FSC-TPL-01-002 Application for a derogation to use a highly hazardous pesticide.

2,4-D, dma salt

Name and contact details of certification body requesting derogation:	SCS Dave Wager dwager@scscertified.com 510 251-7049
Active ingredient for which derogation requested:	2,4-D dma salt
Geographical scope of requested derogation:	Michigan
Is there an accredited or preliminarily accredited FSC Forest Stewardship Standard applicable to the territory concerned?	FSC US standard
Requested time period for derogation: (nb Derogations shall normally be issued for a five-year period. There will be a presumption against renewal of a derogation after the expiry of the five-year period).	5 years

1. Demonstrated need

Need may be demonstrated where:

- The pesticide is used for protecting native species and forests against damage caused by introduced species or for protecting human health against dangerous diseases, OR
- Use of the pesticide is obligatory under national laws or regulations, OR
- Use of the pesticide is the only economically, environmentally, socially and technically feasible way of controlling specific organisms which are causing severe damage in natural forests or plantations in the specified country (as indicated by consideration, assessments and preferably field-trials of alternative non-chemical or less toxic pest-management methods)

Explain how the proposed use complies with the specified criteria for need, including the consideration of alternatives which do not require the use of pesticides on the FSC list of 'highly hazardous pesticides':

Overview

2,4-D dma salt is a selective herbicide used to control broad leaved plants such as woody species and forbs. 2,4-D dma salt is used to control non-native invasive plants in Michigan forests and openlands. Michigan openlands include grasslands, jack pine barrens, wildlife openings, roadways, and rights-of-way.

Specifics

More specifically, 2,4-D dma salt is used in combination with other herbicides or independently as part to the control of non-native invasives species such as honeylocust, honeysuckle, kudzu, multiflora rose, spotted knapweed, kochia, and Canada thistle. 2,4-D dma salt is a selective herbicide for broadleaf plants and does not control grasses. Using a product that is selective and affects as few plants as possible has been a preferred approach compared to unnecessarily applying a broader spectrum product.

In Michigan, invasive species such as those listed above reduce the biodiversity of our forest, reduce regeneration of important native trees, and reduce forest health. Michigan Department of Natural Resources (MDNR) manages over 4.5 million acres of diverse cover types that are mainly found in the northern Lower Peninsula and Upper Peninsula. The Draft 2006 State Forest Management Plan states that the introduction of non-native plant and animal species and diseases are a serious threat to the health of the State's forest ecosystems, and can have major ecological consequences for the composition of native forest communities. The desired future condition of state forest is that they be free from invasive plant and animal species that degrade ecological and socio-economic values and productivity, or the biological impact of such species is mitigated to the extent possible.

Michigan's Wildlife Action Plan (WAP) identifies threats to wildlife and landscape features that were evaluated as high severity throughout the State, one of these highest identified threats was the introduction of invasive non-native species.

As many as one-third of Michigan's plant species may now be non-native. In the Great Lakes basin, at least 37 terrestrial plant species and seven terrestrial insect species are invasive and pose threats to natural communities in Michigan.

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Mechanical control or prescribed burring can sometimes be used to control invasive plants. However, these management practices may also increase rate of spread, germination or resprouting. Often these practices are used cooperatively or in conjunction with herbicide treatments.

There are numerous types of herbicides that can be used to control non-native invasive plants, including glyphosate. There are concerns that with repetitive treatments of specific herbicides such as glyphosate, that individual plants' will develop a tolerance to a specific chemical. By alternating chemical types and approaches there is less risk of the development of tolerance to specific chemicals.

2,4,-D dma salt is a selective herbicide that controls broadleaf plants and does not harm native grasses. Using a product that is selective and affects as few plants as possible has been a preferred approach compared to unnecessarily applying a broader spectrum product.

Not Controlling Invasive Plants
Invasive species left unchecked would compete with native plants, intercept sunlight, and monopolize available soil nutrients and moisture, resulting in slower growth of native plants, mortality and ultimately poor system health. Herbicide treatment of invasives is often a key step to control which, may also include mechanical treatments or prescribed fire. Furthermore, there are concerns that with repetitive treatments of specific treatments such as glyphosate those individual plants will develop a tolerance to a specific chemical. By alternating chemical types and approaches there is less risk of the development of tolerance to specific chemicals.

Control of annual, perennial and woody weeds is essential for the successful restoration, establishment and growth of native ecosystems. Without weed control, plants may die due to inability to compete for water and nutrients or growth rates may be so low that they can not compete against non-native plants. Effects can range from widespread mortality in new plantings to severe suppression of entire stands for indefinite periods.

2,4,-D & environment
2,4-D is one of the oldest herbicides used in the United States, first developed during World War II (TNC, 200X). Today, 2,4-D continues to be one of the most commonly used herbicides on the market. Because there is no longer a patent governing the manufacture and sale of 2,4-D, any company is free to produce it. Thus, a variety of inexpensive 2,4-D products are available from different manufacturers. Because it has been in use for so long, many of the studies regarding its behaviour in the environment are old (e.g. pre-1980). 2,4-D is a selective herbicide that kills dicots (but not grasses) by mimicking the growth hormone auxin, which causes uncontrolled growth and eventually death in susceptible plants. The half-life of 2,4-D in the environment is relatively short, averaging 10 days in soils and less than ten days in water, but can be significantly longer in cold, dry soils, or where the appropriate microbial community is not present to facilitate degradation. In the environment, most formulations are degraded to the anionic form, which is water-soluble and has the potential to be highly mobile. Ester formulations are toxic to fish and aquatic invertebrates, but salt formulations are registered for use against aquatic weeds. 2,4-D is of relatively low toxicity to animals but some formulations can cause severe eye damage. Certain crops, such as grapes, are highly sensitive to 2,4-D and application of this

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herbicide should be avoided if they are nearby. Most formulations are highly volatile and should not be applied when conditions are windy or when temperatures are high.

The World Health Organization (1984) concluded that 2,4-D does not accumulate or persist in the environment. The primary degradation mechanism is microbial metabolism, but mineralization and possibly photolysis may also play a role. The average half-life (the time it takes for the herbicide concentration to decline by 50%) is 10 days, but rates of degradation can vary from several hours to several months or longer. Degradation rates are determined by the microbial population, environmental pH, soil moisture, and temperature (Que Hee & Sutherland 1981; Sandmann et al. 1988; Wilson et al. 1997). The type of 2,4-D formulation applied does not significantly affect the rate of degradation (Wilson et al. 1997).

2,4-D may be applied in acid, salt, or ester formulations, but in most cases, each of these formulations are apparently converted rapidly to the acid form once it contacts soil (Foster & McKercher 1973; Smith 1988; Wilson et al. 1997). Consequently, the rate of dissipation from soils is often the same regardless of the formulation of 2,4-D that is applied (Wilson et al. 1997). Half-lives are short, ranging from a few days to several months but detectable residues can persist for up to a year (McCall et al. 1981).

Degradation is almost entirely through microbial metabolism. Soil conditions that maximize microbial populations (i.e. warm and moist with a high organic content) maximize degradation rates (Foster & McKercher 1973; Ou 1984; Han & New 1994; Johnson et al. 1995a; Veeh et al. 1996).

Most formulations of 2,4-D do not bind tightly with soils and, therefore, have the potential to leach down into the soil column and to move off-site in surface or subsurface water flows. Leaching of 2,4-D to 30 cm has been reported (Johnson et al. 1995a). In many cases, extensive leaching does not occur, most likely because of the rapid degradation of the herbicide (Que Hee & Sutherland 1981). Where 2,4-D does leach, however, it will be more persistent because populations of microbes responsible for the degradation of 2,4-D tends to decrease with soil depth (Wilson et al. 1997).

2,4-D will change form and function with changes in water pH (Que Hee & Sutherland 1981). In alkaline (high pH; pH > 7) waters, 2,4-D takes an ionized (negatively charged) form that is water-soluble and remains in the water column. Theoretically, in water of a lower pH, 2,4-D will remain in a neutral molecular form, increasing its potential for adsorption to organic particles in water, and increasing its persistence (Wang et al. 1994a). 2,4-D is most likely to adsorb to suspended particles in muddy waters with a fine silt load (Que Hee & Sutherland 1981).

Que Hee and Sutherland (1981) reported that concentrations of most 2,4-D residues found in lakes and streams are < 1 ppm, although concentrations of up to 61 ppm have been reported immediately following direct application to water bodies. These concentrations are well above the 0.1 ppm established as "permissable" levels for potable water by the U.S. E.P.A. (EPA 1998).

2,4-D residues taken up by plants remain intact in the foliage until it is lost as litter and degraded in soils (Newton et al. 1990). Fruits from treated trees have been found to retain 2,4-D residues

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for up to seven weeks (Que Hee & Sutherland 1981).

2,4-D is considered of moderate toxicity to animals, although LD50 levels vary significantly between formulations and animal species (Ibrahim et al. 1991). The majority of LD50 values range between 300-1,000 mg/kg. For example, the LD50 for 2,4-D acid in rats and bobwhite quail is 764 mg/kg and 500 mg/kg, respectively. Some animals such as dogs, however, are significantly more sensitive to 2,4-D organic acids than are rats and humans (Ibrahim et al. 1991). In 1991, Hayes et al. reported a significant increase in the occurrence of malignant lymphoma among dogs whose owners applied 2,4-D to their lawns.

2,4-D can bio-accumulate in animals. In Russia, residues of more than ten times the allowable level were found in eggs, milk, and meat products served by public caterers and one study reported residues in 46% of tested cattle (Que Hee & Sutherland 1981). Risk to browsing wildlife, however, is low, Newton et al (1990) analyzed 2,4-D residues in forest browse following aerial application to forests in Oregon and found them to be below the concentrations known to cause effects in mammals.

LC50 levels for bluegill sunfish and rainbow trout are 263 and 377 mg/L, respectively. Wang et al. (1994b) studied bioaccumulation of 2,4-D in carp and tilapia and found that accumulation of up to 18 times the ambient concentration occurred within two days of exposure. 2,4-D was found in oysters and clams in concentrations up to 3.8 ppm, and it persisted for up to two months (Thomas & Duffy 1968). The highest concentrations of 2,4-D were generally reached shortly after application, and dissipated within three weeks following exposure.

2,4-D can accumulate in fish exposed to concentrations as low as 0.05 ppm (Wang et al 1994b) and concentrations of 1.5 ppm can kill the eggs of fathead minnows in 48 hours (Thomas & Duffy 1968). After animals are removed from contaminated waters, they tend to excrete residues.

Human Safety

2,4-D can be absorbed through the skin or through the lungs if inhaled. Applicators of 2,4-D, particularly those using back-pack sprayers, are at greatest risk of exposure (Ibrahim et al. 1991; Johnson & Wattenberg 1996). Reported airborne residues of 1-35 micrograms/cubic meter of air when 2,4-D was applied using hand-held spray guns along power line right-of-ways. Absorption through the skin accounts for 90% of the 2,4-D absorbed by applicators (Ibrahim et al. 1991).

Once in the body, 2,4-D is distributed rapidly with the greatest concentrations appearing in the kidneys and liver (Johnson & Wattenberg 1996). The majority of the compound is excreted unmetabolized (Ibrahim et al. 1991). Due to its solubility in water, 2,4-D is not believed to accumulate in tissues, but is excreted in the urine in less than a week (Shearer 1980; Ibrahim et al. 1991; Johnson & Wattenberg 1996). Nevertheless, some agricultural workers and other applicators have experienced long term complications including pain, paresthesias (tingling or numbness), and paralysis following exposure to 2,4-D (Shearer 1980).

In 1991, a panel with expertise in epidemiology, toxicology, exposure assessment, and industrial hygiene convened to review the evidence available regarding the human carcinogenicity of 2,4-D (Ibrahim et al. 1991). The panel found that case-control studies showed evidence of a relationship between 2,4-D exposure and non-Hodgkins lymphoma in humans, with some

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studies showing an increased risk with increased exposure level (Ibrahim et al. 1991). Non-Hodgkin's lymphoma is the human equivalent of the canine malignant lymphoma found to be associated with 2,4-D exposure in dogs (Hayes et al. 1991). When all evidence was evaluated, however, the panel could not find a cause-effect relationship between exposure to 2,4-D and human cancer (Ibrahim et al. 1991). In another study of human exposure, female applicators were found to have a significant increase in cervical cancer associated with 2,4-D application. Due to the many confounding factors that make identification of cause and effect mechanisms difficult, other expert review panels including the U.S. EPA, Agriculture and Agri-food Canada, and the World Health Organization concluded that 2,4-D alone is not carcinogenic (Ibrahim et al. 1991; Mullison and Bond 1991).

2. Specified controls to mitigate the hazard

The derogation shall specify the controls that will be implemented to mitigate the hazard associated with the use of the pesticide, for example restrictions related to weather conditions, soil types, application method, water courses, etc..

If the specified formulation is considered to reduce the level of hazard then the information on which this claim is based shall be presented, and the applicant shall provide credible independent, third party support for the claimed reduction of hazard.

Specify the controls that will be implemented to mitigate the hazard:

Herbicides sold in the United States must be registered with the Federal government and in some cases by state regulatory agencies. They are reviewed and regulated by the U.S. Environmental Protection Agency (USEPA) under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA 1974; 7 J.S.C. 135 et seq., Public Laws 92-516, 94-140, and 95-356) and recent amendments. EPA regulations are enforced in Michigan through the Michigan Department of Agriculture.

The printed information and instructional material that is sold with a registered herbicide is known as the "label," and constitutes a legal document. These instructions are considered a part of compliance with FIFRA and other Federal regulations, and failure to use a herbicide in accord with label restrictions can lead to severe penalties. The label provides information on the chemical compound(s) comprising the active ingredient(s) of the herbicide, directions for correct use on target plant species, warnings and restrictions, and safety and antidote information.

Purchasers and applicators of restricted-use pesticides must comply with the certification requirements of the 1994 Michigan Natural Resources and Environmental Protection Act as amended (P.A. 451), Part 83 and detailed in Regulation 636 "Pesticide Applicators". This requires studying training manuals prepared by Michigan State University Extension and passing an examination administered by MDA. Recertification is required every three years and may be obtained by one of two methods. The applicator may study a training manual (Extension Bulletin E-2195) and pass an examination, or attend classes accredited by MDA for continuing education credits and obtain sufficient credits for the specific category of certification. Both methods ensure that additional information was provided to applicators in the safe and effective use of restricted-use pesticides.

Resource Application

As part of operational planning process alternatives are evaluated to control invasive plant species. Mechanical, biological, cultural as well as chemical treatments are evaluated for effectiveness and for cost efficiencies. In many cases several alternative control methods will need to be implemented for control of aggressive non-native invasive plants or populations. Frequently the application may be as a strip or spot application where as little as 10% to 20% of the site will be treated with the herbicide.

Local land managers are encouraged to take a triage approach to managing invasive species by prioritizing threats, needs and approach. High priority is given to areas with high ecological values and where control is feasible. Work around these priority areas first addressing small outliers and then moving toward the core of the infestation. The next priority is to address small infestations of high threat species anywhere they can be found and to use the most effective means possible for their control. Once these high priority threats are addressed, land mangers

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should address lower priority areas where control will be effective. The lowest priority are sites with infestations where control is not feasible, at these site land managers should monitor the edge of these sites and implement control efforts to maintain the spread. Throughout this process land managers are encouraged to monitor and learn from the result and to share information gained with others.

3. Program to identify alternatives

The application shall describe the program(s) which are in place in the territory concerned or which will be put in place during the period over which the derogation will be applicable, designed to identify alternative pest control methods which do not use highly hazardous pesticides.

Describe the program(s) that are in place to identify alternatives:

The MDNR continually looks for a variety of methods to control invasive species including biological control, mechanical treatment, cultural practices and herbicides. Over the last ten years the MDNR has worked with Michigan State University, providing financial support and on the ground testing, of several biologic controls. For example, working with MSU, two successful biological controls have been developed for purple loosestrife a non-native invasive wetlands forb. Within the MDNR, research and testing is being conducted to evaluate different methods of controlling invasive species. A recent Wildlife Division project, that has been just concluded, looked at two different herbicides and their effectiveness in controlling autumn olive, a non-native invasive upland shrub. These herbicide practices were evaluated in-conjunction with the use prescribed fire as well as evaluating the impact of prescribed fire only. The use of one of the chemicals and prescribed fire provided the best control.

4. Stakeholder support

All applications for derogations shall include evidence that the application is supported by social, environmental and economic stakeholders in the best interests of promoting FSC's goals in the territory concerned. It is the responsibility of the applicant to present this evidence in support of their application (see summary of procedures in Section 8, below).

The level of stakeholder support required will be evaluated taking account of the geographical scope of the derogation, the justification of need, and other factors include in the application such as the strength of the program to identify alternatives, and the level of controls to mitigate the identified hazards.

A written letter of support by the Board of Directors of the FSC National Initiative for the territory concerned shall normally be considered sufficient evidence of national stakeholder support for the application.

Describe the consultation that has taken place and summarise the results:

Stakeholder consultation will occur August 1 through September 16, 2007. This section will be completed at the conclusion of the stakeholder consultation period.

Contingency plan to eliminate use of the pesticide during the derogation period
Derogations shall normally be issued for a five-year period. There is a presumption against renewal at the end of this five-year period unless it can be clearly demonstrated that the program to identify alternatives has been fully implemented but has failed to identify an acceptable alternative in the available time.

Forest managers seeking certification under an approved derogation should therefore ensure that they have a contingency plan in place to eliminate use of the pesticide prior to the end of the derogation period. If derogation is not renewed, the continued use of a highly hazardous pesticide after the expiry of the derogation would be considered a major non-compliance and would lead to the withdrawal of the certificate.

As a condition of use of a derogated pesticide, forest managers shall record quantitative and qualitative information about their use of such a pesticide, and this information shall be included in the certification body's evaluation reports and in all subsequent surveillance reports.

Compliance with these requirements would need to be demonstrated by an applicant for certification at the Forest Management Unit (FMU) level and be verified by the certification body prior to the issue of a certificate. However, this evaluation is independent of the decision to issue a derogation for use of a pesticide over a geographical area.

References[1]

[1] Much of the reference material used in this paper is from Mandy Tu, Callie Hurd, & John M. Randall, 2001, Weed Control Methods Handbook: Tools and Techniques for Use in Natural Areas. The Nature Conservancy, Global Invasive Species Initiative

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