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OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

Memorandum

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Subject: Diazinon Registration Standard

Attached are EEB's Topical Discussions, Disciplinary Review, and Generic Data Requirements Table for Diazinon. The Data Evaluation Records will be provided at a later date under separate cover.

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ECOLOGICAL EFFECTS
Disciplinary Review

1. Ecological Effects Profile

a. Manufacturing Use

Avian acute oral toxicity data indicate diazinon is "very highly toxic" to the species tested, with LD₅₀ values ranging from 3.2 mg/kg for Red-winged Blackbirds (Hudson et al., 1984, HCOSTA01) to 10 mg/kg for Bobwhite Quail (Hill and Camardese, 1983, ROODI002). Avian dietary toxicity data indicate diazinon is "highly toxic" for species tested, with LC₅₀ values ranging from 167 ppm for Japanese Quail (Hill and Camardese, 1986, ROODI003) to 245 ppm for Bobwhite Quail (Hill et al., 1975, 00034769).

Freshwater invertebrate acute toxicity data indicate diazinon is "very highly toxic" to the species tested, with LC₅₀ values as low as 0.2 ppb for Gammarus fasciatus (Johnson and Finley, 1980, 00003503).

Freshwater fish acute toxicity data indicate diazinon is "very highly toxic" to the species tested, with LC₅₀ values as low as 90 ppb for Rainbow Trout (Johnson and Finley, 1980, 00003503). A single estuarine fish study on Sheepshead Minnow (Goodman et al., 1979, ROODI008) showed diazinon to be moderately toxic at 1400 ppb.

b. Formulated Products

Avian acute oral toxicity data indicate diazinon 14G (14.3% ai granular) is "very highly toxic" to species tested (LD₅₀=1.8 mg/kg for Red-winged Blackbirds; Balcomb et al., 1984, ROODI0001). Microencapsulated diazinon (23% ai) is "highly toxic", on an acute oral basis, to Bobwhite Quail (LD₅₀=108.5 mg/kg, Pennwalt, 1979, ROODI004). Microencapsulated 23% ai diazinon is also "highly toxic" to birds on a dietary basis (LC₅₀=345 ppm for Bobwhite Quail; Pennwalt, 1979, ROODI004). Data indicate AG500 (48% ai EC) is "highly toxic" to Japanese Quail tested in dietary studies (LC₅₀=101 ppm, Hill and Camardese, 1986, ROODI003). The 53% ai wettable powder is also "highly toxic" to Bobwhite Quail on a dietary basis (LC₅₀=140 ppm, Woodard Research Corp., 1964, 00104923).

Microencapsulated diazinon (23% ai) is "very highly toxic" to freshwater invertebrates (LC₅₀=.522 ppb for Daphnia magna; Agchem, 1982, 00121283) and to fish (LC₅₀=512 ppb for Bluegill Sunfish; Calmbacher, 1978, R00DI009).

Numerous pen studies have been conducted with Bobwhite Quail and waterfowl (see bird topical summary).

2. Ecological Hazard Assessment

Diazinon is an organophosphate insecticide presently registered in 964 end-use products for use on 127 crops and other sites (EPA Draft Index, March 13, 1986). The highest application rates are generally on citrus and vegetables (e.g., beans, beets, carrots, cabbage, radish, turnip, corn, lettuce, peas, tomatoes) with maximum rates of 10 lb ai/A. Orchard crops (e.g., almonds, apples, pears) have maximum rates of 6 lb ai/A. Grass sites have rates as high as 11 lb ai/A. Based on the Preliminary Quantitative Usage Analysis (PQUA, 1986) for diazinon, about 40% of the market is professional applicators/golf course uses, another 40% is home and garden use, and the remaining 20% is used in agriculture. In the agriculture category, the major use is on fruit and nut crops, with the largest volume of use in almonds (53,700 lb ai), followed by prune plums (41,000 lb ai) and apples (27,000 lb ai) (PQUA, 1986).

GOLF COURSES AND SOD FARMS

Based on avian hazard, in January, 1986, the EPA initiated a Special Review of diazinon use on golf courses and sod farms. The Special Review identified an unreasonable risk to birds and proposed cancellation of diazinon use on these two sites. The scientific case for the proposed cancellation was approved by the EPA Scientific Advisory Panel in May, 1986. A public document announcing the EPA final decision to cancel diazinon use on golf courses and sod farms is scheduled for publication on September 30, 1986.

LAWNS, PARKS AND OTHER GRASSY SITES

Hazard to birds from grassy sites such as home lawns, athletic fields, parks, etc. is substantially the same as the hazard on golf courses and sod farms. Exposure to residues on grass is the same, and data on diazinon residues on grass (Wildlife Inter., 1986, R00DI006) are applicable to these various grassy sites. The data showed average residue

per unit dose (RUD) as 53 ppm per application to turf grass of one pound active ingredient followed by irrigation with 0.25 inches water. The data were obtained from a test with the 48% ai emulsifiable concentrate.

A record of at least 30 bird kills on grassy sites such as lawns and parks supports the concern that hazardous exposure regularly and routinely occurs. In total, over 80 bird kills associated with diazinon have been reported to the EPA. Over 50 of these incidents occurred on grassy sites, including lawns, parks and golf courses.

Based upon the toxicity of diazinon, measured residues on grass, and confirmed exposure of birds to diazinon as indicated by the record of bird kills the Special Review criterion for avian hazard from use of diazinon on all grassy sites is met. No additional data are needed to permit a full hazard assessment of the avian hazard on grassy sites (see Special Review documents).

AGRICULTURAL AND OTHER SITES

Dietary exposure to diazinon on gardens, ornamental plantings, and crops occurs when birds feed on grass, roots, seed, nuts, grain, fruit, and/or the invertebrates associated with the site. Birds may also ingest diazinon granules accidentally while feeding. Dermal exposure to diazinon residues may also occur as they feed.

Exposure to high concentrations of diazinon in water may also occur. Rain or irrigation (watering in) after diazinon application may result in the formation of pools of contaminated water (puddling), which poses an additional hazard to birds. Irrigation is recommended by the label for control of certain pests. If the water is not immediately absorbed by the soil, puddles with high concentrations of diazinon may form.

Bird kills from diazinon application have been associated with irrigation and puddling. The Agency is concerned that even if applicators comply with label directions, diazinon may still be hazardous because of the practical difficulties in achieving proper irrigation.

In addition to the potential hazard from exposure to residues on food items, birds may accidentally ingest granules because the granules may be mistaken for dietary grit. Diazinon granules are within the size range of grit for birds, and ingestion of only a few granules has been shown to be lethal to small birds.

Over 80 bird kills associated with use of diazinon have been reported to the Agency. The record of kills, which includes applications made by trained pesticide applicators, includes grass sites, orchards, and other agricultural sites. The kills are reported from States throughout the country and occurred throughout the year. Waterfowl were frequently involved but 23 species in total have been reported as killed from exposure to diazinon.

Based upon residue data and reports of bird kills, diazinon appears to pose an extremely serious hazard to birds. Additional data are needed to permit a full hazard assessment of the avian hazard on agricultural sites. Residue monitoring is needed to help determine if hazardous residues are present on avian food items. Avian field studies are needed to determine if birds are being killed by exposure to diazinon, and if reproduction or survivorship of birds is being adversely affected by exposure to non-lethal but physiologically impairing levels of residues.

Aquatic Hazards

EEB reviewed several valid ecological effects studies which characterize diazinon as very highly toxic to fish and aquatic invertebrates. The median lethal concentration which kills 50 percent of the test organisms (LC₅₀) ranged, for freshwater invertebrates, from 0.2 ppb for Gammarus fasciatus and 0.522 ppb for Daphnia magna to, for fish, 90 ppb for rainbow trout and 168 ppb for Bluegill Sunfish. These data demonstrate that diazinon is very highly toxic to fish and aquatic invertebrates.

As a result of this toxicity, EEB is concerned about the hazard of diazinon to aquatic organisms. Eight fish kills that implicate diazinon have been reported to the Agency. In most cases other pesticides may have been involved and in most situations misuse appears to have occurred. In a few instances diazinon residues were found in the fish samples analysed. The reported kills include loss of 1,150 fish in

Westwood, Pennsylvania; loss of 50 fish in Chester County, Pennsylvania; loss of 1,210 fish in Honolulu, Hawaii; loss of over 100 Cutthroat Trout in Hood River, Oregon; loss of over 200 Rainbow Trout in Milton-Freewater, Oregon; loss of 35,000 suckers and sticklebacks in Sonia County, Michigan; loss of 25-50 fish in Sacramento, California; and an non-quantified loss of fish in Grove, Oklahoma.

Drift and/or runoff from application to agricultural and home sites may pose a hazard to aquatic communities. One study (Ritter et. al, 1974) reported maximum runoff of 17 ppb for diazinon. More data are necessary in order to determine the extent of aquatic hazard from agricultural and other site uses of diazinon. However, based upon the toxicity of diazinon, runoff data, and reported fish kills, diazinon appears to potentially pose an environmental hazard to nontarget aquatic organisms.

Endangered/Threatened Species

Based on terrestrial residue analysis, aquatic runoff data, and incident data, it appears that certain use patterns of diazinon have sufficient exposure to pose a hazard to endangered/threatened species. This confirms the analysis of the various crops covered under the Cluster approach. The analysis shows hazard to birds, aquatic organisms, amphibians, reptiles and insects.

Since 1982 cotton, corn, small grains (wheat, barley, rye, and oats), sorghum, soybeans, rangeland, forest, and mosquito larvicide registrations have been reviewed under the cluster project. Diazinon has labeled uses for some of these sites. The hazard to endangered species for other uses of diazinon can be determined by review, which may or may not lead to formal consultation, or by examining consultations of pesticide with "similar" toxicity and with the same use pattern(s). In these investigations, use of diazinon was found to pose potential hazards to the following endangered species:

- A. Cluster Opinions: The various cluster opinions and subsequent communications resulted in the following jeopardy findings which apply to diazinon:

- Alabama cavefish (cotton)
- Aleutian Canada goose (corn)
- Attwater's Greater Prairie chicken (corn, cotton, soybeans, sorghum)
- Bayou darter (cotton)
- Comanche Springs pupfish (cotton)
- Delta green ground beetle (corn)
- Everglade kite (corn)
- Fountain darter (cotton)
- Gila topminnow (cotton)
- Houston toad (cotton)
- Kern Primrose sphinx moth (corn and soybeans)
- Leopard darter (cotton)
- Mollusks (corn, soybeans and sorghum)
- San Marcos gambusia (cotton)
- San Marcos salamander (cotton)
- Scioto madtom (corn and soybeans)
- Slackwater darter (corn, soybeans and cotton)

A. Cluster Opinions: (continued)

Texas Blind salamander (cotton)
Valley Elderberry Longhorn beetle (corn)
Woundfin (corn and sorghum)

(grass and pastureland)

Aleutian Canada goose	Kendall warm springs dace
California condor	Leon Springs pupfish
Whooping crane	Fountain darter
Masked bobwhite	San Marcos gambusia
Santa Cruz long-toed salamander	Comanche Springs pupfish
Eastern indigo snake	Arizona (Apache) trout
Hawaiian goose	Bonytail chub
New Mexican ridge-nosed rattlesnake	Woundfin
Mississippi sandhill crane	Gila topminnow
San Marcos salamander	Owens River pupfish
Mollusks	Unarmored three-spine stickleback
Houston toad	Paiute cutthroat trout
Wyoming toad	Little kern golden trout
Slackwater darter	Greenback cutthroat trout
Desert tortoise	Colorado squawfish
Snail darter	Humpback chub
Valley elderberry longhorn beetle	Ash Meadows speckled dace
Watercress darter	Ash Meadows Amargosa pupfish
Kern primrose sphinx moth	Cui-ui
Alabama cavefish	Devils hole pupfish
Delta green ground beetle	Pahrump killifish
Okaloosa darter	Warm Springs pupfish
Socorro isopod	Pahrana gat bonytail
Maryland darter	Pecos gambusia
Bayou darter	Gila trout
Spotfin chub	Chihuahua chub
Scioto madtom	Leopard darter
Yellowfin madtom	Borax Lake chub
Slender chub	Clear Creek gambusia
Blunt-nosed leopard lizard	

(non-crop)

Awaiting completion of Non-crop Cluster and referral to OES for formal opinion.

- B. Other opinions: Biological opinions for other pesticides with similar non-cluster uses resulted in the following conclusions consistent with diazinon listed species triggers:

Species in Jeopardy (assumptions of jeopardy)

Carbosulfan (apples and pears)

Aleutian Canada goose
American peregrine falcon
Blunt-nosed leopard lizard
Mollusks
Santa Cruz long-toed salamander
Slackwater darter
Valley Elderberry longhorn beetle
Woundfin

Chlorpyrifos (alfalfa)

Cui-ui	Pahrnagat bonytail
Colorado squawfish	Pahrump killifish
Comanche Springs pupfish	Pecos gambusia
Fountain darter	Sam Marcos gambusia
Houston toad	Unarmored three-spine
Mussels	stickleback
	Woundfin

Chlorpyrifos (apples)
Colorado squawfish
Insects
Mussels
Pecos gambusia
Woundfin

Chlorpyrifos (cole crops)

Listed insects
Mussels
Spotfin chub
Unarmored three-spine stickleback

Chlorpyrifos (peanuts)
Attwater's greater prairie chicken
Mussels

Chlorpyrifos (tobacco)
Mussels
Slackwater darter
Spotfin
Yellowfin madtom

Captafol (fruits and vegetables)

Bonytail chub
Colorado Squawfish
Delta green ground beetle
Everglade kite
Humpback chub
Kern primrose sphinx moth
Leopard darter
Maryland darter
Mussels
Ozark cavefish
Slackwater darter
Slender chub
Spotfin chub
Unarmored three-spine stickleback
Valley elderberry longhorn beetle
Woundfin
Yellowfin madtom

Endrin (sugarcane)

Everglade kite

Furadan (rice, peanuts, grains)

Aleutian Canada goose
Attwater's greater prairie chicken
Kern Primrose sphinx moth

Bolero (rice)

Fat pocketbook pearly mussel

Bolero (celery and lettuce in Florida)

Everglade kite

Tilt (pecans)

Mussels

Temik (peanuts)

Attwater's greater prairie chicken

Non-jeopardy decisions [Biological Opinions for the following active ingredients had indicated that OES considered the following uses, but did not specifically indicate jeopardy to any species resulting from their use on these sites (assumptions of non-jeopardy)]

Furadan (tobacco, peppers, sugarbeets, potatoes, sugarcane, strawberries, sweet potatoes and grapes)

Chlorpyrifos (broccoli, brussel sprouts, cabbage, citrus, cauliflower, nectarines, radish and tomatoes)

Temik (tomatoes and citrus)

Thimet (hops, tomatoes, sugarcane, sugarbeets, alfalfa, beans, lettuce, potatoes and brussel sprouts.

C. Remaining uses:

Diazinon is registered for several uses that have not been reviewed in the cluster project or in registration submissions. It is anticipated that little exposure to additional listed species will occur with the rest of the uses: almonds, banana, beans, beets, Bermudagrass, berries, cabbage, cantalope, carrots, casava melon, collards, cauliflower, cherry, clover, coffee, cowpeas, crenshaw melon, cucumbers, dewberry, endive, fig, filbert, forage-fodder, guar, honeydew melon, kale, kidney beans, lespedeza, lima beans, melons, olive, onion, parsely, parsnips, peas, pineapple, plum, prune, pumpkins, radish, spinach, squash, swiss chard, turnips, walnuts, watermelon, watercress, ornamentals, greenhouse crops, cranberries, and indoor uses. Though these (future) crop reviews may add endangered species to the list thus far established, few additions are likely due to the broad geographical distribution of the crops already reviewed (hence the likelihood that these uses will involve only those species already identified for existing crops).

The following are endangered species labeling information for Diazinon. Labels are based on the bulletin approach. It is hoped that bulletins will be ready before labels containing this endangered species information 'hit the streets'. Any labeling submitted to the Agency as a result of the Diazinon Standard or Special Review must come through EEB to ensure accuracy.

Data Requirements

See Generic Data Requirements table.

Labeling Requirements (Under "Environmental Hazards")

Manufacturing-Use Products

"This pesticide is extremely toxic to fish and wildlife. Do not discharge effluent containing this product directly into lakes, streams, ponds, estuaries, oceans or public waters unless this product is specifically identified and addressed in an NPDES permit. Do not discharge effluent containing this product to sewer systems without previously notifying the sewage treatment plant authority. For guidance, contact your State Water Board or Regional Office of the Environmental Protection Agency." [40 CFR 156.80 (Proposed Rule, 9-26-84)]

End-Use Products

"This pesticide is extremely toxic to fish and wildlife." [40 CFR 156.55 (Proposed Rule, 9-26-84)]

"Keep out of lakes, ponds, or streams" (40 CFR 162.10)

[Note: The following statement is currently proposed to replace the above statement: "Do not apply directly to water or wetlands (swamps, bogs, marshes, and potholes)." A shorter version of this appears in 40 CFR 156.55 [Proposed Rule, 9-26-84]

"Do not contaminate water by cleaning equipment or disposal of wastes." [40 CFR 162.10 and 40 CFR 156.55 (Proposed Rule, 9-26-84)]

"Drift and runoff from treated areas may be hazardous to aquatic organisms in neighboring areas." [40 CFR 156.55 (Proposed Rule, 9-26-84)]

Additional Statement for Granular End-Use Products: "Cover or incorporate granules that are spilled during loading or are visible on soil surface in turn areas." [40 CFR 156.55 (Proposed Rule, 9-26-84)]

Classification

As per 40 CFR 162.11, Classification Criteria for Previously Registered Products, diazinon is ineligible for general use classification and should be designated as a restricted use pesticide. This classification is for all formulations and for both home and agricultural use products. The very high toxicity to birds and the record of bird kills from exposure to diazinon indicate diazinon poses lethal exposure to birds. Further, as shown below, residues are estimated to exceed 1/5 the subacute dietary LC₅₀ measured in avian test animals when diazinon is applied to grass and agricultural crops:

Mallard Duck LC₅₀ = 191 ppm Bobwhite Quail LC₅₀ = 245 ppm

Diazinon Residues

GRASS: Average residue per 1 lb application (RUD) = 53 ppm (Wildlife International, 1986, ROODI006). At typical application rate of 4 lb ai/A, residues estimated at 212 ppm.

FORAGE CROPS: Estimated typical residue (Kenaga, 1972): RUD = 33 ppm. At typical application rate of 6 lb ai/A, residues estimated at 198 ppm.

LEAVES AND LEAFY CROPS: Estimated typical residue (Kenaga, 1972): RUD = 35 ppm. At typical application rate of 6 lb ai/A, residues estimated at 210 ppm.

GRANULAR PRODUCTS: Diazinon granules are very highly toxic to birds: one granule of 14.3% ai killed 40% of test House Sparrows (Balcomb et al, 1984, ROODI001) and 5 granules of 14.3% ai killed 100% of test Red-winged Blackbirds (Balcomb et al, 1984, ROODI001).

Inasmuch as only a few granules are required to kill birds, residues in terms of number of granules will exceed 1/5 the LC₅₀ under all application rates and practices. Diazinon granules are of a size that birds will ingest the granules as dietary grit and also when granules are adhered to food items such as insects, leaves, and grass.

Additional Statements to Protect Endangered/Threatened Species:
See following pages.

ECOLOGICAL EFFECTS

Topical Discussions

Effects on Birds

Thirty-two studies in 21 documents were evaluated under this topic. Twenty-nine studies were acceptable for use in a hazard assessment.

<u>Author</u>	<u>Date</u>	<u>MRID No:</u>
Balcomb et al.	1984	ROODI001
Fink	1974	00109021
Fink	1976	00109015
Fink	1983	00131004
Gulf South Research Institute	1968	00109019
Hill & Camardese	1983	ROODI002
Hill & Camardese	1986	ROODI003
Hill et al.	1975	00034769
Hudson et al.	1984	HCOSTA01
Knott et al.	1973	00109020
McEwen et al.	1972	00058747
Pennwalt	1979	ROODI004
Sachsse	1976	00109014
Schafer	1972	00020560
Stromborg	1975	00104083
Stromborg	1981	ROODI010
Voelker	1975	00114052
Wildlife International	1982	ROODI005
Wildlife International	1986	ROODI006
Woodard Research Corp.	1964	00104923

In order to establish the toxicity of diazinon to birds, the following tests are required using the technical material: Two avian dietary studies on one species of waterfowl (preferably the mallard) and on one species of upland game bird (preferably the bobwhite or other native quail or the ring-necked pheasant); one avian single-dose oral study on one species used in the avian dietary studies (preferably the mallard or bobwhite).

The acceptable acute oral toxicity data for use in a hazard assessment are listed below:

<u>Species</u>	<u>% ai</u>	<u>LD₅₀ (mg/kg)</u>	<u>Author</u>	<u>Date</u>	<u>Fiche ID No.</u>	<u>Fulfills Requirement</u>
Mallard	89	3.54	Hudson et al.	1984	HCOSTA01	No <u>1</u> /
Ringnecked Pheasant	89	4.33	Hudson et al.	1984	HCOSTA01	No <u>1</u> /
Bobwhite Quail	99	10.0	Hill & Camardese	1983	ROODI002	No <u>1</u> /
Bobwhite Quail	89	5.2 (3.5-7.6)	Fink	1976	00109015	No <u>1</u> /
House Sparrow	> 90	7.5	Schafer	1972	00020560	No <u>1</u> /
Redwinged Blackbird	> 90	3.2	Schafer	1972	00020560	No <u>1</u> /

1/ In combination, these studies fulfill the Guideline requirement.

The data indicate that technical diazinon is very highly toxic to birds on an acute oral basis. The Guidelines requirement for an avian acute oral toxicity study is fulfilled.

The acceptable avian dietary toxicity studies for use in a hazard assesment are listed below:

<u>Species</u>	<u>% ai</u>	<u>LC₅₀ (ppm)</u>	<u>Author</u>	<u>Date</u>	<u>Fiche ID No.</u>	<u>Fulfills Requirement</u>
Japanese Quail	99	167	Hill & Camardese	1986	ROODI003	No <u>1</u> /
Bobwhite Quail	99	245	Hill et al.	1975	00034769	Yes
Mallard Duck	99	191	Hill et al.	1975	00034769	Yes
Ringnecked Pheasant	99	244	Hill et al.	1975	00034769	Yes

1/ Study is valid but not conducted on recommended species.

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100-0-50
CON/8-50

The data indicate that technical diazinon is highly toxic to birds on a subacute dietary basis. The Guideline requirements for avian dietary studies are fulfilled.

Avian reproduction studies with technical diazinon are required by 40 CFR 158.145, since birds may be subjected to repeated exposure preceding and/or during the breeding season. Current labeling permits repeat applications for many use sites and rates (e.g., apples, cherries, citrus, grapes, peaches, strawberries, broccoli), sometimes without specific restrictions as to the number of such applications.

The following avian reproduction studies were evaluated:

<u>Species</u>	<u>%ai</u>	<u>Formulation</u>	<u>Author</u>	<u>Date</u>	<u>Fiche ID No</u>	<u>Results</u>	<u>Fulfills Requirement</u>
Bobwhite Quail	48	AG500	Stromborg	1981	ROODI010	Weight loss; reduced egg production at 35 ppm.	No
Ring-necked Pheasant		Pen study of treated corn seed fed to breeding hens	Stromborg	1975	00104083	6-12% of daily food intake equals reprod. effect. NOEL=1.05-2.1 mg/day	No

These studies identify some negative effects due to three week dietary exposure to diazinon, especially weight loss and reduced egg productivity. Results are similar for both Bobwhite Quail and Ring-necked Pheasants. Avian reproduction studies with Bobwhite Quail and Mallard Ducks are required.

In addition to the above required tests with technical diazinon, special testing for avian oral and dietary toxicity with technical grade sulfotepp is required. This is necessary because certified limits for diazinon show sulfotepp contamination at levels up to 100 ppm. Under 40 CFR 158.145(b) testing may be required when, among other possible conditions, an ingredient in the end-use product other than the active ingredient is expected to enhance the toxicity of the active ingredient. Sulfotepp is very highly toxic to mammals (Rat LD₅₀=10 mg/kg) and may be toxic to birds also.

Formulated diazinon product testing is required because the technical grade is very highly toxic to birds. Both oral and dietary testing is required.

The following acute oral studies were evaluated:

Species	% ai	Formulation	LD50 ($\frac{\text{mg} \cdot \text{ai}}{\text{kg}}$)	Author	Date	Fiche ID No.	Requirement
Bobwhite Quail	14	Granular	8(6-11)	Hill & Camardese	1983	ROODI002	Yes ^{1/}
Bobwhite Quail	23	Microen- capsulated	108.5	Pennwalt	1979	ROODI004	Yes ^{1/}
House Sparrow	14	Granular	2.5	Balcomb et al.	1984	ROODI001	Yes ^{1/}
Redwinged Blackbird	14	Granular	1.8	Balcomb et al.	1984	ROODI001	Yes ^{1/}

^{1/} In combination, these studies characterize the acute oral toxicity of 14G to bobwhite quail and small passerine birds. The 14G and microencapsulated product must be tested with a waterfowl. Granular products containing 2%, 5%, and 10% ai must be tested with a waterfowl and bobwhite quail. Number of granules to equal an LD₅₀ may be tested instead of mg ai/kg.

The following dietary studies were evaluated:

Species	% ai	Formulation	LC50 (ai;ppm) (95% CI)	Author	Date	Fiche ID No.	Fulfills Requirement
Bobwhite Quail	23	microencap- sulated	345	Pennwalt	1979	ROODI004	Yes ^{1/}
Bobwhite Quail	53	wettable powder	140 (97-205)	Woodard Res.Corp	1964	00104923	No ^{3/}
Mallard Duck	23	microencap- sulated	149 (107-209)	Pennwalt	1979	ROODI004	Yes ^{1/}
Mallard Duck	53	wettable powder	180 (135.3-239.4)	Woodard Res.Corp	1964	00104923	No ^{3/}
Japanese Quail	48	emulsifiable concentrate	101 (81-126)	Hill & Camardese	1986	ROODI003	Yes ^{2/}

^{1/} In combination these studies characterize the dietary toxicity of 23% ai microencapsulated diazinon to bobwhite quail and the mallard duck. ^{2/} The formulated product testing with the 48%

ai emulsifiable concentrate is adequate to characterize dietary toxicity to the Japanese quail but waterfowl testing must be done with this product. 3/ The 53% ai wettable powder is characterized for the mallard and the bobwhite quail.

Also evaluated were the following studies which tested for the number of granules necessary to induce avian mortality on an acute oral basis:

<u>Species</u>	<u>% ai</u>	<u>Formulation</u>	<u>No. Granules= % Mortality</u>	<u>Author</u>	<u>Date</u>	<u>Fiche ID No.</u>	<u>Fulfills Requirement</u>
House Sparrow	14	Granular	1 = 40; 5-10 = 80	Balcomb et al.	1984	ROODI001	No ^{1/}
Redwinged Blackbird	14	Granular	5 = 100	Balcomb et al.	1984	ROODI001	No ^{1/}

^{1/} These studies characterize the acute oral toxicity in terms of number of granules necessary to induce mortality in House Sparrows and Redwinged Blackbirds.

The following field and simulated field (pen) studies were evaluated under the topic of avian hazard:

<u>Species</u>	<u>Conditions</u>	<u>Results</u>	<u>Author</u>	<u>Date</u>	<u>Fiche ID No.</u>	<u>Fulfills Require.</u>
Bobwhite Quail	Pen with 48%ai EC @ 1.5lb/A; 14.3%ai G @ 17.5 lb/A & 14.3%ai G soil incorp. @ 3-4 inches in seed bed	no effects	Gulf South Research Institute	1974	00109019	No
Bobwhite Quail	Pen with 5%ai liquid @ 3lb/1000 ft ²	no effects	Fink	1974	00109021	No
Bobwhite Quail	Pen with 5%ai G @ approx. 20 lb/1000 ft ²	27.8% mortality in first 5 days. Mortality not affected by irrigation	Knott	1973	00109020	No

Bobwhite Quail	Pen with 23%ai microen- capsulated	no effects	Pennwalt	1979	ROODI004	No
Mallards, Canada Geese	Pen with 48%ai EC @ 6 lb ai/A & 14.3%ai G @ 6.2 lb ai/A	No mallard mortality, 1 mortality of goose @ 2.5 hours of first day. Weight loss for all groups	Fink	1983	00131004	No
Mallards, Canada Geese	Brain AcHE	Response dose dependent with critical level @ 10mg/kg	Wildlife Inter.Ltd.	1982	ROODI005	No
Song Birds	Range Spray	3-8oz/A resulted in sig. population reductions	McEwen et al.	1972	00058747	No
Canada Geese	Turf/Pen with 48%ai EC and 0.25inches irri- gation @ 2,4,6 lb ai/A	no mortality, weight losses for all groups, RUD=53ppm/lb ai/A	Wildlife Inter. Ltd.	1986	ROODI006	No
Residues	Turf/Pen with 48%ai EC @ 6 lb ai/A & 14.3%ai G @ 6.2lb ai/A	Max. residues of 144ppm for 48%ai EC & 19ppm for 14.3% ai G, without irrigation	Wildlife Inter. Ltd.	1982	ROODI005	No

These studies do not fulfill guideline requirements for field testing of formulated products using sensitive species under actual or realistically simulated test conditions.

Actual field testing with birds is required as per 40 CFR 158.145. Due to the very high acute toxicity of diazinon to birds, there is a potential hazard to wild birds at virtually any application site where they would be exposed. Also, some formulated products have been shown to be more toxic to birds than is the technical grade.

Test Material/Sites

The company is required to identify which formulated products are most commonly used on these sites, and these products should be tested. Also, those products with the greatest amount ai and labeled for use on these sites should be tested, for a worst-case situation.

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Emulsifiable Concentrate

The emulsifiable concentrate should be field tested on almonds plums, and alfalfa.

Granular

Granular formulations should be field tested on apples, cherries, and citrus.

Test Parameters

Testing must include a study of dietary exposure and thorough carcass searching to determine whether there is diazinon-induced mortality, and if so, its extent. Research on the almond, apple, and alfalfa areas must also determine, by nest survey, whether avian breeding is disrupted, and collect complete natality, mortality, emigration, and immigration data.

Bird populations must be defined and a determination made if the populations are affected by use of diazinon. Multiple sites, a minimum of three sites and a control per crop, are required for all use patterns that must be tested. A minimum of two years study per site is required. Cancellation of any of the above use patterns would obviate the need for testing of such uses. However, since many crop registrations are intended to be supported by these test crops, other representative sites may be required to be substituted. Protocols that identify proposed sites and site-specific methodology must be approved by the Agency prior to initiation of the studies. Acceptable protocols must be submitted to the Agency no later than 90 days prior to the proposed date for study initiation. The studies are due 30 months from publication of this Registration Standard.

Precautionary Labeling

As per 40 CFR 162.10 and proposed 40 CFR 156.55, the statement "This pesticide is extremely toxic to wildlife" is appropriate since the lowest avian acute oral LD₅₀ is \leq 100 mg/kg, the lowest avian dietary LC₅₀ is \leq 500 ppm, and approximately 80 cases are reported of avian mortality (see Disciplinary Review).

Effects on Wild Mammals

Diazinon is considered to be only "moderately toxic" to laboratory mammals, based on acute oral LD₅₀ information

available from Toxicology Branch (see Disciplinary Review). However, diazinon has a reported two-generation reproductive no-effect level of 4 ppm for the rat, and a three-generation reproductive no-effect level of 8 ppm for the rat. Also, as previously noted, sulfotepp, a contaminant of diazinon, is very highly toxic to mammals, with a rat LD₅₀=10 mg/kg. Residues of diazinon may approach or exceed these levels in wild mammal habitat (as adapted from Kenaga (1972): at 6 lb ai/A, estimated average residues immediately after application to forage crops may equal 193 ppm, and after six weeks, 6 ppm). For many crops repeated applications are permitted, and residues may be increased as a result. Therefore, due to concern for wild mammal exposure, additional data on wild mammals are required as per 158.145 (Guideline 71-3). The initial tests required are eight-day dietary studies, using technical and formulated materials. These tests must include an emulsifiable concentrate product and a granular material in addition to a test with technical material. The test species should be a native species of rodent (e.g., the subfamily Microtinae). These tests will provide information on a species actually exposed in the field, with an exposure more closely similar to that in the field than occurs with LD₅₀ testing. Reproductive testing may be required pending results of the dietary studies.

As previously noted, sulfotepp, is very highly toxic in laboratory tests with rats. Special testing for toxicity of sulfotepp to wild mammals is required.

Effects on Freshwater Invertebrates

Six studies, within three references, were evaluated under this topic. All were acceptable for use in hazard evaluation.

<u>Author</u>	<u>Date</u>	<u>MRID No.</u>
Vilkas	1976	00109022
Johnson & Finley	1980	00003503
Agchem	1982	00121283

The minimum data required to establish the acute toxicity of diazinon to freshwater invertebrates are the results of an acute LC₅₀ study using technical diazinon.

The acceptable studies are listed below:

<u>Species</u>	<u>% ai</u>	<u>LC50 and 95% CI (ug/L)</u>	<u>Author</u>	<u>Date</u>	<u>MRID No.</u>	<u>Fulfills Guideline Requirement</u>
<u>Daphnia magna</u>	>89	0.96 (0.83-1.1) NOEL=0.56	Vilkas	1976	00109022	Yes
<u>Daphnia pulex</u>	89	0.8 (0.6-1.1)	Johnson & Finley	1980	00003503	Yes
<u>Gammarus fasciatus</u>	89	0.2 (0.15-0.28)	Johnson & Finley	1980	00003503	Yes
<u>Pteronarcys</u>	89	2.5 (2.0-3.0)	Johnson & Finley	1980	00003503	Yes
<u>Simocephalus</u>	89	1.4	Johnson & Finley	1980	00003503	Yes

There is sufficient information to place diazinon in the EEB category "very highly toxic" for all invertebrates tested. The Guideline requirement for a freshwater invertebrate LC50 with technical diazinon has been met.

Testing, for acute toxicity to a freshwater invertebrate, with technical grade sulfotepp, a contaminant of diazinon is required as per 40 CRF 158.145(b) and as detailed under the avian topical review.

The following study using formulated product was evaluated:

<u>Species</u>	<u>% ai</u>	<u>Formulation</u>	<u>LC50 (ug/L)</u>	<u>Author</u>	<u>Date</u>	<u>Fiche ID No</u>	<u>Fulfill Require.</u>
<u>Daphnia magna</u>	23	microencap- sulated	0.522 (0.459-0.585)	Agchem	1982	00121283	Yes

The requirement for testing for acute toxicity to a freshwater invertebrate with the 23% ai microencapsulated formulated product is fulfilled.

Acute LC50 studies of freshwater invertebrates using the 48% ai emulsifiable concentrate and the 14% ai granular formulated products are required for hazard evaluation since the LC50 of the technical grade of active ingredient is < the maximum measured residue level of 19 ppb reported in runoff water (Ritter et.al., 1974: Core study from EAB/HED).

An invertebrate life cycle study using D. magna is required as per 40 CFR 158.145 because 1) invertebrate LC₅₀ values are below 1 mg ai/L, and 2) diazinon has broad and repeated use on numerous use sites.

EEB presumes substantial acute hazard to aquatic invertebrates from diazinon (see 40 CFR 154.7). Estimates of aquatic exposure are greater than many acute LC₅₀ values, and aquatic field kills have been reported (see Disciplinary Review).

Aquatic residue monitoring and field studies are required of formulated materials. These studies are detailed under the section concerning effects on freshwater fish.

Precautionary Labeling

Labeling for aquatic invertebrate hazard is not specified by current 40 CFR 162.10. Proposed 40 CFR 156.55 indicates that a specific statement is not required for invertebrates since a hazard statement is already specified for fish (see below).

Effects on Freshwater Fish

Fourteen studies, within five references, were evaluated under this topic. Thirteen studies are acceptable for use in hazard assessment.

<u>Author</u>	<u>Date</u>	<u>MRID No.</u>
Johnson & Finley	1980	00003503
Allison & Hermanutz	1977	ROODI007
Goodman, <u>et. al.</u>	1979	ROODI008
Woodard Research Corp.	1964	00104923
Calmbacher	1978	ROODI0009

The minimum data required to establish the acute toxicity of diazinon to freshwater fish are the results from two 96-hour LC₅₀ studies using technical material, one using a coldwater species (preferably the rainbow trout), and one using a warmwater species (preferably the bluegill sunfish).

The acceptable studies are listed below:

<u>Species</u>	<u>% ai</u>	<u>LC₅₀ and 95% CI (ug/L)</u>	<u>Author</u>	<u>Date</u>	<u>Fiche ID No</u>	<u>Fulfills Requirements</u>
Bluegill Sunfish	92	168 (120-220)	Johnson & Finley	1980	00003503	Yes
Bluegill Sunfish	92	460	Allison & Hermanutz	1977	ROODI007	Yes
Bluegill Sunfish	91	136 (100-186)	Woodard Res. Corp.	1964	00104923	Yes
Rainbow Trout	89	90	Johnson & Finley	1980	00003503	Yes
Rainbow Trout	91	400 (230-700)	Woodard Res. Corp.	1964	00104923	Yes
Cutthroat Trout	92	1700 (1390-2090)	Johnson & Finley	1980	00003503	Yes
Lake Trout	92	602 (400-906)	Johnson & Finley	1980	00003503	Yes
Fathead Minnow	92	7800	Allison & Hermanutz	1977	ROODI007	No
Flagfish	92	1600	Allison & Hermanutz	1977	ROODI007	No
Brook Trout	92	770	Allison & Hermanutz	1977	ROODI007	No

There is sufficient information to characterize diazinon as "very highly toxic" to all of the fish species tested. The Guideline requirement for freshwater fish acute LC₅₀ data with technical material has been met.

Testing with technical grade sulfotepp is required as per 40 CFR 158.145(b) and as detailed in the avian topical review section.

Two acceptable 96-hour LC₅₀ studies have been conducted

with formulated material as follows:

<u>Species</u>	<u>Formu- lation & % ai</u>	<u>LC₅₀ and 95% CI (ug/L)</u>	<u>Author</u>	<u>Date</u>	<u>Fiche ID No</u>	<u>Fulfills Guideline Requirements</u>
Bluegill Sunfish (mic- roencap- sulated)	23	512 (392-672)	Calmbacher	1978	ROODI009	Yes
Rainbow Trout (mic- roencap- sulated)	23	635 (420-960)	Calmbacher	1978	ROODI009	Yes

The testing required for 23% ai microencapsulated products is fulfilled.

A fish embryolarvae study is required as per 40 CFR 158.145 because 1) fish LC₅₀ values are below 1 mg ai/L, and 2) diazinon has broad and repeated use on numerous use sites.

Following submission and review of the fish embryolarvae study specified above, a fish full life cycle study may be required as per 40 CFR 158.145.

EEB presumes substantial acute hazard to fish from diazinon (see 40 CFR 154.7). Estimates of aquatic exposure are greater than many acute LC₅₀ values, and aquatic field kills have been reported. Aquatic residue monitoring is required on alfalfa, almonds, apples, citrus, and cranberry sites.

Additional residue monitoring studies are reserved pending results of these studies. Full field testing examining effects on aquatic invertebrates and fish in addition to residue monitoring is required on alfalfa, almonds, apples and citrus. Additional field testing may be required on other sites pending results from these tests.

Cancellation of any of the above use patterns would obviate the need for testing of these uses. However, since further studies are pending the results of the above initial testing, other sites may be required to be substituted. Protocols for conducting the studies must be submitted to the Agency for review and approval well in advance of the anticipated study initiation.

Precautionary Labeling

As per 40 CFR 162.10 and proposed 40 CFR 156.155, the statement "This pesticide is extremely toxic to fish" is required, based on toxicity data and reported fish kills.

Effects on Estuarine and Marine Organisms

Acute toxicity studies with estuarine and marine organisms are needed for hazard evaluation as per 40 CFR 158.145 due to existing registrations on crops (e.g., cotton, soybeans) with greater than 300,000 acres in coastal counties of the U.S.

One study under one citation was evaluated. The study was acceptable for use in a hazard assessment.

<u>Species</u>	<u>%ai</u>	<u>LC50 (ug/L)</u>	<u>Author</u>	<u>Date</u>	<u>Fiche No</u>	<u>Fulfills Requirement</u>
Sheepshead Minnow	>89	1400	Goodman <u>et. al.</u>	1979	ROODI008	Yes ^{1/}

1/ This study fulfills the portion of the data requirement concerning testing with a fish.

This study fulfills the requirement to test for toxicity to a fish, but testing must be done with a shrimp and oyster.

Ecological Effects

The following studies were sent to EEB via the Pesticide Document Management System (PDMS) but are not cited in the Topical Discussions. They received only abbreviated reviews.

<u>Author</u>	<u>Mrid No.</u>
Bathe <u>et al</u>	00109024
DeWitt <u>et al</u>	00030114
Fink	00114081
Heath <u>et al</u>	00058746
Hill <u>et al</u>	00022923
Posner & Reimer	00109012
Sanders	00097842
Scott & Sons	00004352
US Fish & Wildlife Service	00014476

[DIAZINON ENDANGERED SPECIES LABELING INFORMATION FOR CROP USES]

ENDANGERED SPECIES RESTRICTIONS

The use of any pesticide in a manner that may kill or otherwise harm an endangered or threatened species or adversely modify their habitat is a violation of federal laws. The use of this product is controlled to prevent death or harm to endangered or threatened species that occur in the following counties or elsewhere in their range.

Before using this pesticide in the following counties you must obtain the EPA Cropland Endangered Species Bulletin. The use of this pesticide is prohibited in these counties unless specified otherwise in the Bulletin. The EPA Bulletin is available from either your County Agricultural Extension Agent, the Endangered Species Specialist in your State Wildlife Agency Headquarters or the appropriate Regional Office of either the U.S. Fish and Wildlife Service (FWS) or the U.S. Environmental Protection Agency. THIS BULLETIN MUST BE REVIEWED PRIOR TO PESTICIDE USE.

STATE (Regional office FWS) Species	COUNTY
ALABAMA (Atlanta, GA.) Slackwater darter	LAUDERDALE MADISON LIMESTONE
Alabama cavefish	LAUDERDALE
Freshwater mussels	COLBERT MARSHALL JACKSON MORGAN
ARIZONA (Albuquerque, N.M.) Woundfin	MOHAVE
Bonytail chub	MOHAVE
Gila topminnow	GRAHAM PINAL MARICOPA SANTA CRUZ PIMA
ARKANSAS (Atlanta, GA.) Freshwater mussels	CLAY RANDOLPH CLARK SHARP CROSS ST. FRANCIS LAWRENCE
Ozark cavefish	BENTON
Leopard darter	POLK

CALIFORNIA (Portland, OR.)		
Delta green ground beetle	SOLANO	
Valley elderberry longhorn beetle	MERCED SACRAMENTO	
Aleutian Canada goose	COLUSA MERCED	SUTTER STANISLAUS
Kern primrose sphinx moth	KERN	
American peregrine falcon	HUMBOLT LOS ANGELES MARIPOSA MENDOCINO MONTEREY SAN DIEGO	SAN LUIS OBISPO SAN MATEO SANTA CLARA SANTA CRUZ SONOMA TUOLUMNE
Blunt-nosed leopard lizard	FRESNO KERN KINGS MADERA MERCED	MONTEREY SAN LUIS OBISPO SANTA BARBARA STANISLAUS TULARE
Santa Cruz long-toed salamander	MONTEREY	SANTA CRUZ
Unarmored three-spine stickelback	LOS ANGELES	SANTA BARBARA
COLORADO (Denver, CO.)		
Colorado squawfish	BLANCO DELTA GARFIELD MESA	MOFFAT RIO ROUTT
Humpback chub	MESA	
FLORIDA (Atlanta, GA.)		
Everglade Kite	BROWARD DADE	GLADES PALM BEACH
KENTUCKY (Atlanta, GA.)		
Freshwater mussels	BALLARD EDMUNDSON JACKSON LAUREL MARSHALL	MCCRACKEN PULASKI ROCKCASTLE WARREN WAYNE
MARYLAND (Newton Corners, MA.)		
Maryland darter	HARFORD	
MICHIGAN (Twin Cities, MN.)		
American peregrine falcon	LEEVANAU	
MINNESOTA (Twin Cities, MN.)		
American peregrine falcon	CHISAGO DAKOTA GOODHUE HOUSTON	WABASHA WASHINGTON WINONA
MISSISSIPPI (Atlanta, GA.)		
Bayou darter	CLAIBORNE COPIAH	
MISSOURI (Twin Cities, MN.)		
Ozark cavefish	CHRISTIAN GREENE JASPER LAWRENCE	NEWTON BARRY STONE
NEVADA (Portland, OR.)		
Woundfin	CLARK	
Pahrnagat bonytail	LINCOLN	
Cui-ui	WASHOE	
Pahrump killifish	CLARK	WHITE PINE

STATE (Regional office FWS) Species	COUNTY	
NEW MEXICO (Albuquerque, N.M.) Pecos gambusia	CHAVES EDDY	
NORTH CAROLINA (Atlanta, GA.) Spotfin chub	MACON	SWAIN
OHIO (Twin Cities, MN.) Scioto madtom	CHAMPAGNE FRANKLIN LOGAN	MADISON PICKAWAY UNION
OKLAHOMA (Albuquerque, N.M.) Leopard darter Ozark cavefish	MCCURTAIN PUSHMATAHA DELAWARE	
OREGON (Portland, OR.) American peregrine falcon	CLACKAMUS ^R DOUGLAS HOOD RIVER JACKSON	MARION UMATILLA WASCO
TENNESSEE (Atlanta, GA.) Slackwater darter Slender chub Spotfin chub	LAWRENCE WAYNE CLAIBORNE CUMBERLAND FENTRESS	HANCOCK MORGAN
Freshwater mussels	BLOUNT CLAIBORNE DECATUR FRANKLIN HANCOCK HARDIN LINCOLN LOUDON	MARSHALL MAURY RHEA ROANE SCOTT SEQUATCHIE SMITH SULLIVAN
Yellowfin madtom	CLAIBORNE	HANCOCK
TEXAS (Albuquerque, N.M.) Attwater's Greater Prairie Chicken	ARANSAS AUSTIN COLORADO FORT BEND	GOLIAD REFUGIO VICTORIA
Comanche Springs pupfish	JEFF DAVIS REEVES	
Pecos gambusia	JEFF DAVIS PECOS	REEVES
Texas blind salamander	HAYS	
San Marcos salamander	COMAL	HAYS
San Marcos gambusia	HAYS	
Houston toad	BASTROP BURLESON	HARRIS
Fountain darter	COMAL	HAYS
UTAH (Denver, CO.) Woundfin Humpback chub Bonytail chub Colorado squawfish	WASHINGTON GRAND GRAND CARBON DUCHESNE EMERY GARFIELD GRAND	KANE SAN JUAN UINTAH WAYNE

STATE (Regional office FWS) Species	COUNTY	
VIRGINIA (Newton Corners, MA.)		
Spotfin chub	SCOTT	WASHINGTON
Freshwater mussels	LEE	TAZEWELL
	RUSSELL	WASHINGTON
	SCOTT	WISE
	SMYTH	
Yellowfin madtom	LEE	SCOTT
	RUSSELL	
WASHINGTON (Portland, OR.)		
American peregrine falcon	SKAMANIA	
WISCONSON (Twin Cities, MN.)	CRAWFORD	RICHLAND
American peregrine falcon	DANE	SAUK
	DOOR	TREMPEALEAU

[DIAZINON LABELING INFORMATION FOR RANGE AND PASTURELAND USES]

ENDANGERED SPECIES RESTRICTIONS

The use of any pesticide in a manner that may kill or otherwise harm an endangered or threatened species or adversely modify their habitat is a violation of federal laws. The use of this product is controlled to prevent death or harm to endangered or threatened species that occur in the following counties or elsewhere in their range:

<u>STATE</u> (Regional Office FWS/EPA)	<u>Species</u>	<u>County</u> (unless specified otherwise)
ALABAMA (Atlanta, GA.)	Alabama cavefish	Lauderdale
	Slackwater darter	Lauderdale, Limestone and Madison
	Snail darter	Jackson and Madison
	Watercress darter	Jefferson
	Freshwater mussels	Colbert, Jackson, Marshall and Morgan and Monroe
ARIZONA (Albuquerque, N.M./San Francisco, CA.)	Arizona (Apache) trout	Apache, Graham and Greenlee
	Bonytail chub	Mohave
	Woundfin	Mohave
	Gila and Yaqui topminnow	Graham, Maricopa, Pima, Pinal and Santa Cruz
	Masked Bobwhite	Pima
ARKANSAS (Atlanta, GA./Dallas, TX.)	Freshwater mussels	Clark, Clay, Cross, Lawrence, Randolph, Sharp and St. Francis
CALIFORNIA (Portland, OR.)	Owens River pupfish	Inyo and Mono
	Unarmored threespine stickleback	Los Angeles and Santa Barbara
	Aleutian Canada goose	Colusa, Merced, Stanislaus and Sutter
	California condor	Fresno, Kern, Kings, Los Angeles, Monterey, San Benito, San Luis Obispo, Santa Barbara, Tulare and Ventura
	Blunt-nosed leopard lizard	Kern, Kings, Fresno, Madera, Merced, Monterey, San Luis Obispo, Santa Barbara, Stanislaus and Tulare

<u>STATE (Regional Office FWS)</u> <u>Species</u>	<u>County (unless specified otherwise)</u>
CALIFORNIA (continued)	
Paiute cutthroat trout	Alpine, Madera and Mono
Little Kern golden trout	Tulare
Santa Cruz long-toed salamander	Monterey and Santa Cruz
Delta green ground beetle	Solano
Valley elderberry longhorn beetle	Merced
Kern Primrose sphinx moth	Kern
COLORADO (Denver, CO.)	
Greenback cutthroat trout	Boulder, Larimer, Gilpin, Park and Fremont
Colorado squawfish	Blanco, Delta, Garfield, Mesa, Moffat Rio and Routt
Bonytail chub	
Humpback chub	
FLORIDA (Atlanta, GA.)	
Okaloosa darter	Okaloosa and Walton
Eastern indigo snake	Statewide
GEORGIA (Atlanta, GA.)	
Snail darter	Catoosa
Eastern indigo snake	S.E. Georgia
HAWAII (Portland, OR.)	
Hawaiian goose	Islands of Maui and Hawaii
IDAHO (Portland, OR.)	
Whooping crane	Caribou, Bear Lake and Bonneville
KENTUCKY (Atlanta, GA.)	
Freshwater mussels	Ballard, Edmundson, Jackson, Laurel, Marshall, McCracken, Pulaski, Rockcastle, Warren and Wayne
MARYLAND (Newton Corners, MA./Philadelphia, PA.)	
Maryland darter	Harford
MISSISSIPPI (Atlanta, GA.)	
Bayou darter	Claiborne and Copiah
Mississippi sandhill crane	Jackson

<u>STATE (Regional Office FWS)</u> <u>Species</u>	<u>County (unless specified otherwise)</u>
NEVADA (Portland, OR./San Francisco, CA.)	
Ash Meadows speckled dace	Nye
Ash Meadows Amargosa pupfish	Nye
Cui-ui	Washoe
Devils hole pupfish	Nye
Pahrnagat bonytail	Lincoln
Pahrump killifish	Clark and White Pine
Warm springs pupfish	Nye
Woundfin	Clark
NEW MEXICO (Albuquerque, N.M./Dallas, TX.)	
Chihuahua chub	Grant
Gila trout	Catron and Grant
New Mexican ridge-nosed rattlesnake	Hidalgo
Pecos Gambusia	Chaves, Eddy
Socorro isopod	Socorro
NORTH CAROLINA (Atlanta, GA.)	
Spotfin chub	Macon and Swain
OHIO (Twin Cities, MN./Chicago, IL.)	
Scioto Madtom	Champagne, Franklin, Logan, Madison, Pickaway and Union
OKLAHOMA (Albuquerque, N.M./Dallas, TX.)	
Leopard darter	Pushmataha and McCurtain
OREGON (Portland, OR./Seattle, WA.)	
Borax lake chub	Harney

STATE (Regional Office FWS)

Species

County (unless specified otherwise)

TENNESSEE (Atlanta, GA.)

Freshwater mussels

Blount, Claiborne, Decatur, Franklin, Hancock, Hardin, Hawkins, Lincoln, Loudon, Marshall, Maury, Rhea, Roane, Scott, Sequatchie, Smith and Sullivan

Slackwater darter

Lawrence, Wayne,

Slender chub

Claiborne and Hancock

Snail darter

Bradley, Hamilton, Knox, Loudon, Marion, Meigs and Polk

Spotfin chub

Cumberland, Fentress and Morgan

Yellowfin madtom

Claiborne, Hancock and Monroe

TEXAS (Albuquerque, N.M./Dallas, TX.)

Clear creek gambusia

Menard

Comanche springs pupfish

Jeff Davis and Reeves

Fountain darter

Comal and Hays

Houston toad

Bastrop, Burleson and Harris

Leon springs pupfish

Pecos

Pecos gambusia

Jeff Davis, Pecos and Reeves

San Marcos gambusia

Hays

San Marcos salamander

Hays

UTAH (Denver, CO.)

Desert tortoise

Washington

Colorado squawfish

Bonytail chub

Humpback chub

Carbon, Duchesne, Emery, Garfield, Grand, Kane, San Juan, Uintah and Wayne

Woundfin

Washington

STATE (Regional Office FWS)

<u>Species</u>	<u>County</u> (unless specified otherwise)
VIRGINIA (Newton Corners, MA./Philadelphia, PA.)	
Slender chub	Lee and Scott
Spotfin chub	Scott and Washington
Yellowfin madtom	Lee, Russell and Scott
Freshwater mussels	Lee, Russell, Scott, Smyth, Tazewell, Washington and Wise
WYOMING (Denver, CO.)	
Kendall Warm Springs dace	Sublette
Wyoming toad	Albany
Whooping crane	Lincoln and Sublette

Before using this pesticide in the above counties you must first obtain the Rangeland Endangered Species Bulletin (EPA/ES-RANGE). The use of this pesticide is prohibited in these counties unless specified otherwise in the Bulletin. The EPA Bulletin is available from either your County Agricultural Extension Agent, the Endangered Species Specialist in your State Wildlife Agency Headquarters or the appropriate Regional Office of either the U.S. Fish and Wildlife Service (FWS) or the U.S. Environmental Protection Agency (EPA). THIS BULLETIN MUST BE REVIEWED PRIOR TO PESTICIDE USE.

TABLE A

GENERIC DATA REQUIREMENTS FOR DIAZINON

	Use Composition/Pattern/	Does EPA Have Data To Satisfy This Requirement? (Yes, No or Partially)	Bibliographic Citation	Must Additional Data Be Submitted Under FIFRA Section 3(c)(2)(B)?
<u>§158.145 Wildlife and Aquatic Organisms</u>				
<u>AVIAN AND MAMMALIAN TESTING</u>				
71-1 - Avian Single-Dose Oral LD50	TGAI A, B, C, (E, I) 17, H	Yes ^{3/}	HC0STA01, R00DI002, 00109015, 00020560	No
(SULFOTEPP)	TGAI A, B, C, (E, I) 17, H	No		Yes ^{9/}
	TEP A, B, C, H	Partially	R00DI001, R00DI002, R00DI004	Yes ^{4/}
71-2 - Avian dietary LC50	TGAI A, B, C, (E, I) 17, 18, H	Yes	00034769	No
(SULFOTEPP)	TGAI A, B, C, (E, I) 17, H	No		Yes ^{9/}
	TEP A, B, C, H	Partially	R00DI004, R00DI003,	Yes ^{5/}
71-3 - Wild Mammal Toxicity	TGAI A, B, C, H	No		Yes ^{6/}
(SULFOTEPP)	TGAI A, B, C, H	No		Yes ^{9/}
	TEP A, B, C, H	No		Yes ^{6/}
71-4 - Avian Reproduction	TGAI A, B, C, H	No		Yes ^{7/}
71-5 - Simulated and Actual Field Testing for Mammals & Birds	TEP A, B, C, H	No		Yes ^{8/}

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TABLE A

GENERIC DATA REQUIREMENTS FOR DIAZINON (cont)

Data Requirement	Composition ¹ / Pattern ²	Use	Does EPA Have Data To Satisfy This Requirement? (Yes, No or Partially)	Bibliographic Citation	Must Additional Data Be Sub- mitted Under FIFRA Section 3(c)(2)(B)?
<u>AQUATIC ORGANISM TESTING</u>					
72-1 - Freshwater Fish LC ₅₀	TGAI	A, B, C, (E, I) ^{17, 18}	Yes	00003503	No
(SULFOTEPP)	TGAI	A, B, C, H	No		Yes ⁹ / Yes ¹⁰ / Yes ¹¹ / Reserved ¹² / Yes ¹³ / Reserved ¹⁴ / Yes ¹⁵ / Yes ¹⁶ /
72-2 - Acute LC ₅₀ Aquatic Invertebrates	TEP	A, B, C, H	Partially	ROODI009	No
(SULFOTEPP)	TGAI	A, B, C, (E, I) ^{17, H}	Yes	00109022, 00003503	No
72-3 - Acute LC ₅₀ Estuarine and Marine Organisms	TEP	A, B, C, H	No		Yes ⁹ / Yes ¹⁰ / Yes ¹¹ / Reserved ¹² / Yes ¹³ / Reserved ¹⁴ / Yes ¹⁵ / Yes ¹⁶ /
72-4 - Fish Early Life-Stage and Aquatic Invertebrate Life-Cycle	TGAI	A, B, C	Partially	00121283	No
72-5 - Fish Life-Cycle	TEP	A, B, C	Partially	ROODI008	Reserved ¹² / Yes ¹³ / Reserved ¹⁴ / Yes ¹⁵ / Yes ¹⁶ /
72-6 - Aquatic Organism Accumulation	TGAI	A, B, C, H	No		Reserved ¹⁴ / Yes ¹⁵ / Yes ¹⁶ /
72-7 - Simulated or Actual Field Testing for Aquatic Organisms	TGAI	A, B, C	No		Reserved ¹⁴ / Yes ¹⁵ / Yes ¹⁶ /
72-7 - Simulated or Actual Field Testing for Aquatic Organisms	TEP	A, B, C, H	No		Reserved ¹⁴ / Yes ¹⁵ / Yes ¹⁶ /

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TABLE A

GENERIC DATA REQUIREMENTS FOR DIAZINON (cont)

Data Requirement	Composition	Use	Does EPA Have Data To Satisfy This Requirement? (Yes, No or Partially)	Bibliographic Citation	Must Additional Data Be Submitted Under FIFRA Section 3(c)(2)(B)?
<u>§158.150 Plant Protection</u>					
<u>TARGET AREA PHYTOTOXICITY</u>					
121-1 - Target area Phytotoxicity	TEP	B	No		No
<u>NONTARGET AREA PHYTOTOXICITY</u>					
TIER I					
122-1 - Seed Germination/Seedling Emergence	TGAI	B	No		Yes
122-1 - Vegetative Vigor	TGAI	B	No		Yes
122-2 - Aquatic Plant Growth	TGAI	B	No		Yes
TIER II					
123-1 - Seed Germination/Seed Emergence	TGAI	B	No		Reserved ^{19/}
123-1 - Vegetative Vigor	TGAI	B	No		Reserved ^{19/}
123-2 - Aquatic Plant Growth	TGAI	B	No		Reserved ^{19/}
TIER III					
124-1 - Terrestrial Field	TGAI	B	No		Reserved ^{20/}
124-2 - Aquatic Field	TGAI	B	No		Reserved ^{20/}

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TABLE A

GENERIC DATA REQUIREMENTS FOR DIAZINON (cont)

FOOTNOTES

- 1/ Composition: TGAI = Technical grade of the active ingredient; TEP = Typical end-use product.
- 2/ The use patterns are coded as follows: A = Terrestrial, Food Crop; B = Terrestrial, Nonfood; C = Aquatic, Food Crop; D = Aquatic, Nonfood; E = Greenhouse, Food Crop; F = Greenhouse, Nonfood; G = Forestry; H = Domestic Outdoor; I = Indoor.
- 3/ None of the studies fulfills the requirement individually, but the combination of all studies does fulfill the requirement.
- 4/ Avian single-dose oral LD50 testing with waterfowl and upland gamebird species required with granular products containing 2%,5%, and 10% ai, and with emulsifiable concentrate products containing 3%,12.5%,20%,32%, and 48% ai.
- 5/ Avian dietary LC50 testing with waterfowl and upland gamebird species required with emulsifiable concentrate products containing 3%,12.5%,20%,and 32%ai. Testing with waterfowl species with 48% ai emulsifiable concentrate product is required.
- 6/ An eight-day dietary study is required as per 40 CFR 158.145 to provide information on a species actually exposed in the field, with a dietary feeding type of ingestion. Test species should be a native species of rodent. Technical grade ai plus 5% and 14.3% ai granular products and 3%,20%,32%, and 48% ai emulsifiable concentrate products should be tested.
- 7/ Avian reproduction studies with technical grade ai are required for an upland gamebird and waterfowl species. The standard protocol, as in the guidelines, should be expanded to include behavioral monitoring for such effects as decreased nest attentiveness (i.e., birds must be allowed to naturally incubate eggs). Protocol must be submitted to Agency for approval a minimum of 90 days prior to anticipated date of test initiation.

TABLE A

GENERIC DATA REQUIREMENTS FOR DIAZINON (cont)

- 8/ Actual field testing with birds is required as per 40 CFR 158.145. With a 48% ai emulsifiable concentrate product, initial crops to be tested are almonds, plums, and alfalfa. With a 14.3% ai granular product, initial crops to be tested are citrus, cherries, and apples. Initial testing must include 3 sites plus a control in one location per crop, residue analysis of avian food items, and carcass searching to determine the extent of diazinon-induced mortality. These are single use season studies for the plum, citrus and cherry crops. The research on the almond, alfalfa and apple sites must additionally determine by nest survey whether avian breeding is disrupted, and must obtain natality, mortality, emigration and immigration data. The duration for these studies on almond, alfalfa, and apple sites is a minimum of two (2) years. Additional field testing is reserved pending results of these studies.
- Cancellation of any of the above use patterns would obviate the need for testing of these uses. However, since further studies are pending the results of the above initial testing, other sites may be required to be substituted. Protocols for conducting the studies, including quantitative descriptions of the proposed test sites and detailed descriptions of proposed methodology and sample sizes, must be submitted to the Agency no later than 90 days prior to the anticipated date of study initiation. The study is due 30 months from publication of this Registration Standard.
- 9/ Technical sulfotepp, a very highly toxic contaminant of diazinon, must be tested for acute toxicity to wild mammals, birds, freshwater invertebrates, and fish as per guideline procedures for basic tests.
- 10/ Acute EC50 studies with a freshwater invertebrate and warm and cold water fish species are required. Formulated products to be tested include a 14.3% ai granular product and a 48% ai emulsifiable concentrate.
- 11/ Acute toxicity testing with the technical grade ai is required because diazinon is labeled for use on crops grown in more than 300,000 acres in coastal counties. Shrimp and oyster tests are required.
- 12/ Formulated product testing for acute toxicity to estuarine and marine organisms is reserved pending the results of testing with technical grade ai.
- 13/ Both the fish early life stage and aquatic invertebrate life cycle studies are required.

TABLE A

GENERIC DATA REQUIREMENTS FOR DIAZINON (cont)

- 14/ Testing is reserved pending the results of the the fish early life-stage testing.
- 15/ Testing is required as per 158.165.5 Environmental Chemistry Data Requirements (Exposure Assessment Branch).
- 16/ Aquatic residue monitoring is required on a cranberry crop. A minimum of three sites for cranberry monitoring is required; the study duration is a single use season. Additional residue monitoring studies are reserved pending results of this study. Full field testing, plus aquatic residue monitoring, to exam effects on aquatic invertebrates and fish is also required on alfalfa, almonds, apples, and citrus. A minimum of three sites per crop are required. The study duration is a minimum of two (2) years. Mesocosm studies are an alternative to full field testing, and would satisfy both residue and full field study requirements for the above crops. Additional field testing may be required on other sites pending results of these initial studies. Cancellation of any of the above uses would obviate the need for testing of those uses. However, since further studies are pending the results of the above initial testing, other sites may be required to be substituted. Protocols for conducting the studies, including quantitative descriptions of the proposed test sites and detailed descriptions of proposed methodology and sample sizes, must be submitted to the Agency no later than 90 days prior to the anticipated date of study initiation. The study is due 30 months from publication of this Registration Standard.
- 17/ To support the manufacturing use product used to reformulate the end-use product.
- 18/ Only one species is required.
- 19/ Reserved pending results of Tier 1.
- 20/ Reserved pending results of Tier 11.