

**Experimental Research Application
for the use of Entrust 80W (Spinosad) on Sawflies
on 45 hectares of forest in Western Newfoundland**

May 2004

**Environmental assessment Registration
pursuant to
Part 10, Environmental Assessment, Section 49
of the
Environmental Protection Act, 2002**

**Submitted to
Minister of Environment and Conservation
P.O. Box 8700
St John's, NL
A1B 4J6**

PROPONENT:

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THE UNDERTAKING:

i) Nature of Undertaking

The Province of Newfoundland and Labrador continues to face serious and widespread infestations of balsam fir sawfly (*Neodiprion abietis* - Hymenoptera: Diprionidae). These infestations are threatening substantial investments in silviculture and consequently the long term wood supply for the forest industry. Dow AgroSciences in conjunction with Natural Resources Canada, Canadian Forestry Service (CFS) is proposing an experimental application on selected silviculturally treated forest stands forecast to receive moderate to severe balsam fir sawfly defoliation in 2004. Applications of this biological control agent, Entrust 80W, will be made using fixed-wing aircraft.

Spinosad, the active ingredient in Entrust 80W, is currently registered on more than 70 fruit and vegetable crops across Canada including apples, potatoes, peaches, lettuce, sweet corn and cabbage. It is also registered for use on ornamentals for the control of conifer sawflies.

ii) Purpose,/Rationale/Need for the Undertaking

Description of Balsam Fir Sawfly Problem

Insect population levels

The balsam fir sawfly is native to and has been an occasional pest on balsam fir in Newfoundland. Recently, it has become more important as a pest of young and semi-mature balsam fir (*Abies balsamea*), particularly in pre-commercially thinned stands (PCTs). The population overwinters in the egg stage in fir needles and larvae usually hatch in late-June to mid-July depending on the weather. Larvae feed on previous-year and older foliage for a number of weeks before pupating. Adult sawflies emerge in August, mate and eggs are laid in the needles of the current year. Populations have been regulated by natural pathogens, parasites and predators. Outbreaks have normally been of short duration (3 - 4 years). Although localized damage was often severe, tree mortality was limited. Defoliation, however, can cause significant growth loss to affected trees without tree death. Research at CFS has shown that, after defoliation has ceased, there may be a 13- to- 18-year period of reduced growth before the trees recover to pre-infestation growth rates (Piene et al. 2001).

The current infestation in western Newfoundland was detected in 1991 near Bottom Brook, east of Stephenville. By 1994, approximately 1,216 hectares (ha) of defoliation were recorded. In 1995, high population levels were observed. Moderate and severe defoliation was mapped on 12,600 ha, with some 10 percent mortality occurring in young fir stands. The situation in 1996 saw the infestation continue to expand with defoliation on 19,700 ha, including 15,400 ha in the moderate and severe categories. In 1997, the infestation expanded to the northeast and southeast into larger areas of valuable balsam fir (PCT) stands. A total of 53,000 ha were defoliated in 1997 with 30,300 ha in the moderate and severe categories. Pockets of defoliation were also detected on the Burin Peninsula and in Bay d'Espoir. The moderate and severe defoliation in 1998 totaled approximately 24,400 ha with 16,500 ha occurring in western Newfoundland, 5,800 ha in

Bay d'Espoir and 2,100 ha on the Burin Peninsula. In 1999, moderate and severe defoliation occurred on 18,400 ha with 12,400 ha in western Newfoundland, 3,300 ha in Bay d'Espoir and 2,800 ha on the Burin Peninsula. In 2000, approximately 22,000 ha in western Newfoundland and 19,000 ha in the Bay d'Espoir were defoliated. Moderate to severe defoliation was recorded on 38,000 ha in western Newfoundland and 9,000 ha in the Bay d'Espoir in 2001.

In 2002-2003, moderate to severe defoliation reached 60,000 ha in western and southern Newfoundland. The western area extended from south of Grand Lake, north to Old Man's Pond and from Stag Lake-Cook's Brook across the Humber Arm near Gillams and east to Steady Brook-Corner Brook Lake. This area is of particular concern because a significant proportion is PCT. These PCTs have been established, at an average cost of \$1,000+/ha (a total amount in excess of \$10 million). These are critical to maintaining an adequate wood supply for the forest industry.

The impact of balsam fir sawfly infestations, if left unchecked, will result in substantial loss of this investment. The failure to adequately protect the investment in silviculture, and the potential loss of future harvestable stands, would be significant to the social and economic well-being of the people, particularly on the west and south-west coasts of the Island. This is true both in terms of direct employment and in spin-off economics.

With prolonged, severe defoliation, affected trees will be stressed, lose growth and be subject to mortality from secondary insects and diseases. It is estimated that, since the balsam fir sawfly outbreak began, the Province has loss in excess of 120,000 m³ of incremental growth.

Control Options

A pest management program is being developed against the balsam fir sawfly in Newfoundland to protect valuable young stands and silviculturally treated areas of balsam fir. The purpose of the program is to reduce balsam fir sawfly population levels in treated areas to minimize the loss of foliage, tree growth and to prevent tree mortality due to secondary infestations in trees weakened by balsam fir sawfly attack.

Unfortunately, control options for balsam fir sawfly are limited. Experimental programs have been carried out by CFS and its collaborators in 1998, 1999, 2000, 2001, 2002 and 2003 in Newfoundland and in other jurisdictions to develop biological control options for a number of sawflies, including the balsam fir sawfly. Progress has been made and work is continuing.

Registration Approval Process

Any pest control product manufacturer who wishes to sell a pesticide in Canada must first register that product under the Pest Control Products Act. To receive registration, the manufacturer must follow the registration process administered by the Pest Management Regulatory Agency (PMRA), Health Canada. Registration involves the submission of an application by the manufacturer. The company must first carry out extensive studies on the product. The application must be supported by a very thorough data package documenting the effects of the pesticide on users, bystanders and the environment. A scientific evaluation of the product is then performed by PMRA. The scientific evaluation

may take years, as the evaluation may require long- and short-term human health effects, residues in food, ground water contamination, effects on wildlife and environmental fate. A registration will be granted only if the safety of the pesticide and its merit and value for the proposed use are found to be acceptable. If problems with the product are identified, registration will not be granted. All products are subject to reevaluation, with provision for suspension or cancellation.

Once the Federal Government approves a registration, the provincial governments become more involved. Each province has legislation dealing specifically with pesticide use in that province. In Newfoundland and Labrador pesticide use is regulated under the *Pesticides Control Act*. This legislation requires all organizations and companies using pesticides to apply for and receive a Pesticide Operator License. This license regulates aspects of an operation not covered by federal legislation and requirements. As with federal regulations, the Pesticide Operator License is designed to minimize risk to human health and the environment. Aspects of a pesticide operation, such as buffer zones, spill response, public information and notification programs, monitoring requirements, weather conditions, are all specified in the license as they relate to a particular spray program. The federal registration system, combined with the provincial licensing and regulatory system, ensures that any pesticide that is used in Canada has passed a comprehensive environment/health evaluation.

Provincial legislation also requires individuals to be trained in the safe use of pesticides. Only individuals that successfully pass the provincial pesticide applicator exam (administered by the Department of Environment and Conservation - Pesticides Control Section) are granted an applicator license and authorized to handle pesticides. Compliance and enforcement activities are also carried out by the Pesticides Control Section.

As with all commercial pesticide operations, the 2004 experimental Dow AgroSciences program will be regulated by the Pesticides Control Section of the Newfoundland and Labrador Department of Environment and Conservation.

Description of the Undertaking

i) Geographical Location

The three 15 hectares blocks are located on the west side of Deer Lake near Ninth Brook. Site is remote with no residential or open water near the three blocks. See map for details of site.

iv) Operation

Applications will be completed in July under the supervision of Canadian Forestry Service, Atlantic Region, using fixed winged aircraft. A single application will be used on each of three 15 hectare block of forest. The total area to be treated is 45 hectares which is less than the 100 hectares approved under the federal research permit. Timing of the application will be linked to the life stage of the insect. Applications will be made when the insect is actively feeding on the foliage of balsam fir but before there is

significant feeding damage to the trees. Assessment of control will be conducted by Canadian Forestry Service.

Entrust 80W will be applied at the rate of 15, 30, and 60 grams of product per hectare. The product will be diluted with water to ensure proper coverage of the foliage.

v) Occupations

The ground crew and assessments will be completed by CFS staff plus local temporary help. Tasks would include marking of plot site, sampling of foliage before and at intervals after application, and insect counts. The aircraft and pilot will be supplied by Forest Protection Limited. The Forestry Service of Newfoundland and Labrador will monitor this study.

Approval of the Undertaking

A research permit has been issued by the Pest Management Regulatory Agency, Health Canada, Ottawa. The Research Permit Number 37-RP-04 has been approved along with a label review by this agency. The active ingredient is currently registered in Canada on more than 70 fruit and vegetable crops as well as use on turf and outdoor ornamentals.

All federal and provincial regulatory requirements as described in the permits and licenses including buffer zones to inhabited and aquatic areas and public notification programs will be adhered to.

Schedule

Timing of the application is in July with the exact date determined by the development of the pest.

Funding

Funding for the project will be provided by Dow AgroSciences Canada Inc. Canadian Forestry Service will provide the scientific and technical personnel to complete the project.

Date

Signature of Chief Financial Leader

June 2/2004

Murray Stet

ATTACHMENTS:

- Appendix
- Product Label
- Map of Proposed Application Sites
- PMRA Research Permit
- Material Safety Data Sheet

SPINOSAD Technical Insect Control Product

Name, Physical and Chemical Properties (Technical Grade Active Ingredient)

Common Name:	Spinosad (a mixture of spinosyns A and D)
Chemical Name (CAS):	Spinosyn A: 2-[6-deoxy-2,3,4-tri-O-methyl- α -L-Mano-pyranosyl)oxy]-13-[[5-(dimethylamino)-Tetrahydro-6-methyl-2H-pyran-2-yl]oxy]-9-Ethyl-2,3,3a,5a,5b,6,9,10,11,12,13,14,16a,16b-Tetradecahydro-14-methyl-1H-as-indeceno[3,2-d]oxycyclododecin-7,15-dione Spinosyn D: 2-[6-deoxy-2,3,4-tri-O-methyl- α -L-Mano-pyranosyl)oxy]-13-[[5-(dimethylamino)-Tetrahydro-6-methyl-2H-pyran-2-yl]oxy]-9-Ethyl-2,3,3a,5a,5b,6,9,10,11,12,13,14,16a,16b-Tetrahydro-4, 14-dimethyl-1H-as-indeceno[3,2-d]oxycyclododecin-7,15-dione
CAS Registry Number:	Spinosyn A: 131929-60-7 Spinosyn D: 131929-63-0
Empirical Formula:	Spinosyn A: C ₄₁ H ₆₅ NO ₁₀ Spinosyn D: C ₄₂ H ₆₇ NO ₁₀
Molecular Weight:	Spinosyn A: 731.45 Spinosyn D: 745.45
Physical Form:	Solid at 23° C
Colour:	Light gray to white
Odour:	Slightly stale water
Melting Point:	Spinosyn A: 84 - 99.5° C Spinosyn D: 161.6 – 170 ° C
Vapour Pressure:	Spinosyn A: 3.0 x 10 ⁻⁶ mPa at 25° C Spinosyn D: 2.0 x 10 ⁻⁶ mPa at 25° C
Log ₁₀ P:	Spinosyn A: 3.9 (water), 4.0 (pH 5), 4.0 (pH 7) 5.2 (pH 9) Spinosyn D: 4.4 (water), 4.5 (pH 5), 4.5 (pH 7) 5.2 (pH 9)
Water solubility:	Spinosyn A: 89.4 mg/L in water Spinosyn D: 0.495 mg/L in water
Solubility in Organic solvents:	Spinosyn A: 160 g/L in acetone Spinosyn D: 10.1 g/L in acetone
Stability:	Stable
Formulated Products:	Success 480 SC Naturalyte Insect Control Product PCP Reg. No. 26835 Entrust 80W Naturalyte Insect Control (Certified Organic Formulation)
Guarantee:	85% w/w
Density:	0.512 g/ml at 20° C

Development, History and Biological Properties

Spinosyns are a naturally derived products from a soil bacteria (*Saccharopolyspora spinosa*). Spinosad is a mixture of the two most active natural factors, A and D, which are the result of a fermentation process. Spinosad has demonstrated excellent control of pests of many crops.

Spinosad has also shown a significant margin of safety to many beneficial insects. As such, spinosad is a useful tool in numerous crops where the preservation of beneficial insects plays an important role in pest management practices. Use of spinosad to control pest species will have minimal impact on predators which aid in the suppression of certain economic pests.

The mode of action of spinosad is unique. Spinosad must be ingested by the insect to be effective.

Use Summary

Spinosad Technical Insect Control Product is used to formulate the end-use products Success 480 SC Naturalyte Insect Control Product and Entrust 80 Wettable Powder. Success is registered for use in fruit and vegetable crops (PMRA Use Site Category 14), as well as for use in turf and ornamentals (PMRA Use Site Categories 20, 27 and 30). Spinosad was reviewed by the U.S. EPA as a reduced risk compound.

Success was first registered in Canada in 2001. The product is now registered for the following food uses: potatoes, sweet corn, leafy vegetables, root and tuber vegetables, fruiting vegetables, pome fruit, stone fruit, brassica leafy vegetables, and snap beans. Success is also registered for use in turf for control of sod webworm and in ornamentals for control of conifer sawflies, leaf beetles, thrips, Eastern tent caterpillar and Gypsy moth.

See the product label for specific application rates and additional information.

Toxicology

Acute Toxicity

Spinosad has low acute toxicity. The rat oral LD₅₀ was 7500 (males) and 5268 (females) mg/k, and the mouse oral LD₅₀ was 6124 (males) and 7119 (females) mg/kg (Gilbert et al, 1996). The rabbit dermal LD₅₀ was > 5000 mg/kg (Gilbert, 1994a), and the rat inhalation LC₅₀ was > 5.18 mg/L air (Wolff et al., 1992). In addition, spinosad was not a guinea pig skin sensitizer (Gilbert, 1994b and Shibata, 1996); and did not produce significant dermal (Gilbert, 1994c) or ocular irritation (Gilbert, 1994d) in rabbits.

Sub chronic Toxicity

Spinosad has been evaluated in several 13-week dietary studies (Harada, 1994; Grothe, 1992a; Grothe et al., 1992b). The NOELs were 4.89 mg/kg/day for dogs, 6 mg/kg/day for mice, and 8.6 mg/kg/day for rats.

Genotoxicity

Spinosad consistently demonstrated lack of genotoxicity based on the results of the standard studies.

Chronic Toxicity/Oncogenicity

In a 12-month chronic dog study (Harada, 1995), the NOEL for male and female dogs was approximately 2.68 and 2.72 mg/kg/day, respectively.

In a 24-month chronic toxicity/oncogenicity study in Fischer 344 rats (Bond et al., 1995a), the NOEL for male and female rats was determined to be 2.4 and 3.0 mg/kg/day, respectively.

In an 18-month oncogenicity study in CD-1 mice (Bond et al., 1995b), the NOEL for male and female rats was determined to be 11.4 and 13.8 mg/kg/day, respectively.

Reproduction and Teratology

In a dietary reproduction study with rate (Breslin et al, 1994), the NOEL for adults and pups was 10 mg/kg/day.

In a gavage teratology study in rats (Liberacki et al., 1993), the NOELs for maternal and fetal effects were 50 and 200 mg/kg/day, respectively. In a gavage teratology study in rabbits (Vedula et al., 1994), the NOELs for maternal and fetal effects were 10 and 50 mg/kg/day, respectively.

Neurotoxicity

Spinosad did not cause neurotoxicity in rats in acute (Albee et al., 1994), sub chronic (Wilmer et al., 1993) or chronic (Spencer and Yano, 1995) studies specifically designed to evaluate potential neurotoxic effects.

Metabolism

A rat metabolism study was conducted to provide information on the adsorption, distribution, metabolism and excretion of ¹⁴C spinosyn A in Fischer 344 rats. The data indicate that ¹⁴C spinosyn A was well absorbed and extensively metabolized, and that the routes and rates of excretion were not affected by repeated administration of spinosad.

Conclusion: Mammalian Toxicology

Spinosad has low acute toxicity by the oral, dermal and inhalation routes. In studies up to 13 weeks duration, the NOELs for spinosad are ≥ 5 mg/kg/day in rats, mice and dogs. In chronic studies, the NOELs for spinosad are ≥ 2.4 mg/kg/day in rats, mice and dogs. Spinosad is not genotoxic, tumourigenic, carcinogenic, neurotoxic, teratogenic, foetotoxic or a developmental

toxin by the oral route. Using the chronic NOEL of 2.4 mg/kg/day and the conventional safety factor of 100, the ADI is 0.024 mg/kg bw/day.

Occupational Exposure

An assessment of potential exposure and risks to workers associated with the use of spinosad insect control product has been determined (Day et al., 1994). Exposures have been estimated by the use of the Pesticide Handlers Database (PHED) based on the aerial application of the product in cotton assuming a seasonal application rate of 500 g ai/ha. Estimates were made for workers who load or mix the product or who are flaggers for the aerial application; pilots who apply the product, as well as for the farmer who mixes, loads and applies the product. Using the 5 mg/kgBW/day NOEL from the 90-day dog feeding study as the toxicity endpoint (lowest NOEL), margins of exposure (MOE) for spinosad ranged from 1,800 to 14,000. These MOEs are well above the value of 100 which is usually deemed to be acceptable for agricultural workers. It was concluded that spinosad can be used in without significant hazard to agricultural workers and that minimal worker protection and re-entry labeling will be required.

Fate and Behavior in the Environment

Spinosad is non-persistent with observed overall field dissipation half-lives ranging from 0.3 to 0.5 days. Primary pathways of degradation are photolysis by sunlight and microbial breakdown. Breakdown of spinosad exposed to sunlight has been observed in all key environmental compartments: treated plant surfaces (half-lives of 2 to 16 days), water (half-life <1 day) and on bare field soil (<1 day). In the absence of sunlight, spinosad still undergoes microbial decay: laboratory studies conducted in aerobic soil in the dark indicate a bi-phasic degradation pattern with an initial half-life on the order of 2 weeks. A study under forestry conditions resulted in 50% dissipation times from 2.0 to 7.8 days; these results illustrate the timely breakdown of spinosad even with attenuated light.

Spinosad is moderately to strongly absorbed by soil particles and therefore it is relatively immobile. K_d values for spinosad range from 4.3 to 323 mL/g depending on soil type and length of soil contact.

Photolysis, again, will be the most significant route of degradation in water with aqueous photolysis half-life of approximately 1 day in pH 7 buffered water at 25° C.

Environmental Toxicology

Spinosad has been evaluated in a wide range of ecotoxicological studies to assess acute and sub chronic toxicity and reproductive effects. Spinosad has a favorable ecotoxicology profile. Spinosyn A has a low potential to bioconcentrate. Spinosad has low toxicity to birds, fish and most aquatic invertebrates and plants.

In laboratory tests, spinosad has demonstrated toxicity to some aquatic organisms. However, with the rapid dissipation of spinosad, the actual risk from in-field use has been demonstrated to be very low. The Environmental Protection Agency has determined when the exposure of

spinosad to aquatic organisms is calculated using environmental fate transport models to predict off-site environmental concentrations, actual impact under field conditions for aquatic organism is unlikely. The product is slightly toxic to aquatic invertebrates such as Daphnia, grass shrimp, marine diatom, and blue-green algae. The material is slightly toxic to rainbow trout and moderately toxic to common carp, bluegill, and sheep head minnow on an acute basis. It is considered highly toxic to eastern oyster on an acute basis.

Spinosad is inherently toxic to bees under laboratory conditions, but toxicity of residue studies and field studies indicate that under actual use conditions, the impact on bees is eliminated once the sprayed material has dried. In use in orchards across Canada for three years, spinosad is considered as a product that fits into Integrated Pest Management programs i.e. it is not harsh to beneficial insects such as spiders, true bugs, ants, and mites.

NOTE ON ENTRUST FORMULATION

Entrust 80WP Naturalyte Insect Control is an approved organic compatible formulation. Spinosad is recognized as an active ingredient suitable for use in organic agriculture by the USDA National Organic Standards Board. Entrust 80W is an organic compatible formulation.

(Container)



Entrust* 80 W

Naturalyte* Insect Control Product

GROUP	5	INSECTICIDE
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For the control of Balsam Fir Sawfly in forest management programs.

FOR EXPERIMENTAL USE ONLY

Not for sale. Not for distribution to any person other than a researcher or a cooperator.

READ THE LABEL AND BOOKLET BEFORE USING
KEEP OUT OF REACH OF CHILDREN

GUARANTEE: spinosad 80%

RESEARCH PERMIT 37-RP-04 PEST CONTROL PRODUCTS ACT

MAY CAUSE EYE AND SKIN IRRITATION

NET CONTENTS: .45 kg

Dow AgroSciences Canada Inc.
Suite 201, 1144 - 29 Avenue N.E.
Calgary, Alberta
T2E 7P1
1-800-667-3852

*Trademark of Dow AgroSciences LLC

PRECAUTIONS**MAY CAUSE EYE AND SKIN IRRITATION****KEEP OUT OF REACH OF CHILDREN**

Avoid contact with eyes, skin and clothing. During mixing, loading, application, and cleanup and repair activities, wear long-sleeved shirt and long pants, shoes plus socks and chemical resistant gloves. Wash thoroughly with soap and water after handling.

Apply only when the potential for drift to areas of human habitation or areas of human activity such as houses, cottages, schools and recreational areas is minimal. Take into consideration wind speed, wind direction, temperature, application equipment and sprayer settings.

For all activities, do not enter, or allow workers, adults, children or pets to enter into treated areas until pesticide residues have dried.

FIRST AID

Take container, label or product name and Pest Control Product Registration Number with you when seeking medical attention.

If in eyes: Flush with plenty of water. Call a physician or poison control centre if irritation persists.

If on skin: Wash with plenty of soap and water.

TOXICOLOGICAL INFORMATION

No specific antidote. Employ supportive care. Treatment should be based on judgment of the physician in response to reactions of the patient.

AGRICULTURAL CHEMICAL

Do not ship or store with food, feeds, drugs or clothing.

ENVIRONMENTAL PRECAUTIONS

This product is highly toxic to bees exposed to direct treatment, drift or residues on blooming plants. Do not apply this product or allow it to drift to blooming plants if bees are visiting the treatment area. This product is harmful to parasitoids and predatory mites and slightly harmful to foliage-dwelling predators. Care should be taken when using this product in an integrated pest management program where users are relying on the presence of beneficial arthropods.

This product is highly toxic to aquatic invertebrates. Do not contaminate aquatic habitats, such as lakes, rivers, ponds, coulees, prairie potholes, creeks, marshes, streams, reservoirs, and wetlands when cleaning and rinsing spray equipment or containers. For aerial applications, a buffer zone of 10 metres is required between the point of direct application and the closest downwind edge of sensitive aquatic habitats such as lakes, rivers, sloughs, ponds, coulees, prairie potholes, creeks, marshes, streams, reservoirs, and wetlands.

This product has potential for run-off. It should not be applied under conditions where run-off is likely to occur. Do not apply immediately after a rainfall or if there is a forecast for rain during or within 48 hours after application.

STORAGE

Store in original container in a secured dry storage area. Prevent cross-contamination with other pesticides and fertilizers. Keep away from food and feed.

DISPOSAL

Do not reuse this container for any purpose. This is a recyclable container, and is to be disposed of at a container collection site. Contact your local distributor/dealer or municipality for the location of the nearest collection site. Before taking the container to the collection site:

1. Triple- or pressure-rinse the empty container. Add the rinsings to the spray mixture in the tank.
2. Make the empty, rinsed container unsuitable for further use.

If there is no container collection site in your area, dispose of the container in accordance with provincial requirements.

Any unused product must be returned to the manufacturer. Contact the manufacturer and the provincial regulatory agency in case of a spill, and for clean-up of spills.

NOTICE TO USER: This control product is to be used only in accordance with the directions on this label. It is an offense under the *Pest Control Products Act* to use a control product under unsafe conditions.

(Booklet)



Entrust* 80 W

Naturalyte* Insect Control Product

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*Trademark of Dow AgroSciences LLC

PRECAUTIONS**MAY CAUSE EYE AND SKIN IRRITATION****KEEP OUT OF REACH OF CHILDREN**

Avoid contact with eyes, skin and clothing. During mixing, loading, application, and cleanup and repair activities, wear long-sleeved shirt and long pants, shoes plus socks and chemical resistant gloves. Wash thoroughly with soap and water after handling.

Apply only when the potential for drift to areas of human habitation or areas of human activity such as houses, cottages, schools and recreational areas is minimal. Take into consideration wind speed, wind direction, temperature, application equipment and sprayer settings.

For all activities, do not enter, or allow workers, adults, children or pets to enter into treated areas until pesticide residues have dried.

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AGRICULTURAL CHEMICAL

Do not ship or store with food, feeds, drugs or clothing.

ENVIRONMENTAL PRECAUTIONS

This product is highly toxic to bees exposed to direct treatment, drift or residues on blooming plants. Do not apply this product or allow it to drift to blooming plants if bees are visiting the treatment area. This product is harmful to parasitoids and predatory mites and slightly harmful to foliage-dwelling predators. Care should be taken when using this product in an integrated pest management program where users are relying on the presence of beneficial arthropods.

This product is highly toxic to aquatic invertebrates. Do not contaminate aquatic habitats, such as lakes, rivers, ponds, coulees, prairie potholes, creeks, marshes, streams, reservoirs, and wetlands when cleaning and rinsing spray equipment or containers. For aerial applications, a buffer zone of 10 metres is required between the point of direct application and the closest downwind edge of sensitive aquatic habitats such as lakes, rivers, sloughs, ponds, coulees, prairie potholes, creeks, marshes, streams, reservoirs, and wetlands.

This product has potential for run-off. It should not be applied under conditions where run-off is likely to occur. Do not apply immediately after a rainfall or if there is a forecast for rain during or within 48 hours after application.

STORAGE

Store in original container in a secured dry storage area. Prevent cross-contamination with other pesticides and fertilizers. Keep away from food and feed.

DISPOSAL

Do not reuse this container for any purpose. This is a recyclable container, and is to be disposed of at a container collection site. Contact your local distributor/dealer or municipality for the location of the nearest collection site. Before taking the container to the collection site:

1. Triple- or pressure-rinse the empty container. Add the rinsings to the spray mixture in the tank.
2. Make the empty, rinsed container unsuitable for further use.

If there is no container collection site in your area, dispose of the container in accordance with provincial requirements.

Any unused product must be returned to the manufacturer. Contact the manufacturer and the provincial regulatory agency in case of a spill, and for clean-up of spills.

DIRECTIONS FOR USE

Read and understand the entire label and booklet before using this product.

Entrust 80 W contains the active ingredient spinosad which is derived from a naturally occurring organism. Use Entrust 80 W to control balsam fir sawfly larvae in areas where insect pressure may result in economic loss. Consult local pesticide regulatory authorities about use permits that may be required.

Apply by air only by fixed-wing or rotary aircraft equipment which has been functionally and operationally calibrated for the atmospheric conditions of the area and for the application rates and conditions of this label. Ensure uniform application. To avoid streaked, uneven or overlapped application, use appropriate marking devices.

Insect pest	Application rate & Number of applications per season	Application timing
Balsam fir sawfly on conifers	15, 30 & 60 g product/ha. One application per season	Apply as soon as larvae start to appear up to the 4 th instar.

Use Precautions

Apply only when meteorological conditions at the treatment site allow for complete and even crop coverage. Apply only under conditions of good practice specific to aerial application as outlined in the *Basic Knowledge Requirements for Pesticide Education in Canada: Applicator Core and Aerial Module*, developed by CAPCO.

Do not apply to any body of water. Avoid drifting of spray onto any body of water or other non-target areas. Specified buffer zones should be observed.

Coarse sprays are less likely to drift, therefore, avoid combinations of pressure and nozzle type that will result in fine particles (mist). Do not apply during periods of dead calm or when wind velocity and direction pose a risk of spray drift. Do not spray when the wind is blowing towards a nearby sensitive crop, garden, terrestrial habitat (such as shelter-belt) or aquatic habitat.

Operator Precautions

Do not allow the pilot to mix chemicals to be loaded onto the aircraft. Loading of premixed chemicals with a closed system is permitted.

It is desirable that the pilot have communication capabilities at each treatment site at the time of application.

The field crew and the mixer/loaders must wear chemical resistant gloves, coveralls and goggles or face shield during mixing/loading, cleanup and repair. Follow the more stringent label precautions in cases where the operator precautions exceed the generic label recommendations on the existing ground boom label.

All personnel on the job site must wash hands and face thoroughly before eating and drinking. Protective clothing, aircraft cockpit and vehicle cabs must be decontaminated regularly.

Resistance Management Recommendations

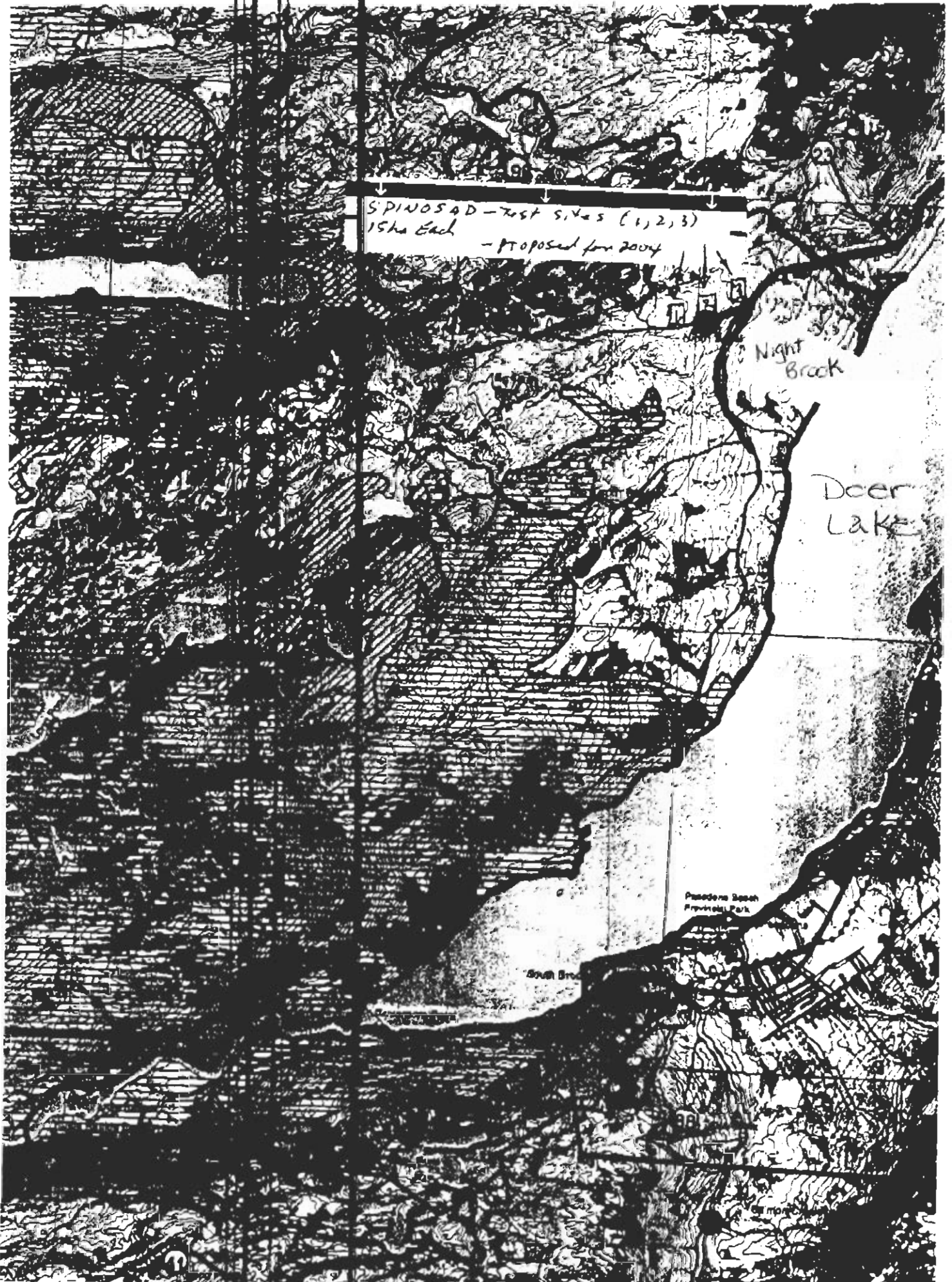
For resistance management, please note that Entrust 80 W contains a Group 5 insecticide. Any insect population may contain individuals naturally resistant to Entrust 80 W and other Group 5 insecticides. The resistant individuals may dominate the insect population if this group of insecticides are used repeatedly in the same fields. Other resistance mechanisms that are not linked to site of action but are specific for individual chemicals, such as enhanced metabolism, may also exist. Appropriate resistance management strategies should be followed.

To delay insect resistance:

- Where possible, rotate the use of Entrust 80 W or other Group 5 insecticides with different groups that control the same pests in a field.
- Use tank mixtures with insecticides from a different group when such use is permitted.
- Insecticide use should be based on an IPM program that includes scouting, record keeping, and considers cultural, biological and other chemical control practices. Monitor treated pest populations for resistance development.
- Contact your local extension specialist or certified crop advisors for any additional pesticide resistance management and/or IPM recommendations for the specific site and pest problems in your area.
- For further information or to report suspected resistance, contact Dow AgroSciences Canada Inc. at 1-800-667-3852 or at www.dowagro.ca

NOTICE TO USER: This control product is to be used only in accordance with the directions on this label. It is an offense under the *Pest Control Products Act* to use a control product under unsafe conditions.

051104



SPINOSAD - Test Sites (1, 2, 3)
15ha Each
- Proposed for 2004

Night Brook

Deer Lake

Paradise Beach
Franklin Park

South Brook



Pest Management Regulatory Agency
Agence de réglementation de la lutte antiparasitaire

APPLICATION FOR RESEARCH PERMIT
Under the Pest Control Products Act

DEMANDE DE PERMIS DE RECHERCHE
Aux termes de la Loi sur les produits antiparasitaires

NOTE: TYPE OR PRINT CLEARLY.
LEAVE SHADED AREAS BLANK.

NOTA: ÉCRIRE LISIÈLEMENT OU DACTYLOGRAPHIER.
NE PAS ÉCRIRE DANS LES ESPACES OMBRÉS.

1. Product name or experimental no./ Enrlist 80 W Naturalyte Insect Control Product	2. Reg. No. if appl./N° d'homolog. appl. n/a
3. CSA common name - Chemical name and percent for each active ingredient Nom commun (CSA), formule chimique et pourcentage de chaque matière active spinosad	
4. Name of applicant/Nom du demandeur Dow AgroSciences Canada Inc.	Tel. no./N° de tél. (403) 735-8800
Address/Adresse Suite 201, 1144 - 29 Avenue N.E.	Fax no./N° de télécopieur (403) 735-8819
Calgary, AB Canada T2E 7P1	
5. Name of research coordinator/Nom du coordonnateur de la recherche Al McFadden	Tel. no./N° de tél. (519) 836-3728
Address/Adresse 46 Park Avenue, Guelph, ON N1H 4S5	Fax no./N° de télécopieur (403) 735-8819
6. Name of supplier/Nom du fournisseur Dow AgroSciences Canada Inc.	Tel. no./N° de tél. (403) 735-8800
Address/Adresse Suite 201, 1144 29th Avenue N.E., Calgary, AB T2E 7P1	Fax no./N° de télécopieur (403) 735-8819

Submission no.
N° de la demande
2004-0566
Date Received
Date de réception
26-Feb-2004
Research permit no.
N° permis de rech.
31-RP-04
Registrant code
Code du titulaire
DWE
Active ingred. code
Code matière active
SPI

7A. Quantity of product distributed or obtained by region/Quantité de produit distribuée ou obtenue par région 6 L	7B. Points of entry/Points d'entrée Windsor, ON; or Fort Erie, ON
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8A. Host or crop being treated/Hôte ou culture traité(e) Conifers	8F. Additional directions/Directives supplémentaires Up to 100 ha will be treated. (Should be in Box 11) <i>ck</i>
8B. Pest/Agent nuisible Balsam Fir Sawfly	

8C. Rate/Taux 15, 30 and 60 g product/ha	9. Preharvest interval/Délai d'attente avant récolte N/A
	10. Purpose/But Residue <input type="checkbox"/> Efficacy <input checked="" type="checkbox"/> Environment <input type="checkbox"/> Other / Autre Résidus <input type="checkbox"/> Efficacité <input checked="" type="checkbox"/> Environnement <input type="checkbox"/> Autre

8D. Timing and number of applications (Testing dates where possible) Calendrier et nombre d'applications (dates des applications si possible) June-July 2004	11. Exact location, size & number/Région exacte, grandeur et numéro To be determined. Can be provided later if needed. Newfoundland Total 100ha <i>ck</i>
--	--

8E. Application equipment to be used/Équipement d'application à être utilisé Aerial	12. Type of research/Genre de recherche <input checked="" type="checkbox"/> New use of reg. product Nouvel emploi d'un <input type="checkbox"/> New Formulation Nouvelle Formulation <input type="checkbox"/> Additional Residue Data Données additionnelles sur <input type="checkbox"/> New active/New Source Nouvelle matière active/nouvelle source
--	---

13. Indicate if the following have been submitted/Indiquer si les renseignements suivants ont été soumis	Y/O N/N				
A. Product Specification form Formule de spécifications du produit	<input checked="" type="radio"/>	C. Material Safety Data Sheets Fiche signalétique	<input checked="" type="radio"/>	E. List of cooperators and researchers Liste des collaborateurs et des chercheurs	<input checked="" type="radio"/>
B. Experimental label Étiquette expérimentale	<input checked="" type="radio"/>	D. Maps/Cartes	<input checked="" type="radio"/>	F. Protocols/Protocoles	<input checked="" type="radio"/>
				G. Data (specify) Données (spécifier)	<input checked="" type="radio"/>
				H. Other (specify)/Autres (spécifier)	<input checked="" type="radio"/>

14. I hereby specify that the above information is correct in all respects. I understand that the grant of a permit does not create any liability on the Crown and the applicant remains totally liable for such things as damage to treated crops or properties on the crops or property of others and for such matters as occupational health and safety and environmental impact as a result of this research being performed.

Nous attestons que les renseignements sur cette formule sont exacts sous tous les rapports. Nous comprenons que la délivrance d'un permis ne constitue aucune responsabilité de la part de la Couronne et que le demandeur est totalement responsable pour certaines répercussions de cette recherche telles que les dommages infligés aux cultures ou aux propriétés traitées ou aux cultures ou propriétés appartenant à une autre personne ainsi que pour d'autres sujets tels que la santé professionnelle, l'innocuité et l'impact sur l'environnement.

Signature or Name of Applicant/Signature ou nom du demandeur <i>Carol Saunders</i>	clsanders@dow.com	04/02/23
15. Date of application/Dats de la demande		

16. Comments (reserved for use of Federal Government Officials)/Commentaires (réservé à l'usage des agents du gouvernement fédéral)

Please refer to accompanying form for conditions pertaining to this permit.

Pursuant to the application and attachments and subject to amendments (if any) made therein, authorization is granted to proceed with research involving the specified pest control product. This issuance of this federal permit does not imply provincial approval. It is the applicant's responsibility to obtain provincial approval of pesticides research trials where this may be required. Crops harvested from treated plots should not be sold for food purposes unless written authorization is obtained from the PMRA.

Sur la foi des renseignements contenus dans la formule et les documents en annexe et sous réserve, (s'il y a lieu) des modifications qui leur sont apportées, le demandeur est autorisé à entreprendre la recherche sur le produit antiparasitaire susmentionné. La délivrance de ce permis n'implique pas l'approbation provinciale. Le demandeur a la responsabilité d'obtenir l'approbation de la province pour les essais de recherche sur les pesticides lorsque cela est nécessaire. Les cultures vivrières récoltées sur les parcelles traitées ne devraient pas être vendues comme aliment à moins qu'une permission écrite ne soit obtenue de l'ARLA.

This authorization of research is for the year ending: 31 DEC 2004 La présente autorisation prend fin le: 2004	Reviewing Officer/Agent responsable <i>Verre Blouet</i>	Code	Date: May 11, 2004
--	--	------	------------------------------



Material Safety Data Sheet

GEROPON SDS

Date Prepared: 9/24/03

Supersedes Date: 3/30/99

1. PRODUCT AND COMPANY DESCRIPTION

RHODIA INC.
HOME, PERSONAL CARE & INDUSTRIAL INGREDIENTS
CN 7500
Prospect Plains Road
Cranbury NJ 08512-7500

Emergency Phone Numbers:

FOR EMERGENCIES INVOLVING A SPILL, LEAK, FIRE, EXPOSURE OR ACCIDENT
CONTACT: CHEMTREC (800-424-9300 within the United States or 703-527-3887 for international collect calls) or Rhodia CAERS (Communication and Emergency Response System) at 800-916-3232.

For Product Information:

(800) 973-7873

Chemical Name or Synonym:

DIOCTYL SODIUM SULFOSUCCINATE/SODIUM BENZOATE

2. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS Reg Number	OSHA Hazard	Percentage
DIOCTYL SODIUM SULFOSUCCINATE	577-11-7	N	80 - 90
SODIUM BENZOATE	532-32-1	N	8 - 18
WATER	7732-18-5	N	< 2
2-ETHYLHEXANOL	104-76-7	Y	< 1.5

3. HAZARDS IDENTIFICATION

A. EMERGENCY OVERVIEW:

Physical Appearance and Odor:

white powder solid, slight odor.

Warning Statements:

WARNING!! DUSTS MAY FORM EXPLOSIVE MIXTURES IN AIR. SEVERE EYE IRRITANT. SKIN AND RESPIRATORY TRACT IRRITANT.

B. POTENTIAL HEALTH EFFECTS:**Acute Eye:**

Severe irritant. Can cause redness, irritation, eye damage.

Acute Skin:

Irritant. Can cause redness, inflammation, irritation, Low acute dermal toxicity.

Acute Inhalation:

Dusts may cause upper respiratory tract irritation, Low acute inhalation toxicity.

Acute Ingestion:

Harmful if ingested. Can cause nausea, diarrhea, abdominal cramps.

Chronic Effects:

This product does not contain any ingredient designated by IARC, NTP, ACGIH or OSHA as probable or suspected human carcinogens.

4. FIRST AID MEASURES

FIRST AID MEASURES FOR ACCIDENTAL:**Eye Exposure:**

Hold eyelids open and flush with a steady, gentle stream of water for at least 15 minutes. Seek immediate medical attention.

Skin Exposure:

In case of contact, immediately wash with plenty of soap and water for at least 5 minutes. Seek medical attention if irritation develops or persists. Remove contaminated clothing and shoes. Clean contaminated clothing and shoes before re-use.

Inhalation:

If respiratory irritation or distress occurs remove victim to fresh air. Seek medical attention if respiratory irritation or distress continues.

Ingestion:

NEVER attempt to induce vomiting. Consult a doctor if necessary. Wash out mouth with water and keep at rest. Seek immediate medical attention.

MEDICAL CONDITIONS POSSIBLY AGGRAVATED BY EXPOSURE:

Skin contact may aggravate existing skin disease.

NOTES TO PHYSICIAN:

All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this

product may have occurred.

Treat symptomatically. No specific antidote available.

5. FIRE FIGHTING MEASURES

FIRE HAZARD DATA:

Flash Point:

> 100 C (212 F). Flammability Class: WILL BURN.

Method Used:

Pensky-Martens Closed Cup

Flammability Limits (vol/vol%): Lower: Upper:
1.1 7.4

Extinguishing Media:

Recommended (small fires): dry chemical, carbon dioxide, Recommended (large fire): alcohol foam, universal foam, water spray, Not recommended: water jet (frothing possible).

Special Fire Fighting Procedures:

Firefighters should wear NIOSH/MSHA approved self-contained breathing apparatus and full protective clothing.

Unusual Fire and Explosion Hazards:

Product will burn under fire conditions. Closed containers may explode (due to the build-up of pressure) when exposed to extreme heat. Like all organic and most dry chemicals, as a powder or dust, this product (when mixed with air in critical proportions and in the presence of an ignition source) may present an explosion hazard.

Hazardous Decomposition Materials (Under Fire Conditions):

oxides of sulfur
oxides of carbon

6. ACCIDENTAL RELEASE MEASURES

Evacuation Procedures and Safety:

Wear appropriate protective gear for the situation. See Personal Protection information in Section 8.

Containment of Spill:

Follow procedure described below under Cleanup and Disposal of Spill.

Cleanup and Disposal of Spill:

Absorb with a damp, inert absorbent. Sweep up and place in an appropriate closed container (see Section 7: Handling and Storage). Clean up residual material by washing area with water.

Collect washings for disposal.

Environmental and Regulatory Reporting:

Do not flush to drain. Spills may be reportable to the National Response Center (800-424-8802) and to state and/or local agencies.

7. HANDLING AND STORAGE

Minimum/Maximum Storage Temperatures:

> 4 C (39 F)

Handling:

Avoid breathing dusts or vapors. Avoid direct or prolonged contact with skin and eyes. Use nonsparking tools and grounded/bonded equipment and containers when transferring.

Storage:

Store in tightly closed containers. Store in an area that is dry, well-ventilated, away from ignition sources, away from incompatible materials (see Section 10. Stability and Reactivity), SHIP AND STORE ABOVE 40F.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Introductory Remarks:

These recommendations provide general guidance for handling this product. Because specific work environments and material handling practices vary, safety procedures should be developed for each intended application. While developing safe handling procedures, do not overlook the need to clean equipment and piping systems for maintenance and repairs. Waste resulting from these procedures should be handled in accordance with Section 13: Disposal Considerations.

Assistance with selection, use and maintenance of worker protection equipment is generally available from equipment manufacturers.

Exposure Guidelines:

No exposure limits were found for this product or any of its ingredients.

Engineering Controls:

Where engineering controls are indicated by use conditions or a potential for excessive exposure exists, the following traditional exposure control techniques may be used to effectively minimize employee exposures: general area dilution/exhaust ventilation.

Respiratory Protection:

When respirators are required, select NIOSH/MSHA approved equipment based on actual or potential airborne concentrations and in accordance with the appropriate regulatory standards and/or industrial recommendations.

For reasonably foreseeable industrial end uses of this material, respiratory protection should not be necessary.

Eye/Face Protection:

Eye and face protection requirements will vary dependent upon work environment conditions and material handling practices. Appropriate ANSI Z87 approved equipment should be selected for the particular use intended for this material.

Eye contact should be prevented through use of chemical safety glasses with side shields or splash proof goggles. An emergency eye wash must be readily accessible to the work area.

Skin Protection:

Skin contact should be minimized through use of gloves and suitable long-sleeved clothing (i.e., shirts and pants). Consideration must be given both to durability as well as permeation resistance.

Work Practice Controls:

Personal hygiene is an important work practice exposure control measure and the following general measures should be taken when working with or handling this material:

- (1) Do not store, use, and/or consume foods, beverages, tobacco products, or cosmetics in areas where this material is stored.
- (2) Wash hands and face carefully before eating, drinking, using tobacco, applying cosmetics, or using the toilet.
- (3) Wash exposed skin promptly to remove accidental splashes or contact with this material.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical and Chemical properties here represent typical properties of this product. Contact the business area using the Product Information phone number in Section 1 for its exact specifications.

Physical Appearance:

white powder solid.

Odor:

slight odor.

pH:

5 to 7 at 5 wt/wt%.

Specific Gravity:

0.2 at 25 C (77 F).

Water Solubility:

dispersible

Melting Point Range:

> 100 C (212 F)

Boiling Point Range:

Not Available

Vapor Pressure:

Not Available

Vapor Density:

Not Available

10. STABILITY AND REACTIVITY

Chemical Stability:

This material is stable under normal handling and storage conditions described in Section 7.

Conditions To Be Avoided:

dusting conditions

heat

open flame

spark

Materials/Chemicals To Be Avoided:

strong oxidizing agents

strong reducing agents

Decomposition Temperature Range:

> 100 C (212 F)

The Following Hazardous Decomposition Products Might Be Expected:**Decomposition Type: thermal**

oxides of sulfur

oxides of carbon

Hazardous Polymerization Will Not Occur.**Avoid The Following To Inhibit Hazardous Polymerization:**

not applicable

11. TOXICOLOGICAL INFORMATION

Acute Eye Irritation:**Toxicological Information and Interpretation:**

eye - eye irritation, 1 %, rabbit. Standard Draize Test. Severely irritating.

Acute Skin Irritation:**Toxicological Information and Interpretation:**

skin - skin irritation, 10 mg/24 hr, rabbit.

Acute Dermal Toxicity:

No test data found for product.

Acute Respiratory Irritation:
No test data found for product.

Acute Inhalation Toxicity:
No test data found for product.

Acute Oral Toxicity:

Toxicological Information and Interpretation:
LD50 - lethal dose 50% of test species, 1900 mg/kg, rat.

Chronic Toxicity:

This product does not contain any substances that are considered by OSHA, NTP, IARC or ACGIH to be "probable" or "suspected" human carcinogens.

No additional test data found for product.

12. ECOLOGICAL INFORMATION

Ecotoxicological Information:

For ecotoxicological data call the product information phone number listed in Section 1.

Chemical Fate Information:

For chemical fate data call the product information phone number listed in Section 1.

13. DISPOSAL CONSIDERATIONS

Waste Disposal Method:

Chemical additions, processing or otherwise altering this material may make the waste management information presented in this MSDS incomplete, inaccurate or otherwise inappropriate. Please be advised that state and local requirements for waste disposal may be more restrictive or otherwise different from federal laws and regulations. Consult state and local regulations regarding the proper disposal of this material.

Container Handling and Disposal:

Any containers or equipment used should be decontaminated immediately after use.

EPA Hazardous Waste - NO

14. TRANSPORTATION INFORMATION

Transportation Status: IMPORTANT! Statements below provide additional data on listed DOT classification.

The listed Transportation Classification does not address regulatory variations due to changes in package size, mode of shipment or other regulatory descriptors.

US Department of Transportation

Shipping Name:
NOT REGULATED

15. REGULATORY INFORMATION

Inventory Status

Inventory	Status
UNITED STATES (TSCA)	Y
CANADA (DSL)	Y
EUROPE (EINECS/ELINCS)	Y
AUSTRALIA (AICS)	Y
JAPAN (MITI)	Y
SOUTH KOREA (KECL)	Y

Y = All ingredients are on the inventory.

E = All ingredients are on the inventory or exempt from listing.

P = One or more ingredients fall under the polymer exemption or are on the no longer polymer list. All other ingredients are on the inventory or exempt from listing.

N = Not determined or one or more ingredients are not on the inventory and are not exempt from listing.

FEDERAL REGULATIONS

Inventory Issues:

All functional components of this product are listed on the TSCA Inventory.

SARA Title III Hazard Classes:

Fire Hazard	- NO
Reactive Hazard	- NO
Release of Pressure	- NO
Acute Health Hazard	- YES
Chronic Health Hazard	- NO

STATE REGULATIONS:

This product does not contain any components that are regulated under California Proposition 65.

16. OTHER INFORMATION

National Fire Protection Association Hazard Ratings--NFPA(R):

- 2 Health Hazard Rating--Moderate
- 1 Flammability Rating--Slight
- 0 Instability Rating--Minimal

National Paint & Coating Hazardous Materials Identification System--HMIS(R):

- 2 Health Hazard Rating--Moderate
- 1 Flammability Rating--Slight
- 0 Reactivity Rating--Minimal

Reason for Revisions:

Change and/or addition made to Section 2, Section 3, Warning Statements in Section 3, Section 4, Section 7, Section 10, Section 11, Section 12, Regulatory Review and Update.

Key Legend Information:

ACGIH - American Conference of Governmental Industrial Hygienists

OSHA - Occupational Safety and Health Administration

TLV - Threshold Limit Value

PEL - Permissible Exposure Limit

TWA - Time Weighted Average

STEL - Short Term Exposure Limit

NTP - National Toxicology Program

IARC - International Agency for Research on Cancer

ND - Not determined

RPI - Rhodia Established Exposure Limits

Disclaimer:

The information herein is given in good faith but no warranty, expressed or implied, is made.

**** End of MSDS Document ****