128829
SHAUGHNESSY NO.

REVIEW NO.

EEB REVIEW

DATE: IN 08/14/85 OUT 4-9-86

FILE OR REG. NO. 241-273

PETITION OR EXP. PERMIT NO.

DATE OF SUBMISSION 07/26/85

DATE RECEIVED BY HED 08/12/85

RD REQUESTED COMPLETION DATE 10/30/85

EEB ESTIMATED COMPLETION DATE 10/23/85

RD ACTION CODE/TYPE OF REVIEW 300

TYPE PRODUCT(S): I, D, H, F, N, R, S Herbicide

DATA ACCESSION NO(S). 258898

PRODUCT MANAGER NO. R. Taylor (25)

PRODUCT NAME(S) Arsenal

COMPANY NAME American Cyanamid Company

SUBMISSION PURPOSE Submission of data to support full registration of use on noncropland areas.

SHAUGHNESSY NO.	CHEMICAL & FORMULATION	% A.I.
128829	Arsenal	27.6
	Inert	72.4

Pesticide Name

100 Submission Purpose and Label Information

100.1 Submission Purpose and Pesticide Use

Submission of data to support full registration of use on noncropland areas for the control of most annual and perennial grasses and broadleaf weeds.

100.2 Formulation Information

Active Ingredient: 2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-3-pyridinecarboxylic acid with 2-propanamine (1:1) salt*	27.6%
Inert Ingredients	72.4%

*Equivalent to 22.6% 2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-3-pyridinecarboxylic acid or 2 pounds acid per gallon.

100.3 Application Methods, Directions, Rates

IMPORTANT

DO NOT use on food or feed crops. DO NOT apply on ditches used to transport irrigation water. DO NOT apply where runoff or irrigation water may flow onto agricultural land as injury to crops may result. Keep from contact with fertilizers, insecticides, fungicides and seeds. DO NOT apply or drain or flush equipment on or near desirable trees or other plants, or on areas where their roots may extend, or in locations where the chemical may be washed or moved into contact with their roots. DO NOT use on lawns, walks, driveways, tennis courts, or similar areas. Prevent drift of spray to desirable plants. DO NOT USE in California.

Thoroughly clean application equipment immediately after use. Flush tank, pump, hoses and boom with several changes of water after removing nozzle tips and screens (clean these parts separately).

GENERAL INFORMATION

ARSENAL herbicide is an aqueous solution to be mixed in water and applied as a spray for control of most annual and perennial grasses and broadleaf weeds on noncropland areas.

ARSENAL may be applied either preemergence or postemergence to the weeds; however, post-emergence application is the method of choice in most situations, particularly for control of perennials. For maximum activity, weeds should be growing vigorously at the time of postemergence applications. The preemergence activity of **ARSENAL** will provide residual control of most weed species following a postemergence application.

ARSENAL is readily absorbed through foliage and roots and is translocated rapidly through-out the plant, with accumulation in the meristematic regions. Treated plants stop growing soon after spray application. Chlorosis appears first in the newest leaves, and necrosis spreads from this point. In perennials, the herbicide is translocated into and kills underground storage organs, thus preventing regrowth. Chlorosis and tissue necrosis may not be apparent in some plant species until two weeks after application. Complete kill of plants may not occur for several weeks.

Rates range from 2 to 6 pints per acre.

DIRECTIONS FOR USE

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling.

ARSENAL herbicide should be used only in accordance with recommendations on the leaflet label attached to the container. Keep containers closed to avoid spills and contamination.

A postemergence application of **ARSENAL** is recommended for control of most annual and perennial grasses and broadleaf weeds on noncropland areas such as railroad, utility and pipeline rights-of-way, utility plant

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sites, petroleum tank farms, pumping installations, fence rows, storage areas, non-irrigation ditch banks and other similar areas.

MIXING INSTRUCTIONS

Mix the proper amount of **ARSENAL** in water in the spray tank with the agitator running. To minimize drift, a drift control agent may be added at the recommended label rate. A foam reducing agent may be added at the recommended label rate, if needed.

SPRAYING INSTRUCTIONS

Uniformly apply with properly calibrated ground equipment in 30 to 60 gallons of water per acre with a spray pressure of 25 to 50 psi. Spray volumes greater than 60 gallons per acre may be applied without reducing efficacy; however, additional nonionic surfactant such as Surfactant WK† or Ortho†† X-77 must then be added at the rate of 1 quart per 100 gallons of spray to provide optimum wetting and/or contact activity.

100.4 Target Organisms

Annual and perennial and broadleaf weeds.

ARSENAL herbicide will provide postemergence control with residual control of the following weed species at the rates listed.

BIENNIAL/PERENNIAL WEEDS
Apply 2-3 pints per acre*

Dandelion *(Taraxacum officinale)*
Field bindweed *(Convolvulus arvensis)*
Guineagrass *(Panicum maximum)*
Honeylocust *(Gleditsia triacanthos)*
Johnsongrass *(Sorghum halepense)*
Multiflora rose *(Rosa multiflora)*
Ox-eye daisy *(Chrysanthemum leucanthemum)*
Paragrass *(Panicum purpurascens)*
Quackgrass *(Agropyron repens)*
Sandspur *(Cenchrus* spp.*)*
Tall fescue *(Festuca arundinacea)*
Vaseygrass *(Paspalum urvillei)*
Wild carrot *(Daucus carota)*

Apply 3-4 pints per acre*

Dewberry *(Rubus* spp.*)*
Greenbriar *(Smilax* spp.*)*
Honeysuckle *(Lonicera* spp.*)*
Opossum grape *(Cissus sicyoides)*
Poison ivy *(Rhus radicans)*
Redvine *(Brunnichia cirrhosa)*
Trumpetcreeper *(Campsis radicans)*
Virginia creeper *(Parthenocissus quinquefolia)*

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Apply 4-6 pints per acre*

Bermudagrass *(Cynodon dactylon)*
Blackberry *(Rubus* spp.*)*
Canada thistle *(Cirsium arvense)*
Mulberry *(Morus* spp.*)*
Sumac *(Rhus* spp.*)*

ANNUAL WEEDS

Apply 2-3 pints per acre*

Broadleaf signalgrass *(Brachiaria platyphylla)*
Carpetweed *(Mollugo verticillata)*
Common ragweed *(Ambrosia artemisiifolia)*
Curly dock *(Rumex crispus)*
Downy brome *(Bromus tectorum)*
Fleabane *(Erigeron* spp.*)*
Foxtails *(Setaria* spp.*)*
Goldenrod *(Solidago* spp.*)*
Hoary vervain *(Verbena stricta)*
Horseweed *(Erigeron canadensis)*
Kochia *(Kochia scoparia)*
Lambsquarters *(Chenopodium album)*
Lespedeza *(Lespedeza* spp.*)*
Pigweed *(Amaranthus* spp.*)*
Plantain *(Plantago* spp.*)*
Smartweed *(Polygonum* spp.*)*
Sorrel *(Rumex* spp.*)*
Sowthistle *(Sonchrus* spp.*)*
Sunflower *(Helianthus annuus)*
Wild buckwheat *(Polygonum convolvulus)*
Wild mustard *(Brassica kaber)*
Yellow woodsorrel *(Oxalis stricta)*

Apply 3-4 pints per acre*

Cocklebur *(Xanthium pensylvanicum)*
Crabgrass *(Digitaria* spp.*)*
Goosegrass *(Eleusine indica)*
Morningglory *(Ipomoea* spp.*)*

*The higher rates should be used where heavy or well established infestations occur.

100.5 Precautionary Labeling

CAUTION!

Avoid contact with skin, eyes or clothing. Avoiding breathing spray mist. Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash before reuse.

FIRST AID

IF ON SKIN: Wash with plenty of soap and water.

IF IN EYES: Flush with plenty of water. Get medical attention if irritation persists.

PHYSICAL AND CHEMICAL HAZARDS

Spray solutions of ARSENAL should be mixed, stored and applied only in stainless steel, fiberglass, plastic and plastic-lined steel containers.

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DO NOT mix, store or apply ARSENAL or spray solutions of ARSENAL in unlined steel (except stainless steel) containers or spray tanks.

ENVIRONMENTAL HAZARDS

DO NOT apply directly to any body water. DO NOT contaminate water by cleaning of equipment or disposal of waste.

101 Hazard Assessment

101.1 Discussion

A postemergence application of ARSENAL is recommended for control of most annual and perennial grasses and broadleaf weeds on noncropland areas such as railroad, utility and pipeline rights-of-way, utility plant sites, petroleum tank farms, pumping installations, fence rows, storage areas, non-irrigation ditch banks, and other similar areas.

101.2 Likelihood of Adverse Effects to Nontarget Organisms

Based upon the available data Arsenal is practically nontoxic acutely to avian species, fish species, and aquatic invertebrates. There will, of course, be some exposure of this product to both fish and wildlife. However, the likelihood for acute adverse effects to both fish and wildlife should be minimal according to the available data. For example, the maximum application rate of 4 lb (4 pints) per acre will produce the following concentrations:

Maximum Expected Residues on Vegetation (ppm) 4 lb/acre

Short rangegrass	920
Long grass	445
Leaves and leafy crops	500
Forage alfalfa, clover	230
Pod containing seeds legumes	48
Fruit-cherries, peaches	26
Soil - 0.1 inch	88.2
Water 0.5 ft depth	2.9

The maximum application rate of 4 lb per acre applied directly to vegetation and 0.5 ft depth of water will produce a concentration of 920 ppm on short range-grasses and 2.9 ppm in water. The avian LC_{50} value is 5.4 times greater than the expected residue level on vegetation (> 5000 vs. 920 ppm) and aquatic invertebrate LC_{50} is 258 times greater than Arsenal concentration in 0.5 ft depth of water (750 vs. 2.9ppm)

101.3 Endangered Species Consideration

Animals

The toxicity categories for both technical active ingredient and formulated product are practically nontoxic to both fish and wildlife species according to the available data.

Plants

The proposed use pattern of Arsenal on noncropland has potential for exposure and risks of this compound to the endangered plant species through water movement following heavy rainfall and/or over spray.

Ground equipment may reduce over spray and spray drift, but will not eliminate the exposure of this compound to the endangered plant species.

101.4 Adequacy of Toxicity Data

Species	Material % ai	Results	Category	Accession No.
Bobwhite quail	monoisopropylamine	LC_{50} > 5000 ppm	Core	243997
Bluegill sunfish	isopropylamine	LC_{50} > 1000 ppm	Core	243997
Daphnia magna	isopropylamine	LC_{50} > 750 ppm	Core	243997

101.5 Adequacy of Labeling

EEB will formally consult with OES on all pesticides used on non-cropland areas. Until receipt of a biological opinion for this "non-cropland cluster", the following/interim labelling is required for Arsenal based on previous biological opinions of similar use and toxicity:

> Notice: The use of this product may pose a hazard to certain Federally designated endangered plant species. They are known to be found in specific areas within the locations noted below. The use of this product is prohibited in these areas unless you obtain permission annually from the Endangered Species Specialist of the appropriate Regional Office of the U.S. Fish and Wildlife Service lisred below:

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Contact FWS in Portland, Oregon

CALIFORNIA: counties of Contra Costra, Inyo, Orange, Los Angeles, San Benito, San Bernardino, San Diego, San Joaquin, San Mateo, Santa Barbara, Solano and Ventura.
NEVADA: Nye County.

Contact FWS in Portland, Oregon

IDAHO: Idaho county.
OREGON: counties of Harney and Wallowa.

Contact FWS in Albuquerque, New Mexico

ARIZONA: counties of Coconino, Gila, Graham, Mohave, Navajo, Pima and Pinal.
NEW MEXICO: counties of Chaves, Dona Ana, Eddy, Lincoln, Otero and San Juan.
TEXAS: counties of Bandera, Brazos, Brewster, Burleson, Culberson, Edwards, El Paso, Grimes, Hays, Jim Wells, Kerr, Kimble, Kleberg, Nueces, Pecos, Presidio, Real, Refugio, Robertson, Runnels, Starr, Terrell, Val Verde and Zapata.

Contact FWS in Atlanta, Georgia

ALABAMA: counties of Cherokee, Dekalb, Etowah, Jackson and Marshall.
FLORIDA: counties of Clay, Dade, Franklin, Gadsden, Gulf, Indian River, Jefferson, Liberty, Monroe and St. Lucie.
GEORGIA: counties of Brantley, Habersham, Rabun, Stephens, Towns and Wayne.
KENTUCKY: counties of Fleming, Nicholas and Robertson.
NORTH CAROLINA: counties of Avery, Henderson and Mitchell.
SOUTH CAROLINA: counties of Greenville, McCormick and Oconee.
TENNESSEE: counties of Carter, Davidson, Polk, Rutherford and Wilson.

102 Classification

N/A

103 Conclusions

EEB has completed a full risk assessment (3(c)(5) finding) of the proposed registration of Arsenal for use on

noncropland areas. Based upon the available data and use information EEB concludes that the proposed uses provide for minimal acute hazards to both terrestrial wildlife and aquatic species. However, there is potential for hazards to the endangered plant species. Also, EEB is unable to complete a risk assessment relative to chronic hazards until EAB has finalized their review and we have an opportunity to examine it. Further, we need clarification from the registrant on the number of applications proposed throughout a year of use. Interim labelling is provided pending the outcome of a formal consultation with OES for all pesticides used on non-croplands.

Curtis E. Laird 4-8-86
Curtis E. Laird, Fishery Biologist
Ecological Effects Branch
Hazard Evaluation Division (TS-769C)

Norman Cook 4.8.86
Norman Cook, Head-Section 2
Ecological Effects Branch
Hazard Evaluation Division (TS-769C)

for HT Craven 4/10/86
Michael Slimak, Chief
Ecological Effects Branch
Hazard Evaluation Division (TS-769C)

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DATA EVALUATION RECORD

1. Chemical: Arsenal

2. Test Material: AC 252,925 - isopropylamine salt of AC 243,997
49.68% of AC 252,925 (ai)

3. Study/Action Type: Fish acute toxicity test
Bluegill sunfish (Lepomis macrochirus)

4. Study ID: Static Acute Toxicity Report No. 32182. Acute Toxicity of AC 252,925 to Bluegill Sunfish (Lepomis macrochirus). By Analytical Bio-Chemistry Laboratories, Inc. Submitted to American Cyanamid Co. October 25, 1984. EPA Accession No. 258898.

5. Reviewed by: Ann Stavola
Aquatic Biologist
EEB/HED
Signature: Ann Stavola
Date: Mar 31 1986

6. Approved by: Doug Urban
Supervisory Biologist
EEB/HED
Signature: Douglas J. Urban
Date: 3/31/86

7. Conclusions:

With an LC_{50} > 1000 mg/L, AC 252,925 is practically nontoxic to warmwater fish. This study is scientifically sound. Since EEB required testing with this formulation, the study meets our Guidelines requirements.

8. Recommendations: N/A

9. Background:

Testing with the formulated product was requested to see if the presence of isopropylamine affects the toxicity of the active ingredient.

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10. Materials and Methods:

a. Animals:

Species: Bluegill sunfish (Lepomis macrochirus)

Source: Osage Catfisheries, Osage Beach, MO

Size: Mean weight of 0.32 (± 0.13) g
Mean standard length of 24 (± 3.6) mm

b. Dosage: Static acute bioassay - Test compound - AC 252,925, 49.68% ai. The test concentrations added directly to the chambers without any solvent. The test concentrations were 56, 100, 180, 320, 560, and 1000 mg/L plus a control.

c. Design: Test vessels - 5-gallon glass vessels containing 15 liters of soft reconstituted water. Test vessels were kept in a water bath at 22 °C. Ten fish per concentration. Photoperiod was 16L:8D. Procedures were based on those in Methods for Acute Toxicity Tests with Fish, Macroinvertebrates and Amphibians.

d. Statistics: Computerized LC_{50} program by Stephan.

11. Reported Results:

Nominal Conc. (mg/L)	Percent Mortality 24 hr	48 hr	96 hr
Control	0	0	0
56	0	0	0
100	0	0	0
180	0	0	0
320	0	0	0
560	0	0	0
1000	0	0	0

LC_{50} (mg/L)

24 hr > 1000
48 hr > 1000
96 hr > 1000

The D.O. at the beginning of the test was 8.4 mg/L in control and test chambers, and it was 6.1 and 5.9 mg/L in control and test chambers, respectively, at 96 hours.

The pH was 7.4 and 7.5 in control and test chambers, respectively, at 0-hour, and it was 7.1 in control and test chambers at 96 hours.

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12. Study Author's Conclusions/QA Measures

96-hr LC_{50} value > 1000 mg/L

"The study was conducted following the intent of the Good Laboratory Practice Regulations, and the final report was reviewed by Analytical Bio-Chemistry Laboratories' Quality Assurance Unit. All original raw data was provided to American Cyanamid Co., with a copy retained at Analytical Bio-Chemistry Laboratories."

13. Reviewer's Evaluation:

a. Test Procedures: The procedures followed those recommended by EPA Guidelines, 1982.

b. Statistical Analysis: None was needed since there were no mortalities.

c. Discussion/Results: A 96-hour LC_{50} value > 1000 mg/L indicates that AC 252,925 is practically nontoxic to bluegills.

d. Adequacy of Study:

1. Classification: Core.

2. Rationale: EEB reguired testing with the isopropylamine salt of AC 243,997.

D

DATA EVALUATION RECORD

1. Chemical: Arsenal

2. Test Material: AC 252,925 - isopropylamine salt of AC 243,997
49.68% ai

3. Study/Action Type: Aquatic invertebrate acute toxicity test
Daphnia magna

4. Study ID: Static Acute Toxicity Report No. 32183. Acute Toxicity of AC 252,925 to *Daphnia magna*. By Analytical Bio-Chemistry Laboratories, Inc. Submitted to American Cyanamid Co. October 24, 1984. EPA Accession No. 258898.

5. Reviewed by: Ann Stavola
Aquatic Biologist
EEB/HED
Signature: Ann Stavola
Date: Mar. 31 1986

6. Approved by: Doug Urban
Supervisory Biologist
EEB/HED
Signature: Douglas Urban
Date: 3/31/86

7. Conclusions:

With an LC_{50} of 750 (560 to 1000) mg/L, AC 252,925 is practically nontoxic to freshwater invertebrates. This study is scientifically sound. Since EEB required testing with this formulation, the study meets our Guidelines requirements.

8. Recommendations: N/A

9. Background:

Testing with the formulated product was requested by EEB to see if the presence of isopropylamine affects the toxicity of the active ingredient.

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10. Materials and Methods:

a. Animals:

Species: Daphnia magna

Source: Cultured at ABC facilities.

Age: First instar less than 24 hours old.

b. Dosage: Test compound - AC 252,925, 49.68% ai. The test compound was added directly to the beakers without any solvent. The test concentrations were 56, 100, 180, 320, 560, and 1000 mg/L plus a control.

c. Design: Static acute bioassay - Test vessels - 250 mL glass beakers containing 200 mL of ABC aged well water of hard quality. Test vessels were kept at 20 °C, and photoperiod was 16L:8D. There were two beakers per concentration, with each beaker containing 10 daphnids.

d. Statistics: Computerized LC_{50} program by Stephan.

11. Reported Results:

Nominal Conc. (mg/L)	Percent Mortality 24 hr	48 hr
Control	0	0
56	0	0
100	0	0
180	0	0
320	0	0
560	0	0
1000	85	100

LC_{50} mg/L

24 hr 820 (560 to 1000)
48 hr 750 (560 to 1000)

D.O. was 7.9 mg/L at 0-hour in the control, and 7.5 mg/L in the control, and 7.2 mg/L in the test vessels at 48 hours. pH was 8.3 at 0-hour in the control, and 8.6 in the control, and 8.7 in the test vessels at 48 hours.

12. Study Author's Conclusions/QA Measures

48-hour LC_{50} = 750 (560 to 1000) mg/L

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"The study was conducted following the intent of the Good Laboratory Practice Regulations, and the final report was reviewed by Analytical Bio-Chemistry Laboratories' Quality Assurance Unit. All original raw data was provided to American Cyanamid Co., with a copy retained at Analytical Bio-Chemistry Laboratories."

13. Reviewer's Conclusions:

a. Test Procedures: The procedures followed those recommended by EPA Guidelines, 1982.

b. Statistical Analysis: A recalculation of the 24-hour and 48-hour LC_{50} values with our "Toxanal" programs gave the respective LC_{50} values as 816 (560 to 10,000) mg/L and 748 (560 to 1000) mg/L. The reported results are acceptable.

c. Discussion/Results: A 48-hour LC_{50} value of 750 (560 to 1000) mg/L indicates that AC 252,925 is practically nontoxic to freshwater invertebrates.

d. Adequacy of Study:

1. Classification: Core.

2. Rationale: EEB required testing with the isopropylamine salt of AC 243,997.

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DATA EVALUATION RECORD

1. Chemical: Arsenal

2. Test Material: (CL 252,925) (AC 252,925) - monoisopropylamine salt of AC 243,997
49.68% of AC 252,925 (ai)

3. Study/Action Type: Avian dietary LC_{50} study
Bobwhite quail (Colinus virginianus)

4. Study ID: Final Report to American Cyanamid Co. 8-Day Dietary LC_{50} Study with AC 252,925 in Bobwhite Quail. Bio-Life Assoc., Ltd. BLAL No. 84 QC 48. December 7, 1984. EPA Accession No. 258898.

5. Reviewed by: Ann Stavola
Aquatic Biologist
EEB/HED
Signature: Ann Stavola
Date: Mar. 31, 1986

6. Approved by: Doug Urban
Supervisory Biologist
EEB/HED
Signature: Douglas J. Urban
Date: 3/31/86

7. Conclusions:

With an LC_{50} > 5000 ppm ai, AC 252,925 is practically nontoxic to upland gamebirds on a dietary basis. The study is scientifically sound. Since EEB required testing with the formulation, the study meets our Guidelines requirements.

8. Recommendations: N/A

9. Background:

Testing with the formulated product was requested to see if the presence of isopropylamine affects the toxicity of the active ingredient.

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10. Materials and Methods:

a. Animals: Bobwhite quail (Colinus virginianus) 15 days old at start of test. Quarantined for 4 days prior to start of test.
Source: Bio-Life's Colony

b. Dosage: AC 252,925 (isopropylamine salt of AC 243,997) was incorporated into a standard lab diet using tap water as the vehicle. The dietary levels were 312, 625, 1250, 2500, and 5000 ppm ai. There were also five groups of vehicle control brids.

c. Study Design: There were 10 birds in each control group and each dietary test group. Each group was housed in a 45.7 cm x 61 cm x 45.7 cm wire pen in an environmentally controlled room (Ta of 95 °F to 110 °F; photoperiod of 24 L; relative humidity of 35 to 47%). The birds were kept on the test diet for 5 days and then placed on plain feed for 3 days.

d. Statistics: None

11. Reported Results:

There were no mortalities in any test or vehicle control group during the 8 days. No abnormal behavioral reactions of systemic signs of toxicity were observed. Pathology exams indicated there were no abnormalities. There were no differences in mean body weight gain or food consumption between the control groups and the test groups.

12. Study Author's Conclusions/QA Assurance:

8-day LC_{50} > 5000 ppm ai

Final report audited by QA unit prior to submission to the sponsor.

13. Reviewer's Discussion and Evaluation:

a. Test Procedure: The test procedure agrees with the protocol recommended in EPA's Pesticide Assessment Guidelines Subdivision E: Hazard Evaluation Wildlife and Aquatic Organisms, EPA -540/9-82-024, October 1982.

b. Statistical Analysis: None was needed since there were no mortalities.

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c. Discussion/Results: With an LC_{50} > 5000 ppm ai, AC 252,925 is practically nontoxic to upland gamebirds on a dietary basis.

d. Adequacy of Study:

1. Classification: Core.

2. Rationale: EEB required testing with the isopropylamine salt of AC 243,997.

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