

Drinking water treatment chemicals — Health effects

NSF International Standard/ American National Standard

Developed by a consortium of:

- NSF International
- The American Water Works Association Research Foundation
- The Association of State Drinking Water Administrators
- The American Water Works Association

With support from:

- The U. S. Environmental Protection Agency
under cooperative agreement CR-812144



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NSF International Standard/
American National Standard
for Drinking Water Additives —

**Drinking water treatment chemicals —
Health effects**

Standard Developer
NSF International

Adopted October 24, 2006
NSF International Board of Directors

Designated an ANSI Standard
October 24, 2006
American National Standards Institute

Prepared by
The NSF Joint Committee on Drinking Water Additives

Recommended for Adoption by
The NSF Council of Public Health Consultants

Adopted by
NSF International
December 1987

Revised June 1988
Revised October 1988
Revised May 1996
Revised November 1996
Revised September 1997
Revised October 1999
Revised May 2000
Revised November 2000
Revised February 2001
 Addendum September 2001
Revised June 2002
 Addendum August 2002
Revised September 2003
 Editorial Revision October 2003
 Addendum December 2003
Revised November 2004
 Addendum May 2005
Revised November 2005
 Addendum October 2006

Published by

NSF International
PO Box 130140, Ann Arbor, Michigan 48113-0140, USA

For ordering copies or for making inquiries with regard to this Standard, please reference the designation "NSF/ANSI 60-2005, Addendum 1."

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Foreword²

In response to a competitive request for proposals from the U. S. Environmental Protection Agency (USEPA), a Consortium led by NSF International (NSF) agreed to develop voluntary third-party consensus standards and a certification program for all direct and indirect drinking water additives. Other members of the Consortium included the American Water Works Association Research Foundation, the Association of State Drinking Water Administrators, the Conference of State Health and Environmental Managers, and the American Water Works Association. (COSHEM has since become inactive as an organization.) Each organization was represented on a steering committee with oversight responsibility for the administration of the cooperative agreement. The steering committee provided guidance on overall administration and management, and the member organizations will remain active after the expiration of the cooperative agreement.

The standards were developed using a voluntary consensus process. All parties with interest were represented, including regulatory agencies, industry, and water suppliers; consultants; and other users of products covered by the standards.

Two standards for additives products have been adopted. NSF/ANSI 61: *Drinking water system components – Health effects* currently covers indirect additives. NSF/ANSI 60, and subsequent product certification against it, will replace the USEPA Additives Advisory Program for drinking water treatment chemicals. For more information with regard to USEPA's actions, refer to the July 7, 1988 *Federal Register* (53FR25586).

NSF/ANSI 60 has been developed to establish minimum requirements for the control of potential adverse human health effects from products added to water for its treatment. It does not attempt to include product performance requirements, which are currently addressed in standards established by such organizations as the American Water Works Association, the American Society for Testing and Materials, and the American National Standards Institute. Because this Standard complements the standards of these organizations, it is recommended that products also meet the appropriate requirements specified in the standards of such organizations.

The Standard and the accompanying text are intended for voluntary use by certifying organizations, utilities, regulatory agencies, and/or manufacturers as a basis for providing assurances that adequate health protection exists for covered products.

This version (NSF/ANSI 60-2005, Addendum 1) includes the following revisions:

- Incorporation of the Absolute Method as defined by ASTM E29 *Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications* when determining conformance with the specifications in this Standard, and addition of this reference in the Normative References, Section 1.3.
- Streamlining of the sampling procedures described in Annex B, sections B.2.1 and B.2.2, and addition of procedures for sampling from retains.
- Incorporation of recent additions of unregulated contaminants to Tables D2 and D4.

Please note that the footnote in Table D1 that states that the Single Product Acceptable Concentration (SPAC) for bromate will be lowered to 0.003 mg/L in 2005 is still under evaluation by the NSF Joint Committee on Drinking Water Additives. At this time, it has not been demonstrated that the drinking water

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industry demand for hypochlorite chemicals cannot be adequately met at the lower SPAC. The next revision of this standard will be made up to date with the decision of the Joint Committee.

This Standard was developed by the NSF Joint Committee on Drinking Water Additives using the consensus process described by the American National Standards Institute.

Suggestions for improvement of this Standard are welcome. Comments should be sent to Chair, Drinking Water Additives, c/o NSF International, Standards Department, P. O. Box 130140, Ann Arbor, Michigan 48113-0140, USA.

Consortium Organizations

NSF International

Popularly referred to as NSF, NSF International is a non-commercial agency. It is incorporated under the laws of Michigan as a not-for-profit organization devoted to research, education, and service. It seeks to solve problems involving man and his environment. It wishes to promote health and enrich the quality of life through conserving and improving that environment. Its fundamental principle of operation is to serve as a neutral medium in which business and industry, official regulatory agencies, and the public come together to deal with problems involving products, equipment, procedures, and services related to health and the environment. It is conceived and administered as a public service organization.

NSF is perhaps best known for its role in developing Standards and Criteria for equipment, products, and services that bear upon health. NSF was the lead organization in the Consortium responsible for developing this Standard. NSF conducts research; tests and evaluates equipment, products, and services for compliance with standards and criteria; and grants and controls the use of NSF registered Marks.

NSF offers product certification (Listing Services) for all products covered by its Standards. Each program has established policies governing the associated product evaluation, Listing Services, follow-up, and enforcement activities. The NSF Listing Mark is widely recognized as a sign that the product or service to which it relates complies with the applicable NSF Standard(s).

AWWA Research Foundation

The mission of the American Water Works Association Research Foundation (AWWARF) is to sponsor practical, applied research on behalf of the drinking water industry of North America. The scope of the research program embraces all aspects of water supply operation, from development and maintenance of water resources to treatment technologies and water quality issues, from storage and distribution system operations to health effects studies and utility planning and management activities. AWWARF serves as the centralized industry institution for planning, managing, and funding cooperative research and development in drinking water, including the subsequent transfer of technology and results for practical application by the water utility community.

AWWARF's purpose in this cooperative program is to provide a communication link with the water utilities throughout North America and serve as the focal point for identification of research needs of the water supply industry with respect to the additives program.

The Association of State Drinking Water Administrators

The Association of State Drinking Water Administrators (ASDWA) is a non-profit organization whose eligible membership is comprised of drinking water program administrators in each of the fifty states and seven U. S. territories. Through the organization, representatives speak with a collective voice to Congressional committees, the United States Environmental Protection Agency, professional and trade associations, water utilities, and the general public on issues related to state drinking water programs. With its mission of protecting the public health through assurance of high quality drinking water, and promoting responsible, reasonable, and feasible drinking water programs at the state and federal levels, the Association is a valued contributor to the consortium and to the program. It provides the link between the additives program and the state drinking water programs.

The Conference of State Health and Environmental Managers

The Conference of State Health and Environmental Managers (COSHEM), known formerly as the Conference of State Sanitary Engineers (CSSE), is currently inactive as an organization. It brought to the consortium expertise and involvement of state health and environmental program managers. The Conference was the focal point for health concerns of all state environmental programs, including drinking water, wastewater, air, solid and hazardous wastes, radiological, occupational, health, and food programs. A standing committee on water supply focused on drinking water issues and kept the membership informed. The Conference played an important role early in the program through two-way communication with state health and environmental program decision makers.

American Water Works Association

The purpose of the American Water Works Association (AWWA) is to promote public health, safety, and welfare through the improvement of the quality and quantity of water delivered to the public and the development and furtherance of understanding of the problems relating thereto by:

- advancing the knowledge of the design, construction, operation, water treatment and management of water utilities, and developing standards for procedures, equipment, and materials used by public water supply systems;
- advancing the knowledge of problems involved in the development of resources, production, and distribution of safe and adequate water supplies;
- educating the public on the problems of water supply and promoting a spirit of cooperation between consumers and suppliers in solving these problems; and
- conducting research to determine the causes of problems with providing a safe and adequate water supply and proposing solutions thereto.

AWWA brings to the Consortium its established position as the largest public drinking water association in North America, with a broad range of membership including utilities, consultants, manufacturers/distributors/agents, contractors, and other organizations with a direct interest in drinking water.

NSF/ANSI Standard for Drinking Water Additives —

Drinking water treatment chemicals — Health effects

1 Purpose, scope, and normative references

1.1 Purpose

This Standard establishes minimum health effects requirements for the chemicals, chemical contaminants, and impurities that are directly added to drinking water from drinking water treatment chemicals.

1.2 Scope

This Standard contains health effects requirements for drinking water treatment chemicals that are directly added to water and are intended to be present in the finished water. This Standard also contains health effects requirements for other chemical products that are directly added to water but are not intended to be present in the finished water. Chemicals covered by this Standard include, but are not limited to, coagulation and flocculation chemicals, softening, precipitation, sequestering, pH adjustment, and corrosion/scale control chemicals, disinfection and oxidation chemicals, miscellaneous treatment chemicals, and miscellaneous water supply chemicals.

Contaminants created as byproducts through reaction of the treatment chemical with a constituent of the treated water are not covered by this Standard. This Standard also does not establish performance or taste and odor requirements for drinking water treatment chemicals.

1.3 Normative references

The following documents contain requirements that, by reference in this text, constitute requirements of this Standard.

APHA, *Standard Methods for the Examination of Water and Wastewater*, twentieth edition³

ASTM E29-02. *Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications*⁴

ASTM E506-98. *Standard Test Method for Mercury in Liquid Chlorine*⁴

ASTM G22-76 (1996). *Standard Practice for Determining Resistance of Plastics to Bacteria*⁴

³ American Public Health Association, 800 I Street NW, Washington, DC 20001

⁴ ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2859

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CGA, G-6.2-1994. *Commodity Specification for Carbon Dioxide*⁵

OECD, *Guidelines for the Testing of Chemicals*, May 1996⁶

USEPA-600/4-79-020. *Methods for the Chemical Analysis of Water and Wastes*, March 1983⁷

USEPA-600/4-80-032. *Prescribed Procedures for Measurement of Radioactivity in Drinking Water*⁷

USEPA, *Health Effects Testing Guidelines*, 40 CFR Part 798⁸

USEPA, *Good Laboratory Practice Standards*, 40 CFR Part 160⁸

USFDA, *Good Laboratory Practice for Non-Clinical Laboratory Studies*, 21 CFR 587⁹

USFDA, *Toxicological Principles for the Safety Assessment of Direct Food Additives and Color Additives in Food*⁹

1.4 Alternate chemicals

Chemicals or mixtures of chemicals used for the various purposes discussed in this Standard, but not specifically referenced, shall be considered acceptable provided they meet the requirements of this Standard.

1.5 Significant figures

When determining conformance with the specifications in this standard, the Absolute Method in ASTM E29 (*Standard Practice for Using Significant Digits in Test Data to Determine Conformance With Specifications*) shall be used.

⁵ Compressed Gas Association, 1725 Jefferson Davis Highway, Suite 1004, Arlington, VA 22202-4102

⁶ Organization for Economic Cooperation and Development, 2 Rue Andre-Pascal, 75775 Paris Cedex 16, France

⁷ USEPA, Environmental Monitoring and Support Laboratory, Cincinnati, OH 45268

⁸ Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402

⁹ USFDA, 5600 Fishers Lane, Rockville, MD 20857

Annex B (normative)

Sampling, preparation, and analysis of samples

B.1 General

Samples of products to be analyzed for impurities shall be prepared and analyzed as detailed in this section:

- coagulation and flocculation chemicals (also see 4, table 4.1);
- corrosion and scale control, softening, precipitation, sequestering, and pH adjustment chemicals (also see 5, table 5.1);
- disinfection and oxidation chemicals (also see 6, table 6.1);
- miscellaneous treatment applications (also see 7, table 7.1); and
- miscellaneous water supply products (also see 8, table 8.1).

The analysis methods listed for a product are based on detecting impurities that may be present when established methods of production are used and the materials are derived from known sources. If the products are created using alternate methods, or if they originate from alternate sources, the analytical procedures may require modification. Alternate analytical procedures shall be described in detail, by the manufacturer, with appropriate literature references.

B.2 Sampling

A representative sample of the product/material shall be obtained prior to shipment in accordance with the requirements outlined below. No sample shall be taken from a broken or leaky container.

B.2.1 Liquid samples

B.2.1.1 Sampling from bulk

A specified quantity of sample shall be obtained from a bulk storage tank, or bulk shipping vessel, through normal connections. Where available on site, sampling from bulk shipping vessels is preferred, as it is representative of the final container of product being shipped to the customer. ~~Five individual samples approximately 100 mL each shall be obtained from either various depths or sectors of the bulk storage vessel. The individual samples shall be combined and mixed thoroughly to form a single composite, approximately 500 mL, to be further divided as described in annex B, section B.2.1.4.~~

B.2.1.2 Sampling from packages

Sufficient sample shall be collected from packaged inventory to fulfill the sample quantity requirements specified in the relevant subsection of B.3. ~~A composite sample from packaged lots, where bulk storage is not available, shall be obtained by selecting individual samples from approximately 5% of the containers in the lot, with a minimum of 5 and a maximum of 15 containers sampled. If fewer than 5 containers are available, the sampling procedures shall be identical to those used for bulk vessels (see annex B, section B.2.1.1). The individual samples shall be combined and mixed thoroughly to form a single composite, approximately 500 mL, to be further divided as described in annex B, section B.2.1.4.~~

B.2.1.3 Sampling from production

Sufficient sample shall be collected from production to fulfill the requirements of the quantity needed for the product sample according to the relevant subsection of B.3. ~~In lieu of sampling in accordance with annex B, sections B.2.1.1 or B.2.1.2, composite samples obtained and composited by the manufacturer's sampling procedures during production shall be acceptable if the procedures used result in a representative sample, as determined by the certification entity. The sample shall be further prepared in accordance with annex B, section B.2.1.4.~~

B.2.1.4 Sampling from retains

Up to ten samples shall be collected, covering the length of the specified retain period or six months, whichever is greater, but not to exceed 12 months in the age of material sampled. A portion shall be collected from each retain, and the samples shall be mixed thoroughly to form a composite.

B.2.1.5 Sample for analysis

The sample obtained according to annex B, sections B.2.1.1, B.2.1.2, B.2.1.3, or B.2.1.4, shall be mixed thoroughly. This sample shall be poured into two approximately 250mL, airtight, moisture-proof glass containers and sealed. If a glass container is not appropriate, the manufacturer shall recommend a type of sample container. Each sample container shall be clearly labeled with the product name, manufacturer's name, sampling date, production location, and lot number, and shall be signed by the person responsible for sampling.

One sample shall be used for analysis as described in annex B, sections B.3 and B.4. The remaining sample shall be retained for reevaluation purposes (if necessary) for at least one year or until results are received by the certification agency.

~~The composite sample obtained in annex B, sections B.2.1.1, B.2.1.2 or B.2.1.3 shall be mixed thoroughly. This sample shall be poured into three, approximately 125 mL airtight, moisture-proof glass containers and sealed. If a glass container is inappropriate, the manufacturer shall recommend the type of sample container. Each container shall be clearly labeled with product name, type of container sampled, manufacturer's name, sampling date, production location, sampling location, lot number, and be signed by the person responsible for sampling.~~

~~One sample is used for analysis as described in annex B, sections B.3 and B.4. The remaining two samples are retained for reevaluation purposes (if necessary) for up to one year.~~

B.2.2 Solid samples

B.2.2.1 Sampling from bulk

Specified amount of sample shall be obtained from storage tank or bulk shipping vessel through normal connections. Where available on site, sampling from bulk shipping vessels is preferred, as it is representative of the final container of product being shipped to the customer. ~~A composite sample shall be obtained by selecting five individual samples of approximately 100 g, from either various depths or sectors of the bulk storage vessel. The individual samples shall be combined and mixed thoroughly to form a single composite, approximately 500 g, to be further divided as described in annex B, section B.2.2.4.~~

B.2.2.2 Sampling from packages

Sufficient sample shall be collected from packaged inventory to fulfill the sample quantity requirements specified in the relevant subsection of B.3. ~~A composite sample from packaged lots, where bulk storage is not available, shall be obtained by selecting individual samples from approximately 5% of the lot, with a minimum of 5 and a maximum of 15 containers sampled. If fewer than 5 containers are available, the sampling procedures shall be identical to those used for bulk vessels (see annex B, section B.2.2.1). The~~

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~~individual samples shall be combined and mixed thoroughly to form a single composite, approximately 500 g, to be further divided as described in annex B, section B.2.2.4.~~

B.2.2.3 Sampling from production

Sufficient sample shall be collected from production to fulfill the sample quantity requirements specified in the relevant subsection of B.3. ~~In lieu of sampling in accordance with annex B, sections B.2.2.1 or B.2.2.2, composite samples obtained and composited by the manufacturer's sampling procedures during production shall be acceptable if the procedures used result in a representative sample, as determined by the certification entity. The sample shall be further prepared in accordance with annex B, section B.2.2.4.~~

B.2.2.4 Sampling from retains

Up to ten samples shall be collected, covering the length of the specified retain period or six months, whichever is greater, but not to exceed twelve months in the age of material sampled. A portion shall be collected from each retain, and the samples shall be mixed thoroughly to form a composite.

B.2.2.45 Sample for analysis

The sample obtained per annex B, section B.2.2.1, B.2.2.2, B.2.2.3, or B.2.2.4, shall be mixed thoroughly. This sample shall be poured into two approximately 200g, airtight, moisture-proof glass containers and sealed. If a glass container is not appropriate, the manufacturer shall recommend a type of sample container. Each sample container shall be clearly labeled with the product name, manufacturer's name, sampling date, production location, and lot number, and shall be signed by the person responsible for sampling. ~~The composite sample obtained in annex B, sections B.2.2.1, B.2.2.2 or B.2.2.3 shall be mixed thoroughly. This sample shall be divided into three approximately 160 g aliquots stored in airtight, moisture-proof glass containers and sealed. If a glass container is inappropriate, the manufacturer shall recommend the type of sample container. Each container shall be clearly labeled with product name, type of container sampled, manufacturer's name, sampling date, production location, lot number, and be signed by the person responsible for sampling.~~

B.2.3 Gas samples

A representative sample shall be obtained using an appropriate gas-sampling cylinder. The sample shall be acquired in accordance with the manufacturer's specifications and precautions.

B.2.4 Blends and mixtures

Samples collected for analysis shall be verified as being identical to the product initially submitted.

B.3 Preparation of samples

The methods included in this section have been written for trained chemical laboratory personnel. Appropriate quality assurance procedures and safety precautions shall be followed.

B.3.1 General

Acid-washed glassware and equipment, organic-free deionized water for dilutions, trace metals grade acids, and reagent blanks shall be used in all preparation methods referenced in this section.

B.3.1.1 Reagent blank

A reagent blank shall be prepared using the same reagents and in the same manner as a product sample, but no product sample shall be added.

NOTE – For bromate analysis of sodium hypochlorite, no preparation of the sample is required. Bromate analysis can be performed on the sample as received.

The following procedure shall be followed for sample preparation to this method:

- 1) Dilute the sample to a strength equivalent to 10 times the maximum use dose of the chemical using organic-free deionized water.^{10, 11, 13}

Formula:

$$\begin{array}{ccccccc} \text{mg/L} & \times & 10 & \times & \text{required volume of} & = & \text{mg} \\ & & & & \text{sample solution (L)} & & \\ \text{(maximum use dose)} & & \text{(multiple factor)} & & & & \text{(amount of sample to be weighed)} \end{array}$$

- 2) Acidify with concentrated hydrochloric acid (HCl) to pH < 2.¹²
- 3) Quantitatively transfer to a volumetric flask of a size corresponding with the required volume of sample solution determined above and dilute to volume with organic-free deionized water.
- 4) Preserve according to the requirements of table B1.

B.3.4 Method C

This method shall be used for calcium carbonate, calcium hydroxide, calcium oxide, magnesium carbonate hydroxide, and magnesium oxide.

The following procedure shall be followed for sample preparation to this method:

- 1) Pulverize sample as follows:
 - i) Crush approximately 125 g of sample to pass a No. 100 U. S. Standard Sieve, using a nonmetallic crusher such as an acid-washed glass mortar and pestle.
 - ii) Mix thoroughly and store in an airtight, moisture-proof container.
- 2) Pipette 20 mL of organic-free deionized water into 500mL beaker.
- 3) Place the beaker on 60 °C (140 °F) hot plate and add stir bar.
- 4) Slowly add 10 times the maximum use dose of the test sample.

Formula:

$$\begin{array}{ccccccc} \text{mg/L} & \times & 10 & \times & \text{required volume of} & = & \text{mg} \\ & & & & \text{sample solution (L)} & & \\ \text{(maximum use dose)} & & \text{(multiple factor)} & & & & \text{(amount sample to be weighed)} \end{array}$$

- 5) Mix thoroughly to include all of pulverized sample, making a paste. If sample spatters, remove from hot plate.

¹³ Tricalcium phosphate and other compounds will not dissolve until the addition of hydrochloric acid.

- 5) Record the final weight of the flask, assembly, and contents to the nearest 0.01 g; the increase in weight is equal to the product weight. For oxygen, weigh the final weight of the cylinder; the decrease in weight is equal to the oxygen product weight.
- 6) Analyze immediately after preparation of the sample solution.¹⁴

B.3.7 Method F

This method is applicable to well-drilling muds and solid swelling well sealants.

- 1) Moisten 25 g of sample using 100 mL reagent water in an appropriately sized beaker.
- 2) Cover with a watch glass and allow to stand 24 h.
- 3) After 24 h, make a solution of 1 g moistened sample per 1 L reagent water.
- 4) Place on a stirring plate until sample is fully dispersed.
- 5) Collect a sample for turbidity analysis prior to addition of Superfloc.¹⁵
- 6) Add 1.5 mL of 1% SuperFloc® per 1 L of sample solution prepared.
- 7) Remove from stirring plate and let stand for a minimum of 1 h.
- 8) Filter sample under vacuum.
- 9) Preserve the filtrate according to the requirements of table B1.

B.3.8 Method G

This method is applicable to frac sands and backfill materials for cathodic protection or electrical installations.

B.3.8.1 Conditioning

The analysis sample obtained shall be initially prepared according to the manufacturer's written specifications. The product sample shall be allowed to air dry prior to exposure, if needed.

B.3.8.2 Preparation

Samples shall be prepared according to the following procedure:

- 1) Following conditioning as described in B.3.8.1, combine the manufacturer's recommended amount or 1250 ± 50 g of sample with 2 L reagent water in a 4L Erlenmeyer flask.
- 2) Seal with PTFE film and agitate for 1 min.
- 3) Expose sample for 24 h.
- 4) Decant, discard, and replace extractant water.
- 5) Expose extractant water 24 h.
- 6) Immediately filter and collect analysis samples.
- 7) Preserve according to the requirements of table B1.

¹⁴ The method detailed is applicable to analysis of water samples. In some cases, the gas can be analyzed directly as follows:

- chlorine for mercury ASTM E506
- chlorine for carbon tetrachloride ASTM E806
- carbon dioxide CGA G-6.2-1994

¹⁵ Cytec Industries, Inc., 5 Garret Mountain Plaza, West Paterson, NJ 07424

B.3.9 Method H

This method shall be used for reverse osmosis and distillation process chemicals.

Dry products shall be prepared according to the manufacturer's instructions. No preparation shall be required for liquid products, which shall be analyzed as received.

B.3.10 Method I

This method shall be used for well-drilling foams.

Chemical analyses for contaminants shall be conducted on the liquid product, as received.

B.3.11 Method J

This method shall be used for polymers used as well-drilling aids and in reverse osmosis or distillation processes.

Polymers shall be analyzed according to the methods described in B.4.3.1 through B.4.3.3, as applicable.

B.3.12 Method K

This method shall be used for metal salt coagulants such as alum, ferric chloride, ferrous chloride, ferric sulfate, ferrous sulfate, and polyaluminum chloride.

B.3.12.1 Preparation

For the preparation of coagulant solutions, the amount of product on a dry weight basis shall be determined. To calculate the weight of the material (dry basis) in a coagulant solution, the following procedure shall be followed.

- 1) Weigh a clean, dry 100mL volumetric flask to the nearest 0.1 mg (Wt A).
- 2) Pipette a known volume (20-50 mL) of well-mixed coagulant solution into the flask. Take care not to touch the ground glass.
- 3) Weigh the flask and contents to the nearest 0.1 mg (Wt C).
- 4) Dilute the solution to volume with DI water. (Take care not to wet the ground glass.) Do not mix.
- 5) Weigh the flask and contents to the nearest 0.1 mg (Wt D).
- 6) After weighing, mix the contents thoroughly and transfer into a 125mL bottle.
- 7) Thoroughly rinse the flask with DI water, allow the neck of the flask to dry, then fill the flask to volume with DI water. Take care not to wet the ground glass.
- 8) Weigh the flask and water to the nearest 0.1 mg (Wt B).
- 9) The weight of the material (dry basis) shall be calculated as follows:
 - $Wt\ B - Wt\ A = \text{weight of water} = W;$
 - $Wt\ C - Wt\ A = \text{weight of sample solution} = X;$

- $Wt\ D - Wt\ C = \text{weight of water added} = Y;$
- $Wt\ D - Wt\ B = \text{weight of material (dry basis) in sample solution} = M;$
- $W - Y = \text{weight of water equivalent to sample solution} = Z ;$
- $X/Z = \text{SPG of sample solution; and}$
- $X - Z = \text{weight of material (dry basis) in sample solution} = M.$

NOTE – If the material is alum, to account for waters of hydration:

- $M = \text{Wt of } Al_2(SO_4)_3; \text{ and}$
- $M \times 1.7372 = \text{Wt of } (Al_2(SO_4)_3 \cdot 14\ H_2O).$

For other metal salt coagulants with waters of hydration, similar calculations shall be made.

If the test material is provided as a dry product:

- 1) Weigh 10 times the maximum use dose of the chemical in an acid-washed 1L volumetric flask.
- 2) Dilute to volume with deionized distilled water, or follow manufacturer's instructions for dissolving the material and then dilute to volume.

NOTE – Contaminants of interest can be determined on the base (unflocked) material. If the level of contaminants in the base material meets the requirements of this Standard (i. e., \leq SPAC), then no analyses need be performed for the flocked material. If the SPAC is exceeded, then the flocked supernatant shall be analyzed and the contaminant levels compared to the appropriate SPACs.

B.3.12.2 Analysis of chemical before flocking

For analysis of the base material, the base material shall be prepared as described below.

- 1) Pipette an aliquot of the solution into a 250mL Griffin beaker and add DI water to 100 mL.
- 2) Carefully add 2 mL of 30% H_2O_2 and 1 mL of concentrated nitric acid to the solution in the beaker.
- 3) Heat for 1 h at 95 °C (203 °F), or until the volume is slightly less than 50 mL.
- 4) Cool to ambient temperature and quantitatively transfer the solution into a 100mL volumetric flask. Dilute to volume with DI water and mix thoroughly.

B.3.12.3 Analysis of solution after flocking

For analysis of the flocked material, the following preparation steps shall be followed.

- 1) The volume of solution to give the equivalent of 10 times the evaluation dose shall be calculated by the following equation:

$$\left[\frac{\text{mg}}{\text{L}} \times 10 \times 1 \text{ L} \right] \div \left[\text{g} \div 100 \text{ mL} \times \frac{1000 \text{ mg}}{\text{g}} \right] = \text{mL}$$

(evaluation dose) (multiple factor) (dry wt. sample in solution)

- 2) Pipette the calculated aliquot into a 1L volumetric flask and dilute to volume with DI water.
- 3) Transfer a 100mL aliquot into a 200mL beaker.
- 4) Add 0.1 M NaOH with constant stirring until the desired pH is reached and the pH holds for 1 min.
- 5) Allow the mixture to stand undisturbed for at least 1 h.
- 6) Filter through GF/C (or equivalent) filter with the aid of vacuum.
- 7) Preserve the sample according to the requirements of table B1.

B.3.13 Method Z

This method shall be used for tracer dyes.

- 1) Preheat a sufficient volume of organic-free deionized water to 82 °C (180 °F).
- 2) Use a graduated cylinder to measure 950 mL of the hot water, and transfer into a beaker with a stir bar.
- 3) Weigh a quantity of the tracer dye equivalent to 10 times the maximum use dose when diluted to 1 L. Transfer dye to the beaker of hot water with stirring.
- 4) Cool to room temperature.
- 5) Transfer solution to a 1L (0.26gal) volumetric flask and dilute to volume with room-temperature organic-free deionized water.

B.4 Analysis methods

B.4.1 General

This section is divided into three parts: inorganics (metals and others), organics, and radionuclides.

B.4.2 Inorganics

B.4.2.1 Metals

Analyses for metals shall be performed in accordance with currently accepted USEPA methods (see 40 CFR Part 141), except as otherwise provided for herein. When no USEPA method is provided, analyses shall be performed in accordance with *Standard Methods for the Examination of Water and Wastewater* (most current edition).

If neither of these references includes the required method, a method from another recognized source shall be allowed, and the method cited and validated. If no recognized method is available, a method shall be developed, provided the method is fully documented and validated, including all appropriate quality assurance procedures. The method used to determine the contaminant level shall have an

analytical concentration range, such that the report limit is no greater than 50% of the lowest contaminant concentration being sought. Quality control standards shall be run at concentrations of 0.5, 1.0, 2.0, 5.0, and 10.0 times the target limit.

B.4.2.2 Nonmetallic inorganics

Analyses for inorganics (other than metals) shall be performed in accordance with currently accepted USEPA methods (see USEPA, National Primary Drinking Water Regulations, 40 CFR Part 141⁸), except as otherwise provided for herein. When no USEPA method is provided, analyses shall be performed in accordance with *Standard Methods for the Examination of Water and Wastewater* (most current edition)³.

If neither of these references includes the required method, a method from another recognized source shall be allowed, and the method cited and validated. If no recognized method is available, a method shall be developed, provided the method is fully documented and validated, including all appropriate quality assurance procedures. The method used to determine the contaminant level shall have an analytical concentration range, such that the report limit is no greater than 50% of the lowest contaminant concentration being sought. Quality control standards shall be run at concentrations of 0.5, 1.0, 2.0, 5.0, and 10.0 times the target limit.

B.4.2.3 Mercury analysis for liquid chlorine samples

Direct analysis for mercury in liquid chlorine samples shall be performed according to the most current version of ASTM E506.

B.4.3 Organics

Analyses for organics shall be performed in accordance with currently accepted USEPA methods (see 40 CFR Part 141⁸), except as otherwise provided for herein. When no USEPA method is provided, analyses shall be performed in accordance with *Standard Methods for the Examination of Water and Wastewater* (most current edition)³.

If neither of these references includes the required method, a method from another recognized source shall be allowed, and the method cited and validated. If no recognized method is available, a method shall be developed, provided the method is fully documented and validated, including all appropriate quality assurance procedures. The method used to determine the contaminant level shall have an analytical concentration range, such that the report limit is no greater than 50% of the lowest contaminant concentration being sought. Quality control standards shall be run at concentrations of 0.5, 1.0, 2.0, 5.0, and 10.0 times the target limit.

B.4.3.1 Epichlorohydrin-dimethylamine copolymer (EPI-DMA)

B.4.3.1.1 General

Sample analysis shall be by gas chromatography with flame ionization detection (FID). An internal standard comprised of 100 µg/mL 1,3-dichloroacetone in 1:1 methylene chloride/isopropanol shall be used. Alternate methods shall be allowed, but shall be validated.

B.4.3.1.2 Apparatus

The following apparatus shall be used in this analysis:

- gas chromatograph, equipped with a split/splitless capillary injection port and a flame ionization detector;
- capillary column: 30 m x 0.53 mm DB-Wax, 1.0 µ film thickness;

- analytical balance, 0.1 mg accuracy;
- syringe, GC – 10 µL;
- Pasteur pipettes;
- 40mL glass vials with polytetrafluoroethylene (PTFE) faced septa;
- 2mL GC glass vials with PTFE-faced septa;
- 10mL volumetric flasks;
- 0.45µm syringe filters; and
- 10mL disposable syringe.

B.4.3.1.3 Reagents

The following reagents shall be used in this analysis:

- epichlorohydrin, 99+% (EPI);
- 1,3-dichloro-2-propanol, 98% (DCIP);
- 1,2-dichloro-3-propanol;
- glycidol;
- 1,3-dichloroacetone (internal standard);
- 2-propanol (IPA); and
- methylene chloride.

B.4.3.1.4 Procedure

B.4.3.1.4.1 Preparation of solutions

Standards and solutions shall be prepared as follows.

- 1) Prepare a stock solution of each compound of interest by weighing approximately 0.1 g of the neat material into a 10mL volumetric flask, and dilute to volume with methylene chloride.
- 2) Prepare an internal standard stock solution by weighing 0.1 g of 1,3-dichloroacetone into a 10 mL volumetric flask, and dilute to volume with methylene chloride.
- 3) Prepare a dilution standard at 1000 µg/mL by adding the appropriate volumes of each stock standard to a 10mL volumetric flask containing methylene chloride/isopropanol (1:1). Add an appropriate volume of the internal standard stock solution to give a 1,3-dichloroacetone concentration of 100 µg/mL and dilute to mark.
- 4) Prepare an extracting solution by weighing 0.0500 g of 1,3-dichloroacetone into a 500mL volumetric flask and add 250 mL methylene chloride to dissolve. Dilute to mark with isopropanol. The resulting solution shall be used to prepare calibration standards and as the extracting solution for the polymer products.
- 5) Prepare five calibration standards at concentrations of 5.0, 10, 25, 50, and 200 µg/mL by serial dilution of the 1000µg/mL dilution standard using the extracting solution.

B.4.3.1.4.2 Extraction of samples

Polymer samples shall be extracted as follows.

- 1) Add 5.0 mL of extracting solution to 10.0 g of polymer in a 40mL glass vial.
- 2) Mix the solution on a wrist action shaker for 1 h.
- 3) Allow the two layers to separate.
- 4) Use a Pasteur pipette to transfer approximately 2 mL of extract to a syringe fitted with a filter.
- 5) Filter the extract prior to injection onto the instrument (extract should be free of any polymer droplets).

NOTE – Analyze the extract within 8 h of extraction since aged extracts are unstable and will not produce accurate results.

B.4.3.1.4.3 Instrument conditions

The polymer extract shall be analyzed under the following conditions:

- oven temperature – multiple ramp:
 - 1) 40 to 125 °C (104 to 257 °F) at 20 °C (36 °F)/min; initial hold – 5.0 min; final hold – 2.5 min;
 - 2) 125 to 150 °C (257 to 302 °F) at 20 °C (36 °F)/min; final hold – 2.0 min; and
 - 3) 150 to 175 °C (302 to 347 °F) at 20 °C (36 °F)/min; final hold – 10.0 min.
- injector temperature: 235 °C (455 °F);
- detector temperature: 300 °C (572 °F);
- injection volume: 3.0 µL;
- column head pressure: 5 psi; and
- injection port – splitless mode, purge valve on at 0.5 min.

B.4.3.1.5 Calculations

A linear regression of the five calibration standards shall be used to calculate the concentration of each analyte in the sample extract (in µg/mL). The following equation shall be used to calculate the concentration of the analyte in the polymer sample:

$$\text{curve concentration } (\mu\text{g/mL}) \times \frac{5.0 \text{ mL}}{10 \text{ g polymer sample}} = \frac{\mu\text{g analyte}}{\text{g polymer sample}}$$

B.4.3.2 Acrylamide monomer in polyacrylamide

Acrylamide monomer shall be determined using the method described in "Determination of acrylamide monomer in polyacrylamide and in environmental samples by high performance liquid chromatography," *Analytical Chemistry* 50: 1959 (1978)¹⁶. Alternate methods shall be allowed, but shall be validated.

B.4.3.3 Dimethyldiallylammonium chloride monomer in polyDADMAC

B.4.3.3.1 General

Sample analysis shall be by high performance liquid chromatography (HPLC) with ultraviolet (UV) detection. Alternate methods shall be allowed, but shall be validated.

B.4.3.3.2 Apparatus

The following apparatus shall be used in this analysis:

- high performance liquid chromatograph equipped with UV detector;
- column: 250 x 4.6 mm Alltima C18, 5 μ (Alltech catalog #88054 or equivalent);
- analytical balance, 0.1mg accuracy;
- syringe, HPLC – 20 μ L;
- 10mL volumetric flasks; and
- 0.45 μ m syringe filters.

B.4.3.3.3 Reagents

The following reagents shall be used in this analysis:

- 1-octane sulfonic acid, Na salt;
- tetramethylammonium hydroxide;
- o-phosphoric acid;
- n-butanol;
- acetonitrile; and
- diallyldimethylammonium chloride monomer (mDADMAC).

B.4.3.3.4 Procedure

B.4.3.3.4.1 Preparation of mobile phase

A mobile phase solution shall be prepared by adding the following to 900 mL of HPLC grade water:

- 1.08 g of 1-octane sulfonic acid, Na salt;
- 5.0 mL of 1.0 M tetramethylammonium hydroxide;
- 100 mL of acetonitrile; and
- 25 mL of n-butanol.

The pH of the solution shall be adjusted to 3.0 by adding o-phosphoric acid.

B.4.3.3.4.2 Analysis solution

An analysis solution shall be prepared as follows.

- 1) Dissolve a 2.0g aliquot of the polyDADMAC sample in 10 mL of deionized water.
- 2) Filter approximately 2 mL of this solution through a 0.45 μ m syringe filter.

¹⁶ American Chemical Society, P. O. Box 3337, Columbus, OH 43210

- 3) Dilute 1.0 mL of the filtrate to 10 mL with mobile phase solution.

B.4.3.3.4.3 Calibration standards

Four calibration standards shall be prepared at concentrations of 20, 50, 200, and 500 µg/mL by serial dilution of the m-DADMAC stock standard using the mobile phase solution.

B.4.3.3.4.4 Instrument conditions

The analysis solution containing the polymer sample shall be analyzed under the following conditions:

- column temperature: ambient;
- column flow: 2.0 mL/min;
- injection volume: 20 µL;
- detector: UV at 200 nm; and
- retention time of mDADMAC = 6.5 min.

B.4.3.3.5 Calculations

A linear regression of the four calibration standards shall be used to calculate the concentration of each analyte in the sample extract (in µg/mL). The following equation shall be used to calculate the concentration of the analyte in the polymer sample:

$$\text{curve concentration } (\mu\text{g/mL}) \times \frac{10.0 \text{ mL}}{2 \text{ g polymer sample}} \times 10 = \frac{\mu\text{g analyte}}{\text{g polymer sample}}$$

B.4.3.4. Dimethylamine in polyDADMAC and Epichlorohydrin/dimethylamine polymers

B.4.3.4.1 General

This procedure shall be used for the analysis of Dimethylamine in polyDADMAC and Epichlorohydrin/dimethylamine polymers. Alternate methods shall be allowed, but shall be validated.

B.4.3.4.2. Apparatus

The following apparatus shall be used in this analysis:

- gas chromatograph with electron capture detector and autosampler;
- 100% dimethyl siloxane .32mm x 30M, 1.0µ film capillary column;
- hot plate;
- disposable pipettes;
- syringes – various sizes;
- 40mL VOA vials; and
- appropriately sized volumetric flasks.

B.4.3.4.3 Reagents

The following reagents shall be used in this analysis:

- toluene;
- dimethylamine (40% wt);
- hexachlorobenzene (100 µg/mL);
- 2,4-dinitrofluorobenzene;
- sodium hydroxide;
- sodium tetraborate; and
- 1,4-dioxane.

B.4.3.4.4 Analytical procedure

B.4.3.4.4.1 Preparation of reagent solutions

Reagent solutions shall be prepared as follows.

- 1) Prepare a 2.0N solution of NaOH by adding 8 g of NaOH into 100 mL of deionized water.
- 2) Prepare a 2.5% sodium tetraborate solution by adding 2.5 g of sodium tetraborate into 100 mL of deionized water.
- 3) Prepare 2,4-dinitrofluorobenzene derivatizing solution by adding 0.625 g of 2,4-dinitrofluorobenzene into 25 mL of 1,4-dioxane.
- 4) Prepare a stock standard solution at 1000 µg/mL by weighing out approximately 25 mg of dimethylamine (40% w/w) into 10 mL of deionized water.
- 5) Prepare a dilution standard at 100 µg/mL by adding 1 mL of stock standard solution to 10 mL of deionized water.
- 6) Prepare four calibration standards at concentrations of 10, 50, 200, and 500 µg/L by serial dilution of the 100 µg/mL dilution standard into deionized water.

B.4.3.4.4.2 Preparation of calibration standards and samples

Calibration standards and samples shall be prepared as follows.

- 1) Add 10 mL of each calibration standard to a 40mL VOA vial.
- 2) For each sample add 0.5 g of sample to 100 mL of deionized water. Cap and shake for 30 min. Add 1 mL of sample and 9 mL of deionized water to a 40mL VOA vial.
- 3) For each QC, MS (Matrix Spike) and MSD (Matrix Spike Duplicate), add 0.5 g of sample to 100 mL of deionized water. Spike at 50 mg/Kg or level equivalent to that found in sample. Cap and shake for 30 min. Add 1 mL of each QC sample and 9 mL of deionized water to a 40mL VOA vial.

B.4.3.4.4.3 Derivatization and extraction of standards and sampling of vials

Derivation, extraction, and sampling shall be performed as follows.

- 1) To each standard and sample add 5.0 mL of 2.5% sodium tetraborate and 1.0 mL of the 2,4-dinitrofluorobenzene solution.
- 2) Cap the vials and place them in a 60 °C water bath for 20 min.
- 3) Remove the vials and add 2.0 mL of 2.0 N sodium hydroxide.
- 4) Return the vials to the water bath for 30 min.
- 5) Place the vials in an ice bath until they reach room temperature.
- 6) To each vial add 5.0 mL of toluene.
- 7) Cap the vials and shake for 2 min.

- 8) Allow the samples to set for approximately 5 min.
- 9) Transfer 1.0 mL of toluene layer into 1.8mL autosampler vial.
- 10) Add 10 µL of hexachlorobenzene into each vial and cap the vial.

B.4.3.4.4 Run conditions

- 1) Set up the GC with the GC column.
- 2) Set the GC with the following temperature program:

initial temperature	150 °C
final temperature	220 °C
rate	4 °C/min
initial time	1 min
final time	10 min
injector temperature	235 °C
detector temperature	300 °C
signal range	1

B.4.3.4.5 Calculations

A linear regression of the four standards shall be used to calculate the concentration in each sample extract. The following equation shall be used to calculate the concentration of dimethylamine in the polymer sample:

$$\frac{\text{curve concentration } (\mu\text{g/L}) \times (1\text{L}/1000\text{ mL}) \times 100\text{ mL} \times 10}{0.5\text{ g polymer sample}} = \frac{\mu\text{g dimethylamine}}{\text{g polymer sample}}$$

B.4.4 Radionuclides

Analyses for radionuclides shall be performed in accordance with *Prescribed Procedures for Measurement of Radioactivity in Drinking Water*, EPA-600/4-80-032⁷, except as otherwise provided for herein. When no USEPA method is provided, analyses shall be performed in accordance with *Standard Methods for the Examination of Water and Wastewater* (most current edition)³.

If neither of these publications includes the required method, a method from another recognized source shall be allowed, and the method cited and validated. If no recognized method is available, a method shall be developed, provided the method is fully documented, including all appropriate quality assurance procedures. The method used to determine the contaminant level shall have an analytical concentration range, such that the report limit is no greater than 50% of the lowest contaminant concentration being sought. Quality control standards shall be run at concentrations of 0.5, 1.0, 2.0, 5.0, and 10.0 times the target limit.

B.5 Estimated contaminant exposure concentration

To estimate the exposure concentration of a contaminant in the finished drinking water, the following calculations shall be used. These calculations adjust the contaminant concentrations measured in the laboratory preparation solution to the evaluation or maximum dose. The resulting value shall be compared to the SPAC, as determined in annex A.

Table B1 – Preservation of prepared sample solutions

Contaminant	Preservative	Container	Storage
herbicides/ pesticides	none	amber glass with PTFE cap	4 °C (39 °F)
metals	1.25 mL HNO ₃ per 125 mL of sample	HDPE plastic	room temperature
organics	none	amber glass with PTFE cap	4 °C (39 °F)
radionuclides	10 mL HNO ₃ per 1L of sample	HDPE plastic	room temperature
VOCs	4 drops 50% HCl per 160 mL of sample	glass vial with PTFE cap	4 °C (39 °F)

Annex D

(normative)

Normative drinking water criteria

D.1 General

The drinking water criteria in this annex shall be used as normative evaluation criteria for the determination of product compliance with the health effects requirements of this Standard. The values in these tables include the consensus USEPA and Health Canada drinking water criteria for contaminants evaluated by these two agencies. They also include criteria for non-regulated contaminants that have been developed according to the toxicity data requirements of annex A, and that have been externally peer reviewed. Non-regulatory USEPA guidance values that have been reviewed and found to satisfy annex A toxicity data requirements are also included, as well as chemicals that have been evaluated using the threshold of evaluation approach.

The drinking water criteria in this annex have not been evaluated for taste and odor considerations at the concentration limits indicated.

The substances listed in tables D1, D2, D3, and D4 are not intended to encompass all of the potential analytes of interest that need to be considered when evaluating products to the requirements of this Standard. The user is cautioned that each product may have formulation-dependent analytes of interest for which acceptable concentration limits have not been determined. In these cases, the user is required to develop acceptable concentration limits based on the requirements of annex A in order to determine full compliance with this Standard.

These tables are specific to NSF/ANSI 60. While the tables may be used for evaluation of impurities in drinking water system components, the substances listed in these tables may not have been evaluated for use as indirect drinking water additives under NSF/ANSI 61. Use as indirect drinking water additives may require the consideration of different exposure parameters from those used for NSF/ANSI 60 evaluation.

D.2 USEPA and Health Canada drinking water criteria

Table D1 contains drinking water criteria for contaminants regulated by the USEPA and established by Health Canada. Values for each contaminant have been agreed on by representatives of both agencies for the purpose of evaluating products against the health effects requirements of NSF/ANSI 60. For each substance, the values in the table represent a consensus decision regarding the selection of the most appropriate assessment on which to base NSF/ANSI 60 evaluation.

At the time of publication, the indicated values were valid. These values are subject to change, however, and the user is encouraged to contact USEPA or Health Canada for the most current values. Some of these values have been developed using a linear multistage model to predict theoretical excess carcinogenic risk at low exposure concentrations. Where the database is sufficient and the compound mode of action can be determined, the USEPA is replacing the default linear multistage model with either a biologically based cell kinetic multistage model or a margin of exposure analysis. Cancer potency ($q1^*$) values developed using the linear multistage model may be reevaluated in the future.

D.3 NSF International peer-reviewed drinking water criteria

Table D2 contains drinking water criteria for unregulated substances for which NSF International has determined Total Allowable Concentrations (TAC) and Single Product Allowable Concentrations (SPAC) in accordance with annex A of this Standard. These criteria have been externally peer reviewed.

Revisions to NSF/ANSI 60-2005 are shown in this addendum as ~~crossouts~~ for deletions and **highlights** for additions.

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Addendum 1

At the time of publication, the indicated values were valid. These values are subject to change, however, and the user is encouraged to contact NSF International for the most current values.

D.4 Drinking water criteria based on USEPA guidance concentrations

Table D3 contains drinking water criteria for unregulated contaminants for which the acceptable drinking water concentrations are based on USEPA guidance values, including those in the USEPA Health Advisory and Integrated Risk Information System (IRIS) databases (<http://www.epa.gov/ngispgm3/iris/subst>). A relative source contribution factor has been applied to calculation of the drinking water criteria when no such factor was applied as part of the USEPA risk assessment. In the absence of sufficient information to determine a data-derived relative source contribution factor, a default 20% drinking water contribution is assumed.

At the time of publication, the indicated values were valid. These values are subject to change, however, and the user is encouraged to contact USEPA for the most current values. Some of these values have been developed using a linear multistage model to predict risk at low exposure concentrations and may be reevaluated in the future.

D.5 Threshold of Evaluation (TOE) chemical list

Table D4 contains the list of chemicals that have been evaluated below the threshold of evaluation because of a lack of the minimum data needed to determine chemical specific concentrations in accordance with the requirements of annex A (see annex A, section A.7.1). Qualification to the Threshold of Evaluation category includes a comprehensive literature search for the particular substance and consideration of structure-activity relationships.

**Table D1 – U. S. Environmental Protection Agency and Health Canada
NSF/ANSI 60 drinking water criteria**

Contaminant (reference)¹	Drinking water regulatory level (MCL/MAC) (mg/L)	Single product allowable concentration (SPAC) (mg/L)
Organics/pesticides		
acrylamide (as a monomer in drinking water treatment polymers) (40 CFR §141.111, §141.110)	TT ² (0.05% dosed at 1 ppm, or equivalent)	TT ² (0.05% dosed at 1 ppm, or equivalent)
alachlor (40 CFR §141.60, §141.61)	0.002	0.0002
aldicarb aldicarb sulphone aldicarb sulphoxide (40 CFR §141.60, §141.61)	0.007	0.0007
aldrin / dieldrin issue date: 10/94	0.0007	0.00007
atrazine issue date: 04/93	0.003	0.0003
atrazine and metabolites issue date: 04/93	0.005	0.0005
azinphos-methyl issue date: 02/86	0.02	0.002
bendiocarb issue date: 02/86	0.04	0.004
benzene (40 CFR §141.60, §141.61)	0.005	0.0005
benzo(a)pyrene (PAH) (40 CFR §141.60, §141.61)	0.0002	0.00002
bromodichloromethane – see trihalomethanes (total)	N/A	N/A
bromoform – see trihalomethanes (total)	N/A	N/A
bromoxynil issue date: 03/87	0.005	0.0005
carbaryl issue date: 02/86	0.09	0.009
carbofuran (40 CFR §141.60, §141.61)	0.04	0.004
carbon tetrachloride (40 CFR §141.60, §141.61)	0.005	0.0005
chlordane (40 CFR §141.60, §141.61)	0.002	0.0002
chlorodibromomethane see trihalomethanes (total)	N/A	N/A
chloroform see trihalomethanes (total)	N/A	N/A
chlorpyrifos issue date: 02/86	0.09	0.009

**Table D1 – U. S. Environmental Protection Agency and Health Canada
NSF/ANSI 60 drinking water criteria**

Contaminant (reference)¹	Drinking water regulatory level (MCL/MAC) (mg/L)	Single product allowable concentration (SPAC) (mg/L)
cyanazine issue date: 02/86	0.01	0.001
Organics/pesticides		
cyanobacterial toxin (microcystin-LR) issue date: 04/02	0.0015	0.00015
2,4-D (40 CFR §141.60, §141.61)	0.07	0.007
dalapon (40 CFR §141.60, §141.61)	0.2	0.02
diazinon issue date: 02/86	0.02	0.002
dibromo-3-chloropropane (1,2-) (40 CFR §141.60, §141.61)	0.0002	0.00002
dicamba issue date: 03/87	0.12	0.012
dichlorobenzene o- (40 CFR §141.60, §141.61)	0.6	0.06
dichlorobenzene m- (see o-dichlorobenzene)	0.6	0.06
dichlorobenzene p- (40 CFR §141.60, §141.61)	0.075	0.0075
dichloroethane (1,2-) (40 CFR §141.60, §141.61)	0.005	0.0005
dichloroethylene (1,1-) (40 CFR §141.60, §141.61)	0.007	0.0007
dichloroethylene (cis-1,2-) (40 CFR §141.60, §141.61)	0.07	0.007
dichloroethylene (trans-1,2) (40 CFR §141.60, §141.61)	0.1	0.01
dichloromethane (40 CFR §141.60, §141.61)	0.005	0.0005
dichloropropane (1,2-) (40 CFR §141.60, §141.61)	0.005	0.0005
diclofop-methyl issue date: 03/87	0.009	0.0009
di(2-ethylhexyl)adipate (40 CFR §141.60, §141.61)	0.4	0.04
di(2-ethylhexyl)phthalate (PAE) (40 CFR §141.60, §141.61)	0.006	0.0006
dimethoate issue date: 02/86	0.020	0.002
dinoseb (40 CFR §141.60, §141.61)	0.007	0.0007
diquat (40 CFR §141.60, §141.61)	0.02	0.002
diuron issue date: 03/87	0.15	0.015

**Table D1 – U. S. Environmental Protection Agency and Health Canada
NSF/ANSI 60 drinking water criteria**

Contaminant (reference)¹	Drinking water regulatory level (MCL/MAC) (mg/L)	Single product allowable concentration (SPAC) (mg/L)
Organics/pesticides		
endothall (40 CFR §141.60, §141.61)	0.1	0.01
endrin (40 CFR §141.60, §141.61)	0.002	0.0002
epichlorohydrin (as a monomer in drinking water treatment polymers) (40 CFR §141.111, §141.110)	TT ² (0.01% dosed at 20 ppm, or equivalent)	TT ² (0.01% dosed at 20 ppm, or equivalent)
ethylbenzene (40 CFR §141.60, §141.61)	0.7	0.07
ethylene dibromide (EDB) (40 CFR §141.60, §141.61)	0.00005	0.000005
glyphosate (40 CFR §141.60, §141.61)	0.7	0.07
heptachlor (40 CFR §141.60, §141.61)	0.0004	0.00004
heptachlor epoxide (40 CFR §141.60, §141.61)	0.0002	0.00002
hexachlorobenzene (40 CFR §141.60, §141.61)	0.001	0.0001
hexachlorocyclopentadiene (40 CFR §141.60, §141.61)	0.05	0.005
lindane (40 CFR §141.60, §141.61)	0.0002	0.00002
malathion issue date: 02/86	0.19	0.019
methoxychlor (40 CFR §141.60, §141.61)	0.04	0.004
metolachlor issue date: 02/86	0.05	0.005
metribuzin issue date: 02/86	0.08	0.008
monochlorobenzene (40 CFR §141.60, §141.61)	0.1	0.01
nitrilotriacetic acid issue date: 01/90	0.4	0.04
oxamyl (Vydate) (40 CFR §141.60, §141.61)	0.2	0.02
paraquat (as dichloride) issue date: 02/86	0.01	0.001
parathion issue date: 02/86	0.05	0.005
pentachlorophenol (40 CFR §141.60, §141.61)	0.001	0.0001
phorate issue date: 02/86	0.002	0.0002

**Table D1 – U. S. Environmental Protection Agency and Health Canada
NSF/ANSI 60 drinking water criteria**

Contaminant (reference)¹	Drinking water regulatory level (MCL/MAC) (mg/L)	Single product allowable concentration (SPAC) (mg/L)
Organics/pesticides		
picloram issue date: 06/88	0.19	0.019
polychlorinated biphenyls (PCB) (40 CFR §141.60, §141.61)	0.0005	0.00005
simazine (40 CFR §141.60, §141.61)	0.004	0.0004
styrene (40 CFR §141.60, §141.61)	0.1	0.01
2,3,7,8-TCDD (dioxin) (40 CFR §141.60, §141.61)	3E-08	3E-09
terbufos issue date: 01/87	0.001	0.0001
tetrachloroethylene (40 CFR §141.60, §141.61)	0.005	0.0005
2,3,4,6-tetrachlorophenol issue date: 02/87	0.1	0.01
toluene (40 CFR §141.60, §141.61)	1	0.1
toxaphene (40 CFR §141.60, §141.61)	0.003	0.0003
2,4,5-TP (40 CFR §141.60, §141.61)	0.05	0.005
trichlorobenzene (1,2,4-) (40 CFR §141.60, §141.61)	0.07	0.007
trichloroethane (1,1,1-) (40 CFR §141.60, §141.61)	0.2	0.02
trichloroethane (1,1,2-) (40 CFR §141.60, §141.61)	0.005	0.0005
trichloroethylene (40 CFR §141.60, §141.61)	0.005	0.0005
2,4,6-trichlorophenol issue date: 02/87	0.005	0.0005
trifluralin issue date: 02/89	0.045	0.0045
trihalomethanes (total)	0.08	0.008
bromodichloromethane	—	—
bromoform	—	—
chlorodibromomethane	—	—
chloroform	—	—
(40 CFR §141.64)	—	—
vinyl chloride (40 CFR §141.60, §141.61)	0.002	0.0002
xlenes (total) (40 CFR §141.60, §141.61)	10	1

**Table D1 – U. S. Environmental Protection Agency and Health Canada
NSF/ANSI 60 drinking water criteria**

Contaminant (reference)¹	Drinking water regulatory level (MCL/MAC) (mg/L)	Single product allowable concentration (SPAC) (mg/L)
Regulated metals		
antimony (40 CFR §141.60, §141.62)	0.006	0.0006
arsenic issue date: 10/01	0.010	0.001
barium (40 CFR §141.60, §141.62)	2	0.2
beryllium (40 CFR §141.60, §141.62)	0.004	0.0004
boron issue date: 09/90	5	0.5
cadmium (40 CFR §141.60, §141.62)	0.005	0.0005
chromium (total) (40 CFR §141.60, §141.62)	0.1	0.01
copper (40 CFR §141.80; 65 FR 1950)	TT ² (action level 1.3 mg/L)	0.13
lead (at tap) (40 CFR §141.80; 65 FR 1950)	TT ² (action level 0.015 mg/L)	0.0015
mercury (inorganic) (40 CFR §141.60, §141.62)	0.002	0.0002
selenium (40 CFR §141.60, §141.62)	0.05	0.005
thallium (40 CFR §141.60, §141.62)	0.002	0.0002
Other inorganics		
asbestos (40 CFR §141.60, §141.62)	7 ³ MFL	0.7 MFL
bromate (40 CFR §141.64)	0.01	0.005 ⁴
chloramines (total as Cl ₂) (40 CFR §141.65)	4 ⁵	0.4
chlorine (free as Cl ₂) (40 CFR §141.65)	4 ⁵	0.4
chlorine dioxide (as ClO ₂) (40 CFR §141.65)	0.8 ⁵	0.08
chlorite (40 CFR §141.64)	1	0.1
cyanide (as free cyanide) (40 CFR §141.60, §141.62)	0.2	0.02
fluoride (40 CFR §141.60, §141.62)	1.2 ⁶	1.2 as a direct additive ⁶ 0.12 as a contaminant
haloacetic acids (total) (40 CFR §141.64)	0.06	0.006
nitrate (as N) (40 CFR §141.60, §141.62)	10	1
nitrite (as N) (40 CFR §141.60, §141.62)	1	0.1

**Table D1 – U. S. Environmental Protection Agency and Health Canada
NSF/ANSI 60 drinking water criteria**

Contaminant (reference)¹	Drinking water regulatory level (MCL/MAC) (mg/L)	Single product allowable concentration (SPAC) (mg/L)
Other inorganics		
nitrate + nitrite (both as N) (40 CFR §141.60, §141.62)	10	1
beta particle and photon activity (40 CFR §141.16)	4 mrem/y	0.4 mrem/y
gross alpha particle activity (40 CFR §141.15)	15 pCi/L	1.5 pCi/L
combined radium 226 and 228 (40 CFR §141.15)	5 pCi/L	0.5 pCi/L
uranium issue date: 10/99	0.02 mg/L 13 pCi/L	0.002 mg/L 1.3 pCi/L
<p>¹ The references for criteria based on U. S. primary drinking water regulations are from the U. S. Code of Federal Regulations, Title 40 (Protection of Environment), revised July 1, 2001. This document is available online at www.access.gpo.gov. Issue dates are given for criteria based on Health Canada guidelines. Additional information on the guidelines for these chemicals is available at www.hc-sc.gc.ca/waterquality.</p> <p>² TT – Treatment technique</p> <p>³ MFL = Million fibers per liter, with fiber length > 10 microns</p> <p>⁴ Beginning January 2005, the Single Product Acceptable Concentration (SPAC) for bromate will be lowered to 0.003 mg/L, unless it is demonstrated to the Joint Committee on Drinking Water Additives by the manufacturers of hypochlorite treatment chemicals that the drinking water industry demand for hypochlorite chemicals cannot be adequately met while the SPAC remains above 0.005 mg/L. Please note that this change is still under evaluation by the NSF Joint Committee on Drinking Water Additives. At this time, it has not been demonstrated that the drinking water industry demand for hypochlorite chemicals cannot be adequately met at the lower SPAC. The next revision of this standard will be made up to date with the decision of the Joint Committee.</p> <p>⁵ Value represents the maximum residual disinfectant level (MRDL)</p> <p>⁶ “Recommendations for Using Fluoride to Prevent and Control Dental Caries in the United States,” August 17, 2001 / Morbidity & Mortality Weekly Report 50 (RR14); 1-42</p>		

– concluded –

Table D2 – NSF International peer-reviewed drinking water criteria

Substance	CAS #	Total allowable concentration (TAC) mg/L	Single product allowable concentration (SPAC) mg/L	Source of supporting documentation
Inorganics				
iodine	7553-56-2	0.3	0.1	NSF action level ¹ External peer review date: 04/25/2002
thiocyanate potassium salt sodium salt ammonium salt	333-20-0 540-72-7 1762-95-4	0.2 (total as SCN)	0.02 (total as SCN)	NSF action level ¹ External peer review date: 09/03/2003
titanium and titanium dioxide	7440-32-6 13463-67-7	90 (total as Ti)	9 (total as Ti)	NSF action level ¹ External peer review date: 09/04/2003
tungsten	7440-33-7	0.01	0.01	NSF action level ¹ External peer review date: 04/06/2005
Organics				
acetophenone	98-86-2	0.2	0.02	NSF action level ¹ External peer review date: 09/03/2003
adipic acid	124-04-9	30	3	NSF action level ¹ External peer review date: 04/06/2005
benzyl alcohol	100-51-6	3	0.3	NSF action level ¹ External peer review date: 04/26/2002
benzaldehyde	100-52-7	0.9	0.09	NSF action level ¹ External peer review date: 04/15/1999
bisphenol A diglycidyl ether	1675-54-3	1 (total)	0.1 (total)	NSF action level ¹ External peer review date: 10/03/2002
bisphenol A diglycideryl ether	5581-32-8			
t-butanol	75-65-0	9	0.9	NSF action level ¹ External peer review date: 10/03/2002
di-t-butyl peroxide	110-05-4	0.01	0.01	NSF action level ¹ External peer review date: 10/03/2002
n-butyl acetate	123-86-4	1	0.1	NSF action level ¹ External peer review date: 04/25/2002
γ-butyrolactone	96-48-0	4	0.4	NSF action level ¹ External peer review date: 10/04/2002
2-chloro-1,4- benzenediamine	615-66-7	0.3	0.03	NSF action level ¹ External peer review date: 04/20/2004

Table D2 – NSF International peer-reviewed drinking water criteria

Substance	CAS #	Total allowable concentration (TAC) mg/L	Single product allowable concentration (SPAC) mg/L	Source of supporting documentation
4-chloro-1,2-benzenediamine	95-83-0	0.2	0.02	NSF action level ¹ External peer review date: 04/20/2004
4-chloro-1,3-benzenediamine	5131-60-2	0.3	0.03	NSF action level ¹ External peer review date: 04/06/2005
4-chlorobenzo-trifluoride	98-56-6	0.3	0.03	NSF action level ¹ External peer review date: 04/07/2006
p-chloro-m-cresol	59-50-7	0.7	0.07	NSF action level ¹ External peer review date: 04/25/2002
Organics				
cyclohexanone	108-94-1	30	3	NSF action level ¹ External peer review date: 04/26/2002
2,2-dibromo-3-nitrilopropionamide	10222-01-2	0.4	0.09	NSF action level ¹ External peer review date: 04/20/2004
2,4-dichlorobenzoic acid	50-84-0	0.1	0.01	NSF action level ¹ External peer review date: 04/21/2004
dodecanedioic acid	693-23-2	30	30	NSF action level ¹ External peer review date: 10/07/2005
ethylenediamine	107-15-3	10	2	NSF action level ¹ External peer review date: 04/06/2005
2-ethylhexanoic acid	149-57-5	0.7	0.07	NSF action level ¹ External peer review date: 04/06/2005
furfural	98-01-1	0.2	0.02	NSF action level ¹ External peer review date: 09/03/2003
hexamethylene-diamine	124-09-4	10	1	NSF action level ¹ External peer review date: 04/06/2006
1(3H)-isobenzofuranone	87-41-2	0.01	0.01	NSF action level ¹ External peer review date: 04/06/2006
melamine	108-78-1	3.0	0.3	NSF action level ¹ External peer review date: 04/14/1999
methanol	67-56-1	20	2	NSF action level ¹ External peer review date: 04/06/2006

Table D2 – NSF International peer-reviewed drinking water criteria

Substance	CAS #	Total allowable concentration (TAC) mg/L	Single product allowable concentration (SPAC) mg/L	Source of supporting documentation
methyl 3-(3,5-di-tert-butyl-4-hydroxyphenyl) propionate and 3-(3,5-di-tert-butyl-4-hydroxyphenyl) propionic acid	6386-38-5 20170-32-5	0.02 (total)	0.002 (total)	NSF action level ¹ External peer review date: 04/20/04
methyl isoamyl ketone (MIAK)	110-12-3	0.06	0.006	NSF action level ¹ External peer review date: 04/25/2002
methyl isobutyl ketone (MIBK)	108-10-1	7	0.7	NSF action level ¹ External peer review date: 10/06/2005
oligomeric cyclic ethers CBEL (total OCE 3-6) OCE-3: 1,6,11-trioxacyclo-pentadecane OCE-4: 1,6,11,16-tetraoxacyclo-pentadecane OCE-5: 1,6,11,16,21-pentaoxacyclo-pentadecane OCE-6: 1,6,11,16,21,26-hexaoxacyclo-pentadecane	295-63-6 17043-02-6 56890-57-4 64001-05-4	3	0.4	NSF action level ¹ External peer review date: 10/04/2002
phenyl glycidyl ether	122-60-1	0.006	0.0006	NSF action level ¹ External peer review date: 10/03/2002
Organics				
di-propylene glycol n-butyl ether	29911-28-2	2	0.2	NSF action level ¹ External peer review date: 10/03/2002
propylene glycol n-butyl ether	5131-66-8	2	0.2	NSF action level ¹ External peer review date: 10/03/2002
2,4,4'-trichloro-2'-hydroxydiphenyl ether	3380-34-5	0.5	0.05	NSF action level ¹ External peer review date: 10/19/2000
triethyl citrate	77-93-0	4	0.4	NSF action level ¹ External peer review date: 11/05/2004

Revisions to NSF/ANSI 60-2005 are shown in this addendum as ~~crossouts~~ for deletions and **highlights** for additions.

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Addendum 1

Table D2 – NSF International peer-reviewed drinking water criteria

Substance	CAS #	Total allowable concentration (TAC) mg/L	Single product allowable concentration (SPAC) mg/L	Source of supporting documentation
1,3,5-trioxane	110-88-3	0.7	0.07	NSF action level ¹ External peer review date: 04/20/04
¹ NSF action levels have been derived according to the requirements of NSF/ANSI 60-2005, annex A.				

– concluded –

Table D3 – Drinking water criteria based on USEPA guidance concentrations

Substance	CAS #	Total allowable concentration (TAC) mg/L	Single product allowable concentration (SPAC) mg/L	Source of supporting documentation^{1, 2, 3}
Inorganics				
chromium III	16065-83-1	10	1	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Agency consensus date: 04/28/1998
chromium VI	18540-29-9	0.02	0.002	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Agency consensus date: 04/28/1998
manganese	7439-96-5	0.3	0.03	Derived from the oral RfD on the USEPA IRIS database, with a 3x modifying factor because of the large contribution from food sources and a default 20% relative source contribution for drinking water. Verification date: 05/12/1995
molybdenum	7439-98-7	0.04	0.004	USEPA Draft Health Advisory issue date: 1993
silver	7440-22-4	0.1	0.01	USEPA Lifetime Drinking Water Health Advisory Issue date: 1992
strontium	7440-24-6	4	0.4	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Verification date: 06/23/1992

Table D3 – Drinking water criteria based on USEPA guidance concentrations

Substance	CAS #	Total allowable concentration (TAC) mg/L	Single product allowable concentration (SPAC) mg/L	Source of supporting documentation^{1, 2, 3}
Organics				
acetone	67-64-1	6	0.6	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Agency consensus date: 05/29/03
acrolein	107-02-8	0.004	0.0004	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Agency consensus date: 05/16/2003
acrylic acid	79-10-7	4	0.4	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. verification date: 02/17/1994
acrylonitrile	107-13-1	0.0006	0.00006	USEPA IRIS 10 ⁻⁵ /10 ⁻⁶ cancer risk levels. verification date: 02/11/1987
benzyl chloride	100-44-7	0.002	0.0002	USEPA IRIS 10 ⁻⁵ /10 ⁻⁶ cancer risk levels. verification date: 03/01/1989
bromochloromethane	74-97-5	0.09	0.009	USEPA Lifetime Drinking Water Health Advisory issue date: 1989
bromomethane	74-83-9	0.01	0.001	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Verification date: 05/26/1988

Table D3 – Drinking water criteria based on USEPA guidance concentrations

Substance	CAS #	Total allowable concentration (TAC) mg/L	Single product allowable concentration (SPAC) mg/L	Source of supporting documentation ^{1, 2, 3}
Organics				
butylbenzyl phthalate	85-68-7	1	0.1	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Verification date: 06/15/1989
n-butanol	71-36-3	0.7	0.07	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Verification date: 05/14/1986
carbon disulfide	75-15-0	0.7	0.07	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Verification date: 08/05/1985
chloral hydrate	302-17-0	0.7	0.07	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Agency Consensus Date: 11/16/1999
1,4-dibromobenzene	106-37-6	0.07	0.007	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Agency Consensus Date: 05/15/1986
1,2-dibromoethane	106-93-4	0.0002	0.00002	USEPA IRIS $10^{-5}/10^{-6}$ cancer risk levels. Agency Completion Date: 07/26/2004
dichloroacetic acid	79-43-6	0.007	0.0007	USEPA IRIS $10^{-5}/10^{-6}$ upper bound risk levels. Agency Consensus Date: 08/20/2003
di-n-butyl phthalate	84-74-2	0.7	0.07	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Verification date: 01/22/1986

Table D3 – Drinking water criteria based on USEPA guidance concentrations

Substance	CAS #	Total allowable concentration (TAC) mg/L	Single product allowable concentration (SPAC) mg/L	Source of supporting documentation^{1, 2, 3}
Organics				
1,3-dichloropropene mixed isomers cis- trans-	542-75-6 10061-01-5 10061-02-6	0.004	0.0004	USEPA IRIS 10 ⁻⁵ /10 ⁻⁶ cancer risk levels. Agency Consensus Date: 04/20/2000
diethyl phthalate	84-66-2	6	0.6	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Verification date: 07/16/1987
2,4-dimethylphenol	105-67-9	0.1	0.01	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Verification date: 02/21/1990
2,6-dimethylphenol	576-26-1	0.004	0.0004	Derived from the oral RfD on the USEPA IRIS database with an default 20% relative source contribution for drinking water. verification date: 01/22/1986
3,4-dimethylphenol	95-65-8	0.007	0.0007	Derived from the oral RfD on the USEPA IRIS database with an default 20% relative source contribution for drinking water. verification date: 01/22/1986
dimethylterephthalate	120-61-6	0.7	0.07	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Verification date: 10/09/1985
diphenylamine	122-39-4	0.2	0.02	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Verification date: 07/22/1986
1,4-dithiane	505-29-3	0.07	0.007	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Verification date: 06/24/1992

Table D3 – Drinking water criteria based on USEPA guidance concentrations

Substance	CAS #	Total allowable concentration (TAC) mg/L	Single product allowable concentration (SPAC) mg/L	Source of supporting documentation ^{1, 2, 3}
Organics				
1,4-dioxane	123-91-1	0.03	0.003	USEPA IRIS 10 ⁻⁵ /10 ⁻⁶ cancer risk levels Verification date: 02/03/88
ethylene glycol	107-21-1	10	1	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. verification date: 03/19/1987
ethylene glycol monobutyl ether	111-76-2	4	0.4	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Agency Consensus Date: 11/16/1999
formaldehyde	50-00-0	1	0.1	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. verification date: 06/20/1990
1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin	35822-46-9	0.000003	0.0000003	Toxic Equivalency Factor: 0.01
1,2,3,4,6,7,8-heptachlorodibenzofuran	67562-39-4	0.000003	0.0000003	Toxic Equivalency Factor: 0.01
1,2,3,4,7,8,9-heptachlorodibenzofuran	55673-89-7	0.000003	0.0000003	Toxic Equivalency Factor: 0.01
hexabromobenzene	87-82-1	0.01	0.001	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. verification date: 11/06/1985
1,2,3,4,7,8-hexachlorodibenzo-p-dioxin	39227-28-6	0.0000003	0.00000003	Toxic Equivalency Factor: 0.1
1,2,3,7,8,9-hexachlorodibenzo-p-dioxin	19408-74-3	0.0000003	0.00000003	Toxic Equivalency Factor: 0.1
1,2,3,6,7,8-hexachlorodibenzo-p-dioxin	57653-85-7	0.0000003	0.00000003	Toxic Equivalency Factor: 0.1
1,2,3,4,7,8-hexachlorodibenzofuran	70648-26-9	0.0000003	0.00000003	Toxic Equivalency Factor: 0.1
1,2,3,7,8,9-hexachlorodibenzofuran	72918-21-9	0.0000003	0.00000003	Toxic Equivalency Factor: 0.1
1,2,3,6,7,8-hexachlorodibenzofuran	57117-44-9	0.0000003	0.00000003	Toxic Equivalency Factor: 0.1
2,3,4,6,7,8-hexachlorodibenzofuran	60851-34-5	0.0000003	0.00000003	Toxic Equivalency Factor: 0.1

Table D3 – Drinking water criteria based on USEPA guidance concentrations

Substance	CAS #	Total allowable concentration (TAC) mg/L	Single product allowable concentration (SPAC) mg/L	Source of supporting documentation ^{1, 2, 3}
Organics				
isopropylbenzene (cumene)	98-82-8	0.7	0.07	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Agency Consensus Date: 06/06/1997
methyl ethyl ketone (MEK)	78-93-3	4	0.4	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Agency Consensus Date: 09/10/2003
methyl mercury	22967-92-6	0.0007	0.00007	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Verification date: 06/19/2001
methyl methacrylate	80-62-6	10	1	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Agency Consensus Date: 11/25/1997
2-methyl naphthalene	91-57-6	0.03	0.003	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Agency Consensus Date: 12/11/2003
naphthalene	91-20-3	0.1	0.01	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Agency Consensus Date: 07/01/1998
nitroguanidine	556-88-7	0.7	0.07	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Verification date: 05/17/1989

Table D3 – Drinking water criteria based on USEPA guidance concentrations

Substance	CAS #	Total allowable concentration (TAC) mg/L	Single product allowable concentration (SPAC) mg/L	Source of supporting documentation^{1, 2, 3}
Organics				
N-nitroso-di-n-butylamine	924-16-3	0.00006	0.000006	USEPA IRIS 10 ⁻⁵ /10 ⁻⁶ cancer risk levels. Verification date: 10/29/86
N-nitroso-N-methylethylamine	10595-95-6	0.00002	0.000002	USEPA IRIS 10 ⁻⁵ /10 ⁻⁶ cancer risk levels. Verification date: 02/11/87
N-nitroso-di-N-propylamine	621-64-7	0.00005	0.000005	USEPA IRIS 10 ⁻⁵ /10 ⁻⁶ cancer risk levels. Verification date: 02/11/87
N-nitrosodiethanolamine	1116-54-7	0.0001	0.00001	USEPA IRIS 10 ⁻⁵ /10 ⁻⁶ cancer risk levels. Verification date: 01/28/87
N-nitrosodiethylamine	55-18-5	0.000002	0.0000002	USEPA IRIS 10 ⁻⁵ /10 ⁻⁶ cancer risk levels. Verification date: 10/29/86
N-Nitrosodimethylamine	62-75-9	0.000007	0.0000007	USEPA IRIS 10 ⁻⁵ /10 ⁻⁶ cancer risk levels. verification date: 10/29/86
N-nitrosodiphenylamine	86-30-6	0.07	0.007	USEPA IRIS 10 ⁻⁵ /10 ⁻⁶ cancer risk levels. Verification date: 02/11/87
N-nitrosopyrrolidine	930-55-2	0.0002	0.00002	USEPA IRIS 10 ⁻⁵ /10 ⁻⁶ cancer risk levels. Verification date: 10/14/86
1,2,3,4,6,7,8,9-octa-chlorodibenzo-p-dioxin	3268-87-9	0.0003	0.00003	Toxic Equivalency Factor: 0.0001
1,2,3,4,6,7,8,9-octachlorodibenzofuran	39001-02-0	0.0003	0.00003	Toxic Equivalency Factor: 0.0001
1,2,3,7,8-penta-chlorodibenzo-p-dioxin	40321-76-4	0.00000003	0.000000003	Toxic Equivalency Factor: 1
1,2,3,7,8-penta-chlorodibenzofuran	57117-41-6	0.0000006	0.00000006	Toxic Equivalency Factor: 0.05
2,3,4,7,8- penta-chlorodibenzofuran	57117-31-4	0.00000006	0.000000006	Toxic Equivalency Factor: 0.5
pentachloronitrobenzene	82-68-8	0.02	0.002	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Verification date: 04/15/1987

Table D3 – Drinking water criteria based on USEPA guidance concentrations

Substance	CAS #	Total allowable concentration (TAC) mg/L	Single product allowable concentration (SPAC) mg/L	Source of supporting documentation ^{1, 2, 3}
Organics				
phenol	108-95-2	2	0.2	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Agency Consensus Date: 08/28/2002
m-phenylenediamine	108-45-2	0.04	0.004	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Verification date: 02/26/1986
phthalic anhydride	85-44-9	10	1	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Verification date: 02/24/1988
propylene oxide	75-56-9	0.001	0.0001	USEPA IRIS 10 ⁻⁵ /10 ⁻⁶ cancer risk levels. verification date: 04/05/1990
quinoline	91-22-5	0.0001	0.00001	USEPA IRIS 10 ⁻⁵ /10 ⁻⁶ cancer risk levels. Agency Consensus Date: 09/21/2001
sodium diethyldithiocarbamate	148-18-5	0.2	0.02	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Verification date: 10/09/1985
2,3,7,8-tetra-chlorodibenzo-p-dioxin	1746-01-6	0.00000003	0.000000003	Toxic Equivalency Factor: 1
2,3,7,8-tetrachlorodibenzofuran	51207-31-9	0.00000003	0.000000003	Toxic Equivalency Factor: 0.1
1,1,1,2-tetrachloroethane	630-20-6	0.01	0.001	USEPA IRIS 10 ⁻⁵ /10 ⁻⁶ cancer risk levels. verification date: 05/04/1988
1,1,2,2-tetrachloroethane	79-34-5	0.002	0.0002	USEPA IRIS 10 ⁻⁵ /10 ⁻⁶ cancer risk levels. verification date: 06/26/1986
1,2,4-tribromobenzene	615-54-3	0.04	0.004	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Verification date: 05/15/1986

Table D3 – Drinking water criteria based on USEPA guidance concentrations

Substance	CAS #	Total allowable concentration (TAC) mg/L	Single product allowable concentration (SPAC) mg/L	Source of supporting documentation ^{1, 2, 3}
Organics				
tributyltin oxide	56-35-9	0.002	0.0002	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Agency Consensus date: 07/02/1997
trichlorofluoromethane	75-69-4	2	0.2	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Verification date: 05/31/1985
1,2,3-trichloropropane	96-18-4	0.04	0.004	USEPA Lifetime Drinking Water Health Advisory issue date: 1989
1,3,5-trinitrobenzene	99-35-4	0.2	0.02	Derived from the oral RfD on the USEPA IRIS database with a default 20% relative source contribution for drinking water. Verification date: 08/27/1997

¹ Criteria are derived from the oral RfD on the USEPA IRIS database as follows:

$$\text{Oral RfD (mg /kg-d)} \times (70 \text{ kg} / 2 \text{ L/d}) \times \text{relative source contribution factor} = \text{TAC (mg/L)}$$

where:

70 kg = assumed adult body weight

2 L/d = assumed adult water consumption

relative source contribution factor = percentage of daily exposure to the substance represented by drinking water (default value is 20%)

Other criteria have been used directly, unless otherwise noted.

² The IRIS verification date represents the date the oral RfD or the cancer risk assessment was peer-reviewed by the USEPA. Refer to the online IRIS database for the complete update and revision history of the IRIS files: (<http://www.epa.gov/ngispgm3/iris/subst>).

³ Toxic Equivalency Factors (TEFs) have been established as a means to compare the potency of 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) to individual congeners of polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), and polychlorinated biphenyls (PCBs). The USEPA uses an approach to dioxin risk assessment methodology in which levels of dioxins and furans are analytically determined, the concentration of each congener is multiplied by its respective TEF value, and all the products are totaled to a single 2,3,7,8-TCDD equivalent.

Van den Berg et al. 1998. Toxic Equivalency Factors (TEFs) for PCBs, PCDDs, PCDFs for Humans and Wildlife. Environmental Health Perspectives 106(12):775:792. Available from Brogan and Partners, 401 Westchase Blvd., Ste 150 Raleigh NC 27607.

U. S. Environmental Protection Agency. 2000. Chapter 9: Toxic Equivalency Factors (TEFs) for Dioxin and Related Compounds. From Exposure and Human Health Risk Assessment of 2,3,7,8-Tetrachlorodibenzo-p-Dioxin (TCDD) and Related Compounds. Part II: Health Assessment for 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) and Related Compounds. NCEA-I-0386. September 2000. SAB Review Draft. <http://www.epa.gov/ncea/pdfs/dioxin/part2/fm-chap9.pdf>

– concluded –

Table D4 – Threshold of evaluation chemicals¹

Substance	CAS #
Inorganics	
gallium	007440-55-3
hafnium	007440-58-6
tungsten	007440-33-7
tantalum	007440-25-7
yttrium	007440-65-5
Organics	
acenaphthylene	000208-96-8
acetamide, 2,2-dibromo	000598-70-9
acetic acid, propyl ester	000109-60-4
acetophenone, 2,2-dimethoxy-2-phenyl-	024650-42-8
acetophenone, p-isopropyl-	000645-13-6
acetophenone, 2'-methyl-	000577-16-2
acetophenone, 4-methyl	000122-00-9
acetophenone, alpha-hydroxy-	000582-24-1
acetophenone, 3'-methyl-	000585-74-0
acetophenone, 4'-isopropenyl	005359-04-6
acetophenone, 4'-hydroxy-	000099-93-4
acridine	000260-94-6
adipic acid, monomethyl ester	000627-91-8
alcohols, C12-C15, ethoxylated propoxylated	068551-13-3
allyl ether	000557-40-4
allyl phenol ether	001746-13-0
aminopiperidine, 4, 2,2,6,6-tetramethyl-	036768-62-4
aminoundecanoic acid, 12-	000693-57-2
ammonium chloride, octadecyldimethyl{3-(trimethoxysilyl)propyl}	027668-52-6
benzaldehyde azine	000588-68-1
benzaldehyde, 3,5-di-tert-butyl-4-hydroxy-	001620-98-0
benzaldehyde, 4-hydroxy-3-methoxy (Vanillin)	000121-33-5
benzaldehyde, 3,5-dimethoxy-4-hydroxy-	000134-96-3
benzaldehyde, 2-hydroxy-	000090-02-8
benzaldehyde, 2-hydroxy-4-methoxy	000673-22-3
benzaldehyde, hydroxymethoxy-	106799-60-4
benzaldehyde, 2-methyl-	000529-20-4
benzaldehyde, 3-methyl-	000620-23-5
benzaldehyde, 4-methyl-	000104-87-0
benzaldehyde, 2-, 3-, 4-methyl- mixed isomers	001334-78-7
benzaldehyde, tert-butylmethyl-	066949-23-3
benzene, 1-chloro-2-(trifluoromethyl)-	000088-16-4
benzene, 1-chloro-3-(trifluoromethyl)-	000098-15-7
benzene, 1,2,3-trichloro-	000087-61-6
benzene, (1,1-dimethylethoxy)-	006669-13-2
benzene, 1,1'-[(1-propenylthio)methylene]bis-, (Z)-	056195-66-5
benzene, 2-ethoxyethenyl-	017655-74-2
benzene, (2-methoxy-1-methylethyl)-	065738-46-7
benzene, divinyl-	001321-74-0
benzene, (1-methoxy-1-methylethyl)-	000935-67-1
benzene, 1,1-oxybis-	000101-84-8
benzene, 1,3-dimethyl-5-isopropyl-	004706-90-5
benzene, 4,6-diisopropyl-1,3-dimethyl-	005186-68-5

Table D4 – Threshold of evaluation chemicals¹

Substance	CAS #
benzeneacetaldehyde	000122-78-1
benzeneacetic acid, alpha-oxo-, methyl ester	015206-55-0
benzeneamine, 4-(1-methylethyl)-N-phenyl-	005650-10-2
benzenediamine, ar,ar-diethyl-ar-methyl	068479-98-1
benzenediamine, 5-chloro-1,3-	033786-89-9
Organics	
benzenedimethanol, a,a,a',a'-tetramethyl-1,4-	002948-46-1
benzenedimethanol, a,a,a',a'-tetramethyl-1,3-	001999-85-5
benzenemethanamine, 1,3-	001477-55-0
benzenemethanamine, N-(phenylmethylene)-	000780-25-6
benzenemethanol, 4-(1-methylethyl)-	000536-60-7
benzenepropanoic acid, 3,5-bis(1,1-dimethylethyl)-4-hydroxy-	020170-32-5
benzenesulfonamide, 4-methyl-	000070-55-3
benzenesulfonyl isocyanate, 4-methyl	004083-64-1
benzenetricarboxylic acid, 1,2,4-	000528-44-9
benzimidazolone, 3-methyl-2-	001849-01-0
benzimidazolone, 4-methyl-	019190-68-2
benzothiazolin-3-one	002634-33-5
benzofuran, methyl-	025586-38-3
benzoic acid, 2-cyano-	003839-22-3
benzoic acid, 2,5-dichloro-	000050-79-3
benzoic acid, 3,4-dichloro-	000051-44-5
benzoic acid, mixed isomers (2,4- or 2,5-dichloro-)	035915-19-6
benzoic acid, m-methyl-	000099-04-7
benzoic acid, o-methyl-	000118-90-1
benzoic acid, p-methyl-	000099-94-5
benzoic acid, 4-tert-butyl-	000098-73-7
benzonitrile	000100-47-0
benzoquinone, 2,6-dimethyl-1,4-	000517-61-7
benzoquinone, 2,6-di-t-butyl-	000719-22-2
benzoquinone, 2,5-di-tert-pentyl-p-	004584-63-8
benzothiazole	000095-16-9
benzothiazole, 2-(cyclohexylamino)-	028291-75-0
benzothiazole, ethylamino-	028291-69-2
benzothiazole, 2-(methylmercapto)-	000615-22-5
benzothiazole, 2-methyl-	000120-75-2
benzothiazole, 2-(morpholiniothio)-	000102-77-2
benzothiazole-2-thione, N-methyl-	002254-94-6
benzotriazole, 2-(2-hydroxy-5-methyl-phenyl)-	002440-22-4
benzothiazolinone, 2-	000934-34-9
benzotropilidene, 3,4-	000264-09-5
benzoxazole, N-methyl-2-	019776-98-8
benzyl ethyl ether	000539-30-0
benzyl alcohol, 4-ethoxy	006214-44-4
benzyl alcohol, alpha, alpha, 4-trimethyl-	001197-01-9
benzyl alcohol, a,a-dimethyl-p-isopropyl-	003445-42-9
benzylamine	000100-46-9
benzylamine, N,N-dimethyl-	000103-83-3
benzylidiphenylphosphine oxide	002959-74-2
binaphthyl sulfone	032390-26-4

Table D4 – Threshold of evaluation chemicals¹

Substance	CAS #
bisphenol A bis(polypropylene glycol) ether	037353-75-6
bisphenol F diglycidyl ether	002095-03-6
borneol	000507-70-0
bromobenzene	000108-86-1
bromophenol	032762-51-9
bromophenol, 2-	000095-56-7
bromophenol, 3-	000591-20-8
bromophenol, 4-	000106-41-2
Organics	
1-butanamine,N,N-dibutyl-	000102-82-9
butanedioic acid	000110-15-6
butanediol diglycidyl ether, 1,4-	002425-79-8
butanediol dimethacrylate, 1,4-	002082-81-7
butanenitrile	000109-74-0
butanetricarboxylic acid, 2-phosphono-, 1,2,4-	037971-36-1
butanoic acid	000107-96-2
butanoic acid, 3,3-dimethyl-	001070-83-3
butanone, 1-phenyl-2-	001007-32-5
buten-1-ol, 2-methyl-2-	004675-87-0
buten-1-ol, 3-methyl-2-	000556-82-1
buten-1-ol, 3-methyl-3-	000763-32-6
butenal, methyl-	001115-11-3
butene, 2,3-dichloro-2-methyl-	000507-45-9
butenoic acid, trans-2-	000107-93-7
butenoic acid, 2-	003724-65-0
butenoic acid, 3-	000625-38-7
butyl isocyanate, n-	000111-36-4
butylamine, N-butyldiene	004853-56-9
carbodiimide, di-t-butyl-	000691-24-7
carbonic acid, diisopropyl ester	006482-34-4
chloroethane, 1-butoxy-2-	010503-96-5
chlorotoluene, p-	000106-43-4
cinnamate, 2-ethylhexyl-4-methoxy-	005466-77-3
cyanovaleic acid, 4-	unknown
cyclododecane	000294-62-2
cyclohexadecane	000295-65-8
cyclohexadiene-1-one, 2,6-(1,1-dimethylethyl)-4-methylene-2,5-	002607-52-5
cyclohexadiene-1-one, 2,6-di-tert-butyl-4-hydroxy-4-methyl-2,5-	010396-80-2
cyclohexanamine, 4,4'-methylene-bis-	001761-71-3
cyclohexanamine, N-methyl-	000100-60-7
cyclohexanamine, N-cyclohexyl-	000101-83-7
cyclohexanamine, N,N-dimethyl-	000098-94-2
cyclohexenecarbonitrile	027456-25-3
cyclohexanedimethanamine, 1,3-	002579-20-6
cyclohexane, cis-1-methyl-4-isopropyl-	006069-98-3
cyclohexane, 1-isopropyl-4-methyl-	000099-82-1
cyclohexanemethanol, trans-alpha,alpha,4-trimethyl-	005114-00-1
cyclohexane, methyl-	000108-87-2
cyclohexanol	000108-93-0
cyclohexanol, 3-methyl-	000591-23-1

Table D4 – Threshold of evaluation chemicals¹

Substance	CAS #
cyclohexanol, trimethyl-	001321-60-4
cyclohexanol, 4-tert-butyl-	000098-52-2
cyclohexanone, 2-hydroxy	000533-60-8
cyclohexanone, 2-(1-hydroxycyclohexyl)-	028746-99-8
cyclohexen-1-one, 3-methyl-2-	001193-18-6
cyclohexene, 4-cyano also (1-cyano-3-cyclohexene)	000100-45-8
cyclohexyl isocyanate	003173-53-3
cyclohexylurea, dimethyl-	031468-12-9
cyclopentane, trimethyl	030498-64-7
Organics	
cyclopentanol, 2-methyl-	024070-77-7
cyclopentanone	000120-92-3
cyclopentylcyclopentanone, 2-	004884-24-6
decadien-1-al, trans,trans-2,4-	025152-84-5
decadienal, 2,4-	002363-88-4
decamethylcyclopentasiloxane	000541-02-6
decanamide, N,N-dimethyl-	014433-76-2
decanedioic acid, bis(2,2,6,6-tetramethyl-4-piperidinyl)-	052829-07-9
decanedioic acid, dimethyl ester	000106-79-6
decanoic acid, methyl ester	000110-42-9
decylamine, n-	002016-57-1
dehydroabiatic acid	001740-19-8
dehydroacetic acid	000520-45-6
di-o-tolylguanidine, 1,3-	000097-39-2
diazacyclotetradecane-2,9-dione, 1,8-	056403-09-9
dibenzylamine	000103-49-1
dibenzyl ether	000103-50-4
dibutyl cyanamide, N,N-	002050-54-6
1,3-dicyclohexylurea	002387-23-7
diethylene glycol monomethacrylate homopolymer	027598-43-2
diethyleneglycol monophenyl ether	000104-68-7
diethylurea, 1,3-	000623-76-7
diglycol chlorohydrin	000628-89-7
dihydro-5-pentyl-2(3H)-furanone	000104-61-0
dihydrobenzofuran, 2,3-	000496-16-2
dihydrofuran, 4-methyl-2,3-	034314-83-5
dihydromethoxymethyl oxopyridinecarbonitrile	000524-40-3
dihydromethyl benzimidazolone	005400-75-9
dimethyl ditallow ammonium chloride	068783-78-8
dimethyl glutarate	001119-40-0
dimethyl succinate	000106-65-0
dimethyl thioacetamide	000631-67-4
dimethyl-3,3'-thiobispropionate	004131-74-2
dimethyl-p-benzoquinone, 2,5-	000137-18-8
dimethylaminopyridine	001122-58-3
dimethylbenzaldehyde, 2,4-	015764-16-6
dimethylbenzaldehyde, 2,5	005779-94-2
dimethylbenzaldehyde, 3,4-	005973-71-7
dimethylcyanamide	001467-79-4
dimethyldiphenyl sulphone	005097-12-1

Table D4 – Threshold of evaluation chemicals¹

Substance	CAS #
dimethyldithiocarbamate, methyl	003735-92-0
dimethyldodecanamide, N,N-	003007-53-2
dimethylhexane-2,5-diol, 2,5-	000110-03-2
dioctyldiphenylamine	026603-23-6
dioxacyclododecane-7,12-dione, 1,6-	000777-95-7
dioxadithionane, 1,3,6,7-	005980-67-6
dioxathiocane, 1,3,6-	002094-92-0
dioxolane-1,3, 4-ethyl	029921-38-8
diphenylamine, 4-hydroxy-	000122-37-2
Organics	
diphenyl sulfide	000139-66-2
diphenylamine, 4-(diisopropylamino)	064092-29-1
diphenylethanedione, 1,2-	000134-81-6
dipropylamine, 3,3'-diamino-	000056-18-8
dithiolane-2-thione, 1,3-	000822-38-8
docosane	000629-97-0
docosenamide (erucamide)	000112-84-5
dodecamethylcyclohexasiloxane	000540-97-6
dodecanamide	001120-16-7
dodecanamine, 1-	000124-22-1
dodecylamine, N,N-dimethyl-	000112-18-5
dodecyl glycidyl ether	002461-18-9
ethane, 1,2-diphenoxy-	000104-66-5
ethan-1-one, 1-(methylphenyl)-	026444-19-9
ethane, 1-(3-hydroxyphenyl)-2-phenyl-	033675-75-1
ethanediamide, N-(2-ethoxyphenyl)-N'-(2-ethylphenyl)-	023949-66-8
ethanol, 2-[2-[2-[2[(1,1,3,3-tetramethylbutyl)phenoxy]ethoxy]ethoxy]-	049796-75-0
ethanol, 2-[2-[2-[(1,1,3,3-tetramethylbutyl)phenoxy]ethoxy]ethoxy]-	058705-51-4
ethanol, 2-[2-[4-(1,1,3,3-tetramethylbutyl)phenoxy]ethoxy]-	002315-61-9
ethanol, 2-(4-methoxyphenoxy) -	005394-57-0
ethanone, 1-[4-(ethoxymethyl)phenyl]-	093205-94-8
ethanone, 1-(4-hydroxy-3-methoxyphenyl)-	000498-02-2
ethanone, 1-(4-(1-hydroxy-1-methylethyl)phenyl)-	054549-72-3
ethanone, 1-[3-(methoxymethyl)phenyl]-	112766-37-7
ethanone, 1-[4-(methoxymethyl)phenyl]-	022072-50-0
ethyl hydroxyphthalide	000485-26-7
ethylbenzene acetate	000101-97-3
ethylcyclopentanone	004971-18-0
ethylene glycol dimethacrylate	000097-90-5
ethylene glycol monoethyl ether acetate	000111-15-9
fenchyl alcohol	001632-73-1
fenchyl alcohol, alpha-	000512-13-0
fenchyl alcohol, alpha-	014575-74-7
fluorenone	000486-25-9
formamide, N,N-diethyl-	000617-84-5
formamide, N-methyl-N-phenyl-	000093-61-8
formamide, N-cyclohexyl-	000766-93-8
formamide, N-(1,1-dimethylethyl)-	002425-74-3
formamide, N,N-dimethylthio-	000758-16-7
formamide, N,N-di-n-butyl-	000761-65-9

Table D4 – Threshold of evaluation chemicals¹

Substance	CAS #
formamidine, N,N-dimethyl-N'-cyclohexyl-	003459-75-4
formylcyclopentene, 1-	006140-65-4
furan, tetrahydro-2,2,5,5-tetramethyl-	015045-43-9
furaric acid, bis(2-ethylhexyl) ester	000141-02-6
furfural, 5-methyl	000620-02-0
furylmethylketone, 5-methyl-2-	001193-79-9
geraniol	000106-24-1
glutaraldehyde	000111-30-8
glycidyl ether, 2-methylphenyl-	002210-79-9
guanidine, 1,2,3-triphenyl-	000101-01-9
heneicosane	000629-94-7
heptacosane	000593-49-7
heptadecanoic acid, 16-methyl-, methyl ester	005129-61-3
heptyl aldehyde, n-	000111-71-7
hexacosane	000630-01-3
Organics	
hexanoic acid, 2-ethyl-, methyl ester	000816-19-3
hexanoic acid, methyl ester	000106-70-7
hex-1-ene, 2-ethyl-	001632-16-2
hex-2-en-1-ol, cis-	000928-94-9
hex-2-en-1-ol, trans-	000928-95-0
hex-5-en-1-ol	000821-41-0
hexadecanamide	000629-54-9
hexadecanamide, N,N-dimethyl-	003886-91-7
hexadecene-1	000629-73-2
hexamethylene oxide	000592-90-5
hexamethylene dibenzamide	005326-21-6
hexamethyleneimine, 1-ethyl-	006763-91-3
hexamethylene oxide	000592-90-5
hexanal, 2-ethyl-	000123-05-7
hexanal	000066-25-1
hexanamine, 2-	005329-79-3
hexane, 2,5-dimethyl-	000592-13-2
hexane-2,5-dione	000110-13-4
hexaoxacyclotriacontane, 1,6,11,16,21,26-	064001-05-4
hexen-2-one, 3-, 3,4-dimethyl-	020685-46-5
hexen-2-one, 4-, 3,4-dimethyl-	053252-21-4
hexen-2-one, 3-methyl-4-	072189-24-3
hexen-2-one, 5-methyl-3-	005166-53-0
hexen-2-one, 5-methyl-5-	003240-09-3
hexyne-2,5-diol, 2,5-dimethyl-3-	000142-30-3
hydrocinnamic acid	006386-38-5
hydroxydiphenylamine, 3-	000101-18-8
hydroxypropyl methacrylate, 2-	000923-26-2
icosane	000112-95-8
imidazole, methylphenyl-	000670-91-7
indan-1-ol	006351-10-6
indan-1-one	000083-33-0
indene, 1H-, 2,3-dihydro-1-methyl-	000767-58-8
indene, 1H-, 2,3-dihydro-4-methyl-	000824-22-6

Table D4 – Threshold of evaluation chemicals¹

Substance	CAS #
indene, 1H-, 2,3-dihydro-5-methyl-	000874-35-1
indene, 2,3-dihydro- also (2,3-dihydro-1H-)	000496-11-7
indene	000095-13-6
isoalkanes, C9-C12	090622-57-4
isobutylene	000115-11-7
isobutyramide	000563-83-7
isobutyric acid	000079-31-2
isobutyronitrile	000078-82-0
isocrotonic acid	000503-64-0
isoindole, 2H-, 4,7-dione	056460-94-7
isophorone diamine	002855-13-2
Isovanillin	000621-59-0
laurolactam	000947-04-6
maleic anhydride, 2,3-dimethyl-	000766-39-2
mephenesin	000059-47-2
Organics	
methacrylate, lauryl-	000142-90-5
methacrylic acid, 2-hydroxyethyl ester	000868-77-9
methacrylic acid, 3-(trimethylsilyl)propyl ester	002530-85-0
methane, chlorodifluoro-	000075-45-6
methane, di-t-butoxy	002568-93-6
methane, di-t-butyl-	001070-87-7
methoxybenzene	000100-66-3
methyl anthranilate	000134-20-3
methylcarbamate, methyl N-butyl-N-	054644-60-9
methylcoumarin, 7-diethylamino-4-	000091-44-1
methyl palmitate	000112-39-0
methyl laurate	000111-82-0
methyl salicylate	000119-36-8
methyl stearate	000112-68-1
methyl-4-isopropyl cyclohexane, trans-1-	001678-82-6
methyldiethyl carbamate	004652-44-2
methylene bis(4-methyl-6-tertbutyl-phenol), 2,2'	000119-47-1
2,2'-methylenediphenol	002467-02-9
4,4'-methylenediphenol	000620-92-8
methylenephenethyl alcohol, beta-	006006-81-1
methylindene	029036-25-7
methylpiperidine, 1-	000626-67-5
methylthioacetone nitrile	035120-10-6
morpholine, methyl-	000109-02-4
morpholine, 4-dodecyl-	001541-81-7
morpholinecarbaldehyde, 4-	004394-85-8
morpholinecarboxamide, N-cyclohexyl-4-	003417-54-7
morpholinepropanenitrile, 4-	004542-47-6
N-butyl formamide	000871-71-6
N-isopropyl-2-methyl-2-propyl-1,3-propanediol dicarbamate	000078-44-4
naphthalene, dimethyl-	028804-88-8
naphthalene, 1,2-dimethyl-	000573-98-8
naphthalene, 1,3-dimethyl-	000575-41-7
naphthalene, 1,4-dimethyl-	000571-58-4

Table D4 – Threshold of evaluation chemicals¹

Substance	CAS #
naphthalene, 1,5-dimethyl-	000571-61-9
naphthalene, 1,7-dimethyl-	000575-37-1
naphthalene, 1,8-dimethyl-	000569-41-5
naphthalene, 2,3-dimethyl-	000581-40-8
naphthalene, 2,6-dimethyl-	000581-42-0
naphthalene, 2,7-dimethyl-	000582-16-1
naphthalene, 1-ethyl-	001127-76-0
naphthalene, 2-ethyl-	000939-27-5
naphthalene, ethyl	027138-19-8
nonacosane	000630-03-5
nonanal	000124-19-6
nonanoic acid, 9-oxo-	002553-17-5
nonanoic acid, n-	000112-05-0
norbornene, 5-ethylidene-2-	016219-75-3
octacosane	000630-02-4
octadecadienoic acid, (Z,Z)-9,12-, butyl ester	002634-45-9
Organics	
octadecane, n-	000593-45-3
octadecenoic acid, 6(Z), methyl ester	002777-58-4
octadecenoic acid, 6-, methyl ester	052355-31-4
octadecenoic acid, 7-, methyl ester	057396-98-2
octadecenoic acid, 9(E)-, methyl ester	001937-62-8
octadecenoic acid, 9(Z)-, methyl ester	000112-62-9
octadecenoic acid, 9-, methyl ester	002462-84-2
octadecenoic acid, 10-, methyl ester	013481-95-3
octadecanamide	000124-26-5
octadecenamide	000301-02-0
octadecene, 1-	000112-88-9
octadien-1-ol, 3,7-dimethyl-2,6-	000624-15-7
octadien-2-ol, 2,6-dimethyl-5,7-	005986-38-9
octadien-3-ol, 2,6-dimethyl-1,7-	022460-59-9
octadien-3-ol, 3,7-dimethyl-1,6-	000078-70-6
octadien-3-ol, 3,7-dimethyl-4,6-	018479-54-4
octanal	000124-13-0
octanoate, methyl-	000111-11-5
octaphenyl pentaethylene glycol ether, tert-	038621-31-7
octen-3-ol, 1-	003391-86-4
octylphenoxy-pentaethoxyethanol, tert-	037809-81-7
oleate, n-butyl-	000142-77-8
oxabicyclo (4.1.0) heptane-3-carboxylic acid, 7-	002386-87-0
oxamide, di-tert-butyl-	037486-48-9
oxaspirodecadienedione, di-(t-butyl)	082304-66-3
oxirane, [(dodecyloxy)methyl]-	002461-18-9
oxybis(propanenitrile)	001656-48-0
palmitate, isopropyl-	000142-91-6
palmitic acid, n-butyl ester	000111-06-8
pentacosane	000629-99-2
pentane, 1-amino	000110-58-7
pentanediol, 2,2,4-trimethyl-1,3-	000144-19-4
pentanenitrile	000110-59-8

Table D4 – Threshold of evaluation chemicals¹

Substance	CAS #
pentaoxacyclopentacosane, 1,6,11,16,21-	056890-57-4
pentenal, trans-2-	001576-87-0
penten-2-ol, 3-	001569-50-2
penten-2-one, 3,4-dimethyl-3-	000684-94-6
peroxide, tert-butyl-	000110-05-4
phenanthrene	000085-01-8
phenol, 4-ethoxy-	000622-62-8
phenol, o-(1-phenylethyl)-	004237-44-9
phenol, (phenylethyl)-	051937-33-8
phenol, o-(alpha, alpha-dimethylbenzyl)-	018168-40-6
phenol, p-(alpha, alpha-dimethylbenzyl)-	000599-64-4
phenol, p-phenylethyl-	006335-83-7
phenol, 4-(2-propenyl)-	000501-92-8
phenol, 3,5-dibenzyl-2,4,6-trimethyl-	unknown
phenol, 2,6-di-t-butyl-4-methoxy-	000489-01-0
phenol, 2,2'-methylenebis (6-tert-butyl)-4-ethyl-	000088-24-4
Organics	
phenol, 4-(1-phenylethyl)-	001988-89-2
phenol, 2-allyl-	001745-81-9
phenothiazine	000092-84-2
phenoxypropanol, 1- (or 2-)	041593-38-8
phenyl isothiocyanate	000103-72-0
phenyl-1-buten-4-ol, 4-	000936-58-3
phenylbutane, 2-	000135-98-8
phenylene) bis-ethanone, 1,1'-(1,4-	001009-61-6
phenylene) bis-ethanone, 1,1'-(1,3-	006781-42-6
phenylenediamine, N,N-bis(1,3-dimethylbutyl)-N'-phenyl-p-	019929-72-7
2,2'-p-phenylenedioxydiethanol	000104-38-1
phenylethanol, 2-	000060-12-8
(phenylimino) cyclohexadiene	002406-04-4
phenylindan, 1,1,3-trimethyl-3-	003910-35-8
phorone	000504-20-1
phosphate, diphenyl-2-ethylhexyl-	001241-94-7
phosphonic acid, (nitrilotris(methylene))tri-, pentasodium	002235-43-0
phthalide [also 1(3H)-isobenzofuranone]	000087-41-2
pinanol	000473-54-1
pinanol (or cis-2-pinanol)	004948-28-1
pinanol, trans-2-	004948-29-2
pinocampeol (also pinocamphone)	000547-60-4
piperazine, 1-(2-aminoethyl)-	000140-31-8
piperidine, 1-formyl	002591-86-8
piperidine, 2-propyl-	000458-88-8
piperidinol, 1,2,2,6,6-pentamethyl-4-	002403-89-6
piperidinol, 2,2,6,6-tetramethyl-4-	002403-88-5
piperidone, 2-	000675-20-7
poly(oxy-1,2-ethanediyl), a-isotridecyl-w-hydroxy-, phosphate	073038-25-2
propanal, 2,2-dimethyl-3-hydroxy-	000597-31-9
propanaminium chloride, N,N,N-trimethyl-3-((1-oxo-2-propenyl)amino)-1-	045021-77-0
propane, 1,1-dimethoxy-2-methyl	041632-89-7
propanediol, 2-ethyl-2-butyl-1,3-	000115-84-4

Table D4 – Threshold of evaluation chemicals¹

Substance	CAS #
propanenitrile, 3-(diethylamino)-	005351-04-2
propanenitrile, 3,3'-oxybis-	001656-48-0
propanenitrile, 3,3'-thiobis-	000111-97-7
propanoic acid, 2-methyl-, 1-(1,1-dimethylethyl)-2-methyl-1,3-propanediyl ester	074381-40-1
propanoic acid, 3-ethoxy-, ethyl ester	000763-69-9
propanoic acid, ethyl ester	000105-37-3
propanoic acid, 2,2-dimethyl-	000075-98-9
propanoic acid, 2-methyl-, 3-hydroxy-2,4,4-trimethylpentyl ester	000077-68-9
propanoic acid, 2-methyl-, 3-hydroxy-2,4,4-trimethylpentyl ester	074367-34-3
propanoic acid, 2-methyl-, 2,2-dimethyl-1-(2-hydroxy-1-methylethyl)propyl ester	074367-33-2
propanol, 1-amino-2 -	000078-96-6
propanol, 1-[4-(1,1-dimethylethyl)phenoxy]-2-	002416-30-0
propanol, 1-phenoxy 2-	000770-35-4
propanol, phenyl-1-	001335-12-2
propanol, 1-propoxy-2-	001569-01-3
propanone, 1-phenyl-1-	000093-55-0
Organics	
propanone, 1-, 2-hydroxy-2-methyl-1-phenyl-	007473-98-5
propenoic acid, 2-methyl-2-, polymer with octadecyl-2-methyl-2-propenoate	027401-06-5
propenone, (dihydroxy methoxyphenyl) phenyl-	018956-15-5
pyrazine, 2-methyl-	000109-08-0
pyrene	000129-00-0
pyridine, 2-methyl-	000109-06-8
pyridine, 2,4-dimethyl-	000108-47-4
pyridine, trimethyl-	029611-84-5
pyridine, 2,4,6-trimethyl-	000108-75-8
pyridine, 1,2,3,4-tetrahydro-1,2,2,6-tetramethyl-	063867-76-5
pyridine, 1,2,3,6-tetrahydro-1,2,3,4-tetramethyl-	090949-18-1
pyridine, 1,2,3,6-tetrahydro-1,2,4,5-tetramethyl-	090949-19-2
pyridine, 1,2,3,6-tetrahydro-1,2,4,6-tetramethyl-, cis-	023513-16-8
pyridine, 1,2,3,6-tetrahydro-1,3,3,6-tetramethyl-	122913-54-6
pyridine, 1,2,3,6-tetrahydro-1,4,5,6-tetramethyl-	090949-20-5
pyridine, 1,2,3,6-tetrahydro-2,2,2,6-tetramethyl-	001124-69-2
pyridine, 1,2,5,6-tetrahydro-2,2,5,5-tetramethyl-	155904-89-5
pyridine, 2,3,4,5-tetrahydro-2,2,4,6-tetramethyl-	200561-41-7
pyrrolidine	000123-75-1
pyrrolidinone, 1-decyl-2-	055257-88-0
quinoline, 3,4-dihydro-2,4,4-trimethyl-	063177-93-5
sodium p-sulfophenyl methallyl ether	001208-67-9
soya alkylamines, ethoxylated	061791-24-0
squalene	007683-64-9
stearic acid, butyl ester	000123-95-5
styrene, alpha-methyl-	000098-83-9
styrene, methyl- (mixed isomers)	025013-15-4
sulfonylbis(4-methyl)-benzene, 1,1'	000599-66-6
terephthalic acid, monomethyl ester	001679-64-7
terpineol, alpha-	000098-55-5
tert-butylamine	000075-64-9
tetracosane	000646-31-1

Table D4 – Threshold of evaluation chemicals¹

Substance	CAS #
tetradecamethylcycloheptasiloxane	000107-50-6
tetradecanamide	000638-58-4
tetradecanamine, 1-	002016-42-4
tetradecane	001120-36-1
tetraethyleneglycol di-(2-ethylhexoate)	018268-70-7
tetraethyleneglycol dimethacrylate	000109-17-1
tetrahydrofuran, diphenyl-	050637-09-7
tetrahydrofurfuryl alcohol	000097-99-4
tetrahydropyridine, 2,3,4,5-	000505-18-0
tetramethyl urea	000632-22-4
tetramethyldec-5-yne-4,7-diol, 2,4,7,9-	000126-86-3
tetramethyldecynediol	001333-17-1
2,6,10,14-tetramethylhexadecane	000638-36-8
tetramethylpyrazine, 2,3,5,6-	001124-11-4
tetramethylsuccinonitrile	003333-52-6
tetraoxacycloeicosane, 1,6,11,16-	017043-02-6
Organics	
tetrathiacyclooctadecane, 1,3,10,12-tetraoxa-6,7,15,16-	099634-55-6
4,4'-thiobis-(6-t-butyl-o-cresol)	000096-66-2
toluene, 2,6-diamino-	000823-40-5
toluenesulfonamide, N-ethyl-4-	000080-39-7
toluenesulfonic acid, p-, butyl ester	000778-28-9
toluidine, N,N-diethyl-p-	000613-48-9
triallyl cyanurate	000101-37-1
tributoxyethyl phosphate	000078-51-3
tributylphosphine oxide	000814-29-9
trichloroaniline, 2,4,5-	000636-30-6
trichloroaniline, 2,3,4-	000634-67-3
trichlorotrifluoroethane	026523-64-8
tricosane, also (n-tricosane)	000638-67-5
triethylamine	000121-44-8
triethyleneglycol dimethacrylate	000109-16-0
triethylsilanol	000597-52-4
trimethylcyclohexanone	050874-76-5
trimethylolpropane trimethacrylate	003290-92-4
trioxane, 1,3,5-trimethyl-	000123-63-7
trioxepane, 1,3,5-	005981-06-6
triphenylphosphate	000115-86-6
triphenylphosphine oxide	000791-28-6
tropic acid	000552-63-6
undecanoic acid	000112-37-8
urea, N,N-bis-(1,1-dimethylethyl)-	005336-24-3
urea, 1,1,3,3-tetrabutyl-	004559-86-8
urea, N,N',N'-trimethyl-	000623-14-4
valeronitrile, 2,4-dimethyl-	034372-09-3
¹ For the chemicals listed in this table, the evaluation criteria are 0.003 mg/L under static conditions, and 0.0003 mg/L under flowing conditions.	

– concluded –

Annex E¹⁷ (informative)

Informational drinking water criteria

E.1 General

The drinking water criteria in this annex have not undergone external peer review.

The drinking water criteria in this annex are intended to be used as guidance in the determination of evaluation criteria for those compounds that do not have normative evaluation criteria established. Some of these values, as noted in the tables, are currently under external peer review for inclusion as normative criteria. The values in these tables include criteria that have been developed according to the requirements of annex A, but have not been externally peer reviewed. The tables also include non-regulatory USEPA values that have been reviewed but failed to satisfy annex A toxicity data requirements. Compounds that have been detected only at concentrations below the threshold of evaluation (see annex A, section A.7.1) to which the threshold of evaluation protocol has been applied are also listed here.

The drinking water criteria in this annex have not been evaluated for taste and odor considerations at the concentration limits indicated.

In the event that one of the chemicals listed in this annex is detected at concentrations exceeding the guidance evaluation criteria values, a complete toxicity data review should be conducted. The review should be performed according to annex A requirements prior to using the informational evaluation criteria values to determine product compliance to this Standard.

The list of substances in annex E, table E1 is not intended to encompass all of the potential analytes of interest that need to be considered when evaluating products. The user is cautioned that each product may have formulation-dependent analytes of interest for which concentration limits have not been determined. In these cases, the user is required to develop acceptable concentration limits based on the requirements of annex A in order to determine full compliance with this Standard.

These tables are specific to NSF/ANSI 60. While the tables may be used for evaluation of impurities in drinking water system components, the substances listed in these tables may have not been evaluated for use as indirect additive drinking water treatment chemicals under NSF/ANSI 61 *Drinking water system components – Health effects*. Use as indirect additive drinking water additives may require the consideration of different exposure parameters from those used for NSF/ANSI 60 evaluation.

E.2 Informational threshold of evaluation chemicals

Annex E, table E1 contains chemicals that have been evaluated using the threshold of evaluation (see annex A, section A.7.1), but that may have sufficient toxicity data available that would enable chemical

¹⁷ The information contained in this Annex is not part of this American National Standard (ANS) and has not been processed in accordance with ANSI's requirements for an ANS. Therefore, this Annex may contain material that has not been subjected to public review or a consensus process. In addition, it does not contain requirements necessary for conformance to the Standard.

Revisions to NSF/ANSI 60-2005 are shown in this addendum as ~~crossouts~~ for deletions and **highlights** for additions.

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Addendum 1

specific risk assessments to be performed if needed. To date, these chemicals have not been detected at concentrations exceeding the threshold of evaluation criteria. In the event that these chemicals are detected at concentrations exceeding the threshold of evaluation criteria, a toxicity data review should be conducted according to annex A prior to using the threshold of evaluation to determine product compliance to this Standard.

Table E1 – Threshold of evaluation chemicals having datasets from which specific TAC/SPAC values, or CBEL values, could be set using Annex A¹

Substance	CAS#
Inorganics	
cobalt	007440-48-4
titanium	007440-32-6
Organics	
acetamide, 2-(diethylamino)-N-(2,6-dimethylphenyl)-	000137-58-6
benzene, 1-chloro-4-(trifluoromethyl)-	000098-56-6
benzalazine	064896-26-0
benzamide	000055-21-0
benzophenone	000119-61-9
benzoguanamine	000091-76-9
benzotriazole, 1,2,3-	000095-14-7
benzyl acetate	000140-11-4
benzyl alcohol, 3,5-di-tert-butyl-4-hydroxy-	000088-26-6
cyanoguanidine	000461-58-5
cyclohexene	000110-83-8
dichlorodifluoromethane	000075-71-8
diethylaminoethanol	000100-37-8
dimethylacetamide, n,n-	000127-19-5
dimethyl adipate	000627-93-0
dimethylaminopropanenitrile	001738-25-6
dimethylformamide, n,n-	000068-12-2
dimethyl phthalate	000131-11-3
diphenyl guanidine, 1,3- (or n,n-)	000102-06-7
diphenyl-p-phenylenediamine, n,n'-	000074-31-7
ethanol, 2-diethylamino-	000100-37-8
ethanol, 2-(dimethylamino)-	000108-01-0
ethanol, 2-phenoxy-	000122-99-6
ethanol, 1-phenyl-	000098-85-1
fluoranthene	000206-44-0
fluorescein	002321-07-5
fluorescein, dipotassium salt	006417-85-2
furanmethanol, 2-	000098-00-0
hexamethylenediamine	000124-09-4
heptanoic acid, n-	000111-14-8
hexamethylenetetramine	000100-97-0
hexanoic acid, 2-ethyl	000149-57-5
hexanoic acid, n-	000142-62-1
isobutyl isobutyrate	000097-85-8
(isopropylamino)diphenylamine, 4-	000101-72-4
isopropyltoluene	000099-87-6
methyl acrylate	000096-33-3
methyldiethanolamine, n-	000105-59-9
methylene diphenyl diisocyanate	000101-68-8
methylene bis(n-iso-butylbenzenamine)	088990-59-4
phenylene diamine, n-(1,3-dimethylbutyl)-n'-phenyl-p-	000793-24-8
phenylenediamine, n-phenyl-p-	000101-54-2
phthalic acid, o-	000088-99-3

Table E1 – Threshold of evaluation chemicals having datasets from which specific TAC/SPAC values, or CBEL values, could be set using Annex A¹

Substance	CAS#
piperidine	000110-89-4
Organics	
sebacate, bis(2-ethylhexyl)-	000122-62-3
silane, gamma-aminopropyl triethoxy-	000919-30-2
Tacrine	000321-64-2
tetramethylene sulfone	000126-33-0
tetramethyl piperidinone	000826-36-8
thiabendazole	000148-79-8
triallyl isocyanurate	001025-15-6
triethylene diamine	000280-57-9
tris(2-ethylhexyl) phosphate	000078-42-2
vanillin, o-	000148-53-8
¹ For the chemicals in this table, the evaluation criteria are 0.003 mg/L under static conditions and 0.0003 mg/L under flowing conditions. The chemicals that appear in this table have been detected only at concentrations not exceeding these threshold of evaluation concentrations as established in this Standard (see annex A, A.7.1), and have not been evaluated for specific TAC and SPAC values. If any of these chemicals are detected at concentrations exceeding the threshold of evaluation, toxicity data should be reviewed to determine whether specific TAC and SPAC values can be established, prior to using threshold of evaluation to determine compliance with the Standard.	

– conclude –

Standards and Criteria¹⁸

The following standards and criteria established and adopted by NSF as minimum voluntary consensus standards are used internationally:

- 2 Food equipment
- 3 Commercial warewashing equipment
- 4 Commercial cooking, rethermalization, and powered hot food holding and transport equipment
- 5 Water heaters, hot water supply boilers, and heat recovery equipment
- 6 Dispensing freezers
- 7 Commercial refrigerators and freezers
- 8 Commercial powered food preparation equipment
- 12 Automatic ice making equipment
- 13 Refuse processors and processing systems
- 14 Plastics piping system components and related materials
- 18 Manual food and beverage dispensing equipment
- 20 Commercial bulk milk dispensing equipment
- 21 Thermoplastic refuse containers
- 24 Plumbing system components for recreational vehicles
- 25 Vending machines for food and beverages
- 29 Detergent and chemical feeders for commercial spray-type dishwashing machines
- 35 High pressure decorative laminates (HPDL) for surfacing food service equipment
- 36 Dinnerware
- 37 Air curtains for entranceways in food and food service establishments
- 40 Residential wastewater treatment systems
- 41 Non-liquid saturated treatment systems
- 42 Drinking water treatment units – Aesthetic effects
- 44 Residential cation exchange water softeners
- 46 Evaluation of components and devices used in wastewater treatment systems
- 49 Class II (laminar flow) biosafety cabinetry
- 50 Circulation system components and related materials for swimming pools, spas/hot tubs
- 51 Food equipment materials
- 52 Supplemental flooring
- 53 Drinking water treatment units – Health effects
- 55 Ultraviolet microbiological water treatment systems
- 58 Reverse osmosis drinking water treatment systems
- 59 Mobile food carts
- 60 Drinking water treatment chemicals – Health effects
- 61 Drinking water system components – Health effects
- 62 Drinking water distillation systems
- 143 Environmentally preferable products – Hard surface cleaners
- 169 Special purpose food equipment and devices
- 170 Glossary of food equipment terminology
- 173 Dietary supplements
- 177 Shower filtration systems – Aesthetic effects
- 184 Residential dishwashers
- 222 Ozone generators
- 14159-1 Hygiene requirements for the design of meat and poultry processing equipment
- 14159-2 Hygiene requirements for the design of hand held tools used in meat and poultry processing equipment
- 14159-3 Hygiene requirements for the design of mechanical belt conveyors used in meat and poultry processing equipment

¹⁸ The information contained in this Standards and Criteria page is not part of this American National Standard (ANS) and has not been processed in accordance with ANSI's requirements for an ANS. Therefore, this Standards and Criteria page may contain material that has not been subjected to public review or a consensus process. In addition, it does not contain requirements necessary for conformance to the Standard.



THE HOPE OF MANKIND rests in the ability of man to define and seek out the environment which will permit him to live with fellow creatures of the earth, in health, in peace, and in mutual respect.