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Joe Martens
Commissioner

October 5, 2012

VIA UPS (432)

Mr. Julio Rosa
Bayer Environmental Science
2 T.W. Alexander Drive
Research Triangle Park, North Carolina 27709

Dear Mr. Rosa:

Re: Registration of the New Active Ingredient Indaziflam as Contained in Alion Herbicide (EPA Reg. No. 264-1106), Esplanade 200 SC (EPA Reg. No. 432-1516), and Marengo (EPA Reg. No. 432-1518) and the Withdrawal of Specticle 20 WSP (EPA Reg. No. 432-1499)

The New York State Department of Environmental Conservation (Department) has reviewed the new applications, received May 11, 2011, July 1, 2011 and April 20, 2012, and the supplemental information, received August 1, 2011, September 29, 2011, March, 16, 2012, April 20, 2012 and September 17, 2012 from Bayer Environmental Science, Bayer CropScience, and Bayer Advanced (collectively referred to as Bayer) to register the new active ingredient indaziflam as contained in the pesticide products listed above. Indaziflam is a selective preemergence herbicide and is labeled for the control of annual grasses and broadleaf weeds.

The application package was deemed complete for purposes of technical review on October 20, 2011. Pursuant to the review time frame specified in Environmental Conservation Law (ECL) §33-0704.2, a registration decision date of March 16, 2012 had been established. A technical issues letter, dated March 5, 2012, identified some concerns with the commercial and agricultural products. There were no concerns for registration of the homeowner products. The registration date was waived by the registrant in order to allow for adequate time to respond to concerns raised in the Department's letter. On April 5, 2012, representatives from Bayer met with the Department to discuss these concerns.

As there were no outstanding concerns with the two homeowner products, Bayer requested the homeowner products be registered separately from the commercial and agricultural products. On May 31, 2012, the Department registered the two products, Bayer Advanced DuraZone Ready-to-Use Weed & Grass Killer (EPA Reg. No. 72155-103) and Bayer Advanced DuraZone Ready-to-Use Weed & Grass Killer (EPA Reg. No. 72155-100).

Three products containing indaziflam for agricultural and commercial uses were initially proposed for use in New York State. On April 20, 2012, a request was made to replace the turf product, Specticle 20 WSP (EPA Reg. No. 432-1499), with the ornamental product, Marengo (EPA Reg. No. 432-1518). Therefore, the current products proposed are:

1. **Alion Herbicide (EPA Reg. No. 264-1106)** contains 19.05% indaziflam for pre-emergent weed control in citrus fruit, stone fruit, pome fruit, tree nuts and pistachios and non-crop areas on farmsteads. The highest single application rate for agricultural areas is 0.085 lbs AI/acre and the maximum seasonal application rate is 0.134 lbs AI/acre. Two applications can be made per year with a 30 day interval between applications, as long as the maximum seasonal rate is not exceeded. For farmsteads, the highest application rate is 0.085 lb AI/acre and the maximum seasonal application rate is 0.089 lb AI/acre.

2. **Esplanade 200 SC (EPA Reg. No. 432-1516)** contains 19.05% indaziflam for pre-emergent control of annual grasses and broadleaf weeds in non-residential non-crop areas, railroad and rail yards, managed roadsides, fence rows, utilities, hardscapes, industrial, municipal, and government sites. The highest single application rate is 0.09 lbs AI/acre and the maximum seasonal application rate is 0.13 lbs AI/acre. Two applications can be made per year as long as the maximum seasonal rate is not exceeded, however the label does not specify an interval between applications.

3. **Marengo (EPA Reg. No. 432-1518)** was submitted as a replacement product after the technical reviews were completed and thus not mentioned in those reviews. This product contains 7.4% indaziflam and is for pre-emergent control in ornamentals in outdoor nurseries, shadehouses, hoop houses, Christmas trees, and conifer plantations and in ornamental production sites in areas covered with landscaped fabric. For ornamentals, conifers and Christmas trees, the highest single application rate is 0.075 lbs AI/acre and the maximum seasonal application rate is 0.09 lbs AI/acre. Two applications can be made per year with a three month interval between applications, as long as the maximum seasonal rate is not exceeded. For ornamental production facilities, a one time application of 0.09 lb AI/acre can be applied prior to plant production.

Specticle 20 WSP (EPA Reg. No. 432-1499) was initially submitted for registration, but was replaced with Marengo after the technical reviews were completed. This product contained 20% indaziflam and was for pre-emergent control of annual grasses, annual sedges, and broadleaf weeds in turfgrass, landscape ornamentals, Christmas trees, and hardscapes. The highest single application rate was 0.062 lbs AI/acre and the maximum seasonal application rate was 0.089 lbs AI/acre.

The Department hereby accepts the registration of the new active ingredient, indaziflam, as contained in the three products listed above. The products are registered as "restricted" use with labeled restrictions concerning applications in Nassau and Suffolk counties, New York. The Department and the New York State Department of Health evaluated the application and all supporting documents submitted to date regarding human health and the environment in New York State. The following are the technical reviews for the active ingredient.

HUMAN HEALTH RISK ASSESSMENT

The New York State Department of Health (NYSDOH) reviewed the data, submitted by Bayer in support of the registration of the new active ingredient, indaziflam. The NYSDOH stated that neither indaziflam nor any of the formulated products was very toxic in acute oral, dermal or inhalation exposure studies in laboratory animals. In addition, neither the active ingredient nor the formulated products were very irritating to skin and eyes (tested on rabbits) or skin sensitizers (tested on guinea pigs).

Indaziflam caused some toxicity in mice, rats and dogs in chronic feeding studies. In a chronic feeding/oncogenicity study in mice, decreased body weight, body weight gain and food consumption in both sexes, renal and liver toxicity in males, and stomach and ovary toxicity in females were reported at 142 milligrams indaziflam per kilogram body weight per day (mg/kg/day) in males and 168 mg/kg/day in females; the respective no-observed-effect-levels (NOELs) were 34 mg/kg/day and 42 mg/kg/day. In a chronic feeding/oncogenicity study in rats, indaziflam caused decreased body weight/weight gain, signs of neurotoxicity (various symptoms, including dilated pupils, tremors, limb/movement effects, reduced activity/alertness) and renal toxicity in females, atrophic seminal vesicles, increased TSH (Week 3 only) and thyroid colloid alteration in males, as well as liver toxicity in both sexes at 118 mg/kg/day in males and 167 mg/kg/day in females; the NOELs were 12 mg/kg/day and 17 mg/kg/day in males and females, respectively. In a one-year dog feeding study, indaziflam caused axonal degeneration of nerve fibers in the brain, spinal cord and sciatic nerve at 6 mg/kg/day in males and 7 mg/kg/day in females; the NOEL was 2 mg/kg/day in both sexes. The United States Environmental Protection Agency (U.S. EPA) Office of Pesticide Programs (OPP) established a chronic reference dose (cRfD) for indaziflam of 0.02 mg/kg/day based on the NOEL from this study and an uncertainty factor of 100. This RfD has not yet been adopted by the U.S. EPA's Integrated Risk Information System (IRIS).

Indaziflam also caused some developmental toxicity in the offspring of pregnant rats, but not rabbits, exposed to this chemical during organogenesis at doses that also caused maternal toxicity. In the rat, developmental effects were characterized by decreased fetal body weights at 200 mg/kg/day; the NOEL was 25 mg/kg/day. Maternal effects were observed at 200 mg/kg/day and included decreased body weight gain and food consumption; the NOEL was 25 mg/kg/day. In the rabbit, indaziflam did not cause any developmental toxicity up to 60 mg/kg/day, the highest dose tested. Maternal toxicity was characterized by decreased body weight gain and food consumption and macroscopic changes in the liver in one doe at 60 mg/kg/day; the NOEL was 25 mg/kg/day. In a multi-generation reproduction study in rats, indaziflam was associated with decreased pup body weights throughout the postnatal period and clinical signs of toxicity (perianal, urine or nasal staining, diarrhea or soft stool, distended abdomen, weakness, tremors, myoclonus, increased activity and reactivity) at 317.6 mg/kg/day in males and 355.2 mg/kg/day in females; the respective NOELs were 69.3 mg/kg/day and 85.2 mg/kg/day. Reproductive toxicity was reported as delayed sexual maturation at 317.6 mg/kg/day in males and 355.2 mg/kg/day in females; the respective NOELs were 69.3 mg/kg/day and 85.2 mg/kg/day. Parental toxicity consisted of coarse tremors in females, renal toxicity (tubular degeneration/regeneration and increased weight) in males and decreased body weight, body weight gain and food consumption in both sexes at 560.1 mg/kg/day in males and 656.2 mg/kg/day in females. The NOELs for parental toxicity were 69.3 mg/kg/day and 85.2 mg/kg/day in males and females, respectively.

Indaziflam caused some effects in acute, subchronic and developmental neurotoxicity studies in rats. In the acute study, decreased motor and locomotor activity in females was observed at 100 mg/kg; the NOEL was 50 mg/kg. In the subchronic study, indaziflam caused decreased body weights and total session motor/locomotor activity in females and decreased overall cumulative body weight gain and clinical signs of toxicity (tremors, repetitive chewing motion and perianal and lacrimal staining) in both sexes at 585.7 mg/kg/day in males and 580.9 mg/kg/day in females; the respective NOELs were 243.6 mg/kg/day and 306.9 mg/kg/day. Indaziflam additionally caused decreased body weights in both sexes and decreased motor activity in male pups on post-natal-day 21 at 432 mg/kg/day; the NOEL was 83.8 mg/kg/day. Maternal toxicity was characterized by clinical signs at daily observation (coarse tremors, dilated pupils and dilated pupils unresponsive to penlight, nasal staining, and repetitive chewing movements) at 432 mg/kg/day; the NOEL was 83.8

mg/kg/day. The U.S. EPA OPP established an acute reference dose (aRfD) for indaziflam of 0.5 mg/kg/day based on the NOEL of 50 mg/kg/day from the acute neurotoxicity study in rats and an uncertainty factor of 100 to account for interspecies extrapolation and human variability.

Indaziflam did not cause oncogenic effects in rat or mouse chronic feeding studies. This compound was also negative in a number of genotoxicity studies. The U.S. EPA classified indaziflam as "not likely to be carcinogenic to humans."

The U.S. EPA established tolerances for indaziflam residues in or on a number of crops and animal commodities (Federal Register 76 (No. 66): 18,899−18,906; April 6, 2011). The acute population adjusted dose for this active ingredient (aPAD) is 0.5 mg/kg/day and has the same basis as the aRfD. The U.S. EPA estimated the acute dietary exposure to indaziflam from food and drinking water would be three percent of the aPAD for all infants (< 1 year old), the highest exposed subgroup, and less than one percent for the general population and all other population subgroups. The chronic population adjusted dose (cPAD) for indaziflam is 0.02 mg/kg/day and has the same basis as the cRfD. The U.S. EPA estimated that the chronic dietary exposure from all crops for which there are tolerances and drinking water to indaziflam residues would be three percent of the cPAD for the general population, ten percent for all infants less than one-year-old and five percent for children one-to-two years old. These exposure analyses are based on the assumption that 100 percent of crops are treated and contain tolerance level residues. Actual residues and resulting exposure levels are expected to be less than these assessments estimate.

The U.S. EPA reported the extensive results of several occupational and residential risk assessments for exposures to indaziflam from a variety of crop and non-crop uses. Occupational and residential risks were estimated for short- (1−30 days)/intermediate-term (1−6 months) combined dermal and inhalation exposures and for short-term dermal post-application exposures. Post-application inhalation risks were not assessed because indaziflam is applied at low application rates (maximum 57 grams per acre) and has a rather low vapor pressure (1.9×10^{-10} mm Hg). For determining margins of exposure (MOEs) for all application and post-application scenarios, the U.S. EPA compared estimated combined dermal and inhalation exposures to a NOEL of 7.5 mg/kg/day from a subchronic feeding study in the dog (axonal degenerative microscopic findings in the brain, spinal cord and sciatic nerve). The U.S. EPA considered MOEs of 100-fold or greater to provide adequate worker and residential protection for indaziflam.

1. Occupational risk from non-crop uses:

The U.S. EPA estimated occupational risks for a number of scenarios involving a variety of application methods (groundboom, rights-of-way equipment, broadcast sprayer, push cyclone granular spreader and belly grinder), application locations (turf grass, nurseries, forestry, golf courses, or sod farms) and product formulations (liquid, water soluble packet, or granule). The estimated combined MOEs for mixers/loaders supporting the aforementioned application methods ranged from 1,100 to 830,000 depending on the application location and product formulation. The combined MOEs for applicators ranged from 2,800 to 840,000, also depending on the application method, location and product formulation. The estimated combined MOEs for mixers/loaders/applicators to non-crop areas using only the Esplanade liquid product ranged from 100 to 34,000 depending on the application method (low pressure handwand, backpack sprayer, or handgun sprayer). These scenarios assumed workers wore only base line personal protective equipment (long-sleeved shirt, long pants, shoes plus socks). Post-application, short-term dermal MOEs on the day of application ranged from 1,400 to 45,000 using standard U.S. EPA assumptions, depending on the application location and the post-application activity.

2. Occupational risk from crop uses:

The U.S. EPA estimated occupational risks for exposure to indaziflam from use on citrus, stone, and pome fruit, grapes, tree nuts, pistachios and olives via groundboom or handgun sprayer. For mixers/loaders and applicators using groundboom application equipment, the combined MOEs were 360 and 43,000, respectively. The combined MOE for mixers/loaders/applicators using a handgun sprayer was 7,100. Both scenarios assumed workers wore baseline PPE and the handgun sprayer scenario assumed workers additionally wore gloves. Post-application dermal risks for this scenario were not assessed because exposures are expected to be negligible as indaziflam is applied to the soil, not to crop foliage.

3. Residential risk from homeowner use:

The U.S. EPA estimated risks for combined exposures to indaziflam from homeowner applications with a ready-to-use trigger sprayer and a hand held pump-style tank sprayer. The MOE for combined exposures from application with the trigger sprayer was estimated to be 510,000. The MOE for combined exposures to indaziflam for mixers/loaders/applicators using the hand held pump sprayer was estimated to be 40,000.

4. Residential post-application risk:

The U.S. EPA also estimated short-term (1−30 days) residential post-application risks to adults and children (3−6 years) following commercial or homeowner application of indaziflam to lawns. For commercial applications via a hose end sprayer, MOEs for short-term dermal exposures to adults and children were 6,000 and 3,700, respectively. Post-application homeowner application (hand held pump sprayer) MOEs for short-term dermal exposures were 4,700 for adults and 2,800 for children. The short-term MOEs from incidental ingestion for a toddler after application of a commercial product were 7,000, 28,000 and 2,100,000 for hand-to-mouth, object-to-mouth, and soil ingestion exposure pathways, respectively. The short-term MOEs from incidental ingestion for a toddler after application of a homeowner product were 5,300, 21,000 and 1,600,000 for hand-to-mouth, object-to-mouth, and soil ingestion exposure pathways, respectively.

There are no chemical specific federal or New York State drinking water/groundwater standards for indaziflam. Based on its chemical structure, this chemical and its degradates fall under the 50 micrograms per liter (µg/L) New York State drinking water standard for "unspecified organic contaminants" (10 NYCRR Part 5, Public Water Systems).

The available information on indaziflam and the formulated products Alion Herbicide, Specticle 20 WSP Herbicide and Esplanade 200 SC indicates that they were not very acutely toxic in laboratory animal studies. Indaziflam caused some toxicity, including kidney and liver toxicity in chronic feeding studies, but was not carcinogenic. In addition, the nervous system appears to be most sensitive to indaziflam as neurotoxicity was observed in rats and dogs in acute, subchronic, and chronic toxicity studies. However, estimated risks posed by indaziflam to workers and homeowners from use of these products are within the range considered acceptable by the U.S. EPA. Dietary risks from exposure to indaziflam via crop residues and drinking water were also considered acceptable by the U.S. EPA.

Given the above, the NYSDOH does not object to the registration of these pesticide products in the state on the basis of direct health risks from worker/homeowner use or dietary exposures.

ECOLOGICAL RISK ASSESSMENT

The following is the review performed by the Department's Division of Fish, Wildlife and Marine Resources' Bureau of Habitat (BOH):

Indaziflam is a fluoroalkyltriazine herbicide, part of the broader triazine herbicide family. Indaziflam controls weeds by inhibiting cellulose biosynthesis, and its primary modes of action are through inhibition of seedling emergence and root development. It is primarily a pre-emergent herbicide and it has low post-emergence activity. The technical grade product is a mixture of two active isomers; containing 95-100% isomer A and 0-5% isomer B. The molecular weight of indaziflam is 301.4, and its density is 1.23 g/ml. Its solubility in water is pH dependent and ranges from 1.2-4.4 mg/L. Solubility decreases as the pH value increases.

Indaziflam exhibited low toxicity to mammals, both in terms of single acute and dietary doses. Similarly, birds demonstrated low acute and chronic sensitivity to indaziflam, except for avian reproduction studies with mallard ducks. In a 22 week study, a no adverse effects concentration (NOAEC) could not be determined because of impacts to female weight gain and adult food consumption at the lowest dose tested (NOAEC <95 mg/kg diet). A modified study was then conducted, in which indaziflam was only administered during the final 6 weeks (egg laying stage), although the test dosages were smaller. This study resulted in a NOEAC of 44 mg/kg diet for male ducks, but for females, adverse effects to weight gain were again observed at the lowest dose tested (NOAEC<44 mg/kg diet). No similar impacts were observed in reproductive studies conducted with bobwhite quail. In a 23 week avian reproduction study, no impacts were observed to either bobwhite quail parents or offspring at the highest dose tested, resulting in a lowest observed adverse effects concentration (LOAEC) of >1,023 mg/kg diet and a NOAEC of 1,023 mg/kg diet. Honeybees were not sensitive to indaziflam, with acute contact and oral LD_{50}s of >100 µg/bee and 120 µg/bee, respectively. Earthworms were also insensitive to indaziflam. The LOAEC and NOAEC for indaziflam from an earthworm reproductive study were 60.3 mg/kg soil dw and 34 mg/kg soil dw, respectively.

Indaziflam was toxic to fish, with freshwater LC_{50}s ranging between 0.32 – 0.57 mg/L and a marine/estuarine fish LC_{50} of 0.96 mg/L. For freshwater invertebrates, represented by Daphnia magna, the acute 48 hour EC_{50} was 9.88 mg/L, and the 21 day chronic lowest observed effects concentration (LOEC) was about an 1/10th of the acute value, 0.8 mg/L. Marine/Estuarine invertebrates were more sensitive, with acute 96 hour LC_{50}/EC_{50}s ranging around 1 mg/L. Almost all of the fish and aquatic toxicity tests were classified by the U.S. EPA as supplemental, because test solutions were not centrifuged to accurately determine how much of the indaziflam was actually in solution.

Whole sediment toxicity tests with technical grade indaziflam were conducted with both freshwater species (Chironomus tentans) and marine estuarine species (Leptocheirus plumulosus). No adverse effects were observed in the 10 day toxicity tests; resulting in sediment LC_{50}s of >100 mg/kg dw sediment and >180 mg/kg dw sediment, respectively. These values equated to pore water LC_{50}s of >2.2 mg/L and >3.8 mg/L, respectively.

As would be expected with an herbicide, the most sensitive non-target species were aquatic plants, both vascular macrophytes and non-vascular (algae). Certain indaziflam degradates were also highly toxic to aquatic plants. The toxicity to non-target aquatic plants is summarized below:

Table 1. Summary of indaziflam toxicity to non-target aquatic plants.

Plant Species	Test material	Test	EC_{50} (mg/L)	NOEC (mg/L)
Lemna gibba (vascular)	Indaziflam	Seven day	0.000076	0.0000314
Selenastrum capricornutum (algae)	Indaziflam	96 hour	0.077	0.038
Selenastrum capricornutum (algae)	Indaziflam	96 hour	0.074	0.0242
Lemna gibba (vascular)	Triazine indanone metabolite	Seven day	0.012	0.00609
Lemna gibba (vascular)	Fluoroethyl diamino s-triazine (FDAT) metabolite	Seven day	0.051	<0.0111
Lemna gibba (vascular)	Indaziflam carboxylic acid metabolite	Seven day	4.0	1.13
Lemna gibba (vascular)	Indaziflam hydroxyethyl metabolite	Seven day	0.00051	0.00025
Lemna gibba (vascular)	Indaziflam olefin	Seven day	0.00034	0.00009
Lemna gibba (vascular)	Indaziflam	Seven day w/sediment	0.00035	0.000167
Selenastrum capricornutum (algae)	Formulated product (500 SC)	72 hour	0.051	<0.034
Selenastrum capricornutum (algae)	Formulated product (200SC)	72 hour	0.053	0.0168

Because indaziflam and its metabolites were highly toxic to aquatic plants, the U.S.EPA required Tier III microcosm tests with indaziflam and aquatic plants. In a six week, preliminary study with eight macrophyte species, the resulting NOAEC for sublethal effects was <0.00032 mg/L. In the full, 69 day microcosm study, macrophyte species were far more sensitive to indaziflam than algal or zooplankton species. Of the macrophytes tested, Lemna and related species were the most sensitive, with a NOAEC of 0.00001 mg/L. The majority of other, non-Lemnid vascular plants tested began to show effects at 0.001 mg/L, and plants exposed to indaziflam concentrations of 0.0032 and 0.01 mg/L did not recover.

Exposure Assessment and Modeling:

The two previously registered homeowner products, DuraZone RTU and DuraZone Concentrate, and the Marengo product propose very limited uses. As a result, none of these products is likely to result in significant exposure of indaziflam to fish and wildlife populations. However, the two other products are likely to result in fish and wildlife exposure. Alion is labeled for use in pome fruit, stone fruit, and tree nut orchards. Esplanade is used in a variety of bare ground sites were non-selective control of most all vegetation is desired.

Indaziflam products are primarily intended for pre-emergent applications. The mode of action interferes with rapidly growing areas of plant tissue, such as the apical meristems, and the product has relatively little impact on established plants. Indaziflam has been classified as moderately mobile and persistent in soil, and several indaziflam metabolites have been classified as mobile to highly mobile in soil. Applications to bare ground are unlikely to result in exposure to herbivorous birds animals. Also, applications to bare ground would not be impeded by foliar intercept when runoff events occur.

To assess risks to terrestrial wildlife, the MAMTOX model was employed. Using the highest seasonal application rate of 0.134 lbs AI/acre, the risks to three different sized herbivorous animals were assessed, rabbit, woodchuck, and white-tailed deer. This exposure assessment is highly conservative, since that application rate would only be made to bare ground and not turf where these mammals are likely to graze. Using vegetation residues based on the 0.134 lb AI/acre application rate and the Hoerger and Kenaga upper limit nomagraph values, no acute or chronic adverse impacts are predicted.

The AVTOX model estimates risks to herbivorous birds. If a NOAEC is not provided, the LOAEC is divided by 10 and used as the NOAEC. For mallard duck reproduction, the LOAEC was 44 mg/kg diet and the LOAEC was <44 mg/kg diet. Because the model cannot accommodate < or > values, no NOAEC was entered, and the model substituted an alternative NOAEC of 4.4 mg/kg diet. This resulted in a risk to mallard ducks grazing on both long grass and short grass using the default 0.134 lbs AI application rate as well as the 0.0625 mg/kg single application rate for Specticle, and the Hoerger and Kenaga "typical" values. Thus, there is a potential for adverse effects to birds that graze on treated turf.

Acute and chronic risks to freshwater fish and invertebrates, marine/estuarine fish and invertebrates, macrophytes, and algae were assessed using to PONDTOX model. Using the highest application rate of 0.134 lbs AI/acre, a worst-case runoff rate of 5%, and no allowance for foliar intercept, runoff into one acre ponds with a depth of one foot, three feet, and six feet were assessed. The resulting indaziflam concentrations in the three ponds was estimated to be 0.01345 mg/L, 0.00643 mg/L, and 0.00361 mg/L in the one foot, three foot, and six foot deep ponds, respectively. At these concentrations, neither the acute LC_{50} nor the acute no observed effects concentration (NOEC) was exceeded for freshwater fish and invertebrates, marine/estuarine fish and invertebrates and algae. The chronic lowest observed effects concentration (LOEC) and NOEC were not exceeded for freshwater fish and invertebrates. However, both the acute LC_{50} and NOEC were exceeded for aquatic macrophytes in all three ponds. When PONDTOX was run again using the lowest recommended runoff rate (1%) and the lowest single application rate, the results were the same; the LC_{50} and NOEC for macrophytes were exceeded in all three pond depths. Therefore, the PONDTOX model indicates that indaziflam potentially poses a significant risk to non-target aquatic macrophytes.

Indaziflam has been classified as persistent and moderately mobile in soil. The photolytic halflife ($T_{1/2}$) in soil was 40.8 days. Aerobic metabolism $T_{1/2\ s}$ ranged from 35 to 178 days. Indaziflam is considered stable to anaerobic soil metabolism with a $T_{1/2}$ of >180 days. Field dissipation half-lives for parent indaziflam ranged from 9-70 days.

In water, indaziflam degraded via photolysis rapidly, with a $T_{1/2}$ of 3.7 days, however it was stable to hydrolysis. Indaziflam dissipated out of the water column fairly quickly, in 0-3 days, and migrated to the sediment. It degrades in aerobic sediment with $T_{1/2s}$ ranging from 120 - 240 days. It is stable to anaerobic degradation in sediment.

The degradation of indaziflam results in the production of five major metabolites. Metabolites have been characterized as more mobile than the parent indaziflam. Metabolites are only toxicologically significant in regards to impacts on non-target aquatic macrophytes, see Table 1, above.

Table 2. Major metabolites resulting from the degradation of indaziflam

Metabolite name	Primary Terrestrial Production process	Peak % of applied parent	Primary Aquatic production process	Peak % of applied parent
Triazine-Indanone	Aerobic soil metabolism	15.8%	Aerobic aquatic metabolism	11.2%
Indaziflam-carboxylic acid	Aerobic soil metabolism	21.7%	Aerobic aquatic metabolism	20.7%
Indaziflam-hydroxyethyl	N/A		Aquatic photolysis	20.8%
Indaziflam-olefin	N/A		Aquatic photolysis	53.9%

Fluoroethyl diamino triazine (FDAT)	Aerobic soil metabolism	39.1%	Aerobic aquatic metabolism	12.8%
Fluoroethyl-triazinanedione	Aerobic soil metabolism	25.7%	N/A	

Indaziflam is mobile in soil, and it is likely that runoff events could move indaziflam off treated areas and into adjacent waterbodies. Fish and invertebrates are somewhat sensitive to indaziflam. However, the application rates are so low that even if indaziflam runs off treated areas into waterbodies, then toxicity thresholds, including no effects concentrations, are unlikely to be exceeded.

A review of the data package suggests two significant ecological risks from the use of indaziflam products. The first is a possible risk to waterfowl that feed upon treated vegetation, and the second is the potential for adverse impacts to non-target aquatic vegetation in waterbodies adjacent to treated areas.

The potential risk to birds is appears to be minimal. It does not extend to all birds, because the chronic/reproductive tests with bobwhite quail showed no adverse impacts. Waterfowl, specifically mallard ducks, when exposed to indaziflam for six weeks through diet experienced weight loss. In the wild, ducks are unlikely to consume treated turf for six weeks. Ducks and geese will eat grass, although it is not their preferred food source. Geese are more likely to graze on turf, but only if other vegetation is not available. The managed type of turf areas where an herbicide is likely to be applied to control broadleaf weeds and annual grasses are also likely to be areas where measures are implemented to discourage geese. Furthermore, at the maximum seasonal application rate of 0.134 lbs AI/acre for any indaziflam product, the Hoerger and Kenaga nomagraph predicts the typical and upper bound concentrations of indaziflam on short grass would be 17 ppm and 33 ppm respectively. At the single application rate for Specticle 20 WSP, the indaziflam product specifically labeled for turf (0.0625 lbs AI/acre), the Hoerger and Kenaga typical and upper bound concentrations for indaziflam would only be 8 ppm and 16 ppm respectively. Therefore it is unlikely that the concentration of indaziflam in turfgrass that a duck or goose might consume would approach the levels at which the weight loss in mallard ducks was documented to occur (44 ppm). EPA has required an additional mallard duck reproduction study (Indaziflam 200 SC Registration document), but that study won't be available before April 2014. Given the unlikelihood that waterfowl will graze on treated turf for six weeks with no other diet source, and that the indaziflam concentration on grass will be less than the concentration at which duck weight loss was documented to occur, the risks to waterfowl from indaziflam use are minimal.

The risk to non-target plants, however, is significant. As stated above, indaziflam is mobile and runoff from treated areas into adjacent water bodies is possible. In two of the three large use products, indaziflam is potentially applied to bare ground where there will be little or no impedance from foliar intercept. Furthermore, indaziflam is rapidly degraded by photolysis, but the photolytic degradates indaziflam-hydroxyethyl and indaziflam-olefin, which together can comprise more than 70% of the original parent molecule, are nearly as toxic to aquatic plants as parent indaziflam. The use of indaziflam as labeled is likely to result in injury to non-target aquatic plants.

The U.S. EPA risk assessment documents also conclude that indaziflam poses a risk to non-target aquatic plants. Apparently, to mitigate risks to aquatic organisms, the registrant agreed to adopt a buffer. The imposition of the 25 foot buffer will reduce the likelihood that concentrations of indaziflam will run off from treated areas into adjacent waterbodies.

In the March 5, 2012 technical issues letter, the BOH suggested that the buffer strip language on the Alion label be moved from PRODUCT INFORMATION section and to the RESTRICTIONS FOR USE section in order to prevent the statement to be overlooked. On July 20, 2012, a new label was submitted that added the buffer language to the proper section.

Initially, there was a concern regarding the buffer zone language on the Esplanade 200 SC label. The product label does not include a restriction regarding the application of the product in areas adjacent to waterbodies, other than a restriction stating: "Do not apply directly to water or to soil where standing water is present except as specified in this label." Instead, in the APPLICATION INFORMATION section, the label states: "When spraying close or next to ponds, lakes, rivers, and streams be cognizant of keeping the spray solution from reaching the water." Specifically, it was not completely clear as to why the 25 foot buffer strip was not required for Esplanade 200 SC as the target areas for this product's use (i.e., non-residential non-crop areas, railroad and rail yards, managed roadsides, fence rows, utilities, hardscapes, industrial, municipal, and government sites) can certainly exist in areas adjacent to waterbodies.

In the technical issues letter dated March 5, 2012, the BOH suggested that a use restriction be added to the label that stated, "Do not apply within 25 feet of ponds, lakes, rivers, streams, wetlands, and habitat containing aquatic and semi-aquatic plants". This issue was further discussed at the April 5, 2012 meeting with Bayer and subsequently on April 20, 2012, Bayer submitted material to justify the lack of the 25 foot buffer strip and a request to reevaluate the need for the suggested buffer zone.

The justification document argued against the need for a buffer strip based on several points. The first point is that specific conditions for ground application have been integrated into the label to prevent drift; specifically, a requirement for the use of medium to coarse droplets and a spray boom height of not higher than 4 feet. The second point is that applications are likely to be made by trained, professional applicators. The third point is that existing label use restrictions to minimize exposure of water to Esplanade 200 SC treatments by direct application, drift, and runoff. The fourth point is that potential users, such as railroads and highway departments, are less likely to use a product with a buffer requirement.

In review of the justification material, the BOH stated that indaziflam is highly toxic to non-target aquatic plants that could be exposed via drift or runoff. Laboratory tests of aquatic photolysis of indaziflam resulted in the production of two degradates, -olefin and –hydroxyethyl, that were approximately as toxic as the parent molecule. The parent molecule is stable and can persist in anoxic aquatic sediments. In defense of indaziflam, the Aquatic ecological exposure assessment showed that in outdoor field conditions, less than 2.8% of these metabolites were formed, and the dominant biological metabolite was the triazine-indanone metabolite, which is considerably less toxic than the parent. With the Esplanade 200 SC product, indaziflam is likely to be applied to bare ground. Given its moderate mobility, indaziflam is likely to "soak in" to the soil, and runoff from the soil surface is likely to be minimized unless a precipitation event is large. Also, the plant studies show that *Lemna* species are more sensitive to indaziflam than other macrophyte species.

Given the types of sites where Esplanade 200 SC can be used, it is probable that very few treated areas will lie within 25 feet of a waterbody, or that Esplanade 200 SC would be applied very frequently at the water's edge. Therefore, the BOH has accepted the justification for eliminating the suggested buffer strip from the Esplanade 200 SC label. There was no further objection to the current Esplanade 200 SC label.

The BOH reviewed the Marengo product label to ensure that the label contained consistent language with the other indaziflam products that underwent a technical review. The BOH stated that the Marengo label allowed for the use of indaziflam in significantly fewer sites than the Specticle label. Also, the Marengo label does include the 25 foot buffer, and it is appropriately located in the Product Use Restriction section. Therefore, the BOH has no objections to registration of the Marengo product.

Bayer decided not to pursue the registration of the Specticle product and withdrew it after the technical review was completed. However, during the technical review the BOH stated that the U.S. EPA approved label for Specticle 20 WSP contains a restriction stating: "For use on sod farms, golf courses, and non-crop areas (excluding lawns) do not apply within 25 feet of ponds, lakes, rivers, streams, wetlands, and habitat containing aquatic and semi-aquatic plants." It was also not clear as to why lawns are excluded from the Specticle 20 WSP label. In New York State, it is not uncommon to observe large lots of managed turf on waterfront property right down to the water's edge. In the technical issues letter, the BOH had suggested that the lawns exclusion be dropped and phrase be reworded to state "Do not apply within 25 feet of ponds, lakes, rivers, streams, wetlands, and habitat containing aquatic and semi-aquatic plants."

ENVIRONMENTAL FATE AND GROUNDWATER IMPACTS:

The Department's groundwater staff reviewed the information submitted in support of the registration of the new active ingredient indaziflam. The following is the groundwater staff's review:

Major transformation products:
1170437-olefine = N-[(1R,2S)-2,6-dimethyl-2,3-dihydro-1H-inden-1-yl]-6-vinyl-1,3,5-triazine-2,4-diamine
1170437-1-hydroxyethyl = 1-{4-Amino-6-[(1R,2S)-2,6-dimethyl-2,3-dihydro-1H-inden-1-ylamino]-1,3,5-triazin-2-yl}ethanol
1170437-carboxylic acid = (2S,3R)-3-({4-amino-6-[(1R)-1-fluoroethyl]-1,3,5-triazin-2-yl}amino)-2-methylindane-5-carboxylic acid (2158969)
1170437-triazine indanone = (2R,3R)-3-({4-amino-6-[(1R)-1-fluoroethyl]-1,3,5-triazin-2-yl}amino)-2,5-dimethylindan-1-one
1170437-diaminotriazine = 6-[(1R)-1-fluoroethyl]-1,3,5-triazine-2,4-diamine
1170437-dihydrotriazine = 6-[(1R)-1-Fluoroethyl]-1,3,5-triazinane-2,4-dione (transformation product of 1170437-diaminotriazine

TECHNICAL REVIEW

Solubility: Isomer A has a solubility of 2.2 and isomer B has a solubility of 1.2 at pH 7 and 20^{o}C.

Hydrolysis: (MRID 47443207 acceptable) Indaziflam was stable in pH 4, 7, and 9 aqueous buffer solutions.

Aqueous Photolysis: (MRID 47443208 supplemental) In a sterile pH 7 buffer solution, the half-life was 3.7 days based on the combined labels (indane-3-^{13}C/^{14}C) and (triazine-2,4-^{14}C). Major transformation products 1170437-1-hydroxyethyl and 1170437-olefine were found at 20.3% and 53.6% of applied, respectively.

Soil Photolysis: (MRID 47443209 supplemental) Indaziflam had a corrected environmental half-life (Phoenix, AZ) of 40.3 days in a loamy sand soil (pH 6.5, %OC 0.7). No major transformation products were found.

Aerobic Soil Metabolism: (MRID 47443210 supplemental)

	% OC	pH	Linear half-life	Non-linear half-life	Observed half-life	Degradates
Sandy loam California	0.5	8.6	141.5	87.7	61-90	1170437-carboxylic acid 17.8% 1170437-triazine indanone 17.8%
Parent & unextracted residue	0.5	8.6	266.6	203.9		
Sandy loam NC	1.7	6.5	239.0	177.7		1170437-carboxylic acid 21.7% 1170437-triazine indanone 21.7%
Parent & unextracted residue	1.7	6.5	693.1	630.1		

(MRID 47443211 supplemental)

	% OC	pH	Linear half-life	Non-linear half-life	Observed half-life	Degradates
Sandy loam California	0.5	8.6	135.9	82.5	~31	1170437-carboxylic acid 16.5% 1170437-triazine indanone 10.5% 170437-diaminotriazine 37.9%.
Parent & unextracted residue	0.5	8.6	239	173.3		
Sandy loam NC	1.7	6.5	239.0	147.5	~70	1170437-carboxylic acid 10.0% 1170437-triazine indanone14.5% 170437-diaminotriazine 20.8
Parent & unextracted residue	1.7	6.5	770	630.1		

(MRID 47443212 supplemental; German soils)

	% OC	pH	Linear half-life	Non-linear half-life	Observed half-life	Degradates
Sandy loam	1.64	6.8	62.4	53.7	~45	1170437-triazine indanone 14.3%
Parent & unextracted residue	1.64	6.8	62.4	101.9		
Loam	*1.29*	*7.1*	*43.3*	*35.5*	*~27*	*1170437-carboxylic acid 21.7%*
Parent & unextracted residue	1.29	7.1	43.3	70		
Loam	2.08	6.4	51.0	41.0	~28	1170437-carboxylic acid 12.4% 1170437-triazine indanone 13.7%
Parent & unextracted residue	2.08	6.4	95	80.6		
Silt loam	2.07	7.2	51.7	45.3	~40	1170437-carboxylic acid 11.6% 1170437- triazine indanone 11.5%
Parent & unextracted Residue	2.07	7.2	103.5	81.2		

(MRID 47443213 supplemental; German soils)

	% OC	pH	Linear half-life	Non-linear half-life	Observed half-life	Degradates
Sandy loam	1.64	6.8	68	60.3	~73	1170437-diaminotriazine 17.0% 1170437-carboxylic acid 12.1%
Parent & unextracted residue	1.64	6.8	110	100.5		
Loam	1.29	7.1	44.4	36.1	~28	1170437-diaminotriazine 31.6% 1170437-carboxylic acid 16.8%
Parent & unextracted residue	1.29	7.1	82.5	69.3		
Loam	2.08	6.4	52.5	34.8	~21	1170437-diaminotriazine 23.5% 1170437-triazine indanone 15.8%
Parent & unextracted residue	2.08	6.4	111.8	90		
Silt loam	2.07	7.2	49.5	45.3	~40	1170437-diaminotriazine 11.4% 1170437-triazine indanone 10.2%
Parent & unextracted residue	2.07	7.2	87.7	79.7		

(MRID 47443215 supplemental; German soils)

	% OC	pH	Linear half-life	Non-linear half-life	Observed half-life	Degradates
Loam	1.5	5.96	78.8	65.4	~50	Not addressed
Silt loam	1.77	7.22	50.6	45.3	~420	Not addressed

Aerobic Soil Metabolism 1170437 diaminotriazine: (MRID 47443214 supplemental)

	% OC	pH	Linear half-life	Non-linear half-life	Observed half-life	Degradates
Sandy loam	1.09	7.7	52.5	42.8	~30	1170437-dihydrotriazine 20.7%
Loam	1.39	6.5	177.7	165.0	>120	
Silt loam	2.18	7/1	17.2	14.9	~18	1170437-dihydrotriazine 25.7%

Aerobic Soil Metabolism 1170437 triazine-indanone: (MRID 47443210 supplemental)

	% OC	pH	Linear half-life	Degradates
Sandy loam NC	1.7	8.6	315	None identified

Aerobic Soil Metabolism 1170437 carboxylic acid: (MRID 47443210 supplemental)

	% OC	pH	Linear half-life	Degradates
Sandy loam California	1.7	8.6	267	None identified

Adsorption/Desorption: (MRID 47443203 acceptable)

Soil	pH	% OC	Koc adsorption	Koc desorption
Sandy loam	6.6	2.0	426.0	569.3
Silt loam	6.8	2.4	395.8	542.3
Loam	5.8	1.3	468.2	663.5
Loamy sand	5.7	1.5	741.8	1036.5
Stanley	6.2	2.3	449.7	633.7

Adsorption/Desorption of 1170437-diaminotriazine: (MRID 47443205 supplemental)

Soil	pH	% OC	Koc adsorption	Koc desorption
Sandy loam	5.3	1.0	77	ND
Clay loam	5.7	2.1	53	ND
Silt loam	6.5	2.07	13	ND
Sandy loam	6.1	1.64	13	ND
Loam	5.6	2.08	17	ND

Adsorption/Desorption of 1170437-triazine-indanone: (MRID 47443204 supplemental)

Soil	pH	% OC	Koc adsorption	Koc desorption
Sandy loam	5.3	1.0	535	ND
Clay loam	5.7	2.1	437	ND
Silt loam	6.5	2.07	363	ND
Sandy loam	6.1	1.64	309	ND
Loam	5.6	2.08	228	ND

Adsorption/Desorption of 1170437-carboxylic acid: (MRID 47443206 supplemental)

Soil	pH	% OC	Koc adsorption	Koc desorption
Sandy loam	5.3	1.0	132	ND
Clay loam	5.7	2.1	85	ND
Silt loam	6.5	2.07	50	ND
Sandy loam	6.1	1.64	38	ND
Loam	5.6	2.08	40	ND

Anaerobic Soil Metabolism: (MRID 47443216 supplemental). In a silt loam soil from Germany, for both the linear and non-linear tests, the half-life in water was not determined, and the half-life in the soil and total system was stable. The observed half-life in water was not determined, and in the soil and the total system it was >180 days. In the total system, major transformation product 1170437-carboxylic acid was found at 10.2%, and major transformation product 1170437-triazine indanone was found at 10.0%.

Terrestrial Field Dissipation: (All studies supplemental)

Soil/MRID	pH	%OC	Linear half-life	Non-linear half-life	Degradates
Loamy sand 47443221	6.1	1.1	92.4	66.6	1170437 diaminotriazine 10.5%
Loamy sand 47443222	6.6	1.8	154	69.3	None found
Sandy loam 47443223	8.0	0.4	76.2	9.3	1170437 diaminotriazine 17.6%
Sand 47443224	5.7	1.0	107	59.2	None found
Loamy Sand 47443225	6.1	0.9	131	45.0	None

Label Statements on all labels:
Surface Water Advisory: This pesticide may impact surface water quality due to runoff of rain water. This is especially true for poorly draining soils with shallow ground water. This product is classified as having high potential for reaching surface water via runoff for several months or more after application.

Ground Water Advisory: This pesticide as properties and characteristics associated with chemicals detected in ground water. This chemical may leach into ground water if used in areas where soils are permeable, particularly where the water table is shallow.

Computer Modeling: Running LEACHP on Riverhead soil using a Koc of 426, a half-life of 82.5 days, and an application rate of 0.132 lb ai/a/yr, the model predicted accumulation, reaching 0.25 ppb after 10 years. Changing the half-life to 90 days for just the parent (not total residues), the model predicted no leaching. Modeling 1170437- carboxylic acid using a Koc of 132, a half-life of 315 days and an application rate of 0.05 lb ai/a/yr (21.7% of 0.134 lb ai/a/yr), the model predicted concentrations ranging between 1 and 1.5 ppb. Modeling 1170437-triazine indanone using a Koc of 535, a half-life of 267 days and 0.03 lb ai/a/yr (21.7% of 0.134 lb ai/a/yr), the model predicted concentrations of between 0.03 and 0.05 ppb. Modeling 1170437-diaminotriazine using a Koc of 77, a half-life of 30 days and an application rate of 0.05 lb ai/a/yr (37.9% of 0.134 lb ai/a/yr), the model predicted peaks ranging from 0.05 to 0.15 ppb

Supplemental Computer Modeling for Marengo: Computer modeling on the parent and degradates run at the higher rate of 0.134 lb ai/a/yr projected leaching at 1.5 ppb or less for all parameters. Given that this application rate is two-thirds of the application rate of the products modeled, on bare ground this product could be expected to leach at 1 ppb or less.

Summary: Based on the chemical parameters for the parent and the three degradates as well as the modeling, it does not appear that use of this product as labeled will have a significant negative impact on groundwater

Discussion:

On March 5, 2012, the Department's sent a technical issues letter to Bayer outlining, among other items, the following groundwater issues:

1. According to the "Environmental Fate and Ecological Risk Assessment in Support of the Section Registration of the New Chemical Indaziflam" dated March 10, 2010, the USEPA stated that while there were no environmental fate data gaps identified, there was considerable uncertainty regarding the characterization and quantification of the degradation of indaziflam and its transformation products. Degradation quantification was confounded by reportedly large amounts of un-extracted material in the degradation studies conducted in soil and aquatic systems. They went on to say that it is uncertain whether the un-extracted residues were parent, degradate residues, or bound residues that are no longer biologically available. The 21.7% of degradate residues found in the aerobic metabolism study, therefore, may be a conservative value. Based on the Kocs, the degradates are more mobile than the parent, and were detected in the field studies at depths of up to 120 cm.

Response: Bayer submitted additional information regarding the aerobic metabolism studies and unextracted residues. They indicated that the majority of the applied radioactivity in the bound residue was associated with the humin fraction (rather than humic acid or fulvic acid fractions) and is covalently bound or chemically incorporated into the soil matrix, and therefore is not available for leaching. Bayer indicated that this study was submitted to the EPA, but it is not clear whether or not EPA reviewed and commented on it.

2. Alion has language limiting application rates when the product is for use in coarse soils, and the reapplication rate was increased from 30 to 90 days for Florida and Georgia.

Response: Bayer indicated that groundwater concerns were never the reason for lowering the application rate on coarse soils and lengthening the reapplication interval in Georgia and Florida. It was observed from field trials that no additional benefits can be obtained from using rates higher than the 5 fluid ounces on coarse soils with the exception of citrus. Therefore, the lower rate was considered for coarse soils in all crops except citrus. In anticipation of the surface water modeling inputs EPA applies for Florida and Georgia scenarios, Bayer made the decision to increase the application interval in those two states to ensure an acceptable risk assessment.

Potential Groundwater Concern

Based on the chemical parameters for the parent and the three degradates and the modeling, it does not appear that use of these products as labeled will have a significant negative impact on groundwater. However, given the response regarding the unextracted residues and the application rates when the product is for use in coarse soils, staff have concerns regarding the use of this product on farmstead areas (around farmstead building foundations, non-paved farm roads and driveways, farm equipment lots, ungrazed fences, and shelter belts (windbreaks) around cropland) because these could be bareground applications with limited interception by weeds. Therefore, to be conservative, staff do not object to the registration of Alion provided use is prohibited in farmstead areas on Long Island and it is registered as a restricted use product. In addition, to be conservative, staff also does not object to the registration of Esplanade 200 SC and Marengo provided that they are prohibited on Long Island and registered as a restricted use products.

Response: On July 20, 2012, Bayer submitted a label for Alion that includes the language, "Do not use Alion in farmstead areas on Long Island, NY." in the restrictions section. On September 17, 2012, Bayer submitted labels for Esplanade 200 SC and Marengo that includes the language in the restrictions section that these products are not for sale, distribution, or use in Nassau County, or Suffolk County, New York.

REGISTRATION SUMMARY:

The Department hereby accepts **Alion Herbicide** (EPA Reg. No. 264-1106), **Esplanade 200 SC** (EPA Reg. No. 432-1516), and **Marengo** (EPA Reg. No. 432-1518) for registration as "restricted" use products as labeled in New York State. Enclosed for your files are the Certificates of Pesticide Registration and New York State stamped "Accepted" labeling.

Please note the yes under the "restriction" column on the enclosed Certificates of Pesticide Registration and the "Classified for Restricted Use in New York State" stamp on the enclosed product labels. As such, each product is restricted in its purchase, distribution, sale, use and possession in New York State. Furthermore, each product may only be purchased and used by a certified applicator in New York State.

The New York State Department of Environmental Conservation Regulations 6 NYCRR 326.3(a) state: "It shall be unlawful for any person to distribute, sell, offer for sale, purchase for the purpose of resale, or possess for the purpose of resale, any restricted pesticide unless said person shall have applied for, and been issued a commercial permit." Should you require information to obtain a commercial permit, please contact the Pesticide Reporting and Certification Section, at (518) 402-8748.

The Pesticide Reporting Law within Environmental Conservation Law Article 33 Title 12 requires all certified commercial pesticide applicators to report information annually to the Department regarding each pesticide application they make. Commercial pesticide retailers are required to report all sales of restricted pesticide products and sales of general use pesticide products to private applicators for use in agricultural crop production. If no sales are made within New York State, a report must be filed with the Department indicating this is the case. If you need information relating to the Pesticide Reporting Law, or annual report forms, please visit the Department's website at http://www.dec.ny.gov/chemical/27506.html or call (518) 402-8748.

Please note, a proposal by Bayer, or any registrant to register a product containing indaziflam, whose labeled uses are likely to increase the potential for significant exposure to humans, nontarget organisms, or the environment, would constitute a major change in labeled use pattern. Such an application must be accompanied by a new application fee and meet the requirements specified in 6NYCRR Part 326.17.

Please contact, Jeanine Broughel, Chief of the Product Registration and Pest Management Alternatives Section, at (518) 402-8768, if you have any questions.

Sincerely,
Scott Menrath

Scott Menrath, P.E.
Director
Bureau of Pest Management

Enclosures

cc: Ms. Meshea Brodie, Bayer CropScience
Ms. Jennifer Lilly, Bayer Advanced