Effect Determination for Atrazine

Appendix E: Incident Database Information

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Appendix E
Incident Database Information

E.1 Information from the 2003 IRED Report (EPA, 2003a)

As discussed in Section 4.4, 109 atrazine incidents were listed in the Ecological Incident Information System (EIIS) files as of the writing of the 2003 IRED (EPA, 2003a): 4 cases are listed as highly probable, 40 as probable, 50 as possible, 13 as unlikely, and 2 as unrelated. The majority of the incidents (about 40 percent of the "probable" cases) are listed as effects on corn mostly from corn applications. A number of the crop losses are large, ranging from 50 to 100%; other incidents cited acres lost, ranging from 3 to 631 acres.

Forty incidents are considered "Probable," and four incidents are listed as "Highly Probable." The 4 incidents listed as "Highly Probable" include 3 home/lawn use incidents and 1 corn use incident. The corn use incident in March of 1984, reported mortality to 100 bass and 100 bream (SC: # B000163-001) resulting from a registered use of atrazine. The three home/lawn incidents were lawn applications which affected grass; two were concluded to be misuse/accidental (# I005579-001, I005132-001). The third home incident (# I001910) was a registered use which affected grass and non-target plants.

The forty "Probable" incidents include: 16 (40 %) cases affecting corn; 11 (27.5 %) affecting grass; 11 (27.5 %) fish kills; 1 bird kill case; and effects on ornamentals (2 cases), fruit trees (2 cases), berries (1), garden (1), and oats (1). In addition, runoff killed vegetation around an atrazine/cyanazine-treated field, and pond irrigation water killed greenhouse plants. Four "probable" incidents are classified as misuse (accidents). The misuse incidents include two cases from corn use (I005879-003: pears, raspberry and oats and I007371-013: grass and ornamentals) and two lawn misuse cases (I009445-031: grass and I009445-029: bluegrass). Analysis of 14 corn incidents occurring in 1999 indicates that in all cases, formulations of Bicep II (a mixture of atrazine and metolachlor) were used. The reported applications rates ranged from 1.4 quarts of atrazine /1.4 quarts of metolachlor to 2.6/2.6 quarts/A/M. Effects included distorted and cupping leaves, failure to unfurl, uneven height, chlorotic yellowing and necrotic leaves, and plant death. Approximately 55% of 600 acres of corn was affected. There were 11 grass incidents resulting from home/lawn uses; three of these cases are considered to misuse (accidental).

Many fish species have been indicated in atrazine incident reports including bluegills, largemouth bass, catfish, quillback carpsucker, carp, redhorse, shad, bream, garfish, perch, minnows and crappie. In some incidents, very large numbers of fish were killed. Among the fish kill incidents classified as possible to highly probable, the following large fish kills and the state have been reported: 1,000 bluegill and 1,000 largemouth bass (DE: # I000116-002; May 16, 1991); 300 largemouth bass and 300 bluegill (DE: # B0000-300-28; May 6, 1991); 600 catfish (IL: # I001081-001; April 30 to May 6, 1994); 1,000 carpsucker, 1,000 carp and 1,000 redhorse suckers (IL: # I005002-006; July 1, 1991); 100 bass and 100 bream (SC: # B000163-001; March 31, 1994); 2,000 perch (WA: #I010274-

002; May 10, 2000); and a number of incidents cite “All” killed for bass, bluegill, catfish, crappie, etc. The frequency and magnitude of these fish kills do not appear to be the result of direct toxic effects due to atrazine alone.

Given the low toxicity of atrazine to fish, the reason for the frequency of fish kill incidents is uncertain. About 60% of the reported fish kills listed under atrazine in the incident record occur during the spring when atrazine is applied, soils are saturated and heavy rainfall is frequent. Heavy runoff may carry atrazine, other pesticides and organic loads into surface waters. The high volume and wide-spread use of atrazine increases the probability of co-occurrence of fish kills with atrazine applications. There are other scenarios which may explain atrazine-induced fish kills as well as causes unrelated to atrazine use.

Two plausible scenarios exist in which atrazine applications may be responsible for the fish kills. First, atrazine concentrations in surface waters from runoff and/or spray drift may be much higher in shallow water adjacent to treated fields than estimated by models or found in monitoring studies. Second, atrazine in surface water may kill aquatic plants and the decay of dead plants may lower dissolved oxygen to levels too low for fish survival.

E.2 Uncertainties Related to the Use of Incident Information from the Ecological Incident Information System

Incident data are used in risk assessments to provide evidence that the risk predictions from the screening level assessment are supported by actual effects in the field. Incident reports submitted to EPA since approximately 1994 have been tracked by assignment of incident numbers in an Incident Data System (IDS), microfiched, and then entered to a second database, the Ecological Incident Information System (EIIS). Additionally, there is an on-going effort to enter information to EIIS on incident reports received prior to establishment of current databases. Incident reports are not received in a consistent format (*e.g.*, states and various labs usually have their own formats), may involve multiple incidents involving multiple chemicals in one report, and may report on only part of a given incident investigation (*e.g.*, residues).

Incidents entered into EIIS are categorized into one of several certainty levels regarding the likelihood that a particular pesticide is associated with the incident: highly probable, probable, possible, unlikely, or unrelated. In brief, “highly probable” incidents usually require carcass residues and/or clear circumstances regarding the exposure. “Probable” incidents include those where residues were not available and/or circumstances were less clear than for “highly probable.” “Possible” incidents include those where multiple chemicals may have been involved and it is not clear what the contribution was of a given chemical. The “unlikely” category is used, for example, where a given chemical is practically nontoxic to the category of organism killed and/or the chemical was tested for but not detected in samples. “Unrelated” incidents are those that have been confirmed to be not pesticide-related.

Incidents entered into the EIIS are also categorized as to use/misuse. Unless specifically confirmed by a state or federal agency to be misuse, or there was very clear misuse such as intentional baiting to kill wildlife, incidents are not typically considered misuse.

The number of documented kills in EIIS is believed to be a small fraction of total mortality caused by pesticides. Mortality incidents must be seen, reported, investigated, and have investigation reports submitted to EPA to have the potential for entry into the database. Incidents often are not seen, due to scavenger removal of carcasses, decay in the field, or simply because carcasses may be hard to see on many sites and/or few people are systematically looking. Poisoned animals may also move off-site to less conspicuous areas before dying. Incidents may not get reported to appropriate authorities capable of investigating the incident for a variety of reasons including the finder may not know of the importance of reporting incidents, may not know who to call, may not feel they have the time or desire to call, or may hesitate to call because of their own involvement in the kill. Incidents reported may not get investigated if resources are limited or may not get investigated thoroughly, with residue analyses, for example. Also, if kills are not reported and investigated promptly, there will be little chance of documenting the cause, since tissues and residues may deteriorate quickly. Reports of investigated incidents often do not get submitted to EPA, since reporting by states is voluntary.

Furthermore, the database relies heavily on registrant-submitted incident reports, and registrants are currently only required to submit detailed information on 'major' ecological incidents, while 'minor' incidents are reported aggregately.

Based on the 40 CFR (§159.184 Toxic or adverse effect incident reports), an ecological incident is considered 'major' if any of the following criteria are met:

> *Fish or wildlife:*
>
> (A) Involves any incident caused by a pesticide currently in Formal Review for ecological concerns.
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> (B) Fish: Affected 1,000 or more individuals of a schooling species or 50 or more individuals of a non-schooling species.
>
> (C) Birds: Affected 200 or more individuals of a flocking species, or 50 or more individuals of a songbird species, or 5 or more individuals of a predatory species.
>
> (D) Mammals, reptiles, amphibians: Affected 50 or more individuals of a relatively common or herding species or 5 or more individuals of a rare or solitary species.
>
> (E) Involves effects to, or illegal pesticide treatment (misuse) of a substantial tract of habitat (greater than or equal to 10 acres, terrestrial or aquatic).
>
> *Plants*:

(A) The effect is alleged to have occurred on more than 45 percent of the acreage exposed to the pesticide.

All other ecological incidents are considered ‘minor’ and only need to be aggregately reported. ‘Minor’ incidents reported by the registrants are not included in the EIIS database. Therefore, for example, an incident could affect 900 fish, 150 birds, 45 mammals, and 40% of an exposed crop and not be included in the EIIS database [unless is it reported by a non-registrant (*e.g.*, an incident submitted by a state agency – which are not systematically collected)]. Therefore, because the number of documented kills in EIIS is believed to be a small fraction of total mortality caused by pesticides, absence of reports does not necessarily provide evidence of an absence of incidents.