

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER DIVISION

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Subject: Guidance Memo No. 09-2002
DEQ Field Measurements, Sampling and Evaluation of Data

To: Regional Directors

From: Ellen Gilinsky, Ph.D., Director



Date: February 27, 2009

Copies: James Golden, Rick Weeks, Water Compliance Managers, Fred Cunningham, Steve Stell

Summary:

The purpose of this guidance document is to instruct Water Compliance Inspections program staff in evaluating DEQ field measurements and sampling data and to enumerate the circumstances under which they should forward apparent noncompliance to the appropriate Regional Compliance Auditor.

Electronic Copy:

An electronic copy of this guidance in PDF format is available for staff internally on DEQNET, and for the general public on DEQ's website at: <http://www.deq.virginia.gov>.

Contact information:

Please contact the Office of Water Permits and Compliance Assistance: Fred Cunningham, (804) 698-4285 (fkunningham@deq.virginia.gov) or Steve Stell, (804) 698-4305 (sgstell@deq.virginia.gov) if there area any questions about this guidance.

Disclaimer:

This document is provided as guidance and, as such, sets forth standard operating procedures for the agency. However, it does not mandate any particular method nor does it prohibit any particular alternative method. If alternative proposals are made, such proposals should be reviewed and accepted or denied based on their technical adequacy and compliance with appropriate laws and regulations (e.g., Federal Register 40 CFR 136).

DEQ Field Measurements, Sampling and Evaluation of Data

Water inspectors should bring field meters and sampling equipment whenever conducting inspections. This equipment must be available in order to adequately document and characterize various pollutant discharges that may be encountered during inspections. Simultaneous analysis of field measurements by facility staff, as well as split sampling with facility staff is encouraged in order to compare data obtained by facility staff with data obtained by DEQ staff. These comparisons may subsequently lead to identification of areas of needed improvement in facility staff sampling practices and/or sampling analysis.

Field measurement results are determined on-site by DEQ staff. Wet chemistry samples collected are analyzed by the Division of Consolidated Laboratory Services (DCLS). In some cases DEQ field measurements and sampling results can be used directly to assess compliance with permit limitations, conditions in administrative orders, and conditions of judicial orders as well as to determine whether additional follow up inspection activity is warranted.

Each Regional Office will adopt and follow the Agency's Quality Assurance Manual for Field Testing for Assessing Compliance with VPDES Permits for use when field testing and/or sampling (an example is attached to this guidance). In addition, the following protocol is provided with respect to DEQ field measurements and water chemistry sampling:

1. DEQ Field Measurements

- a. Field measurements should be evaluated by reviewing the discharge limitation and monitoring requirements listed in the permit (Part I.A.1) and the enforcement action, if applicable. If DEQ field measurements match or exceed the permit or enforcement action's monitoring frequency and sample type the results may be used to assess compliance with the permit limitations or enforcement action interim limits.
- b. Should field measurements determine that a minimum or maximum instantaneous discharge limitation or interim limit was not met, the inspector should follow procedures outlined in the Water Compliance Auditing Manual by forwarding information regarding the alleged instance of noncompliance to the Regional Compliance Auditor using the referral form specified in the Manual. For municipal facilities, the permit or enforcement action designated number of allowable excursions must be considered when evaluating failure to meet limitations for total residual chlorine, parameter 157 (Cl₂ – Total Contact). This specific parameter should not be cited by the inspector as potential noncompliance as the number of excursions reported on the DMR will be the basis for assessing potential noncompliance. In addition, some permits provide for immediate bacteriological sampling taken by the permittee to demonstrate disinfection was achieved when a total residual chlorine excursion was reported.

2. DEQ Sampling

Samples taken in all cases involving a facility, permit, certificate, order or potential violation of a regulation or law shall follow chain of custody procedures. Chain of Custody protocol (Guidance Memo No. 00-2016, Amendment #1 – Chain of Custody Policy and Procedure – March 14, 2006, or any future amendment) will be used for all DEQ inspection sampling efforts.

- a. Wet chemistry sampling results should be evaluated by reviewing the discharge limitation or interim limit, the monitoring requirements listed in the permit (Part I.A.1) or enforcement action, and the monitoring period data reported by the permittee for

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the parameter. Parameters such as BOD₅, TSS, nutrients and other wet chemistry parameters generally have permit limitations or interim limits expressed as monthly average and weekly average (max) concentration or loading for municipal permits, and as monthly average and daily maximum, or maximum concentration or loading for industrial permits. Split sample results (if conducted) must be averaged prior to evaluating compliance with permit limitations or interim limits. Evaluation of compliance with loading limits requires flow data from the date of sample collection.

- b. Valid (i.e., check DCLS laboratory qualifiers/flags to ensure data is usable) wet chemistry results for permit limitations or interim limits expressed as a monthly average or weekly average (max) must be evaluated together with permittee sampling results obtained during the relevant monitoring period. Only DEQ sampling that matches or exceeds the permit or enforcement action's sample type requirements may be averaged with the permittee's daily, weekly, and monthly results (as applicable) for compliance assessment. If the averaged DEQ and permittee results for the monitoring period do not meet a permit limitation or interim limit, the inspector should follow procedures outlined in the Water Compliance Auditing Manual by forwarding information regarding the alleged noncompliance to the Regional Compliance Auditor using the referral form specified in the Water Compliance Auditing Manual. When assessing potential noncompliance demonstrated by both DEQ sampling and the facility's DMR data the Compliance Auditor must avoid 'double jeopardy' point assessment.

Note: The permittee should not report any DEQ measurements or sampling results on the Discharge Monitoring Report (DMR). The DMR is solely for self reporting purposes and only includes data obtained by the permittee.

Example 1: DEQ inspector determines the Total Residual Chlorine (TRC) at the end of the chlorine contact tank is 0.2 mg/L. The permit sampling requirement is 1/DAY – GRAB for Parameter 213. The permit limitation for Parameter 213 is 0.6 mg/L minimum with no excursions allowed (i.e., "...no TRC sample shall be less than 0.6 mg/L"). The inspector should follow procedures outlined in the Water Compliance Auditing Manual by forwarding information regarding the alleged Cl₂ Tech Inst. Min. (Parameter 213) noncompliance to the Regional Compliance Auditor using the referral form specified in the Water Compliance Auditing Manual.

Example 2: DEQ samples a municipal wastewater treatment plant for Total Suspended Solids (TSS) on Wednesday the 1st and the DCLS analytical result is 60 mg/L. The inspector returns and samples TSS again on Wednesday the 8th and the DCLS analytical result is 35 mg/L. The permit sampling requirement is 1/MONTH – GRAB. The permit limitation for this parameter is 23 mg/L monthly average and 30 mg/L weekly average (max). The monthly operational log shows the permittee sampled once on Thursday the 9th and the TSS was 25 mg/L. Using all DEQ and permittee generated TSS data the monthly average was 40 mg/L and the weekly average (max) was 30 mg/L. The inspector should follow procedures outlined in the Water Compliance Auditing Manual by forwarding information regarding the alleged 40 mg/L TSS monthly average parameter noncompliance to the Regional Compliance Auditor using the referral form specified in the Manual. In addition, the initial 60 mg/L result might be evaluated and considered for referral as an "unusual or extraordinary discharge". In this example the weekly average (max) TSS limitation was met, however a follow-up inspection was scheduled to try to determine why the first week's TSS was so

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elevated.

Example 3: DEQ conducts split sampling at an industrial wastewater treatment plant. The permit sample requirement is 1/MONTH – GRAB. The consent order interim limit for this parameter (TSS) is 30 mg/L monthly average and 60 mg/L maximum. The sample appeared very turbid. DCLS analytical results were 55 mg/L and the permittee results were 5 mg/L giving an average result of 30 mg/L. Based on the results there is no apparent noncompliance for TSS; however the inspector decides to reinspect in order to assess TSS analytical procedures and to try to resolve the disparity in the two sample results.



Department of Environmental Quality

Quality Assurance Manual for Field Testing for Assessment with VPDES Permits

Approval Signatures

[Manager's Name]

[Manager's Title]

Other(s): _____

Quality Policy Statement

This QA Manual has been prepared for the sole use of the Department of Environmental Quality [specify REGION] Regional Office Water Inspections Staff and may not be specifically applicable to the activities of other organizations. This manual has been reviewed and determined to be appropriate for the scope, volume, and range of testing activities for the field testing, as well as an indication that management has made a commitment to assure that the quality systems defined in the QA manual are implemented and followed at all times.

Staff Responsibilities

Staff are to follow the SOP Manual for the DEQ Water Quality Monitoring and Assessment Program (WQM SOP, Revision No.: 16, Rev. Date 10/13/2006, or any future amendment), included here by reference.

Manufacturer's Instructions for the following individual field testing equipment are included into this QA manual by reference.

HACH Pocket Colorimeter (specify equipment used by RO)

YSI D.O. Meter 550A (specify equipment used by RO)

Beckman Phase 200 pH Meter (specify equipment used by RO)

Other:

Analyst Training and Performance Requirements

- 1) DEQ training requirements are specified in the DEQ performance standards for the individual employee and are included here by reference.
- 2) Refer to the SOP Manual for the DEQ Water Quality Monitoring and Assessment Program (WQM SOP, Revision No.: 16, Rev. Date 10/13/2006).

Field Testing Procedures notations related to the SOP and the manufacturer's instructions referenced above and specific to the Regional Office Water Inspections Program:

Test method References: Standard Methods 18th Edition through 21st Edition, as specifically referenced in the individual inspector's QA/QC records.

Field Thermometers/Thermistors/ATC Units

Temperature measurement devices are verified over the range of use for accuracy at least annually by regional office staff. Equipment is tagged with the date of verification, temperature offset value, and the initials of verification staff. Records of calibration and verifications are maintained by the individual at a known and accessible location. The reference thermometer certification is also maintained by the region.

Quality Assurance Manual for Field Testing

IDC and Field Testing Comments:

pH

The initial demonstration of capability (IDC) records are maintained for each individual inspector. Each analyst must analyze four identical samples (using a pH buffer from a different source than is used for daily calibrations). The pH must be plus or minus 0.1 S.U. of the known value.

Total Residual Chlorine (TRC)

The IDC records are maintained for each individual inspector. Each analyst must analyze four samples from a standard prepared and divided into 4 containers (not HACH SpecCheck secondary gel standards). On each day of testing effluent samples, read a high and a low SpecCheck secondary gel standard to be within range specified by HACH.

Dissolved Oxygen

The IDC records are maintained for each individual inspector. Each analyst must analyze four samples from a standard of oxygen-saturated water, prepared and divided into 4 containers (BOD bottles). The average recovery must be +/- 4% of the calculated oxygen saturation for a given elevation/barometric pressure and sample temperature (use a dissolved oxygen table to get calculated concentration.)

Records:

Records for IDC for pH, D.O. and TRC will be maintained for each analyst and must include method number, preparation log (if needed), analyst initials with date and time of analysis, true value of the samples being analyzed, and whether or not the IDC is acceptable.

Field test calibration and result records will be maintained in the inspector's field log book.

Quality Assurance Manual for Field Testing

Description of Performance Audits

For field pH analyses, a pH 7 check buffer solution is analyzed as a sample immediately after meter calibration and must be within plus or minus 0.1 S.U. of the buffer value. Documentation of instrument calibration (and achieved values) and the pH 7 check buffer is entered in the inspector's field log.

For field D.O. measurements, no performance audits are necessary beyond following the manufacturer's instructions for analysis. Calibrate each day of analysis using water saturated air. Documentation of instrument calibration and achieved values is entered into the inspector's field log.

For total residual chlorine using the HACH Pocket Colorimeters, an analysis using the SpecCheck standards to verify calibration is to be done daily using two values that bracket the expected result. Documentation of the chosen SpecCheck standards' values is entered into the inspector's field log.

Data Recording Procedures

Inspector field logs will contain the following field measurements and sampling information: the sample location(s), the sample parameters and sample types collected, the observed field measurements, the field equipment calibration data, and the date and time samples and field measurements were taken. A QA/QC log will also be maintained. The QA/QC log will contain the QA/QC data associated with the equipment used by the individual inspector. It will contain the initial demonstration of capability data for each inspector and all routine equipment checks (e.g., NIST thermometer versus equipment thermistor/thermometer verifications). A Chain Of Custody form will be used for all wet chemistry samples.

Data Assessment for Bias and Precision, Data Reduction and Validation.

Beyond the QA/QC procedures required for each parameter analysis (pH, D.O., TRC, Temperature), no separate data assessment program is needed for the limited field testing performed.

Statement of Uncertainty for Results for Field Measurement Instruments

pH = ± 0.1 S.U.

D.O. = ± 0.1 mg/L

TRC = ± 0.1 mg/L

Temperature = ± 0.1 °C