Anthraquinone (122701) Fact Sheet

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I. Description of the Active Pesticide

Generic Names of the Active Ingredient: 9,10-anthraquinone

OPP Chemical Code: 22701

Year of Initial Registration: 1998

Pesticide Type: Repellent

Trade Name of End-Use Product: Flight ControlJ

U.S. Registrant:

Environmental Biocontrol, Intl
3521 Silverside Rd., Suite 1-L.
Wilmington, DE 19810

II. Use Sites, Target Pests, and Application Methods

- **Target Pests:** Geese

- **Use Sites:** Terrestrial areas at or near airports, commercial sites, industrial sites, municipal sites or in developed urban areas, golf courses, ornamental nurseries and conifer nurseries, landfills and dumpsites, building roofs, window sills and ledges.

- **Application Timing:** Applications should be made when geese have been determined to be a nuisance. Repeat applications at a weekly intervals.

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III. Science Findings

A. Human Health Effects

The information submitted in support of the application for registration of anthraquinone adequately satisfies the requirements set forth in 40 CFR 158.690 (c) for biochemical pesticides for nonfood outdoor uses. The overall toxicological risk from human exposure to anthraquinone is considered negligible.

1. Toxicology Assessment

Adequate mammalian toxicology data are available and support registration of the active ingredient 9, 10-anthraquinone.

a. Acute Toxicity

The registrant submitted acceptable acute toxicity studies for both the Technical Grade Active Ingredient (TGAI) and the end-use product. For the TGAI: (I) acute oral LD_{50} in rats was >5000 mg/kg (Tox category IV); (ii) acute dermal LD_{50} in rabbits was >5000 mg/kg (Tox category IV) and (iii) acute inhalation LC_{50} in rats was > 2.11 mg/L (Tox category IV). For the end-use product: (I) acute oral LD_{50} in rats was >5000 mg/kg (Tox category IV); (ii) acute dermal LD_{50} in rats was >5000 mg/kg (Tox category IV); (iii) acute inhalation LC_{50} in rats was > 2.04 mg/L (Tox category IV); (iv) the EP caused mild ocular irritation symptoms in rabbits which cleared by 72 hours post-instillation (Tox category III); (v) the EP caused slight dermal irritation symptoms in rabbits which cleared by 24 hours postdosing (Tox category III); and (vi) the EP was shown not to be a contact sensitizer in guinea pigs using the Buehler Method.

b. Mutagenicity and Developmental Toxicity

The registrant submitted acceptable mammalian mutagenicity studies for the TGAI. Based on the data obtained from the *Salmonella typhimurium/Escherichia coli* microsome reverse mutation assay, anthraquinone technical did not induce positive increases in the number of revertants when tester strain cell cultures were dosed with the a.i. at 15.7 to 500 Fg/culture plate. Based on the data obtained from the mouse lymphoma forward mutation assay, anthraquinone technical did not induce a significant increase in mutant cells relative to controls; no dose-response effects nor cell toxicity effects were observed. Based on the data obtained from the *in vivo* mouse microsomal assay, anthraquinone technical (orally fed to mice at 1250,

2500, 5000 mg/kg) did not induce increases in micronucleated PCEs (polychromatic erythrocytes) relative to vehicle controls; no bone marrow toxicity [measured as a decrease in PCE:NCE (normochromatic erythrocytes) ratio] was observed for any dose of test substance. Based on the data obtained from the Chinese hamster ovary (CHO) chromosomal aberration assay, anthraquinone technical did not induce significant increases in chromosomal aberrations, polyploidy, and endoreduplication. Additionally, there were no visual signs of cell toxicity and no reduction in mitotic indices relative to controls. The mutagenicity studies described above demonstrate that anthraquinone was not a mutagenic agent.

c. **Subchronic Toxicity**

A 90 - day feeding study was not required because of the nonfood use of anthraquinone. Moreover, the 90 - day dermal and inhalation toxicity studies are not required because the proposed use pattern does not result in prolonged exposure at concentrations that are likely to be toxic. The immunotoxicity study (cellular immune response study) was waived based on the minimal potential for exposure and the low toxicity of anthraquinone shown in the studies submitted.

d. **Chronic Exposure and Oncogenicity Assessment**

Chronic exposure studies are conditionally required to support nonfood uses only if the potential for adverse chronic effects are indicated based on 1) the subchronic effect levels established in Tier I subchronic oral, inhalation, or dermal studies, 2) the pesticide use pattern, or 3) the frequency and the level of repeated human exposure that is expected. Oncogenicity studies are required to support non-food uses only if the active ingredient or any of its metabolites, degradation products, or impurities produce in Tier I studies morphologic effects in any organ that potentially could lead to neoplastic changes. The triggers for chronic exposure and oncogenicity studies were not met.

e. **Effects on the Endocrine Systems**

The agency is not requiring information on the endocrine effects of this compound at this time. Congress has allowed 3 years after August 3, 1996, for the Agency to implement a screening program with respect to endocrine effects. However, BPPD has considered, among other

relevant factors, available information concerning whether this biochemical compound may have an effect in humans similar to an effect produced by a naturally occurring estrogen or other endocrine effects. There is no known evidence so far that active ingredient act as an endocrine disruption in humans. No adverse effects to the endocrine system is known or expected.

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2. **Dose Response Assessment**

No toxicological endpoints are identified.

3. **Dietary Exposure and Risk Characterization**

Dietary exposure is unlikely to occur because of the nonfood use of anthraquinone. In the absence of any toxicological endpoints, risk from the consumption of residues is not expected for the general population including infants and children.

4. **Occupational, Residential, School and Day Care Exposure and Risk Characterization**

Humans exposure to anthraquinone is expected to be minimal in these area.

a. **Occupational Exposure**

Based on its low toxicity and use practice (repellent of a vertebrate pest), anthraquinone is not subject to the Worker Protection Standards (WPS). Moreover, the possibility for dermal, eye and inhalation exposure, is mitigated as long as the product is used according to label directions which recommends allowing the material to dry before allowing human activity in the treated areas.

b. **Residential, School and Day Care Exposure and Risk Characterization**

No indoor residential, school, or day care uses currently appear on proposed labels.

5. **Drinking Water Exposure**

Exposure to anthraquinone in drinking water is not expected.

6. **Acute and Chronic Dietary Risks for Sensitive Subpopulations Particularly Infants and Children**

There are no food uses associated with the proposed use of the anthraquinone. Therefore, the acute dietary risks should be negligible based on the lack of exposure.

7. **Aggregate Exposure from Multiple Routes Including Dermal, Oral, and Inhalation**

Aggregate exposure would primarily occur in the mixer/loader/applicator subpopulations via dermal and inhalation routes. Risks associated with dermal and inhalation aggregate exposure are measured via the acute toxicity studies submitted to support registration. Because the inhalation toxicity studies for anthraquinone showed no toxicity (Toxicity Category IV), the risks anticipated for this route of exposure are considered minimal. Results of the acute dermal study indicated low toxicity (Toxicity Category IV), and no significant dermal irritation (Toxicity Category IV). Based on these results, the anticipated risks from dermal exposure are also considered minimal. Therefore, the risks from aggregate exposure via dermal and inhalation exposure are a compilation of two low risk exposure scenarios and are considered negligible.

8. **Cumulative Effects**

Anthraquinone is not toxic and therefore there would be no expected cumulative effects from common mechanisms of toxicity.

9. **Risk Characterization**

The Agency has considered anthraquinone in light of the relevant safety factors in FQPA and FIFRA. A determination has been made that no unreasonable adverse effects to the U. S. population in general, and to infants and children in particular, will result from the use of anthraquinone when label instructions are followed.

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B. Environmental Assessment

1. **Ecological Effects Hazard Assessment**

The registrant submitted acceptable ecotoxicity/non-target organism studies. Based on the data, the LD_{50} is >3000 mg a.i./kg body weight for Bobwhite quail orally dosed with anthraquinone technical (99.2%). Based on the data for a 24, 48, 72, and 96-hour study, the anthraquinone $LC_{50}$is >190 Fg/L for bluegill sunfish; the no observable effects concentration (NOEC) is >190 Fg/L. The 24, 48, 72, and 96-hour anthraquinone rainbow trout LC_{50} is >150 Fg/L; the no observable effects concentration (NOEC) is >150 Fg/L. Based on the data, the 48 hour daphnia LC_{50} is >240 Fg/L and the NOEC is >240 Fg/L; all daphnids survived the study period and no sublethal effects were observed. The studies described above indicate that the TGAI is slightly toxic to Bobwhite quail, non-toxic to bluegill sunfish and rainbow trout, and non-toxic to freshwater daphnids.

2. **Environmental Fate and Ground Water Data**

The need for environmental fate and groundwater data (Tier II, (40 CFR Section 158.690(d)(2)(vii through xv)) was not triggered because of practically non-toxic results indicated in Tier I studies. Risk to nontarget species is minimal due to the lack of toxicity, use pattern, and application methods.

3. **Ecological Exposure and Risk Characterization**

A potential for exposure exists to nontarget wildlife with terrestrial spray applications. However, test results indicate that the compound is practically nontoxic to freshwater fish, and, at most, slightly toxic to aquatic invertebrates and to Bobwhite quail. EPA also believes that low toxicity, and mitigating label language present minimal to nonexistent risk to wildlife.

C. Efficary Data

The use of the product in airports is intended to disperse birds that may pose threats to airplanes. Efficacy data were submitted to support claims of anthraquinone's ability to repel blackbirds, geese, cowbirds, robins, starlings, pigeons, horned lark and gulls. However, the review of the data indicated anthraquinone's repellency for **geese only**. Effects on the other bird species are not supported by the studies submitted. Because anthraquinone is not persistent in the environment (as demonstrated by the data), regular applications are required to keep the geese away.

IV. Summary of Data Gaps

There are no data gaps for the use of Anthraquinone.

V. Additional Contact Information

Ombudsman, Biopesticides and Pollution Prevention Division (7511P)
Office of Pesticide Programs
Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, D.C. 20460