**APPENDIX 4-5. Analysis of Granular and Fly Bait Uses**

Most methomyl use and usage involves flowable uses (*e.g*., emulsifiable concentrate, wettable powder). Therefore, the methods developed for analyzing terrestrial exposures in this BE focus on flowable uses; however, methomyl also has non-flowable uses: granular and fly bait uses.

Because exposures related to granular/bait uses are readily modeled using our current aquatic modeling approaches, these types of uses are incorporated into the aquatic exposure analysis used to help make effects determinations for listed aquatic species (and those that rely on aquatic species). However, due to differences in estimating potential exposures from granular/bait uses and flowable uses, these (granular/bait) uses are not as easily incorporated into the current modeling approach for assessing terrestrial exposures to listed terrestrial species. Exposure of listed terrestrial species to flowable uses, which account for most of the use and usage of methomyl, is incorporated into the current version of the MAGTool (v2.3) that are used to help make effects determinations for listed terrestrial species (and those that rely on terrestrial species). While the granular/bait uses are not built into these tools, they are considered when making effects determinations. In the individual effects determinations output sheets from the MAGtool (**Appendix 4-9**), if a terrestrial animal range or critical habitat has overlap with a use site where granular uses are permitted, as shown in **Table 1** below, it is specified that this use should be given additional consideration by the assessor. Consideration of this additional use outside of the flowable uses already captured in the MAGtool did not result in the alteration of any effects determinations. A discussion of the methods for assessing risk from granular and fly bait uses for listed terrestrial species is described below.

1. Granule Use

For terrestrial organisms, the primary route of exposure to granules is assumed to be via ingestion by vertebrates and ingestion and contact by terrestrial invertebrates. Spray drift is not expected from these types of uses; therefore, potential terrestrial exposures are assumed to be limited to the sites of application. Methomyl has one granular registration (for use on corn): Methomyl 5G granules (EPA Reg. Number - 57242-2). Methomyl also has flowable registrations for corn. Therefore, the methomyl granular use does not represent a different use footprint than the one being captured by the flowable uses. The maximum granular application use rate is 0.15 lb a.i./acre per application, with a maximum annual application rate of 1.5 lb a.i./acre (10 applications/year; the minimum application interval is not specified). The maximum single flowable application rate for corn is 0.45 lb a.i./acre for field, popcorn, seed and sweet corn. Maximum annual application rates are 2.25 lb a.i./acre (4.5 lb a.i./acre in CA, HI, and TX) for field, popcorn and seed corn, and 12.6 lb a.i./acre (18.9 lb a.i./acre in AZ) for sweet corn (see **APPENDIX 1-3**). Therefore, for methomyl, the granular use rates for corn are lower than the application rates for the flowable uses on corn and are expected, generally, to result in lower exposure concentrations to non-target organisms.

For terrestrial invertebrates, the primary routes of exposure from the granular uses of methomyl are assumed to be via contact with contaminated soil and/or ingestion of contaminated plants that uptake methomyl from the soil. This approach is consistent with EFED’s risk assessment method for bees. For ground dwelling species, there may also be contact with or ingestion of soil or granules. Since the application rates are lower for the granular use on corn than the flowable uses on corn, the soil concentrations from the granular use are expected to be lower than the concentrations from the flowable uses. There are currently no standard methods for assessing exposure and risk via consumption of contaminated plants that have taken up a pesticide and distributed the residues within the plant. It is anticipated that the residue concentrations in plants from the granular use will be lower than the residues on plants from flowable uses (assuming similar application rates) because the assessment for flowable uses assumes that a plant or invertebrate being consumed is sprayed directly. Therefore, for terrestrial invertebrates, the estimated exposures from the flowable uses are used as a protective proxy for the exposures from the granular uses.

For terrestrial vertebrates, the primary route of exposure is expected to be to birds found on the site of application that may ingest the granules, which are clay-based, as grit. Other vertebrates are generally not expected to intentionally ingest the granules because they are not food-based and are only likely to be intentionally ingested by animals that require grit for normal digestion (*i.e*., birds). Other taxa may also eat soil or have incidental soil ingestion; however, the probability of incidental ingestion for other vertebrates is assumed to be lower. Because the quantity of potential granules consumed will be lower via incidental soil consumption relative to animals that may consume granules directly, the risk exposure estimates calculated for direct consumption of granule(s) by birds are used as a conservative proxy for the exposure of other terrestrial vertebrates.

The currently registered methomyl granular product contains 5% a.i. To explore potential exposures to birds, the number of methomyl granules (5% a.i. products) that birds of different sizes would need to ingest to exceed the acute mortality threshold is calculated using T-REX (see **Table 1**). Based on this analysis, 20 g, 100 g, and 1,000 g birds would need to ingest 1.11, 6.31, and 75.9 granules, respectively, to exceed the mortality threshold.

**Table 1. T-REX Input and Outputs for the Methomyl Granular Exposure Estimates for Birds (5% a.i. products)**

|  |  |  |  |
| --- | --- | --- | --- |
| **In-put/Out-put** | **20 g Bird** | **100 g Bird** | **1,000 g Bird** |
| Weight of bird (kg) | 0.02 | 0.10 | 1.0 |
| Adjusted threshold, mg/kg-bw1, 2 | 2.10 | 2.39 | 2.87 |
| mg a.i. needed to achieve the adjusted threshold for bird of assessed weight | 0.04 | 0.24 | 2.87 |
| Fraction of a.i. in formulated product  | 0.05 | 0.05 | 0.05 |
| Weight of 1 granule (mg, obtained from registrant) | 0.756 | 0.756 | 0.756 |
| mg a.i./granule  | 0.038 | 0.038 | 0.038 |
| No. of granules needed to exceed mortality threshold | 1.11 | 6.31 | 75.9 |

1 Based on the LD50 for mortality of 2.03 mg a.i./kg-bw for a 13.2 g bird.

2 A Mineau scaling factor of 1.08 is used based on the methomyl-specific results in Mineau, *et al*. 1996.

For vertebrate animals that may ingest contaminated plants, it is anticipated that the residue concentrations in plants from the granular corn use will be lower than the residues on plants from flowable corn uses (assuming similar application rates). Therefore, for terrestrial vertebrates that may ingest contaminated plant material, the estimated exposures from the flowable uses on corn will be used as a protective proxy for the exposures from the granular use on corn.

1. Fly Bait Use

There are currently three registered methomyl fly bait products: Golden Malrin RF-128 Fly Killer (2724-274); Lurectron Scatter bait (7319-6); and Stimukil Fly Bait (53871-3). All three products are formulated as solid baits and contain 1% methomyl. Additionally, they are all co-formulated with (z)-9-tricosene (PC Code 103201, also referred to as ‘Muscamone’), a female house fly sex pheromone registered as a biopesticide. The pheromone is used to attract flies and is orders of magnitude less toxic to aquatic and terrestrial species than methomyl on an acute exposure basis. Golden Malrin Fly Killer, Lurectron Scatter bait, and Stimukil Fly Bait contain 0.049%, 0.26%, and 0.040% (z)-9-tricosene, respectively. These fly baits are the only currently registered methomyl products that are not Restricted Use Pesticides (Restricted Use Pesticides can only be applied by, or under the supervision of, a certified applicator). There are known reports of the methomyl fly baits being illegally used to control ‘nuisance’ vertebrate pests (*e.g*., raccoons). The fly bait labels have recently been changed to make it clearer that the products should not be used on non-target animals, specifically vertebrate pests. The assessment below only considers currently registered fly bait uses (*i.e*., the use of the fly baits to control flies).

Golden Malrin, Lurectron, and Stimukil can all be used both as a scatter bait (i.e. applied outside of a container) and in bait stations at 0.22 lb a.i./acre outside a variety of industrial, commercial, and livestock buildings (see **Table 2**). Additionally, Lurectron and Stimukil can be used as a brush on paste on the walls, windowsills and support beams of livestock housing (outside). According to the labels, none of the products can be used around homes or in any other place where children or pets are likely to be present or in areas accessible to livestock. For use around dumpsters, the scatter baits can only be placed around dumpsters that are enclosed (*i.e*., fenced in), and for all the bait station uses, bait stations must be at least 4 feet above the ground.

**Table 2. Methomyl Fly Bait Use Information**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **USE** | **USE SITE** | **PRODUCT(S)** | **MAXIMUM SINGLE APPLICATION RATE** | **MINIMUM APPLICATION INTERVAL** |
| Scatter Bait | Outside of commercial facilities, such as, canneries, beverage plants, meat and poultry processing plants, food processing plants, commercial refuse dumpsters which are enclosed, feedlots, and livestock housing.  | Golden Malrin1 | 0.22 lb a.i./acre (4 oz product/500 ft2) | Daily with heavy fly infestation, then every 2-3 days |
| Lurecton Scatter Bait1 |
| Stimukil Fly Bait |
| Bait Stations | Stables, outside of milking parlors, kennels, fast food establishments, restaurants, commissaries, bakeries, supermarkets, warehouses, feedlots, livestock housing, food processing plants, beverage plants, meat and poultry processing plants, fenced dumpsters | Golden Malrin | 0.22 lb a.i./acre (1 oz product/bait station with 4 bait stations/500 ft2) |
| Lurecton Scatter Bait2 |
| Stimukil Fly Bait2 |
| Brush on Paste | Livestock housing walls, windowsills, and support beams (outside) | Lurecton Scatter Bait | Mix with water (1:1 ratio - product to water) | Reapply every 3 – 5 days |
| Stimukil Fly Bait |

1 Can also be used inside on walkways in caged poultry houses at this rate and application interval.

2 Can also be used inside of caged poultry layer houses at this application rate; replenished every 3 – 5 days.

Due to the registered use sites for the fly baits, fly baits are expected to be used in developed areas. Additionally, when applications of the fly baits are made, they are expected to be very localized (*e.g*., perimeter treatments around buildings and treatments around enclosed dumpsters). The best spatial representation of where fly bait could be used would be one that represents these developed areas. Since the fly bait use is applied as spot and perimeter treatments, it is expected that the spatial footprint of the developed landcover would grossly overestimate the footprint. The chances of an individual of a listed species being exposed to methomyl from fly bait use is considered discountable. For these reasons, the fly bait uses are not considered significant contributors to exposure from methomyl use. Therefore, this use is not incorporated quantitatively into the action area and the effects determinations made for methomyl will be made based on the non-fly bait uses.