MATERIAL SAFETY DATA SHEET

Merck Animal Health urges each user or recipient of this MSDS to read the entire data sheet to become aware of the hazards associated with this material.

SECTION 1. IDENTIFICATION OF SUBSTANCE AND CONTACT INFORMATION

MSDS NAME: Boss Pour-On Insecticide
SYNONYM(S): 5% Permethrin Pour On
MSDS NUMBER: SP000819
EMERGENCY NUMBER(S): (908) 423-6000 (24/7/365) English Only
Transportation Emergencies - CHEMTREC: (800) 424-9300 (Inside Continental USA) (703) 527-3887 (Outside Continental USA)
Rocky Mountain Poison Center (For Human Exposure): (303) 595-4869
Animal Health Technical Services:
For Animal Adverse Events: Small Animals and Horses: (800) 224-5318
For Animal Adverse Events: Livestock: (800) 211-3573
For Animal Adverse Events: Poultry: (800) 219-9286
INFORMATION: Animal Health Technical Services:
For Small Animals and Horses: (800) 224-5318
For Livestock: (800) 211-3573
For Poultry: (800) 219-9286
MERCK MSDS HELPLINE: (800) 770-8878 (US and Canada)
(908) 473-3371 (Worldwide)
Monday to Friday, 9am to 5pm (US Eastern Time)
SECTION 2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Liquid
Clear, Amber
Odorless
May be harmful by inhalation or if swallowed.
May be irritating to respiratory system.
May be irritating to skin.
May be an aspiration hazard if ingested.
May cause skin sensitization in sensitive individuals.
May cause effects to:
- central nervous system
- gastrointestinal tract
- respiratory system
- cardiovascular system
Very toxic to aquatic organisms.

POTENTIAL HEALTH EFFECTS:

This product is a permethrin insecticide and contains petroleum distillates. This product may cause mild skin sensitization in susceptible individuals or may cause slight eye irritation.

This product contains permethrin, a synthetic Type I pyrethroid ester. Occupational exposure to permethrin has induced temporary skin and facial sensations (feelings of numbness and tingling). Workers exposed to permethrin have also reported irritative symptoms, such as itching and burning of the skin, itching and irritation of the eyes, and irritation of the upper respiratory tract as well as increased nasal secretions. Anaphylactic reactions including bronchospasm and shock may occur in very sensitive individuals. Ingestion of large amounts may cause central nervous system effects resulting in seizures, coma, and respiratory arrest.

Ingestion of pyrethroid esters has caused stomach pain, nausea and vomiting, headache, dizziness, numbness and tingling, anorexia, fatigue, tremors, and intermittent convulsions.

Petroleum distillates may be skin, eye, and respiratory tract irritants. Repeated skin contact may cause oil acne or dermatitis. Exposure to large amounts of petroleum distillates by inhalation or ingestion may cause CNS depression or excitement, headaches, drowsiness, nausea, vomiting, diarrhea, laxative effects, lung damage, or an irregular heartbeat. Aspiration of liquid into the lungs may produce chemical pneumonitis.

LISTED CARCINOGENS

Fields in the above table that do not contain data indicate that the materials have not been classified as human or animal carcinogens.

Permethrin technical is classified by IARC as a Group 3 carcinogen (unclassifiable as to carcinogenicity in humans).

SECTION 3. COMPOSITION AND INFORMATION ON INGREDIENTS

PRODUCT USE:
Veterinary product

CHEMICAL FORMULA:
Mixture.

The formulations for these products are proprietary information. These formulations have the same hazardous profile; however, the presence of hazardous ingredients may vary by formulation. Only hazardous ingredients in concentrations of 1% or greater and/or carcinogenic ingredients in concentrations of 0.1% or greater are listed in the Chemical Composition table. Active ingredients in any concentration are listed. For additional information about carcinogenic ingredients see Section 2.

CHEMICAL COMPOSITION

<table>
<thead>
<tr>
<th>INGREDIENT</th>
<th>CAS NUMBER</th>
<th>PERCENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permethrin Technical</td>
<td>52645-53-1</td>
<td>5</td>
</tr>
<tr>
<td>Distillates, petroleum, solvent-refined light paraffinic</td>
<td>64741-89-5</td>
<td>40-70</td>
</tr>
<tr>
<td>Distillates, petroleum, solvent-refined heavy paraffinic</td>
<td>64741-88-4</td>
<td>20-50</td>
</tr>
</tbody>
</table>

MSDS NAME: Boss Pour-On Insecticide
MSDS NUMBER: SP000819
Latest Revision Date: 23-Sep-2011
ADDITIONAL INFORMATION: This MSDS is written to provide health and safety information for individuals who will be handling the final product formulation during research, manufacturing, and distribution. For health and safety information for individual ingredients used during manufacturing, refer to the appropriate MSDS for each ingredient. Refer to the package insert or product label for handling guidance for the consumer.

SECTION 4. FIRST AID MEASURES

INHALATION: Remove to fresh air. If any trouble breathing, get immediate medical attention. Administer artificial respiration if breathing has ceased. If irritation or symptoms occur or persist, consult a physician.

SKIN CONTACT: In case of skin contact, while wearing protective gloves, carefully remove any contaminated clothing, including shoes, and wash skin thoroughly with soap and water. If irritation or symptoms occur or persist, consult a physician.

EYE CONTACT: In case of eye contact, immediately rinse eyes thoroughly with plenty of water. If wearing contact lenses, remove only after initial rinse, and continue rinsing eyes for at least 15 minutes. If irritation occurs or persists, consult a physician.

INGESTION: DO NOT induce vomiting or give any liquid to drink. IMMEDIATELY consult a physician for treatment advice.

NOTE TO PHYSICIAN: Vomiting is contraindicated due to the possibility of aspiration pneumonia.

SECTION 5. FIRE FIGHTING MEASURES

FLAMMABILITY DATA:

Flash Point: 151.7 deg C (305 deg F) Method: Pensky-Martens closed-cup tester

SPECIAL FIRE FIGHTING PROCEDURES: Wear full protective clothing and self-contained breathing apparatus (SCBA).

SUITABLE EXTINGUISHING MEDIA: Carbon dioxide (CO2), extinguishing powder or water spray.

See Section 9 for Physical and Chemical Properties.

SECTION 6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS: Wear appropriate personal protective equipment as specified in Section 8. Keep personnel away from the clean-up area.

SPILL RESPONSE / CLEANUP: All spills should be handled according to site requirements and based on precautions cited in the MSDS. In the case of liquids, use proper absorbent materials. For laboratories and small-scale operations, incidental spills within a hood or enclosure should be cleaned by using a HEPA filtered vacuum or wet cleaning methods as appropriate. For large dry or liquid spills or those spills outside enclosure or hood, appropriate emergency response personnel should be notified. In manufacturing and large-scale operations, HEPA vacuuming prior to wet mopping or cleaning is required.

ENVIRONMENTAL PRECAUTIONS: This product is very toxic to aquatic organisms. Do not allow product to reach ground water, water course, sewage or drainage systems.

See Sections 9 and 10 for additional physical, chemical, and hazard information.

SECTION 7. HANDLING AND STORAGE

HANDLING: Keep containers adequately sealed during material transfer, transport, or when not in use. Wash face, hands, and any exposed skin after handling. Do not eat, drink, or smoke when using this substance or mixture.

Appropriate handling of this material is dependent on many factors, including physical form, duration and frequency of process or task, and effectiveness of engineering controls. Site-specific risk assessments should be conducted to determine the feasibility and the appropriateness of all exposure control measures. See Section 8 (Exposure Controls) for additional guidance.

STORAGE: Keep away from heat, sparks, open flames, and direct sunlight. Store in a cool, dry, well ventilated area.

MSDS NAME: Boss Pour-On Insecticide

MSDS NUMBER: SP000819

Latest Revision Date: 23-Sep-2011
SECTION 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

EXPOSURE CONTROLS
The health hazard risks of handling this material are dependent on many factors, including physical form, duration and frequency of process or task, and effectiveness of engineering controls. Site-specific risk assessments should be conducted to determine the feasibility and the appropriateness of all exposure control measures. Exposure controls for normal operating or routine procedures follow a tiered strategy. Engineering controls are the preferred means of long-term or permanent exposure control. If engineering controls are not feasible, appropriate use of personal protective equipment (PPE) may be considered as alternative control measures. Exposure controls for non-routine operations must be evaluated and addressed as part of the site-specific risk assessment.

RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT (PPE):

Respiratory Protection: Respiratory protective equipment (RPE) may be required for certain laboratory and large-scale manufacturing tasks if potential airborne breathing zone concentrations of substances exceed the relevant exposure limit(s). Workplace risk assessment should be completed before specifying and implementing RPE usage. Potential exposure points and pathways, task duration and frequency, potential employee contact with the substance, and the ability of the substance to be rendered airborne during specific tasks should be evaluated. Initial and ongoing strategies of quantitative exposure measurement should be obtained as required by the workplace risk assessment. All RPE must conform to local and regional specifications for efficacy and performance. Consult your site or corporate health and safety professional for additional guidance.

Skin Protection: Gloves that provide an appropriate barrier to the skin are recommended if there is potential for contact with this material. Consult your site safety staff for guidance.

Eye Protection: Safety glasses with side shields. Use of goggles or full face protection may be required based on hazard, potential for contact, or level of exposure. Consult your site safety staff for guidance.

Body Protection: In small-scale or laboratory operations, lab coats or equivalent protection is required. Disposable Tyvek or other dust impermeable suit should be considered based on procedure or level of exposure. Use of additional PPE such as shoe coverings, gauntlets, hood, or head covering may be necessary. Consult your site safety staff for guidance.

In large-scale or manufacturing operations, disposable Tyvek or other dust impermeable suit is recommended and based on level of exposure. Use of additional PPE such as shoe coverings, gauntlets, hood, or head covering may be necessary. Consult your site safety staff for guidance.

EXPOSURE LIMIT VALUES

No exposure limits are available for the active ingredient(s) or any other hazardous ingredient in this formulation.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>FORM:</td>
<td>Liquid</td>
</tr>
<tr>
<td>COLOR:</td>
<td>Clear, Amber</td>
</tr>
<tr>
<td>ODOR:</td>
<td>Odorless</td>
</tr>
<tr>
<td>VAPOR PRESSURE:</td>
<td>&lt;2 mmHg @ 25 deg C</td>
</tr>
<tr>
<td>SPECIFIC GRAVITY:</td>
<td>0.876 at 20 deg C</td>
</tr>
<tr>
<td>SOLUBILITY:</td>
<td></td>
</tr>
<tr>
<td>Water:</td>
<td>Not miscible</td>
</tr>
<tr>
<td>Other:</td>
<td>Kerosene, diesel fuel, and xylene: Miscible</td>
</tr>
<tr>
<td>ADDITIONAL INFORMATION:</td>
<td>Viscosity: 39 Centipoise</td>
</tr>
</tbody>
</table>

See Section 5 for flammability/explosivity information.

SECTION 10. STABILITY AND REACTIVITY

STABILITY/ REACTIVITY:
Stable under normal conditions.

INCOMPATIBLE MATERIALS / CONDITIONS TO AVOID:
Oxidizers. Open flames and high temperatures.

HAZARDOUS DECOMPOSITION PRODUCTS / REACTIONS:
SECTION 11. TOXICOLOGICAL INFORMATION

The toxicological properties of the mixture(s) have not been fully characterized in humans or animals. There are no data specifically for this formulation. The data presented are from studies conducted using similar formulas containing the same active and/or hazardous ingredients found in this product.

ACUTE TOXICITY DATA

<table>
<thead>
<tr>
<th>EXPOSURE ROUTE</th>
<th>STUDY DESCRIPTION</th>
<th>RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhalation</td>
<td>LC50 (rat)</td>
<td>&gt;5.82 mg/L/4hr</td>
</tr>
<tr>
<td>Dermal</td>
<td>LD50 (rabbit)</td>
<td>&gt;2.02 g/kg</td>
</tr>
<tr>
<td>Oral</td>
<td>LD50 (rat)</td>
<td>&gt;5.05 g/kg</td>
</tr>
<tr>
<td>Eye</td>
<td>Eye Irritation (rabbit)</td>
<td>Slightly irritating</td>
</tr>
<tr>
<td>Skin</td>
<td>Skin Sensitization (guinea pig)</td>
<td>Weak sensitizer</td>
</tr>
</tbody>
</table>

SUBCHRONIC / CHRONIC TOXICITY:
In sub-chronic studies ranging from 14 days to 26 weeks, rats and mice were treated with oral dosages of permethrin up to 10,000 mg/kg. Dose-dependent effects such as an increase in liver/body weight ratio, hypertrophy of the liver, and clinical signs of poisoning such as tremor were observed. The no-observed effects-level (NOEL) in rats ranged from 20 mg/kg diet (in studies lasting 90 days or 6 months) to 1500 mg/kg diet (in a 6-month study). Chronic studies ranging from 1 to 2 years were conducted in rats, mice and dogs. Dosages varied with species ranging from 1 mg/kg/day to 375 mg/kg/day of permethrin. Target organs of toxicity were the liver (increased liver weight and hepatocellular swelling), lung (increased weight), and testes (decreased weight). Depression and increased mortality were observed in mice at 75 mg/kg/day and above. Additional signs and symptoms of toxicity in the rat include hypereexcitation, sparring behavior, aggressiveness, enhanced startle response, whole body tremor and prostration.

REPRODUCTIVE / DEVELOPMENTAL TOXICITY:
In a three-generation reproductive study with permethrin, rats were administered doses ranging from 25 to 125 mg/kg/day. Systemic effects observed in the offspring were seen in the liver (hepatocyte hypertrophy and eosinophilia) and eye (infantile glaucoma). Body tremors were observed in the parents and offspring at 125 mg/kg/day. No teratogenic effects, maternal toxicity or fetotoxicity were observed in rats and rabbits administered 200 and 400 mg/kg/day, respectively, of permethrin.

MUTAGENICITY / GENOTOXICITY:
Permethrin was negative in a bacterial mutagenicity study (Ames) and in a mammalian mutagenicity study (mouse lymphoma).

CARCINOGENICITY:
This material or product has not been evaluated for carcinogenicity.

Six carcinogenicity assays, three each in mice and rats, were conducted with permethrin. No tumorigenicity was seen in rat studies. However, species specific increases in pulmonary adenomas, a common benign tumor of mice with a high spontaneous background incidence, were seen in the three mouse studies. In one of these studies, there was an increased incidence of pulmonary alveolar cell carcinomas and benign liver adenomas when permethrin was administered in the diet at 5,000 ppm.

SECTION 12. ECOLOGICAL INFORMATION

There are no data for the final product or its formulation(s). The information presented below pertains to the following ingredient(s).

ECOTOXICITY DATA

<table>
<thead>
<tr>
<th>INGREDIENT ECOTOXICITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permethrin: 96-hr LC50 (rainbow trout): 0.1 to 314 ug/L</td>
</tr>
<tr>
<td>Permethrin: 96-hr LC50 (brook trout): 2.3 to 5.2 ug/L</td>
</tr>
<tr>
<td>Permethrin: 96-hr LC50 (channel catfish): 1.1 ug/L</td>
</tr>
<tr>
<td>Permethrin: 48-hr EC50 (daphnid): 0.2 to 22 ug/L</td>
</tr>
</tbody>
</table>

ENVIRONMENTAL DATA

OTHER INGREDIENT ENVIRONMENTAL DATA:
Permethrin is readily biodegradable.

ADDITIONAL ECOTOXICITY / ENVIRONMENTAL INFORMATION:
This pesticide is extremely toxic to fish and aquatic organisms.

SECTION 13. DISPOSAL CONSIDERATIONS

MATERIAL WASTE:
Disposal must be in accordance with applicable federal, state/provincial, and/or local regulations. Incineration is the preferred method of disposal, when appropriate. Operations that involve the crushing or shredding of waste materials or returned goods must be handled to meet the recommended exposure limit(s).

MSDS NAME: Boss Pour-On Insecticide
MSDS NUMBER: SP000819

Latest Revision Date: 23-Sep-2011
PACKAGING AND CONTAINERS:
Disposal must be in accordance with applicable federal, state/provincial, and/or local regulations.

SPECIAL ENVIRONMENTAL HANDLING PROCEDURES:
Do not allow product to reach ground water, water courses, sewage or drainage systems.

SECTION 14. TRANSPORT INFORMATION

This material is not subject to the transportation regulations of DOT, IATA, and the IMO. Refer to site-specific procedures and requirements for additional guidance.

ADR CLASSIFICATION:

<table>
<thead>
<tr>
<th>Proper Shipping Name:</th>
<th>Environmentally hazardous substance, liquid, n.o.s. (permethrin)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazard Class:</td>
<td>9</td>
</tr>
<tr>
<td>UN Number:</td>
<td>UN 3082</td>
</tr>
<tr>
<td>Packing Group:</td>
<td>III</td>
</tr>
<tr>
<td>Classification Code:</td>
<td>M6</td>
</tr>
</tbody>
</table>

ADDITIONAL INFORMATION:
Although this material is regulated only under the ADR, both the IATA and IMO have special provisions that allow the shipper to transport materials under the shipping name "Environmentally hazardous substance, liquid, n.o.s." if the material is being transported under both ADR and either IATA or IMO regulations.

SECTION 15. REGULATORY INFORMATION

TSCA LISTING

<table>
<thead>
<tr>
<th>INGREDIENT</th>
<th>TSCA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distillates, petroleum, solvent-refined light paraffinic</td>
<td>X</td>
</tr>
<tr>
<td>Distillates, petroleum, solvent-refined heavy paraffinic</td>
<td>X</td>
</tr>
</tbody>
</table>

U.S. STATE REGULATIONS

<table>
<thead>
<tr>
<th>INGREDIENT</th>
<th>California Proposition 65</th>
<th>CARTK</th>
<th>NJRTK</th>
<th>CTRTK</th>
<th>MARTK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permethrin Technical</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distillates, petroleum, solvent-refined light paraffinic</td>
<td></td>
<td>3422</td>
<td></td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INGREDIENT</th>
<th>PARTK</th>
<th>MNRTK</th>
<th>MIRTK</th>
<th>RIRTK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distillates, petroleum, solvent-refined light paraffinic</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Distillates, petroleum, solvent-refined heavy paraffinic</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

Fields in the above tables that do not contain data indicate that those materials have not been listed by local regulations.

SECTION 16. OTHER INFORMATION

Although reasonable care has been taken in the preparation of this document, we extend no warranties and make no representations as to the accuracy or completeness of the information contained therein, and assume no responsibility regarding the suitability of this information for the user's intended purposes or for the consequence of its use. Each individual should make a determination as to the suitability of the information for their particular purpose(s).

DEPARTMENT ISSUING MSDS: Global Safety & the Environment
Merck & Co., Inc.
One Merck Drive
Whitehouse Station, NJ 08889

MERCK MSDS HELPLINE: (800) 770-8878 (US and Canada)
(908) 473-3371 (Worldwide)
Monday to Friday, 9am to 5pm (US Eastern Time)

MSDS CREATION DATE: 14-Aug-1998
SUPERSEDES DATE: 21-Mar-2008

MSDS NAME: Boss Pour-On Insecticide  MSDS NUMBER: SP000819
Latest Revision Date: 23-Sep-2011