIS (Canada)
- Di: WHMIS (Canada), Class D-2A: material causing other toxic effects (Very Toxic) (*Science Lab MSDS*)

LD50

Acute toxicity –

- Mono: no available weight-of-the-evidence summary assessment (*PAN Database*)
- Di: no available weight-of-the-evidence summary assessment (*PAN Database*)

Acute oral toxicity LD₅₀

- Mono: not available (*Science Lab MSDS*)
- Di: rat – 3000 mg/kg (*Science Lab MSDS*)

Potential Health Effects (Warnings)

- **Inhalation**
 - Mono: mild respiratory tract irritation (irritation of the mucosa of nose and throat), nausea, vomiting (after inhalation of high concentrations of dust) (*Science Lab MSDS*); causes irritation to the respiratory tract, symptoms may include coughing, shortness of breath (*MSDS A6108*)
 - Di: toxic to lungs, mucous membranes (*Science Lab MSDS*)
- **Eye**

- Mono: mild eye irritation (*Science Lab MSDS*); causes irritation, redness, and pain (*MSDS A6108*)
- Di: irritant; inflammation characterized by redness, watering, itching (*Science Lab MSDS*); DSCL (EEC), R41 – risk of serious damage to eyes (*Science Lab MSDS*); redness, pain (*ICSC 0217; PAN Database*)
- **Skin**
 - Mono: skin irritation (*Science Lab MSDS*); causes irritation to skin, symptoms include redness, itching and pain (*MSDS A6108*)
 - Di: irritant, permeator (*Science Lab MSDS*)
- **Carcinogenicity** (same for both) - no available weight-of-the-evidence summary assessment (*PAN Database*).
- **Developmental or Reproductive Toxin** (same for both) - no available weight-of-the-evidence summary assessment (*PAN Database*).
- **Endocrine Disruptor** (same for both) - no available weight-of-the-evidence summary assessment (*PAN Database*).
- **General**
 - Di: repeated or prolonged exposure can produce target organ damage (*Science Lab MSDS*); cause damage to lungs, mucous membranes (*Science Lab MSDS*)
 - Di: a nuisance causing concentration of airborne particles can be quickly reached when dispersed, especially if powdered (*ICSC 0217*)

Ecological Toxicity

- Di: long term degradation products may arise, *products* of degradation more toxic (*Science Lab MSDS*)
- aquatic ecotoxicity:
 - Mono:
 - none listed (*PAN Database*)
 - Di:
 - fish – effects noted: biochemistry, cells, enzymes, feeding behavior, mortality (*PAN Database*)
- **ground water contaminant** (same for both) - no available weight-of-the-evidence summary assessment (*PAN Database*).

1,2-benzisothiazolin-3-one

1,2-benzisothiazolin-3-one (as reported by CDFA)

CAS Number -2634-33-5

Class

- use type – microbiocide (kills microbes such as bacteria, viruses, and fungi and used in disinfectant or antibacterial products) (*PAN Database*)
- chem class – isothiazoline (*PAN Database*)

LD50

Acute toxicity - no available weight-of-the-evidence summary assessment (*PAN Database*).

Potential Health Effects (Warnings)

- **Inhalation** – none listed (*PAN Database*).
- **Eye** – none listed (*PAN Database*).
- **Skin** – allergic contact dermatitis reported, occupational asthma reported (HAZ-MAP listing; Damstra et al. 1992; Moscato et al. 1997; Roberts et al. 1981; Taran & Delaney 1997))
- **Carcinogenicity** - no available weight-of-the-evidence summary assessment (*PAN Database*).
- **Developmental or Reproductive Toxin** - no available weight-of-the-evidence summary assessment (*PAN Database*).
- **Endocrine Disruptor** - no available weight-of-the-evidence summary assessment (*PAN Database*).

Ecological Toxicity

- aquatic ecotoxicity
 - fish – effects noted: mortality (*PAN Database*)
 - mollusks – effects noted: intoxication (*PAN Database*)
 - zooplankton – effects noted: intoxication, mortality, reproduction (*PAN Database*)
- **ground water contaminant** - no available weight-of-the-evidence summary assessment (*PAN Database*).
- according to the EPA reregistration document for this chemical:
 - the high toxicity of BIT to green algae and invertebrate species suggests that potential adverse acute effects could occur to some species if environmental contamination from BIT-treated oil recovery fluids occurs (*EPA reregistration document*)
 - birds & mammals – low to moderate toxicity (*EPA reregistration document*)
 - freshwater fish & invertebrates – moderate toxicity (*EPA reregistration document*)
 - marine/estuarine fish – slight toxicity (*EPA reregistration document*)
 - marine/estuarine invertebrates – high toxicity (*EPA reregistration document*)
 - if used outdoors, BIT may possibly move with soil during rainfall events and potentially reach surface waters (*EPA reregistration document*)

2-hydroxy-4-n-octyl benzophenone

2-hydroxy-4-n-octyloxybenzophenone (as reported by CDFA)

CAS Number – 1843-05-6

Class

- use type – not listed (*PAN Database*); polymer stabilizer (*Chemtura MSDS*); light absorber (*Cytec MSDS*)
- chem class – unclassified (*PAN Database*);

LD50

Acute toxicity - no available weight-of-the-evidence summary assessment (*PAN Database*).

Acute toxicity LD₅₀

- rat (oral)/rabbit (skin) - > 10.0 g/kg (*Cytec MSDS*)
- rat – 4-hour LC₅₀ value estimated to be greater than 20 mg/L (*Cytec MSDS*)

Mammalian toxicity

- acute toxicity
 - rats > 10 g/kg (*Cytec/Ciba Data Summary*)
- repeated dose toxicity
 - rat 30-day dietary (*Cytec/Ciba Data Summary*)
 - rat 90-day dietary: NOEL = 0.6% (6000 ppm) (*Cytec/Ciba Data Summary*)
 - dog 120-day dietary: NOEL = 0.6% (6000 ppm) (*Cytec/Ciba Data Summary*)
 - rat 90-day dietary: NOEL = 0.15% (1500 ppm) (*Cytec/Ciba Data Summary*)
 - rats 90-day dietary: NOEL = 1000 ppm (*Cytec/Ciba Data Summary*)
- reproductive/developmental toxicity
 - rats NOEL = 0.6% (6000 ppm) for 4 successive generations (*Cytec/Ciba Data Summary*)

Marine life

- acute toxicity to fish – zebra fish – LC₅₀ (96 h) > 100mg/L (*Cytec/Ciba Data Summary*)
- toxicity to aquatic plants – green algae – EC₅₀ (0-72 h) > 100 mg/L (*Cytec/Ciba Data Summary*)
- acute toxicity to aquatic invertebrates – *Daphne magna*
 - EC₀ (24 h) > 10 mg/L (*Cytec/Ciba Data Summary*)
 - EC₅₀ (24 h) > 52 mg/L (*Cytec/Ciba Data Summary*)

Potential Health Effects (Warnings)

- **Inhalation**
- **Eye** – none listed (*PAN Database*)
- **Skin** - none listed (*PAN Database*)
- **Carcinogenicity** - no available weight-of-the-evidence summary assessment (*PAN Database*).
- **Developmental or Reproductive Toxin** - no available weight-of-the-evidence summary assessment (*PAN Database*).
- **Endocrine Disruptor** - no available weight-of-the-evidence summary assessment (*PAN Database*); compounds in the benzophenone family have been shown to form estrogenic photoproducts, upon exposure to UV or sunlight (Hayashi et al. 2006)

Ecological Toxicity

- harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment (*Great Lakes Safety Data Sheet*)
- not readily biodegradable (*Great Lakes Safety Data Sheet*)
- **ground water contaminant** - no available weight-of-the-evidence summary assessment (*PAN Database*).

