Field Method Testing For Drinking Water

Drinking Water Field Method Training
October/November 2013

Arizona Department of Health Services

History:

-January 2010 ADEQ/ADHS Meeting
-Spring and Fall 2010 Training
-January 2011 AZPDES and APP Permitees Inspections Begin
-August 2011 Training
-January 2012 – Mine Specific Training
-Inspection Follow-ups Summer and Fall 2012

Drinking Water:

-August 2012 Announcement to Systems
-October 2012 Training Around State
-February 2013 Begin Inspections of Drinking Water Systems

-USEPA Established in 1970 by President Nixon
-Clean Water Act Enacted into Law 1972 by Congress overriding Nixon veto.
-Safe Drinking Water Act enacted in 1974 by President Ford.
-Safe Drinking Water Act Amended in 1986 by President Reagan.
-1986 – ADEQ formed from ADHS taking most of the environmental programs.
-1989 – Arizona Legislature passes new Environmental Laboratory Licensure Law.

Note: Statute implemented 1989

36-495.01. Licensure program; rules

A. On or before July 1, 1991, the department shall license environmental laboratories engaged in compliance testing. Upon application for an environmental laboratory license, the department shall issue the license if, after investigation, the department determines that the application conforms with the standards established by the department.

B. The director shall prescribe rules providing for minimum standards of proficiency, methodology, quality assurance, operation and safety for environmental laboratories and may prescribe standards for personnel education, training and experience to meet federal environmental statutes or regulations, or enabling reciprocity with other states and the manner and

36-495. Definitions

In this chapter, unless the context otherwise requires:

1. "Compliance testing" means laboratory analysis of any matter, pollutant, contaminant, hazardous substance or other substance subject to regulation pursuant to:

(a) Title 49 or rules adopted or enforced by the department of environmental quality for the purpose of determining compliance with title 49.

(b) Federal environmental statutes or regulations administered or enforced by the United States environmental protection agency relating to the safe drinking water act (42 United States Code sections 300f through 300j), the clean air act (42 United States Code sections 7401 through 7642), the clean water act (33 United States Code sections 1251 through 1376), the resource conservation and recovery act (42 United States Code sections 6921 through 6939B), the comprehensive environmental response, compensation, and liability act (42 United States Code sections 9601 through 9657) and the toxic substance control act (42 United States Code sections 2601 through 2654) as they relate only to the regulation of polychlorinated biphenyls and asbestos.

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36-495.02. Exemptions

A. This chapter does not apply to an environmental laboratory in this state that is:

1. Certified or designated by the United States environmental protection agency as the laboratory which provides analytical services to this state required for the delegation of primary enforcement responsibility under a federal law or regulation administered by that agency.
2. Operated by the Arizona department of agriculture or the radiation regulatory agency.
3. Performing only compliance testing of parameters which require analysis at the time of sample collection as long as the testing methodologies employed are approved by the director of the department of health services or the department of environmental quality.
4. Licensed to perform those analyses for which it is licensed or certified by another agency of this state.
5. Accredited by a national voluntary laboratory accreditation program administered by the national institute of standards and technology and approved by the department.

B. In addition to the exemptions established in subsection A, the director may also exempt by rule certain classes of environmental laboratories and types of compliance testing, parameters and methods, if the director determines that the exemptions will not adversely affect the public health or the environment. The rules shall be developed in cooperation with the director of the department of environmental quality and the director of the Arizona department of agriculture.

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ADEQ Drinking Water Regulations

A.A.C. R18-4-114. Disinfectant Residuals, Disinfection Byproducts, and Disinfection Byproduct Precursors-40 CFR Part 141, subpart L

…

C. In order to demonstrate compliance with the requirements of this Chapter:

1. Public water systems shall use analytical methods approved by EPA and the Arizona Department of Health Services for monitoring under this Chapter; and

2. Analysis of drinking water samples shall be conducted by laboratories that have been certified by EPA or the Arizona Department of Health Services.

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Drinking Water Field Methods:

- Total Chorine
- Free Chlorine
- Chloramine
- Chlorine Dioxide
- Chlorite
- Turbidity

?

Wastewater Treatment Plant QA/QC Requirements for Exempt Methods Rev. 2.1, 11/29/2010

1. Using ADHS exempt approved method(s) for pH, dissolved oxygen (DO), turbidity, temperature, total residual chlorine (TRC), and specific conductivity (AZPDES, NPDES, APP and Reuse Permits).
2. Standard Operating Procedure (SOP) for each ADHS exempt approved method reported (SM 1020A.1)
    - A. Specifications for reagents and standards;
    - B. Sample collection process;
    - C. Calibration and standardization process;
    - D. Specific quality control practices:
        - i) ID of QC types;
        - ii) Frequency;
        - iii) Acceptance criteria;
        - iv) Required corrective action if acceptance criteria not met
    - E. Details on the actual test procedure;
3. Record of each analyst's training
    - A. Review of the method and the SOP procedure.
    - B. Review of manufacturer's guidelines for instrumentation used.
    - C. Initial demonstration of capability by using 4 replicates of a Laboratory Control sample [LCS] or Laboratory Fortified Blank [LFB] - (Not temperature, DO or in-line meters)
4. Record of each AZPDES/NPDES permitted plant's participation in an annual proficiency test for all reported exempt methods with either a DMRQA or WP sample (Not temperature or DO).
5. Record of a method detection limit study (ultra low level total residual chlorine only).
6. Documented Preventative Maintenance on instrumentation.
7. Records for all reagents and standards.
    - A. Date receipt, lot #, expiration date, dates of use.
    - B. Discard or segregate all expired standards or reagents.
8. Records (Logbooks or bench sheets) maintained for each test or procedure.
    - A. Method reference;
    - B. Sample ID, sampler, sample date and time;
    - C. Standard and QC sample results;
    - D. Reagent blank results (turbidity and TRC only)(not in-line meters);
    - E. Date/time of preparation/analysis for sample;
        - i) Analysis time within 15 minutes of sample time;
    - F. Analyst name or initials;
    - G. Calibration data and sample results obtained;
    - H. Corrective actions if QC or method requirements not met;
        - i) Data not reported until the cause of the problem is identified and either corrected or qualified;
    - I. Indelible ink;
    - J. Corrections to records only made with single line thru incorrect entry, correct entry written to side with initials and date of person making change; and
    - K. Records maintained for at least 10 years (R18-9-A206(B)(3).

Drinking Water QA/QC Requirements for Exempt Field Methods Rev. 2012

1. Using ADHS approved field method(s) for disinfection byproducts (chlorine residual, chlorine dioxide, chlorite, and chloramine) and turbidity.
2. Standard Operating Procedure (SOP) for each ADHS exempt approved method reported .
   - A. Specifications for reagents and standards;
   - B. Calibration and standardization process;
   - C. Sample collection process;
   - D. Details on the actual test procedure; and
   - E. Specific quality control practices:
     - i) ID of QC types;
     - ii) Frequency;
     - iii) Acceptance criteria;
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3. Record of each analyst's training
   - A. Review of the ADHS approved method (Standard Methods or Hach);
   - B. Review of the SOP; and
   - C. Review of manufacturer's guidelines for instrumentation used.
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   - A. Date receipt, lot #, expiration date, dates of use.
   - B. Discard or segregate all expired standards or reagents.
6. Records (Logbooks or bench sheets) maintained for each test or procedure.
   - A. Method reference on all records;
   - B. Standard/calibration results;
   - C. Reagent blank results;
   - D. Sample ID, sampler, sample date and time;
   - E. Analyst; analysis date and time;
     - i) Analysis time within 15 minutes of sample time;
   - F. Sample and QC results obtained;
   - G. Corrective actions if QC or method requirements not met;
     - i) Data not reported until the cause of the problem is identified and either corrected or qualified;
   - H. Indelible ink;
   - I. Corrections to records only made with single line thru incorrect entry, correct entry written to side with initials and date of person making change; and
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Note: Will be used as Checklist for on-site Reviews

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   - B. Calibration and standardization process;
   - C. Sample collection process;
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   - B. Calibration and standardization process; **e.g. Quarterly calibration w/ 20 NTU Std.**
   - C. Sample collection process;
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e.g. grab sample taken with cup on pole sampling device taken back to ____

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e.g. duplicates, accuracy checks

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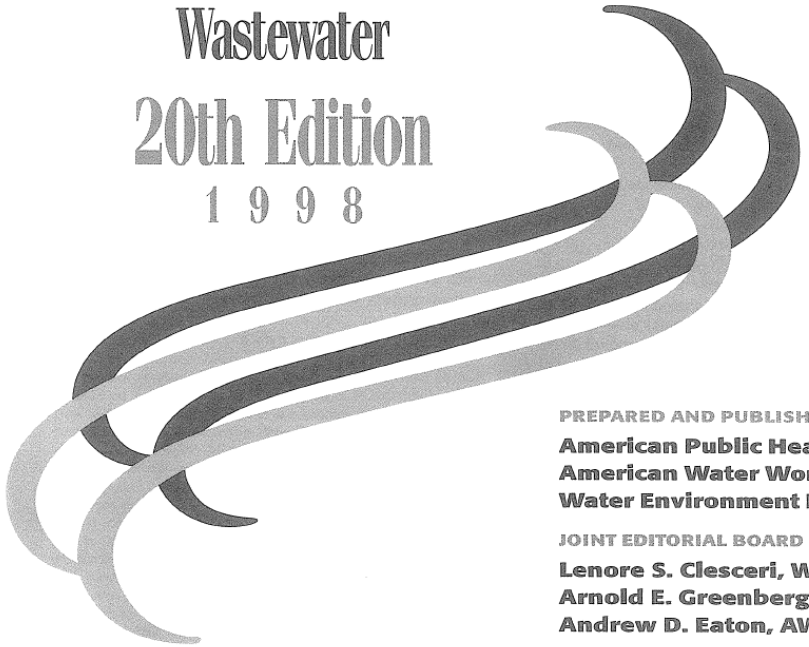
Standard Methods

FOR THE

Examination of Water and Wastewater

20th Edition

1998



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$B - A$	NH_2Cl	NH_2Cl
$C - B$	$NHCl_2$	$NHCl_2 + \frac{1}{2}NCl_3$
N	—	Free Cl + $\frac{1}{2}NCl_3$
$2(N - A)$	—	NCl_3
$C - N$	—	$NHCl_2$

Water Works Assoc. 60:847.

PALIN, A.T. 1975. Current DPD methods for residual halogen compounds and ozone in water. *J. Amer. Water Works Assoc.* 67:32.

Methods for the Examination of Waters and Associated Materials. Chemical Disinfecting Agents in Water and Effluents, and Chlorine Demand. 1980. Her Majesty's Stationery Off., London, England.

4500-Cl G. DPD Colorimetric Method

1. General Discussion

a. Principle: This is a colorimetric version of the DPD method and is based on the same principles. Instead of titration with standard ferrous ammonium sulfate (FAS) solution as in the titrimetric method, a colorimetric procedure is used.

b. Interference: See A.3 and F.1*d*. Compensate for color and turbidity by using sample to zero photometer. Minimize chromate interference by using the thioacetamide blank correction.

c. Minimum detectable concentration: Approximately 10 µg Cl as Cl_2/L. This detection limit is achievable under ideal conditions; normal working detection limits typically are higher.

2. Apparatus

a. Photometric equipment: One of the following is required:

1) *Spectrophotometer,* for use at a wavelength of 515 nm and providing a light path of 1 cm or longer.

2) *Filter photometer,* equipped with a filter having maximum transmission in the wavelength range of 490 to 530 nm and providing a light path of 1 cm or longer.

b. Glassware: Use separate glassware, including separate spectrophotometer cells, for free and combined (dichloramine) measurements, to avoid iodide contamination in free chlorine measurement.

3. Reagents

See F.2*a*, *b*, *c*, *d*, *e*, *h*, *i*, and *j*.

4. Procedure

a. Calibration of photometric equipment: Calibrate instrument with chlorine or potassium permanganate solutions.

1) Chlorine solutions—Prepare chlorine standards in the range of 0.05 to 4 mg/L from about 100 mg/L chlorine water standardized as follows: Place 2 mL acetic acid and 10 to 25 mL chlorine-

Drinking Water QA/QC Requirements for Exempt Field Methods Rev. 2012

1. Using ADHS approved field method(s) for disinfection byproducts (chlorine residual, chlorine dioxide, chlorite, and chloramine) and turbidity.
2. Standard Operating Procedure (SOP) for each ADHS exempt approved method reported .
   - A. Specifications for reagents and standards;
   - B. Calibration and standardization process;
   - C. Sample collection process;
   - D. Details on the actual test procedure; and
   - E. Specific quality control practices:
     - i) ID of QC types;
     - ii) Frequency;
     - iii) Acceptance criteria;
     - iv) Required corrective action if acceptance criteria not met
3. Record of each analyst's training
   - A. Review of the ADHS approved method (Standard Methods or Hach);
   - B. Review of the SOP; and
   - C. Review of manufacturer's guidelines for instrumentation used.
4. Documented Preventative Maintenance on instrumentation.
5. Records for all reagents and standards.
   - A. Date receipt, lot #, expiration date, dates of use.
   - B. Discard or segregate all expired standards or reagents.
6. Records (Logbooks or bench sheets) maintained for each test or procedure.
   - A. Method reference on all records;
   - B. Standard/calibration results;

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Pocket Colorimeter™ II
Analysis System

Chlorine (Cl_2)

Instruction Manual

HACH®

Be Right™

C. Review of manufacturer's guidelines for instrumentation used.

4. Documented Preventative Maintenance on instrumentation. **e.g. on bench sheet or in log book**
5. Records for all reagents and standards.
   A. Date receipt, lot #, expiration date, dates of use.
   B. Discard or segregate all expired standards or reagents.
6. Records (Logbooks or bench sheets) maintained for each test or procedure.
   A. Method reference on all records;
   B. Standard/calibration results;
   C. Reagent blank results;
   D. Sample ID, sampler, sample date and time;
   E. Analyst; analysis date and time;
      i) Analysis time within 15 minutes of sample time;
   F. Sample and QC results obtained;
   G. Corrective actions if QC or method requirements not met;
      i) Data not reported until the cause of the problem is identified and either corrected or qualified;
   H. Indelible ink;
   I. Corrections to records only made with single line thru incorrect entry, correct entry written to side with initials and date of person making change; and
   J. Records maintained for at least:
      i) 10 years for chemical analyses - 40 CFR § 141.33(a).
      ii) 5 years for turbidity analyses – 40 CFR § 141.33(a).

C. Review of manufacturer's guidelines for instrumentation used.

4. Documented Preventative Maintenance on instrumentation.
5. Records for all reagents and standards.
   A. Date receipt, lot #, expiration date, dates of use.
   B. Discard or segregate all expired standards or reagents.
6. Records (Logbooks or bench sheets) maintained for each test or procedure.
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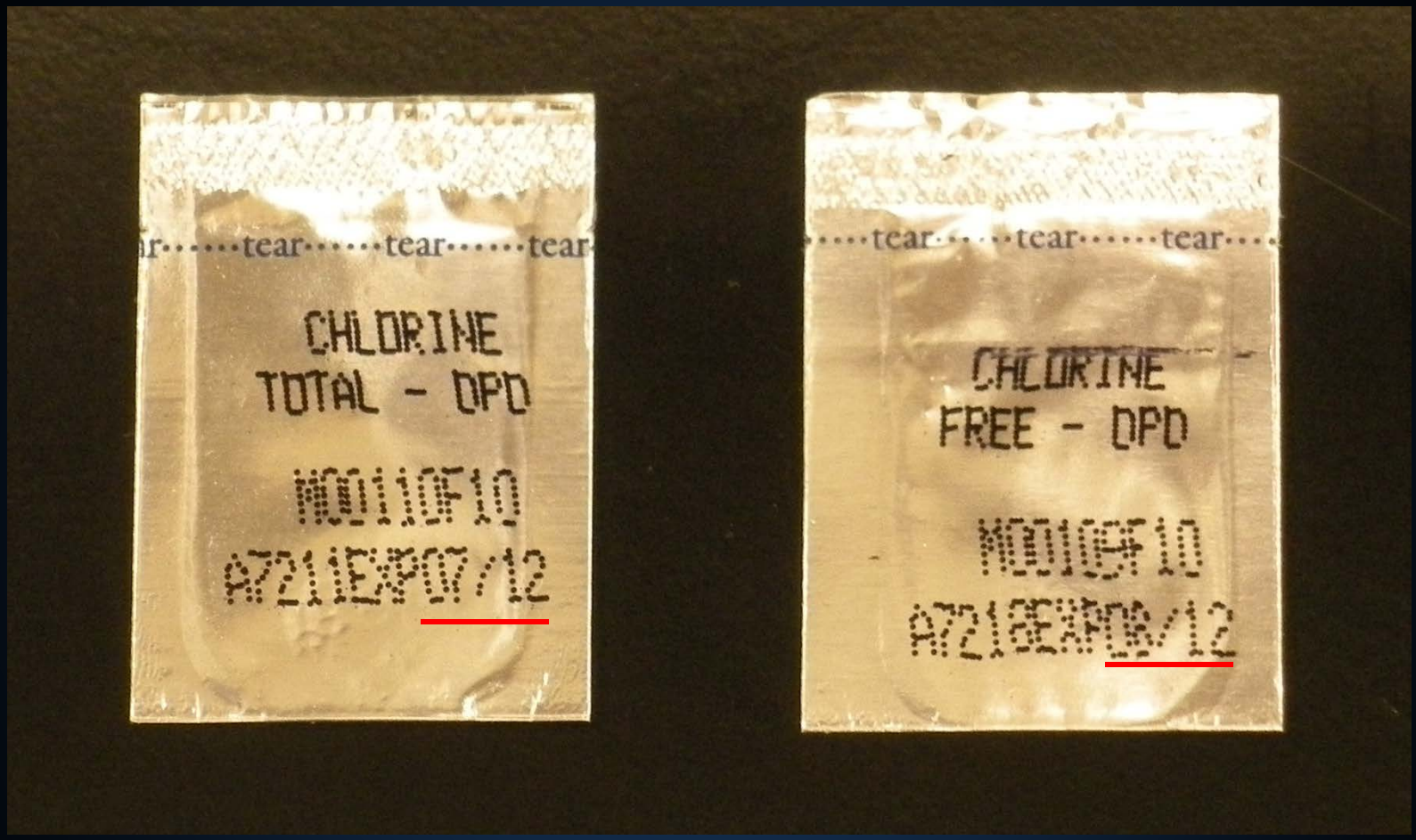
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ADEQ Drinking Water Regulations

A.A.C. R18-4-106. Reporting and Recordkeeping – 40 CFR, Subpart D

A. 40 CFR 141, Subpart D (40 CFR 141.31 through 141.35), is incorporated by reference as of the date specified in R18-4-102; …

B. Department reporting forms. A public water system shall report to the Department the results of all analyses completed under this Chapter on Department-approved forms.

§ 141.33 Record maintenance.

Any owner or operator of a public water system subject to the provisions of this part shall retain on its premises or at a convenient location near its premises the following records:

(a) Records of microbiological analyses and turbidity analyses made pursuant to this part shall be kept for not less than 5 years. Records of chemical analyses made pursuant to this part shall be kept for not less than 10 years. Actual laboratory reports may be kept, or data may be transferred to tabular summaries, provided that the following information is included:

(1) The date, place, and time of sampling, and the name of the person who collected the sample;

(2) Identification of the sample as to whether it was a routine distribution system sample, check sample, raw or process water sample or other special purpose sample;

(3) Date of analysis;

(4) Laboratory and person responsible for performing analysis;

(5) The analytical technique/method used; and

(6) The results of the analysis.

C. Review of manufacturer's guidelines for instrumentation used.

4. Documented Preventative Maintenance on instrumentation.
5. Records for all reagents and standards.
   A. Date receipt, lot #, expiration date, dates of use.
   B. Discard or segregate all expired standards or reagents.
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http://www.azdhs.gov/lab/license/drinking-water.htm