SECTION 1 IDENTIFICATION

ZIRAM GRANUFLO® (Ziram 76% WDG)
Zinc Dimethyldithiocarbamate
(syn: Ziram, Milbam, Bis [Dimethyldithiocarbamate] Zinc)

EPA Reg No. 45728-12

SECTION 2 PRODUCT COMPONENTS

<table>
<thead>
<tr>
<th>INGREDIENTS</th>
<th>CAS#.</th>
<th>WT.%</th>
<th>EXPOSURE LIMITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc dimethyldithiocarbamate</td>
<td>137-30-4</td>
<td>76</td>
<td>None established</td>
</tr>
<tr>
<td>Inert Ingredients</td>
<td>24</td>
<td></td>
<td>None Established</td>
</tr>
</tbody>
</table>

SECTION 3: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: This product is a tan/light brown, free flowing micropearl solid with no odor. It is not defined as flammable or combustible but will burn under fire conditions. Very high concentrations of dust in the air may present a dust explosion hazard.

Corrosive to the eyes. Skin contact may cause irritation and sensitization. May be absorbed through the skin and cause toxic effects. Inhalation of dust may cause severe mucous membrane and respiratory irritation. Respirable ziram is highly toxic by inhalation, however, this product is sold as a granular solid that will not form respirable dust under normal handling conditions. Ingestion may cause systemic poisoning with symptoms of ascending paralysis, numbness and weakness in the extremities and death. Chronic exposure may cause metabolic and blood abnormalities and liver damage.

SECTION 4 EMERGENCY and FIRST AID PROCEDURES

INGESTION: Call a physician or Poison Control Center. If conscious, give 1-2 glasses of water to dilute and induce vomiting. Never give anything by mouth to or induce vomiting in a person who is unconscious or convulsing. Get immediate medical attention.

SKIN CONTACT: Wash contact area thoroughly with soap and water until no traces of the chemical remain. Remove contaminated clothing immediately and launder before reuse. Get medical attention.

EYE CONTACT: Immediately flush eye with water for at least 15 minutes while lifting the upper and lower lids. Get medical attention.

INHALATION: Remove victim to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, have qualified personnel administer oxygen. Get immediate medical attention.

NOTES TO PHYSICIAN: Possible mucosal damage may contraindicate gastric lavage.

SECTION 5 FIRE and EXPLOSION HAZARD DATA

FLASH POINT: Not applicable
FLAMMABLE LIMITS: Not available
METHOD: Not available
AUTOIGNITION TEMPERATURE: Not available

EXTINGUISHING MEDIA: Not defined as flammable or combustible. Product may support combustion under fire condition. Use carbon dioxide, dry chemicals, foam, water or water fog.

SPECIAL FIRE FIGHTING PROCEDURES: Evacuate area of all non-emergency personnel. Firefighters should wear full emergency equipment and NIOSH approved positive pressure self-contained breathing apparatus. Fight fire from upwind, and cool exposed intact containers and structures with water spray or stream at maximum range. Decontaminate all protective equipment after use, prevent skin contact. Contain all water run-off with diking.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Very high concentrations of this product suspended in air may present an explosion hazard.
SECTION 6 ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Wear appropriate protective clothing as described in Section VII to prevent eye and skin contact and appropriate respirator to prevent overexposure. Isolate area and keep out animals and unprotected persons. Stop leak at source. Carefully sweep up dry spilled material and collect into labeled containers for proper disposal. If liquid, dike and absorb with inert material. This material is toxic to fish and wildlife. Prevent run-off to storm sewers and ditches leading to natural waterways. Report spill as required by local and federal regulations.

SECTION 7 HANDLING and STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Protect containers from physical damage. Store in a cool, dry area away from excessive heat, fire and sparks. Store in original container only. Do not put concentrate or dilute material into food or drink containers. Keep away from food and feed. Do not contaminate water, food or feed by storage or disposal. Do not get in eyes, on skin, or on clothing. Harmful if swallowed or absorbed through the skin. Do not breathe dusts, mists or aerosols. Use only with adequate ventilation and appropriate protective equipment. Carefully open containers. Immediately remove and launder contaminated clothing before re-use. Wash thoroughly after handling and before eating, drinking, chewing gum, using tobacco, or using toilet facilities. Remove personal protective equipment (PPE) immediately after handling product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing. If pesticide gets inside clothing, immediately remove, wash skin thoroughly and change into clean clothing. Keep out of reach of children and animals.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your state, province or Tribe, consult the agency responsible for pesticide regulation. Use this product only in accordance with its labeling and the Worker Protection Standard, 40CFR Part 170. This standard contains requirements for the protection of agricultural workers on farms, forests, nurseries and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification and emergency assistance. Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 48 hours. PPE required for early entry to treated areas that is permitted under the Worker Protection Standard is described in Section 8 of this MSDS. Notify workers of the application by warning them orally and by posting warning signs at entrances to treated areas.

OTHER PRECAUTIONS: Keep containers tightly closed. Empty containers retain product residues and are hazardous. Follow all MSDS precautions in handling empty containers. This product is toxic to fish and wildlife. Do not apply directly to water, or to areas where surface water is present or to intertidal area below the mean high water mark. Do not apply where run-off is likely to occur. Do not apply when weather conditions favor drift from areas treated. Do not contaminate water when disposing of equipment washwaters. Do not apply this product through any type of irrigation system. Apply this product only as specified on the product label.

SECTION 8 EXPOSURE CONTROLS and PERSONAL PROTECTION

RESPIRATORY PROTECTION: Use a properly fit-tested NIOSH approved full-facepiece respirator with pesticide cartridge or half-face respirator with non-venting chemical goggles required for applicators and other handlers and when performing any operation where exposure to Ziram is likely. Selection of respiratory protection depends on the contaminant type, form and concentration. Select in accordance with OSHA 1910.134 and good Industrial Hygiene practice.

ENGINEERING CONTROLS: When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in the Worker Protection Standard for agricultural pesticides [40CFR 170.240(d) (4-6)], the handler PPE requirements may be reduced or modified as specified in the Worker Protection Standard.

PROTECTIVE CLOTHING: Applicators and other handlers must wear rubber or other chemical resistant, waterproof gloves, long sleeved shirt and long pants, shoes plus socks, protective eyewear (see below) and chemical resistant headgear for overhead exposure. Early entry to treated areas that is permitted under the Worker Protection Standard requires the wearing of overalls, rubber or other chemical resistant, waterproof gloves, shoes plus socks, protective eye wear (see below) and chemical resistant headgear for overhead exposure. Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing. Remove personal protective equipment (PPE) immediately after handling product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

EYE PROTECTION: Non-vented chemical safety goggles are required if full face-piece respirator is not worn. Do not wear contact lenses.

OTHER PROTECTIVE EQUIPMENT: For operations where contact can occur, a safety shower and an eye wash facility should be immediately available.

Note: Discard clothing and other absorbent materials that have been drenched or heavily contaminated with the concentrate. Do not reuse them. Follow the manufacturer’s instructions for cleaning and maintaining Personal Protective Equipment (PPE). If no specific instructions for decontamination are available, use detergent and hot water. Keep and wash (launder) PPE separately from other laundry.
SECTION 9 PHYSICAL and CHEMICAL PROPERTIES

BOILING POINT (@760 mmHg): Not available
SPECIFIC GRAVITY (H₂O=1): 1.65
VOLATILE: 0%
EVAPORATION RATE: Not applicable
COEFFICIENT OF WATER/OIL: Not applicable
APPEARANCE AND ODOR: Tan/light brown, free flowing micropearls, no odor.

SECTION 10 STABILITY and REACTIVITY

STABILITY: Stable
CONDITIONS TO AVOID: Excessive heat
INCOMPATIBILITY: Acids, bases and preparations containing iron, copper and mercury.
HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

EYE CONTACT: Corrosive! May cause irritation with permanent damage possible based on a proprietary study in rabbits.
SKIN CONTACT: May cause irritation and possibly sensitization. Animal studies indicate that this product is a moderate sensitizer. Limited toxicity by skin absorption based on a proprietary study (Dermal LD50 (rat) - >2g/kg).
INHALATION: Respirable ziram is highly toxic by inhalation in animal studies. Dust may cause severe mucous membrane and respiratory irritation with coughing, choking and labored breathing; lethargy, respiratory congestion and death.
INGESTION: May cause systemic poisoning with symptoms of weakness, ataxia, ascending paralysis, hypothermia and peripheral neuropathy (pain, numbness and weakness of the extremities).
CHRONIC EFFECTS OF OVER EXPOSURE: May cause dermatitis, metabolic disorders, blood abnormalities and liver damage. Studies in workers handling Ziram have shown an increase in frequency of chromosome and chromatid aberrations. Ziram is mutagenic in some test systems. Ziram has been found to cause adverse reproductive effects and teratogenic effects in some studies with laboratory animals. Recent studies conducted under FIFRA requirements had indicated that Ziram is non-teratogenic in rats and rabbits.
CARCINOGENICITY: This product is not listed as a carcinogen or suspect carcinogen by NTP, IARC or OSHA, however, Ziram has been associated with increased cancer rates in some animal studies. IARC has classified Ziram as Group 3 -- not classifiable as to carcinogenicity in humans and inadequate evidence of carcinogenicity in animals. NTP Carcinogenesis Bioassay (feed) showed clear evidence of carcinogenicity in mice and rats.
OTHER TOXIC EFFECTS: An antabuse-like reaction with flushing, sweating, headache, weakness and hypertension may occur when ethyl alcohol (alcoholic beverages) is ingested following exposure to this material.
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Individuals with chronic respiratory, liver, blood and skin diseases may be at increased risk from exposure to this material.

TOXICOLOGY DATA:

<table>
<thead>
<tr>
<th>Substance</th>
<th>LD50**</th>
<th>LC50**</th>
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</thead>
<tbody>
<tr>
<td>Zinc dimethyldithiocarbamate</td>
<td>2.7 g/kg oral rat</td>
<td>0.13 mg/L/4 hr (rat)</td>
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<tr>
<td>**UCB proprietary studies</td>
<td>&gt;2000 mg/kg dermal rabbit</td>
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SECTION 12: ECOLOGICAL INFORMATION

ENVIRONMENTAL PRECAUTIONS: This product is toxic to fish and wildlife. 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 apply where run-off is likely to occur. Do not apply when weather conditions favor drift from areas treated. Do not contaminate water when disposing of equipment washwaters. Apply this product only as specified on this label.

Ecotoxicity Values for Ziram:
- LD50 Goldfish: 5-10 mg/L/5 hr
- LC50 Tilapia metanopleura: 5-10 mg/L/5 hr
- LD50 Wild bird oral: 100 mg/kg
MATERIAL SAFETY DATA SHEET

SECTION 13: DISPOSAL INFORMATION

WASTE DISPOSAL METHOD: Dispose of in accordance with all local, state/provincial and federal regulations. Completely empty container into application equipment, then dispose of empty container in a sanitary landfill by incineration or by other procedures approved by state/provincial and local authorities. If burned, stay out of smoke.

Methyl Ziram is a hazardous waste in the United States, RCRA Code P205.

SECTION 14: TRANSPORTATION INFORMATION

DOMESTIC:

- **DOT SHIPPING NAME:** Environmentally Hazardous Substance, Solid, n.o.s. (Ziram), 9, UN3077, PG III
  (Note: Product granular form excludes it from Poison Classification)
- **DOT HAZARD CLASSIFICATION:** Class 9 (Miscellaneous Hazardous Material)
- **DOT LABELS REQUIRED (49CFR 172.101):** Class 9
- **UN NUMBER:** UN3077
- **REPORTABLE QUANTITY:** 1 lb. Statutory RQ under CERCLA – Not Listed in 49 CFR

INTERNATIONAL:

- **IMCO SHIPPING NAME:** ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (ZIRAM), 9, UN3077, PG III
- **IMCO CLASS:** 9 PG III
- **UN NUMBER:** UN3077
- **IMCO LABEL:** CLASS 9

SECTION 15: REGULATORY INFORMATION

- **OSHA HAZARD CLASSIFICATION:** Irritant, highly toxic, target organ effect, sensitizer
- **EPA SARA 311 HAZARD CLASSIFICATION:** Acute health, chronic health

SARA TITLE 111 SECTION 313 INFORMATION: The following components are regulated under SARA Title 313

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>CAS#</th>
<th>WT%</th>
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<tr>
<td>Zinc dimethyldithiocarbamate (Zinc compound)</td>
<td>137-30-4</td>
<td>76</td>
</tr>
</tbody>
</table>

CERCLA HAZARDOUS SUBSTANCE (40CFR 116): Ziram

- **REPORTABLE QUANTITY:** Ziram 1 lb. Product 1.3 lbs. (Statutory RQ)

EPA/TSCA INVENTORY STATUS: Excluded from listing requirements as product is registered under EPA/FIFRA regulations.

STATE R-T-K COMPOSITION INFORMATION

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<thead>
<tr>
<th>COMPONENT</th>
<th>CAS #</th>
<th>WT%</th>
<th>PA</th>
<th>NJ</th>
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<tr>
<td>Zinc dimethyldithiocarbamate</td>
<td>137-30-4</td>
<td>Y</td>
<td>Y</td>
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</tbody>
</table>

CALIFORNIA PROPOSITION 65 INFORMATION: This product contains no California Proposition 65 regulated chemicals.

SECTION 16: OTHER INFORMATION

Approved By: **Spyridon Zapantis** Dated: **3/24/00**

ESHA Manager

MSDS updated on 11/06/92 Changes made to: All MSDS Sections
MSDS updated on 04/29/94 Changes made to: Remove International Information
MSDS updated on 05/08/95 Revised to ANSI Standard Format
MSDS updated on 03/08/96 Revised Transportation Classification, Section 14
MSDS updated on 04/18/96 Revised Sections 3, 4, 6, 8, 11 and 13 for consistency with pesticide label and product form.
MSDS updated on 03/24/00 Revised Sections 3, 4, 7, 11, 12, 13, 14, 15 and 16

MSDS: ZIRAM GRANUFLO®

03/24/00