To: Catarina Owen, Assistant Executive Director
ʔehdzo Got'ı̨nę Gots'ę́ Nákedı Sahtú Renewable Resources Board
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Introduction

Community members questioned the environmental effects of wildfire retardants multiple times during the Public Listening Session in Norman Wells, Northwest Territories (NWT). As the number of wildfires increases, wildfire retardant use will also likely rise, adding to community concerns. To address concerns about wildfire retardants, the Sahtu Renewable Resource Board (SRRB) requested additional information on the environmental effects of wildfire retardants.

To address questions about the impact of fire retardants, the NWT website was reviewed to determine the types of fire retardants used in NWT. Once the types were found, an internet search was completed to find research studies and additional information on the environmental effect of fire retardants. Further information was obtained from Material Safety Data Sheets (MSDS), available on the Perimeter Solutions website (Perimeter Solutions 2024).

Northwest Territories Wildfire Retardants

NWT uses two types of wildfire retardants for short and long-term purposes (NWT 2024). Short-term retardants increase water efficiency, cooling the fire by direct application onto the flame front or just ahead of the fire perimeter. The short-term retardant NWT uses is FireFoam WD881-C (aka PHOS-CHEK WD881). Long-term retardants create a barrier between the wildland fire and available fuel, like wood, and are applied just outside the fire perimeter. The long-term retardant product used by NWT is Liquid Concentrate 95-AMV (LC95-AMV) (NWT 2024).

FireFoam WD881-C (PHOS-CHEK WD881)

No research studies on the environmental effects of FireFoam WD881-C were reviewed. The MSDS indicates that the LC50 for fish is 11mg/l and it states that the retardant may cause long-term adverse effects in the aquatic environment.

Liquid Concentrate 95-AMV (PHOS-CHEK LC95)

Researchers tested the effects of PHOS-CHEK LC95W on tadpole survival, growth, development and swimming behaviour. Tadpoles of the striped marsh frog (*Limnodynastes peronii*) were exposed to two concentrations of PHOS-CHEK (0.25 and 1 g/L) for 16 days. The highest concentration of PHOS–CHEK was lethal to tadpoles, with mortalities gradually increasing over time and only 8% of animals surviving to day 16. The PHOS-CHEK also affected the growth and development of tadpoles. PHOS-CHEK was found to stop tadpole growth and development completely over the 16-day exposure. The toxicity caused by the Phos-Chek likely relates to the increased ammonia and altered water quality parameters. The researchers state that runoff or accidental application into small waterways may have significant ramifications for aquatic biota (Tunstill et al., 2022)

Researchers tested PHOS-CHEK LC-95a on Chinook salmon and found that the fire retardant was toxic to ocean-type salmon at the smolt stage. The researchers concluded that PHOS-CHEK LC-95A during salmon outmigration would have adverse impacts beyond acute mortality (Deitrich et al. 2014).

The MSDS for PHOS-CHEK LC95 indicates that the LC50 for fish is 465 mg/l, and it may cause long-term adverse effects in the aquatic environment.

Environmental Safety

A United States Forest Service (U.S. Forest Service) study concluded that retardants could adversely affect water quality where there is a lack of flowing water. This reduces retardant dilution and can lead to nutrient production that causes algal blooms and starves water of oxygen. The study concluded that adverse impacts could linger in these systems for two years or more (Environmental Health News 2021).

Wildfire Retardant Selection

The U.S. Forest Service has a qualified product list for wildfire retardant use in the U.S. and Canada (limited). The product list includes approved products for long-term purposes, pretreatment, foams, and water enhancers used in wildland fires. Evaluation of the approved products includes tests on corrosion, stability, effectiveness, physical parameters, mammalian toxicity, aquatic toxicity, and human health and ecological risk assessments. Perimeter Solutions supplies wildfire retardant products. They market a product called PHOS-CHEK LCEE20-Fx as an environmentally friendly fire retardant. The U.S. Forest Service approves it for use in fixed-wing aircraft, helicopter buckets, and ground engines (Perimeter Solutions 2024).

Increase Use of Wildfire Retardants

The original use of long-term fire retardants was to slow the fire ahead of ground crews so they could access and gain control of the fire. The use of fire retardants may be changing. For example, fire retardants are replacing ground crews in California. The change in intended use is causing concern because more of these chemicals are being added to the environment (Tufts University 2024).

Recommendations

The U.S. Forest Service has identified multiple types and brands recommended for wildfire suppression (U.S. Forest Service 2024). SRRB may want to request NWT confirm using wildfire retardants that meet or exceed the U.S. Forest Service requirements for effectiveness and environmental safety.

NWT uses two fire retardants that may have a negative effect on the boreal forest environment based on scientific study and information included in the MSDS. Many wildfire retardants are available for use that may be more environmentally safe than those currently used in NWT. SRRB may want to request that NWT evaluate available wildfire retardants and select the most environmentally safe retardants available for use.

Tufts University (2024) indicates that wildfire suppression retardants are more frequently used and replacing ground crews. SRRB may want to enquire with NWT to determine if they are using more fire retardants now than in the past and reducing the number of ground crews. NWT could also be asked to provide the quantity of fire retardant per hectare of wildlife or another suitable unit each year to determine if use has changed.

Information Sources

Dietrich, J. P., Van Gaest, A. L., Strickland, S. A., Hutchinson, G. P., Krupkin, A. B., & Arkoosh, M. R. (2014). Toxicity of PHOS-CHEK LC-95A and 259F fire retardants to ocean- and stream-type Chinook salmon and their potential to recover before seawater entry. Science of the Total Environment. https://doi.org/10.1016/j.scitotenv.2014.05.052

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NWT Government. 2024. (https://www.gov.nt.ca/ecc/en/services/wildfire-operations/retardants) lists two types of fire retardants that are referred to as Short-term and Long-term retardants.

Perimeter Solutions. 2024. PHOS-CHEK LCE20-Fx Information page. https://www.perimeter-solutions.com/en/fire-safety-fire-retardants/phos-chek-lce20-fx/ access on March 1, 2024.

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Tunstill, K., Grogan, L. F., Morrison, C., McCallum, H., & Lanctôt, C. (2022). Effects of two firefighting chemical formulations, Phos-Chek LC95W and BlazeTamer380, on striped marsh frog (Limnodynastes peronii) tadpole survival, growth, development, and behavior. Aquatic Toxicology, 252. https://doi.org/10.1016/j.aquatox.2022.106326.