



PROTECTING HUMAN HEALTH

CELEBRATING THREE DECADES OF STANDARDS NSF/ANSI 60 AND 61

**MUNICIPAL
WATER MATTERS**

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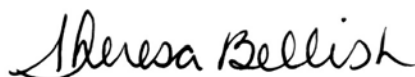
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Dear Reader,

This year marks the 30th anniversary of standards NSF/ANSI 60 and 61. Historically referred to as the additives standards, these comprehensive health effects standards are now officially recognized in 49 U.S. states and the majority of Canadian provinces and territories, with continued growth in recognition throughout the world. NSF is dedicated to utilizing its technical expertise to protect and improve human health in the drinking water industry and we are proud to be a partner in this mission alongside regulators, utilities and manufacturers. As consumer awareness about drinking water matters continues to be a top priority throughout North America and the world, NSF looks forward to continuing our role as a partner in drinking water safety.

We would like to thank all of the industry members, regulators, utilities, clients, staff and users who have contributed to the development of NSF/ANSI 60 and 61 in the past, present and future.

Sincerely,



Theresa A. Bellish
General Manager - Municipal Water Systems
NSF International

About NSF

Founded in 1944, NSF International is a global independent organization that writes standards, and separately, tests and certifies products for the water, food, health sciences and consumer goods industries to minimize adverse health effects and protect and improve human health. Operating in more than 170 countries, NSF International is a Pan American Health Organization/ World Health Organization (WHO) Collaborating Center on Food Safety, Water Quality and Indoor Environment.

NSF's global water services include testing, certification and auditing for municipal water treatment components and chemicals, plastic piping systems, plumbing fixtures and fittings, point-of-use and point-of-entry water systems and filters.

Behind the Mark

An In-Depth Look at the Path to Product Certification

By Kathryn Foster

Standards NSF/ANSI 60 and 61

NSF/ANSI 60 and 61 are North America's flagship health effects standards for drinking water treatment chemicals and drinking water system components. The scope of NSF/ANSI 60 includes any chemical directly or indirectly added to treat drinking water, whether or not the chemical is intended to be present in finished water, whereas the scope of NSF/ANSI 61 includes any material or product that comes into contact with drinking water or drinking water treatment chemicals, from source to tap. Certification to these standards ensures that treatment chemicals and components of potable water distribution systems do not impart harmful contaminants into potable water.

Certification requires a rigorous evaluation process that includes complete information disclosure from the manufacturer, a thorough technical review of the product, laboratory testing and a complete audit of all manufacturing facilities producing the product. All requirements must be met with satisfactory results before a product is entitled to bear the NSF certification mark.

The NSF mark, signifying a product's compliance to NSF/ANSI 60 and/or 61, is widely recognized and specified worldwide. In fact, 49 U.S. states and the majority of Canadian provinces/territories have requirements for water treatment chemicals or water system components to comply with NSF/ANSI 60 and 61. However, there is not a widespread understanding among water utilities and project specifiers of exactly what certification to these standards entails. In this article, we go "behind the mark" to highlight the key requirements for certification to these widely specified standards.

1 INFORMATION DISCLOSURE

A manufacturer of a water treatment chemical or a water system component seeking certification of its product must first submit a detailed set of product information to NSF International. The manufacturer must also provide fundamental information related to the manufacturing location(s) for the product. Products are certified individually at each production location: Certification of a product at one manufacturing facility does not authorize the manufacturer to use the NSF mark on the same product produced at other locations unless NSF has specifically evaluated and listed those locations.

Manufacturers must also supply information regarding the function and end use of the product in the field. This information allows NSF to determine the amount of product that will come into contact with potable water, such as field surface area to volume ratios





of a component or maximum use levels of a water treatment chemical. Product function can also impact the type of evaluation the product receives, as tank components are evaluated differently from pipe materials, and distribution system corrosion control chemicals are evaluated differently from reverse osmosis antiscalants and membrane cleaners.

Crucially, clients must also disclose detailed compositional and supply chain information for all water contact materials used in their product. For products that are comprised of multiple materials, the manufacturer must provide the trade name and disclose all sources of supply for each wetted material or ingredient used in the product. In some cases, additional formulary information will be required from individual material suppliers. In this case, NSF contacts material suppliers all the way down the supply chain to obtain full formulation of each wetted material, down to the individual chemical level. Similarly, manufacturers seeking certification of chemicals and single-material products must provide NSF with complete formulary information for the chemical or material they manufacture, for 100 percent of the formulation.

Manufacturers must also disclose coatings, platings, wash procedures or any other specialized processing steps used in the manufacture of their product, as these types of processes may have a health effects impact and therefore must be taken into account when evaluating the product to the applicable standard.

2

TECHNICAL REVIEW

Once NSF has received complete product information, our team of technical experts conducts a comprehensive review. The purpose of this review is to evaluate products for health effects, select the test representatives and create a customized test procedure specific to the product.

During the technical review, the product's ingredient or material formulations are reviewed individually and used to design a customized analytical test battery for the product. This test battery always includes, at a minimum, all material-specific analyses required by the applicable standard in addition to more specialized analyses designed to detect compounds unique to the formulations being evaluated. In many cases, the design of this test battery requires a line-by-line review of every individual chemical compound used in the treatment chemical, ingredient, material or assembly. This incredibly detailed review of the materials that comprise the product results in a highly specialized test battery designed to detect chemical contaminants that may be unintentionally added to the drinking water supply. NSF/ANSI 60 technical reviews include an additional step in which the safety and health effects of the intentional ingredients to be added to drinking water are assessed. If the intentional ingredients, such as phosphates or fluoride, exceed their safety requirements, then the maximum use level of the product or ingredient must be lowered.

If the certification request includes multiple versions of the same product (e.g. different formulations, models or sizes), the technical review team next determines the versions of the product that will require testing. When a family of products shares similar ingredients, materials, processing and field end uses, a set of worst-case formulations, models and/or sizes can often be established, where the testing of these worst-case test cases can represent the entire range of products in laboratory testing.

Once the test sample(s) have been selected, the technical team summarizes the required testing in a customized plan, which is used to direct laboratory testing of the product. For NSF/ANSI 61, the test plan includes a complete set of directions to the laboratory regarding the appropriate field use normalization, required analyses, exposure water temperature, exposure duration and other details necessary to complete chemical leachate testing of the product. For NSF/ANSI 60, the test plan includes the maximum use level, a preparation method based on the type of chemical product, and the required analyses for contaminant testing.

Upon completion of the technical review, the manufacturer is issued an Unauthorized Registered Formulation (URF) that documents all relevant details about the products evaluated, including all wetted materials/ingredients reviewed under the request. This is an “unauthorized formulation” because the product cannot yet be represented as certified. The URF document will be used during the facility audit for verification against the manufacturing facility's production records.

3

PRODUCT TESTING

At this point in the process, the manufacturer is requested to submit samples of the specific products identified for testing during the technical review. Once the requested samples are received at NSF International's laboratories, our team tests them according to the custom test plan that was designed during the technical review based on standard requirements and the individual characteristics of the products under test.

For products being evaluated to NSF/ANSI 61, the exposure test is the first phase of product testing. Generally, the product is exposed to various buffered exposure waters depending on the analyses required





for the test. Products are either filled with the exposure water for an in-product exposure, or the wetted components of the product are submerged in exposure water for an in-vessel exposure. The samples undergo a sequence of water changes particular to the type of product being tested, with the length of the total exposure sequence ranging from one to 19 days. Products intended for use downstream of a domestic or commercial hot water heater will be exposed to hot water during this sequence, while all other products are exposed to water at ambient temperature. At the end of the exposure sequence, the water, along with any leachates that may have leached from the product, is collected from the product and preserved for analysis. Product exposures are always accompanied by a control exposure, which is used to subtract any background compounds that may have been present in the exposure water or in the components of the test assembly.

For products being evaluated to NSF/ANSI 60, chemical samples may be prepared for analysis by dosing them into a solution of deionized water and other reagents specific for the type of chemical being evaluated; this solution is then preserved for analysis. Alternatively, some chemicals, such as dry polymers, are directly extracted using solvents without first dissolving them into water. The solvent extraction is then analyzed for monomer contaminants.

Analytical testing is the next step of the testing process for samples being evaluated to either standard. The prepared and preserved samples are sent for analytical testing using the test battery determined during the technical review of the product. A typical test battery will include analysis for regulated and non-regulated metals as well as a wide range of semi-volatile and volatile organic compounds using ICP-MS, GC-MS, HPLC, LC-MS, and a number of other quantitative analytical methods. Contaminants are identified either by use of authentic analytical standards, or by comparison to libraries containing the spectra of hundreds of thousands of compounds. The level of each compound detected in the sample water is quantified, control subtracted and summarized in a test report. Following peer review and final sign off by chemistry lab personnel, this test report is sent to NSF's technical team for toxicological evaluation of the results.

4

TEST REPORT EVALUATION

NSF technical staff review the data in the test report and confirm correct testing of the product. Next, the test results are normalized to accurately reflect field use conditions of the product, as testing in the laboratory setting does not always yield contaminant levels that are directly representative of real-world conditions. For example, plastic materials for use in manufacturing potable water storage tanks are tested by submerging small, rectangular plaques of the material in a glass jar filled with exposure water, typically at a surface area to volume ratio of 500 in²/L, whereas the actual surface area to volume ratio

of a tank does not typically exceed 50 in²/L. Because chemical leaching tends to increase in proportion to the surface area to volume ratio being exposed, this overexposure of the plastic material would be expected to yield chemical leachates at a concentration ten times higher than would be seen in an actual tank in the field. Therefore, in scenarios where the exposure in the lab does not accurately represent its use in the field, the technical team mathematically adjusts the laboratory results to account for this difference in surface area to volume ratio.

In the example of the plastic tank material, the test results would be mathematically adjusted by a factor of 0.1. Similarly, water treatment chemicals are typically dosed into the test water at ten times their maximum use, with the resulting contaminant levels normalized back to the maximum use level of the chemical before evaluation. For both NSF/ANSI 60 and 61, the practice of overexposure increases the sensitivity of the analysis for low concentration contaminants. The field use assumptions used to determine the correct normalization of laboratory results are determined either by fixed requirements set forth in the standard, or based on the specific end use requested by the client. Given the significant impact of normalization on the evaluation of the product, the end use criteria used to generate these normalization assumptions always appear in the public listing for the product.

After the analytical test data is properly normalized, the test report is evaluated for compliance to the standard. All compounds detected in the test must be compared against the appropriate pass/fail criteria. If a regulatory criterion set by the United States Environmental Protection Agency (U.S. EPA) or Health Canada exists for a detected compound, this level is preferentially used to evaluate the contaminant. In the absence of regulatory criteria, pass/fail levels may be set by utilizing existing risk assessments published by other entities such as the World Health Organization (WHO) or the International Programme on Chemical Safety (IPCS). Alternately, with sufficient toxicological data available, NSF toxicologists may set pass/fail levels by performing a risk assessment according to requirements outlined in

IMPORTANT ACRONYMS TO REMEMBER

URF: Unauthorized Registered Formulation

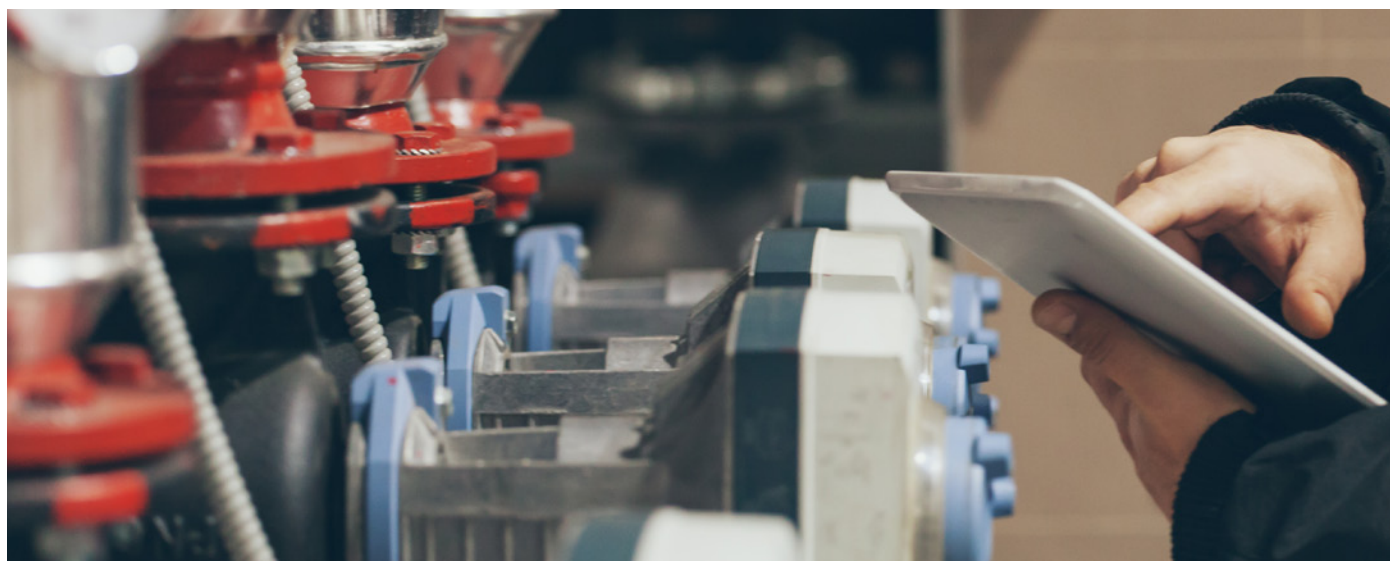
HAB: Health Advisory Board

WHO: World Health Organization

IPCS: International Programme on Chemical Safety

TOE: Threshold of Evaluation

ARF: Authorized Registered Formulation



NSF/ANSI 60 and 61. These risk assessments must be peer-reviewed by a panel of external toxicologists on the Health Advisory Board (HAB) before the new criteria may be incorporated into the standards. Compounds for which no peer-reviewed criteria exist are often evaluated to the threshold of evaluation (TOE), a very conservative default level that may be used when no toxicological risk assessment has been performed on a given compound. Compounds without established criteria that have the potential for adverse health effects at very low levels (based on available toxicity data and structure activity relationships) may be assigned a criteria of zero, where no detectable level of that compound is allowable.

After comparing the level of each compound detected against the appropriate criterion, the technical review team issues the test report to the product manufacturer with a final status of pass or fail. Test reports are only issued with a passing status when the normalized levels of all detected contaminants are less than or equal to their individual evaluation criteria.

NSF International provides full-day training courses on NSF/ANSI 60 and 61 for those interested in a more in-depth understanding of these standards and the certification process. Please see the article titled, “Master the Standards” on page 18 of this publication for more details.

5 FACILITY AUDIT

The facility audit, another requirement for product certification, typically occurs in parallel with the laboratory testing of the product. Each facility seeking to manufacture certified product must undergo an initial audit where an NSF auditor visits the facility and performs a comprehensive inspection. Audits typically include a walk-through of the production area and a review of the facility's production processes and quality control program. The auditor looks to identify sources of potential product contamination via visual inspection and a review of the manufacturer's record system and key records. Additionally, the NSF auditor will compare the facility's records for product composition and material sources against the official record of materials evaluated during the product's technical review as documented in the URF. Any discrepancies

between this document and the actual production records at the facility must be resolved prior to certification of the product, as formulary and supply chain differences have the potential to affect compliance of the product to the standard and, consequently, to have an impact on public health.

At the conclusion of the audit, the NSF auditor completes an audit report summarizing the results of the audit and identifying any items of non-compliance. All non-compliances must be resolved before certification can be granted.

6 LISTING, CERTIFICATION AND MONITORING

Once all requirements have been met with satisfactory results, the manufacturer is notified that products are officially certified and thus entitled to bear the NSF certification mark. The manufacturer is also issued an Authorized Registered Formulation (ARF) that lists the range of products covered by the certification and includes the full list of materials, ingredients and suppliers approved for use in manufacturing the certified product. This document will be used in future monitoring audits to verify continued compliance to the standard and to NSF policies.

The product's trade name(s), manufacturer and production location are made public in NSF's online listings of certified products (<http://www.nsf.org/certified-products-systems>), along with any end use parameters relevant to the manner in which the product was evaluated during the chemical extraction testing. These parameters may include size ranges, surface area to volume ratios, strengths, flow rates or other criteria critical to the evaluation of the product, as well as the certification temperature (cold, domestic hot or commercial hot) to which the product was tested. Any use of the product

outside the listed parameters is considered outside of the scope of the certification of that product.

Once certified, the product enters the monitoring phase of certification, in which the product and its listed manufacturing facilities are subject to regularly recurring audits and monitoring tests, typically on an annual basis. Products that do not comply with these monitoring audits or tests are subject to removal from NSF listings and loss of their right to use the NSF certification mark. In extreme cases of non-compliance, NSF may take additional action such as requesting a product recall and issuing a public notice.

Manufacturers of certified products must notify NSF prior to making any change to the product as documented in the product's ARF. The modification must be reviewed and approved by NSF's technical team before it can be implemented in products being represented as certified. Depending on the type of change requested, NSF may require chemical extraction testing of the modification prior to approval to verify that the modification does not negatively impact compliance to the standard or to public health.

Backed by this rigorous certification process and NSF International's team of experts, the NSF mark thus provides a high level of assurance that a chemical additive or water distribution component will not impart harmful contaminants into public water supplies. From source to tap, the NSF mark is an instrumental tool for helping regulators and water utilities to keep water clean, safe and available for all.

HOW DO I EXPLAIN WATER TREATMENT?

The certification process you read about in the article above affects products all along the water distribution system. Ever have trouble explaining this? Feel free to reference this simplified graphic.



NSF/ANSI 60 AND 61 THROUGH HISTORY

1972
-1990

NEED FOR STANDARDIZED EVALUATION

The U.S. Environmental Protection Agency (U.S. EPA) operated a program which issued letters of approval to manufacturers for some products intended to come in contact with drinking water. The process involved only a review of the material formulations for potentially harmful compounds. The EPA approval did not include product testing or inspections of manufacturing facilities. Early on, the EPA recognized a need for a more thorough and standardized evaluation process for these products, yet realized that their limited resources prevented expansion of this program.

1984

RFPs FOR STANDARDS DEVELOPMENT

The EPA issued a request for proposals for independent, not-for-profit organizations to develop standards and a certification program for products used to treat or distribute drinking water.

1985

CONTRACT AWARDED

The EPA awarded the contract to a consortium led by NSF International, which included the American Water Works Association (AWWA), the AWWA Research Foundation (AWWARF) and the Association of State Drinking Water Administrators (ASDWA). Participation of all groups was key to the development of both the NSF/ANSI 60 and 61 standards.

1988

FIRST HEALTH EFFECTS STANDARDS ARE PUBLISHED

The first comprehensive health effects standards, NSF 60 and 61, were published.

1989

ANSI ACCREDITATION

NSF 60 and 61 become ANSI-accredited standards and NSF begins certifying products to these standards.

2008

ANNEX G FOR LEAD REQUIREMENTS

In December 2008, Annex G is introduced to NSF/ANSI 61, which sets parameters for meeting 0.25 percent lead content requirements. This allows product manufacturers to show compliance to laws with lead content requirements such as California law AB 1953.

2010 FROM ANNEX G TO NSF/ANSI 372

The requirements of Annex G were moved to NSF/ANSI 372. Annex G became only a reference to NSF/ANSI 372 if lead content verification methods were required.

2011 LEAD-FREE DEFINITION CHANGES

The federal Safe Drinking Water Act (SDWA) changed the definition of “lead-free” to mean products are required to meet a weighted average lead content of 0.25 percent or less. The federal law had a January 2014 compliance date. NSF/ANSI 61 Section 3.5 also required all products falling under the scope of the legislation to meet the lead free definition of the Safe Drinking Water Act by January 2014.

2012 IMPORTANT CHANGES TO INDUSTRY STANDARDS

In May 2012, the companion standard to NSF/ANSI 60, NSF 223, was approved by ANSI. NSF/ANSI 223 provides requirements for companies certifying to NSF/ANSI 60.

July 1, 2012 marked a significant milestone in the effort to reduce lead in drinking water. The reduced chemical extraction criteria for lead previously contained in Annex F of NSF/ANSI 61 went into effect. The 2012 version of NSF/ANSI 61 was issued and the reduced lead extraction criteria moved from Annex F into the main body of the standard and compliance was now mandated.

2013 RETIRING OF ANNEX G

In October 2013, Annex G was retired from NSF/ANSI 61.

2014 LEAD-FREE LEGISLATION IS OFFICIALLY IMPLEMENTED

The SDWA and the changes to the “lead-free” definition went into effect January 2014.

2022 NSF/ANSI 61, SECTION 3.6 TAKES EFFECT

On January 1, 2022, the implementation deadline to comply with section 3.6 of NSF/ANSI 61 will go in effect. This section of the standard has been updated to include the requirement of lead content verification testing for all products certified to NSF/ANSI 61 with the exception of those specifically exempted within the Safe Drinking Water Act (SDWA).

Repaired or Modified – Is It Still Certified?

By David Nance

According to a survey of state drinking water administrators, forty-nine states require certification or compliance to NSF/ANSI 61 for materials, components and products used in drinking water treatment and distribution.

VERIFYING A PRODUCT IS CERTIFIED TO NSF/ANSI 61

1. Look for the certification mark on the product.



A product that is certified to NSF/ANSI 61 by NSF International will display one of these certification marks (all colors have equal meaning).

2. Double check the product certification listings.

For products certified by NSF International, search our database at <http://www.nsf.org/certified-products-systems> and select “Drinking Water System Components.”

North American states, provinces and territories wrote this requirement into legislation, regulation or policy to ensure products are safe for drinking water use. When installing new equipment, North American inspectors are looking for the NSF/ANSI 61 certification mark to ensure products comply with the regulation. With new installations or complete product replacements, it is a relatively straightforward exercise to verify equipment is certified to NSF/ANSI 61 by reviewing the certification mark on the product or reviewing the product listings on the certifier’s website.

Thirty years after the original publication of NSF/ANSI 61, odds are that some of those first certified products have needed to be repaired or replaced since they were installed. Nothing lasts forever, not even the best designed product, so eventually normal wear and tear or unforeseen issues will require parts or components to be replaced. NSF utilizes NSF/ANSI 61 to certify compliance of products produced under the controlled manufacturing practices and authorized materials at the original manufacturer’s production locations. Repairs and maintenance of those products can modify the wetted surfaces or introduce new materials beyond those evaluated during initial certification. These activities are outside the scope of the certification as they do not have the same review, testing and auditing oversight as the original equipment and product manufacture.

As the repairs or modifications are beyond the scope of initial certification, there are several ways utilities can keep their equipment in good standing by using the same materials as in the certified product:

- > **Use OEM replacement components** so you get the exact part and material from the manufacturer. The manufacturer can attest that these are the same components used in the originally certified product. With certification by NSF, the manufacturer undergoes annual audits and testing to verify products maintain compliance with NSF/ANSI 61.
- > **Use NSF/ANSI 61 certified components** since a certified component, such as an o-ring or gasket, is intended to be used with another product. These components undergo the same rigorous review, testing and auditing evaluations to NSF/ANSI 61 as products. The component’s certification should be compared to the application and end use required to ensure they are in alignment.
- > **Perform risk and safety assessments** if OEM or certified components are not available. This should always be done prior to considering a component for use.

Of course other methods and criteria could come into play for specific situations and examples. For any modifications, utilities should review their specific requirements and changes with the appropriate authority having jurisdiction.

Withstanding the Tests of Time: The Value of Annual Testing

By Scott Randall

NSF International requires periodic retesting for all NSF/ANSI 61 certified products. For most product types, this testing occurs on an annual basis, for as long as the product is certified. Product types such as faucets, faucet components and some coatings are tested every three or five years. Because these cycles of periodic retesting vary by product type, this testing is sometimes referred to as monitor testing. Testing is conducted on a representative model from a family of similar products, in the same manner as qualification testing during initial certification. Likewise, the testing is performed using the same protocols and methods for the same leachates.

But why is it so important to repeat this testing once a product is certified? After all, qualification testing has already demonstrated the product's compliance with the health and safety requirements outlined in NSF/ANSI 61. Every year, about 15 percent of products fail qualification testing, meaning that not all products are built or formulated to a quality level that can meet the stringent health effects requirements of NSF/ANSI 61. Once a manufacturer has found a formulation that complies with NSF/ANSI 61, that manufacturer often maintains the same formulation for many years.

However, NSF's extensive records of monitor tests shows that products do not perform the same year over year. As shown in the table below, 6 percent of monitor tests in 2017 did not meet the health and safety requirements of NSF/ANSI 61. When looking at specific categories, a sizable difference in compliance rates is apparent. For example, coatings and other barrier materials have a high rate of failure in large part due to the materials used in their manufacture. Some contain high concentrations of solvents and may contain reactive components that polymerize as they are applied on a surface. Variations in solvent evaporation or reaction rates of multi-component coatings are two important factors that increase their risk of noncompliance.

2017 Monitor Testing Failure Rates by Product Type

PRODUCT TYPE	2017 FAILURE RATES
O-rings, gaskets and adhesives	5%
Plastic materials	5%
Valves, meters and other mechanical devices	5%
Faucets, stop valves and supply hoses	13%
Pipes	6%
Coatings, paints and barrier materials	13%
Filtration and oxidative media	2%
All categories	6%





For NSF/ANSI 61 testing as a whole, the average 6 percent rate of noncompliance is consistent over the past five years. That is likely due to quality issues continuously being introduced into the supply chain for certified products. If the testing frequency for pipes, fittings and gaskets were reduced from one to five years, it would be plausible that those quality issues could compound each year with fewer corrections. This could result in a higher noncompliance rate and a larger number of noncompliant products being sold in the marketplace.

The state of California was concerned enough about monitor testing that it now requires annual testing for all NSF/ANSI 60 certified drinking water treatment chemicals.

When a monitor test is noncompliant with the requirements of NSF/ANSI 61, NSF requires a root cause investigation and corrective action from the manufacturer of the certified product. Over many years of reviewing these investigations, NSF has seen repeating themes as the causes for these noncompliances:

- > **Raw material** quality is one cause of differing leaching results. Either the supplier is providing a lower quality material to the manufacturer, or the manufacturer has switched to a lower quality supplier.
- > **Changes to manufacturing processes** is another cause of noncompliance. Changes in mixing times, processing temperatures or the manufacturing equipment can affect how the finished product performs in a leaching test.

Audits of the manufacturing facility provide some protection against supply chain changes. However, the ability of an audit to detect these changes is limited to the manufacturing information documented for the product. The documents used to verify compliant manufacturing of the product may not include all details of the manufacturing process, and may not include impurity criteria for each ingredient in a formula. The manufacturer's documentation may only identify the trade name of a purchased assembly, while the component materials can vary. Critically, there are many impactful variables under the control of material and ingredient suppliers that are not visible to the manufacturing facility.

Monitor Testing Case Study

Consider, for example, the use of plasticizers in flexible plastics. There is a wide spectrum of plasticizer chemicals that have differing toxicological profiles, some with greater health risk than others. Furthermore, it is difficult to manufacture a 100-percent pure plasticizer chemical. If the plasticizer manufacturer selling di(2-ethylhexyl) adipate changes its manufacturing process, then the plasticizer impurities will change. However, this change will not be readily visible to the tubing manufacturer who is buying 95-percent di(2-ethylhexyl) adipate. Even though the ingredient trade name is unchanged, the heptanol content has tripled. Testing can illuminate these risks, but an audit cannot. For the faucet manufacturer, these changes are even less visible. The manufacturer may purchase the same hose for years, but the ingredients change from year to year. These types of changes at the supply chain level only become evident from monitor testing.

Monitor testing can shed light on unaddressed risk and liability for manufacturers of certified products and provides feedback regarding the quality of their products and raw material supplies. Manufacturers can use this information to improve the quality of their products. In some cases, it may be that the manufacturer's supplier has substituted materials or ingredients without the consequences being understood. This allows manufacturers to avoid unwanted surprises and to provide the highest quality product to their customers.

Water utilities, regulatory bodies and manufacturers concerned about the safety of their products understand the importance of this rigorous annual monitoring requirement for the quality of the potable water being delivered to homes across the world. Continued compliance of a product to the standard can only be confirmed via frequent empirical testing of the product.

The benefit of NSF/ANSI 61 certification backed by annual monitoring testing is clear: **safe drinking water**. Annual testing of products in contact with potable water allows utilities and consumers to be confident that a certified product meets health and safety requirements whether the product was originally certified one or seven years ago, and allows product manufacturers to confirm the quality of their supply chain and manufacturing process. Annual monitor testing of certified products is a critical component of the water industry's common goal to keep our potable water safe.



FAQs on NSF/ANSI 60

The Scope of NSF/ANSI 60 Certification During Transport and Delivery of Drinking Water Treatment Chemicals

By Blake Stark

Product certification to NSF/ANSI 60: *Drinking Water Treatment Chemicals - Health Effects* is required in most U.S. states and Canadian provinces and territories, and serves as an important tool to ensure the safety and suitability of chemicals used in the treatment of public drinking water supplies.

In recent months, NSF International has received a few questions regarding the scope of NSF/ANSI 60 certification during the transport and delivery of chemical products.

Q: What should I look for to verify that a received chemical is certified to NSF/ANSI 60?

A: The company name, product name and facility designation (city, state/province/country or unique facility identification number) should be shown on the product label or accompanying documentation for bulk shipments. In addition, the NSF mark and the product's maximum use level (MUL) are required to be on the product label or other accompanying documentation provided with the delivered product.

End users should check to ensure that the received chemicals arrive in properly sealed containers (including railcars, tank trucks, totes and drums) that are sourced directly from a company and facility that appears in the NSF/ANSI 60 listings.

The company name, product name, maximum use level, facility designation and NSF mark should match the information shown in the official NSF certification listings (info.nsf.org/Certified/PwsChemicals) for the respective company and product.

Q: What are NSF's certification policies for treatment chemicals that are repackaged or otherwise transferred between containers off-site from the original NSF/ANSI 60 certified facility?

A: For a treatment chemical to be considered NSF certified upon arrival, the delivered product must have been inspected and evaluated at all points in the supply chain prior to reaching the water utility/end user site. Therefore, the NSF/ANSI 60 certification of a certified chemical ends (is voided) when it

is repackaged, diluted, transferred between containers, blended, reacted or otherwise handled subsequent to shipment from the certified manufacturer's location. A distributor of chemicals (originating from NSF/ANSI 60 certified source products) may apply for and obtain a separate NSF/ANSI 60 certification through NSF. The chemical distribution location will receive site audits by NSF as well as testing of at least one representative product sample to the requirements of NSF/ANSI 60. The site audits and product testing are conducted prior to certification and on an annual basis after certification is granted. These monitoring activities are conducted to ensure that chemical products are protected from contamination during transport and delivery to the water utility/end user site.

Q: Is NSF/ANSI 60 certification required for chemicals that are repackaged/diluted, or otherwise transferred between containers or storage tanks, on-site at drinking water utilities?

Also, is NSF/ANSI 60 certification required if a water utility operation blends chemicals together or produces new chemicals in a reaction (on the utility grounds)?

A: After delivery of chemicals to the water utility, any further handling of the chemicals (including transfers between containers, repackaging, dilutions, blending or reactions) conducted on the utility grounds is considered a component of the water utility's operation. The decision of whether NSF/ANSI 60 certification is required in these situations rests with the water utility and/or the governmental regulatory agency that has primacy for enforcement of drinking water regulations in that location.

In many cases, a third-party NSF/ANSI 60 certification of the water utility's chemical handling operation may not be required, provided that each incoming chemical arrives in its original sealed container or bulk delivery vessel from an NSF/ANSI 60 certified chemical vendor, and subsequent chemical handling processes are monitored as part of the regulatory primacy agency's monitoring of the utility operation.

However, the water utility or governmental regulatory primacy agency may require a separate NSF/ANSI 60 certification of the utility's chemical production or handling operation. In this scenario, the water utility would apply for NSF/ANSI 60 certification and receive routine site audits and testing of the resulting chemical to the requirements of NSF/ANSI 60, similar to the process followed by chemical manufacturers and distributors.

Separate from product certification, NSF is also able to conduct testing of treatment chemicals that are produced (or distributed) at utility sites, upon request/contract by the water utility and/or the water regulatory primacy agency.



Master the Standards

Comprehensive Training from NSF International

Required by 49 U.S. states and the majority of Canadian provinces, standards NSF/ANSI 60 and 61 are recognized in much of North America; yet for many, the scope, intent and requirements of the standards are not well understood.

To help bridge this gap, NSF International provides complimentary webinars for staff at water utilities and state drinking water agencies as well as public health officials interested in an overview of these or other standards. Webinars can be customized to meet specific training goals for an organization. NSF also periodically hosts free webinars to provide information related to standard updates or other current industry topics.

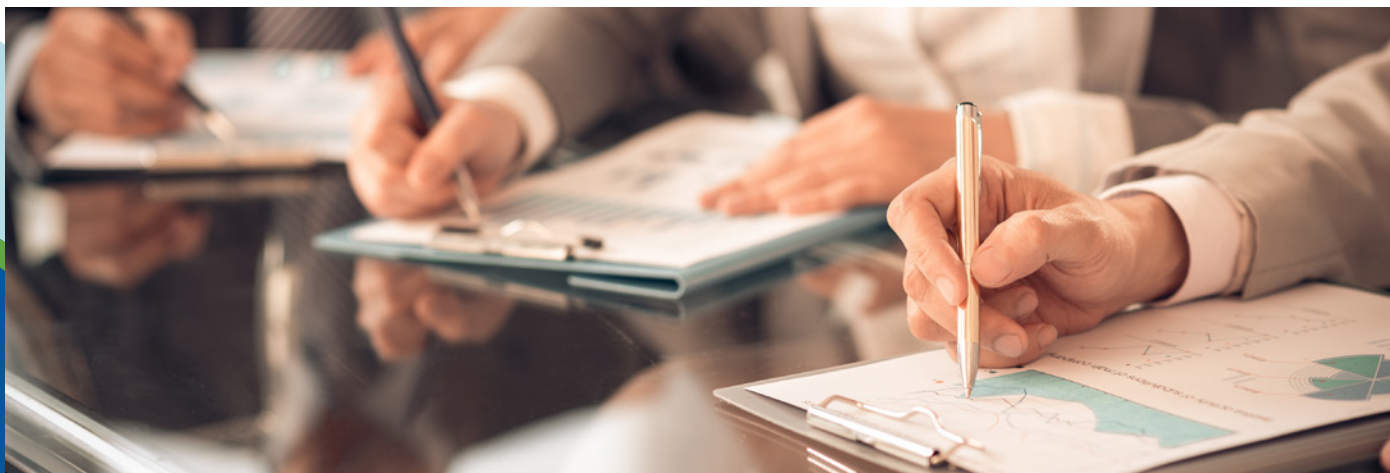
For more in-depth training, NSF offers full-day training courses on a number of standards including:

- > **NSF/ANSI 61:** *Drinking Water System Components – Health Effects*
- > **NSF/ANSI 372:** *Drinking Water System Components – Lead Content*
- > **NSF/ANSI 60:** *Drinking Water Treatment Chemicals – Health Effects*
- > **NSF/ANSI 50:** *Equipment for Swimming Pools, Spas, Hot Tubs and Other Recreational Water Facilities*

The full-day training courses listed above are offered on a regularly-scheduled basis at NSF International's headquarters in Ann Arbor, Michigan.

NSF can also bring any of our training courses to your location. Our on-site training provides cost and time savings, flexible scheduling, personalized attention and the ability to customize the content to focus on those topics that are most relevant for your organization.

All NSF courses are presented by water safety experts who have scientific and academic backgrounds and the hands-on industry experience necessary to provide an invaluable, relevant experience for attendees. If you would like to learn more about the training and education services NSF can provide for you, please visit www.nsf.org/training-education/training-water or contact regulatory@nsf.org.



Celebrating a Lifelong Dedication to Public Health and Safety

Pete Greiner's 40th Anniversary With NSF International

As NSF International celebrates the 30th anniversary of the publication of standards NSF/ANSI 60 and 61, we also celebrate the career of Pete Greiner.

This year marks an incredible 40 years of employment with NSF. During his career, Pete has worked in multiple areas and has contributed to the majority of certification programs in NSF's Water Division. Among his roles at NSF, Pete has served as the supervisor of the chemistry lab, manager of new certification programs and technical manager for the water certification programs. He was instrumental in publishing the first NSF/ANSI 60 and 61 listing books which served as a directory of certified products long before our current online database existed.

During the past 20 years, Pete has served as the Technical Manager of Water Systems. In this role, he works with public health officials, engineers and manufacturers in the drinking water industry. While his primary focus has been on NSF/ANSI standards 14, 60, 61 and 372, he also has experience working with our drinking water treatment unit (DWTU) standards as well.

Pete has been very active in the development of NSF and ANSI standards since 1981 and was a voting member of the Joint Committees for Drinking Water Additives from 2001 through 2016. During those years, he chaired or actively participated in more than 50 task groups addressing key issues for NSF drinking water standards. Pete's technical guidance, expertise and commitment to protecting public health were showcased in his work in the development of NSF/ANSI 61 Annex G and later NSF/ANSI 372 for lead content.

Pete has dedicated a lifelong career to living the NSF mission to protect and improve global human health, and he has been a mentor and educator for those who have been lucky enough to know him and work with him.

NSF International would like to congratulate and thank Pete for all that he has done in contributing to the drinking water industry and to making water safer.



Congratulations on 40 years!

About the Authors



Blake Stark

General Manager, Treatment Chemicals and Filtration Media

stark@nsf.org

Blake Stark is the General Manager of NSF's treatment chemicals and filtration media programs and works with NSF's global testing, auditing and certification of these products. Stark has worked as a key member of the NSF International staff for over 28 years, holding important roles in the water treatment area and, before that, serving as an NSF product auditor on the field services team.



David Nance

Business Unit Manager, Water Distribution and Recreational Water Products

dnance@nsf.org

David Nance is the Business Unit Manager for NSF International's municipal water products and recreational water products programs and works with NSF's global testing, auditing and certification services for distribution system components and recreational water products. Nance has nine years of experience in NSF's municipal water products program.



Kathryn Foster

Technical Operations Manager, Municipal and Recreational Water Products

kfoster@nsf.org

Kathryn Foster is the Technical Operations Manager for NSF International's water distribution systems and recreational water programs, where she leads a team of technical reviewers who evaluate products to NSF/ANSI 61, 372 and 50. Foster has over nine years of experience in the water industry and is currently NSF's representative on the Drinking Water Additives Joint Committee with oversight of NSF/ANSI 61 and 372.



Scott Randall

Technical Operations Manager, Treatment Chemicals and Filtration Media

randall@nsf.org

Scott Randall is a Technical Operations Manager at NSF International overseeing the evaluation of treatment chemicals and media products against the requirement of NSF/ANSI standards 42, 44, 50, 60 and 61. He also works with NSF laboratories to develop and improve testing, and is the NSF representative on the NSF/ANSI 60 Joint Committee. He has over 17 years of testing and certification experience at NSF International.

**Suzan Somo**

Business Unit Manager, Municipal Water Products

ssomo@nsf.org

Suzan Somo is the Business Unit Manager of NSF International's municipal water products program and works with NSF's global testing, auditing and certification services for distribution system components. Somo has over ten years of water industry experience within the municipal water products and plumbing programs at NSF International.

**Theresa Bellish**

General Manager, Municipal Water Products

bellish@nsf.org

Theresa Bellish is the General Manager of NSF International's municipal water products program and works with NSF's global testing, auditing and certification services for drinking water treatment chemicals, distribution system components and recreational water products. Bellish has a long-standing career at NSF with over 18 years of experience in the water industry.

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Contact us for more information.

789 N. Dixboro Road | Ann Arbor, MI 48105 | **P** +1 734.769.8010

www.nsf.org

americas@nsf.org | europa@nsf.org | middleeast@nsf.org | asia@nsf.org

