Central Data Management at P.O. Box 12233, Research Triangle Park, NC 27709 or telephone (91) 541–3419.

Copies of *Toxicology and Carcinogenesis Studies of Nickel Oxide (CAS No. 1313–99–1)* (TR–451) are available without charge from Central Data Management, NIEHS, MD E1–02, P.O. Box 12233, Research Triangle Park, NC 27709; telephone (919) 541–3419.

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Samuel H. Wilson,

Deputy Director, NIEHS.

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National Toxicology Program; Availability of Technical Report on Toxicology and Carcinogenesis Studies of Isobutyl Nitrite

The HHS' National Toxicology Program announces the availability of the NTP Technical Report on the toxicology and carcinogenesis studies of isobutyle nitrite which is used as an intermediate in the syntheses of aliphatic nitrites. It is also an ingredient of various incenses or room odorizers and is used as a euphoric. The chemical has also been used as a jet propellant and in the preparation of fuels.

Toxicology and carcinogenicity studies were conducted by inhalation administration of isobutyl nitrite to groups of 56 F344/N rats and 60 B6C3F_1 mice of each sex at exposures of 0, 37.5, 75, or 150 ppm (equivalent to 0, 158, 315, or 630 mg/m^3) for 6 hours per day, 5 days per week, for 103 weeks.

Under the conditions of these 2-year studies, there was clear evidence of carcinogenic activity[1] of isobutyl nitrite in male and female F344/N rats based on the increased incidences of alveolar/bronchiolar adenoma and alveolar/bronchiolar adenoma or carcinoma (combined). There was *some evidence of carcinogenic activity* of isobutyl nitrite in male and female B6C3F_1 mice based on the increased incidences of alveolar/bronchiolar adenoma and alveolar/bronchiolar adenoma or carcinoma (combined) in males and females. The increased incidence of thyroid gland follicular cell adenoma in male mice may have been related to isobutyl nitrite exposure.

Exposure of rats and mice to isobutyl nitrite by inhalation for 2 years resulted in increased incidences of alveolar epithelial hyperplasia (male and female rate and mice), thyroid gland follicular cell hyperplasia and splenic hemosiderin pigmentation (male mice), and serous exudate and atrophy of the olfactory epithelium of the nose (female mice).

Exposure of rats to isobutyl nitrite by inhalation for 2 years resulted in decreased incidences of mononuclear cell leukemia in males and females.

Questions or comments about the Technical Report should be directed to Central Data Management at P.O. Box 12233, Research Triangle Park, NC 27709 or telephone (919) 541–3419.

Copies of *Toxicology and Carcinogenesis Studies of Isobutyl Nitrite (CAS No. 542–56–3)* (TR–448) are available without charge from Central Data Management, NIEHS, MD E1–02, P.O. Box 12233, Research Triangle Park, NC 27709; telephone (919) 541–3419.

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Samuel H. Wilson,

Deputy Director, NIEHS

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National Toxicology Program; Availability of Technical Report on Toxicology and Carcinogenesis Studies of 1-Amino-2,4-Dibromoanthraquinone

The HHS' National Toxicology Program announces the availability of the NTP Technical Report on the toxicology and carcinogenesis studies of 1-amino-2,4-dibromoanthraquinone. This chemical is an anthraquinone-derived vat dye, a member of a class of insoluble dyes that are impregnated into textile fibers.

Toxicology and carcinogenicity studies were conducted by administering 1-amino-2,4-dibromoanthraquinone to groups of 70 F344/N rats of each sex at 0; 5,000; or 10,000 ppm in feed for 104 weeks. In addition, groups of 50 F344/N rats of each sex were given 2,000 ppm for 104 weeks. Groups of 60 B6C3F_1 mice of each sex were given 0, 10,000, or 20,000 ppm in feed for 104 weeks.

Under the conditions of these 2-year feed studies, there was clear evidence of carcinogenic activity[1] of 1-amino-2,4-dibromoanthraquinone in male and female F344/N rats based on increased incidences of neoplasms in the liver, large intestine, kidney, and urinary bladder. There was clear evidence of carcinogenic activity of 1-amino-2,4-dibromoanthraquinone in male and female B6C3F_1 mice based on increased incidences of neoplasms in the liver, forestomach, and lung.

Questions or comments about the Technical Report should be directed to Central Data Management at P.O. Box 12233, Research Triangle Park, NC 27709 or telephone (919) 541–3419.

Copies of *Toxicology and Carcinogenesis Studies of 1-Amino-2,4-Dibromoanthraquinone (CAS No. 81–49–2)* (TR–383) are available without charge from Central Data Management, NIEHS, MD E1–02, P.O. Box 12233, Research Triangle Park, NC 27709; telephone (919) 541–3419.

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Deputy Director, NIEHS.

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National Toxicology Program; Availability of Technical Report on Toxicology and Carcinogenesis Studies of Codeine

The HHS' National Toxicology Program announces the availability of the NTP Technical Report on the toxicology and carcinogenesis studies of codeine, which is used in a variety of pharmaceuticals including analgesics, sedatives, hypnotics, antiperistaltics, and antitussive agents.

Toxicology and carcinogenicity studies were conducted by oral administration of codeine to groups of 60 F344/N rats of each sex at 0, 400, 800, or 1,600 ppm and 60 B6C3F_1 mice of each sex at 0, 750, 1,500, or 3,000 ppm in feed for up to 106 weeks. In addition 9 or 10 animals per group were evaluated at 15 months.

Under the conditions of these 2-year feed studies, there was no evidence of carcinogenic activity [1] of codeine in male or female F344/N rats exposed to 400, 800, or 1,600 ppm. There was no evidence of carcinogenic activity of codeine in male or female B6C3F_1 mice exposed to 750, 1,500, or 3,000 ppm.

Thyroid gland follicular cell hyperplasia was increased in exposed male and female mice.

Decreased incidences of benign pheochromocytomas of the adrenal

[1] The NTP uses five categories of evidence of carcinogenic activity observed in each animal study: two categories for positive results (''clear evidence'' and ''some evidence''), one category for uncertain findings (''equivocal evidence''), one category for studies that cannot be evaluated because of major flaws (''inadequate study'').

[1] The NTP uses five categories of evidence of carcinogenic activity observed in each animal study: two categories for positive results (''clear evidence'' and ''some evidence''), one category for uncertain findings (''equivocal evidence''), one category for studies that cannot be evaluated because of major flaws (''inadequate study'').

[1] The NTP uses five categories of evidence of carcinogenic activity observed in each animal study; two categories for positive results (''clear evidence'' and ''some evidence''), one category for uncertain findings (''equivocal evidence''), one category for studies that cannot be evaluated because of major flaws (''inadequate study'').

medulla in male rats and mammary gland fibroadenomas and fibroadenomas or adenocarcinomas (combined) in female rats were related to codeine exposure.

Questions or comments about the Technical Report should be directed to Central Data Management at P.O. Box 12233, Research Triangle Park, NC 27709 or telephone (919) 541–3419.

Copies of *Toxicology and Carcinogenesis Studies of Codeine (CAS No. 76–57–3)* (TR–455) are available without charge from Central Data Management, NIEHS, MD E1–02, P.O. Box 12233, Research Triangle Park, NC 27709; telphone (919) 541–3419.

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Samuel H. Wilson,

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National Toxicology Program; Availability of Technical Report on Toxicology and Carcinogenesis Studies of 2,2-Bis(Bromomethyl)-1,3-Propanediol

The HHS' National Toxicology Program announces the availability of the NTP Technical Report on the toxicology and carcinogenesis studies of 2,2-bis(bromomethyl)-1,3-propanediol which is used as a fire retardant in unsaturated polyester resins, in molded products, and in rigid polyurethane foam.

Toxicology and carcinogenicity studies were conducted by administering 2,2-bis(bromomethyl)-1,3-propanediol to groups of 60 F344/N rats of each sex in feed at exposures of 0, 2,500, 5,000, or 10,000 for 104 to 105 weeks. Nine or ten control animals and five to nine animals from each of the continuous-exposure groups were evaluated at 15 months. Additional male rats added for a ''stop-study'' received 0 or 20,000 ppm for 3 months, after which animals received undosed feed for the remainder of the 2-year study. Groups of 60 $B6C3F_1$ mice of each sex received 0, 312, 625, or 1,250 ppm in feed for 104 to 105 weeks. Eight to 10 animals were evaluated at 15 months.

Under the conditions of these 2-year feed studies, there was clear evidence of carcinogenic activity[1] of 2,2-bis(bromomethyl)-1,3-propanediol (FR–1138®) in male F344/N rats based on increased incidences of neoplasms of the skin, subcutaneous tissue, mammary gland, Zymbal's gland, oral cavity, esophagus, forestomach, small and large intestines, mesothelium, urinary bladder, lung, thyroid gland, and seminal vesicle, and the increased incidence of mononuclear cell leukemia.

There was clear evidence of carcinogenic activity of 2,2-bis(bromomethyl)-1,3-propanediol in female F344/N rats based on increased incidences of neoplasms of the oral cavity, esophagus, mammary gland, and thyroid gland. There was clear evidence of carcinogenic activity of 2,2-bis(bromomethyl)-1,3-propanediol in male $B6C3F_1$ mice based on increased incidences of neoplasms of the harderian gland, lung, and kidney.

There was clear evidence of carcinogenic activity of 2,2-bis(bromomethyl)-1,3-propanediol in female $B6C3F_1$ mice based on increased incidences of neoplasms of the harderian gland, lung, and subcutaneous tissue. Slight increases in the incidences of neoplasms of the pancreas and kidney in male rats; forestomach in male mice; and forestomach mammary gland, and circulatory system in female mice may have also been related to treatment.

Exposure of male and female rats to 2,2-bis(bromomethyl)-1,3-propanediol was associated with alveolar/bronchiolar hyperlasia in the lung (males only); focal atrophy, papillary degeneration, transitional epithelial hyperplasia (pelvis), and papillary epithelial hyperplasia in the kidney; follicular cell hyperplasia in the thyroid gland (males only); hyperplasia in the seminal vesicle and pancreas (males only); mucosal hyperplasia in the forestomach (males only); and urinary bladder hyperplasia (males only). Exposure of mice to 2,2-bis(bromomethyl)-1,3-propanediol was associated with hyperplasia of the alveolar epithelium in females.

Questions or comments about the Technical Report should be directed to Central Data Management at P.O. Box 12233, Research Triangle Park, NC 27709 or telephone (919) 541–3419.

Copies of Toxicology and Carcinogenesis Studies of 2,2-Bis(bromomethyl)-1,3-propanediol (CAS No. 3296–90–0) (TR–452) are available without charge from Central Data Management, NIEHS, MD E1–02, P.O. Box 12233, Research Triangle Park, NC 27709; telephone (919) 541–3419.

[1] The NTP uses five categories of evidence of carcinogenic activity observed in each animal study: two categories for positive results (''clear evidence'' and ''some evidence''), one category for uncertain findings (''equivocal evidence''), one category for no observable effect (''no evidence''), and one category for studies that cannot be evaluated because of major flaws (''inadequate study'').

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Samuel H. Wilson,

Deputy Director, NIEHS.

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National Toxicology Program; Availability of Technical Report on Toxicology and Carcinogenesis Studies of Nickel Sulfate Hexahydrate

The HHS' National Toxicology Program announces the availability of the NTP Technical Report on the toxicology and carcinogenesis studies of nickel sulfate hexahydrate which is used in nickel plating, as a mordant in dyeing and printing textiles, as a blackening agent for zinc and brass, and in the manufacture of organic nickel salts. This chemical was studied because of potential for exposure in nickel industries.

Toxicology and carcinogenicity studies were conducted by inhalation administration of nickel sulfate hexahydrate to groups of 63 to 65 female F344/N rates at concentrations of 0, 0.12, 0.25, or 0.5 mg/m^3 (equivalent to 0, 0.03, 0.06, or 0.11 mg nickel/m^3) and groups of 80 $B6C3F_1$ mice of each sex at concentrations of 0, 0.25, 0.5, or 1 mg/m^3 (equivalent to 0, 0.06, 0.11, or 0.22 mg nickel/m^3) for 6 hours per day 5 days per week, for up to 104 weeks.

Under the conditions of these 2-year inhalation studies, there was no evidence of carcinogenic [1] activity of nickel sulfate hexahydrate in male or female F344/N rats exposed to 0.12, 0.25, or 0.5 mg/m^3 (0.03, 0.06, or 0.11 mg nickel/m^3). There was no evidence of carcinogenic activity of nickel sulfate hexahydrate in male or female $B6C3F_1$ mice exposed to 0.25, 0.5, or 1 mg/m^3 (0.06, 0.11, or 0.22 mg nickel/m^3).

Exposure of rats to nickel sulfate hexahydrate by inhalation for 2 years resulted in increased incidences of chronic active inflammation, macrophage hyperplasia, alveolar proteinosis, and fibrosis of the lung; lymphoid hyperplasia of the bronchial lymph node; and atrophy of the olfactory epithelium. Exposure of mice to nickel sulfate hexahydrate by inhalation for 2 years resulted in increased incidences of chronic active inflammation, bronchialization (alveolar

[1] The NTP uses five categories of evidence of carcinogenic activity observed in each animal study: two categories for positive results (''clear evidence'' and ''some evidence''), one category for uncertain findings (''equivocal evidence''), one category for studies that cannot be evaluated because of major flaws (''inadequate study'').