



# Department of Pesticide Regulation



Brian R. Leahy  
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## MEMORANDUM

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TO: Joy Dias  
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FROM: Vaneet Aggarwal, Ph.D. *Original Signed by*  
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916-445-5393

DATE: February 09, 2016

SUBJECT: THE QUALIFICATION OF METHOD EMON-SM-05-032 AS  
UNEQUIVOCAL ACCORDING TO CRITERIA IN THE PESTICIDE  
CONTAMINATION PREVENTION ACT

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### 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 ground water which may be used for drinking water supplies. FAC section 13149 specifies the conditions under which a pesticide is considered “found” in ground water or soil, and thus subject to formal review as specified. FAC subsection 13149(d) allows a finding of a pesticide in ground water 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. Criteria to identify methods providing unequivocal identification of a chemical are included in a DPR memo entitled “Evaluating analytical methods for compliance with the Pesticide Contamination Prevention Act Requirements” (Aggarwal, 2012).

### PURPOSE

Determine if the analytical method (EMON-SM-05-032) for 44 pesticides in well water used by the California Department of Food and Agriculture (CDFA) meets the definition of an unequivocal detection method.

### DISCUSSION AND RECOMMENDATION

CDFA Center for Analytical Chemistry method (EMON-SM-05-032) uses either a liquid chromatography coupled to linear ion trap quadrupole mass spectrometer (LC/MS/MS) system or a gas chromatography coupled to triple quadrupole mass spectrometer (GC/MS/MS) system for the detection of 44 pesticides in well water. LC/MS/MS is used for the determination of 29 pesticides (Table 1), while GC/MS/MS is used for the detection of 15 pesticides (Table 2). Prior to injection of sample into the LC/MS/MS or GC/MS/MS apparatus, the pesticides are extracted from the well water sample with methylene chloride.



**Table 1. Pesticides determined by LC/MS/MS in CDFA Method EMON-SM-05-032.**

Atrazine	Linuron
Azinphos- methyl	Mefenoxam
Azoxystrobin	Methiocarb
Bensulide	Metolachlor
Bromacil	Metribuzin
Carbaryl	Napropamide
Carbofuran	Norflurazon
Diazinon	Oryzalin
Dimethenamide	Prometon
Dimethoate	Simazine
Diuron	Tebuthiuron
Ethofumesate NH4	Thiamethoxam
Fenamiphos	Thiobencarb
Fludioxonil NH4	Uniconazole-p
Imidacloprid	

**Table 2. Pesticides determined by GC/MS/MS in CDFA Method EMON-SM-05-032.**

Alachlor	Malathion
Clomazone	Methyl Parathion
Dichloran	Phorate
Dichlorbenil	Piperonyl Butoxide
Disulfoton	Prometryn
Ethoprophos	Propanil
Ethyl Parathion	Triallate
Fonofos	

In CDFA method EMON-SM-05-032 for the above mentioned 44 pesticides analysis, the first 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 final mass spectrometer quantifies the pesticides based on either one or two characteristic fragments. Three stepwise factors are used to eliminate possible interferences for these 44 pesticides: chromatographic retention times, molecular ion masses, and specific daughter ion masses.

In CDFA method EMON-SM-05-032, the following criteria are used to confirm the presence of 44 pesticides in well water:

1. Each set of samples will have a matrix blank and a spiked matrix sample.
2. The retention time should be within  $\pm 2$  percent of that of the standards.
3. The recoveries of the matrix spikes shall be within the control limits.
4. The sample shall be diluted if results fall outside of the calibration curve (minimum of five levels).
5. Each analyte has a precursor/parent ion and corresponding product/daughter ion that needs to be present in order to quantify that analyte.

Analysis of these 44 pesticides by method EMON-SM-05-032 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 these 44 pesticides by 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.  
[http://www.cdpr.ca.gov/docs/emon/pubs/ehapreps/analysis\\_memos/2391\\_ross.pdf](http://www.cdpr.ca.gov/docs/emon/pubs/ehapreps/analysis_memos/2391_ross.pdf) (accessed TO: