



CENTER FOR  
FOOD SAFETY

## **Center for Food Safety Analysis of Federal Records Regarding the Cancer Hazards and Risks of EPA-Approved Pesticides *March 2026***

The following analysis is based on the Environmental Protection Agency (EPA) Office of Pesticide Program's latest listing (October 2024) of the cancer hazard classifications it has assigned to pesticides and related chemicals.<sup>1</sup> It is also based on EPA's Guidelines for Carcinogen Risk Assessment ("Cancer Guidelines"),<sup>2</sup> and numerous EPA risk assessments of pesticides the Agency has classified as likely or probably carcinogenic.

### **Breakdown of Cancer-Causing Potential of Pesticides**

Of the 570 unique pesticide chemicals that EPA's Office of Pesticide program has classified for carcinogenic potential since 1985, over one-third (200, or 35%) are either possible human carcinogens (127) or likely to be carcinogenic to humans (73). The status of 62 others (11%) is uncertain, because EPA lacks sufficient data to make a determination (see the Appendix for details). Of the 200 pesticides that are possible or likely human carcinogens, a report by the Center for Biological Diversity identifies the labels for 125 that are still registered for use.

EPA's list includes both current use and legacy (no longer registered) pesticides. Legacy pesticides are often still relevant because years to decades can lapse between low-level exposure to a carcinogenic chemical and the development of cancer, for instance 10 to 30 years or more in the case of non-Hodgkin lymphoma.<sup>3</sup>

### **How Much Cancer Does EPA Say is Acceptable?**

Because cancer is such a devastating, often fatal disease, EPA regulation is supposed to keep the risk below 1 additional cancer among 1 million people exposed to the pesticide (equivalent to  $1 \times 10^{-6}$ ), its "benchmark level of concern."<sup>4</sup> But in practice, the Agency permits far higher risks. See the Appendix for how EPA assesses cancer risks from pesticide exposure.

The acceptable degree of cancer risk is not a scientific question, but rather a policy matter that falls squarely within states' rights. As EPA states in another context: "The target cancer risk level used in determining if there is an unacceptable risk level is a policy decision."<sup>5</sup>

San Francisco, CA - 600 California Street - Suite 12-013 San Francisco, CA 94108

Washington, DC - 110 Maryland Avenue, NE - Suite 307, Washington DC, 20002

Portland, OR - 2009 NE Alberta St - Suite 207, Portland, OR 97211

[centerforfoodsafety.org](http://centerforfoodsafety.org)

[office@centerforfoodsafety.org](mailto:office@centerforfoodsafety.org)

(415) 826-2770

## How Much Cancer Do EPA-Approved Pesticides Cause?

While pesticide users are at highest risk of cancer, the general public can also be affected. EPA assessments show that drinking water and food contaminated with the likely carcinogenic fungicide iprodione can induce cancer in up to an average of 1.2 persons per 10,000 exposed;<sup>6</sup> while another fungicide, thiophanate-methyl, can cause cancer in up to 4.3 in 10,000 people exposed to it in drinking water.<sup>7</sup>

Residential and occupational pesticide use involves risks due to skin absorption and inhalation. Homeowners can expect up to a 1 in 10,000 or 3.4 in 10,000 risk of cancer from use of the fungicides mancozeb<sup>8</sup> or iprodione,<sup>9</sup> respectively.

The herbicides fluthiacet-methyl<sup>10</sup> (brand name Cadet), used mostly on soybeans, corn and cotton, and diuron<sup>11</sup> (orchards, alfalfa and cotton) can cause cancer in up to 8 of 10,000 workers exposed to them, according to EPA assessments. The same holds true of the insecticide propargite<sup>12</sup> (Comite), which is applied to corn, orchards and vineyards. These risks exceed EPA's benchmark by 800-fold.

EPA predicts 7 of every 1,000 commercial landscapers who mix a wettable powder (WP) form of the fungicide iprodione and apply it via backpack sprayer will contract cancer,<sup>13</sup> a 7,000-fold higher risk than the one in one million that supposedly arouses EPA's concern.

Cyanazine belongs to the triazine class, which also includes atrazine and simazine. Cyanazine was once a leading corn herbicide, with up to 30-35 million pounds applied annually,<sup>14</sup> while twice as much atrazine continues to be used.<sup>15</sup> EPA acknowledged that cyanazine causes birth defects in rodent studies (including fetal rats without eyes) in 1985,<sup>16</sup> 14 years after its introduction in 1971. A decade later, EPA realized cyanazine was also carcinogenic.<sup>17</sup> EPA estimated that up to 1.2 in 100 (equivalent to 1 in 83) commercial applicators exposed while mixing, loading and applying cyanazine might contract cancer, an extremely high cancer rate.<sup>18</sup> Yet rather than stop use immediately, EPA agreed to the manufacturer's (DuPont's) proposed seven-year phase-out, allowing continued distribution and sale until the end of 2002.<sup>19</sup>

Like atrazine and simazine, cyanazine induces mammary gland cancer in rats,<sup>20</sup> while a human ecological study showed an association between triazine exposure and increased incidence of breast cancer<sup>21</sup> in woman. An epidemiology study linked triazine exposure to ovarian cancer.<sup>22</sup> Atrazine was recently classified "probably carcinogenic to humans" by the International Agency for Research on Cancer based on both animal and human evidence.<sup>23</sup> In two studies, rats fed atrazine developed either malignant mammary gland or uterine tumors, while use of triazines/atrazine is associated with increased risk of a molecular subtype of non-Hodgkin lymphoma – the t(12;18)(q32;q21) chromosomal translocation.

EPA recognized that ethylene thiourea (ETU), a contaminant, metabolite, and breakdown product of the EBDC family of pesticides, caused cancer and birth defects based on multiple rodent studies conducted from 1969 to the 1970s.<sup>24</sup> But the Agency has nevertheless maintained the registration of mancozeb (introduced in 1948), by far the mostly heavily used of this carcinogenic class (from 6-10 million pounds are applied each year<sup>25</sup>) to a huge range of vegetables, fruit and nut trees, herbs, grains and turfgrass (e.g. golf courses).<sup>26</sup> EPA has failed to cancel mancozeb's registration despite the Agency's prediction that up to 2 in 1,000 commercial applicators, wearing gloves and making foliar applications, contract cancer from exposure to it.<sup>27</sup>

### **EPA Violates Cancer Guidelines to Avoid Finding a Pesticide is Carcinogenic**

The EPA's Office of Pesticide Programs increasingly bends the rules to avoid classifying a pesticide as a known carcinogen or as likely to be carcinogenic to humans. In 2022, a federal court revoked EPA's 2017 human health assessment of glyphosate because the Agency blatantly contradicted itself by denying the herbicide could cause cancer, while admitting it might cause non-Hodgkin lymphoma (NHL).<sup>28</sup> (Multiple epidemiology studies link glyphosate to NHL,<sup>29</sup> and thousands of plaintiffs with NHL have sued Bayer for its failure to warn that the glyphosate herbicides they used could cause cancer.) In addition, the court pointed to EPA's numerous violations of the Agency's own Cancer Guidelines,<sup>30</sup> to which it claimed to adhere, echoing criticism voiced earlier by an EPA Scientific Advisory Panel and by scientists with EPA's Office of Research and Development,<sup>31</sup> an independent science division that the Trump Administration has closed.<sup>32</sup>

Rather than mending its ways, EPA's recent cancer assessments lean into many of the very same errors and Guideline violations it committed in denying glyphosate's carcinogenic potential.

### ***Cyclobutrifluram***

EPA proposed an interim registration of this new fungicide and nematicide in April of 2025, based in part on a classification of cyclobutrifluram as "not likely to be carcinogenic to humans,"<sup>33</sup> a conclusion at odds with the evidence and the Cancer Guidelines, which point to a "likely to be carcinogenic" classification.

In reaching its "not likely" determination, EPA violated its Guidelines by discounting the statistically significant trends of increasing number of animals with tumors as a function of dosage in two rodent carcinogenicity studies: thyroid follicular cell tumors in male and female rats, and hepatocellular (liver) tumors in male mice.<sup>34</sup> These findings justify a classification of likely to be carcinogenic to humans. If maximally tolerated doses had been used, as prescribed in the Cancer Guidelines (dosing was far too low in both studies), the tumor findings would likely have provided even stronger evidence that cyclobutrifluram can cause cancer. EPA also

ignored cyclobutrifluram's mode of action. It kills fungi and nematodes by inhibiting an enzyme that is also present in humans; scientists cite evidence that inhibition of this enzyme in humans could induce thyroid tumors, as seen in the rat study. EPA also dismissed evidence that two related pesticides with the same mode of action (boscalid and fluopyram) also induce liver and/or thyroid tumors in test animals.<sup>35</sup>

### ***Isocycloseram***

EPA approved a new fungicide, isocycloseram, in May of 2025, classifying it as not likely to be carcinogenic to humans.<sup>36</sup> EPA discounted much evidence to the contrary, and failed to demand Cancer Guideline-compliant studies to decide the issue.<sup>37</sup>

First, EPA's assessment revealed that isocycloseram and at least 13 of the 26 compounds it breaks down to have structural features of carcinogenic chemicals. One dietary metabolite (a chemical that isocycloseram breaks down to once it has been ingested) came up positive in a genotoxicity test (an assay to determine if a chemical can trigger cancer-like changes). Mice fed isocycloseram in their diets exhibited unusual immune responses (plasmacytosis/plasma cell infiltration in the lymph nodes) indicative of either an infection or malignant lymphoma. Although EPA maintains the plasmacytosis was not associated with an increase in lymphoid tumors, the mice were treated with doses far too low to constitute a test of the compound's carcinogenic potential. The rat study was also so extremely underdosed as to be useless for assessment of carcinogenic potential. Finally, EPA found that two closely related compounds are either likely to be carcinogenic to humans (broflanilide) or exhibit suggestive evidence of carcinogenic potential (fluxametamide), additional evidence that isocycloseram is also carcinogenic. The rodent studies underlying the carcinogenicity classifications of the related fungicides properly employed Cancer Guideline-consistent doses that were up to 100-fold higher than those used in the underdosed isocycloseram rodent studies. EPA must demand repeat, Cancer-Guideline-compliant rodent studies that incorporate a maximally tolerated dose to ascertain the carcinogenic potential of this fungicide.

### ***Fluoxapiprolin***

EPA proposed approval of the fungicide fluoxapiprolin in August of 2025, classifying it as not likely to be carcinogenic to humans.<sup>38</sup> This determination is also contrary to EPA's Cancer Guidelines and understates the carcinogenic potential of fluoxapiprolin, which merits classification as likely to be carcinogenic to humans.<sup>39</sup>

EPA dismisses statistically significant trends of two types of tumors in female rats: uterine endometrial cancer and tumors of the thymus gland, known as thymomas. EPA errs in also demanding statistically significant elevation of tumor numbers in treatment groups versus controls, and in using inappropriate historical control group comparisons, both in blatant violation of its Cancer Guidelines. EPA also ignores evidence of uterine hyperplasia, a precursor

condition to uterine endometrial cancer, in some rats. Most absurdly, EPA attempts to substitute a putative lack of endometrial uterine cancer in rats treated with a related fungicide, oxathiapiprolin, for the clearly positive results for the compound at issue, fluoxapiprolin, based on an “expert statement” submitted by the fungicide’s maker, Bayer.<sup>40</sup>

### **California Warns While EPA Hides**

Pesticides that do carry warnings do so only thanks to California, which has Proposition 65 (Prop65), the Safe Drinking Water and Toxic Enforcement Act of 1986.<sup>41</sup> Under Prop65, state experts identify chemicals (including pesticides) that cause cancer, birth defects or reproductive harm. Products containing such toxins at hazardous levels<sup>42</sup> must carry an explicit warning to that effect.

For instance, labels for products containing the herbicide diuron<sup>43</sup> (EPA-designated “likely to be carcinogenic to humans”) and the fungicide mancozeb<sup>44</sup> (classified by EPA as a “Group B probable carcinogen”) have the following Prop65 warnings:

**Attention:** This product contains Diuron, a chemical known to the State of California to cause cancer in laboratory animals.

**Attention:** This product contains mancozeb and ETU, chemicals known to the State of California to cause cancer. ETU is also known to the State of California to cause birth defects or other reproductive harm.

Unfortunately, these warnings are hard to find: in small typeface, amidst agricultural use directions, and buried near the end of the labels rather than upfront with the safety instructions, as an EPA-required precautionary statement would be.<sup>45</sup>

### **Does EPA Require Any Warnings on Pesticide Labels?**

Not a single word in EPA’s entire, 299-page Label Review Manual speaks to cancer warnings.<sup>46</sup> Pesticide labels routinely indicate only “acute” harms, the immediate effects of large, one-time exposures. One prominent acute toxicity indicator is the lethal dose (LD<sub>50</sub>), the amount of a chemical that when ingested in a single dose causes death in 50% of treated rats.<sup>47</sup> Acute toxicity has nothing to do with chronic toxicity, which denotes the adverse effects of repeated, low-level exposure to a toxin over years, such as cancer.<sup>48</sup> Even acute harms are not communicated effectively. Labels carry signal words – “caution,” “warning” or “danger” – intended to signify low, moderate or high acute toxicity, respectively,<sup>49</sup> but they are not understood by nearly half of consumers.<sup>50</sup> And in any case, the adverse acute effects of a pesticide provide no guide whatsoever to its chronic toxicity or carcinogenic potential.<sup>51</sup>

# Appendix

## Background

Cancer **hazard** refers to the *capacity* of a chemical to trigger carcinogenic changes, based primarily on treatment-related tumors in rodents administered the pesticide in long-term feeding trials sponsored by the pesticide’s manufacturer. Cancer hazard classifications are based on the strength of the evidence of the pesticide’s cancer-causing potential.

Cancer **risk** is the *likelihood* of contracting cancer, expressed as the number of people predicted to contract cancer as a share of the number who are exposed, e.g. 1 in 1,000. For most carcinogens, risk is never zero and increases with the level of exposure. For each likely/probable human carcinogen, EPA provides multiple cancer risk estimates for various exposure scenarios. Generally speaking, occupational pesticide users run the highest risks of cancer, while dietary exposure (pesticide residues in food or drinking water) poses lesser risk.

## Breakdown of EPA’s Cancer Hazard Assignments

Below we break down EPA’s cancer hazard classifications for the 570 unique pesticide chemicals on its [October 2024 list](#). (Of the 692 entries, 122 represent alternate names, leaving 570 unique pesticide chemicals.) The list includes both currently registered and discontinued (legacy) pesticides. Because EPA’s classification system has changed several times since the 1980s, to simplify reporting we group pesticides that have similar classifications from different eras as follows:

Current 2005 System	1986, 1996 or 1999 System
Suggestive Evidence of Carcinogenic Potential	Group C – Possible Human Carcinogen (1986)
	Suggestive Evidence of Carcinogenicity, But Not Sufficient to Assess Human Carcinogenic Potential (1999)
Likely to be Carcinogenic to Humans (also 1999)	Group B – Probable Human Carcinogen (1986)
	Known/Likely (1996)
Inadequate Information to Assess Carcinogenic Potential	Data are Inadequate for an Assessment of Human Carcinogenic Potential (1999)
	Cannot be Determined (1996)
	Group D – Not Classifiable as to Human Carcinogenicity (1986)

EPA has classified over one-third (35%) of pesticides as either possible human carcinogens (127) or likely to be carcinogenic to humans (73). According to a report by Center for Biological Diversity, 125 of these 200 possible or likely carcinogens are still found in EPA-registered pesticide products. The status of 62 of the 570 total pesticides (11%) is uncertain, because EPA lacks sufficient data to make a determination.

Cancer Classification	No.	Notes
Likely to Be Carcinogenic to Humans, Group B – Probable Human Carcinogen	73	Includes 8 that are “Likely to Be Carcinogenic to Humans at High Doses; Not Likely ... at Low Doses”
Suggestive Evidence of Carcinogenic Potential, Group C – Possible Human Carcinogen	127	
Not Likely to Be Carcinogenic to Humans	233	Includes several with qualifiers indicating the “Not Likely” designation only applies to lower exposures
Inadequate Information to Assess Carcinogenic Potential, Cannot be Determined, Group D – Not Classifiable as to Human Carcinogenicity	62	Covers a variety of designations that have in common EPA’s inability to assess cancer risk
Not Required (non-food)	11	Also includes Not Required Based on Proposed Use Pattern (1) and FDA Generally Recognized as Safe (GRAS) Food Additive (1)
Group E – Evidence of Non-Carcinogenicity for Humans	64	
<b>TOTAL</b>	<b>570</b>	

### How Does EPA Assign a Cancer Classification?

Because it is unethical to experiment on human beings, long-term rodent bioassays are the primary means EPA uses to assess the carcinogenic hazard of new pesticides. Test Guidelines<sup>52</sup> prescribe how these animal studies, which are conducted or sponsored by the manufacturer, are to be carried out. Groups of rats or mice are fed different amounts of a pesticide (usually as part of their diet) each day for 18 months (mice) or 2 years (rats), while one control group receives none. The numbers of various types of tumors are recorded, and the results analyzed to determine whether they are treatment-related (induced by the pesticide) or appeared spontaneously (cause unknown). Tumors are more likely to be pesticide-induced if they appear more frequently in pesticide-treated groups than in the controls; if there is a trend in number of animals with particular types of tumors increasing in groups receiving higher versus lower doses (there are usually three dosage groups); and if there are a significant number of malignant vs. benign tumors; among other indicia. Statistical methods are employed to help distinguish spontaneous (unexplained) from pesticide-triggered tumors.

In the case of a pesticide with a history of use, EPA is also supposed to factor in the results of any epidemiology studies that have been conducted involving farmers or other groups with documented exposure to it. The incidence of cancer type(s) in the exposed population (often

broken down into groups comprised of individuals with differing length or intensity of exposure) is compared to that in a similar group of unexposed people. As with rodents, statistical analysis is used to help determine whether observed cancer cases are attributable to the pesticide or some other unexplained factor(s).

EPA also considers mechanistic studies, which are most often cell-based assays intended to ascertain whether or not the pesticide triggers genetic mutations or other cellular changes characteristic of cancer. Other information, such as the metabolism and toxicokinetics of the pesticide, may also be considered.

The cancer hazard classification is supposed to be based on the weight of the evidence, with priority assigned to the results of animal studies and, if available, human epidemiology. Mechanistic studies are also considered, though of tertiary importance. EPA's Guidelines for Carcinogen Risk Assessment<sup>53</sup> provide nuanced rules and guidance for how the results from these studies and other evidence are to be interpreted. These Cancer Guidelines also provide detailed criteria to be met for assignment to one of the five hazard categories.

### **How Does EPA Predict Cancer Risk?**

EPA estimates risks for pesticides classified as known carcinogens or those likely to be carcinogenic to humans. When the pesticide's mode of action (key molecular, cellular and organ/tissue changes resulting in cancer formation) is unknown, as is true in most cases, the EPA ascertains the pesticide's cancer potency by linear low-dose extrapolation from the tumor findings in animal studies. The cancer potency factor is combined with levels of exposure for various subpopulations/exposure scenarios to predict their respective risks of cancer. When mode of action is unknown, cancer risk is never zero, and increases with exposure.

Cancer risk is expressed as the number of people predicted to contract cancer among those exposed in a particular way, e.g. 1 in 1,000. It can also be expressed in scientific notation: e.g.  $5 \times 10^{-4}$  = 5 in 10,000.<sup>54</sup>

- 
- <sup>1</sup> EPA, Chemicals Evaluated for Carcinogenic Potential by Office of Pesticide Programs, October 30, 2024. [https://npic.orst.edu/chemicals\\_evaluated.pdf](https://npic.orst.edu/chemicals_evaluated.pdf).
- <sup>2</sup> EPA, Guidelines for Carcinogen Risk Assessment, Risk Assessment Forum, EPA/630/P-03/001F, March 2005. [https://www.epa.gov/sites/default/files/2013-09/documents/cancer\\_guidelines\\_final\\_3-25-05.pdf](https://www.epa.gov/sites/default/files/2013-09/documents/cancer_guidelines_final_3-25-05.pdf).
- <sup>3</sup> DD Weisenburger (2021). A review and update with perspective of evidence that the herbicide glyphosate (Roundup) is a cause of non-Hodgkin lymphoma. *Clinical Lymphoma, Myeloma and Leukemia* 21(9): 621-630.
- <sup>4</sup> EPA OPP (2013). Fenbuconazole; Pesticide Tolerances. Office of Pesticide Programs, EPA, 78 FR 40020-40027 (July 3, 2013), pp. 40025-26. <https://www.govinfo.gov/content/pkg/FR-2013-07-03/pdf/2013-15867.pdf>.
- <sup>5</sup> EPA, EPA Response to External Peer Review Comments on the Draft Sewage Sludge Risk Assessment for Perfluorooctanoic Acid (PFOA) CASRN 335-67-1 and Perfluorooctane Sulfonic Acid (PFOS) CASRN 1763-23-1. EPA Office of Water, EPA, January 2025, p. 54. <https://www.epa.gov/system/files/documents/2025-01/response-peer-review-draft-sewage-sludge-risk-assessment-pfoa-pfos.pdf>.
- <sup>6</sup> EPA, Iprodione Proposed Interim Registration Review Decision, December 2021, Table 2, p. 19. <https://www.regulations.gov/document/EPA-HQ-OPP-2012-0392-0056>. Equivalent to the cited cancer risk of  $1.2 \times 10^{-4}$ .  $10^{-4} = 1/10,000$ . The average cancer risk is thus  $1.2 \times 1/10,000 = 1.2$  in 10,000.
- <sup>7</sup> EPA, Thiophanate-methyl and carbendazim: amended draft human health risk assessment for registration review, August 27, 2020, p. 10. <https://www.regulations.gov/document/EPA-HQ-OPP-2014-0004-0193>.
- <sup>8</sup> EPA, Mancozeb and ethylene thiourea (ETU): draft human health risk assessment for registration review, Dec. 14, 2020, p. 14: “The cancer residential risk estimate for ETU” ranges up to  $1 \times 10^{-4}$ . ETU is a contaminant and breakdown product of mancozeb.” <https://www.regulations.gov/document/EPA-HQ-OPP-2015-0291-0022>.
- <sup>9</sup> EPA, Iprodione Proposed Interim Registration Review Decision, op. cit., p. 22.
- <sup>10</sup> EPA, Fluthiacet-methyl: Human Health Assessment Scoping Document in Support of Registration Review, p. 6: occupational cancer risk estimate for use on cotton up to  $8.4 \times 10^{-4}$ . <https://www.regulations.gov/document/EPA-HQ-OPP-2013-0285-0003>.
- <sup>11</sup> EPA, Diuron, Proposed Interim Registration Review Decision, March 2022, p. 24. <https://www.regulations.gov/document/EPA-HQ-OPP-2023-0420-0008>.
- <sup>12</sup> EPA, Propargite Proposed Interim Registration Review Decision, March 2021, p. 22, expressed as  $8 \times 10^{-4}$ . <https://www.regulations.gov/document/EPA-HQ-OPP-2014-0131-0061>.
- <sup>13</sup> EPA, Iprodione Proposed Interim Registration Review Decision, op. cit., Table 6, p. 25.
- <sup>14</sup> U.S. Geological Survey, Estimated Annual Use of Cyanazine, [https://water.usgs.gov/nawqa/pnsp/usage/maps/show\\_map.php?year=2019&map=CYANAZINE&hilo=l&disp=Cyanazine](https://water.usgs.gov/nawqa/pnsp/usage/maps/show_map.php?year=2019&map=CYANAZINE&hilo=l&disp=Cyanazine).
- <sup>15</sup> U.S. Geological Survey, Estimated Annual Use of Atrazine, [https://water.usgs.gov/nawqa/pnsp/usage/maps/show\\_map.php?year=2019&map=ATRAZINE&hilo=L&disp=Atrazine](https://water.usgs.gov/nawqa/pnsp/usage/maps/show_map.php?year=2019&map=ATRAZINE&hilo=L&disp=Atrazine).
- <sup>16</sup> EPA, Cyanazine Special Review Position, Document 1, April 1985, pp. 7-8. <https://tinyurl.com/3hxrbufd>.
- <sup>17</sup> Environmental Working Group, Background Information on Cyanazine, August 2, 1995. <https://www.ewg.org/research/background-information-cyanazine>.
- <sup>18</sup> EPA, Revised Occupational and Residential Risk Assessment for the Triazines. Office of Pesticide Programs, EPA, March 7, 1994, Table 9, pdf pp. 1, 27. See entry for Corn – Commercial/Ground boom: M/L/A [mixing/loading/applying]– open/open [open loading system/open cab], 2% dermal absorption:  $1.2 \times 10^{-2} = 1.2$  in 100 cancer risk, equivalent to 1 in 83.
- <sup>19</sup> EPA, Notice of Final Determination to Terminate Special Review of Cyanazine; Notice of Voluntary Cancellation and Cancellation Order of Cyanazine Product Registrations. 61 Fed. Reg. 39024-29 (July 25, 1996). <https://www.govinfo.gov/content/pkg/FR-1996-07-25/pdf/96-18921.pdf>.
- <sup>20</sup> EPA, Revised Occupational and Residential Risk Assessment for the Triazines. Office of Pesticide Programs, EPA, March 7, 1994, pdf pp. 6-8. [https://www3.epa.gov/pesticides/chem\\_search/cleared\\_reviews/csr\\_PC-100101\\_7-Mar-94\\_046.pdf](https://www3.epa.gov/pesticides/chem_search/cleared_reviews/csr_PC-100101_7-Mar-94_046.pdf).
- <sup>21</sup> Kettles MA et al. (1997). Triazine herbicide exposure and breast cancer incidence: an ecologic study of Kentucky counties. *Environmental Health Perspectives* 105(11): 1222-1227.

- 
- <sup>22</sup> Donna A et al. (1989). Triazine herbicides and ovarian epithelial neoplasms. *Scand J Work Environ Health* 15(1): 47-53.
- <sup>23</sup> Cattley RC et al. (2026). Carcinogenicity of atrazine, alachlor and vinclozolin. *Lancet Oncology* 27(2):e71. doi: 10.1016/S1470-2045(25)00757-0.
- <sup>24</sup> EPA, Ethylenethiourea Pesticide Fact Sheet, Office of Pesticide Programs, June 1987. <https://tinyurl.com/49ndauwu>.
- <sup>25</sup> U.S. Geological Survey, Estimated Annual Use of Mancozeb, [https://water.usgs.gov/nawqa/pnsp/usage/maps/show\\_map.php?year=2019&map=MANCOZEB&hilo=L&disp=Mancozeb](https://water.usgs.gov/nawqa/pnsp/usage/maps/show_map.php?year=2019&map=MANCOZEB&hilo=L&disp=Mancozeb).
- <sup>26</sup> EPA, Mancozeb and Ethylene Thiourea (ETU): Second Revision: Draft Human Health Risk Assessment (DRA) for Registration Review, June 28, 2024: p. 5. <https://www.regulations.gov/document/EPA-HQ-OPP-2015-0291-0100>.
- <sup>27</sup> *Ibid.*, p. 61, cancer risk of  $2 \times 10^{-3} = 2$  in 1,000.
- <sup>28</sup> Rural Coalition/Nat. Res. Def. Council v. EPA, 38 F.4th 34 (9th Cir. 2022), at: [https://www.centerforfoodsafety.org/files/ca9\\_glyphosate-decision\\_82995.pdf](https://www.centerforfoodsafety.org/files/ca9_glyphosate-decision_82995.pdf), pp. 22-24. The contradiction is between EPA's "not likely to be carcinogenic to humans" designation, which according to its Cancer Guidelines requires "robust" data "for deciding that there is no basis for human hazard concern," on the one hand, and EPA's inability to reach "a conclusion regarding the association between glyphosate exposure and risk of NHL..." on the other hand, given the substantial epidemiological evidence supporting that association.
- <sup>29</sup> De Roos et al. (2003). Integrative assessment of multiple pesticides as risk factors for non-Hodgkin's lymphoma among men. *Occup Environ Med.* 60(9):E11; Zhang L et al. (2019). Exposure to glyphosate-based herbicides and risk for non-Hodgkin lymphoma: A meta-analysis and supporting evidence. *Mutat Res Revi Mutat Research* 781: 186-206; McDuffie HH et al. (2001). Non-Hodgkin's lymphoma and specific pesticide exposures in men: cross-Canada study of pesticides and health. *Cancer Epidemiol Biomarkers Prev.* 10(11): 1155-63.
- <sup>30</sup> Rural Coalition/Nat. Res. Def. Council v. EPA, 38 F.4th 34 (9th Cir. 2022), *op. cit.*, pp. 25-33.
- <sup>31</sup> *Ibid.*, p. 14.
- <sup>32</sup> LK Boerner, As the EPA formalizes end of research office, critics fear health impacts. *Chemical & Engineering News*, March 3, 2026. <https://cen.acs.org/policy/EPA-closes-independent-research-office/104/web/2026/03>. See also: E Stokstad, In 'blow to the environment,' EPA begins to dismantle its research office, *Science*, July 22, 2025. <https://www.science.org/content/article/blow-environment-epa-begins-dismantle-its-research-office>.
- <sup>33</sup> EPA, Memorandum supporting proposed decision to approve registration for the new active ingredient of cyclobutrifluram, EPA-HQ-OPP-2022-0003-0021, April 21, 2025.
- <sup>34</sup> For this discussion generally, see: Center for Food Safety, Comments on Proposed Decision to Register Cyclobutrifluram, May 6, 2025.
- <sup>35</sup> EPA, Cyclobutrifluram: Report of the Cancer Assessment Review Committee, EPA-HQ-OPP-2022-0003-0018, April 15, 2025.
- <sup>36</sup> EPA, Memorandum supporting proposed decision to approve registration for the new active ingredient of isocycloseram, EPA-HQ-OPP-2021-0641-0007, May 6, 2025.
- <sup>37</sup> For the following discussion, see: Center for Food Safety, Comments on proposed decision to register the new active ingredient isocycloseram, June 10, 2025.
- <sup>38</sup> EPA, Memorandum supporting proposed decision to approve registration for the new active ingredient of fluoxapiprolin, EPA-HQ-OPP-2022-0980-0018, August 12, 2025.
- <sup>39</sup> For the following discussion, see: Center for Food Safety, Comments on Proposed Registration of New Fungicidal Active Ingredient Fluoxapiprolin, September 12, 2025.
- <sup>40</sup> EPA, Fluoxapiprolin: Report of the Cancer Assessment Review Committee, EPA-HQ-OPP-2022-0980-0016, October 15, 2024, p. 18.
- <sup>41</sup> <https://oehha.ca.gov/proposition-65>.
- <sup>42</sup> Not all products containing a Proposition 65-listed carcinogen trigger the warning requirement. A warning is not required if lifetime use of the product poses no significant risk. To this end, California's Office of Environmental Health Hazard Assessment (OEHHA) often establishes a "no significant risk level" (NSRL) of exposure, also called the safe harbor level, below which a warning is not required. For example, [the NSRL for glyphosate is 1,100 ug/day](#). Because the exposure of a typical home user of a dilute, ready-to-use glyphosate-containing weedkiller product falls below the NSRL, [that product would not require a Proposition 65 warning](#).

- 
- <sup>43</sup> Diuron 4L label, RedEagle International LLC, March 16, 2016, p. 24.  
[https://www3.epa.gov/pesticides/chem\\_search/ppls/085678-00024-20160316.pdf](https://www3.epa.gov/pesticides/chem_search/ppls/085678-00024-20160316.pdf).
- <sup>44</sup> Dithane F-45 label, Corteva Agriscience, August 22, 2023, p. 36.  
[https://www3.epa.gov/pesticides/chem\\_search/ppls/062719-00396-20230823.pdf](https://www3.epa.gov/pesticides/chem_search/ppls/062719-00396-20230823.pdf)
- <sup>45</sup> EPA, Label Review Manual, Chapter 7: Precautionary Statements, revised March 2018, pp. 7-3 to 7-7.  
[https://www.epa.gov/system/files/documents/2024-12/label\\_review\\_manual\\_12122024.pdf](https://www.epa.gov/system/files/documents/2024-12/label_review_manual_12122024.pdf).
- <sup>46</sup> EPA, Label Review Manual, December 2024. <https://www.epa.gov/pesticide-registration/label-review-manual>.
- <sup>47</sup> EPA, Label Review Manual, Chapter 7: Precautionary Statements, op. cit., pp. 7-2 to 7-3.
- <sup>48</sup> National Pesticide Information Center, Signal Words, July 2008: “However, the LD<sub>50</sub>/LC<sub>50</sub> does not reflect any effects from long-term exposure (i.e. cancer, birth defects or reproductive toxicity) that may occur at levels below those that cause death.” <https://npic.orst.edu/factsheets/signalwords.pdf>.
- <sup>49</sup> Ibid., p. 7-3.
- <sup>50</sup> Hosni H et al. (2024). Improving consumer understanding of pesticide toxicity labels: experimental evidence. Scientific Reports 14:17291. <https://doi.org/10.1038/s41598-024-68288-9>.
- <sup>51</sup> Canadian Centre for Occupational Health and Safety, What Makes Chemicals Poisonous, 1/24/16, <https://www.ccohs.ca/oshanswers/chemicals/poisonou.pdf>.
- <sup>52</sup> EPA, Health Effects Test Guidelines: OPPTS 870.4300 Combined Chronic Toxicity/Carcinogenicity, EPA 712-C-98-212, August 1998. <https://www.regulations.gov/document/EPA-HQ-OPPT-2009-0156-0021>.
- <sup>53</sup> EPA, Guidelines for Carcinogen Risk Assessment, Risk Assessment Forum, EPA/630/P-03/001F, March 2005. [https://www.epa.gov/sites/default/files/2013-09/documents/cancer\\_guidelines\\_final\\_3-25-05.pdf](https://www.epa.gov/sites/default/files/2013-09/documents/cancer_guidelines_final_3-25-05.pdf).
- <sup>54</sup>  $10^{-4} = 1$  divided by  $10^4$  or 10,000, times 5 for  $5/10,000 = 5$  in 10,000. Similarly,  $2 \times 10^{-6} = 2 \times 1/1,000,000 = 2$  divided by 1 million = 2 in 1,000,000.