

US EPA ARCHIVE DOCUMENT

See 008001 for DER'S

265564

RECORD NO.

008101 023401, 023503

SHAUGHNESSEY NO

REVIEW NO.

EEB REVIEW

DATE: IN 6-12-90 OUT 11-1-90

FILE OR REG. NO. 0649

PETITION OR EXP. NO. \_\_\_\_\_

DATE OF SUBMISSION 5-24-90

DATE RECEIVED BY EFED 6-8-90

RD REQUESTED COMPLETION DATE 9-07-90

EEB ESTIMATED COMPLETION DATE 9-07-90

RD ACTION CODE/TYPE OF REVIEW 660

TYPE PRODUCT(S) Algicide, herbicide

DATA ACCESSION NO(S) \_\_\_\_\_

PRODUCT MANAGER, NO. Phil Hundeman (74)

PRODUCT NAME(S) Copper Sulfate

COMPANY NAME Tennessee Chemical Company

SUBMISSION PURPOSE Review Data Submitted in Response to  
Registration Standard

SHAUGHNESSEY NO. \_\_\_\_\_ CHEMICAL \_\_\_\_\_ % A.I. \_\_\_\_\_

Copper Sulfate



2003459



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

OFFICE OF  
PESTICIDES AND TOXIC  
SUBSTANCES

November 1, 1990

MEMORANDUM

SUBJECT: Review of Avian Reproduction Studies Submitted  
in Response to Registration Standard of Copper II Compds

FROM: James W. Akerman, Chief  
Ecological Effects Branch  
Environmental Fate and Effects Division H7507C

TO: Phil Hundeman PM 74  
Reregistration Branch  
Special Review and Reregistration Division H7508C

023401 In response to the reregistration guidance document published in April 1987, 4 avian reproduction studies have been submitted and reviewed. While there were 11 copper II compounds, EEB requested that avian testing be performed with only two of the compounds. These compounds were Copper Oxychloride Sulfate 023503 and Copper Hydroxide. None of the studies submitted fulfilled the guideline requirements. See the summaries below for an explanation of study deficiency.

1. Mallard Duck with Copper Hydroxide

STUDY TYPE: Avian Reproduction Study.  
Species Tested: Mallard Duck (Anas platyrhynchos).

CITATION: Hakin, B., M.H. Rodgers, A. Anderson, I.S. Dawe, and D.O. Chanter. 1990. The Effects of Dietary Inclusion of Copper Hydroxide on Reproduction in the Mallard Duck. Prepared by Huntingdon Research Centre, Ltd., Cambridgeshire, England. Laboratory Study No. CSF 3/89745. Submitted by Copper Sulfate Task Force, Tennessee Chemical Company, Atlanta, Georgia. MRID Number: 415008-03.

CONCLUSIONS: Based on the study protocol, nominal dietary concentrations of Copper Hydroxide at 100 and 500 ppm had no effects upon general behavior, health or food consumption of adult mallards during the test period. Statistical analysis performed by the author showed a significant difference ( $p < 0.05$ ) in adult female body weight between the 2500 ppm group and the control group. The following significant effects ( $p < 0.05$ ) were also observed at 2500 ppm: fewer eggs were

laid; mean egg weights were lower; and initial and 14-day chick body weights were both lower than the control. Egg shell thickness was also significantly lower ( $p < 0.05$ ) at 500 ppm and 2500 ppm. **The NOEC, based upon decreased egg shell thickness, was 100 ppm.** The study, however, does not fulfill the guideline requirements for an avian reproduction study due to the use of replacement birds after test initiation and a high percentage of cracked eggs in the control group.

## 2. Bobwhite Quail with Copper Hydroxide

**STUDY TYPE:** Avian Reproduction Study.  
**Species Tested:** Bobwhite Quail (Colinus virginianus).

**CITATION:** Hakin, B., M.H. Rodgers, A. Anderson, I.S. Dawe, and D.O. Chanter. 1990. The Effects of Dietary Inclusion of Copper Hydroxide on Reproduction in the Bobwhite quail. Prepared by Huntingdon Research Centre, Ltd., Cambridgeshire, England. Laboratory Study No. CSF 4/89767. Submitted by Copper Sulfate Task Force, Tennessee Chemical Company, Atlanta, Georgia. MRID Number: 415008-04.

**CONCLUSIONS:** Based on the study protocol nominal dietary concentrations of Copper Hydroxide at 100 and 500 ppm had no effects upon general behavior, health, body weights or food consumption of adult quail during the test period. Statistical analysis performed by the author showed a significant difference ( $p < 0.01$ ) in adult body weight between the 2500 ppm group and the control group during the pre-egg production period. A significant difference ( $p < 0.1$ ) was also noted in female body weight at termination of the study. Food consumption was also significantly reduced ( $p < 0.01$ ) at a nominal concentration of 2500 ppm. The following significant effects ( $p < 0.05$ ) were also observed at 2500 ppm: fewer eggs were laid; mean egg weights were lower; and the number of viable eggs was lower than the controls. Initial and 14-day chick body weights were also significantly lower at 500 ppm ( $p < 0.05$ ) and at 2500 ppm ( $p < 0.01$ ). **The NOEC, based on chick body weight, was 100 ppm.** The study, however, does not fulfill the guideline requirements for an avian reproduction study due to high control mortality, the use of replacement birds after test initiation and a high percentage of cracked eggs in the control group.

## 3. Mallard Duck with Copper Oxychloride Sulfate; 58.80% active

**STUDY TYPE:** Avian Reproduction

**CITATION:** Hakin, B., M.H. Rodgers, A. Anderson, I.S. Dawe, and D.O. Chanter. 1990. The Effects of Dietary Inclusion

of Copper Oxychloride Sulfate on Reproduction in the Mallard Duck. Prepared by Huntingdon Research Centre, Ltd., Cambridgeshire, England. Laboratory Study No. CSF 1/8910. Submitted by Copper Sulfate Task Force, Tennessee Chemical Company, Atlanta, Georgia. MRID Number: 415008-01.

CONCLUSIONS: Based on the study protocol, nominal dietary concentrations of Copper Oxychloride Sulfate at 100, 500, and 2,500 ppm did not result in treatment-related effects upon reproduction, behavior or food consumption of mallard ducks (Anas platyrhynchos) during the test period. Statistical analysis performed by the author showed a significant dose-related trend in numbers of deaths with the sexes combined and females alone. The NOEC, based upon mortality, was 100 ppm. The study, however, does not fulfill the guideline requirements for an avian reproduction study due to high control mortality, the use of replacement birds after test initiation, and a high percentage of cracked eggs in the control group.

4. Bobwhite Quail with Copper Oxychloride Sulfate; Preparation # LX1126-02; copper content: 58.80%; a green powder.

STUDY TYPE: Avian Reproduction Study.  
Species Tested: Bobwhite quail (Colinus virginianus).

CITATION: Hakin, B., M.H. Rodgers, A. Anderson, I.S. Dawe, and D.O. Chanter. 1989. The effects of dietary inclusion of copper oxychloride sulfate on reproduction in the bobwhite quail. Prepared by Huntingdon Research Centre Ltd., Huntingdon, Cambridgeshire, England. HRC study # CSF 2/891104. Submitted by Copper sulfate task force, Tennessee Chemical Company, Atlanta, Georgia. MRID No. 415008-02.

CONCLUSIONS: Nominal dietary concentrations of copper oxychloride sulfate at 2500 ppm resulted in decreased adult food consumption and bodyweight, decreased egg production, and decreased eggshell thickness. The NOEC, based on reduced eggshell thickness at 500 ppm, was 100 ppm. The study is scientifically sound but does not fulfill the guideline requirements for an avian reproduction study due to a high percentage of defective eggs in the control group.

Since these studies do not fulfill guideline requirements, it is impossible to conclude an assessment on the chronic toxicity of copper to birds. Acceptable studies must be provided. It is possible that acceptable studies would show that adverse effects do occur at 100 ppm, thus negating that NOEL provided by the studies submitted and summarized above.

If you have questions, please contact Dan Rieder.