UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OCT 1 1992

MEMORANDUM

OFFICE OF WATER

SUBJECT: The Use of Grab Samples to Detect Violations of Pretreatment Standards

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The primary purpose of this Memorandum is to provide guidance on the propriety of using single grab samples for periodic compliance monitoring to determine whether a violation of Pretreatment Standards has occurred. More specifically, the Memorandum identifies those circumstances when single grab results may be used by Control Authorities, including EPA, State or publicly owned treatment works (POTW) personnel, to determine or verify an industrial user's compliance with categorical standards and local limits. Please be aware that the concepts set out below are applicable when drafting self-monitoring requirements for industrial user permits.

REGULATORY BACKGROUND

The General Pretreatment Regulations require Control Authorities to sample all significant industrial users (SIUs) at least once per year [see 40 CFR 403.8(f)(2)(v)]. In addition, the Regulations, at 40 CFR 403.12(e), (g) and (h) require, at a minimum, that all SIUs self-monitor and report on their compliance status for each pollutant regulated by a Pretreatment Standard at least twice per year unless the Control Authority chooses to conduct all monitoring in lieu of self-monitoring by its industrial users.[1]

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[1] The POTW should conduct more frequent sampling and/or require more frequent self-monitoring by an industrial user if deemed necessary to assess the industry's compliance status (e.g., a daily, weekly, monthly or quarterly frequency as appropriate).

The Regulations, at 40 CFR 403.12(g) and (h), also specify that pollutant sampling and analysis be performed using the procedures set forth in 40 CFR Part 136. Part 136 identifies the proper laboratory procedures to be used in analyzing industrial wastewater (including the volume of wastewater necessary to perform the tests and proper techniques to preserve the sample's integrity). However, with certain exceptions, Part 136 does not specifically designate the method to be used in obtaining samples of the wastewater. Rather, section 403.12(g) and (h) require sampling to be "appropriate" to obtain "representative" data; that is, data which represent the nature and character of the discharge.

DISCUSSION OF BASIC SAMPLING TYPES

Sampling may be conducted in two basic ways. Both types of sampling provide valid, useful information about the processes and pollutants in the wastewater being sampled. The first is an "individual grab sample." An analysis of an individual grab sample provides a measurement of pollutant concentrations in the wastewater at a particular point in time. For example, a single grab sample might be used for a batch discharge which only occurs for a brief period (e.g., an hour or less). Such samples are typically collected manually but are sometimes obtained using a mechanical sampler.[2]

The second type of sample is a "composite sample." Composite samples are best conceptualized as a series of grab samples which, taken together, measure the quality of the wastewater over a specified period of time (e.g., an operating day). Monitoring data may be composited on either a flow or time basis. A flow-proportional composite is collected after the passage of a defined volume of the discharge (e.g., once every 2,000 gallons). Alternatively, a flow-proportional composite may be obtained by adjusting the size of the aliquots to correspond to the size of the flow. A time-proportional composite is collected after the passage of a defined period of time (e.g., once every two hours).

Generally, composite samples are collected using a mechanical sampler, but may also be obtained through a series of manual grab samples taken at intervals which correspond to the wastewater flow or time of the facility's operations. In some cases, composite data is obtained by combining grab samples prior

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[2] Mechanical samplers may not be used to sample for certain pollutants (e.g., those which could adhere to the sampler tubing, volatilize in the sampler, or pollutants with short holding times).

to transmittal to a laboratory. At other times, the samples remain discrete and are either combined by the laboratory prior to testing or are analyzed separately (and mathematically averaged to derive a daily maximum value).[3]

DETERMINING APPROPRIATE COMPLIANCE SAMPLING METHODS

EPA policy on appropriate compliance sampling types has been articulated in several pretreatment guidance manuals and regulatory preambles, and continues to be as follows:

A. Compliance With Categorical Standards

- Most effluent limits established by categorical standards are imposed on a maximum daily-average and a monthly-average bases. Generally, wastewater samples taken to determine compliance with these limits should be collected using composite methods.

- There are exceptions to the general rule. Composite samples are inappropriate for certain characteristic pollutants (i.e., pH and temperature) since the composite alters the characteristic being measured. Therefore, analysis of these pollutants should be based on individual grab samples. Alternatively, continuous monitoring devices may be used for measuring compliance with pH and temperature limits. Any exceedance recorded by a continuous monitoring device is a violation of the standard.

- Sampling wastewater from electroplating facilities regulated under 40 CFR Part 413 may be conducted using single grab samples [(assuming that the grab samples are representative of the daily discharge for a particular facility); see also preamble discussion at 44 Fed. Reg. 52609, September 7, 1979]

- A series of grab samples may be needed to obtain appropriate composite data for some parameters due to the nature of the pollutant being sampled. Examples of this situation include:

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[3] Daily maximum discharge limits are controls on the average wastewater strength over the course of the operating day. They are not intended to be instantaneous limits applied at any single point during that operating day.

- Sampling for parameters which may be altered in concentration by compositing or storage. These pollutants include pH-sensitive compounds (i.e., total phenols, ammonia, cyanides, sulfides);[4] and volatile organics such as purgeable halocarbons, purgeable aromatics, acrolein, and acrylonitrile.

- Sampling for pollutants with short holding times such as hexavalent chromium and residual chlorine; and

- Sampling for pollutants which may adhere to the sample container or tubing such as fats, oil and grease. Individual analysis for these parameters ensures that all the material in the sample is accounted for.

B. Compliance With Local Limits

• Local limits may be established on an instantaneous, daily, weekly or monthly-average basis. The sample type used to determine compliance with local limits should be linked to the duration of the pollutant limit being applied.

- Compliance with instantaneous limits should be established using individual grab samples. Exceedances identified by composite sampling are also violations.

- Compliance with daily, weekly or monthly average limits should be determined using composited sampling data, with the same exceptions noted in A, above.

- Measurements of wastewater strength for non-pretreatment purposes (e.g., surcharging) may be conducted in a manner prescribed by the POTW.

GRAB SAMPLING AS A SUBSTITUTE FOR COMPOSITE SAMPLING

EPA is aware that a number of Control Authorities currently rely on a single grab sample to determine compliance, particularly at small industrial users, as a way of holding down monitoring costs. It is EPA's experience that the process activities and wastewater treatment at many industrial facilities may not be sufficiently steady-state as to allow for routine use

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[4] Certain pH-sensitive compounds can be automatically composited without losses if the collected sample is only to be analyzed for a single parameter. Additionally, a series of grab samples may be manually composited if appropriate procedures are followed.

of single grab results as a substitute for composite results. Therefore, the Agency expects composited data to be used in most cases. However, there are several circumstances when a single grab sample may be properly substituted for a single composite sample. These situations are:

- Sampling a batch or other similar short term discharge, the duration of which only allows for a single grab sample to be taken;

- Sampling a facility where a statistical relationship can be established from previous grab and composite monitoring data obtained over the same long-term period of time;[5] and

- Where the industrial user, in its self-monitoring report, certifies that the individual grab sample is representative of its daily operation.

Except for these circumstances, Control Authorities should continue to use composite methods for their compliance sampling.

GRAB SAMPLES AS A COMPLIANCE SCREENING TOOL

Control Authorities may consider using grab samples as a compliance screening tool once a body of composite data (e.g., Control Authority and self-monitoring samples obtained over a year's time), shows consistent compliance. However, in the event single grab samples suggest noncompliance, the Control Authority

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[5] Grab sampling may provide results that are similar to composite sampling. See for example, a March 2, 1989, Office of Water Regulations and Standards (OWRS) Memorandum to Region IX describing the results of a statistical analysis of sampling data from a single industrial facility. These sampling data included both individual grab and flow-proportional, composite sampling obtained during different, non-overlapping time periods. After reviewing the data, OWRS concluded that the composite and grab sample data sets displayed similar patterns of violation for lead, copper, and total metals. In fact, the analyses did not find any statistically significant difference in the concentration values measured between the grab and composited data. Furthermore, additional statistical tests of the two data sets indicated that the means and variances for each pollutant were similar. The statistical conclusion was that the plant was judged to be out of compliance regardless of what data were analyzed.

and/or the industrial user should resample using composite techniques on the industrial users effluent until consistent compliance is again demonstrated.[6]

Control Authorities may also rely on single grab samples, or a series of grab samples for identifying and tracking slug loads/spills since these "single event" violations are not tied to a discharger's performance over time.

Any time an SIU's sample (either grab or composite) shows noncompliance, the General Pretreatment Regulations, at 40 CFR 403.12(g)(2), require that the SIU notify the Control Authority within twenty four (24) hours of becoming aware of the violation and resample within 30 days. Furthermore, EPA encourages Control Authorities to conduct or require more intensive sampling in order to thoroughly document the extent of the violation(s). Of course, the use of grab samples should be reconsidered in the event the SIU changes its process or treatment.[7]

SUMMARY

The collection and analysis of sampling data is the foundation of EPA's compliance and enforcement programs. In order for these programs to be successful, wastewater samples must be properly collected, preserved and analyzed. Although the Federal standards and self-monitoring requirements are independently enforceable, Control Authorities should specify, in individual control mechanisms for industrial users, the sampling collection techniques to be used by the industry. Generally, pretreatment sampling should be conducted using composite methods wherever possible, to determine compliance with daily, weekly or monthly average limits since this sampling technique most closely reflects the average quality of the wastewater as it is discharged to the publicly owned treatment works. Grab samples should be used to determine compliance with instantaneous limits. There are circumstances when discrete grab samples are also an appropriate, cost effective means of screening compliance with daily, weekly and monthly pretreatment standards.

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[6] Where grab samples are used as a screening tool only (i.e., consistent compliance has been demonstrated by composite data), the results should not be used in the POTW's calculation of significant noncompliance (SNC).

[7] When POTWs choose to allow the SIU to collect single grab samples, the POTW should draft the SIU's individual control mechanism to clearly indicate that grab samples are to be obtained thereby preventing any uncertainty at a later date.

In summary, there are limited situations in which single grab sample data may be used in lieu of composite data. Assuming adequate quality control measures are observed, analyses of these grab samples can indicate noncompliance with Federal, State and Local Pretreatment Standards and can form the basis of a successful enforcement action. Grab sampling can also be useful in quantifying batches, spills, and slug loads which may have an impact on the publicly owned treatment works, its receiving stream and sludge quality.

Should you have any further comments or questions regarding this matter, please have your staff contact Mark Charles of OWEC at (202) 260-8319, or David Hindin of OE at (202) 260-8547.

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