

**Nomination:** 1-Amino-2,4-dibromoanthraquinone (ADBAQ)

**Review committee:** NTP Executive Committee Working Group for the Report on Carcinogens - RG2

**Review Date:** 10/02/02

### **Application of criteria**

#### ▪ **Exposure**

- The RG2 felt that there was sufficient evidence of human exposure to ADBAQ in the United States. ADBAQ is used as a dye and as a dye intermediate; US production of dyes totaled 14 million kilograms in 1991. ADBAQ is available from two vendors in the United States and was found in raw wastewater of a dye manufacturing plant. Dermal exposure of workers exposed to dyes is probably the main exposure to ADBAQ. Although no specific occupational information was found for ADBAQ in the current literature, epidemiologic studies indicate potential occupational exposure to anthraquinone dyes in a New Jersey dye and resin manufacturing plant.
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### **Carcinogenicity**

#### **Animal Data:**

The RG2 felt that the National Toxicology Program two-year feeding study in rats and mice provided sufficient evidence that ADBAQ was carcinogenic in experimental animals. Tumors were observed in multiple species and at multiple tissue sites. Significant increased incidences of neoplasms in the liver, large intestine, kidney and urinary bladder were observed in F344/N rats and significant increases in the incidences in neoplasms of liver, forestomach and lung were observed in male and female mice.

#### **Human Data:**

Although there were no studies of specific exposure to ADBAQ there were studies of two populations exposed to anthraquinones dyes and intermediates. In the first population, an excess of esophageal and prostate cancer was observed in Scottish workers and in the second study, an excess of lung and CNS cancers were observed in New Jersey workers (reported in two cohort studies and two nested case-control studies). The committee noted that the tumor sites were not consistent between studies although there was site concordance of lung cancer with the animal studies. The committee also felt that the excess of lung cancer might have been due to occupational exposure; however, the human data were not specific for the evaluation of exposure to ADBAQ.

### **Other Scientific Concerns**

#### **Genotoxicity and Mechanistic Data:**

ADBAQ is mutagenic in bacteria strains that revert by frame shift mutations. Other evidence of ADBAQ genotoxicity included induction of chromosomal aberrations and sister chromatid

exchange in CHO cells without metabolic activation and the induction of ras mutations in forestomach and lung tumors in experimental animals.

**Recommendation**

**Motion:**

Recommend that 1-Amino-2,4-dibromoanthraquinone to be listed in the RoC as *reasonably anticipated to be a human carcinogen* based on sufficient evidence in animals that indicates there is an increased incidence of malignant and/or a combination of malignant and benign tumors at multiple tissue sites in multiple species of experimental animals

Vote on the motion: 8 yes votes to 0 no votes