

## Creosote; CASRN 8001-58-9

Human health assessment information on a chemical substance is included in the IRIS database only after a comprehensive review of toxicity data, as outlined in the [IRIS assessment development process](#). Sections I (Health Hazard Assessments for Noncarcinogenic Effects) and II (Carcinogenicity Assessment for Lifetime Exposure) present the conclusions that were reached during the assessment development process. Supporting information and explanations of the methods used to derive the values given in IRIS are provided in the [guidance documents located on the IRIS website](#).

### STATUS OF DATA FOR Creosote

**File First On-Line 09/07/1988**

Category (section)	Assessment Available?	Last Revised
Oral RfD (I.A.)	not evaluated	
Inhalation RfC (I.B.)	not evaluated	
Carcinogenicity Assessment (II.)	yes	09/07/1988

## I. Chronic Health Hazard Assessments for Noncarcinogenic Effects

### I.A. Reference Dose for Chronic Oral Exposure (RfD)

Substance Name — Creosote  
CASRN — 8001-58-9

Not available at this time.

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### I.B. Reference Concentration for Chronic Inhalation Exposure (RfC)

Substance Name — Creosote  
CASRN — 8001-58-9

Not available at this time.

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## **II. Carcinogenicity Assessment for Lifetime Exposure**

Substance Name — Creosote

CASRN — 8001-58-9

Last Revised — 09/07/1988

Section II provides information on three aspects of the carcinogenic assessment for the substance in question; the weight-of-evidence judgment of the likelihood that the substance is a human carcinogen, and quantitative estimates of risk from oral exposure and from inhalation exposure. The quantitative risk estimates are presented in three ways. The slope factor is the result of application of a low-dose extrapolation procedure and is presented as the risk per (mg/kg)/day. The unit risk is the quantitative estimate in terms of either risk per ug/L drinking water or risk per ug/cu.m air breathed. The third form in which risk is presented is a drinking water or air concentration providing cancer risks of 1 in 10,000, 1 in 100,000 or 1 in 1,000,000. The rationale and methods used to develop the carcinogenicity information in IRIS are described in The Risk Assessment Guidelines of 1986 (EPA/600/8-87/045) and in the IRIS Background Document. IRIS summaries developed since the publication of EPA's more recent Proposed Guidelines for Carcinogen Risk Assessment also utilize those Guidelines where indicated (Federal Register 61(79):17960-18011, April 23, 1996). Users are referred to Section I of this IRIS file for information on long-term toxic effects other than carcinogenicity.

### **II.A. Evidence for Human Carcinogenicity**

#### **II.A.1. Weight-of-Evidence Characterization**

Classification — B1; probable human carcinogen.

Basis — limited evidence of the association between occupational creosote contact and subsequent tumor formation, sufficient evidence of local and distant tumor formation after dermal application to mice, and some evidence of mutagenic activity, as well as the well-documented carcinogenicity of other coal tar products to humans.

#### **II.A.2. Human Carcinogenicity Data**

Limited. Creosote is a mixture of over 200 chemical compounds, most of which are aromatic hydrocarbons. This chemical mixture is obtained by fractional distillation of coal tar, which is a

by-product of high temperature coking of bituminous coal. Wood preservative creosote is commonly used on railroad cross ties, utility poles, lumber and timber, fence post and pilings for docks and foundations (U.S. EPA, 1977).

Several case reports of human carcinomas associated with exposure to creosote have been published. Cookson (1924) described the case of a 66-year-old creosote factory worker who had developed a squamous cell carcinoma of the right hand after 33 years of heavy exposure. The patient died 8 weeks after the diagnosis of the tumor. The autopsy revealed metastases to the lungs, liver, kidneys, heart and axillary lymph nodes. Haldin-Davis (1935) described a similar case in which a worker developed squamous cell papillomas of the hands, forearms, nose and thighs after several years of employment in the creosote impregnation of logs. Lenson (1956) reported a case of a 64-year-old man who developed five primary cutaneous carcinomas of the face. The man had been employed from 1947 to 1950 at a creosote shipyard.

It has been demonstrated that chimney sweeps exposed to creosote from the burning of wood and coal have an elevated risk of cancer. There are no adequate studies of workers exposed to creosote wood preservatives. Creosote wood preservatives contain many of the compounds present in other polycyclic aromatic hydrocarbon mixtures (roofing tar pitch and coke oven emissions) that have been found to be human carcinogens (U.S. EPA, 1986a).

### **II.A.3. Animal Carcinogenicity Data**

Sufficient. Poel and Kammer (1957) applied blended creosote oil (mixture of creosote, anthracene oils, and the oil drained from naphthalene recovery operations) to the skin of C57L female mice for the animals' lifetimes or until persistent papillomas developed. Skin carcinomas and papillomas were observed in all eight mice receiving 1 drop of 80% solution 3 times/week for 18-25 weeks as well as in eight mice receiving 1 drop of 20% solution 3 times/week for 21-44 weeks (1 drop = 0.0087-0.009 cc). No tumors developed in the 10 control animals after the administration of 1 drop of toluene 3 times/week for their lifetime. Lijinsky et al. (1957) applied 1 drop of creosote oil twice a week to the skin of female Swiss mice for 70 weeks. Skin tumors, 16 of which were carcinomas, were reported in 23/26 of the mice. The average latent period was 50 weeks. Although no untreated control group was included in the study, a control group of 50 mice receiving a single application of 1% dimethyl benz[a]anthracene in mineral oil developed no tumors after 80 weeks. Boutwell and Bosch (1958) applied 25 uL of creosote oil (Carbasota) twice weekly to 8-week-old female mice (random bred) for 28 weeks. No untreated control group was included. Among the 30 treated mice, the average number of skin papillomas was 5.4 at 28 weeks. The average induction time for papillomas and carcinomas was 20 and 26 weeks, respectively. Tumor incidence was not reported, although it appeared to be 100%.

Roe et al. (1958) applied 25 uL of creosote oil, known as Carbasota, to the skin of 3-week-old female random bred mice twice weekly for 21 weeks. After 8 months, 24 of the 25 surviving mice bore a total of 139 lung adenomas. In the untreated control group of 19 mice, a total of nine lung tumors were reported. Creosote oil (25 uL twice weekly for 4 weeks) was also applied dermally to 8-week-old mice. After 10 months, 23 of the 30 surviving mice bore a total of 37 lung adenomas. Among 50 surviving control mice treated with croton oil or benzene oil alone, 15 lung adenomas were reported.

Other studies indicate that creosote produced an additive effect on skin tumor response in mice when applied together with benzo[a]pyrene (Poel and Kammer, 1957).

#### **II.A.4. Supporting Data for Carcinogenicity**

Creosote caused mutations in *S. typhimurium* strains TA98, TA100 and TA1537 and in L5178y mouse lymphoma cells (Federal Register, 1978).

The carcinogenic effect of creosote is supported by reports of studies in which other coal tar products produced tumors in mice and rats by topical application and by inhalation, and by the identification of carcinogenic polycyclic aromatic hydrocarbons in coal tar products (NIOSH, 1977).

Creosote displayed tumor-promoting activity when applied topically to mice after a single initiating treatment with 7,12-dimethylbenz[a]anthracene (Boutwell and Bosch, 1958).

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#### **II.B. Quantitative Estimate of Carcinogenic Risk from Oral Exposure**

Not available.

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#### **II.C. Quantitative Estimate of Carcinogenic Risk from Inhalation Exposure**

Not available.

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#### **II.D. EPA Documentation, Review, and Contacts (Carcinogenicity Assessment)**

##### **II.D.1. EPA Documentation**

Source Document — U.S. EPA, 1986a,b, 1977

The 1986 Reportable Quality Document for Creosote (review draft) has received limited Agency Review.

### **II.D.2. EPA Review (Carcinogenicity Assessment)**

Agency Work Group Review — 05/13/1987

Verification Date — 05/13/1987

Screening-Level Literature Review Findings — A screening-level review conducted by an EPA contractor of the more recent toxicology literature pertinent to the cancer assessment for Creosote conducted in November 2001 did not identify any critical new studies. IRIS users who know of important new studies may provide that information to the IRIS Hotline at [hotline.iris@epa.gov](mailto:hotline.iris@epa.gov) or (202)566-1676.

### **II.D.3. EPA Contacts (Carcinogenicity Assessment)**

Please contact the IRIS Hotline for all questions concerning this assessment or IRIS, in general, at (202)566-1676 (phone), (202)566-1749 (FAX) or [hotline.iris@epa.gov](mailto:hotline.iris@epa.gov) (internet address).

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**III. [reserved]**

**IV. [reserved]**

**V. [reserved]**

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## **VI. Bibliography**

Substance Name — Creosote  
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### **VI.A. Oral RfD References**

None

## **VI.B. Inhalation RfC References**

None

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## **VI.C. Carcinogenicity Assessment References**

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Federal Register. 1978. Vol. 43, No. 200, October 18, 1978, p. 48199.

Haldin-Davis, H.W. 1935. Multiple warts in a creosote worker. *Proc. Royal Soc. Med.* 29: 89-90.

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Poel, W.E. and A.G. Kammer. 1957. Experimental carcinogenicity of coal-tar fractions: The carcinogenicity of creosote oils. *J. Natl. Cancer Inst.* 18(1): 41-55.

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U.S. EPA. 1986b. Reportable Quantity Document for Creosote. Prepared by the Carcinogen Assessment Group, Office of Health and Environmental Assessment, Washington, DC for the

Office of Emergency and Remedial Response and the Office of Solid Waste and Emergency Response, Washington, DC.

U.S. EPA. 1977. Carcinogen Assessment Group's Report on Creosote. Office of Health and Environmental Assessment, Washington, DC, October 27. (unpublished)

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## VII. Revision History

Substance Name — Creosote  
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Date	Section	Description
09/07/1988	II.	Carcinogen summary on-line
12/03/2002	II.D.2.	Screening-Level Literature Review Findings message has been added.

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## VIII. Synonyms

Substance Name — Creosote  
CASRN — 8001-58-9  
Last Revised — 09/07/1988

- 8001-58-9
- AWPA #1
- BRICK OIL
- COAL TAR CREOSOTE
- COAL TAR OIL
- Creosote
- CREOSOTE OIL
- CREOSOTE P1
- CREOSOTUM
- CRESYLIC CREOSOTE
- LIQUID PITCH OIL
- NAPHTHALENE OIL

- PRESERV-O-SOTE
- RCRA WASTE NUMBER U051
- TAR OIL
- UN 1136