UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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MEMORANDUM

SUBJECT: Section 18 Ecological Risk Assessment for Fipronil Use to Control Cabbage Maggot in Turnip and Rutabaga. Addendum regarding assessment of potential for effects to listed fishes

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As was indicated in the risk assessment of April 18, 2007, a number of potential concerns were identified for indirect effects upon federally listed endangered fishes in the counties identified for the proposed Section 18 registration of fipronil for use on turnips and rutabagas in Oregon. The indirect effects were associated with potential exposures of fipronil in receiving waters at concentrations exceeding acute and chronic levels of concern for freshwater invertebrates, which may be considered important as food sources to fishes. The fish species co-occurrences in proposed Oregon counties were as follows:

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Oregon chub	Clackamas, Marion
Chinook salmon (lower Columbia)	Clackamas, Multnomah
Chinook salmon (upper Willamette)	Clackamas, Marion, Multnomah
Chinook salmon (Snake, fall and spring/summer)	Multnomah, Umatilla
chum salmon (Columbia)	Multnomah
steelhead (lower Columbia)	Clackamas, Marion, Multnomah,
steelhead (middle Columbia)	Multnomah, Umatilla
steelhead (upper Columbia)	Multnomah, Umatilla
steelhead (upper Willamette)	Clackamas, Marion, Multnomah
steelhead (Snake)	Multnomah, Umatilla
sockeye salmon (Snake)	Umatilla
bull trout	Clackamas, Multnomah, Umatilla
bull trout (Klamath)	Multnomah, Umatilla

The April 18, 2007 risk assessment stated,

> "If screening levels identify concerns for direct effects on one or more taxa, then the assessment may proceed further to determine the degree to which listed species locations overlap with expected areas of pesticide use and the areas or impacts associated with those uses that may be farther from the field than initial assumptions."

The following analysis is related to this analysis of the overlap of the proposed use sites with possible locations of the listed fish species.

Potential Use Site Identification

Potential use site locations were identified by the Oregon Department of Agriculture in a letter to the Agency on April 20, 2007. Location information consisted of outlined agricultural sites in areas of Clackamas, Marion, and Multnoma counties on available United States Department of Agriculture Soil maps. The total identified land area encompassing potential use locations exceed the Section 18 proposal for 660 acres of fipronil treatment by 3 to 4- fold and therefore represent a conservative assumption of potential use sites. No such information has been supplied to the Agency for Umatilla County and so this assessment does not apply to proposed uses there. The Oregon Department of Agriculture maps did not indicate that any of the potential use sites encompassed or were bisected by surface waters, nor were there indications that the margins of the potential uses sites were closer than 100 feet from any identified water body on these maps. EFED compared the potential use site location information with the 2001 National Landcover Database (NLCD)and the National Hydrography Database Plus (NHDP) and confirmed these conclusions regarding the locations of potential uses sites and surface waters that were based on initial Oregon mapping submissions..

Based on these co-locations it was concluded that no cultivated area potentially involved in the Section 18 would be directly associated with the margins of any surface water body and therefore assumptions that surface waters directly adjacent to the field, a basic screening level assumption, were not upheld by available site specific data. While these findings would suggest that the screening-level assumptions of exposure and therefore risk are likely conservative for this particular situation, EFED continued with the assessment to provide more quantitative analysis of the potential for off-site introduction of fipronil to surface waters at concentrations that would exceed Agency levels of concern.

Sources of Fipronil Introduction to Surface Waters

The April 18, 2007 risk assessment modeling of surface water concentrations represented a labeled use of fipronil as an in-furrow treatment. Therefore any off site loss of fipronil to nearby waters would be associated with surface runoff and not drift to small headwaters and drain ways feeding into fish occupied surface waters that are more than 100 feet from the treatment sites.. This suggests that fipronil concentrations in receiving waters from this use pattern involve the dilution of treated field drainage containing fipronil into the volume of the nearby receiving waters.

Establishing a Threshold for Concern for Setting Boundaries for Areas of Reasonably Expected Effects

An operative assumption of the Agency's approached for evaluating effects to listed species is that screening risk assessment quotients are calculated for the treated field or for a water body directly adjacent to the treated field and that effects (the action area) may extend beyond this point through such dispersal mechanisms as downstream dilution and spray drift.

The Agency's method for establishing the limits to endangered species assessment action areas uses the most sensitive direct or indirect effects endpoint from the available screening risk assessment on-field or directly adjacent to treated field and off- site pesticide transport tools (e.g. surface water dilution with downstream flow). This combination of risk targets and off-site transport tool allows the Agency to place geographical limits on the extent of pesticide contamination at levels the Agency considers to be of potential concern for listed species.
Establishing the most sensitive effects endpoint for used in establishing the geographical limits of expected effects involves dividing the acute (0.05) or the chronic (1) listed species concern level by the on-field or adjacent water body risk quotient for each taxonomic group. This ratio indicates how much reduction in estimated exposures is necessary for risks to fall below Agency effects concern thresholds. An evaluation of the risk quotients presented in the April 18, 2007 risk assessment indicates that the risk quotient for acute effects in freshwater invertebrates (1.62) is the most sensitive for this purpose because estimated exposures must be diluted by 97% before risk quotients would fall below the effects threshold of concern (0.05/1.62 = 0.03). It is important to note that, in addition to being the most sensitive effects endpoint for action area determination,

the invertebrate acute risks are directly applicable to an evaluation of indirect effects to listed freshwater fish.

The evaluation of the potential action area for treated fields identified by Oregon Department of Agriculture will use this 97% dilution rate to determine if it is reasonable to expect that any field runoff could result in water concentrations above the threshold for listed species concern in nearby streams assumed to be occupied by listed fish or considered to be Critical Habitat for these fish.

Consideration of Proximity, Land Area Potentially Treated, and the Expected Likely Dilution of Runoff from Treatment Sites

EFED considered the dilution of field drainage into receiving waters to determine the potential for effects on aquatic invertebrates occupying surface waters given that the above proximity analysis has indicated that those surfaces waters are near but not adjacent to treatment areas. To accomplish this analysis, EFED assumed that runoff from the isolated and few treatment sites mapped by the Oregon Department of Agriculture could drain to nearby streams known or suspected to be occupied habitat or critical habitat for one or more fish species listed above. EFED assumed that the runoff volume and rate of dilution of that runoff was related to the ratio of treated and untreated land area within the water body catchments for surface waters in proximity to Oregon-identified treatment sites.

EFED conservatively assumed that 100% of the Section 18 treatment of acreage of 660 acres was assigned to each of the identified potential use sites (in most cases potential use site areas were larger than the allowable total acres under the proposed 660 total acres).

EFED then used the available mapping information from Oregon Department of agriculture, associated with available 2001 NLCD, and NHDP information to identify streams nearby the potential use sites and to provide total surface areas for the catchments for segments of those streams that use sites could potentially drain into.. Assuming that water volume is directly related to surface area of drainage in a surface water catchment or treated area (an assumption incorporated into Agency ESA Section 7 evaluations of the action areas of pesticide registrations as they relate to aquatic systems), the ratio of total treated acres (660) to the total catchment acreage was used as a dilution factor to be applied to the screening-level risk assessment estimated of surface water concentrations to determine if fipronil screening level risks can reasonably be applied to nearby streams once dilution is considered

Sources of the geospatial data for this analysis may be found at the following websites:

http://www.mrlc.gov/mrlc2k_nlcd.asp

http://www.horizon-systems.com/nhdplus/

http://www.streamnet.org/online-data/GISData.html

The 2001 NLCD cultivated crop land class (class #82) representing row crops was used as a surrogate for turnip/rutabaga locations and was compared against the maps provided. Each field identified was located and its proximity relative to occupied streams was determined. Any field identified as being located adjacent to an occupied stream (regardless of species) was further evaluated. Fields that are not located adjacent to occupied streams were determined to not likely adversely affect salmonids given the lack of direct exposure. Fields that are located adjacent to occupied streams ¼ of a mile or less were further analyzed to determine the extent of the watershed draining to the stream reach located next to the "potentially" treated field. In this analysis it is assumed that the 660 acre limit on this action was represented by the entire field. The ratio of the treated field (660 acres) to the acreage draining to the occupied stream reach (in essence the watershed acreage) was calculated for each stream reach. The ratio of treated field to watershed was then compared to the target of 97% dilution or under the assumptions of this analysis a target where treated acreages is 3% or less of the entire stream reach catchment. If the resulting ratio of treated acreage to catchment acreage is less than 3%, it is assumed that the stream will not reach fipronil concentrations considered to constitute an effect.

The catchment areas for streams nearby all the potential uses sites identified by the Oregon Department of Agriculture in Clackamas, Marion, and Multnoma counties range from 26.23 to 23,000 square kilometers (6,424 to 5,683,423 acres). Dividing the maximum proposed use of fipronil (660 acres) by these catchment areas indicates that for all but one potential fipronil use area identified by the Oregon Department of Agriculture in Clackamas, Marion, and Multnoma counties, the assumption of a maximum of 660 acres of fipronil treatment would fall well below the threshold of 3% of the total acres of catchments for any nearby stream segments. Except for the single treatment area this can be interpreted as showing that drainage from these potential treatment sites will not result in fipronil concentrations at levels constituting effects on any taxonomic group evaluated in the screening risk assessment and so the action area would not extend to any nearby streams.

The only exception is a proposed area identified by the Oregon Department of Agriculture on Sheet number 32 of the Clackamas County Soil Survey. The stream catchment potentially receiving drainage from this area is approximately 26.23 square kilometers (6,424 acres), for which drainage from a maximum of 660 fipronil-treated acres would not be expected to be diluted enough to achieve the necessary no effect targets. It must be remembered that it is conservatively assumed that the entire Section 18 proposed treatment of 660 acres occurs in each of the identified potential treatment areas. If actual treatment in this single problematic treatment area is limited to 190 acres (0.03* 6424 acres = 192 acres) drainage from this area would not be reasonably expected to result in fipronil concentrations in nearby streams at concentrations exceeding Agency effects concern levels.

Conclusions

The geographic limits to areas of expected effects for all but one potential fipronil treatment site identified by the Oregon Department of Agriculture do not extend to nearby streams and so do not constitute an effect to any listed fish in those streams. This conclusion is based on the following:

1. The aquatic exposures for fipronil treatment are based on run-off alone because spray drift is not expected for in-furrow treatments for turnips and rutabagas.

2. No treatment sites are bisected or directly adjacent to surface waters and nearby surface waters potentially occupied by listed species are well removed from the treatment fields by 100 feet or more. Therefore the screening-level risk quotients based on runoff directly to a runoff dominated water body do not hold for the identified treatment sites.

3. Agency action area bounding methods involving catchment areas and stream dilution indicate that fipronil drainage from runoff to nearby streams is of insufficient quantity to result in in-stream fipronil concentrations above Agency concern levels for the most sensitive listed taxa in these streams.

The single site for which the above conclusion is not appropriate may still be considered to result in a "no effect" determination if the conditions of the Section 18 specify that no more than 190 acres may be treated with fipronil within this area.

The conclusions of this assessment do not extend to any Section 18 proposed use in Umatilla County because no information on the locations of proposed treatment sites has yet been provided by the section 18 applicants.