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Mail Stop 412

September 10, 2010

To: GS-W-ALL

From: Terry Schertz  
Office of Water Quality

Subject: Approval of a new USGS Method O-2435-10 for the Determination of Terbufos, Phorate Insecticides and selected degradates in Filtered Water Using Gas Chromatography/Mass Spectrometry

The Office of Water Quality has approved a new analytical method, O-2435-10 (NWQL Schedule 2435), developed by chemists at the National Water Quality Laboratory for the determination of two organophosphate insecticides and their major degradates in filtered water.

The method was developed by the U.S. Geological Survey in response to regulatory needs for occurrence data on the sulfoxide and sulfone degradates, which are the toxicologically significant degradates of these organophosphate compounds. The insecticides included in this method are applied to mainly agricultural areas.

The analytes are isolated from a filtered 1-liter water sample onto a 0.5-gram octadecyl-bonded silica solid-phase extraction (SPE) column and eluted with 2 milliliters of ethyl acetate. The extract is analyzed by gas chromatography/mass spectrometry, using a short (5-meter) column, with selected-ion monitoring mode mass spectrometry following solvent evaporation and exchange to toluene. The short GC column is essential for determination of terbufos sulfoxide because it prevents band broadening of the analyte on the gas chromatography column.

Estimated method detection limits range from 0.002 to 0.022 microgram per liter ( $\mu\text{g/L}$ ).

This method approval process follows the technical procedures specified in OWQ Technical Memorandum 04.01 and the method is described in a USGS Techniques and Methods Report:

Sandstrom, M.W., Stoppel, M.E., and Kanagy, C.J., 2010, Determination of terbufos, phorate, and selected degradates in filtered water by short-column gas chromatography/mass spectrometry: U.S. Geological Survey Techniques and Methods 5-5B, xx p.

When published, the report will be made available through the USGS Publications Warehouse.

If you have any questions about the new analytical method, or would like a copy of the report, when it is available, please contact Mark Sandstrom ([sandstro@usgs.gov](mailto:sandstro@usgs.gov), 303-938-8748) or Jeff McCoy ([jefmccoy@usgs.gov](mailto:jefmccoy@usgs.gov), 303-236-3940).

If you have questions about the method approval process, please contact Terry Schertz ([tschertz@usgs.gov](mailto:tschertz@usgs.gov), 703-648-6864)

Table 1 - Compound name, parameter code, method code, use, pesticide class, and Chemical Abstract Service Registry Number (CASRN) for Terbufos and Phorate Insecticides and selected degradates and surrogates.

[NWIS, National Water Information System; P-code, parameter code; I, insecticide; Deg, degradate; Surr, surrogate; The five-digit parameter codes are used by the U.S. Geological Survey to uniquely identify a specific constituent or property in the National Water Information System (NWIS) database]

Compound name	NWIS P-code	NWIS method code	CASRN <sup>1</sup>	Use	Class
Terbufos	82675	G	13071-79-9	I	Organothiophosphate
Terbufos sulfoxide	61675	A	10548-10-4	Deg	Organothiophosphate
Terbufos sulfone	63773	A	56070-16-7	Deg	Organothiophosphate
Terbufos oxon sulfone <sup>2</sup>	61674	C	56070-15-6	Deg	Organothiophosphate
Phorate	82664	G	298-02-2	I	Organothiophosphate
Phorate sulfoxide	64093	A	2588-05-8	Deg	Organothiophosphate
Phorate sulfone	61667	A	2588-04-7	Deg	Organothiophosphate
Phorate oxon <sup>2</sup>	61666	D	2600-69-3	Deg	Organothiophosphate
<b>Surrogates</b>					
<i>Alpha</i> -HCH- <i>d</i> <sub>6</sub>	90752	A	86194-41-4	Surr	Organochlorine
Diazinon- <i>d</i> <sub>10</sub>	90753	A	100155-47-3	Surr	Organothiophosphate

<sup>1</sup>This report contains Chemical Abstracts Service Registry Numbers (CASRN), which is a Registered Trademark of the American Chemical Society. Chemical Abstracts Service (CAS) recommends the verification of the CASRNs through CAS Client Services.

<sup>2</sup>Alternative nomenclature used for these oxon degradates is “oxygen analog”.