

**CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF ENVIRONMENTAL HEALTH HAZARD ASSESSMENT
SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986
(PROPOSITION 65)**

**NOTICE OF INTENT TO LIST PENTACHLOROPHENOL AND BY-PRODUCTS OF
ITS SYNTHESIS (COMPLEX MIXTURE)**

OCTOBER 30, 2015

The California Environmental Protection Agency's Office of Environmental Health Hazard Assessment (OEHHA) intends to list "*pentachlorophenol and by-products of its synthesis (complex mixture)*" as known to the state to cause cancer under the Safe Drinking Water and Toxic Enforcement Act of 1986.¹ This action is being proposed under the authoritative bodies listing mechanism.²

¹ Commonly known as Proposition 65, the Safe Drinking Water and Toxic Enforcement Act of 1986 is codified in Health and Safety Code section 25249.5 *et seq.*

² See Health and Safety Code section 25249.8(b) and Title 27, Cal. Code of Regs., section 25306.

Chemical (CAS No.)	Endpoint	Reference	Occurrence and Uses
<i>Pentachlorophenol^a and by-products of its synthesis^b (complex mixture)</i> Pentachlorophenol (87-86-5), and Pentachlorophenol, sodium salt (131-52-2)	Cancer	NTP ^c (2014)	The commercially available complex mixture of pentachlorophenol and by-products of its synthesis is a restricted-use pesticide and registered as a heavy-duty wood preservative for utility poles, cross arms, pilings, fence posts, and construction. It is also used as a competitive inhibitor of sulfotransferase in the laboratory. The complex mixture was used in the past as a biocide in ropes, paints, adhesives, leather, canvas, insulation, and brick walls. Indoor uses were cancelled in 1984. Non-wood preservative uses were cancelled and restricted in 1987.

^a Pentachlorophenol is currently listed as known to the state to cause cancer under Proposition 65. This listing includes the byproducts of pentachlorophenol synthesis, which are found in varying amounts in pentachlorophenol and the sodium salt formulations.

^b The commonly found by-products of pentachlorophenol synthesis include polychlorinated phenols (trichlorophenols and tetrachlorophenols), hexachlorobenzene, polychlorinated dibenzofurans (hexachlorodibenzofurans, heptachlorodibenzofurans, and octachlorodibenzofuran), polychlorinated dibenzo-*p*-dioxins (hexachlorodibenzo-*p*-dioxins, heptachlorodibenzo-*p*-dioxins, and octachlorodibenzo-*p*-dioxin), whereas 2,3,7,8-tetrachlorodibenzo-*p*-dioxin is a less commonly found by-product. Among them, 2,4,6-trichlorophenol, hexachlorobenzene, hexachlorodibenzodioxin, polychlorinated dibenzo-*p*-dioxins, and polychlorinated dibenzofurans are listed as known to the state to cause cancer under Proposition 65.

c. NTP = National Toxicology Program

Background on listing via the authoritative bodies mechanism: A chemical must be listed under the Proposition 65 regulations when two conditions are met:

- 1) An authoritative body formally identifies the chemical as causing cancer (Section 25306(d)³).
- 2) The evidence considered by the authoritative body meets the sufficiency criteria contained in the regulations (Section 25306(e)).

However, the chemical is not listed if scientifically valid data which were not considered by the authoritative body clearly establish that the sufficiency of evidence criteria were not met (Section 25306(f)).

³ All referenced sections are from Title 27 of the Cal. Code of Regulations.

The National Toxicology Program (NTP) is one of several institutions designated as authoritative for the identification of chemicals as causing cancer (Section 25306(m)). OEHHA is the lead agency for Proposition 65 implementation. After an authoritative body has made a determination about a chemical, OEHHA evaluates whether listing under Proposition 65 is required using the criteria contained in the regulations.

OEHHA's determination: *Pentachlorophenol and by-products of its synthesis (complex mixture)* meet the criteria for listing as known to the state to cause cancer under Proposition 65, based on the findings of NTP (2014).

Formal identification and sufficiency of evidence for *pentachlorophenol and by-products of its synthesis (complex mixture)*: In 2014, NTP published the Thirteenth Edition of the [Report on Carcinogens](#) (NTP, 2014). This report satisfies the formal identification and sufficiency of evidence criteria in the Proposition 65 regulations for *pentachlorophenol and by-products of its synthesis (complex mixture)*. NTP concluded that “The complex mixture pentachlorophenol and by-products of its synthesis is [reasonably anticipated to be a human carcinogen](#) based on limited evidence of carcinogenicity from studies in humans and sufficient evidence of carcinogenicity from studies in experimental animals” (emphasis in original). Additionally, NTP states that “People exposed to pentachlorophenol are also exposed to its by-products; therefore, the listing is for this complex mixture,” and that “the evidence from studies in experimental animals indicates that the observed carcinogenicity cannot be fully explained by either the presence of by-products alone or pentachlorophenol alone.”

OEHHA is relying on NTP's discussion of data and conclusions in the report that *pentachlorophenol and by-products of its synthesis (complex mixture)* causes cancer. Evidence described in the report includes studies showing that *pentachlorophenol and by-products of its synthesis (complex mixture)* increased the incidences of malignant liver tumors in male mice, combined malignant and benign liver tumors and combined malignant and benign adrenal-gland tumors in male and female mice, malignant tumors of the blood vessels of the spleen and/or liver in female mice, malignant tumors in the tunica vaginalis of the testes in male rats, and malignant tumors of the nose to an unusual degree with respect to tumor type in male rats.

“The combined incidence of benign and malignant liver tumors (hepatocellular adenoma and carcinoma) was significantly increased in mice of both sexes

following dietary exposure to Dowicide EC-7⁴ and in males following exposure to technical-grade pentachlorophenol. In males exposed to either formulation, the separate incidence of malignant liver tumors also was significantly increased” (footnote not in original).

“The incidences of benign and malignant adrenal-gland tumors (pheochromocytoma) combined, benign adrenal-gland tumors, and preneoplastic adrenal-gland lesions (medullary hyperplasia) were significantly increased in mice of both sexes exposed to Dowicide EC-7.”

“The incidence of malignant tumors of the blood vessels (hemangiosarcoma) of the spleen and/or liver was significantly increased in female mice exposed to technical-grade pentachlorophenol or Dowicide EC-7.”

“In male F344 rats (Chhabra et al. 1999, NTP 1999), increased incidences of tumors were observed in the tunica vaginalis of the testes and in the nose. In a stop-exposure study, the incidence of malignant mesothelioma of the tunica vaginalis was significantly increased after dietary exposure to 99% pure pentachlorophenol for one year, followed by one year of observation. Although the increased incidence of squamous-cell carcinoma of the nose was not statistically significant, this is a rare tumor, and its incidence exceeded the range for historical controls.”

Thus, NTP (2014) found that *pentachlorophenol and by-products of its synthesis (complex mixture)* causes increased incidences of malignant liver tumors in male mice, combined malignant and benign liver tumors and combined malignant and benign adrenal-gland tumors in male and female mice, malignant tumors of the blood vessels of the spleen and/or liver in female mice. The title of the NTP Substance Profile includes sodium pentachlorophenate (pentachlorophenol, sodium salt) and its CAS number and it is discussed in the NTP Substance Profile as a water-soluble formulation of pentachlorophenol. It dissociates to pentachlorophenol in aqueous solution. Pentachlorophenol, sodium salt is included in this proposed listing.

Request for comments: OEHHA is requesting comments as to whether *pentachlorophenol and by-products of its synthesis (complex mixture)* meets the criteria set forth in the Proposition 65 regulations for authoritative bodies listings. In order to be considered, **OEHHA must receive comments by 5:00 p.m. on November 30, 2015.** We encourage you to submit comments in electronic form, rather than in paper form.

⁴ Dowicide EC-7 is a technical-grade formulation of pentachlorophenol, which contains approximately 90% pure pentachlorophenol.

Comments transmitted by e-mail should be addressed to P65Public.Comments@oehha.ca.gov with “NOIL - *pentachlorophenol*” in the subject line. Comments submitted in paper form may be mailed, faxed, or delivered in person to the addresses below:

Mailing Address: Ms. Esther Barajas-Ochoa
Office of Environmental Health Hazard Assessment
P.O. Box 4010, MS-12B
Sacramento, California 95812-4010

Fax: (916) 323-2265

Street Address: 1001 I Street
Sacramento, California 95814

Comments received during the public comment period will be posted on the OEHHA web site after the close of the comment period. Electronic files submitted should not have any form of encryption.

If you have any questions, please contact Esther Barajas-Ochoa at esther.barajas-ochoa@oehha.ca.gov or at (916) 445-6900.

References

NTP (2014). Report on Carcinogens, Thirteenth Edition, U.S. Department of Health and Human Services, Public Health Service, NTP, Research Triangle Park, North Carolina. Available at URL: <http://ntp.niehs.nih.gov/pubhealth/roc/roc13/index.html>.