Human Health Data for SPARC Committee

Human Health Assessment Branch - November 2026

Background

From August 7 through September 11, 2026, the California Department of Pesticide Regulation (DPR) accepted public submissions of pesticides for potential prioritization and recommendation by Scientific Prioritization and Review Committee (SPARC). This submission cycle focused on human health.

Through the online Pesticide Priority Recommendation Form, DPR asked submitters to identify the pesticides being recommended, describe their concerns and reasons for prioritization, and provide scientific or other supporting information. Submitters were encouraged to identify potentially affected populations and relevant exposure circumstances, including use sites, geographic areas, and application methods. A complete scientific analysis was not required.

DPR received 8 submissions, including supporting documents provided to explain or substantiate the concerns raised. Public recommendations were reviewed to identify the pesticides represented, confirm active registration in California as pesticides, and consolidate select groups for data collection, ranking, and reporting. These submissions are initially categorized as Category 3. A summary of individual submissions can be found online. Complete summaries are available through SmartComment. A total of 95 individual pesticides were identified within the submissions, 86 had sufficient data for further screening by HHA. All submitted pesticides were considered by DPR.

Prioritization Approach

DPR applied its data-driven, screening level prioritization approach to rank a total of 86 Category 3 pesticides. This approach, developed by DPR's Human Health Assessment (HHA) branch, is designed to be rapid and reproducible. To accomplish this, data must be readily accessible for most pesticides and scoring conducted in an objective manner that is as free from ambiguity and qualitative judgements as possible. This approach is appropriate for initial prioritization, such as the Category 3 evaluation process under SPARC, where a larger number of chemicals were anticipated for submission and would require timely consideration.

HHA's approach uses an established set of parameters to capture toxicological hazard and exposure potential. The tool consists of six hazard parameters covering acute oral, chronic, reproductive, developmental toxicity, carcinogenicity, and neurotoxicity and five exposure parameters covering use/sales data, inhalation, dietary, and drinking water exposure, and possible residential/child/community pesticide use. Application of the tool to the relevant data for the Category 3 pesticides generated a quantitative score for each pesticide, and subsequent

relative ranking of the pesticides for consideration in a screening level prioritization. DPR applied its human health prioritization ranking tool to a total of 86 Category 3 pesticides. Please note one submission focused solely on pesticides used in pet products, and thus sales information for pet products was used as the exposure parameter rather than broader use information. Looking across the Category 3 scores, 8 pesticides were identified in the top 6 rankings. These are shown in Table 1. Of the 8 pesticides shown in Table 1, fipronil and thiamethoxam are both current priorities for DPR action as reflected on the Department's continuous evaluation and mitigation table. DPR has selected all submissions in these rankings that are not current priorities to move forward as Category 2 potential priorities for discussion by the SPARC.

Table 1. Top Six Ranked Pesticides

Pesticide	CAS	DPR Chem Code	Score	Category 3 Rank
Cyhalothrins* (Lambda-Cyhalothrin, Gamma-Cyhalothrin)	Lambda-Cyhalothrin: 91465-08-6 Gamma-Cyhalothrin: 76703-62-3	Lambda-Cyhalothrin: 2297 Gamma-Cyhalothrin: 5877	33	1
Dichlorvos	62-73-7	187	33	1
Fipronil**	120068-37-3	3995	32	2
Methyl Bromide	74-83-9	385	31	3
Naled	300-76-5	418	31	3
Malathion	121-75-5	367	30	4
Thiamethoxam**	153719-23-4	5598	28	5
Fluopyram	658066-35-4	6004	27	6

* Grouped based on closely related stereochemical composition and comparable toxicity

** Fipronil and thiamethoxam are not agendized for discussion as Category 2 potential priorities since both are current priorities for DPR action as reflected on DPR's continuous evaluation and mitigation table webpage.

Additional data were collected for the Category 2 pesticides as post-ranking comparative deliberation to aid in the discussion as this information may be helpful for finer distinction in priorities between pesticides. There are five parameters under Category 2: three expand on existing parameters from Category 3: neurotoxicity, acute toxicity, inhalation exposure potential, and two address additional areas: bioaccumulation and endocrine-related effects.

Results

The Category 3 data (i.e., scoring sheets) and the Category 2 data (additional information) for consideration are presented below by pesticide. Tables with summarized parameters from the data included below are found in Appendix A.

Cyhalothrin – Category 3 Data

Includes:

Gamma-Cyhalothrin (CAS: 76703-62-3, Chemcode: 5877)

Lambda-Cyhalothrin (CAS: 91465-08-6, Chemcode: 2297)

33 / 46 72%

HAZARD PARAMETERS

Parameter	Score	Source / Note
Acute Oral Toxicity	3 / 4	LD_{50} = 56 mg/kg in rats. Category II. (Doc ID: 50907-0002; Study ID: 41394)
Chronic Toxicity	4 / 4	NOEL = 0.1 mg/kg/day based on ataxia, tremors, and convulsions in a 1-year chronic study in dogs. (Doc ID: 50907-0018; Study ID: 071581)
Reproductive Toxicity	4/ 4	Reproductive NOEL (50 ppm or 2.5 mg/kg/day) based on decreased body weights < the systemic NOEL (150 ppm or 7.5 mg/kg/day) based on decreased body weights at week 1 in a preliminary 3-generation reproductive study in rats. (Doc ID: 50907-023; Study ID: 085103)
Developmental Toxicity	0 / 4	Fetal NOEL (2.0 mg/kg/day) based on lack of treatment-related effects at HDT ≥ the maternal NOEL (0.5 mg/kg/day) based on clinical signs and decreased body weight gains in a developmental study in rats. (Doc ID: 50907-0049; Study ID: 210792)
Carcinogenicity	6 / 6	Carcinogenic in two or more species.

		(Doc ID: 50907-0009, -0021, -0024, -0027, Study ID: 071584, 051192, 087982, 097864; Doc ID: 50907-0009, -0021, -0024, -0027; Study ID: 051130, 071582, 087972, 097864)
Neurotoxicity	4 / 4	Pesticide class: Pyrethroid — recognized neurotoxic class.

EXPOSURE PARAMETERS

Parameter	Score	Source / Note
Use/Sales Data	4 / 4	Gamma-cyhalothrin: 5-yr avg = 724 lbs chemical/year used (2021–2025) Lambda-cyhalothrin: 5-yr avg = 135,402 lbs chemical/year used (2021–2025) Total: 5-yr avg = 136,126 lbs chemical/year used (2021-2025)
Inhalation Exposure	0 / 4	Gamma-cyhalothrin: 7.73e-10 mmHg (DPR Chemistry Database) Lambda-cyhalotrhin: 2.42e-05 mmHg (DPR Chemistry Database)
Dietary Exposure	4 / 4	Gamma-cyhalothrin: 72 active ECFR tolerances on 72 commodities (0.01–6 ppm) Alfalfa, forage, Alfalfa, hay, Almond, hulls, Apple, pomace, wet, Avocado, imported, Brassica, head and stem, subgroup 5A, Canola, seed, Cattle, fat + 64 more Lambda-cyhalothrin: 91 active ECFR tolerances on 91 commodities (0.01–10 ppm) Alfalfa, forage, Alfalfa, hay, Almond, hulls, Apple, wet pomace, Avocado, imported, Barley, bran, Barley, grain, Barley, hay + 83 more
Drinking Water Exposure	0 / 4	Gamma-cyhalothrin: MLV = 10.77 (threshold: 14.4706) — below leaching threshold. Lambda-cyhalothrin: MLV = 10.09 (threshold: 14.4706) — below leaching threshold.

Residential/Child/Community Pesticide Use	4 / 4	Gamma-cyhalothrin: Active use site(s): AUTOMOBILES, TAXIS, LIMOS, RV'S, & COMPONENTS; BASEBOARDS; BATHROOM PREMISES (LAVATORIES, RESTROOMS, ETC.); CARPETS (HOSPITAL, COMMERCIAL, HOUSEHOLD); CRACKS & CREVICES; EATING ESTABLISHMENTS (ALL OR UNSPEC); HOSPITALS & RELATED INSTITUTIONS (ALL OR UNSPEC); HOUSEHOLD OR RESIDENTIAL DWELLINGS (INDOOR AND OUTDOOR); HOUSEHOLD OR RESIDENTIAL DWELLINGS (INDOOR); HOUSEHOLD OR RESIDENTIAL DWELLINGS (OUTDOOR); HUMAN BEDDING; LAUNDRY(MATTRESSES,PILLOWS,DRAPERIES; ORNAMENTAL LAWNS, LAWNS (ALL OR UNSPEC); PAVED AREAS, PRE-PAVING APPLICATIONS; PRIVATE ROADS, WALKWAYS, LANES, PATIOS, ETC.; RECREATIONAL AREAS (TENNIS COURTS, PARKS, SCHOOL YARDS, ETC.); SCHOOLS (INDOOR AND OUTDOOR); UPHOLSTERY (HOSPITAL, COMMERCIAL, HOUSEHOLD); WALL VOIDS, WOOD (INJECTION); WINDOW FRAMES (INDOOR Lambda-cyhalothrin: Active use site(s): AUTOMOBILES, TAXIS, LIMOS, RV'S, & COMPONENTS; BASEBOARDS; BATHROOM PREMISES (LAVATORIES, RESTROOMS, ETC.); CARPETS (HOSPITAL, COMMERCIAL, HOUSEHOLD); CRACKS & CREVICES; EATING ESTABLISHMENTS (ALL OR UNSPEC); FABRIC SURFACES (E.G. FURNITURE); HARD NON-POROUS SURFACES; HOSPITALS & RELATED INSTITUTIONS (ALL OR UNSPEC); HOUSEHOLD OR RESIDENTIAL DWELLINGS (INDOOR AND OUTDOOR); HOUSEHOLD OR RESIDENTIAL DWELLINGS (INDOOR); HOUSEHOLD OR RESIDENTIAL DWELLINGS (OUTDOOR); LAUNDRY(MATTRESSES,PILLOWS,DRAPERIES; ORNAMENTAL LAWNS, LAWNS (ALL OR UNSPEC); PAVED AREAS, PRE-PAVING APPLICATIONS; PRIVATE ROADS, WALKWAYS, LANES, PATIOS, ETC.; RECREATIONAL AREAS

		(TENNIS COURTS, PARKS, SCHOOL YARDS, ETC.); SCHOOLS (INDOOR AND OUTDOOR); SCHOOLS (INDOOR); UPHOLSTERY (HOSPITAL, COMMERCIAL, HOUSEHOLD); WALL VOIDS, WOOD (INJECTION); WINDOW FRAMES (INDOOR); WINDOW SILLS; ZOOS

Cyhalothrins – Category 2 Data

Includes:

Gamma-Cyhalothrin (CAS: 76703-62-3, Chemcode: 5877)

Lambda-Cyhalothrin (CAS: 91465-08-6, Chemcode: 2297)

Score: 33 / 46 72%

Priority Ranking: 1st

CATEGORY 2 PARAMETERS

Parameter	Results	Discussion
Neurotoxicity	Pyrethroid pesticide	Cyhalothrins were originally scored as 4/4 as they belong to the pyrethroid neurotoxic pesticide class. No further review of neurotoxicity studies was conducted.
Acute Toxicity Categories	Oral – II Dermal – II Inhalation – NA Eye – III Skin – IV No dermal sensitization	Toxicity categories determine the signal word on a pesticide label[a]. Technical grade cyhalothrin is Category II for acute oral and dermal toxicity, and the label requires the signal word "WARNING: may be fatal if swallowed or inhaled".
Application Method	Lambda-Cyhalothrin: Airblast, Broadcast, Fog, Spray Gamma-Cyhalothrin: Airblast, Broadcast, Spray	Both lambda- and gamma-cyhalothrin were originally scored as 0/4 for inhalation exposure as they have vapor pressures below the threshold in the guidance; however, both have multiple active registered products in California with application methods that may lead to potential inhalation exposure.
Bioaccumulation	Log-kow = 7 (lambda-cyhalothrin), 5 (gamma-cyhalothrin: 5 (DPR Pesticide Chemistry Database)	A log-kow range of 5 to 7 indicates that cyhalothrins partition to fat vs water at a ratio of ~100,000 to 10,000,000:1. This is at and above the log-kow threshold of 5 and indicates a high potential for bioaccumulation.
Endocrine Effects	Endocrine effects not observed.	

[a]Acute Toxicity Categories (Acute toxicity categories determine the signal word on a pesticide label). US EPA Label Review Manual Chapter 7: Precautionary Statements. https://www.epa.gov/sites/default/files/2018-04/documents/chap-07-mar-2018.pdf

Dichlorvos – Category 3 Data

(CAS: 62-73-7, Chemcode: 187)

Exposure includes precursor Naled (CAS: 300-76-5, Chemcode: 418)

33 / 46 72%

HAZARD PARAMETERS

Parameter	Score	Source / Note
Acute Oral Toxicity	3 / 4	LD_{50} = 56 mg/kg in rats. Category II. (Doc ID: 235-069; Study ID: 75574).
Chronic Toxicity	4 / 4	NOEL = 0.05 mg/kg/day based on erythrocyte cholinesterase inhibition in a chronic toxicity study in dogs. (Doc ID: 235-106; Study ID: 088784)
Reproductive Toxicity	0 / 4	Reproductive NOEL (1 mg/kg/day; 20 ppm) based on reduction in pregnant F1 dams, including irregular and absent estrous cycles ≥ the systemic NOEL (1 mg/kg/day; 20 ppm) based on reduced water consumption and maternal body weights in a two-generation reproduction study in rats. (Doc ID: 235-118; Study ID: 117629). *Cholinesterase effects were also reported at 5 ppm dose for dams, but does not change Reproductive Toxicity Score
Developmental Toxicity	0 / 4	Fetal NOEL (≥21 mg/kg/day) based on no treatment related effects ≥ the maternal NOEL (3.0 mg/kg/day) based on tremors and decreased food consumption and weight gain in dams in a teratology study in rats. (Doc ID: 235-110; Study ID: 09639)
Carcinogenicity	6 / 6	Carcinogenic in two or more species. (Doc ID: 235-095, Study ID: 074933; Doc ID: 235-095; Study ID: 074933)
Neurotoxicity	4 / 4	Pesticide class: Organophosphate — recognized neurotoxic class.

EXPOSURE PARAMETERS

Parameter	Score	Source / Note
Use/Sales Data	4 / 4	5-yr avg = 3,816 (dichlorvos) + 229,327 (naled) + 27 (DDVP,other related); 233,170 (total) lbs chemical/year used (2021–2025)
Inhalation Exposure	4 / 4	Dichlorvos: 0.0165 mmHg (DPR Chemistry Database) Naled: 0.0002 mmHg (DPR Chemistry Database)
Dietary Exposure	4 / 4	Dichlorvos: 21 active ECFR tolerances on 21 commodities (0.5–2 ppm) Cattle, fat, Cattle, meat, Cattle, meat byproducts, Egg, Goat, fat, Goat, meat, Goat, meat byproducts, Horse, fat + 13 more Naled: 38 active ECFR tolerances on 38 commodities (0.5–10 ppm) Almond, Almond, hulls, Bean, dry, seed, Bean, succulent, Beet, sugar, roots, Beet, sugar, tops, Broccoli, Brussels sprouts + 30 more
Drinking Water Exposure	0 / 4	MLV = 11.72 (dichlorvos); 12.62 (naled) (threshold: 14.4706) — both below leaching threshold.
Residential/Child/Community Pesticide Use	4 / 4	Active use site(s): Dichlorvos: AUTOMOBILES, TAXIS, LIMOS, RV'S, & COMPONENTS; BATHROOM PREMISES (LAVATORIES, RESTROOMS, ETC.); CARPETS (HOSPITAL, COMMERCIAL, HOUSEHOLD); EATING ESTABLISHMENTS (ALL OR UNSPEC); HOUSEHOLD OR RESIDENTIAL DWELLINGS (INDOOR AND OUTDOOR); HOUSEHOLD OR RESIDENTIAL DWELLINGS (INDOOR); HOUSEHOLD OR RESIDENTIAL DWELLINGS (OUTDOOR); HUMAN BEDDING; LAUNDRY(MATTRESSES,PILLOWS,DRAPERIES; PAVED AREAS, PRE-PAVING APPLICATIONS; PRIVATE ROADS, WALKWAYS, LANES, PATIOS, ETC.; RECREATIONAL AREAS (TENNIS COURTS, PARKS, SCHOOL YARDS, ETC.); WINDOW SILLS Naled: ORNAMENTAL LAWNS, LAWNS (ALL OR UNSPEC)

Dichlorvos – Category 2 Data

(CAS: 62-73-7, Chemcode: 187)

Score: 33 / 46 72%

Priority Ranking: 1st

CATEGORY 2 PARAMETERS

Parameter	Results	Discussion
Neurotoxicity	Organophosphate pesticide	Dichlorvos was originally scored as 4/4 as it belongs to the organophosphate neurotoxic pesticide class. No further review of neurotoxicity studies was conducted.
Acute Toxicity Categories	Oral – II Dermal – I Inhalation – NA Eye – Category III Skin – Category NA Dermal Sensitization – NA	Technical grade dichlorovos is Category I for acute dermal toxicity, and the label requires the signal word "DANGER: Fatal if absorbed through the skin."[a]
Application Method	Evaporating Solid, Fog, Fumigation, Spray	Dichlorvos was originally scored as 4/4 for inhalation exposure as the vapor pressure is at/above the threshold in the guidance. Additionally, there are multiple active registered products in California with application methods that may lead to potential inhalation exposure.
Bioaccumulation	Log-kow = 1.6 (DPR Pesticide Chemistry Database)	A log-kow of 1.6 indicates that methyl bromide partitions to fat vs water at a ratio of ~40:1. This is below the log-kow threshold of 5 and indicates a low potential for bioaccumulation.
Endocrine Effects	Observed endocrine effects in 1 study	There were suggestions of DDVP-induced testicular degeneration and pancreatic exocrine cell adenomas in carcinogenesis studies of dichlorvos in mice and rats.

[a]U.S. Environmental Protection Agency memorandum (Feb 20, 1998; From Ghazi A. Dannan to Christina Scheltema through Stephen C. Dapson).

Methyl Bromide – Category 3 Data

(CAS: 74-83-9, Chemcode: 385)

31 / 46 67%

HAZARD PARAMETERS

Parameter	Score	Source / Note
Acute Oral Toxicity	3 / 4	LD_{50} = 86 mg/kg in rats. Category II. (Doc ID: 123-162; Study ID: 132699)
Chronic Toxicity	4 / 4	NOEL = 0.0375 mg/kg/day based on anemia in a chronic toxicity study in dogs. (Doc ID: 123-175; Study ID: 143945)
Reproductive Toxicity	0 / 4	Reproductive NOEL (3 ppm) based on reduced fertility ≥ the systemic NOEL (3 ppm) based on reduced brain weights and reduced cerebral-cortex width in a reproductive toxicity study in rats. (Doc ID: 123-082; Study ID: 058196)
Developmental Toxicity	4 / 4	Developmental NOEL (20 ppm) based on treatment-related skeletal and delayed ossification effects < the maternal NOEL (70 ppm) based on no effect at highest tested dose in a developmental toxicity study in rats.(Doc ID: 123-039; Study ID: 026866)
Carcinogenicity	4 / 6	Carcinogenic in one species. (Doc ID: 123-084 and 123-179; Study ID: and 158746)
Neurotoxicity	0 / 4	Not in a recognized neurotoxic class.

EXPOSURE PARAMETERS

Parameter	Score	Source / Note
Use/Sales Data	4 / 4	5-yr avg = 1,630,472 lbs chemical/year used (2021–2025)
Inhalation Exposure	4 / 4	3800 mmHg (DPR Chemistry Database)
Dietary Exposure	4 / 4	30 active ECFR tolerances: Berry and small fruit, group 13-07, Cactus, Coconut, copra, Coffee, green bean, Cola, seed, Cucurbit, seed, Fig, + 23 more
Drinking Water Exposure	0 / 4	MLV = 13.23 (threshold: 14.4706) — below leaching threshold.
Residential/Child/Community Pesticide Use	4 / 4	Active use site(s): AUTOMOBILES, TAXIS, LIMOS, RV'S, & COMPONENTS; HOUSEHOLD OR RESIDENTIAL DWELLINGS (INDOOR AND OUTDOOR)

Methyl Bromide – Category 2 Data

(CAS: 74-83-9, Chemcode: 385)

Score: 31 / 46 67%

Priority Ranking: 3rd

CATEGORY 2 PARAMETERS

Parameter	Results	Discussion
Neurotoxicity	Multiple neurotoxicity effects observed across multiple studies.	Neurotoxic effects were consistently observed across acute, subchronic, and chronic studies as in dogs, rabbits, mice, and rats. Findings included depression, ataxia, tremors, emesis, rales, irregular gait, lethargy, and spasms.
Acute Toxicity Categories	Oral – II Dermal – NA Inhalation – NA Eye – I Skin – I Dermal sensitization – NA	Methyl bromide is a Toxicity Category I inhaled toxicant, and eye and skin irritant. The label requires the signal word "DANGER-POISON: Fatal if inhaled; Corrosive: causes irreversible eye damage and causes skin burns."
Application Method	Broadcast, Fumigation	Methyl Bromide was originally scored as 4/4 for inhalation exposure as the vapor pressure is at/above the threshold in the guidance. Additionally, there are multiple active registered products in California with application methods that may lead to potential inhalation exposure.
Bioaccumulation	Log-kow = 2.0 (DPR Pesticide Chemistry Database)	A log-kow of 2.0 indicates that methyl bromide partitions to fat vs water at a ratio of ~100:1. This is below the log-kow threshold of 5 and indicates a low potential for bioaccumulation.
Endocrine Effects	Multiple endocrine effects observed across multiple studies.	Findings suggest thyroid and pituitary tumor induction, reduced testosterone levels, adrenal gland lesions (including pheochromocytoma, lipid accumulation, and cytoplasmic vacuoles).

Naled – Category 3 Data

(CAS: 300-76-5, Chemcode: 418)

31 / 46 67%

HAZARD PARAMETERS

Parameter	Score	Source / Note
Acute Oral Toxicity	3 / 4	LD_{50} = 50 mg/kg in rats. Category II. (Doc ID: 215-178; Study ID: 176872)
Chronic Toxicity	4 / 4	NOEL = 0.2 mg/kg/day based on brain and plasma ChE inhibition in a combined chronic plus carcinogenicity study in rats. (Doc ID: 215-064 and -071; Study ID: 037591-98)
Reproductive Toxicity	0 / 4	Reproductive NOEL (2 mg/kg/day) based on reduced litter sizes ≥ the systemic NOEL (ENEL) (0.2 mg/kg/day) based on decreased male body weights in all tested doses in a two-generation reproduction study in rats. (Doc ID: 215-051; Study ID: 027114)
Developmental Toxicity	0 / 4	Fetal NOEL (8 mg/kg/day) based on no treatment related effects ≥ the maternal NOEL (8 mg/kg/day) based on no treatment related effects in a developmental toxicity study in rabbits. (Doc ID: 215-072; Study ID: 037599)
Carcinogenicity	4 / 6	Carcinogenic in one species. (Doc ID: 215-064 and -071; Study ID: 037591-98)
Neurotoxicity	4 / 4	Pesticide class: Organophosphate — recognized neurotoxic class.

EXPOSURE PARAMETERS

Parameter	Score	Source / Note
Use/Sales Data	4 / 4	5-yr avg = 229,327 lbs chemical/year used (2021–2025)
Inhalation Exposure	4 / 4	0.0002 mmHg (DPR Chemistry Database)
Dietary Exposure	4 / 4	38 active ECFR tolerances on 38 commodities (0.5–10 ppm) Almond, Almond, hulls, Bean, dry, seed, Bean, succulent, Beet, sugar, roots, Beet, sugar, tops, Broccoli, Brussels sprouts + 30 more
Drinking Water Exposure	0 / 4	MLV = 12.62 (threshold: 14.4706) — below leaching threshold.
Residential/Child/Community Pesticide Use	4 / 4	Active use site(s): ORNAMENTAL LAWNS, LAWNS (ALL OR UNSPEC)

Naled – Category 2 Data

(CAS: 300-76-5, Chemcode: 418)

Score: 31 / 46 67%

Priority Ranking: 3rd

CATEGORY 2 PARAMETERS

Parameter	Results	Discussion
Neurotoxicity	Organophosphate pesticide	Naled was originally scored as 4/4 as it belongs to the organophosphate neurotoxic pesticide class. No further review of neurotoxicity studies was conducted.
Acute Toxicity Categories	Oral – II Dermal – III Inhalation – III Eye –I Skin –IIII Dermal sensitization – NA	Naled is a Toxicity Category I primary eye irritant and requires the signal word "DANGER: Corrosive. Causes irreversible eye damage".
Application Method	Broadcast, Fog, Spray	Naled was originally scored as 4/4 for inhalation exposure as the vapor pressure is at/above the threshold in the guidance. Additionally, there are multiple active registered products in California with application methods that may lead to potential inhalation exposure.
Bioaccumulation	Log-kow = 2.0 (DPR Pesticide Chemistry Database)	A log-kow of 2.0 indicates that naled partitions to fat vs water at a ratio of ~100:1. This is below the log-kow threshold of 5 and indicates a low potential for bioaccumulation.
Endocrine Effects	Observed endocrine effects in 1 study	Except for a report of mild testicular degeneration in dogs, review of DPR databases revealed no evidence of hormonal effects.

Malathion – Category 3 Data

(CAS: 121-75-5, Chemcode: 367)

31 / 46 67%

HAZARD PARAMETERS

Parameter	Score	Source / Note
Acute Oral Toxicity	4 / 4	LD_{50} = 5.4 mg/kg in rats. Category I. (Doc ID: 111-117; Study ID: 90416)
Chronic Toxicity	3 / 4	NOEL = 2 mg/kg/day based on RBC ChE inhibition in a combined chronic plus oncogenicity study in rats. (Doc ID: 111-0208; Study ID: 145994)
Reproductive Toxicity	0 / 4	Reproductive NOEL (7500 ppm or 595 mg/kg/day) based on no treatment related effects to fertility or reproductive indices ≥ the systemic NOEL (5000 ppm or 394 mg/kg/day) based on decreased maternal body weights in a two-generation reproduction study in rats. (Doc ID: 111-0126; Study ID: 091230)
Developmental Toxicity	0 / 4	Fetal NOEL (25 mg/kg/day) based on increase in resorptions = the Maternal NOEL (25 mg/kg/day) based on reduced weight gain in a teratology study in rabbits. (Doc ID: 111-089; Study ID: 051413)
Carcinogenicity	6 / 6	Carcinogenic in two or more species. (Doc ID: 111-0208; Study ID: 145994, Doc ID: 111-150; Study ID: 132499)
Neurotoxicity	4 / 4	Pesticide class: Organophosphate — recognized neurotoxic class.

EXPOSURE PARAMETERS

Parameter	Score	Source / Note
Use/Sales Data	4 / 4	5-yr avg = 276,786 lbs chemical/year used (2021–2025)
Inhalation Exposure	4 / 4	0.00014 mmHg (DPR Chemistry Database)
Dietary Exposure	4 / 4	150 active ECFR tolerances on 150 commodities (0.1–270 ppm) Alfalfa, forage, Alfalfa, hay, Almond, hulls, Almond, postharvest, Apple, Apricot, Asparagus, Avocado + 142 more
Drinking Water Exposure	0 / 4	MLV = 11.38 (threshold: 14.4706) — below leaching threshold.
Residential/Child/Community Pesticide Use	4 / 4	Active use site(s): HOUSEHOLD OR RESIDENTIAL DWELLINGS (INDOOR AND OUTDOOR); HOUSEHOLD OR RESIDENTIAL DWELLINGS (OUTDOOR); ORNAMENTAL LAWNS, LAWNS (ALL OR UNSPEC); PRIVATE ROADS, WALKWAYS, LANES, PATIOS, ETC.

Malathion – Category 2 Data

(CAS: 658066-35-4, Chemcode: 6004)

Score: 30 / 46 65%

Priority Ranking: 4th

CATEGORY 2 PARAMETERS

Parameter	Results	Discussion
Neurotoxicity	Organophosphate Pesticide	Malathion was originally scored as 4/4 as it belongs to the organophosphate neurotoxic pesticide class. No further review of neurotoxicity studies was conducted.
Acute Toxicity Categories	Oral – IV Dermal – III Inhalation – IV Eye – IV Skin – IV No dermal sensitization	Technical-grade malathion is Category III for acute dermal hazard and the label requires the signal word "CAUTION: Harmful if absorbed through skin".
Application Method	Broadcast, Dust, Fog, Spray	Malathion was originally scored as 4/4 for inhalation exposure as the vapor pressure is at/above the threshold in the guidance. Additionally, there are multiple active registered products in California with application methods that may lead to potential inhalation exposure.
Bioaccumulation	Log-kow = 2.3 (DPR Pesticide Chemistry Database)	A log-kow of 2.0 indicates that malathion partitions to fat vs water at a ratio of ~100:1. This is below the log-kow threshold of 5 and indicates a low potential for bioaccumulation.
Endocrine Effects	Potential effects in 1 study	Malathion showed minimal endocrine effects in DPR database studies, limited to increased absolute and relative liver, kidney, and adrenal weights in male rats.

Fluopyram – Category 3 Data

(CAS: 658066-35-4, Chemcode: 6004)

27 / 46 59%

HAZARD PARAMETERS

Parameter	Score	Source / Note
Acute Oral Toxicity	2/ 4	LD_{50} > 2000 mg/kg in rats. Category III. (Doc ID: 53087-0261; Study ID: 245602)
Chronic Toxicity	4 / 4	NOEL = 0.12 mg/kg/day (ENEL) based on hepatocellular macrovacuolation in a chronic toxicity and carcinogenicity study in rats. (Doc ID: 53087-0277; Study ID: 245653)
Reproductive Toxicity	0 / 4	Reproductive NOEL (1200 ppm or 60 mg/kg/day) based on the lack of reproductive effects up to the highest dose tested ≥ the systemic NOEL (220 ppm or 11 mg/kg/day) based on liver hypertrophy in both sexes, protein-droplet nephropathy and lymphocytic infiltrate in males, slight body weight decrements in F0 females (primarily during gestation), and small reductions in RBC parameters such as hemoglobin and hematocrit in a two generation reproductive toxicity study in rats. (Doc ID: 53087-0273; Study ID: 245616)
Developmental Toxicity	0 / 4	Fetal NOEL (25 mg/kg/day) based on decreased mean fetal weight ≥ the maternal NOEL (25 mg/kg/day) based on marked decrement in maternal food consumption from gestation days 14-26, with a slight associated body weight decrement in a developmental toxicity study in rabbits. (Doc ID: 53087-0272; Study ID: 245615)
Carcinogenicity	6 / 6	Carcinogenic in both rats and mice. Rat: Hepatocellular tumors in females (Doc ID: 53087-0277; Study ID: 245653; Mouse: Thyroid follicular cell adenoma in males (Doc ID: 53087-0276; Study ID: 245650)
Neurotoxicity	0 / 4	Not in a recognized neurotoxic class.

EXPOSURE PARAMETERS

Parameter	Score	Source / Note
Use/Sales Data	3 / 4	5-yr avg = 70,351 lbs chemical/year used (2021–2025)
Inhalation Exposure	0 / 4	9.001e-09 mmHg (Comptox - OChem_2024_04_03 - Experimental)
Dietary Exposure	4 / 4	87 active ECFR tolerances on 86 commodities (0.01–70 ppm) Alfalfa, forage, Alfalfa, hay, Almond, hulls, Artichoke, globe, Banana, Beet, sugar, Berry, low growing, except cranberry, subgroup 13-07G, Brassica, leafy greens, subgroup 4-16B + 78 more
Drinking Water Exposure	4 / 4	MLV = 15.33 (threshold: 14.4706) — exceeds leaching threshold.
Residential/Child/Community Pesticide use	4 / 4	Active use site(s): RECREATIONAL AREAS (TENNIS COURTS, PARKS, SCHOOL YARDS, ETC.)

Fluopyram – Category 2 Data

(CAS: 658066-35-4, Chemcode: 6004)

Score: 27 / 46 59%

Priority Ranking: 6th

CATEGORY 2 PARAMETERS

Parameter	Results	Discussion
Neurotoxicity	Observed neurotoxicity in 1 study	Fluopyram was originally scored as 0/4 as it does not belong to one of the neurotoxic pesticide classes outlined in the prioritization guidance. Neurotoxicity was not seen in the acute and subchronic neurotoxicity studies. Retinal atrophy was observed in a chronic toxicity study in rats, which could represent neurotoxicity (Document ID: 53087-0277, Study ID: 245653).
Acute Toxicity Categories	Oral – III Dermal – III Inhalation – IV Eye – IV Skin – IV No dermal sensitization	Technical grade fluopyram is Category III for acute oral and dermal hazard and the label requires the signal word "CAUTION: Harmful if swallowed or absorbed through skin".
Application Method	Airblast, Broadcast, and Spray	Fluopyram was originally scored as 0/4 for inhalation exposure as the vapor pressure is below the threshold in the guidance; however, there are multiple active registered products in California with application methods that may lead to potential inhalation exposure.
Bioaccumulation	Log-kow = 4.1 (Comptox - OPERA2.8 - predicted)	A log-kow of 4.1 indicates that fluopyram partitions to fat vs water at a ratio of ~10,000:1. While below the log-kow threshold of 5; this still indicates a moderate potential for bioaccumulation.
Endocrine Effects	Observed endocrine effects in 6 studies.	Potential endocrine effects of fluopyram were observed in the thyroid regulatory system in rats and mice. Changes in T3, T4,

		and TSH levels, possibly mediated by enhanced liver metabolism, may lead to thyroid hypertrophy and subsequent tumors. One study showed adrenal cortical hypertrophy in the zone fasciculata.

Appendix A. Supplemental Information

Supplemental Information

Table A-1 and Table A-2 define the hazard and exposure parameters utilized in the Category 3 screening level prioritization tool, and the corresponding determinant levels and scores for each. Table A-3 describes the Category 2 parameters and their importance and defines their respective data sources. Further, Table A-4 summarizes the additional data for Category 2 for each pesticide.

Table A-1. Hazard Parameter Scoring

Hazard Parameter	Hazard level determinant	Score
Acute Oral Toxicity	≤50 mg/kg (Toxicity Category I) >50 – 500 mg/kg (Toxicity Category II) >500 – 5,000 mg/kg (Toxicity Category III) >5,000 mg/kg (Toxicity Category IV)	4 3 2 1
Chronic Toxicity	0 – 1 mg/kg-day >1 – 3 mg/kg-day >3 – 10 mg/kg-day >10 mg/kg-day	4 3 2 1
Reproductive Toxicity	Reproductive NOEL < systemic NOEL Reproductive NOEL ≥ systemic NOEL	4 0
Developmental Toxicity	Pup NOEL < maternal NOEL Pup NOEL ≥ maternal NOEL	4 0
Carcinogenicity	Carcinogenic in two species Carcinogenic in one species Non-carcinogenic in rodents	6 4 0
Neurotoxicity	AI is in neurotoxic pesticide class AI is not in neurotoxic pesticide class	4 0

LD_{50} – median lethal dose; NOEL – no-observed-effect level

[a] US EPA Acute Toxicity Categories as determined in the Label Review Manual (US EPA, 2018), with Toxicity Category I as the most toxic/irritating) through IV as the least toxic/irritating.

Sources: US EPA. (2018). Label Review Manual, Chapter 7: Precautionary Statements. Office of Pesticide Programs. United States Environmental Protection Agency. Available online at: https://www.epa.gov/sites/production/files/2018-04/documents/chap-07-mar-2018.pdf

Appendix A. Supplemental Information

Table A-2. Exposure Parameter Scoring

Exposure parameters	Exposure level determinant	Score
5-yr Average Use Rate – Agricultural Use Pesticides	>100,000 lbs used/year >10,000 – 100,000 lbs used/year >1,000 – 10,000 lbs used/year ≤1,000 lbs used/year	4 3 2 1
5-yr Average Sales – Non-Agricultural Use Pesticides	>100,000 lbs sold/year >10,000 – 100,000 lbs sold/year >1000 – 10,000 lbs sold/year ≤1,000 lbs sold/year	4 3 2 1
Inhalation Exposure (Vapor Pressure)	$>10^{-4}$ mmHg $\leq 10^{-4}$ mmHg	4 0
Drinking Water Exposure (Multivariate Leaching Value)	Leaching capability indicated Leaching capability unknown Leaching capability not indicated	4 2 0
Residential/Child/Community Pesticide Use	Relevant use site code No relevant use site code	2 0
Dietary Exposure	AI tolerance established 40 CFR Part 180 et seq. No tolerance established or tolerance exempt	4 0

[a]Use rates from the PUR and sales rates from DPR's sales database are to be used on an either/or basis with the intent to use PUR data for agricultural chemicals and sales data for non-agricultural chemicals

[b]See associated text for the product status and uses relevant to inhalation exposure

[c]40 CFR Part 180 – Title 40 of the Code of Federal Regulations, Tolerance and Exemptions for Pesticide Chemical Residues in Food, https://www.ecfr.gov/current/title-40/part-180

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Table A-3. Parameters Evaluated for Category 2

Parameter Type	Parameter	Description
Existing	Neurotoxicity	Neurotoxicity is scored based on a pesticide belonging to one of six chemical classes of pesticides that are considered by regulators to be neurotoxic (organophosphates, N-methyl carbamates, pyrethroids, neonicotinoids, GABA channel blockers, and organochlorines); however, a pesticide outside of these classes may be neurotoxic and not covered with this approach. The FIFRA-required toxicology data made available to DPR under California registration requirements were reviewed for potential neurotoxicity hazards and summarized for each respective chemical that fell outside the initial six neurotoxic chemical classes.
Existing	Inhalation Exposure	Inhalation exposure was initially scored based on the vapor pressure being above or below a specific threshold (10^{-4} mmHg). However, the potential for inhalation exposure may also be present based on the application method, regardless of vapor pressure. DPR's CalPest database[b] was queried for labeled application methods on actively registered products for Category 2 pesticides. A list of application methods which DPR considers likely to result in inhalation exposure are: Airblast, Broadcast, Dust, Evaporating Solid, Fog, Fumigation, Smoke, Spray
Existing	Acute Toxicity Studies 1. Acute Oral 2. Acute Dermal 3. Acute Inhalation 4. Eye Irritation 5. Dermal Irritation 6. Dermal Sensitization	Under California registration requirements, a battery of acute toxicity studies (referred to as the 6-pack studies) are conducted to assess acute oral, dermal, and inhalation toxicity along with eye and dermal irritation and dermal sensitization. The first five are assigned toxicity categories as I (the most toxic/irritating) through IV (the least toxic/irritating). The 6th study (dermal sensitization) is categorized as a sensitizer or non-sensitizer. Note acute oral toxicity and acute inhalation toxicity were included in the initial Category 3 rank scoring process. For Category 2, the information for these 6 acute studies is presented for each pesticide. Category I (most toxic/irritating) • Oral LD_{50} ≤50 mg/kg • Dermal LD_{50} ≤200 mg/kg • Inhalation LC_{50} ≤0.05 mg/L

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Parameter Type	Parameter	Description
		• Eye: Corrosive; corneal involvement or irritation persisting for more than 21 days • Skin: Corrosive Category II • Oral LD_{50} >50-500 mg/kg • Dermal LD_{50} >200-2,000 mg/kg • Inhalation LC_{50} >0.05-0.5 mg/L • Eye: Corneal involvement or other eye irritation clearing in 8-21 days • Skin: Severe irritation at 72 hours Category III • Oral LD_{50} >500-5,000 mg/kg • Dermal LD_{50} >2,000-5,000 mg/kg • Inhalation LC_{50} >0.5-2 mg/L • Eye: Corneal involvement or other eye irritation clearing in 7 days or less • Skin: Moderate irritation at 72 hours Category IV • Oral LD_{50} >5,000 mg/kg • Dermal LD_{50} >5,000 mg/kg • Inhalation LC_{50} >2 mg/L • Eye: Minimal effects clearing in less than 24 hours • Skin: Mild or slight irritation at 72 hours
New	Bioaccumulation	The octanol-water coefficient (K_{ow}) is a chemical's tendency to partition into lipids over water and is an indicator of the potential for a chemical to bioaccumulate or gradually build-up in an organism over time, even from low levels of exposure. Under Annex D of the Stockholm Convention on Persistent Organic Pollutants, a chemical with a log-k_{ow} of 5 (k_{ow} of >100,000) is considered to bioaccumulate. A log-K_{ow} of 5 means that the chemical will partition in oil vs water at a ratio of 100,000:1. This value is not the sole indicator for bioaccumulation as there are other physiochemical properties and biological processes that can affect bioaccumulation but K_{ow} is a strong predictor. K_{ow} and Log-k_{ow} values for pesticides were obtained from DPR's internal pesticide chemistry database or, if unavailable, from US EPA's CompTox database[a].
New	Endocrine Effects	Potential endocrine-related effects were not included as a parameter in the initial Category 3 scoring; however,

Appendix A. Supplemental Information

Parameter Type	Parameter	Description
		exposure to chemicals that impact the endocrine system can have profound developmental and biological effects. To evaluate this parameter, the FIFRA-required toxicology data made available to DPR under California registration requirements were reviewed for potential endocrine effects and were summarized for each pesticide. These findings do not necessarily establish a direct effect on the endocrine system and may be secondary to other mechanisms of action.

[a]US EPA's Comptox Dashboard is a publicly accessible online database aggregating chemistry, toxicity and exposure data for chemical substances.

[b]DPR's CalPest database is a publicly accessible online database that tracks registered pesticide product registrations in California.

Table A-4. Summary of Category 2 Data by Pesticide

Pesticide	Rank	Neurotoxicity	Inhalation Exposure	Acute Toxicity Categories[a]	Bioaccumulation[b]	Endocrine Effects
Cyhalothrins (Lambda-Cyhalothrin, Gamma-Cyhalothrin)	1	Recognized neurotoxic class: Pyrethroid pesticide	Inhalation exposure potential via application method	Oral – II Dermal – II Inhalation – NA Eye – III Skin – IV No sensitization	Log K_{ow} = 7 (lambda-cyhalothrin); 5 (gamma-cyhalothrin) *High* potential for bioaccumulation	No observed endocrine effects in any studies
Dichlorvos	1	Recognized neurotoxic class: Organophosphate pesticide	Inhalation exposure potential via application method	Oral – II Dermal – NA Inhalation – NA Eye –III Skin – NA Sensitization – NA	Log-K_{ow} = 1.6 *slight* potential for bioaccumulation	Potential endocrine effects in the following system(s): -Pancreatic
Methyl Bromide	3	Neurotoxic effects observed	Inhalation exposure potential via application method	Oral – II Dermal – I Inhalation – I Eye – I Skin – I Sensitization – NA	Log-K_{ow} = 2.0 *slight* potential for bioaccumulation	Potential endocrine effects in the following system(s): -Hypothalamus -Pancreatic -Adrenal - Androgen/estrogen

Pesticide	Rank	Neurotoxicity	Inhalation Exposure	Acute Toxicity Categories[a]	Bioaccumulation[b]	Endocrine Effects
Naled	3	Recognized neurotoxic class: Organophosphate pesticide	Inhalation exposure potential via application method	Oral – II Dermal – III Inhalation – III Eye –I Skin –IIII Sensitization – NA	Log-K_{ow} = 2.0 *slight* potential for bioaccumulation	Potential endocrine effects in the following system(s): - Androgen/estrogen
Malathion	4	Recognized neurotoxic class: Organophosphate pesticide	Inhalation exposure potential via application method	Oral – IV Dermal – III Inhalation – IV Eye – IV Skin – IV No sensitization	Log-K_{ow} = 2.3 *slight* potential for bioaccumulation	Potential endocrine effects in the following system(s): - Androgen/estrogen -Thyroid
Fluopyram	6	No neurotoxic effects identified in the studies reviewed	Inhalation exposure potential via application method	Oral – III Dermal – III Inhalation – IV Eye – IV Skin – IV No sensitization	Log-K_{ow} = 4.1 *moderate* potential for bioaccumulation	Potential endocrine effects in the following systems: -Thyroid -Adrenal

[a]Toxicity Categories are defined in Table 3; NA = data not available (further information for each chemical can be found in Appendix A).

[b] Bioaccumulation potential is inferred from log-K_{ow}; these values do not directly measure accumulation in humans or other organisms.

Log-k_{ow} = logscale octanol-water partition coefficient