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Office of Environmental Health Hazard Assessment  
P.O. Box 4010, MS-19B  
Sacramento, California 95812-4010

September 10<sup>th</sup> 2015

Re: Letter in support of listing tetrachlorvinphos, parathion, malathion, and glyphosate as chemicals known to cause cancer

To Whom it May Concern,

I write to you to express the Center for Biological Diversity's (Center) strong support for the decision of the California Office of Environmental Health Hazard Assessment (OEHHA) to list tetrachlorvinphos, parathion, malathion, and glyphosate as known to the state to cause cancer under the Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65).

The Center is a non-profit environmental organization with offices in Oakland, CA and elsewhere in the United States dedicated to the protection of diverse native species and their habitats through science, policy, education and law. The Center has over 900,000 members and online activists throughout the United States, including over 100,000 in California. Recognizing that pesticides are one of the foremost threats to the environment, biodiversity, and public health, the Center works to prevent and reduce the use of harmful pesticides and to promote sound pest management strategies.

According to the OEHHA website: "On July 6, 2015, the Office of Administrative Law approved the adoption of Section 25904, Chemical Listings by Reference to California Labor Code section 6382(b)(1), to Title 27 of the California Code of Regulations. This regulatory action adds a section to the existing Proposition 65 implementing regulations that sets forth the criteria for listing chemicals by reference to Labor Code section 6382(b)(1), as required under Health and Safety Code section 25249.8(a)."

Title 27 California Code of Regulations section 25904 states:

"A chemical or substance shall be included on the list if it is classified by the International Agency for Research on Cancer (IARC) in its IARC Monographs series on the Evaluation of Carcinogenic Risks to Humans (most recent edition), or in its list of Agents Classified by the IARC Monographs, as: (1) Carcinogenic to humans (Group 1), or (2) Probably carcinogenic to humans (Group 2A) with sufficient evidence of carcinogenicity in experimental animals, or (3)

Possibly carcinogenic to humans (Group 2B) with sufficient evidence of carcinogenicity in experimental animals. A chemical or substance for which there is less than sufficient evidence of carcinogenicity in experimental animals and classified by IARC in Group 2B shall not be included on the list.”

According to the published IARC monograph on glyphosate [1], it was concluded that there was “sufficient evidence in experimental animals for the carcinogenicity of glyphosate.”

Of the eight animal studies that the IARC deemed adequate for evaluation, five showed evidence of carcinogenicity [1].

- One feeding study in mice showed a positive trend in the incidence of renal tubule carcinoma and renal tubule adenoma in males
- One feeding study in mice showed a significant trend in the incidence of haemangiosarcoma in males.
- One feeding study in rats showed a significant increase in the incidence of pancreatic islet cell adenocarcinoma in males
- One feeding study in rats showed a significant increase in the incidence of pancreatic islet cell adenocarcinoma in males, a significant trend in the incidences of hepatocellular adenoma in males and a significant trend in the incidence of thyroid C-cell adenoma in females.
- One mouse study determined that, when applied to the skin, glyphosate was a skin tumor promoter.
- Two rat feeding studies and one rat drinking water study found no significant increase in tumor incidence.
- One rat feeding study and one rat drinking water study were determined to be inadequate for evaluation based on the short duration of exposure and the small number of animals used, respectively

The IARC's group 2A finding, together with five out of eight studies showing carcinogenicity in animals, is a more than sufficient reason for the state of California to list glyphosate as known to the state to cause cancer under the labor code mechanism of Proposition 65.

To supplement the animal studies of carcinogenicity, we also note that the IARC found strong evidence in experimental animals that glyphosate is genotoxic and an inducer of oxidative stress, two mechanisms that can lead to carcinogenesis [1-3]. The IARC also found a positive association between glyphosate exposure and non-Hodkin lymphoma in humans [1].

While the full monographs for tetrachlorvinphos, parathion, malathion have not been published yet, a short news article in the journal *Lancet Oncology* has given an overview of the results from the full report [4]. In it, the authors indicate that:

- Tetrachlorvinphos was classified as Group 2B with experimental animal studies indicating that exposure was linked to hepatocellular tumors, renal tubule tumors and spleen haemangioma.
- Parathion was also classified as Group 2B with animal studies showing incidence of multiple types of adenomas and carcinomas, lymphoma, pancreatic cancer, and mammary gland adenocarcinoma.
- Malathion was classified as Group 2A with animal studies showing incidence of multiple types of carcinomas, hepatocellular adenoma, and mammary gland adenocarcinoma.

The IARC's group 2A and 2B findings, together with experimental animal models linking exposure to multiple types of cancers, is a more than sufficient reason for the state of California to list tetrachlorvinphos, parathion, and malathion as known to the state to cause cancer under the labor code mechanism of Proposition 65.

The Center thanks you for taking this important action to protect people and the environment from these carcinogenic chemicals.

Sincerely,

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1. WHO. *IARC Monographs Volume 112: evaluation of five organophosphate insecticides and herbicides. Glyphosate*. 2015; Available from: <http://monographs.iarc.fr/ENG/Monographs/vol112/mono112-02.pdf>.
2. Klaunig, J.E., et al., *The role of oxidative stress in chemical carcinogenesis*. Environ Health Perspect, 1998. **106 Suppl 1**: p. 289-95.
3. Lee, S.J., et al., *Distinguishing between genotoxic and non-genotoxic hepatocarcinogens by gene expression profiling and bioinformatic pathway analysis*. Sci Rep, 2013. **3**: p. 2783.
4. Guyton, K.Z., et al., *Carcinogenicity of tetrachlorvinphos, parathion, malathion, diazinon, and glyphosate*. Lancet Oncol, 2015. **16**(5): p. 490-1.