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DATE: March 23, 2020

SUBJECT: THE QUALIFICATION OF METHOD EM-SM-05-045 AS UNEQUIVOCAL ACCORDING TO CRITERIA IN THE PESTICIDE CONTAMINATION PREVENTION ACT

BACKGROUND

The Pesticide Contamination Prevention Act (Food and Agricultural Code [FAC] sections 13141 et seq.) was passed in 1985 to prevent further pesticide pollution of groundwater which may be used for drinking water supplies. FAC section 13149 specifies the conditions under which a pesticide is considered "found" in groundwater or soil, and thus subject to formal review as specified. FAC subsection 13149(d) allows a finding of a pesticide in groundwater or soil to be based on a single analytical method conducted by a single analytical laboratory, only if the analytical method provides unequivocal identification of a chemical. The criteria and discussion of DPR's process for qualifying methods that provide unequivocal identification of a chemical are included in the memo entitled "Evaluating analytical methods for compliance with the Pesticide Contamination Prevention Act requirements" (Aggarwal, 2012). The memo describes that a method is deemed unequivocal if it meets specific selectivity and/or structural analysis criteria. This qualification memo serves to establish if the method EM-SM-05-045 meets those criteria.

PURPOSE

Determine if the analytical method (EM-SM-05-045) for Glyphosate, Glufosinate and Aminomethylphosphonic Acid (AMPA) in groundwater used by the California Department of Food and Agriculture (CDFA) meets the definition of an unequivocal method.

DISCUSSION AND RECOMMENDATION

The CDFA Center for Analytical Chemistry method EM-SM-05-045 uses an Ion Chromatography coupled to a TSQ Altis triple quadrupole mass spectrometer (IC-MS/MS) for the detection of Glyphosate, Glufosinate and Aminomethylphosphonic Acid in groundwater.

This method calls for shaking the sample and transferring approximately 5 mL of the sample into a 10 mL plastic vial. No further sample preparation is required before the sample is analyzed by IC-MS/MS.

A method is considered "unequivocal" based on (a) matching retention time of the certified reference standard, (b) presence of the precursor ion at the retention time, and/or (c) presence of one or more characteristic product ions (Aggarwal, 2012). In method EM-SM-05-045, the first quadrupole in the mass spectrometer is set to reject all species with mass/charge values that do not correspond to the analyte's molecular ion eluting at that analyte's particular retention time. Each molecular ion is then fragmented in the next stage and the third quadrupole in the mass spectrometer quantifies the pesticides based on either one or two characteristic fragments. Therefore, this method uses three stepwise factors to eliminate possible interferences for these pesticides: chromatographic retention times, molecular ion masses, and specific product ion masses.

As specifically stated in method EM-SM-05-045, the following criteria are used to confirm the presence of Glyphosate, Glufosinate and Aminomethylphosphonic Acid (AMPA) in groundwater:

1. The retention time of the analytes must match within 0.1 minute of the analyte in the standards within the same sequence.
2. Relative abundance of confirmation ion (both qualification and quantification ion) within 30% of the standard.

Analysis of Glyphosate, Glufosinate and Aminomethylphosphonic Acid by method EM-SM-05-045 is highly specific and qualifies for unequivocal detection designation. Therefore, analysis by a second laboratory or a second method is not necessary for well water samples analyzed for Glyphosate, Glufosinate and Aminomethylphosphonic Acid (AMPA) using this method.

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REFERENCES

Aggarwal, V. 2012. Memorandum to Lisa Ross, Ph.D. Evaluating analytical methods for compliance with the Pesticide Contamination Prevention Act requirements. Available at: https://www.cdpr.ca.gov/docs/emon/grndwtr/polprocd/pcpa_requirements_analytical_methods_compliance.pdf (accessed March 12, 2020).