

## **Upcoming Changes to NSF Drinking Water System Components Program**

### **There's No Need to Be Afraid**

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#### **ABSTRACT**

On January 1, 2023, NSF will implement lower extractable limits for certain components in NSF/ANSI/CAN Std. 61/600. This paper will discuss the impact that the change to the extractable limits in NSF Standard 61 will have on facility owners, contractors and specifying engineers. By now, most in the water industry have heard about the new lower extractable limits will take effect on January 1, 2023; but there is significant uncertainty among tank owners and specifying engineers as to how this new standard will impact the coating of water tanks in the near term and future. This paper will analyze how these changes will impact current technology and legacy tank coatings and discuss the use of ultra-high solids coating technology to comply with these standards. While this paper will address the technological impacts of this standard, it will also address the practical considerations related to tank owners and specifiers. This paper will clear up confusion and misunderstanding in the tank painting industry regarding the impact of the new NSF 600 standard.

Key words: NSF, National Sanitation Foundation, Water Tanks, Potable Water, Coatings

#### **INTRODUCTION**

In 1984 the US EPA issued a Request for Proposals to select a provider to privatize the approval of products and components used in water distribution systems across the United States. A team which was led by NSF International and 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 was awarded the contract to develop the standard.

In 1988, *NSF/ANSI 61: Drinking Water System Components — Health Effects* was published as a result of the work of this team. This standard established minimum requirements for the control of potential adverse human health effects from products that contact drinking water and has been updated regularly since then to add testing criteria for additional contaminants and product types.

## Scope of the Standard

NSF/ANSI 61 is 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 products covered by this standard, which include:

- Pipes and related products (pipe, hose and fittings)
- Protective and barrier materials (cements/coatings)
- Joining and sealing materials (gaskets, adhesives and lubricants)
- Process media (filter media)
- Mechanical devices (water meters, valves and filters)
- Mechanical plumbing devices (faucets, drinking fountains and components)
- Potable water materials (non-metallic materials)

NSF/ANSI 61 is a performance-based standard that evaluates the amount of contaminants that leach from the products into drinking water, rather than setting prescriptive limits on the content of the materials themselves. This differs from U.S. Food and Drug Administration requirements and some international standards that are based only on prescriptive content requirements. Currently, forty-eight U.S. states, parts of Canada, and various other countries around the world require municipal drinking water system components to comply with the requirements of the NSF/ANSI 61 standard.

In 2018 the standard was renamed *NSF/ANSI/CAN 61: 2018 Drinking Water System Components — Health Effects*. Additionally, at this time, Annex A of standards 60 and 61 were published as a companion standard entitled *NSF/ANSI/CAN 600: Health Effects Evaluation and Criteria in Drinking Water*. This new companion standard includes the health risk assessment information.

## CHANGES TO THE STANDARD

The 2018 revision to the standard included a drastic reduction of the Maximum Contaminant Levels (MCLs) of xylene, toluene and ethylbenzene which are set to take effect in January 2023. The proposed Jan. 1, 2023 timeline was set to allow manufacturers and other parts of the industry time to adjust and prepare for these very significant changes. **Table 1** Summarizes the changes.

| COMPOUND                                                                  | PREVIOUS CRITERIA IN PPB<br>(TAC/SPAC) | NEW CRITERIA IN PPB<br>(TAC/SPAC) | IMPLEMENTATION DEADLINE          |
|---------------------------------------------------------------------------|----------------------------------------|-----------------------------------|----------------------------------|
| Benzo(a)pyrene                                                            | 0.2/0.02                               | 0.04/0.004                        | Immediate                        |
| Perfluorooctanoic Acid (PFOA)<br>& Perfluorooctanesulfonic Acid<br>(PFOS) | 3/0.3                                  | 0.07/0.007 Total)                 | Products must comply by 1/1/2020 |
| Triphenylphosphine Oxide                                                  | 3/0.3                                  | 1/0.1                             | Products must comply by 1/1/2020 |
| Total Xylenes                                                             | 10,000/1,000                           | 90/9                              | Products must comply by 1/1/2023 |
| Toluene                                                                   | 1,000/100                              | 60/6                              | Products must comply by 1/1/2023 |
| Ethylbenzene                                                              | 700/70                                 | 140/14                            | Products must comply by 1/1/2023 |

**Table 1: Changes to the NSF/ANSI/CAN 61/600 Extractable Levels**

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“TAC” is defined in NSF/ANSI/CAN 61 as “The maximum concentration of a nonregulated contaminant allowed in a public drinking water supply as defined by NSF/ANSI/CAN 600 (previously Annex A)” and “SPAC” is defined in NSF/ANSI/CAN 61 as “The maximum concentration of a contaminant in drinking water that a single product is allowed to contribute as defined by NSF/ANSI/CAN 600 (previously Annex A)”. SPAC is 1/10 of TAC by default. As noted in **Table 1**, the Total Allowable Concentration (TAC) and Single Product Allowable Concentrations (SPAC) in parts per billion for Xylene, Toluene, and Ethylbenzene are dramatically reduced under the pending extractables changes. This makes the use of most current solvent-borne formulations of internal barrier epoxies non-compliant with the new drinking water standards and will force a shift in the technology used to line interior of potable water tanks.

## SOLUTIONS FOR COMPLIANCE

There seems to be a fear in the industry among engineers and municipal tank owners that coating manufacturers are not prepared for the new standard and/or that the new standard will drive costs out of reach for smaller municipalities. This fear is mostly unfounded. Coating manufacturers have been aware of the changes for quite some time and have made preparations to have compliant materials available. It also turns out that the materials expected to be compliant with the new standards gave some very real benefits to the long-term protection of the tanks.

Let’s look at the current coating systems. AWWA D102-17 Interior Coatings Systems (ICS) lists 6 approved systems:

- AWWA D102 - ICS#1 – 2 Coat Epoxy – 8 Mils DFT
- AWWA D102 - ICS#2 – 3 Coat Epoxy – 12 Mils DFT
- AWWA D102 - ICS#3 – 1 Coat UHS Epoxy – 20 Mils DFT
- AWWA D102 - ICS#4 – 1 Coat UHS Elastomeric Polyurethane – 25 mils DFT
- AWWA D102 - ICS#5 – 3 Coat Zinc/Epoxy/Epoxy- 10 Mils DFT
- AWWA D102 - ICS#6 – 2 Coat Zinc/Epoxy – 12.5 Mils DFT

Of these 6, ICS #1, ICS #2, ICS #5, and ICS #6 utilize solvent-borne epoxy linings. Most, if not all, of the current solvent-borne epoxy formulations for internal barrier protection will not meet the new drinking water standards as of January 1, 2023. This will cause a shift in technology to ultra-high solids lining materials while manufacturers develop novel solvent-borne technology that meets the lower extractable levels. This paper will address the currently available ultra-high solids materials.

## History of Ultra-High Solids Epoxies as Tank Linings

Coatings are considered an essential part of the corrosion control process to protect steel surfaces. Corrosion in steel water storage tanks, ship tanks and petrochemical tanks has been well studied over the years. As a result, corrosion control measures have been developed for interior, under side, and exterior surfaces of those tanks. Some of the significant cause of premature coating failure and resulting corrosion are insufficient DFT, poor film thickness on sharp edges or irregular surfaces, pinholes, voids, holidays, or incompatibility with cathodic protection.

For many years, the U.S. Navy was plagued with early corrosion and coating failures while trying to maintain chemical holding tanks, water storage tanks, ballast and fuel tanks, and other critical ship structures in immersion service. These structures are full of hard edges, weld seams, irregular surfaces, and hard to access surfaces much like the roof and rafter systems seen every day in municipal steel water storage tanks.

In 1995, the Navy began a five-year program to improve its materials and practices for preserving tanks with coatings. At that time, the Navy’s traditional solvent-borne thin film tank coating systems had a life