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

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OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

July 31, 1996

Memorandum

RE: Addendum to EFED's RED Chapter for Fenthion, Based on Incident Reports

FROM: Mary Powell
Science Analysis and Coordination Staff
Environmental Fate and Effects Division

THRU: Kathy Monk, Acting Chief
Science Analysis and Coordination Staff
Environmental Fate and Effects Division

TO: Kathryn Davis and Bill Wooge
Special Review and Reregistration Division

The attached addendum to EFED's RED chapter for fenthion will clarify and expand our discussion of wildlife incidents attributable to the use of fenthion.

A main concern with this organophosphate compound is secondary toxicity from the bird-perch use. For the mosquito adulticide use, our concern is direct avian mortality due to ingestion, inhalation and dermal contact. The risk from use of the bird perches may be reduced, but not eliminated, and it seems likely that risk to nontarget birds, especially raptors and scavengers, will exist as long as the product is registered.

There are a substantial number of incidents associated with the use of fenthion that clearly document the risk it poses to non-target wildlife. The U.S. Fish and Wildlife Service is concerned about incidents resulting from fenthion use because some of the affected and killed species are endangered or threatened.

Attachments

cc: K. Monk, W. Erickson, H. Craven, C. Brassard, P. Mastradone, L. Parsons

Addendum to EFED's RED Chapter for Fenthion:
Additional Information on Incident Reports

Background

Incident reports documenting kills of aquatic or terrestrial non-target species and observations of adverse effects are useful information in evaluation of the risk of certain pesticides to non-target species. To date, there is no systematic or reliable mechanism for accurate monitoring and reporting of incidents to EPA. The Agency is attempting to improve the reporting system through reports from state and other government agencies. While a significant increase in the number of incidents has been obtained through this effort, reporting varies among state agencies.

Before a pesticide incident can be reported or investigated, sick or dead animals must be found. Incidents are more apt to be observed on use patterns such as home lawns rather than agricultural settings away from human activity. Movement and behavior of affected birds can also affect sightings. Birds that are severely affected by a pesticide may be less active, more secretive, and less likely to be collected. Slow-acting pesticides may result in birds moving from the treatment site before dying or being affected.

Similar concerns exist for aquatic incidents. Before a pesticide incident can be reported or investigated, sick or dead fish must first be found. In the absence of monitoring aquatic environments following pesticide applications, kills are not likely to be noticed in agricultural settings away from human activity. Further, if the impact is to invertebrates or juvenile life stages of fish such as fry, the incident may not be noticed by casual observers, or even by experienced biologists, unless systematic samples are taken.

With either terrestrial or aquatic incidents, even if the incident is associated with pesticide use, the observer must know where to report the incident and get an appropriate response from the investigator.

Based on these limitations, the Agency believes that even one incident report is likely to represent a larger impact than is actually observed and reported. The incident reports are incorporated as weight of the evidence in the confirmation of environmental risk to nontarget species.

Criteria in selecting the incidents for this review of fenthion follow:

Use Categories: Rid-A-Bird, Livestock, Mosquito vs. Unknown or Not Reported

The incidents were categorized according to the various uses (Rid-A-Bird, Livestock, and Mosquito Control) when there was enough circumstantial evidence to verify the use of fenthion. The incident was placed in the unknown or not reported category when there was not enough information provided to confirm route of exposure. However, once this information is reviewed by various state and federal agencies, both the use pattern and confirmatory data probably will be available.

Incidents in this summary include only nontarget species; in other words, when there were reports of starling kills, as there were several in New York, these were considered target species and were not included.

Incidents categorized as "Suspected" are field kills where adverse effects have been reported, but according to the data provided, confirmation is unlikely. This usually results from a laboratory report showing that they could not confirm fenthion poisoning.

Rid-A-Bird Perches

On April 18, 1996, the Illinois Department of Natural Resources reported that a screech owl had been found dead as a result of fenthion toxicosis. The owl had been collected on March 12, 1996 by a pest control firm. The use of fenthion perches had been initiated in January 1996 to control starlings at an industrial site. Residues of 1.69 ppm were found in the gastrointestinal tract (IL Dept. of Natural Resources April 18, 1996).

On January 16, 1996, it was reported that secondary poisonings occurred to hawks feeding on starlings exposed to fenthion via the Rid-A-Bird Perch 1100 Solution in a paper mill in Longview, Washington. Though no carcasses had been found by the Washington Dept. of Agriculture, according to the report, 2 had been confirmed by US Fish and Wildlife Service. It was later reported that one sharp-shinned hawk, one red-tailed hawk and one unidentified owl were found dead. There was no indication of misuse. According to personal communications, 250 perches were used for 3-4 days at a papermill. As a result, 1000 starlings were found dead (I003651-001, Washington Dept. of Agriculture, April 26, 1996).

On December 26 and 27, 1995, it was reported that fenthion in a Rid-A-Bird Perch 1100 Solution had been used in the town of Amenia, Dutchess County, New York. Although the product was not registered in New York, it was purchased via mail order. It appears the starlings had been picked up and added to a manure spreader at the time of spreading onto the fields. As a result, there was at least one dead adult red-tailed hawk and 3 crows, and one debilitated red-tailed hawk. Residues in the crow ingesta were measured from 37.8 ppm to 54.6 ppm, and the brain cholinesterase was measured to be 1.07 to 1.25 UM/G/MIN. Residues in the red-tailed hawk were measured at 13.2 ppm, with a brain cholinesterase value of 1.68 UM/G/MIN. Residues were measured on the food source, the starlings' feet, at 479.3 ppm. The registration of this product had been canceled since 1991 in New York (I003078-001 and I003165-001, New York Department of Environmental Conservation, Division of Fish and Wildlife, January 10, 1996, January 26, 1996, January 11, 1996). Laboratory Report dated January 5, 1996, State of Illinois Department of Agriculture.

Five red-tailed hawks were documented to have died from fenthion poisoning toxicosis in association with Rid-A-Bird perch use in Arkansas City, Kansas, in early 1994. Three birds were found dead on 2/16/94 in Arkansas City and two were collected on the

same date in Kay County, Oklahoma, just over the border. One screech owl was also found dead on 2/28/94 from confirmed fenthion toxicosis. Brain cholinesterase inhibition was greater than 50% in all five birds, indicating the birds were exposed to a lethal dose of cholinesterase-inhibiting compound (USDI, National Biological Service, February 15, 1996).

On February 5, 1992, a dead peregrine falcon was collected from Langley Air Force Base, VA, as a result of exposure to fenthion. Stomach residues were measured at 0.76 ppm. Brain cholinesterase levels were inhibited by 76%. Rid-A-Bird Perches were installed in the airport hangers to control pigeons, which had been previously controlled via netting (USDI, USFWS, 11/20/92 and 9/15/92).

From December 1991 to March 1992, 3 Cooper's hawks, 3 hawks, and 6 owl species were found dead as a result of fenthion used in perches to control pest birds in a refinery plant in Illinois (Erickson, 1996).

A short-eared owl was found dead and collected on January 31, 1989 in association with Rid-A-Bird perch use in Longview, Washington. Brain ChE was depressed greater than 50% and fenthion was identified in analysis of GI contents (USDI, National Biological Service, February 15, 1996).

In January 1989 it was reported that a Cooper's Hawk died 12 hours after ingesting a starling near Girard, Illinois. The diagnosis was fenthion poisoning (I001595-001, Keltsch-Richter, 1989).

The Iowa Consumer Protection Division reported an incident that occurred in the fall of 1989 with the use of Rid-A-Bird Perches. The report indicated that the perches had killed all of the barn swallows and at least one barred owl at one location in Quaker, Ohio (Consumer Protection Division, January 13, 1990).

The Illinois Department of Agriculture reported another incident occurring in Boone Co., Iowa on February 19, 1988. One Eastern screech owl was found and released. The owl had landed on Rid-A-Bird perches used for house sparrow control and was affected (I000786-002, IL Dept. of Conservation, December 9, 1993).

The Illinois Department of Conservation reported an incident where a Snowy Owl was found dead on March 8, 1988 and a Cooper's Hawk was turned in on April 13, 1988 as a result of the use of fenthion in the vicinity of a refinery in Robinson, Illinois to control nuisance birds. Over 300 perches were treated with Baytex. The Snowy Owl had residues of 2.15 ppm Baytex in the gizzard lining, and 34.0 ppm on the feet. The owl had been feeding on a starling with residues of 282 ppm Baytex on the feet. Secondary exposure is likely. The Cooper's Hawk was analyzed and 15.35 ppm of Baytex was detected in the gizzard contents. For both birds, low levels of organochlorines also were detected, but according to the National Wildlife Health Center (NWHC), these levels were not likely to have been the immediate cause of death. (IL Dept of Conservation, September 2, 1988).

A summary was provided showing that on December 6, 1988 one barred owl and one kestrel were found dead, and one screech owl was found ill in the area where perches had been charged with fenthion at the Marathon Oil Refinery, Robinson, Illinois (I001595-001, Keltsch-Richter, 1989).

In January 1987, Rid-A-Bird Perches were used to control starlings at an oil company tank farm in Illinois. One sharp-shinned hawk and one Red-tailed hawk were found dead; other hawks were poisoned but were treated and recovered; dead starlings apparently were not collected in compliance with label instructions (Erickson, 1996).

In January 1986, 665 perches were used to control starlings at a power plant in Illinois. As a result, 2 great horned owls and 1 bald eagle were found dead. A red-tailed hawk was rehabilitated and released (Erickson, 1996).

In 1985, 5-6 owls, 1 red-tailed hawk, and 1 sharp-shinned hawk were found dead. Approximately 11-12 other raptors were debilitated, some of which were treated and released (Erickson, 1996).

Livestock Use

The Illinois Department of Agriculture reported an incident occurring in Bellevue, IA from 3/20/84 - 4/3/84. Five bald eagles were found dead from exposure to dead pigs treated with fenthion. Residues were not indicated, specimens had been sent to the National Wildlife Health Center, Madison, WI for necropsy and residue follow-up (I000786-001, IL Dept. of Conservation December 9, 1993).

During the winters of 1978, 1979, and 1980, magpies were collected from feed lots where they were found dead or sick after fenthion had been applied to cattle. Residue analysis showed levels of fenthion ranging from 7.29 to 483 mg/kg. Mortality occurred on several farms (Hanson and Howell, 1981).

Mosquito Control

The State of California Department of Fish and Game reported that on October 20, 1988, 26 American Goldfinches died possibly as the result of exposure to fenthion being applied to catch basins for mosquito control in Stanislaus County, CA. Thirteen were sampled for residues of fenthion. Fenthion residue levels were detected at 2.2 ppm in the gizzard (CA Dept. of Fish and Game, December 6, 1988, p. 1193).

The State of California, Department of Fish and Game, Pesticide Investigations Unit, reported approximately 20 birds, including California gulls, Forster's terns, a black-necked stilt, a green-backed heron, mallards, red-winged and Brewer's blackbirds died on July 25, 1988, from exposure to fenthion in San Joaquin County, CA used for midge control in sewage oxidation ponds. Fenthion was detected in water samples at 32, 77, and 120 ppb.

Fenthion was detected on the feathers of four birds examined at 4.1, 22, 260, and 12 ppm. Brain cholinesterase depression was also reported with values ranging from 0.676 to 2.12 um/g/min (CA Fish and Game, Memorandum February 7, 1989, p. 1174).

The State of California, Department of Fish and Game, Pesticide Investigations Unit, reported eight egrets (2 great and 6 snowy) were recovered on April 4, 1979 from an active dredge spoil site and adjacent slough area at Mare Island Naval Base, Solano County, CA. Baytex was applied on April 2, 1979 for mosquito control at 0.1 lb per acre. Residue analysis of the egret stomach content showed Baytex at a level of 93 ppm. Three days later, water samples were taken. Baytex was not detected in the water from the dredge pond, but was found at 16 ppb in water from the slough. According to the report, there was no indication that the pesticide was misused by the mosquito abatement staff (CA Job Progress Report, July 1, 1978- June 30, 1979, Pesticide Investigations).

Field Monitoring Study for Mosquito Control

One study investigated fenthion's effects on birds as the result of aerial application with ULV equipment, at 47 grams of a.i./ha. The following three assessment methods were implemented to measure the impacts of fenthion on wildlife: 1) The study site was searched for dead bodies; 2) ChE activity was measured in the adult birds to evaluate exposure; 3) systematic bird counts were done at 1- to 2-day intervals for 21 days before and after treatment (population census). After treatment, 99 birds and 15 mammals were found sick or dead. The greatest reduction in ChE activity was measured 2 days postspray, with significant effects still measured 15 days postspray, with ChE activity averaging about 15% of normal. Bird populations declined most where mortality was the heaviest. According to the study authors, fenthion sprayed for mosquito control threatened the lives of many birds inhabiting treated meadows (DeWeese, L.R, 1983).

In 1979, for another study, wildlife mortality was again observed after fenthion application (52 grams of a.i. in 1 liter of water or diesel oil per ha) for mosquito control. After treatment, 90 sick or dead animals (mostly birds) were found (DeWeese, L.R. 1983).

Another study had been conducted applying Bayer 29493 (formulation not indicated) to four plots along Little Creek, Delaware. Application rates varied from 0.05 to 0.10 lb/A. Mortality was observed to waterfowl (black duck) at application rates as low as 0.05 lb/A. The Fish and Wildlife Service predicted fenthion residues in water to be 6 ppb. The mechanism by which the birds were killed was unresolved. It was speculated that exposure could have occurred via drinking water. Eighteen birds were adversely affected: 12 were found dead and 6 were found sick (unable to fly). Various aquatic species also were adversely affected (dead, unable to move, mucous secretions, etc.) (Springer, P.F. 1962).

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Unknown or Not Reported Routes of Exposure

On February 10, 1994, a red tailed hawk was recovered from beneath a tree adjacent to a hayfield within 5 miles of Dixon, CA. The results of washing the bird's feet revealed levels of fenthion of 0.12 ug/g. The raptor was released after rehabilitation (I003351-004, CA Department of Fish and Game, 1996, and report dated 1994).

The Illinois Department of Conservation reported that, during February and March 1992, 14 red-tailed hawks (of which 11 were found dead) and one great horned owl were adversely affected in Quad Cities, IA. The report was from a falconer in Davenport, Iowa. The great horned owl and nine of the 11 moribund hawks died and were analyzed for fenthion. It was confirmed that 2 hawks had died from exposure to fenthion. An additional 3 hawks had been treated and released, and two additional were submitted to IL Dept. of Agriculture for analysis. Results indicated 0.51401 ppm (wet weight) fenthion was detected in the hawk suffering from 83% enzyme depression, and 12.96112 ppm (wet weight) in the hawk with 96% enzyme depression. The level of detection was reported to be 0.5 ppm. No other organophosphates were detected. Specimens had been sent to National Wildlife Health Center, Madison, WI for necropsy and residue follow-up (I000786-004, IL Department of Conservation December 9, 1993, and USDI, FWS, November 13, 1992).

On January 24, 1991, a red-tailed hawk died from fenthion exposure. Residues of fenthion were measured at 1.48 ppm. Fensulfathion was measured to be 0.18 ppm. The bird had been found debilitated near a cornfield near Manheim, PA (Lancaster County Wildlife Center, 2/16/91, Laboratories of Veterinary Diagnostic Medicine, 2/22/91).

The Illinois Department of Agriculture reported another incident occurring in Palo Alto County, IA, on March 2, 1990. One bald eagle was found dead. Residues were not indicated. The specimen was sent to the National Wildlife Health Center, Madison, WI for necropsy and residue follow-up (I000786-003, IL Dept. of Conservation December 9, 1993).

Fenthion was indicated in 8 confirmed bald eagle incidents over Illinois, Iowa, Kansas and Oregon from 1984 to 1987. The birds were sent to National Wildlife Research Center, Madison, Wisconsin for necropsy and confirmation. The route of exposure and case history have not been submitted for review (US Fish and Wildlife Service, Memorandum June 6, 1991).

The US Fish and Wildlife Service reported that 225 mallard ducks and 25 wigeon were found dead from fenthion in Lewiston, Idaho on February 1, 1982. Circumstances and residue data are not available (US Fish and Wildlife Service, November 1, 1988).

Nebraska Game and Parks Commission reported a fish kill from the use of Baytex and 2,4D applied to an adjacent field. Shortly after application, heavy rains fell. Approximately 25, 4-14" largemouth bass, approximately 40, 4-8" bluegill, and one turtle were found dead on

May 23, 1986 in Wheeler County, Nebraska (I000598-006, NE Game and Parks Commission, Aquatic Wildlife Division, May 23, 1986).

The State of California, Pesticide Investigations, reported that between July 1, 1975 and June 30, 1976, eight cedar waxwings were found dead as a result of fenthion use on pyracantha. Fenthion residues of 156 ppm were detected in the gizzard. Residues in one pyracantha berry sample was reported to be 11.5 ppm. Misuse was implicated (CA Progress Report, FW-1-R-13, July 1, 1975-June 30, 1976 - Survey and Inventory).

The U.S. Department of Interior reported that 6,000 fish, of which 94% were non-game and 6% were game species, were killed as a result of Baytex use on Moanalua Stream, Honolulu, Hawaii on March 6 and 7, 1971.

Suspected

On January 22, 1987, one sharp-shinned hawk, one red-tailed hawk and 11 starlings were found dead, perhaps as a result of fenthion-impregnated perches used to control starlings in Crawford County, IL. Cholinesterase levels of 3.48(2)$\pm$ .14 UM/G MIN OT 83% ChE inhibition were measured for the sharp-shinned hawk. Cholinesterase levels of 9.94(2)$\pm$ .09 UM/G MIN OT 48% ChE inhibition were measured for the red-tailed hawk. Analysis of the stomach contents did not reveal fenthion residues; therefore, fenthion poisoning is only suspected.

US Fish and Wildlife Service reported two incidents in which a great horned owl and a rock dove were suspected to have been poisoned by fenthion in Illinois on January 27, 1986 (USDI, FWS, May 12, 1987).

A series of other incidents were also reported by the Fish and Wildlife Service with seizure tag numbers, however, confirmation and circumstances were not all included. These are listed below:

A bald eagle was found dead in ice at Matanzas Lake, Mason County, IL. The necropsy was performed by National Wildlife Health Center, Madison, Wisconsin, and the residue analysis was conducted by Patuxent Analytical Control Facility in Laurel, MD. Seizure Tag No. 512253. Confirmation and route of exposure were not indicated (USDI, FWS, Division of Law Enforcement, 7/21/87).

A sharp-shinned hawk was taken by USFWS from a local veterinarian (Tag No. 86739) for future laboratory analysis. Approximate date of death was January 14, 1987. The circumstances and route of exposure were not confirmed, however, it appears to have been Rid-A-Bird exposure (USDI, FWS, Division of Law Enforcement, 7/21/87).

A red-tailed hawk was taken by USFWS from a local veterinarian in Lawrenceville, IL (Tag No. 86766) on January 23, 1987. The bird had died on January 20, 1987. Confirmation

and the route of exposure were not indicated (USDI, FWS, Division of Law Enforcement, 7/21/87).

On January 23, 1987, a red-tailed was taken from a local veterinarian in Lawrenceville, IL (Seizure Tag No. 86766) (USDI, FWS, Division of Law Enforcement, 7/21/87).

Additional Incidents

In addition to the incidents listed above, the Environmental Fate and Effects Division, Office of Pesticide Programs, has recently obtained the following additional listing of incidents from the US Fish and Wildlife Service. These incidents can only be briefly described until the Agency has more data available.

Date: Jan 1986. **Location**: Taylorville, IL. **Species affected**: 1 great grey owl. **Description**: Bird found to have died from fenthion toxicosis.

Date: Jan 1986. **Location**: Mason Co., IL. **Species affected**: 1 bald eagle. **Description**: Fenthion residues identified in stomach contents.

Date: Dec 1986 - Jan 1987. **Location**: Crawford, Co., IL. **Species affected**: 1 sharp-shinned hawk, 1 rough-legged hawk, and 9 red-tailed hawks. **Description**: Birds found sick within 15 miles of Robinson, IL. Brought to Robinson Hospital for Animals, treated for apparent poisoning and released.

Date: Nov 1988. **Location**: St. Louis Co., MO. **Species affected**: 1 red-tailed hawk owned by falconer. **Description**: Falconer found hawk feeding on a pigeon, after which the hawk collapsed. Hawk brought to rehabilitation facility and died the next day. Fenthion poisonings confirmed.

Date: Dec 1988. **Location**: Crawford, Co., IL. **Species affected**: 1 sharp-barred owl. **Description**: Fenthion residues confirmed. Bird found in area of Marathon Oil Company, the site of a Starling eradication program using Rid-A-Bird.

Date: Jan 1989. **Location**: Cascade Co., MT. **Species affected**: 1 bald eagle. **Description**: Fenthion residues identified in stomach contents.

Date: Fall 1989. **Location**: Quaker, OH. **Species affected**: Barn swallows and barred owl. **Description**: Citizen reported birds were killed following use of Rid-A-Bird perch.

Date: Apr 1992. **Location**: Chippewa Co., WI. **Species affected**: 1 bald eagle. **Description**: Fenthion residues identified in stomach contents.

Date: Oct 1992. **Location**: Dublin, Franklin Co., OH. **Species affected**: 1 peregrine falcon. **Description**: Fenthion residues confirmed in gastrointestinal tract contents.

Date: Sep 1994. **Location**: Edina, MN. **Species affected**: Peregrine falcon. **Description**: Gastrointestinal contents contained fenthion. Rid-A-Bird perches used in the metropolitan area.

Date: Dec 1994. **Location**: St. Paul, MN. **Species affected**: Peregrine falcon **Description**: Bird found approximately 10 miles from the Sept. 1994 Edina bird. Rid-A-Bird perches used in the metropolitan area.

Date: Mid 1990s (ongoing). **Location**: northern TX. **Description**: During the last several years, an undetermined number of hawks and owls have apparently been poisoned in association with a Rid-A-Bird operation. The case is under investigation and details are pending.

Incident No.	Date	State	Species/ Class Organism	Number Affected	Residues	Submitter of Data
Rid-A- Bird Perches Use:						
Not Assigned/ Industrial site	03/12/96	IL	Screech Owl	1	1.69 ppm	IL Dept. of Natural Resources 4/18/96
I003651-001/ Industrial site	01/16/96	WA	Sharp-Shinned Hawk Red-Tailed Hawk Owl	1 1 1	N/R	WA Dept. of Agriculture 4/26/96
I003078-001 and I003165-001/Farm site	12/26/95	NY	Red-Tailed Hawk	1 debilitated/1 dead	13.2 ppm	NY Dept. of Environmental Conservation, Div. of Fish and Wildlife, 1/10/96
			Crows	3	37.8-54.6 ppm Food Source: Starling Feet: 479.3 ppm	
Not Assigned site not indicated	2/16-28/94	KS/OK	Red-Tailed Hawks Screech Owl	5 1	N/R N/R	USDI, NBS, February 15, 1996
Not Assigned/ Industrial site	2/05/92	VA	Peregrine Falcon	1	0.76 ppm	USDI, USFWS, 11/20/92 and 9/15/92

Not Assigned/ Industrial site	12/91-3/92	IL	Cooper's Hawk Hawk spp. Owl Spp.	3 3 6	N/R	Erickson, USEPA, 1996
Not Assigned	1/31/89	WA	Short-eared Owl	1	N/R	USDI, NBS, February 15, 1996
I001595-001 site not indicated	1/89	IL	Cooper's Hawk	1	N/R	Keltsch-Richter, 1989[1]
I000786-002	2/19/88	IA	Screech Owl	1(Recovered and Released)	N/R	IL Dept. of Conservation
Not Assigned	Fall 1989	IA	Barred Owl Barn Swallows	1 N/R	N/R	IA Consumer Protection Division, 1/13/90[2]
Not Assigned / Industrial site	3/4/88	IL	Snowy Owl Cooper's Hawk	1 1	2.15ppm-34.0ppm Food Source 282 ppm 15.38 ppm	IL Dept. of Conservation, 9/2/88

[1] This document was a summary only, and was not the actual field investigation.

[2] The report indicated that Rid-A-Bird Inc. was notified in December 1989.

I001595-001/Industrial site	12/6/88	IL	One Barred Owl kestrel screech owl	1 1 1 sick	N/R	Keltsch-Richter, 1989[3]
Not Assigned/ Industrial site	1987	IL	1 Sharp-shinned hawk 1 Red-Tailed Hawk	1 1	N/R	Erickson, 1996
I001595-001	1989	IL	Red-Tailed Hawk	1 sick (possible more raptors)	N/R	Keltsch-Richter, 1989[4]
Not Assigned/Industrial Use	1986	IL	Great- Horned Owls Bald Eagle	2 1	N/R	Erickson, 1996

[3] This document was a summary only, and was not the actual field investigation.

[4] This document was a summary only, and was not the actual field investigation.

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Livestock Use:						
I000786-001	03/84-04/84	IA	Bald Eagles	5	N/R	IL Dept. of Conservation 12/9/93
Not Assigned	1978, 1979, 1980	Canada	Magpies	N/R	7.29-483 mg/kg	Hanson and Howell, 1981
Mosquito/ Midge Control						
	10/88	CA	American Goldfinches	26	2.2 ppm	CA Dept. of Agriculture, 12/6/88
Not Assigned	7/88	CA	California gulls, Forster's Terns, mallards, green-backed heron, red-winged and Brewer's Blackbird, black-necked stilt	Approx. 20 total	Feathers- 4.1-260 ppm Water samples 32-120 ppm	CA Dept. of Fish and Game 2/7/89
Not Assigned	4/4/79	CA	Snowy Egrets Great Egrets	7 2 2 other birds incapacitated (1 great blue heron, 1 snowy egret	Stomach-93ppm Water -in Slough-16 ppb	Zinkl,J.G. et.al. 1981

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Use Not Reported:						
I003351-004	2/10/94	CA	Red-Tailed Hawk	1 sick	0.12 ug/g footwash	CA Dept. of Fish and Game, 1994,
I000786-004	02-03/92	IA	Red-Tailed Hawks/ Possibly Great Horned Owl	2 confirmed dead Total possible 11 dead hawks and one owl, 3 other hawks debilitated	0.5-12.96 ppm	IL Dept. of Conservation 12/9/93
I000786-003	3/90	IA	Bald Eagle	1 (no confirmation data)	N/R	IL Dept. of Conservation 12/9/93
Not Assigned	1/29/86	IL	Bald Eagle	N/R	N/R	FWS, 6/6/91
Not Assigned	4/03/84	IA	Bald Eagle	N/R	N/R	FWS, 6/6/91
Not Assigned	4/03/84.	IA	Bald Eagle	N/R	N/R	FWS, 6/6/91
Not Assigned	4/02/84	IA	Bald Eagle	N/R	N/R	FWS, 6/6/91
Not Assigned	4/03/84	IA	Bald Eagle	N/R	N/R	FWS, 6/6/91
Not Assigned	3/20/84	IA	eagles(not species specific)	N/R	N/R	(USDI, FWS 5/12/87)

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Not Assigned	11/25/87	KS	Bald Eagle	N/R	N/R	FWS, 6/6/91
Not Assigned	1/02/86	OR	Bald Eagle	N/R	N/R	FWS, 6/6/91
Not Assigned	2/82	ID	Ducks	N/R	N/R	FWS, 6/6/91
Not Assigned	1/86	IL	Raptors/Starlings	N/R	N/R	FWS, 6/6/91
I003165-004	1/24/91	PA	Red-Tailed Hawk	1	1.48 ppm	Lancaster County Wildlife Center, 2/16/91, Laboratories of Veterinary Diagnostic Medicine, 2/22/91, & NE Dept. Of Conservation
Misuse/ Pyracantha/Other Uses						
Not Assigned	Exact Date N/R 1975-1976	CA	cedar waxwings	8	156 ppm in gizzard	CA Job Progress Report, 7/1/75-6/30/76

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Not Assigned	3/71	HA	Fish	6000	N/R	DOI, 4/8/71
Field Monitoring Study/Mosquito Control						
Not Assigned	1979	WY	Birds and Mammals	90 total (sick and dead)	N/R	DeWeese, 1983
Not Assigned	1962	DE	Black Duck Willet Greater yellowlegs Lesser yellowlegs Least sandpiper Semi-palmated sandpiper	1 1 1 3 4 2 Also, 6 more birds were found sick. Various adverse effects to aquatic life (fish, mummichogs, snails, etc.)	[5]N/R	Springer, P.F. 1962

[5] The report indicated that residue analysis was being conducted by the registrant and the Department of Interior; however, they did not report the residues in this package.

Not Assigned	5-7/78	WY	Pintail Duck, Wilsons	1	Brain ChE activity was measured[6]	DeWeese, 1983
			Phalarope,			
			Horned Lark	6		
			W. Meadowlark,	1		
			Yellow-Headed Blackbird,	10		
			Red-Winged Blackbird,	1		
			Brewer's Blackbird,	44		
			Brown Headed Cowbird,	1		
			Savanna Sparrow	1		
			Yellow-bellied Marmot	3		
			White-tailed Jackrabbit			
			Mountain Cottontail	1		
			Richardson's Ground Squirrel	2		
			White-footed Mouse			
			Porcupine	2		
			Other Sick Birds			
			Other Sick Mammals	2		
				1		
				1		
				31		

[6] Overall, 14 birds exhibiting severe toxic signs and 36 dead birds had brain ChE activities averaging about 15% of normal, a level significantly lower than the controls.

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Suspected						
Not Assigned	1/27/86	IL	Great Horned Owl	N/R	N/R	USDI, FWS, 5/12/87
Not Assigned	1/27/86	IL	Rock Dove	N/R	N/R	USDI, FWS, 5/12/87
Not Assigned	1/22/87	IL	Sharp-shinned Hawk	1	Not Measured	Not Measured (USDI, FWS, 2/20/87)
			Red-Tailed Hawk	1[7]		
Industrial site						

[7] It is only suspected that these birds died from fenthion poisoning because fenthion was not measured.

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