



MEMORANDUM

TO: Karen Morrison, Ph.D.
Assistant Director
Pesticide Programs Division

HSM-19004

FROM: Susan McCarthy, M.S. *(original signed by S. McCarthy)*
Environmental Program Manager II
Chief, Worker Health and Safety Branch
(916) 324-4116

DATE: June 11, 2019

SUBJECT: COMPLETION OF N,N-DIETHYL-METATOLUAMIDE (DEET) MITIGATION

The N,N-Diethyl-Metatoluamide (DEET) mitigation memorandum (Wroblicky 2019) describes the findings of the Worker Health and Safety (WHS) Branch with regard to the need for mitigation of exposures for DEET.

In 2000, the Department of Pesticide Regulation (DPR) completed a risk characterization document (RCD) for DEET (Lewis 2000). The RCD found all potential human health exposure scenarios of concern, as determined by margins of exposure (MOE), to be acceptable, with the exception of sub-chronic MOEs for children based on high-end exposure estimates.

In 1998, United States Environmental Protection Agency (U.S. EPA) issued a Reregistration Eligibility Decision (RED), which included new label requirements for end-use products to be more protective of people using DEET products, especially children (U.S. EPA 1998). In 2014, U.S. EPA issued a proposed interim registration review decision, which did not identify any risks of concern to human health. However, a final decision is pending an Endocrine Disruptor Screening Program determination to assess the potential for DEET to affect the endocrine system (U.S. EPA 2014).

Based on U.S. EPA's RED label requirements, the lack of significant risk to human health identified by DPR and U.S. EPA, and the few reported illness incidents associated with DEET, there are no exposures of concern associated with the use of DEET when applied according to the instructions on the product labels. Thus, WHS finds that there is no need for further mitigation action with respect to potential exposures for DEET. Your approval of this conclusion is requested.

Attachment

cc: Shelley DuTeaux, Chief, Human Health Assessment Branch
Eric Kwok, Senior Toxicologist, Human Health Assessment Branch
Svetlana Koshlukova, Senior Toxicologist, Human Health Assessment Branch
Kevin Solari, Environmental Program Manager I, WHS Branch

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APPROVAL:

(original signed by K. Morrison)
Karen Morrison, Assistant Director

June 14, 2019
Date

REFERENCES

- Lewis, C.M. 2000. N,N-Diethyl-meta-toluamide (DEET) Risk Characterization Document. California Department of Pesticide Regulation, California Environmental Protection Agency, Sacramento, CA. May 23, 2000. Available at <http://www.cdpr.ca.gov/docs/risk/rcd/deet.pdf> (accessed July 21, 2016).
- United States Environmental Protection Agency (U.S. EPA). 1998. Reregistration Eligibility Decision (RED) DEET List A Case 0002. United States Environmental Protection Agency. Prevention, Pesticides and Toxic Substances (7508W). EPA738-R-98-010. September, 1998. Available at https://www3.epa.gov/pesticides/chem_search/reg_actions/reregistration/red_PC-080301_1-Apr-98.pdf (accessed July 21, 2016).
- U.S. EPA. 2014. DEET (N,N-Diethyl-meta-toluamide) Interim Registration Review Decision, Case Number 0002. United States Environmental Protection Agency. Docket Number EPA-HQ-OPP-2012-0162. September, 2014. Available at <https://www.regulations.gov/document?D=EPA-HQ-OPP-2012-0162-0012> (accessed July 21, 2016).
- Wroblicky, G., A. Schaffner. 2019. Completion of N,N-diethyl-metatoluamide (DEET) Mitigation. Memorandum to Susan McCarthy dated June 10, 2019. California Department of Pesticide Regulation, California Environmental Protection Agency, Sacramento, CA.



MEMORANDUM

TO: Susan McCarthy
Environmental Program Manager II
Chief, Worker Health and Safety Branch

VIA: Ann Schaffner *(original signed by A. Schaffner)*
Senior Environmental Scientist (Supervisory)
Worker Health and Safety Branch

FROM: Greg Wroblicky *(original signed by G. Wroblicky)*
Environmental Scientist
Worker Health and Safety Branch
(916) 445-4322

DATE: June 10, 2019

SUBJECT: COMPLETION OF N,N-DIETHYL-METATOLUAMIDE (DEET) MITIGATION

Summary

The Department of Pesticide Regulation (DPR) has determined that no additional mitigation measures are needed for the insect and acarid repellent N,N-diethyl-metatoluamide (DEET). Neither DPR’s Risk Characterization Document (RCD) nor the United States Environmental Protection Agency’s (U.S. EPA) Reregistration Eligibility Decision (RED) for DEET identified exposures of concern. Furthermore, the RED and DPR’s Pesticide Illness Surveillance Program (PISP) database indicate relatively few illnesses, considering the widespread use of DEET.

Classification and Usage

DEET was first registered in the United States for use by the public without restriction in 1957 (Lewis 2000). DEET is an effective repellent for biting flies, biting midges, black flies, chiggers, deer flies, fleas, gnats, horse flies, mosquitoes, no-see-ums, sand flies, small flying insects, stable flies, and ticks (U.S. EPA 1998). It is currently registered for non-food and residential uses as an insect and acarid (tick and mite) repellent on humans. There are no registered food or agricultural uses (U.S. EPA 2014).

In California, there are 88 actively registered products containing DEET. The oldest currently registered product, Ultrathon Insect Repellent, manufactured by 3M, was first registered in California in 1991. DEET products are generally applied directly to skin and/or clothing, and are available as pressurized liquid-based sprays or foggers (47%), ready-to-use liquid solutions (35%), impregnated materials (11%), and gels, pastes, or creams (5%). Two products, formulated as flowable concentrates (2%), are available only to manufacturers for reformulation and repackaging (DPR 2018a).

Currently registered DEET products contain percent active ingredient (AI) compositions ranging between 0.35% and 98.25%. Approximately 44% of these products (42) have AI percent compositions of 25% (27 products) or 30% (15 products), while 16% (16 products) have higher AI percent compositions, and 38% (38 products) have lower AI percent compositions (DPR 2018a).

Regulatory History

In 1998, U.S. EPA issued an RED for DEET, which noted several cases of seizures potentially related to DEET exposure. To be more protective of people using DEET products, especially children, the RED included new label requirements for end-use products (U.S. EPA 1998).

In 2000, DPR completed an RCD for DEET that found all potential human health exposure scenarios of concern, as determined by margins of exposure (MOE), to be acceptable, with the exception of sub-chronic MOEs for children based on high-end exposure estimates (Lewis 2000). However, U.S. EPA's RED addressed and mitigated the sub-chronic exposure risks identified in the RCD through label requirements for end-use products.

In 2012, U.S. EPA initiated a registration review for DEET that did not identify any risks of concern to human health in its proposed Interim Registration Review decision. However, a final decision is pending an Endocrine Disruptor Screening Program determination to assess the potential for DEET to affect the endocrine system (U.S. EPA 2014).

Use and Sales

The amount of DEET product sold in California between 2010 and 2016 averaged almost 570,000 pounds annually, increasing from 190,000 pounds in 2010 to 1.65 million pounds in 2016. In contrast, DEET usage in California over the same time as reported in DPR's Pesticide Use Reporting database averaged only 4 pounds annually (DPR 2018b, 2019a). Nearly all DEET products are non-agricultural use products applied by users other than pest control businesses and are exempt from pesticide use reporting (Title 3 of the California Code of Regulations sections 6624 and 6627). As a result, the substantial gap between total product sales and reported use gives an indication of the amount of non-reported use. According to U.S. EPA, about 30% of the U.S. population uses DEET annually as an insect repellent, with DEET accounting for the overwhelming majority of insect repellents used nationwide. In 2005, 2009, and 2011, total DEET products sold nationally ranged between approximately 7 and 9 million pounds per year (U.S. EPA 2014).

Illness Incidents

A query of DPR's PISP database found 28 human health incidents associated with DEET reported between 2006 and 2015 (DPR 2019b). This includes reports of adverse health effects that were validated by PISP as being associated with a pesticide exposure incident. Of the associated incidents, 3 incidents were definitely related to DEET exposure, while 16 were probably related, and 9 possibly related. There was no discernable trend in the number of illness incidents reported, with no incidents reported in 2006, a high of 7 incidents reported in 2007, and an average of 3 incidents per year reported for the entire 10-year period. Most incidents resulted from unintentional product misuse in residential, office, or outdoor settings. Eye irritation was reported in 16 cases, while internal symptoms (headache, dizziness, irritated and burning mouth and throat, coughing, nausea and abdominal pain, vomiting, and fever) were reported in 11 cases. Skin irritation or rash was reported in only one case.

Conclusion

Given the widespread use of DEET in California (~0.5 million pounds per year), the number of reported illness incidents associated with exposure to DEET products is negligible (~3 per year). U.S. EPA reached similar conclusions after reviewing human health incidents associated with use of DEET recorded in the U.S. EPA Office of Pesticide Program's Incident Data System between 2007 and 2012 (U.S. EPA 2014). Based on DPR's RCD, the RED labeling guidance, and a lack of significant risk to human health identified by DPR and U.S. EPA, WHS finds that all potential human health exposure levels of concern have been addressed. Therefore, there is no need for further mitigation of DEET with respect to potential exposure.

References

- California Department of Pesticide Regulation (DPR). 2018a. California Product/Label Database Queries & Lists. California Department of Pesticide Regulation, California Environmental Protection Agency, Sacramento, CA. Available at <http://www.cdpr.ca.gov/docs/label/labelque.htm> (accessed March 23, 2018).
- California Department of Pesticide Regulation (DPR). 2018b. Annual Report of Pesticide Sold in California (2010 through 2016) [Online]. California Department of Pesticide Regulation, California Environmental Protection Agency, Sacramento, CA. Available at <http://www.cdpr.ca.gov/docs/mill/nopdsold.htm> (accessed March 23, 2018).
- California Department of Pesticide Regulation (DPR). 2019a. California Pesticide Information Portal (CALPIP), Pesticide Use Report Database. California Department of Pesticide Regulation, California Environmental Protection Agency, Sacramento, CA. Available at <http://calpip.cdpr.ca.gov/main.cfm> (accessed May 9, 2019).

- California Department of Pesticide Regulation (DPR). 2019b. California Pesticide Illness Query (CalPIQ). California Department of Pesticide Regulation, California Environmental Protection Agency, Sacramento, CA. Available at http://apps.cdpr.ca.gov/calpiq/calpiq_input.cfm (accessed May 9, 2019).
- Lewis, C.M. 2000. N,N-Diethyl-meta-toluamide (DEET) Risk Characterization Document. California Department of Pesticide Regulation, California Environmental Protection Agency, Sacramento, CA. May 23, 2000. Available at <http://www.cdpr.ca.gov/docs/risk/rcd/deet.pdf> (accessed July 21, 2016).
- United States Environmental Protection Agency (U.S. EPA). 1998. Reregistration Eligibility Decision (RED) DEET List A Case 0002. United States Environmental Protection Agency. Prevention, Pesticides and Toxic Substances (7508W). EPA738-R-98-010. September, 1998. Available at https://www3.epa.gov/pesticides/chem_search/reg_actions/reregistration/red_PC-080301_1-Apr-98.pdf (accessed July 21, 2016).
- United States Environmental Protection Agency (U.S. EPA). 2012. DEET: Review of Human Incidents. Memorandum from Shanna Recore to Ideliz Negrón-Encarnación and Susan Bartow, May 3, 2012. United States Environmental Protection Agency. Docket Number EPA-HQ-OPP-2012-0162. Available at <https://www.regulations.gov/document?D=EPA-HQ-OPP-2012-0162-0004> (accessed July 21, 2016).
- United States Environmental Protection Agency (U.S. EPA). 2014. DEET (N,N-Diethyl-meta-toluamide) Interim Registration Review Decision, Case Number 0002. United States Environmental Protection Agency. Docket Number EPA-HQ-OPP-2012-0162. September, 2014. Available at <https://www.regulations.gov/document?D=EPA-HQ-OPP-2012-0162-0012> (accessed July 21, 2016).