

## REQUEST FOR PROPOSALS

### BASIS AND RECOMMENDATION OF ACTUAL DRINKING WATERS FOR BENCHMARKING NSF/ANSI STANDARD 61 TEST SOLUTIONS

#### Objective

This research is part of a larger project to quantify the corrosion characteristics of actual drinking waters in North America with respect to metal leaching from brass enabling comparison with the corrosion characteristics of the test waters used in NSF/ANSI Standard 61. The objective of this RFP is to collect data on actual finished drinking waters and make recommendations of those that should be used during the comparative extraction portion of the larger study to serve as benchmarks that standard test solutions can be compared against.

#### Background

ANSI/NSF Standard 61: Drinking Water System Components, Health Effects is the American National Standard used to address the health effects concerns from potential extractants from products that come into contact with drinking water. The standard covers products that contact drinking water from source to tap and is concerned with all potential extractants, not just lead.

In response to concerns raised about the evaluation of lead under NSF 61, the Drinking Water Additives Joint Committee (DWA JC) that oversees the standard created the Lead Task Group (LTG) to investigate. One of the key findings of that group was the lack of available data to sufficiently characterize the corrosion characteristics of drinking waters which presents a significant data gap in either evaluating the effectiveness of the current Standard 61 exposure waters or setting an appropriate measure to evaluate new test water development. The purpose of these studies is to fill that data gap.

Although Std 61 is concerned with all potential extractants from all material types, the research requested in this project is limited to the extraction of metals from brass, especially lead. It is anticipated that the research approach and data collected may be applied to other material types and other potential extractants at a later date.

#### Research Approach

This project will collect currently available information on drinking waters and apply the current state-of-the-art knowledge on water corrosion chemistry to select representative water chemistries that will be used for benchmarking standard extraction testing. The characteristics of the waters selected for benchmarking are to be reflective of actual drinking water, and be appropriately aggressive to represent a conservative assessment of the extraction potential of metals from common brass alloys used in the manufacture of plumbing products (Table 1). A list of key finished (e.g. post disinfectant contact, fluoridation and corrosion control, if present) water quality parameters, water treatment processes used and water system data to be collected is provided below. A respondent may propose additional data collection by listing data to be collected along with a rationale as to their relevance and importance in the context of this project.

Key components of the research will include the following.

- Establish data collection needs: Identification of water quality parameters, water treatment processes used, and water system data for collection. At a minimum, the finished water parameters to survey should include, where applicable;
  - pH
  - Free Chlorine
  - Total Chlorine
  - Combined Chlorine
  - Orthophosphate
  - Total Phosphate
  - Alkalinity

- Aluminum
  - Calcium
  - Chloride
  - Fluoride
  - Iron
  - Magnesium
  - Manganese
  - Nitrate
  - Silica
  - Sodium
  - Specific Conductance
  - Sulfate
  - Total Dissolved Solids
  - Total Inorganic Carbon
  - Total Organic Carbon
  - Regulated Metals
  - Zinc
- Collection of drinking water data: Establish a scheme for characterizing the range and concentration distribution of important water chemistry parameters based on existing data from sources such as (but not restricted to);
    - Private or public water utilities
    - State regulatory and health agencies
    - City/County health departments
    - United States Geological Survey (USGS)
    - Contractors / Consultants working with water systems
    - National Rural Water Association (NRWA)
    - Federal-Provincial-Territorial Committee on Drinking Water
    - AWWA Journal and conference publications

Data should be organized to address the categories;

- Large public water systems
- Medium and small public water systems
- Private well systems and transient non-community systems

Data gaps are to be filled in by supplementary sampling and analysis of finished waters from appropriate systems for listed parameters (above).

- Evaluation of drinking water data: Perform an analysis of the data collected to reduce or group the findings to several worst-case waters. Within the context of this project, worst-case waters are defined as those that are the most aggressive towards the identified metals with respect to leaching.
- Report findings: The report should provide a summary of the data collected, a recommendation of actual drinking waters to use for benchmarking, and rationale, including corrosion theory, for the water groupings and representatives selected.

Please refer to Tables 1 and 2 (attached).

## Budget and Time Schedule

The maximum funding available from \_\_\_\_\_ for this project is \$\_\_\_\_\_.

The project period should be realistic, anticipate possible starting delays, and provide ample time for the writing of final reports and review of project results. Progress reports may be required on a periodic basis. The final report must be submitted in a format that is camera-ready to publish and should include a separate chapter on recommendations.

## Application Procedure and Deadline

Questions to clarify the intent of this Request for Proposals may be addressed to the project manager \_\_\_\_\_, at (\_\_\_\_)\_\_\_\_-\_\_\_\_ or by e-mail at \_\_\_\_\_. Proposals must be postmarked on or before \_\_\_\_/\_\_\_\_/\_\_\_\_. <number of> copies of the proposal should be sent to:

Chairperson, Lead Task Group  
c/o Joint Committee Secretariat, Sarah Kozanecki  
NSF International  
789 N. Dixboro Road  
Ann Arbor, MI 48105

**Table 1A. Typical Wrought Brass Alloys Used for Faucets and Fittings**

<b>Typical Alloys Used for Faucets and Fittings</b>	<b>Copper (%)</b>	<b>Tin (%)</b>	<b>Lead (%)</b>	<b>Zinc (%)</b>	<b>Bismuth (%)</b>	<b>Se (%)</b>	<b>Ni (%)</b>	<b>Fe (%)</b>	<b>S (%)</b>	<b>P (%)</b>	<b>Other Named Elements (%)</b>
C34000 <sup>(1)</sup>	62 – 65		0.8 – 1.5	Rem <sup>(2)</sup>				0.15			
C34500 <sup>(1)</sup>	62 – 65		1.5 – 2.5	Rem <sup>(2)</sup>							
C35300 <sup>(4)</sup>	60 – 63 <sup>(3)</sup>		1.5 – 2.5	Rem <sup>(2)</sup>							
C36000 <sup>(4)</sup> (free cutting brass)	60 – 63		2.5 – 3.7	Rem <sup>(2)</sup>				0.35			
C37700 <sup>(4)</sup> (forging brass)	58 – 61		1.5 – 2.5	Rem <sup>(2)</sup>				0.30			

Values that are not listed as a range indicate maximum % allowable

(1) : Cu + Sum of Named Elements, 99.6% min.

(2) : Rem – Remaining percentage, approximately 35 – 40%

(3) : Cu, 61.0% min. for rod.

(4) : Cu + Sum of Named Elements, 99.5% min.

Sources: AwwaRF 1990; CDA 2005

**Table 1B. Typical Cast Brass Alloys Used for Faucets and Fittings**

Typical Alloys Used for Faucets and Fittings	Copper (%)	Tin (%)	Lead (%)	Zinc (%)	Bismuth (%)	Se (%)	Ni (%)	Fe (%)	S (%)	P (%)	Other Named Elements (%)
C83600 <sup>(1)</sup> (red brass)	84 – 86 <sup>(2)</sup>	4 – 6	4 – 6	4 – 6			1.0 <sup>(3)</sup>	0.30	.08	.05 <sup>(4)</sup>	Sb .250 Al .005 Si .005
C83800 <sup>(1)</sup> (red brass)	82 – 83.8 <sup>(2)</sup>	3.3 – 4.2	5 – 7	5 – 8			1.0 <sup>(3)</sup>	0.30	.08	.03 <sup>(4)</sup>	Sb .250 Al .005 Si .005
C84400 <sup>(1)</sup> (semi-red brass)	78 - 82 <sup>(2)</sup>	2.3 – 3.5	6 – 8	7 – 10			1.0 <sup>(3)</sup>	0.40	.08	.02 <sup>(4)</sup>	Sb .250 Al .005 Si .005
C85200 <sup>(5)</sup> (yellow brass)	70 – 74 <sup>(2)</sup>	0.7 – 2.0	1.5 – 3.8	20 – 27			1.0 <sup>(3)</sup>	0.6	.05	.02	Sb .200 Al .005 Si .050
C85400 <sup>(6)</sup> (yellow brass)	65 – 70 <sup>(2)</sup>	0.5 – 1.5	1.5 – 3.8	24 - 32			1.0 <sup>(3)</sup>	0.7			Al .350 Si .050
C85800 <sup>(7)</sup> (yellow brass)	Min 57% <sup>(2)</sup>	1.5	1.5	31 – 41			0.50 <sup>(3)</sup>	0.50	.05	.01	Sb .050 Mn .250 As .050 Al .005 Si .005
C87500 <sup>(8)</sup> (silicon brass)	79.0 min.		.50	12 - 16							Al .50 Si 3 - 5
C89510 <sup>(8)</sup> (EnviroBrass I™)	86 – 88	4 – 6	0.25	4 – 6	.5 – 1.5 <sup>(9)</sup>	.35 – .75 <sup>(9)</sup>	1.0 <sup>(3)</sup>	0.2	.08	.05	Sb .250 Al .005 Si .005
C89520 <sup>(8)</sup> (EnviroBrass II™)	85 – 87	5 – 6	0.25	4 – 6	1.6 – 2.2 <sup>(10)</sup>	0.8 – 1.1 <sup>(10)</sup>	1.0 <sup>(3)</sup>	0.2	.08	.05	Sb .250 Al .005 Si .005
C89550 <sup>(8)</sup> (EnviroBrass III™)	58 – 64	1.2	0.10	32 – 38	0.6 – 1.2	0.01 – 0.1	1.0 <sup>(3)</sup>	0.5	.05	.01	Sb .250 Al .005 Si .005
C89833 <sup>(1)</sup> (FederAlloy)	87 – 91	4 – 6	0.10	2 – 4	1.7 – 2.7		1.0 <sup>(3)</sup>	0.3	.08	.05	Sb .250 Al .005 Si .005
C89836 <sup>(1)</sup>	87 - 91	4 - 7	.25	2 - 4	1.5 – 3.5		.90 <sup>(3)</sup>	.35	.08	.06	Sb .250 Al .005 Si .005

Values that are not listed as a range indicate maximum % allowable

(1) : Cu + Sum of Named Elements, 99.3% min

(2) : In determining Cu min., Cu may be calculated as Cu + Ni.

(3) : Ni value includes Co.

(4) : For continuous castings, P shall be 1.5%, max.

(5) : Cu + Sum of Named Elements, 99.1% min.

(6) : Cu + Sum of Named Elements, 98.9% min

(7) : Cu + Sum of Named Elements, 98.7% min

(8) : Cu + Sum of Named Elements, 99.5% min.

(9) : Experience favors Bi:Se &gt;= 2:1

(10) : Bi:Se &gt;= 2:1

Sources: AwwaRF 1990; CDA 2005