ANSI/AWWA **C654-21**

(Revision of ANSI/AWWA C654-13)

AWWA Standard

Disinfection of Wells

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American Water Works Association

AWWA Standard

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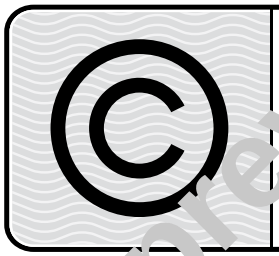

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Committee Personnel

The AWWA Subcommittee on Disinfection of Wells, which developed revisions to this standard, had the following personnel at the time:

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The AWWA Standards Committee on Disinfection of Facilities, which reviewed and approved this standard, had the following personnel at the time of approval:

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Contents

All AWWA standards follow the general format indicated subsequently. Some variations from this format may be found in a particular standard.

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Foreword

This foreword is for information only and is not a part of ANSI/AWWA C654.*

I. Introduction.

I.A. *Background*. During construction of a well, the bore hole may become contaminated by surface-water inflow and undesirable fluids in formations through which the bore hole may penetrate. In addition, contamination may be introduced in a well by the drilling fluid or on equipment. A part of this contamination may be carried into the water-producing formations and/or the well intake interval. During repairs or maintenance of an existing well, contamination may be introduced by the work practices performed or the replacement components utilized.

Well disinfection in accordance with this standard includes chlorination of new or existing well casing, the pump and associated piping, and the gravel or filter pack and immediate area of the aquifer around the intake interval and adjoining casing, as well as verification of satisfactory bacteriological quality of the water. This standard is not intended to provide procedures for disinfection of the aquifer beyond the immediate location of a well. Aquifer disinfection can best be handled by an engineering evaluation of all the conditions present at a specific location. The procedures for disinfection described in this standard are expanded beyond, and are intended to complement, information contained in ANSI/AWWA A100, Water Wells, Sec. 4.9, Well Disinfection.

I.B. *History*. This is the fourth edition of AWWA C654, Disinfection of Wells. The first edition was approved by the AWWA Board of Directors on Jan. 25, 1987. Subsequent editions were approved on June 15, 1997, Jan. 19, 2003, and Jan. 20, 2013. This edition was approved on Oct. 25, 2021.

I.C. *Acceptance*. In May 1985, the US Environmental Protection Agency (USEPA) entered into a cooperative agreement with a consortium led by NSF International (NSF) to develop voluntary third-party consensus standards and a certification program for direct and indirect drinking water additives. Other members of the original consortium included the Water Research Foundation (formerly AwwaRF) and the Conference of State Health and Environmental Managers (COSHEM). The American Water Works Association (AWWA) and the Association of State Drinking Water Administrators (ASDWA) joined later.

* American National Standards Institute, 25 West 43rd Street, Fourth Floor, New York, NY 10036.

In the United States, authority to regulate products for use in, or in contact with, drinking water rests with individual states.[†] Local agencies may choose to impose requirements more stringent than those required by the state. To evaluate the health effects of products and drinking water additives from such products, state and local agencies may use various references, including

1. Specific policies of the state or local agency.

2. Two standards developed under the direction of NSF,[‡] NSF/ANSI/CAN[§] 60, Drinking Water Treatment Chemicals—Health Effects, and NSF/ANSI/CAN 61, Drinking Water System Components—Health Effects.

3. Other references, including AWWA standards, *Food Chemicals Codex*, *Water Chemicals Codex*[¶] and other standards considered appropriate by the state or local agency.

Various certification organizations may be involved in certifying products in accordance with NSF/ANSI/CAN 61. Individual states or local agencies have authority to accept or accredit certification organizations within their jurisdiction. Accreditation of certification organizations may vary from jurisdiction to jurisdiction.

Annex A, "Toxicology Review and Evaluation Procedures," to NSF/ANSI/CAN 61 does not stipulate a maximum allowable level (MAL) or contaminant for substances not regulated by a USEPA final maximum contaminant level (MCL). The MALs of an unspecified list of "unregulated contaminants" are based on toxicity testing guidelines (noncarcinogens) and risk characterization methodology (carcinogens). Use of Annex A procedures may not always be identical, depending on the certifier.

ANSI/AWWA C654 does not address additives requirements. Users of this standard should consult the appropriate state or local agency having jurisdiction in order to

1. Determine additives requirements, including applicable standards.

2. Determine the status of certifications by all parties offering to certify products for contact with, or treatment of, drinking water.

3. Determine current information on product certification.

[†] Persons outside the United States should contact the appropriate authority having jurisdiction.

[‡] NSF International, 789 North Dixboro Road, Ann Arbor, MI 48105.

[§] Standards Council of Canada, 55 Metcalfe Street, Suite 600, Ottawa, ON K1P 6L5 Canada.

[¶] Both publications available from The National Academies Press, 500 Fifth Street NW, Keck 360, Washington, DC 20001.

II. Special Issues. Disinfection of wells requires high levels of disinfectant to be applied to ensure bacteria and other potential pathogens are inactivated. Temperature and pH are two important factors affecting the disinfection process. Above a pH of 9, chlorine is in the form of hypochlorite, which is not as effective a disinfectant as hypochlorous acid. As pH drops below 9, the percent of chlorine as hypochlorous acid increases. Temperature also affects the disinfection process; disinfection with chlorine is more effective at high temperatures than at low temperatures.

Disinfectants other than chlorine may be appropriate to use. While this standard describes only the use of liquid chlorine, sodium hypochlorite solutions, and calcium hypochlorite, the applicability of other disinfectants should be evaluated. Ozone and chemical cleaners have been used, and these warrant further investigation. Whichever disinfectant or method is selected, approval from the local regulatory agency may be required.

III. Use of This Standard. It is the responsibility of the user of an AWWA standard to determine that the products described in that standard are suitable for use in the particular application being considered.

III.A. *Purchaser Options and Alternatives.* The following information should be provided by the purchaser:

1. Standard used—that is, ANSI/AWWA C654, Disinfection of Wells, of latest revision.
2. Whether compliance with NSF/ANSI/CAN 60, Drinking Water Chemicals—Health Effects, is required.
3. Whether compliance with NSF/ANSI/CAN 61, Drinking Water System Components—Health Effects, is required.
4. Method of disinfection to be used.
5. Any disposal requirements and precautions to be taken when disposing of highly chlorinated water.
6. Method of dechlorination to be used—ANSI/AWWA C655, Field Dechlorination, of latest revision.
7. Bacteriological testing and method to be used.
8. Redisinfection procedure to be used if required.
9. Details of other federal, state, or provincial, and local requirements (Section 4).

III.B. *Modification to Standard.* Any modification of the provisions, definitions, or terminology in this standard must be provided by the purchaser.

IV. Major Revisions. Major changes made to the standard in this revision include the following:

1. The scope of the standard was changed to include existing wells, in addition to new construction.
2. Definitions were expanded to include annular space, filter-pack, open-borehole well, and well surging.
3. The chlorine residual was updated to 100 mg/L.
4. Calcium hypochlorite granules and tablets are no longer allowed and must be put in solution for use.
5. Drawings in Appendix A were updated.

V. Comments. If you have any comments or questions about this standard, please call AWWA Engineering & Technical Services at 303.794.7711, FAX at 303.795.7603, write to the department at 6666 West Quincy Avenue, Denver, CO 80235-3098, or email at standards@awwa.org.

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American Water Works Association

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AWWA Standard

Disinfection of Wells

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes the procedures for disinfection, bacteriological testing, and contamination prevention of new and existing individual, private, and community wells for potable water service following construction, servicing, maintenance, or any other activity or event that might lead to contamination of the water. The chlorination procedures provided in this standard are for any well for potable water including the gravel or filter pack, screen, open-borehole intake (bedrock well), well casing, pump, and appurtenant piping and are presented in the sequence in which they generally would be implemented.

Sec. 1.2 Purpose

The purpose of this standard is to establish the minimum requirements for the disinfection of wells for potable water service, including procedures for correcting the source of contamination, disinfection, and bacteriological testing.

Sec. 1.3 Application

This standard can be referenced in specifications for the disinfection of wells and can be used as a guide for chlorination and bacteriological testing procedures. The stipulations of this standard apply when this document has been referenced and then only to the disinfection of wells.