

TRIBUTARY TRIBUNE

San Jose / Santa Clara Water Pollution Control Plant

Winter 98

The Water Pollution Control Plant serves the cities of San Jose, Santa Clara, Milpitas, Cupertino Sanitary District, West Valley Sanitation District (including Campbell, Los Gatos, Monte Sereno, Saratoga), County Sanitation District 2-3, Sunol & Burbank Sanitary Districts.



Analysis of Oil and Grease and Total Petroleum Hydrocarbons

This issue of the newsletter is to inform our industrial users of upcoming changes in the method for testing Oil and Grease and TPH. The information is of a technical nature, and we encourage you to share it with your laboratory.

Chlorofluorocarbons (CFCs) that are discharged to the atmosphere are a primary contributor to the depletion of the earth's stratospheric ozone layer. The United States, as a party to the Montreal Protocol on Substances that Deplete the Ozone Layer, and as required by law under the Clean Air Act Amendments of 1990 (CAAA), is committed to controlling and eventually phasing out CFCs.

Freon-113 is a Class I CFC that is required for use in several U.S. Environmental Protection Agency (EPA) wastewater methods for determining the amount of oil and grease and total petroleum hydrocarbons (TPH) in wastewater.

As part of the effort to eliminate the use of CFCs, the U.S. EPA studied the use of solvent alternatives to Freon-113 for the determination of oil and grease and TPH. As a result of these studies, the EPA has proposed Method 1664: N-Hexane Extractable Material (HEM) and Silica Gel Treated N-Hexane Extractable Material (SGT-HEM) by Extraction and Gravimetry (Oil and Grease and TPH) as a replacement for the current EPA Method 413.1 and Standard Method 5520B, both of which use Freon-113 as the extraction solvent.

Oil and grease analysis is unique in the following respects:

- An absolute quantity of a specific compound is not determined. Rather, groups of substances with similar physical characteristics are determined. Commonly extracted materials include relatively non-volatile petroleum hydrocarbons, vegetable oils, animal fats, waxes, soaps, greases, and related compounds.
- The analytical technique defines the analyte; Any compound extracted by the given solvent is defined as oil and grease. If the extraction solvent is changed, or if some other step of the analytical technique is changed such that it leads to an increase or decrease in the quantity of extracted material, then, the definition of what *is* or *is not* Oil and Grease subsequently changes.

In preparation for the switch to Method 1664, the U.S. EPA has conducted numerous comparative studies attempting to find a replacement solvent for oil and grease analysis. The goal of these studies was to find a solvent that produced analytical results consistent with those obtained using Freon.

A general conclusion from these studies is that when all sample matrices were collectively considered, none of the solvents produced results statistically equivalent to results produced by Freon-113 (as evidenced by the root mean square

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deviation). The decision as to which alternative solvent was best suited for the new method was therefore based on the potential effects of the new solvent on compliance monitoring, logistical and analytical considerations, and health and safety concerns.

Of the solvents evaluated in the two phases of the Freon Replacement Study, n-hexane was chosen for the following reasons:

- It had been previously used as the extraction solvent for determination of oil and grease and TPH prior to the advent of Freon-113,
- N-hexane produces results that are as or more comparable to results produced by Freon-113 than the other solvents tested,
- The Phase II study showed that there was no significant difference in results produced by n-hexane and Freon-113 for the analysis of reagent water samples spiked with reference standards, and
- Comparison of the Phase I and Phase II data suggested that any change in oil and grease concentration that may result from using n-hexane instead of Freon-113 would be obscured by the variability that was observed in the currently approved methods that did not impose the thorough QC requirements contained in Method 1664.

On average, however, the n-hexane/Freon ratio from Phase I and Phase II data combined demonstrates that n-hexane extracts the same amount of material as Freon-113. It must be emphasized that this is an average result: as an example, for some samples, Freon extracts less oil and grease than hexane; for others, more. EPA believes, however, that for most environmental samples, the difference in results produced by the two solvents will not be substantial, and that the difference will be "lost in the noise" of the two measurements.

In addition to the use of hexane, the new method incorporates a number of changes designed to improve reproducibility of results independent of individual analytical technique or laboratory accreditation / capability. As compared with past methods, 1664 describes in much greater detail each step of the analytical technique. This will minimize instances where analysts deviate from accepted protocol. Also, for the first time, specific

quality control parameters have been defined. This will allow laboratory quality assurance officers and laboratory certification agencies to better monitor and improve performance of the method.

As of April 1997, EPA, Region IX began granting interim limited use of Method 1664 approvals on a case-by-case basis. The interim approval is valid until Method 1664 is officially promulgated as a final rule in the Federal Register or is withdrawn from consideration by EPA. In addition, California Department of Health Services, which certifies environmental laboratories, has given its approval for the use of the method.

It is expected that Method 1664 will be fully promulgated in March, 1998 (present target date). According to the Federal Register (Vol. 61, No. 15), simultaneous with the promulgation of Method 1664, all other currently approved methods for the determination of oil and grease will be disallowed. This step is being taken to minimize variability of results from one lab to another. **If you test for Oil and Grease and TPH for your Self-Monitoring Report requirements, make sure your lab uses the correct method!**

In the near future, Method 1664 utilizing hexane as the extracting solvent will be the only methodology approved for oil and grease analysis in the State of California.

Copies of Method 1664 are available from the Water Resources Center, Mail Code RC-4100, 401 "M" St. SW, Washington, D.C. 20460, telephone (202) 260-7786 or (202) 260-2814.

Calendar of Events

- Hazmacon '98 Exhibits, on March 31 - April 01, 1998, at Santa Clara Convention Center, Santa Clara; contact SHO, Inc., at (415) 964-2050.
- Water Environment Federation, Industrial Wastes Technical Conference, on March 1 - 4, 1998, at Renaissance Nashville Hotel, Nashville, Tennessee: 1-800-666-0206.

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