



July 16, 2026

Karen Morrison, Director
California Department of Pesticide Regulation
1001 I Street
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Re: Comments in Support of DPR's Decision to Begin Reevaluation of Specified Total Release Fogger Products for Indoor Consumer Use

Dear Director Morrison: The California Pest Management Association (CAPMA) supports the Department of Pesticide Regulation's decision to begin reevaluation of specified total release fogger (TRF) products for indoor consumer use. DPR's decision appropriately frames the project as whether continued indoor consumer use of TRFs under current use requirements is warranted, and the administrative record provides a substantial public health basis for that review.¹

CAPMA represents licensed structural pest management professionals who protect homes, businesses, schools, food facilities, health care settings, and other occupied structures from pests that can affect public health and property. CAPMA supports effective, science-based pest management and responsible pesticide regulation. In this matter, the record supports a targeted reevaluation focused on unlicensed indoor consumer use, retail access, product misuse, and avoidable exposure events. CAPMA urges DPR to distinguish that consumer-use pathway from licensed structural pest control practice.

¹ California Department of Pesticide Regulation, "Decision to Begin Reevaluation of Specified Total Release Fogger (TRF) Products for Indoor Consumer Use" (Sacramento: California Department of Pesticide Regulation, June 29, 2026), 1, 4.

DPR's record shows that the TRF products subject to reevaluation are available for retail purchase and do not require a pesticide applicator license. DPR received 391 reports of injury or illness associated with TRF use from 2018 through 2024, including 354 injuries or illnesses from indoor consumer use, 8 hospitalizations, and 3 incidents where more than 5 individuals experienced illness symptoms. DPR further reports that incidents averaged approximately 56 per year, that approximately 62 percent could have been avoided if applicators adhered to label requirements, and that approximately 38 percent involved accidental discharge, events not clearly inconsistent with label requirements, or situations where noncompliance could not be determined.²

That record is sufficient to justify a consumer-focused reevaluation. It also shows that this is not merely a theoretical risk. Retail-available bug bombs are being used in real homes by unlicensed consumers in ways that continue to generate reported illnesses, hospitalizations, and multi-person exposure events. DPR's decision appropriately recognizes that a pesticide use pattern can warrant reevaluation when label warnings and current availability conditions are not preventing significant public-health incidents.³

National public-health data reinforce DPR's concern. CDC identified 3,222 acute TRF-related illness and injury cases in 10 states from 2007 through 2015. CDC found no statistically significant reduction in overall TRF-associated injury and illness incidence during the first three years after EPA-required label improvements took effect. The most commonly reported causes included failure to vacate during application, early reentry, inability to vacate before discharge, inadequate ventilation, excessive fogger use, failure to notify others, discharge by children, using a TRF like a spot spray, unintentional discharge, and contamination of food, drink, utensils, furniture, or surfaces. CDC concluded that more comprehensive strategies are needed, including promotion of integrated pest management and better approaches to motivating users to read and follow label instructions.⁴

² California Department of Pesticide Regulation, "Decision to Begin Reevaluation," 2, 4.

³ California Department of Pesticide Regulation, "Decision to Begin Reevaluation," 2-4.

⁴ Ruiling Liu et al., "Acute Illnesses and Injuries Related to Total Release Foggers - 10 States, 2007-2015," *Morbidity and Mortality Weekly Report* 67, no. 4 (February 2, 2018): 125-30, <https://www.cdc.gov/mmwr/volumes/67/wr/mm6704a4.htm>.

EPA's own TRF record reflects the same long-standing concern. EPA previously identified consumer exposure incidents associated with failure to vacate, early reentry, failure to air out treated premises, failure to warn others, and other basic use errors. EPA required label changes including pictograms, stronger vacate and reentry language, warnings against confined-space use, door hang-tags, Spanish-language directions, and a warning that TRFs do not control bed bugs. EPA also identified possible design and marketing changes, including avoiding multipacks for consumer use, smaller unit sizes, time-delay release mechanisms, and non-flammable propellants.⁵

EPA's current consumer safety guidance continues to warn that improper fogger use can cause illness, fires, and explosions. EPA states that foggers should not be used in small enclosed places, that users should use no more than one fogger per room, that ignition sources must be controlled, that family members and neighbors must be notified, and that everyone, including pets, must leave the treated space and stay out until the label reentry period has passed.⁶ The National Pesticide Information Center provides a consumer case profile in which a homeowner used nine foggers instead of two and failed to turn off a pilot light, resulting in an explosion and fire.⁷

CAPMA also urges DPR to consider the efficacy side of the question, not only incident counts. A pesticide use pattern that creates indoor exposure but fails to meaningfully control the target pest presents a serious public-health concern. A leading peer-reviewed field study by DeVries et al. evaluated four consumer TRF products in 20 cockroach-infested homes and compared them with treatments in 10 other homes. The study found that TRFs did not significantly reduce German cockroach populations, while the comparison treatments did. TRF use also produced broad indoor residues, with pesticide residues on horizontal kitchen surfaces increasing by an average of 603-fold and a median of 85-fold over baseline after discharge. One month later, 34 percent of horizontal surface and pesticide combinations remained significantly above baseline.⁸

⁵ U.S. Environmental Protection Agency, "Update: Total Release Foggers" (Washington, DC: U.S. Environmental Protection Agency, 2010), 1-2, <https://archive.epa.gov/pesticides/ppdc/web/pdf/session6-trf.pdf>.

⁶ U.S. Environmental Protection Agency, "Safety Precautions for Total Release Foggers," last updated July 10, 2025, <https://www.epa.gov/safepestcontrol/safety-precautions-total-release-foggers>.

⁷ National Pesticide Information Center, "Can Bug Bombs Really Explode?," accessed June 30, 2026, <https://npic.orst.edu/capro/bugbombs.html>.

⁸ Zachary C. DeVries et al., "Exposure Risks and Ineffectiveness of Total Release Foggers (TRFs) Used for Cockroach Control in Residential Settings," *BMC Public Health* 19, no. 96 (2019): 1-11, <https://doi.org/10.1186/s12889-018-6371-z>.

The DeVries study is especially important because it tested real residential settings, not just laboratory exposure. In all TRF treatments, cockroach trap counts did not change significantly from baseline. Even under artificial sentinel conditions, no TRF product killed more than 38 percent of apartment-collected cockroaches, and some products killed less than 11 percent. The authors identified several likely reasons for failure, including pyrethroid repellency, poor penetration into cockroach harborages, and pyrethroid resistance.⁹

A related DeVries et al. study directly supports the resistance explanation. German cockroaches collected from apartments where TRFs failed showed cypermethrin resistance averaging 202 plus or minus 33-fold compared with a susceptible laboratory population. More than 96 percent of screened apartment-collected cockroaches possessed at least one copy of a knockdown-resistance mutation associated with pyrethroid resistance. The authors concluded that pyrethroid resistance was a major factor contributing to TRF failure and that TRFs would lack efficacy against German cockroaches in residential settings where high levels of pyrethroid resistance are documented.¹⁰

The evidence is not limited to cockroaches. Jones and Bryant evaluated over-the-counter total release foggers against bed bugs and found that field-collected bed bugs showed little, if any, adverse effect after exposure to three OTC foggers. They concluded that TRFs should not be recommended for bed bug control because many field-collected bed bugs are resistant to pyrethroids and because foggers provide minimal, if any, penetration into typical bed bug harborage sites. The study found strong evidence that the tested foggers were ineffective as bed bug control agents.¹¹ EPA likewise advises that foggers should not be used as the sole source of bed bug control because the pesticide must contact the pest, and if the material does not reach cracks and crevices where bed bugs hide, they will not be killed.¹²

⁹ DeVries et al., “Exposure Risks and Ineffectiveness,” 4-7.

¹⁰ Zachary C. DeVries et al., “Pervasive Resistance to Pyrethroids in German Cockroaches (Blattodea: Ectobiidae) Related to Lack of Efficacy of Total Release Foggers,” *Journal of Economic Entomology* 112, no. 5 (2019): 2295-2301, <https://doi.org/10.1093/jee/toz120>.

¹¹ Susan C. Jones and Joshua L. Bryant, “Ineffectiveness of Over-the-Counter Total-Release Foggers Against the Bed Bug (Heteroptera: Cimicidae),” *Journal of Economic Entomology* 105, no. 3 (2012): 957-63, <https://doi.org/10.1603/EC12037>.

¹² U.S. Environmental Protection Agency, “Should I Use a Fogger?,” last updated September 15, 2025, <https://www.epa.gov/bedbugs/should-i-use-fogger>.

Residue and exposure research further supports DPR's public-health review. Keenan, Vega, and Krieger studied cypermethrin distribution after indoor fogger use and found measurable surface residues and air levels after fogger application. Their work evaluated potential exposure for children and adults and found that residue distribution varied by room size, distance from the fogger, and surface type.¹³ These findings are consistent with DeVries et al., who found large residue increases on horizontal kitchen surfaces, including floors, countertops, and cabinets.¹⁴

The public health concern is especially acute because household pests such as cockroaches and bed bugs often hide in cracks, crevices, wall voids, under counters, behind appliances, inside furniture, and other protected areas. UC Agriculture and Natural Resources explains that foggers are rarely effective for crawling insects such as cockroaches, fleas, and bed bugs because those pests can hide in crevices or beneath household items and avoid direct exposure. UC ANR also notes that many fogger active ingredients are repellent and may drive pests deeper into wall voids or other hard-to-reach locations, sometimes spreading them to other rooms.¹⁵

That point has direct implications for licensed professionals. Consumer misuse of TRFs can make subsequent professional control more difficult in some circumstances. Jones and Bryant cite prior research showing that German cockroaches moved from fogged units to adjacent units in 50 percent of apartments, with increased cockroach catches the night after fogger treatment. They also note that pyrethroid deposits have been shown to increase bed bug locomotor activity and that any product that further disperses bed bugs to adjacent units is of grave concern in multi-unit buildings.¹⁶

CAPMA therefore recommends that DPR consider not only immediate exposure events, but also the downstream consequences of consumer fogging: pest dispersal, incomplete control, added residues, obscured treatment history, and the need for licensed professionals to correct failed DIY applications under more complicated site conditions.

¹³ J. J. Keenan, H. Vega, and R. I. Krieger, "Potential Exposure of Children and Adults to Cypermethrin Following Use of Indoor Insecticide Foggers," *Journal of Environmental Science and Health, Part B* 44, no. 6 (2009): 538-45, <https://doi.org/10.1080/03601230902997733>.

¹⁴ DeVries et al., "Exposure Risks and Ineffectiveness," 6-9.

¹⁵ Belinda Messenger-Sikes, "Bug Bombs - Dangerous and Not Always Effective," *Pests in the Urban Landscape*, University of California Agriculture and Natural Resources, December 27, 2020, <https://ucanr.edu/blog/pests-urban-landscape/article/bug-bombs-dangerous-and-not-always-effective>.

¹⁶ Jones and Bryant, "Ineffectiveness of Over-the-Counter Total-Release Foggers," 957-63.

Integrated pest management research supports a more targeted approach. Miller and Meek compared IPM strategies with monthly spray applications for German cockroach control in public housing and found that the traditional spray treatment had little, if any, effect on cockroach populations over the year, while IPM significantly reduced cockroach populations and kept them suppressed.¹⁷ Williams et al. compared conventional and IPM programs in public schools and found that an IPM program relying on monitoring and baiting was an appropriate and preferable alternative, while conventionally treated schools had significantly higher pesticide residues.¹⁸ These studies support DPR's consideration of alternatives to broad indoor consumer fogging and reinforce the importance of inspection, pest identification, monitoring, targeted treatment, source reduction, and follow-up.

At the same time, CAPMA respectfully urges DPR to distinguish unlicensed consumer use from licensed structural pest control practice. California's Structural Pest Control Board licenses Applicators, Field Representatives, and Operators. Applicators may apply pesticides only on behalf of a registered structural pest control company. Field Representatives may identify infestations, make inspections, apply pesticides, submit bids, and contract on behalf of a registered company. Operators may perform those functions and may also own or operate a structural pest control company or act as a qualifying manager.¹⁹ Registered structural pest control companies must have a qualifying manager and are subject to insurance, bond, and workers' compensation requirements, including general liability insurance and bonding obligations.²⁰

Those regulatory controls materially differentiate licensed professional practice from consumer self-deployment of retail foggers. Licensed professionals are trained to identify the pest, determine whether a pesticide is appropriate, select the correct product and formulation, assess structural and occupant risks, follow the label, calculate treatment area, control ignition sources, manage occupant notification and exclusion, ventilate the treated space, observe reentry restrictions, document the treatment, and incorporate the application into a broader pest management program. A consumer purchasing a retail bug bomb is not subject to that same licensing, company supervision, inspection, training, documentation, insurance, or regulatory oversight.

¹⁷ D. M. Miller and F. Meek, "Cost and Efficacy Comparison of Integrated Pest Management Strategies with Monthly Spray Insecticide Applications for German Cockroach (Dictyoptera: Blattellidae) Control in Public Housing," *Journal of Economic Entomology* 97, no. 2 (2004): 559-69, <https://doi.org/10.1093/jee/97.2.559>.

¹⁸ Gregory M. Williams et al., "Comparison of Conventional and Integrated Pest Management Programs in Public Schools," *Journal of Economic Entomology* 98, no. 4 (2005): 1275-83, <https://schal-lab.cals.ncsu.edu/wp-content/uploads/sites/402/2018/10/2005WilliamsJEEv98.pdf>.

¹⁹ California Structural Pest Control Board, "How Do I Become a Structural Pest Control Board Licensee?," accessed June 30, 2026, <https://www.pestboard.ca.gov/howdoi/lic.shtml>.

²⁰ California Structural Pest Control Board, "How Do I Start a Structural Pest Control Company?," accessed June 30, 2026, <https://www.pestboard.ca.gov/howdoi/pr.shtml>.

Accordingly, if DPR determines that indoor consumer access should be restricted, CAPMA requests that DPR preserve an appropriate pathway for lawful, label-compliant professional use in settings where that use can be safely managed. CAPMA is not asking DPR to preserve indiscriminate or stand-alone TRF use for German cockroach or bed bug infestations where the record indicates poor performance. Rather, CAPMA asks DPR to preserve only those professional applications that remain label-supported, site-appropriate, and subject to licensing, notice, exclusion, ventilation, and reentry controls.

Examples of professional use scenarios DPR should preserve where permitted by label and supported by evidence include:

- 1. Vacant or unoccupied structures before re-occupancy, where a licensed professional can control access, confirm vacancy, post or notify as required, control ignition sources, ventilate, and manage reentry.**
- 2. After-hours commercial, industrial, warehouse, storage, or utility spaces where occupant exclusion and reentry can be controlled by a licensed professional and where the target pest is exposed or surface-resting.**
- 3. Attics, crawlspaces, storage rooms, refuse rooms, utility rooms, or similar non-living spaces where label directions permit use and where the professional determines that a TRF is appropriate for exposed flying insects or other label-listed pests.**
- 4. Limited knockdown of exposed flying or surface-resting insects, such as flies or similar pests, when used as part of a broader IPM program that includes source identification, sanitation, exclusion, monitoring, and follow-up. UC ANR recognizes that foggers can be effective against pests that are flying or resting on exposed surfaces, while cautioning that they are rarely effective for hidden-harborage pests.²¹**
- 5. Situations where a licensed professional determines that a TRF is not appropriate and instead uses other methods. That professional ability to decline the tool is itself a key difference from retail consumer self-use. In many cockroach and bed bug situations, the professional decision will be not to fog, precisely because the scientific record shows poor efficacy for hidden-harborage pests.**

²¹ Messenger-Sikes, “Bug Bombs - Dangerous and Not Always Effective.”

CAPMA recommends that DPR evaluate mitigation measures targeted to the documented consumer use pathway.

DPR should also evaluate online sales and shipment of indoor TRF products into California. A mitigation strategy focused only on brick-and-mortar retail access may be incomplete if equivalent products remain readily available to California consumers through internet retailers. DPR should evaluate whether online listings, shipping practices, and consumer-facing warnings provide California purchasers with the same restrictions, notices, and safety information that would apply in retail channels. DPR should also consider whether registrants, distributors, and retailers should be required to take reasonable steps to prevent consumer access restrictions from being bypassed through online sales. Any final mitigation should address both physical retail channels and online sales channels so that consumer-use restrictions are effective in practice.

Options DPR should consider include retail access restrictions short of immediate cancellation; classification or access controls that distinguish consumer use from licensed professional use; stronger point-of-sale warnings; additional bilingual and plain-language directions; improved pictograms; QR-code links to short safety videos; limitations on multipacks or can sizes for consumer channels; warning requirements for multi-unit residential settings; enhanced instructions on occupant notification, evacuation, ignition-source control, ventilation, cleanup, and disposal; and claim-specific efficacy review where products claim control of hidden-harborage pests such as bed bugs or German cockroaches.²²

CAPMA also recommends that DPR require registrants to provide additional data specific to real-world consumer use, including incident causation, accidental discharge, nozzle design, child access, overuse, multi-unit drift, ignition-source failures, post-use residues, and consumer comprehension of label instructions. CAPMA further recommends that DPR require registrants to submit product-specific, field-realistic efficacy data supporting each claimed indoor pest use. The submitted data should evaluate performance under realistic residential conditions, including efficacy against resistant field populations, penetration into typical pest harborages, and meaningful control of the pests identified on the product label. Where existing data do not demonstrate meaningful real-world control, DPR should evaluate whether label claims should be revised, limited, or otherwise supported through additional registrant data as part of the reevaluation. DPR should also require data that separates licensed professional applications from consumer applications, including applicator status, site type, pest target, product, label compliance, severity, reentry conditions, and whether the incident occurred in single-family or multi-unit housing.

²² California Department of Pesticide Regulation, "Decision to Begin Reevaluation," 3-4; U.S. Environmental Protection Agency, "Update: Total Release Foggers," 1-2.

In sum, CAPMA supports DPR's decision to reevaluate indoor consumer TRFs. The California illness record, CDC surveillance data, EPA's long-standing safety concerns, peer-reviewed efficacy studies, residue studies, and bed bug research together justify a targeted consumer-focused response. Any final action should reduce avoidable consumer harms while preserving only those lawful, label-supported professional-use pathways that can be managed under California's licensing and oversight framework.

Respectfully submitted,

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