

HERBICIDE EVALUATION TECHNICAL UPDATE No. 2

List of Approved Surfactants for Use in Sensitive Areas on Rights-of-Way – June 2010

Update to: Statement of Policy on Restricting the Use of Surfactants as Part of the Evaluation Process for Herbicides Proposed for Use in Sensitive Areas of Rights-of-Way. March 1989

The Massachusetts Department of Environmental Protection (MassDEP) described the regulatory basis for its policy for evaluating surfactants as parts of herbicidal products for use in Sensitive Areas of Utility Right-of-Way (ROW) (MassDEP, 1989).

MassDEP and the Massachusetts Department of Agricultural Resources (MDAR) recently initiated an effort to implement this component of the review process to provide for control over the use of surfactants in products used in Sensitive Areas of ROW in Massachusetts. In recent years, it has been recognized that some surfactants can exert substantial non-target toxicity, sometimes greater than that of the active ingredient in the product, and that some may produce highly undesirable adverse effects in non-target organisms such as amphibians.

The Departments have performed a broad review of the environmental fate and non-target toxicities of several classes of surfactant compounds that are presently used with herbicidal formulations (Wijnja 2010). This evaluation represents the first formal review of surfactants conducted by the two agencies under the DEP/DFA Cooperative Agreement Relative to Section 4(1)(E) of 333 CMR 11.00 Right of Way Management Regulations. From this process, this first List of Approved Surfactants for use in Sensitive Areas of ROW in Massachusetts has been generated. As additional compounds and categories of compounds are reviewed, the Surfactant List will be updated.

When products are submitted for consideration for addition to the list of recommended herbicides for use in Sensitive Areas of Rights-of Way, the applicant must either certify that the surfactant(s) in the formulation come(s) from classes of surfactants included on the List of Surfactants Approved for use in Sensitive Areas of Rights-of Way or that the product contains no surfactant; or if such certification is not provided, the applicant must indicate the class or identity of the surfactant(s) in the product and provide required data on the environmental fate and transport characteristics of the surfactants and toxicity information*. Failure to provide the required certification or data will result in products not receiving approval or consideration for approval for addition to the List of Approved Herbicides.

The surfactants evaluated for inclusion on the approved list of surfactants were mostly non-ionic ethoxylated surfactants. The review was conducted with limited empirical data on fate, transport

* See MassDEP/MassDAR (2010) for list of information required

and toxicity. This information was supplemented with modeled predictions on fate and toxicity obtained through use of several fate/transport and toxicity prediction tools available through the US EPA.

The ethoxylate surfactants are often present within a proprietary formulated mixture of surfactant compounds. An example of a surfactant type that is commonly mixed with ethoxylated surfactants is the organosilicones. Organosilicones were also evaluated as part of this effort and the same conclusions listed above were drawn for this class of compounds. Whenever multiple compounds are present in a mixture, it is possible that the toxicological characteristics of a mixture of surfactants may differ from those of its constituent compounds due to possible interactive effects. As is the case with most mixtures, no data are available on the interactions of these two surfactants. However, combination effects from pesticide mixtures (and toxicants in general) from the same the chemical class are often additive in nature. Based on the fact that surfactants have a similar mechanism of toxicity, i.e., the reduction of surface tension in membranes, the overall effect is expected to be sum of the toxicities of the individual components, i.e., a concentration addition effect (Boeije et al., 2006).

The conclusions of the review are that these compounds are of generally low mobility, that predicted environmental concentrations resulting from application are of low toxicity and that application of these surfactants in rights-of-way when used outside of the designated buffer areas from waters should not result in adverse effects to non-target aquatic species. The review of these compounds is limited by toxicological data gaps, particularly with regard to the endpoint of endocrine disruption. While we would prefer to have more information on toxicity, we believe that the hazards posed to non-target aquatic organisms by these surfactants are limited by a low potential for significant exposure. The modeled results represent the best available information at this time for these compounds which have a limited database of information on toxicity and environmental fate.

Documentation for this evaluation may be found in the MDAR publication by Wijnja (2010).

References

Boeije, G.M. et al., 2006. Ecotoxicity quantitative structure-activity relationships for alcohol ethoxylate mixtures based on substance-specific toxicity predictions. *Ecotoxicol. Environ. Saf.* 64:75-84.

Wijnja, H. 2010. Ecological Risk Assessment of Surfactants Associated with Herbicide Application in Rights-of-Way Areas. Massachusetts Department of Agricultural Resources. Boston, MA.

MassDEP (Massachusetts Department of Environmental Protection).1989. Statement of Policy on Restricting the Use of Surfactants as Part of the Evaluation Process of Herbicides Proposed for Use in the Sensitive Areas of Right-of-Way. Office of Research and Standards, MassDEP. Boston, MA.

MassDEP/MassDAR (Massachusetts Department Of Agricultural Resources). 2010. Herbicide Evaluation Technical Update No. 2. Methods For The Evaluation Of Herbicides For Use In Sensitive Areas Of Rights-of-Way. June 2010 Update To: DEQE-DFA Cooperative Agreement Relative To Section 4(1)E Of 333 CMR 11.00 Rights Of Way Management Regulations – Appendix A (Narrative For Herbicide Evaluation Flow Chart) And Appendix B (List Of Characteristics For Evaluation). Boston, MA.

Surfactants Approved for Use in Sensitive Areas on Rights-of-Way in Massachusetts

June 2010

The list of surfactants reviewed to date is provided below. It will be periodically updated as new surfactants are reviewed and approved. Based on current data, use of these surfactants in herbicide applications made to sensitive areas of rights-of-way is acceptable when applied in the manner specified in 333 CMR 11.00. If additional data become available indicating significant differences in fate, transport or toxicity of a compound compared to that of its current database, these data will be reviewed and the decision to keep that compound on the list will be re-evaluated.

- Polyethoxylated ethylamines (POEA)*
- Alkyphenol ethoxylates (APE)*
- Alcohol ethoxylates (AE)*
- Phosphate ester ethoxylates (PE)*
- Organosilicones (OS)*

*Supporting Review: Wijnja, H. (2010). Ecotoxicological Risk Assessment of Surfactants Associated with Herbicide Applications in Rights-Of-Way Areas. Massachusetts Department of Agricultural Resources. Division of Crop and Pest Services. Boston, MA.