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Ecologically sound pest management that does not compromise public health.

May 16, 2004

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**Re: COMMENTS ON INVASIVE MOTH NPDES (No. WA0039047) PERMIT
REQUESTED TO BE ISSUED TO THE WASHINGTON STATE DEPARTMENT OF
AGRICULTURE**

Ms. Emmett:

No Spray Zone is a non-profit organization dedicated ecologically sound pest management that does not compromise public health. We appreciate the opportunity to comment on the draft NPDES permit WA0039047 that has been requested by the Washington State Department of Agriculture (WSDA).

The permit fact sheet, while going into some detail about the safety of the active ingredient of the proposed insecticide, fails to mention or consider any potential harmful effects due to the adjuvant (sometimes labeled as "inert" or "other") ingredients. These substances are present in the pesticide formulation as received from the manufacturer, and/or are added by the applicators prior to spraying. It is somewhat problematic for any member of the public to discover what these ingredients are or what concentrations they are present at in the pesticide, as they are considered confidential business information by the manufacturer. We are quite concerned, however, with the likely presence of two compounds in the customarily used pesticide.

ETHOXYLATED ALCOHOLS

The pesticide Foray 48B (the insecticide now exclusively used by the WSDA to control and eradicate gypsy moths in Washington) contains surfactants, wetting agents and preservatives. In addition to a siloxated oil wetting agent, it is probable that Foray 48B also contains an ethoxylated alcohol. Furthermore, when Foray 48B or other Btk-based insecticides are applied by ground-based spraying equipment, the adjuvant Plyac, an ethoxylated alcohol compound (nonyl phenoxy ethoxylate) is added to the water diluant. Nonyl phenoxy ethoxylate rapidly breaks down into nonylphenol, which has been shown to be a powerful estrogen-mimicking substance that can disrupt the growth and development of aquatic organisms at levels far below the lethal dose.

Concentrations of nonylphenol as low as 0.1 µg/L resulted in alterations in development of Pacific oyster (*Crassostrea gigas*) over a 72-hour exposure period.¹ More dramatic effects were observed in a 2003 study, in which a single 48-hour exposure of Pacific oyster larvae to 1 µg/L nonylphenol resulted in skewed sex ratios and almost 20% hermaphroditism.² (Baseline hermaphroditism in oviparous oysters generally does not exceed 1%.) Also, effects persisted to the next generation with extremely low survivorship of progeny in which at least one parent was exposed to a *single pulse* of nonylphenol. The authors suggest that nonylphenol may be accumulated in the larval oyster and later transferred to developing gametes, a scenario documented to occur in fish for other lipophilic chemicals. The estrogenic effects have also been demonstrated in salmon. Nonylphenol has been shown, in one or more pulse doses of 20 µg/L, to have a significant effect on the weight of Atlantic salmon smolts.³ This mechanism has been hypothesized as one of the key factors in the historical decline in Canadian Atlantic salmon stocks. To make matters worse, there is clear evidence that a

number of similar substances already present as pollutants in Washington waters (e.g., pharmaceuticals, anthropogenic female hormones, phthalates, pesticides, and others) will synergistically aggravate the effects of added nonylphenol and lower the thresholds for damage to the ecosystem.⁴ While surfactants that degrade into nonylphenol have not been included in the recent list of pesticides subject to restriction in order to protect endangered salmon, it is clear that nonylphenol can have profoundly damaging effects on this ecologically and economically important fish.

Estimated exposures from gypsy moth spraying. For aerial spraying, from the Draft Permit Fact Sheet, up to 128 oz. may be applied per acre. Aerial sprayings often encompass one square mile or more, and are repeated three times or more at weekly intervals. Although the concentration of surfactants in Foray 48B is not public knowledge, a standard dilution factor for these compounds in many pesticides is 1:1000. The dose rate per square mile for the surfactant is then estimated to be roughly 2.5 liters per application, or 7.5 liters for a treatment. Not all of the surfactant will degrade into nonylphenol, but a significant portion can be expected to.

The hydrology for various types of terrain can be quite different, but for the square mile area treated for gypsy moth in Vader in 2002, roughly 1000 m³ of slowly moving or stagnant water might be present in several small streams and pools (which also harbor salmon runs). If all of the product were applied to this water, this would result in a concentration of 250 µg/L (single application). Even with mitigating factors such as precipitation, uneven breakdown of the surfactant into nonylphenol, and gradual flushing of the streams and watershed, it would be difficult to claim a ten-thousand-fold reduction in the above dosage – which would be necessary to ensure minimal effects on the sensitive organisms in the water.

Ground sprayings use Foray 48B mixed with water and Plyac (emulsifiable oxidized polyethylene and ethoxylated phenoxy ethanol, 27.5%) and deliver 2-4 oz. of Plyac per acre. It is unknown exactly how much of Plyac is ethoxylated phenoxy ethanol, but an estimate of 5% would still deliver at least 5 g per acre. This dose rate is comparable in magnitude to what might be expected from Foray 48B itself.

BIT (1,2-BENZISOTHIAZOLIN-3-1)

Foray 48B also contains the biocide BIT (1,2-benzisothiazolin-2-1) in an unknown concentration. This compound degrades fairly rapidly in the environment and seems to have LC50 levels higher than the ethoxylated alcohols. However, there is still concern about the safety of this compound, particularly when inhaled. There are a number of reports of human sensitization to BIT. Hopkins⁵ states that there is a fairly high sensitizing potential to this compound in humans. At least one case study has been made of allergic sensitization in a factory worker who developed occupational rhinitis and asthma after exposures to BIT.⁶ In New Zealand, where a considerable amount of aerial spraying of Foray 48B has taken place in urban areas, there are many anecdotal reports of symptoms in humans, some quite severe, that may be due to allergic reactions to one or more of the components of Foray 48B.⁷

SUGGESTIONS FOR MITIGATION

It is clear that gypsy moth is a potentially harmful insect to the region, but repeated sprayings of Foray 48B may also cause damage that might be preventable or minimized. No Spray Zone urges the following considerations:

1. A blanket permit must not be issued for spraying, but permits should be issued on an as-needed basis. As mentioned above, the particular ecology of target areas can be quite different and a blanket permit cannot address the sensitive nature of estuarine and riparian areas with the same proscriptions as for cities. The added cost for this will be offset by the gains, both

tangible and intangible, to the ecology and economy of the state, as additional study and precautions will need to be undertaken for delicate environments. It might be pointed out that no permit was applied for when the Vader area (that contained two salmon spawning streams) was sprayed in 2002, although this was after the decision in the 9th Circuit, and at the time the Attorney Generals' office stated that in their opinion an NPDES permit was not necessary.

2. There has been some cooperation between the manufacturer of Foray 48B and the WSDA, and this relationship could be used to request that Valent Biosciences reformulate Foray 48B to remove BIT and the ethoxylated alcohol surfactants.
3. When ground spraying, adjuvant surfactants such as Plyac or similar ethoxylated alcohols must not be used, and less toxic substitutes should be sought.
4. The WSDA must redouble its efforts to test and use alternative methods that have been shown to have some utility, such as mass trapping (this has proved somewhat effective in eradicating at least one infestation in Canada recently) and using mating disruption (pheromone flakes). The objections to pheromone flakes should be explored with the manufacturer.

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REFERENCES

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