



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON D.C., 20460

OFFICE OF
CHEMICAL SAFETY AND
POLLUTION PREVENTION

PC Code: 128829
DP Barcode: D379032
Chemical: Imazapyr

DATE: September 1, 2010

MEMORANDUM

SUBJECT: Ecological Risk Assessment and Drinking Water Exposure Assessment for Label Amendment to Allow Use of 2-(4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl)-3-pyridinecarboxylic acid (Imazapyr) in aquatic environments.

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BASF has petitioned (D379032) to add aquatic use sites on the ARSENAL POWERLINE™ herbicide (EPA Reg. No. 241-431) label. The label allows a direct of application of imazapyr to potable surface water, public waters, private waters, livestock watering ponds, recreational water areas. The maximum application rate of imazapyr is 1.5 lbs ae/A/year. Label restrictions include:

- Restricted use on public waters by Water Management District personnel, municipal officials, U.S. Army Corps of Engineers, and licensed/certified aquatic pest control applicators authorized by state or local government.
- Applications are allowed to private waters where there is minimal or no outflow to public waters.
- Aerials applications can only be made by helicopter.
- No restrictions exist for livestock water ponds or recreational water
- Applications are restricted to ½ mile upstream from potable water supply inlets on flowing water. If applications are made within ½ mile of potable water supply inlets then the water supply inlet needs to closed for 48 hours after treatment.
- Applications are restricted to 1 mile from an active potable water supply inlet on reservoirs and lakes. Application within 1 mile from an active potable water supply

inlet should remain inactive for 120 days after treatment or until mean imazapyr residues are less than 120 µg/L,

ARSENAL POWERLINE™ herbicide contains a surfactant that is not included in HABITAT™ herbicide, an imazapyr-based formulation that has registered aquatic uses. Based on a review of past risk assessments on technical imazapyr and its salts, the addition of aquatic use sites on the ARSENAL™ herbicide label (EPA Reg. No. 241-431) is not expected to alter the most recent ecological risk determinations or estimated drinking water concentrations for technical imazapyr and its salts. However, there are no data on the ARSENAL™ formulation, containing the surfactant. The registrant provided EPISUITE predictions of two chemical ingredients in ARSENAL herbicide formulation. The two chemicals were identified as phosphate esters with 9 carbon straight chain or branched 16 carbon branched chain. EPISUITE predicts a wide range of physicochemical and fate properties. It is not possible to assess these data without an understanding of their estimated environmental concentrations and toxicity data.

Acute aquatic toxicity testing is required for any end-use product that will be introduced directly into an aquatic environment (40 CFR § 158.630 Terrestrial and aquatic non-target organisms data requirements table). The toxicity testing includes freshwater fish (850.1075) and invertebrates (850.1010) and marine/estuarine species (850.1025, 850.1035, 850.1045, 850.1055 and 850.1075). These data will decrease the risk uncertainties associated with the introduction of a surfactant into the aquatic environment.

Past Ecological Risk Assessment Summaries

An ecological risk assessment in support of the re-registration eligibility decision (RED) for imazapyr (both acid and salt formulations; PC Codes: 128821 and 128829) was finalized by EFED on September 30, 2005 (DP Barcode: D313607). The screening level risk assessment indicated risk to both listed and non-listed non-target terrestrial plants (monocots and dicots) and aquatic vascular plants from imazapyr use, based on the highest application rate from a variety of use patterns. Seedling emergence and vegetative vigor for both monocots and dicots would be impacted by exposure to both the imazapyr acid and the isopropylamine salt. The assessment indicated minimal risk of direct acute effects to fish and aquatic invertebrates and minimal risks to aquatic non-vascular plants at maximum application rates. In addition, there were no direct chronic risks to fish and invertebrates, although there was an uncertainty for estuarine/marine fish and invertebrates, since no toxicity data were available to observe the prolonged effects of imazapyr to these taxa. Likewise, direct acute and chronic risks to mammals and birds consuming food types containing imazapyr residues are not expected from the labeled uses of the herbicide. EFED currently does not quantify risks to terrestrial non-target insects; however, available data on honey bees indicate that the direct risk to terrestrial non-target insects was likely to be low. The assessment indicted indirect risk to all taxa from direct effects on plants (i.e. effects on habitat and/or primary productivity).

An assessment of risk to the listed California Red-Legged Frog (CRLF, *Rana aurora draytonii*) was completed on July 20, 2007. This assessment included aquatic uses; however, marine/estuarine species was not included in the assessment. That assessment indicated no expected direct effects on either the aquatic or terrestrial phase CRLF. There were also no

indirect effects expected for the CRLF through direct effects to either its terrestrial or aquatic food sources. The assessment determined that the CRLF may be adversely affected through direct effects on habitat and/or primary productivity (i.e., ecosystem structure and function for both the aquatic plant community and riparian vegetation). Critical habitat may also be adversely modified based on direct effects to aquatic vascular plants and terrestrial plants. The risks exceeded the level of concern (LOC) for non-listed non-target terrestrial plants (monocots and dicots) for all imazapyr uses. The risks to non-listed non-target aquatic vascular plants exceeded the LOC for aquatic, rangeland and forestry uses (aerial application) as well as rights-of-way (assuming 50% pervious surfaces). No effects were expected for aquatic non-vascular plants.

Finally, a SLN 24 (c) assessment was conducted in May, 2010. The request was to allow broadcast application of imazapyr (Arsenal PowerLine EPA Reg. No. 241-431) on grass pasture for control of cogongrass (*Imperata cylindrica*) in areas that may be grazed or cut for hay. The assessment indicated no expected risks for effects to aquatic and terrestrial animals from the proposed broadcast spray application of 0.75 lbs ae/A of imazapyr on pastures. Non-target terrestrial plants may be adversely affected from the proposed use. Off-site movement of imazapyr onto non-target terrestrial plants is associated with both runoff onto adjoining fields and spray drift deposition.

Environmental Fate Summary

Imazapyr is an anionic, organic acid that is non-volatile and is both persistent and mobile in soil. Upon direct application, or indirect release into water, photolysis is the only identified route of imazapyr degradation. Laboratory studies show imazapyr is stable to hydrolysis, aerobic and anaerobic soil degradation as well as aerobic and anaerobic aquatic metabolism. Field study observations are consistent with imazapyr’s intrinsic ability to persist in soils and move via runoff in surface water and leach to groundwater.

Ecotoxicity Summary

Ecotoxicity study endpoints on both imazapyr and its isopropylamine salt are summarized in **Table 1**. The EC₅₀/NOAEC values from the toxicity tests with the isopropylamine salt of imazapyr are expressed in acid equivalents (a.e.).

| Table 1. Toxicity Endpoints Used in Assessment of Risk in Acid Equivalents | | |
|---|--------------------------|--------------------|
| Organisms | Toxicity Endpoint | MRID |
| Aquatic Organisms | | |
| Acute Freshwater fish LC ₅₀ (mg ae/L) | >100 | 00131629 thru -631 |
| Acute Freshwater invertebrate EC ₅₀ (mg ae/L) | >100 | 00131632 |
| Acute Marine/estuarine fish LC ₅₀ (mg ae/L) | >184 | 41315801 |
| Acute Marine/estuarine invertebrate (mollusk) EC ₅₀ (mg ae/L) | >132 | 45119710 |
| Acute Marine/estuarine invertebrate (mysid) EC ₂₅ (mg ae/L) | >189 | 41315803 |
| Chronic Freshwater fish NOAEC (mg ae/L) | 43.1 | 41315804 |
| Chronic Freshwater invertebrate NOAEC (mg ae/L) | 97.1 | 41315805 |
| Aquatic nonvascular plants EC ₅₀ /NOAEC (mg ae/L) | 11.5/7.16 | 43889102 |

| Organisms | Toxicity Endpoint | MRID |
|---|-------------------|----------|
| Aquatic vascular plants EC ₅₀ /NOAEC (mg ae/L) | 0.018/0.011 | 43889102 |
| Terrestrial Organisms | | |
| Acute Avian (oral dose-based) LD ₅₀ (mg ae/kg-bw) | >2150 | 131633 |
| Acute Avian (dietary) LC ₅₀ (mg ae/kg-diet) | >5000 | 131635 |
| Acute Mammal (oral dose-based) LC ₅₀ (mg ae/kg-bw) | >5000 | 132030 |
| Chronic Avian (dietary) NOAEC (mg ae/kg-diet) | 1670 | 45119714 |
| Chronic Mammal (dietary) NOAEC (mg ae/kg-diet) | 10000 | 41039505 |
| Chronic Mammal (dose-based) NOAEL (mg ae/kg-bw/day) | 738 | 41039505 |
| Dicot Seedling Emergence (EC ₂₅)/(NOAEC/EC ₀₅) (lbs ae/A) | 0.0024/0.00017 | 40811801 |
| Dicot Vegetative Vigor (EC ₂₅)/(NOAEC/EC ₀₅) (lbs ae/A) | 0.0009/0.000064 | |
| Monocot Seedling Emergence (EC ₂₅)/(NOAEC/EC ₀₅) (lbs ae/A) | 0.0046/0.00099 | |
| Monocot Vegetative Vigor (EC ₂₅)/(NOAEC/EC ₀₅) (lbs ae/A) | 0.012/0.0039 | |

Aquatic Exposure Assessment

The aquatic exposure assessment was conducted using simple dilution in a standard farm pond (20E6 L). The EECs for direct application of imazapyr at 1.5 lbs ae/A are not expected to exceed 83.98 µg ae/L (**Table 2**).

| Surface Water Body | Estimated Environmental Concentration (µg ae/L) | | |
|--------------------|---|---------------------|---------------------|
| | Peak ¹ | 21-day ² | 60-day ² |
| Standard Pond | 83.98 | 83.98 | 83.98 |

1- (1.5 lbs ae/A*2.471 A/hectare*454E6 µg/lb)/20E6 liters

2- No degradation was assumed because imazapyr is persistent in aerobic soil metabolism studies (MRID 00131619) and there are no available aerobic aquatic metabolism data.

Aquatic Risk Assessment

The risk from direct aquatic application of imazapyr at 1.5 lbs ae/A exceeds the level of concern (LOC=1) for adverse effects to aquatic nonvascular plants (**Table 3**).

| Organisms | Toxicity Endpoint | EEC (mg/L) | RQ |
|--|-------------------|------------|--------------------------|
| Acute Freshwater fish LC ₅₀ (mg ae/L) | >100 | 0.083 | 0.001 |
| Acute Freshwater invertebrate EC ₅₀ (mg ae/L) | >100 | 0.083 | 0.001 |
| Acute Marine/estuarine fish LC ₅₀ (mg ae/L) | >184 | 0.083 | 0.000 |
| Acute Marine/estuarine invertebrate (mollusk) EC ₅₀ (mg ae/L) | >132 | 0.083 | 0.001 |
| Acute Marine/estuarine invertebrate (mysid) EC ₂₅ (mg ae/L) | >189 | 0.083 | 0.000 |
| Chronic Freshwater fish NOAEC (mg ae/L) | 43.1 | 0.083 | 0.002 |
| Chronic Freshwater invertebrate NOAEC (mg ae/L) | 97.1 | 0.083 | 0.001 |
| Aquatic nonvascular plants EC ₅₀ /NOAEC (mg ae/L) | 11.5/7.16 | 0.083 | 0.012 |
| Aquatic vascular plants EC ₅₀ /NOAEC (mg ae/L) | 0.018/0.011 | 0.083 | 7.545¹ |

¹**Bold** = exceeds the level of concern

Drinking Water Exposure Modeling Assessment

The previous drinking water assessment (DWA) for imazapyr was conducted on terrestrial (spot treatment on pasture) and aquatic uses (D275562, 2003). The DWA was based on an application rate of 1.5 lbs ae/A, which represents the maximum application rate for aquatic use sites (**Table 4**). These concentrations should be used in the drinking water exposure assessment because they represent the most conservative EDWCs.

| Table 4. Estimated Drinking Water Concentrations($\mu\text{g/L}$) for Imazapyr | | | | |
|--|----------------------------|-------------|-----------------------|-------------------------------|
| Use Pattern | Models- Use Pattern | Peak | Annual Average | 30-year Annual Average |
| Aquatic/Terrestrial@ 1.5 lbs ae/A (D275562, 2003) | Tier I FIRST | 137 | 81 | NA |
| | SCI-GROW | | 1700 | NA |