US Environmental Protection Agency
Office of Pesticide Programs

Appendix E:
Additional Incident Database Information

August 31, 2007

Appendix E
Additional Incident Database Information

E.1 Discussion of Aquatic Incidences Associated with Atrazine

As discussed in Section 4.4, a number of incidents have been reported in which atrazine has been associated with some type of environmental effect. Incidences involving aquatic animals assigned a certainty index other than "unrelated" or "unlikely" related to atrazine in EIIS were re-evaluated for correlation to atrazine exposure. The aquatic incidences were divided into three categories:

1. Aquatic incidences in which atrazine concentrations were confirmed to be sufficient to either cause or contribute to the incident, including directly via toxic effects to aquatic organisms or indirectly via effects to aquatic plants, resulting in depleted oxygen levels;
2. Aquatic incidences in which insufficient information is available to conclude whether atrazine may have been a contributing factor – these may include incidents where there was a correlation between atrazine use and a fish kill, but the presence of atrazine in the affected water body was not confirmed; and
3. Aquatic incidences in which causes other than atrazine exposure are more plausible (e.g., presence of substance other than atrazine confirmed at toxic levels).

The presence of atrazine at levels thought to be sufficient to cause either direct or indirect effects was confirmed in 3 (9%) of the 33 aquatic incidents evaluated. Atrazine use was also correlated with 11 (33%) additional aquatic incidents where its presence in the affected water was not confirmed, but the timing of atrazine application was correlated with the incident. Therefore, a causal relationship between atrazine use and the incident could not be established; however, atrazine may or may not have been a contributing factor. The remaining 19 incidents (58%) were likely caused by some factor other than atrazine. Other causes primarily included the presence of other pesticides at levels known to be toxic to affected animals. Aquatic incidences evaluated for this assessment are summarized below in Tables E-1 to E-3.

Table E-1. Aquatic Incidences in which atrazine concentrations were confirmed to be sufficient to either cause or contribute to the incident.

Incident No.	Date	Species	Certainty Discussion	Certainty Index Assigned to Incident in EIIS	Water body description
B0000-502-07	1984	Bass, Bream	Atrazine and metolachlor were applied adjacent to pond prior to a 4 inch rainfall event. Concentrations of atrazine and metolachlor in the pond were 28 ppb and 20 ppb, respectively, at an unspecified time after the	Probable	Pond adjacent to treated field.

			incident.		
I003780-001	1996	Fish	Atrazine was applied one day prior to run-off event (unspecified magnitude of rainfall). Atrazine was found at 160 ppb and cyanazine was found at 1180 ppb.	Possible	Pond, uncharacterized size and distance from field.
I007948-012	1998	Bullhead catfish	Atrazine was applied prior to a 1 ½ inch rainfall event. Concentrations in the pond were 223 ppb eight days after the incident, which would be sufficient to affect aquatic plants and oxygen levels in the pond. Metolachlor (corn application) was also found at 45 ppb.	Possible	¼ acre pond, 50 feet from treated field

Table E-2. Aquatic incidences in which insufficient information is available to conclude whether or not atrazine was likely a contributing factor.

Incident No.	Date	Species	Certainty Discussion	Certainty Index Assigned to Incident in EIIS	Environment
I010274-002	2000	Perch	No environmental sampling was reported. Dimethenamid, atrazine, and dicamba were applied to a nearby field.	Possible	Pond, unreported size or vicinity to treated area.
I010599-01	2000	Fish, Crawfish	Incident was from an accidental release resulting in runoff of numerous pesticides from storage in water used to extinguish a residential fire. "A number" of pesticides were confirmed to be present in the affected pond, but only results for atrazine (10.5 ppb) and diazinon (7 ppb) were included in the report. Therefore, causal relationship between atrazine and the fish kill is uncertain.	Highly probable	Pond, unreported size and distance from treated site.
I007242-001	1998	Catfish	No environmental or fish tissue residue analysis was reported. Cause of fish kill is uncertain.	Possible	Pond adjacent to treated field.
I007385-001	1998	Fish	Atrazine and acetochlor were applied 4 days prior to the incident. No soil or water analysis was performed. Weather data were not reported.	Possible	Pond, unreported size and distance from treated site.
I007372-002	1997	Bluegill, Bass	Metoloachlor and Atrazine were applied prior to heavy rains. Water concentrations of either atrazine or metolachlor were not reported.	Probable	Pond, unreported size or vicinity to treated area.
I004697-082	1993	Fish	Presence of atrazine in the water was not confirmed. No basis for the correlation between atrazine use and the fish kill was provided. No analytical data were reported.	Possible	Pond, unreported size or vicinity to treated area.
I005895-074	1992	Fish	Information was a 6(a)(2) submission. It was alleged that a run-off of atrazine/metolachlor from a nearby field resulted in fish kill. No water, soil, or fish tissue residue analysis was conducted.	Probable	Pond, unreported size or vicinity to treated area.
B0000-300-28	1991	Bluegill, bass	No environmental or tissue residue analysis was performed. Runoff of fertilizer, which was also applied to the field, may have also caused or contributed to the fish kill.	Possible	Pond, unreported size or vicinity to treated area.
I000598-015	1990	Catfish,	Atrazine, tridaphane, simazine, and	Possible	Pond,

Table E-2. Aquatic incidences in which insufficient information is available to conclude whether or not atrazine was likely a contributing factor.

Incident No.	Date	Species	Certainty Discussion	Certainty Index Assigned to Incident in EIIS	Environment
		bluegill	atrazine were applied prior to a run-off event. A fish kill was observed 4 days later. Atrazine was detected at the location of the incident at 7 ppb. Cyanazine was also detected at 21 ppb. Tridiphane and simazine were not included in the water analysis. Therefore, the presence of or levels of those pesticides could not be determined.		unreported size and vicinity to treated field.
I004697-084	1989	Fish	No environmental residue or fish residue analysis was performed. Metolochlor and atrazine were implicated in the incident. Application rate or weather conditions were not reported. Timing of pesticide application relative to the fish kill was not reported; use of other pesticides or fertilizers was not reported.	Probable	Pond, unreported size or vicinity to treated area.
B000163-001	1984	Bass, Bream	Fish kill occurred after a 4 inch rainfall event over a 4-day period. Adjacent fields were treated with terbufos, atrazine, and metolachlor. "Bicep" (atrazine and metolachlor) was detected in the water at unreported levels. Terbufos was not detected; however, it hydrolyzes rapidly, and the proximity of analytical measurement of concentration to the incident was not reported. Terbufos is very highly toxic to fish. Without information on atrazine levels in the affected pond, it is not possible to determine if atrazine was likely a cause of the associated fish kill.	Highly probable	Pond adjacent to treated field

Table E-3. Aquatic incidences in which causes other than atrazine exposures are more likely or that were associated with intentional dumping.

Incident No.	Date	Species	Certainty Discussion	Certainty Index Assigned to Incident in EIIS	Environment
B000150-003	1970	Bass, bluegill	The report indicated that "it is unlikely that atrazine significantly contributed to the observed fish mortality". The report attributed the fish kill to phorate, which was found in the pond at 12 ppb 37 days after the incident.	Probable	Pond, unreported size or vicinity to treated area.
I000636-032	1981	Bluegill, crappie	Terbufos, butylate, and atrazine were included in the incident. Both terbufos and butylate are considerably more toxic to fish than atrazine. Neither environmental nor tissue residue levels were estimated.	Probable	1 acre pond
I000116-002	1991	Bluegill, Bass	Fish and Wildlife investigators suggested that fish kill may have been caused by algal bloom from fertilizer runoff. Atrazine, metolachlor, and fertilizer were implicated in the incident.	Probable	Pond adjacent to treated field.
I001081-001	1994	Catfish	The report indicated that it is "unlikely" that atrazine played a role in the observed fish mortality. Catfish mortality was attributed to tefluthrin.	Probable	Pond, 2.5 acres, 1 to 20 feet deep.
I001081-002	1994	Bluegill, Bass	No residue analysis; the report indicated that tefluthrin, not atrazine, was likely responsible for the fish kill. "Probable" designation appears to be based on effects to grass, not fish. No residue analysis in the pond was conducted.	Probable	Pond, 1 acre, 1 to 15 feet deep, 10 – 30 feet from treated field
I003826-006	1995	Fish	Testing of soil and water did not indicate the presence of atrazine.	Probable	Pond, unreported size or vicinity to treated area.
I000910-001	1992	Bream, Garfish, catfish, minnow, perch, and sunfish	Chlorpyrifos was applied at 3 lbs a.i./Acre 4 days before the incident. Atrazine was applied approximately 1 month prior the incident. Other pesticides implicated in the incident included carbaryl, MSMA, 2,4-D, and Dicamba.	Possible	Canal

Table E-3. Aquatic incidences in which causes other than atrazine exposures are more likely or that were associated with intentional dumping.

Incident No.	Date	Species	Certainty Discussion	Certainty Index Assigned to Incident in EIIS	Environment
I016690-001	2005	Fish, catfish, snakes	Anonymous caller alleged that 4 to 5 gallons of a product containing atrazine was dumped into a ½ acre pond; however, no reason was given as to why atrazine was suspected of being dumped. Water or soil was not analyzed for presence of atrazine.	Possible	Pond, ½ acre
B0000-501-44	1993	Fish	AZM was detected at 5 ppb and methyl parathion was present at 10,000 ppb.	Possible	Stream/River
B0000-501-45	1993	Fish	AZM was detected at 7 ppb.	Possible	Pond
I005002-006	1991	Quillback carpsucker, carp, redhorse.	Atrazine was detected at 0.83 ppb, which is lower than levels thought to be an environmental concern. Presence of other pesticides could not be ruled out, but were not confirmed either.	Possible	River
I007440-001	1998	Frogs, tadpoles, fish, crayfish, turtles	Pond was treated with copper sulfate 3 days prior to the incident. Tefluthrin, metolachlor, and atrazine were applied to nearby corn fields approximately 3 weeks prior to the incident.	Possible	Pond
I005395-001	1997	Fish	Fish kill was attributed to applications of tefluthrin that did not follow label instructions. Environmental or fish tissue residue analysis were not conducted.	Possible	Pond, 10 feet from treated field
I000038-001	1992	Catfish	Fish kill was attributed to applications of tefluthrin that did not follow label instructions although cyromazine and atrazine were also applied to nearby corn fields. Environmental or fish tissue residue analysis were not conducted.	Possible	Pond, 200 yards from treated field.
B000175-001	1992	Fish, 1 to 2 inches long	Several pesticides including paraquat, metolachlor, atrazine, and permethrin were implicated in the incident. However, the likely cause was reported to be run-off of	Possible	Pond, 75 yards from the treated field.

Table E-3. Aquatic incidences in which causes other than atrazine exposures are more likely or that were associated with intentional dumping.

Incident No.	Date	Species	Certainty Discussion	Certainty Index Assigned to Incident in EIIS	Environment
			fertilizer (sufficient evidence of this conclusion was not included in the report). No environmental or fish tissue residues were reported.		
I003826-017	1994	Fish	Atrazine, along with 6 other pesticides, were analyzed for and not detected in the pond. Other pesticides implicated in the incident included dicamba, 2,4-D, MCPP, diazinon, diclofop-methyl, and cyromazine.	Possible	Pond, unreported size or vicinity to treated area.
B000168-012	1990	Fish and a single black snake	Terbufos and ammonia were implicated as the likely cause of the fish kill. Ammonia, atrazine, metolachlor, and alachlor were detected in the water at unspecified concentrations. No fish tissue analysis was reported.	Possible	4 – 5 acre pond, 4 to 5 feet deep, 1320 feet from treated field (snake was found 755 feet from the treated field).
I005002-008	1991	Bass, bluegill	Atrazine was detected at 0.92 ppb, cyromazine was found at 2.6 ppb, and metolachlor was found at 0.82 ppb 10 days after the run-off event. All pesticides were accidentally misused (no details reported).	Possible	Pond, 30 feet from treated field.
I007866-001	1998	Crustacean	No specific event was associated with this incident report, only that trace amounts of atrazine have been found in groundwater of the cave-dwelling amphipod.	Possible	Not applicable

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. For example, incident I007948-012, which was associated with concentrations of atrazine >200 ppb was a small, ¼ acre pond. All other factors being equal, estimated concentrations in a ¼ acre pond would be expected to be 4-times higher than atrazine concentrations in the standard 1 acre ecological pond used for estimating pesticide concentrations. 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. Given the available LC50s for fish (2000 ug/L or higher, see Appendix A) are

considerably higher than measured concentrations associated with the aquatic animal incidences (up to 223 ug/L), if atrazine was associated with the fish kills, the more plausible cause would be from effects on oxygen levels by reducing aquatic plant communities.

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.

The National Pesticide Information Center (NPIC) prepares summaries of information provided by individuals who have contacted NPIC for information or to report a pesticide incident. None of this information has been verified or substantiated by independent investigations of NPIC staff, laboratory analysis, or any other means. Thus, if a person alleges/reports a pesticide incident, it will likely be recorded as an incident by NPIC.

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.
>
> (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.