California Environmental Protection Agency
DEPARTMENT OF TOXIC SUBSTANCES CONTROL

2011 REPORT OF LEAD IN PLUMBING SAMPLING

For Sampling Results obtained From DTSC Sampling conducted January 1, 2011 through December 31, 2011

SECOND ANNUAL REPORT

PURSUANT TO HEALTH AND SAFETY CODE SECTION 25214.4.3

FEBRUARY 2013

Department of Toxic Substances Control

DEPARTMENT OF TOXIC SUBSTANCES CONTROL

The mission of DTSC is to protect California's people and environment from harmful effects of toxic substances through the restoration of contaminated resources, enforcement, regulation and pollution prevention.

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EXECUTIVE SUMMARY

This report fulfills the requirements of Health and Safety Code section 25214.4.3, mandating the Department of Toxic Substances Control (DTSC) to issue an annual report on its plumbing monitoring and compliance testing program. In this report, DTSC presents the results of its testing and evaluation of plumbing system products sampled in 2011. The report includes the following:

(1) DTSC's testing and evaluation results, including chemical analyses for the lead content of each tested product component.;

(2) DTSC's calculation of each product's weighted average, lead content; and

(3) Actions taken by DTSC to inform the California Department of Public Health (CDPH), public, and stakeholders, in accordance with California Law.

BACKGROUND

In 2010, a California law took effect. The law reduces the amount of lead allowed in plumbing components intended to convey, or dispense water for human consumption. Depending on the level of exposure, lead in drinking water can cause a variety of adverse health effects; in general, infants and children are much more susceptible to these effects than adults. No safe blood lead level in children has been determined[1].

Specifically, California law prohibits the introduction into commerce of any pipe, plumbing fitting, or plumbing fixture intended to convey or dispense water for human consumption that is not "lead-free", (Health & Saf. Code, § 116875). The law defines "lead-free" as:

- For pipes, pipe fittings, plumbing fittings and fixtures: not more than a weighted average of 0.25 percent lead content and
- For flux and solder: not more than 0.2 percent lead.

Additionally, California law requires all pipes, pipe or plumbing fittings or fixtures, solder, or flux to be certified for compliance with this standard by independent, accredited third parties.

Finally, California law requires DTSC to conduct annual testing to evaluate compliance with the standard set forth in Health and Safety Code section 116875. (Health & Saf. Code, § 25214.4.3). Section 25214.4.3 requires DTSC to:

1. To the extent resources are available, annually select at locations that are readily accessible to the public up to 75 drinking water faucets and other fittings and fixtures for testing and evaluation, to determine compliance with the "lead-free" standards in Health and Safety Code Section 116875;
2. Use test methods, protocols, and sample preparation procedures that are adequate to determine the total lead concentration in a drinking water plumbing fitting or fixture;

1 http://www.atsdr.cdc.gov/ToxProfiles/tp13.pdf

3. Post the test results on DTSC's Internet web site; and
4. Transmit the test results in an annual report to the CDPH.

As required by Health in Safety Code section 25214.4.3, this is DTSC's second annual report on its testing of plumbing products for compliance with the California's lead-free plumbing standard. It contains the results of DTSC's sampling conducted during calendar year 2011.

DTSC SAMPLING METHODS AND ANALYTICAL RESULTS

As required in Health and Safety Code section 25214.4.3, DTSC collected plumbing product samples from retail and wholesale locations, readily accessible to the public. DTSC also obtained samples from internet locations. The products originated from different geographic areas within California; (1) Sacramento and Bay Area, (2) the Greater Los Angeles Area, and (3) the El Centro Metropolitan Area. The samples were collected between March 30, 2011 and June 16, 2011. DTSC selected 20 distinct consumer plumbing system products offered for sale to the public and intended for potable water use. In most cases duplicate samples were obtained for each product.

A total of 40 plumbing samples were obtained; 73 individual components of these samples were analyzed, and the wetted surface area of each component was calculated as necessary. Each component's lead concentration and wetted surface area were used, as required, to calculate the product's weighted average lead content. California law requires that the lead content of every component of a plumbing product that comes into contact with water must be factored into the product's weighted average lead content.

Of the 40 individual plumbing samples tested:

- Twenty Four (24) were obtained from large retail locations;
- Sixteen (16) were obtained from small/independent retail locations.

Product samples by category were:

- Eight (8) water stop control valves;
- Twenty Eight (28) plumbing pipes or fittings; and
- Four (4) drinking water faucet components and accessories.

RESULTS SUMMARY

Figure 1. Chart of Statistical Ranges for Lead Content Test Results

Due to limitations of sampling size and requirements under the law, the products selected are not representative of all products offered for sale in California. However, DTSC's sampling and testing data, provide some monitoring and compliance baselines. Such information may be useful to identify any trends in products that show a pattern of exceeding "lead-free" standards; provide consumers independent information on product compliance with the lead-free standards; or help identify points of non-compliance in the manufacturing and supply chains. Additionally, this data can assist DTSC in developing future sampling strategies.

Below are sampling results sorted by location purchased and product type:

DTSC testing results by sales location:

- 100% of the 24 samples obtained from large retail locations were determined to meet the "lead-free" standard of less than 0.25% by DTSC.

- 75% of the 16 samples obtained from small and independent retail locations were determined to meet the “lead-free” standard of less than 0.25%.

DTSC testing results by product types:

- Drinking water faucet accessory and repair components: 50% of four plumbing products tested were determined to be “lead-free.”
- Valves: 100% of eight plumbing products tested were determined to be “lead-free.”
- Pipes/Fittings: 93% of 28 plumbing products tested were determined to be “lead-free.”

Detailed analytical findings for each product are available in Appendix C.

DISCLAIMER

As required by the Health and Safety Code section 25214.4.3, this report presents sampling and testing conducted by DTSC to determine the lead content contained in the plumbing products DTSC sampled. DTSC provides this information to satisfy legal requirements and to provide information to the public. Any discussion of commercially available products, or compliance with the lead standards, does not constitute an actual or implied endorsement, nor a regulatory opinion of these products by DTSC.

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SECTION 1. INTRODUCTION

DTSC prepared this report pursuant to Health and Safety Code section 25214.4.3, which requires DTSC to conduct lead plumbing monitoring and compliance testing as a part of its ongoing programs to monitor and promote reductions in levels of toxic substances in consumer products and the environment. Recent changes to California law reduce the amount of lead allowed in plumbing components intended to convey or dispense water for human consumption. These requirements apply to pipes, pipe or plumbing fittings, fixtures, solder, or flux intended to convey or dispense water for human consumption. Lead is a common additive in plumbing materials such as lead solder, brass, bronze, and other metal alloys.

The United States Environmental Protection Agency (EPA) has found that lead can enter drinking water primarily through plumbing materials. Lead in drinking water results primarily from corrosion of lead-containing plumbing materials that are in contact with water[2]. It is a common additive to plumbing materials that can leach from pipes and faucets into drinking water and especially harm infants and children. Furthermore, research has shown that pregnant women can pass lead contained in their bodies, to their fetuses. EPA published a regulation on June 7, 1991, known as the Lead and Copper Rule, to control lead and copper in drinking water. This regulation is (also referred to as the LCR or 1991 Rule).

Concerned about the safety of any amount of lead in drinking water, California enacted several laws to reduce the lead content in drinking water distribution products. Specifically:

- State law prohibits the use of any pipe, pipe or plumbing fitting or fixture, solder, or flux that is not “lead-free”, as defined in statute, in the installation or repair of any public water system or any plumbing in a facility providing water for human consumption, except when necessary for repairing leaded joints of cast iron pipes. (Health & Saf. Code, § 116875, subd. (a).)
- State law prohibits the introduction into commerce of any pipe, pipe or plumbing fitting, or fixture intended to convey or dispense water for human consumption that is not “lead-free” as defined in statute. (Health & Saf. Code, § 116875, subd. (b).)
- State law prohibits any person engaged in the business of selling plumbing supplies, except manufacturers, from selling solder or flux that is not “lead-free” as defined in statute. (Health & Saf. Code, § 116875, subd. (c).)
- State law prohibits the introduction into commerce of any solder or flux that is not “lead-free” unless the solder or flux bears a label stating that it is illegal to use the solder or flux in the installation or repair of any plumbing providing water for human consumption. (Health & Saf. Code, § 116875, subd. (d).)

Before January 1, 2010, federal and state standards for the maximum allowable lead content in “lead-free” pipes, pipe or plumbing fittings, fixtures, solder, or flux were as follows:

- Solder and flux: Not more than 0.2 percent lead;

2 http://water.epa.gov/lawsregs/rulesregs/sdwa/lcr/index.cfm, accessed July 8, 2011.

- Pipes and pipe fittings: Not more than 8 percent lead; and
- Plumbing fittings and fixtures: Not more than 4 percent lead by dry weight.

After January 1, 2010, under California law the maximum allowable lead content in “lead-free” pipes, pipe or plumbing fittings, fixtures, solder, or flux intended to convey or dispense water for human consumption through drinking or cooking are as follows:

- Solder and flux: Not more than 0.2 percent lead; and
- Pipes, pipe fittings, plumbing fittings and fixtures: Not more than 0.25 percent lead in wetted surfaces as determined by a weighted average calculated according to a formula specified in statute..

Additionally, California law requires all pipes, pipe or plumbing fittings or fixtures, solder, or flux to be certified for compliance with this standard by independent, accredited third parties. (Health & Saf. Code, § 116875, subd. (g).)

For a complete description of the lead-in-plumbing requirements, consult the laws referenced above.

DTSC is required to conduct annual lead plumbing monitoring testing. Health and Safety Code section 25214.4.3 requires DTSC to annually collect up to 75 samples of plumbing products for testing and evaluation, as resources allow. The required samples shall consist of drinking water faucets or other drinking water plumbing fittings and fixtures based on available resources. The purpose of the testing and evaluation is to determine compliance with Health and Safety Code section 116875. DTSC is required to post the results of its testing on its web site, and transmit the results in an annual report to California Department of Public Health (CDPH).

SECTION 2. SAMPLE COLLECTION AND ANALYSIS

DTSC collected and analyzed plumbing products following procedures outlined in DTSC Fact Sheet "Interim Drinking Water Plumbing Products Sampling and Evaluation Strategies and Procedures" – April 2010 (Please see Appendix A).

DTSC's Environmental Chemistry Laboratory (ECL) conducted chemical analyses of samples obtained for this report. Quality control followed Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846) criteria, manufacturer manuals, and ECL's Standard Operating Procedures (SOPs). The analytical procedures described in the document were validated during DTSC's participation with the Lead Task Group of the National Sanitation Foundation (NSF) Joint Committee and in a 2009 inter-laboratory round-robin study that compared tests used by ECL and third-party testing laboratories for determining lead in brass alloys.

Product Selection

DTSC collected all of the 2011 samples between March 30, and June 17, 2011. The products selected by DTSC represented a cross section of mechanical plumbing devices, components, and materials which are typically installed within the last liter of the water distribution system and intended by the manufacturer to dispense water for human consumption. Figure 2 provides a summary of the different types of products DTSC sampled. Many of the products sampled contained more than one component. California law requires that the wetted surface area of every individual component that comes into contact with water must be factored into the calculations where necessary to determine compliance. Therefore, many of the product samples required disassembly and measurement of their individual components prior to preparation and delivery to the laboratory. A total of 73 individual components from 20 products were disassembled, measured, and analyzed for lead. Table 1 provides a detailed description of products sampled.

Sampling Locations

Under DTSC's 2010 sample collection strategy and as required in Health and Safety Code section 25214.4.3, samples were collected from locations that are readily accessible to the public, including both retail and wholesale locations. DTSC purchased 40 plumbing products from various geographic areas within California: (1) Sacramento and Bay Area, (2) the Greater Los Angeles Area, and (3) the El Centro Metropolitan Area. The samples collected by DTSC do not represent a statistical or representative sample of plumbing products offered for sale in California. Health and Safety Code section 25214.4.3 does not require DTSC to conduct representative or random sampling, and resources are not available to collect and analyze a representative sample of the thousands of plumbing products offered for sale to the public.

DTSC collected 40 samples of 20 individual products at 10 different retail locations. Table 1 provides a description of the sampling locations for the 20 products sampled. When asked by DTSC staff, employees of most of the retail locations stated they had performed various inventory controls to remove older, potentially non-compliant products from the shelf. DTSC additionally observed that many retail locations had signage informing consumers that only plumbing products marked as "lead-free" should be used for potable water, even though there is no requirement to provide such information to the public under the lead in plumbing law.

TABLE 1: DESCRIPTION OF PLUMBING PRODUCTS SAMPLED

Sample #	Product Description	Number of Wetted Surface Area Components	Sampling Location
01	Quarter Turn Straight Valve (LF)	9	San Francisco
02	Female Pipe Tee (LF)	1	San Francisco
03	ADD-A-TEE Adapter (LF)	2	San Francisco
04	½" x ½" FNPT Elbow (LF)	3	El Centro
05	¼" x 3/8" MIP Elbow (LF)	2	El Centro
06	Female compression to tube adapter ½" X 3/8" (LF)	1	El Centro
07	½" Brass Nipple	1	Brawley
08	½" Brass Elbow	1	Brawley
09	½" Compression Gate Valve (LF)	8	Elk Grove
10	½" x ½" Elbow (LF)	1	Elk Grove
11	Hot/Cold Stem (LF)	6	Los Angeles
12	½" Brass Gate Valve (LF)	6	Los Angeles
13	¼" x ¼" FE COUP (LF)	2	Los Angeles
14	Ander-Ligh Tube to MIP Adapter ¼" x 3/8" (LF)	2	Los Angeles
15	Brass Barb Splicer 3/8" (LF)	1	Los Angeles
16	Angle Valve 1/2" ELP / 7/16" or 1/2" O.D (LF)	9	Tustin
17	Elbow 45 3/8" Galvanized	1	Irvine
18	3/8" x 1/4" Adapter (LF)	2	Irvine
19	Water Filter Diverter Aerator Swivel 1/4"	12	Los Angeles
20	Copper Tee	1	Los Angeles
(LF) Denotes product samples marked or packaged as "lead-free".			

NOTIFICATION

- DTSC makes a best effort to identify manufacturer and/or distributor contact information (e.g., contact address, phone number, etc.) and notify each manufacturer and/or distributor in a timely matter after product collection.
- Included in manufacturer/distributor notification are the labels and markings obtained during product collection.
- Request made from manufacturer and/or distributor for any relevant product information
- DTSC may notify manufacturers or distributors of the testing results.
- The level of interaction DTSC will have with manufacturers, distributors, importers, wholesalers, retailers and/or certifiers will be determined on a case-by-case basis.

SECTION 3. SAMPLING PROTOCOLS AND ANALYTICAL RESULTS

Sample Preparation and Analytical Methods

DTSC followed procedures outlined in DTSC Fact Sheet "Testing and Evaluation of Lead Content in Plumbing Products, Materials, and Components" – August 2009 (Please see Appendix E) for DTSC sample preparation and analytical testing.

The analytical procedures described in the factsheet were validated during DTSC's participation with the Lead Task Group of the National Sanitation Foundation (NSF) Joint Committee, and in a 2009 inter-laboratory round-robin study that compared tests used by ECL and third-party testing laboratories for determining lead in brass alloys.

DTSC released its testing protocols document to inform third party testing organizations and other stakeholders on how DTSC intended to test plumbing fixtures. The testing protocol document was not meant to be prescriptive. Since its release, DTSC received several comments, including those from the Lead Task Group of the NSF Joint Committee, indicating that the document provides a helpful source of information for third party testing organizations and other stakeholders. DTSC continues to revise its public website's FAQ section with additional responses to questions and concerns raised by interested parties.

DTSC's Environmental Chemistry Laboratory (ECL) conducted chemical analyses of all samples. ECL analyzed the samples according to the method published in the DTSC Fact Sheet, "Testing and Evaluation of Lead Content in Plumbing Products, Materials and Components" dated August 2009. Section 2 of the Fact Sheet provides the details of the lead content analytical procedures.

The preparation of individual sample components for analysis is obtained by various methods, such as drilling, turning, sawing, or milling. In order to obtain particle sizes sufficient for complete acid digestions and ICAP laboratory analysis it was necessary to dissolve a minimum of 1.0 gram of sample in accordance with U. S. EPA SW-846 Method 3050B, Method 3052, or equivalent. See Appendix B for procedures used by DTSC in preparation of sampling products for analysis.

ECL conducted laboratory screening of non-metallic components such as rubber and plastic seals by X-Ray Fluorescence (XRF) spectroscopy, using a Bruker Tracer III-SD System. Nonmetallic components that had XRF readings detecting the presence of lead above the detection Limit of 10-20 mg/Kg were processed for further analyses using EPA SW-846 Method 6010C. Brass and metallic components are analyzed using ICAP analysis. Quality control followed Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846) criteria, manufacturer manuals, and ECL's Standard Operating Procedures (SOPs).

Additional Details in the Determination of Weighted Average Lead Content

General Evaluation Protocol:

- **All components ≤0.25%**

  If all wetted components of a product had lead content of not more than 0.25%, then the

product was considered compliant with the "lead-free" standard; no further calculations were performed.

- **All components >0.25%**

  If all wetted components of a product had lead content higher than 0.25%, the product was considered noncompliant with the "lead-free" standard; no further calculations were performed.

- **Some components > 0.25%**

  If some, but not all, wetted components of a product contained more than 0.25% lead, then the wetted surface area measurements and weighted lead content were calculated to determine the product's compliance with the "lead-free" standard.

Weighted average lead content calculation:

- All of the wetted surfaces are included in the weighted average lead content calculation, not just those surfaces that contain lead.
- Wetted surface area calculations were performed independently by DTSC staff for all unique product samples collected.
- The results of the weighted average lead calculations are rounded to two decimal places to determine compliance with the requirements of Health and Safety Code section 25214.4.3.
- For duplicated samples, DTSC assumed that the sizes and wetted surface areas of their respective components were the same; therefore, the calculations were performed on only one of the replicates.

According to Health and Safety Code Section 116875 (e), the weighted average lead content of a pipe and pipe fitting, plumbing fitting, and fixture is calculated by using the following formula:

> The percentage of lead content within each component that comes into contact with water shall be multiplied by the percent of the total wetted surface of the entire pipe and pipe fitting, plumbing fitting, or fixture represented in each lead-containing component. These percentages shall be added and the sum shall constitute the weighted average lead content of the pipe and pipe fitting, plumbing fitting, or fixture. (Health & Safety Code §116875, subd. (e)).

DTSC used the following prescribed formula according to NSF/ANSI Standard 61-Annex G, and Standard 372 to calculate the weighted average lead content of plumbing products:

$$WLC = \sum_{c=1}^{n} \left(LC_c \, x \left[\frac{WSA_c}{WSA_t} \right] \right)$$

WLC = *weighted average lead content of product*

LC_c = *percentage lead content of component*

WSA_c = *wetted surface area of component*

WSA_t = *total wetted surface area of all components*

n = *number of wetted components in product*

DTSC Sampling Results:

Sampling results for products selected in 2010 are provided in Figures 2 and 3. A detailed summary of wetted surface area calculations, laboratory analysis data, and weighted average lead calculations for all products sampled is provided in Appendix C.

FIGURE 2. DTSC Sampling by Product Breakout

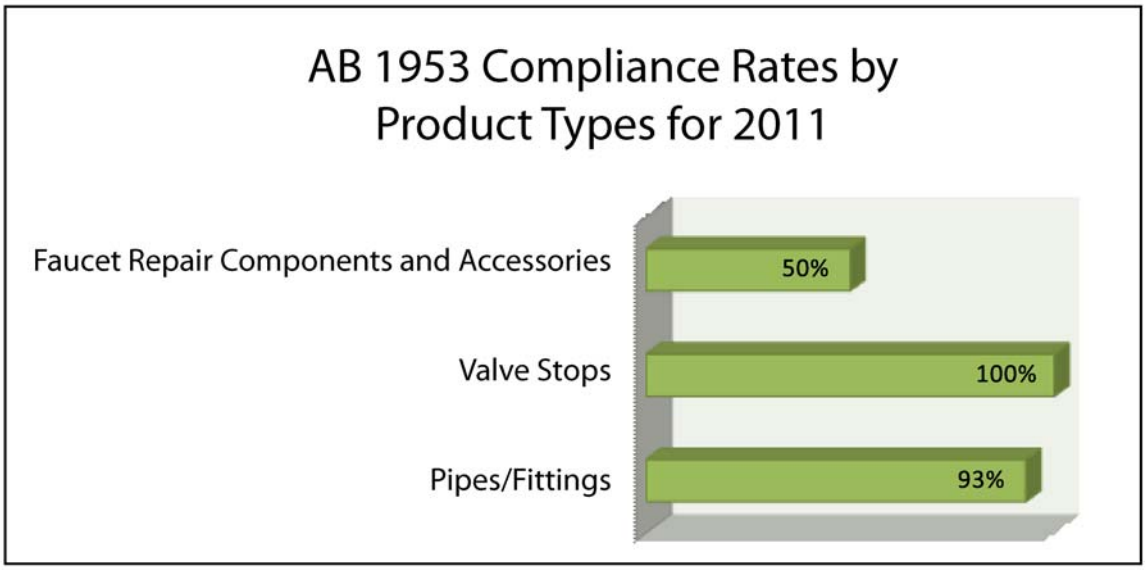
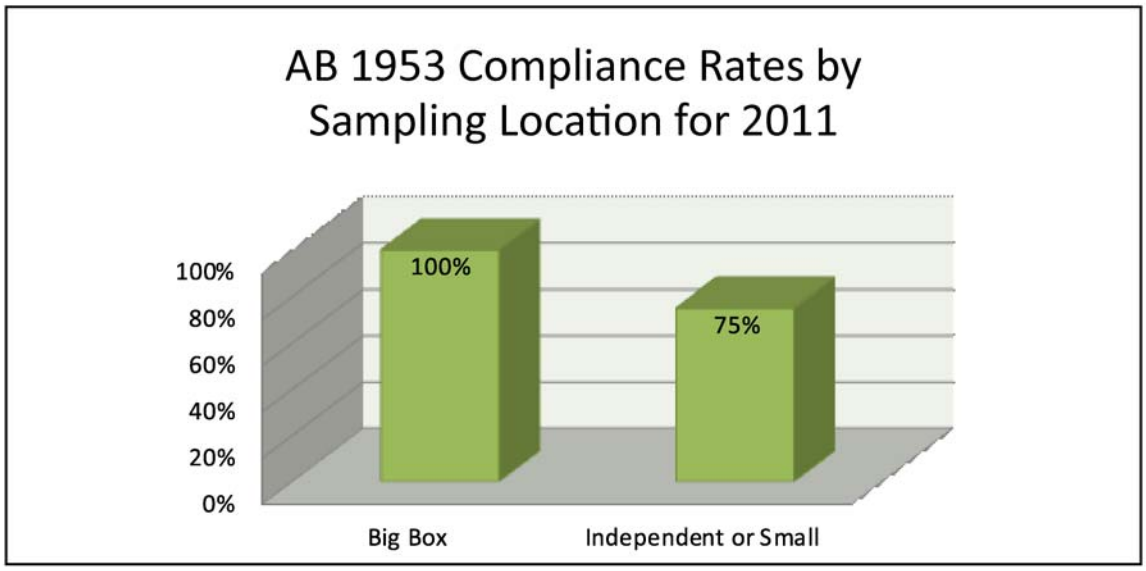


FIGURE 3. DTSC Testing Results by Product Category



Compliance rates for sample by type of product:

- Faucet repair parts (faucet stem) and accessory components (water diverter), [50% of 4 samples tested "lead-free"].
- Water Stop Valves, [100% of 8 samples tested "lead-free"].
- Plumbing Pipes/Fittings, [93% of 28 samples tested "lead-free"].

Plumbing products selected with "lead-free" statement provided:

- Potable plumbing products with "lead-free" designation on packaging were 32 of 40 [80%] samples obtained.
- Potable plumbing products without "lead-free" designation on packaging were 8 of 40 [20%] samples obtained.

Compliance rates for products by packaging statement:

- For products with "lead-free" labeling designation, 32 of 32 [100%] were evaluated as "lead-free".
- For products without "lead-free" labeling designation 4 of 8 [50%] were evaluated as "lead-free".

SECTION 4. DISCUSSION

In accordance with procedures outlined within DTSC's 'Interim Drinking Water Plumbing Products Sampling and Evaluation Strategy and Procedure', (see Appendix A), DTSC provided notification letters to all identified manufacturers/distributors of drinking water plumbing products obtained for sampling, in September 2011. The letters also requested for the submittal of third party certification documents, and relevant information that would assist with the evaluation of their products.

Additionally, DTSC sent notification letters to manufacturers and distributors from March through June 2012, notifying them of the preliminary testing results for samples collected during 2011. For products evaluated by DTSC to be above the 0.25% average wetted surface area limit, DTSC provided the manufacturer, distributor or retailer an opportunity to include a response within the annual report. DTSC included all responses received in Appendix F.

SECTION 5. CONCLUSIONS

This sampling provides a snapshot of several, randomly-selected products offered for sale to the public. The plumbing products DTSC selected do not represent the entire market of products offered for sale in California. However, DTSC's sampling and testing data presented in this report, provide some monitoring and compliance baselines. Such information may be useful to identify trends in product types that show a potential pattern of exceeding "lead-free" standards. The sampling also provides consumers independent information on product compliance with the lead-free standards, or helps identify points of non-compliance in the manufacturing and supply chains. Additionally, this information can assist DTSC in developing future sampling strategies.

Additionally, this information reveals when the 2011 samples were collected (one year after the new standards took effect on January 1, 2010), some non-compliant products were still being sold in California. A majority of the locations visited by DTSC were aware of the new law and had implemented inventory controls to take older products off the shelf. In the few instances where DTSC evaluated some of the products as not being "lead-free", DTSC was informed by the locations that the reason for non-compliance was ignorance of the law, or discrepancies with inventory controls.

For the 2011 plumbing samples tested by DTSC, 4 out of 40 plumbing products were tested as not meeting the "lead-free" requirements. Those non-compliant findings also appear to be products sold at retail locations where older products were still being offered for sale to the public—either because of inadequate inventory controls or ignorance of the new lead-free laws. Additional outreach activities that provide information regarding these new "lead-free" requirements may be helpful in enhancing compliance, and increasing lead-free product availability, as required by law. DTSC will continue to work with manufacturers, industry stakeholders, NSF Lead Task Force Group, and CDPH to discuss testing results, and testing and certification issues that affect product compliance.

Lead in drinking water results, in part, from corrosion of household plumbing systems. The amount of lead in drinking water depends on plumbing materials, but also depends on; the age of the plumbing components, types and amounts of minerals in the water, how long the water stays in the pipes, the amount of wear in the products, water acidity and temperature. It is important to emphasize that the lead content of end point devices is not the only factor that may affect the presence of lead in drinking water.

Water systems in California have a high rate of compliance with drinking water standards. Most community water systems provide their customers with an annual water quality report. Also known as Consumer Confidence Reports (CCRs), these public documents provide customers with information about the quality of their drinking water supply over the past calendar year. Many CCRs for California water systems are also available on the US EPA's web site.

Local public water systems, county health or environmental departments, are also good sources of information on contaminants in your local drinking water supply. Your water bill lists contact information. You can also contact your city's public works department.

State law requires public water systems to send customers an annual CCR that describes the source of the water and any contaminants detected.

For inquiries regarding findings or information provided in this report, please contact DTSC's Lead in Plumbing Program at (916) 445-5658. A copy of this report and associated FAQs regarding DTSC's testing and monitoring program will be available to the public by contacting the DTSC Office of Pollution Prevention and Green Technology at (916) 322-3670 or via the DTSC website at http://www.dtsc.ca.gov/PollutionPrevention/LeadInPlumbing.cfm.

APPENDIX A

INTERIM DRINKING WATER PLUMBING PRODUCTS SAMPLING AND EVALUATION STRATEGIES AND PROCEDURES

APPENDIX A

[Full fact sheet to be included in final report]

DEPARTMENT OF TOXIC SUBSTANCES CONTROL

Our mission is to provide the highest level of safety, and to protect public health and the environment from toxic harm.

April 22, 2010

Interim Drinking Water Plumbing Products Sampling and Evaluation Strategy and Procedures

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1. Introduction

As part of its ongoing program to reduce toxic substances from the environment, the Department of Toxic Substances Control (DTSC) conducts monitoring and testing of lead content in plumbing products. Specifically, Health and Safety Code (HSC) Section 25214.4.3 requires DTSC, based on resources available, to annually select up to 75 drinking water faucets or other drinking water plumbing fittings and fixtures for testing and evaluation with lead plumbing standards set forth in HSC Section 116875. HSC Section 25214.4.3 also requires DTSC to acquire its plumbing product samples from locations that are readily accessible to the public at either retail or wholesale sources.

This document outlines DTSC's general strategy for sampling selection, collection, analysis, and reporting of the lead content in selected plumbing products used to convey drinking water. The collected samples will be analyzed by DTSC Environmental Chemical Laboratory (ECL) using the testing protocol document "Testing and Evaluation of Lead Content in Plumbing Products, Materials, and Components" (DTSC August 2009 factsheet). Results from the collection and analysis will be summarized in an evaluation report, which will be posted on DTSC's website and submitted to the California Department of Public Health (DPH).

Every effort will be made to follow the sampling and testing strategy outlined in this document, however, deviations may be necessary based on actual field conditions and observations.

2. Plumbing Product Sample Collection and Laboratory Procedures

a). Selection of Plumbing Products and Locations for Sample

DTSC will exercise professional judgment regarding the strategy for selecting plumbing fittings and fixtures to sample. Factors that DTSC will consider in selecting locations and plumbing products for testing include, but are not limited to the following:

STATE OF CALIFORNIA

1

APPENDIX B

MACHINE SHOP SAMPLE PREPARATION PROCEDURES

Machine Shop Grinding Procedures

In order to obtain particle sizes sufficient for complete acid digestions and ICAP laboratory analysis it is necessary to dissolve a minimum of 1.0 gram of sample in accordance with U. S. EPA SW-846 Method 3050B, Method 3052, or equivalent. Sample disassembly and grinding or machining was required to obtain the proper particle size.

Samples from components were obtained by various methods, such as drilling, turning, sawing, or milling.

1) For some relatively big metal components, the brand-new cutting tools shown in [Figures 4 thru 5] are used to obtain grounded particles at the ends of the component. The direction of carbide insert (Interstate, model TT 321 122) is changed for each component; a new carbide insert is changed after taking samples from three components. (Note: This method is not recommended due to time-consuming tool change, decontamination and installation procedure)

Figure 4.

Figure 5.

2) For most relatively big metal components, the drill bits (Jobber Length HSS Black Oxide R10, 5/32, made in USA, Figure 6.) and drill press work station (Figure 7.) were used. Component are drilled completely through from a minimum of three areas taken at random locations across the component, drilled materials are collected on a clean white paper.

Figure 6.

Figure 7.

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3) Store blended drilled materials in a clean glass jar. Write sample number and date on label tag.

4) A brand-new drill bit and white paper are used for each component. The holding tool is decontaminated by air blowing or acetone solution.

Figure 8.

Figure 9.

5) For relatively small metal components, if not possible to drill, use flat bastrad (i.e. file) (Nicholson, made in USA, Figure 9.). Based on component shape, either mill the component manually or holding by clamp (Figure 8). Collect at least 1 gram powder on a clean white paper using a brand-new brush.

6) Grinded materials are stored in a clean glass jar (precleaned/quality certified 20 ml glass vials – closed top), with sample number written on label.

7) Change white paper for each component. Decontaminate the file, holding tools, and brush by air blowing and/or acetone solution.

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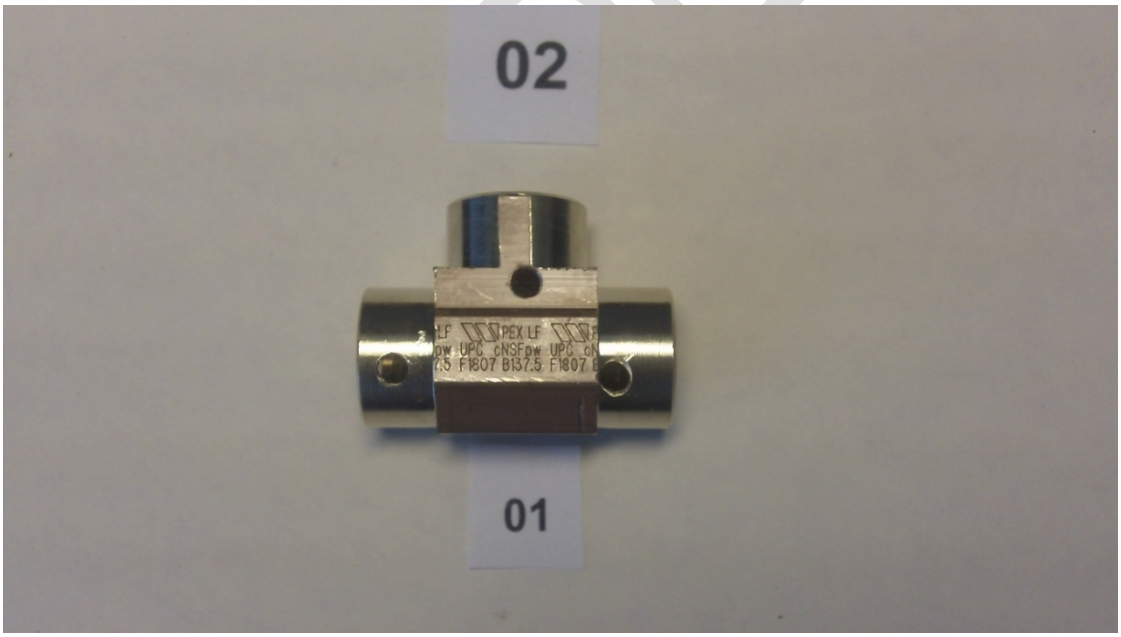
APPENDIX C

PHOTOGRAPHIC SUMMARY OF 2011 LEAD IN PLUMBING SAMPLES

Photographic Summary of 2011 Lead in Plumbing Samples

Sample 1.



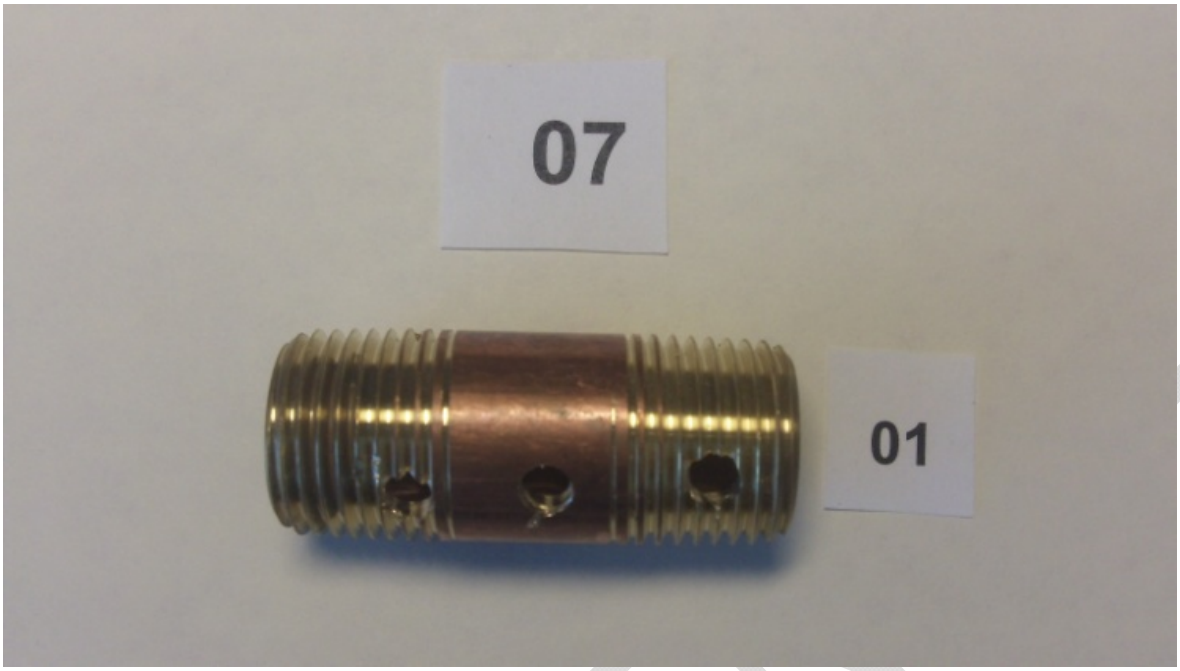
Sample 2.

Sample 3.

Sample 4.

Sample 5.

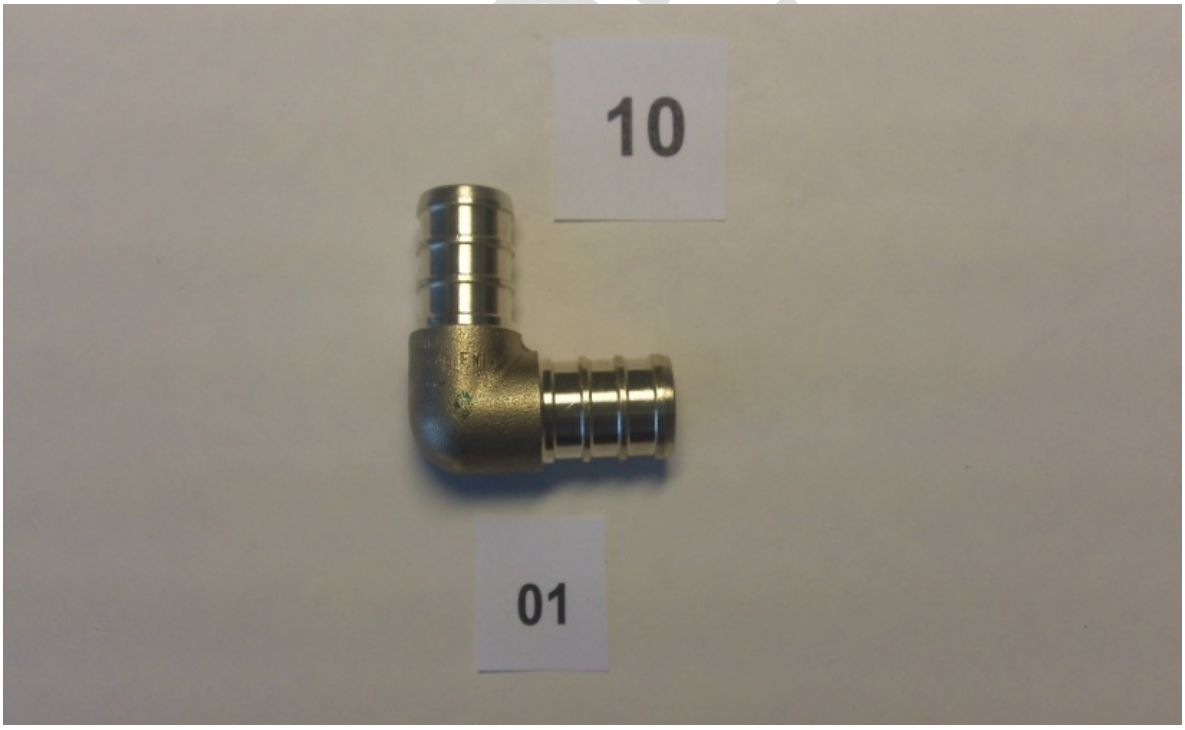
Sample 6.



Sample 7.

Sample 8.

Sample 9.

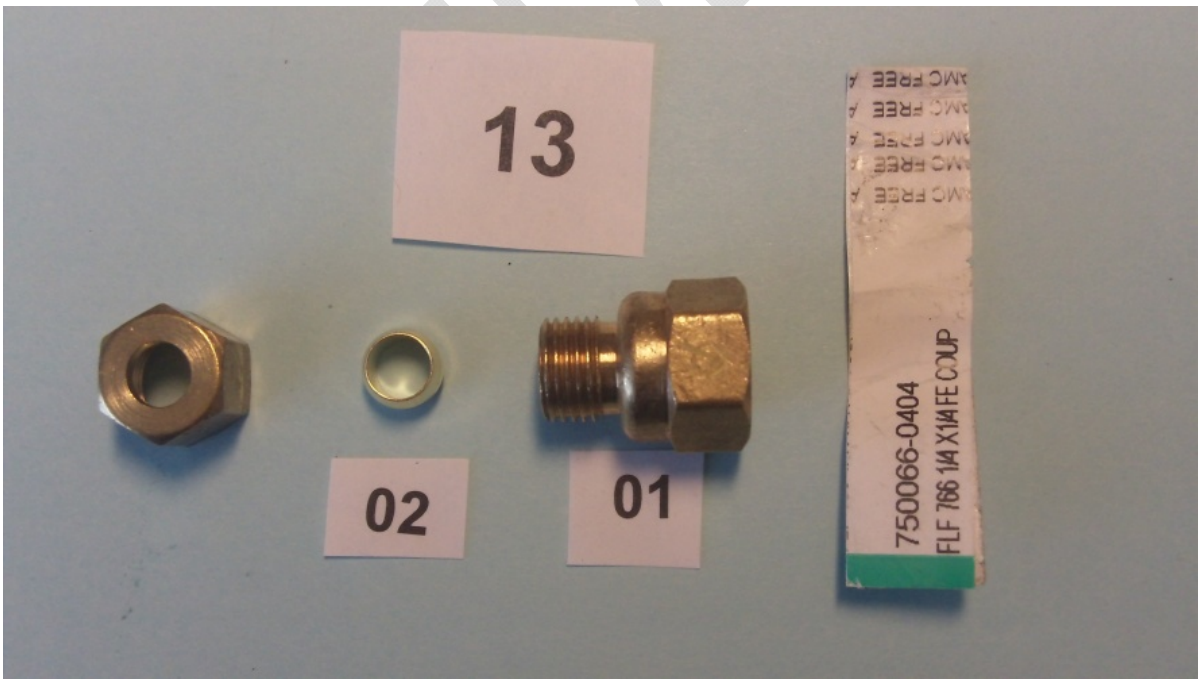


Sample 10.

Sample 11.

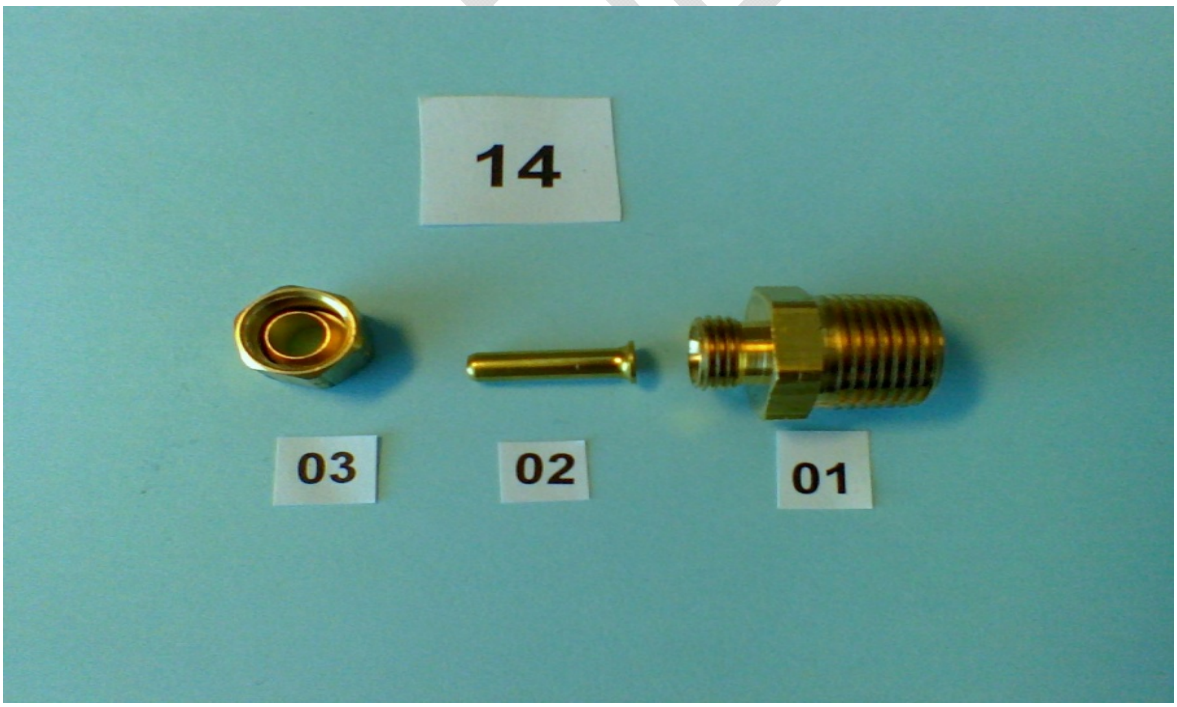
Sample 12.

Sample 12.



Sample 13.

Sample 14.



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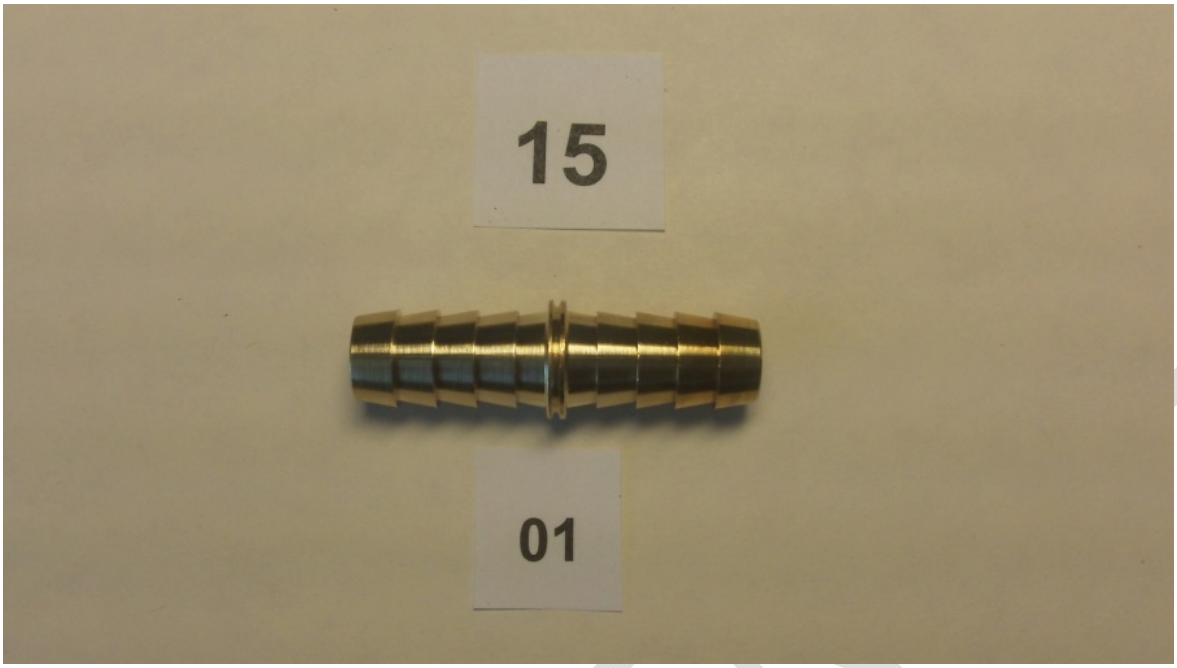
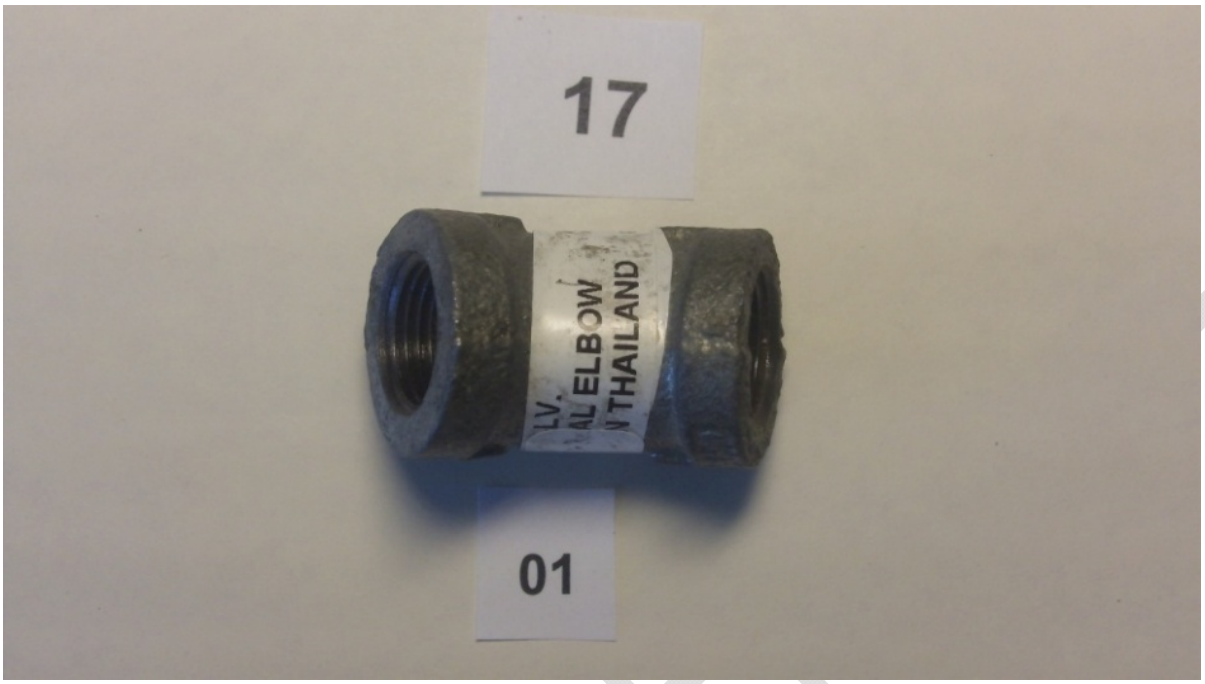


Sample 15.

Sample 16.



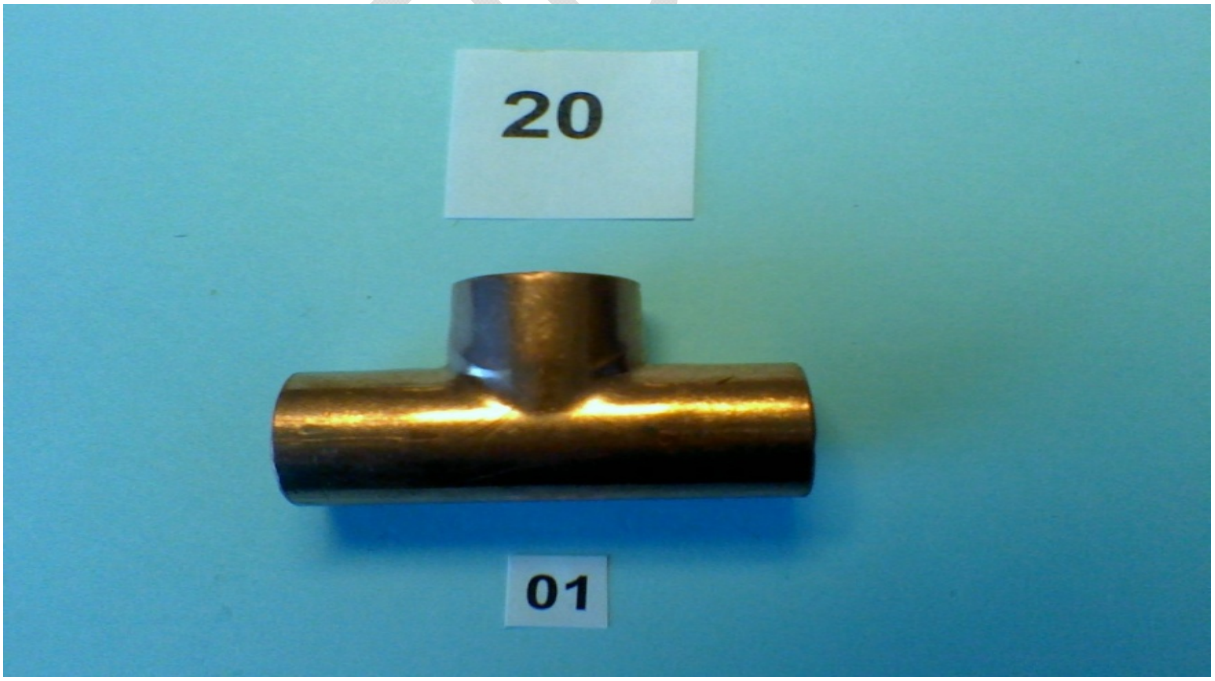
Sample 17.

Sample 18.

Sample 18.

Sample 19.

Sample 19.



Sample 20.

APPENDIX D

WETTED SURFACE AREA CALCULATIONS AND TESTING RESULTS

Footnotes:

(a) Number of replicate samples taken for each individual product type.

(b) [M] = Manufacturer; [D] = Distributor

(c) "lead free" is defined, in part, in section 116875 of the Health and Safety Code as: "... not more than a weighted average of 0.25 percent when used with respect to the wetted surfaces of pipes and pipe fittings, plumbing fittings, and fixtures."

Calculated data for each component in columns 3 and 5 shown in tables below with two decimal places to increase readability. When the calculation is performed, rounding to 2 decimal places is only performed on the final result.

* For products where all the wetted surface area components are above or below 0.25% lead, wetted surface areas calculations not performed.

Sample 1 - [Keeney Quarter Turn Straight Valve]						
			Product 1		Product 2	
Component	Wetted Area $inch^2$	Percent of Wetted Area	Lead Content mg/kg	Weighted Average Lead Content	Lead Content mg/kg	Weighted Average Lead Content
1	3.499	61.18%	1390	0.09%	1300	0.08%
2	0.025	0.44%	693	0.00%	1090	0.00%
3	0.039	0.68%	664	0.00%	1610	0.00%
4	0.272	4.76%	1770	0.01%	1520	0.01%
5	0.025	0.44%	1160	0.00%	1600	0.00%
6	1.219	21.31%	1090	0.02%	1170	0.02%
7	0.303	5.30%	10	0.00%	10	0.00%
8	0.337	5.89%	553	0.00%	727	0.00%
Totals	5.719	100.00%		**0.12%**		**0.12%**
			Below 0.25% Lead		**Below 0.25% Lead**	

Sample 2 -[WATTS A758LF]						
			Product 1		Product 2	
Component	Wetted Area $inch^2$	Percent of Wetted Area	Lead Content mg/kg	Weighted Average Lead Content	Lead Content mg/kg	Weighted Average Lead Content
1		100.00%	579	0.06%	649	0.06%
Totals				**0.06%**		**0.06%**
			Below 0.25% Lead		**Below 0.25% Lead**	

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Sample 3 - [Keeney K2037LF Add-A-Tee Adapter]						
			Product 1		Product 2	
Component	Wetted Area inch^2	Percent of Wetted Area	Lead Content mg/kg	Weighted Average Lead Content	Lead Content mg/kg	Weighted Average Lead Content
1	1.757	77.13%	1930	0.15%	1370	0.11%
2	0.521	22.87%	1150	0.03%	921	0.02%
Totals	2.278	100.00%		**0.18%**		**0.13%**
			Below 0.25% Lead		**Below 0.25% Lead**	

Sample 4 - [Shark Bite 1/2"x1/2" FNPT Elbow]						
			Product 1		Product 2	
Component	Wetted Area inch^2	Percent of Wetted Area	Lead Content mg/kg	Weighted Average Lead Content	Lead Content mg/kg	Weighted Average Lead Content
1	4.055	57.90%	1600	0.09%	1860	0.11%
2	2.556	36.50%	10	0.00%	10	0.00%
3	0.392	5.60%	15	0.00%	20	0.00%
Totals	7.003	100.00%		**0.09%**		**0.11%**
			Below 0.25% Lead		**Below 0.25% Lead**	

Sample 5 - [SharkBite 1/4"x3/8" MIP Elbow]						
			Product 1		Product 2	
Component	Wetted Area inch^2	Percent of Wetted Area	Lead Content mg/kg	Weighted Average Lead Content	Lead Content mg/kg	Weighted Average Lead Content
1	2.272	91.17%	507	0.05%	506	0.05%
2	0.22	8.83%	11	0.00%	24	0.00%
Totals	2.492	100.00%		**0.05%**		**0.05%**
			Below 0.25% Lead		**Below 0.25% Lead**	

Sample 6 - [WATTS A230 LF]						
			Product 1		Product 2	
Component	Wetted Area inch^2	Percent of Wetted Area	Lead Content mg/kg	Weighted Average Lead Content	Lead Content mg/kg	Weighted Average Lead Content
1	1.128	94.95%	536	0.05%	524	0.05%
2	0.029	2.44%	25400	0.06%	25700	0.06%
3	0.031	2.61%	10	0.00%	10	0.00%
Totals	1.188	100.00%		**0.11%**		**0.11%**
			Below 0.25% Lead		**Below 0.25% Lead**	

Sample 7 - [1/2" Brass Nipple]						
			Product 1		Product 2	
Component	Wetted Area inch^2	Percent of Wetted Area	Lead Content mg/kg	Weighted Average Lead Content	Lead Content mg/kg	Weighted Average Lead Content
1		100.00%	491	0.05%	502	0.05%
Totals		100.00%		**0.05%**		**0.05%**
			Below 0.25% Lead		**Below 0.25% Lead**	

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Wetted Surface Area Calculations and Testing Results

TABLE 2. Lead Free Testing Results Summary

# of Product Samples (a)	Product Description and Sample Collection Location	Sampling Date	Manufacturer/ Distributor (b)	Lead Free by DTSC Testing (c)
2	(Quarter Turn Straight Valve) Lowe's – San Francisco	3/30/11	Keeney [M]	Yes
2	(Female Pipe Tee) Lowe's – San Francisco	3/30/11	Orchard Supply Hardware [D]	Yes
2	(Add-A-Tee Adapter) Lowe's – San Francisco	3/30/11	Watts [M]	Yes
2	(1/2" x ¼" FNPT Elbow) – Home Depot-El Centro	4/6/11	Reliance Worldwide Corporation, [M]	Yes
2	(1/4" x 3/8" MIP Elbow) Home Depot-El Centro	4/6/11	Reliance Worldwide Corporation, [M]	Yes
2	(Female Compression toTube Adapter) Home Depot-El Centro	4/6/11	Watts [M]	Yes
2	(½" Brass Nipple) Jim O'Malley Plumbing - Brawley	4/7/11	Unknown	Yes
2	(½" Brass Elbow) Jim O'Malley Plumbing - Brawley	4/7/11	Unknown	No
2	(1/2" Comp. Gate Valve) (LF) Lowe's – Elk Grove	6/15/11	LDR Industries [M]	Yes
2	(½" x ½" Elbow) (LF) Lowe's Elk Grove	6/15/11	Vanguard – Apollo Pex [M]	Yes
2	(Hot/Cold Stem) (LF) OSH – West Los Angeles	6/16/11	Danco [D]	Yes
2	(1/2" Brass Gate Valve) (LF) Hane's Hardware and Paint	6/16/11	Homewerks [D]	Yes
2	(1/4" x ¼" Female Coup) (LF) Hane's Hardware and Paint	6/16/10	Anderson Metals [D]	Yes
2	(Adapt-A-Tube to MIP Adapter ¼" x 3/8") (LF) Home Depot – Los Angeles	6/16/11	Watts [M]	Yes
2	(Brass Barb Splitter) (LF) Home Depot – Los Angeles	6/16/11	Watts [M]	Yes
2	(1/2" FIP x 7/16" OD or ½" OD Angle Valve) (LF) Adams Hardware - Tustin	6/16/11	Do-It-Best [D]	Yes
2	(3/8" 45° Elbow Galvanized) Crown Ace Hardware - Irvine	6/17/11	Anvil [D]	Yes
2	(Adapter 3/8" x ¼") Crown Ace Hardware - Irvine	6/17/11	ACE [D]	Yes
2	(Water Filter Diverter Aerator Swivel ¼") Dave's Discount Ceramics – L.A.	6/16/11	Plumb USA [D]	No
2	(1/2" Copper Tee) Dave's Discount Ceramics – L.A.	6/16/11	Apex [D]	Yes

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Sample 8 - [1/2" Brass Elbow]						
			Product 1		Product 2	
Component	Wetted Area inch^2	Percent of Wetted Area	Lead Content mg/kg	Weighted Average Lead Content	Lead Content mg/kg	Weighted Average Lead Content
1		100.00%	68600	6.86%	62400	6.24%
Totals	0	%		**6.86%**		**6.24%**
			Above 0.25% Lead		**Above 0.25% Lead**	

Sample 9 [LDR 1/2" Compression Gate Valve]						
			Product 1		Product 2	
Component	Wetted Area inch^2	Percent of Wetted Area	Lead Content mg/kg	Weighted Average Lead Content	Lead Content mg/kg	Weighted Average Lead Content
1	6.306	42.51%	494	0.02%	507	0.02%
2	2.453	16.54%	497	0.01%	505	0.01%
3	0.098	0.66%	409	0.00%	577	0.00%
4	0.098	0.66%	651	0.00%	691	0.00%
5	2.073	13.97%	492	0.01%	505	0.01%
6	2.638	17.78%	492	0.01%	492	0.01%
7	0.977	6.59%	633	0.00%	534	0.00%
8	0.192	1.29%	93.3	0.00%	174	0.00%
Totals	14.835	100.00%		**0.05%**		**0.05%**
			Below 0.25% Lead		**Below 0.25% Lead**	

Sample 10 - [Apollo Pex 1/2" Brass Elbow]						
			Product 1		Product 2	
Component	Wetted Area inch^2	Percent of Wetted Area	Lead Content mg/kg	Weighted Average Lead Content	Lead Content mg/kg	Weighted Average Lead Content
1		100.00%	508	0.05%	871	0.09%
Totals		100.00%		**0.05%**		**0.09%**
			Below 0.25% Lead		**Below 0.25% Lead**	

Sample 11 - [Danco Hot/Cold Stem 2J-8H/C]						
			Product 1		Product 2	
Component	Wetted Area inch^2	Percent of Wetted Area	Lead Content mg/kg	Weighted Average Lead Content	Lead Content mg/kg	Weighted Average Lead Content
1	0.751	31.74%	996	0.03%	987	0.03%
2	0.132	5.58%	77.8	0.00%	101	0.00%
3	0.176	7.44%	207	0.00%	266	0.00%
4	0.211	8.92%	93.9	0.00%	95	0.00%
5	0.201	8.50%	126.5	0.00%	128	0.00%
6	0.895	37.83%	998	0.04%	988	0.04%
Totals	2.366	100.00%		**0.07%**		**0.07%**
			Below 0.25% Lead		**Below 0.25% Lead**	

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Sample 12 - [Homewerks 1/2" Gate Valve]						
			Product 1		Product 2	
Component	Wetted Area inch^2	Percent of Wetted Area	Lead Content mg/kg	Weighted Average Lead Content	Lead Content mg/kg	Weighted Average Lead Content
1	4.582	37.28%	496	0.02%	494	0.02%
2	3.12	25.39%	1550	0.04%	1510	0.04%
3	2.207	17.96%	268	0.00%	254	0.00%
4	2.192	17.84%	545	0.01%	629	0.01%
5	0.104	0.85%	143	0.00%	155	0.00%
6	0.085	0.69%	105	0.00%	182	0.00%
Totals	12.29	100.00%		**0.07%**		**0.07%**
			Below 0.25% Lead		**Below 0.25% Lead**	

Sample 13 - [Anderson Metals FLF 766]						
			Product 1		Product 2	
Component	Wetted Area inch^2	Percent of Wetted Area	Lead Content mg/kg	Weighted Average Lead Content	Lead Content mg/kg	Weighted Average Lead Content
1	0.553	72.86%	1240	0.09%	1820	0.13%
2	0.206	27.14%	535	0.01%	505	0.01%
Totals	0.759	100.00%		**0.09%**		**0.13%**
			Below 0.25% Lead		**Below 0.25% Lead**	

Sample 14 - [Watts A-24 LF]						
			Product 1		Product 2	
Component	Wetted Area inch^2	Percent of Wetted Area	Lead Content mg/kg	Weighted Average Lead Content	Lead Content mg/kg	Weighted Average Lead Content
1	1.191	60.43%	1740	0.11%	1670	0.10%
2	0.769	39.02%	904	0.04%	599	0.02%
3	0.011	0.56%	27000	0.02%	28600	0.02%
Totals	1.971	100.00%		**0.16%**		**0.14%**
			Below 0.25% Lead		**Below 0.25% Lead**	

Sample 15 - [Watts A-290 LF]						
			Product 1		Product 2	
Component	Wetted Area inch^2	Percent of Wetted Area	Lead Content mg/kg	Weighted Average Lead Content	Lead Content mg/kg	Weighted Average Lead Content
1		100.00%	997	0.10%	997	0.10%
Totals		100.00%		**0.10%**		**0.10%**
			Below 0.25% Lead		**Below 0.25% Lead**	

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Sample 16 - [Do-It-Best 54PCLF]						
			Product 1		Product 2	
Component	Wetted Area $inch^2$	Percent of Wetted Area	Lead Content mg/kg	Weighted Average Lead Content	Lead Content mg/kg	Weighted Average Lead Content
1	2.991	51.64%	1360	0.07%	1120	0.06%
2	0.276	4.77%	10	0.00%	89	0.00%
3	0.285	4.92%	62.4	0.00%	98	0.00%
4	1.194	20.61%	1950	0.04%	1720	0.04%
5	0.261	4.51%	1750	0.01%	1680	0.01%
6	0.074	1.28%	498	0.00%	50	0.00%
7	0.036	0.62%	725	0.00%	97	0.00%
8	0.045	0.78%	813	0.00%	798	0.00%
9	0.63	10.88%	71.3	0.00%	1000	0.01%
Totals	5.792	100.00%		**0.12%**		**0.11%**
			Below 0.25% Lead		**Below 0.25% Lead**	

Sample 17 - [Anvil 3/8" Galvanized 45° Elbow]						
			Product 1		Product 2	
Component	Wetted Area $inch^2$	Percent of Wetted Area	Lead Content mg/kg	Weighted Average Lead Content	Lead Content mg/kg	Weighted Average Lead Content
1		100.00%	618	0.06%	504	0.05%
Totals		100.00%		**0.06%**		**0.05%**
			Below 0.25% Lead		**Below 0.25% Lead**	

Sample 18 - [ACE Adapter 3/8" x 1/4"]						
			Product 1		Product 2	
Component	Wetted Area $inch^2$	Percent of Wetted Area	Lead Content mg/kg	Weighted Average Lead Content	Lead Content mg/kg	Weighted Average Lead Content
1	1.094	84.15%	1560	0.13%	1760	0.15%
2	0.206	15.85%	716	0.01%	962	0.02%
Totals	1.3	100.00%		**0.14%**		**0.16%**
			Below 0.25% Lead		**Below 0.25% Lead**	

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Sample 19 - [Plumb USA Water Filter Diverter Aerator Swivel 1/4"]						
			Product 1		Product 2	
Component	Wetted Area inch^2	Percent of Wetted Area	Lead Content mg/kg	Weighted Average Lead Content	Lead Content mg/kg	Weighted Average Lead Content
1	2.442	25.65%	35600	0.91%	36100	0.93%
2	1.165	12.24%	34500	0.42%	27300	0.33%
3	0.188	1.97%	10	0.00%	10	0.00%
4	0.125	1.31%	10	0.00%	10	0.00%
5	1.442	15.15%	10	0.00%	10	0.00%
6	2.138	22.46%	10	0.00%	10	0.00%
7	0.688	7.23%	10	0.00%	10	0.00%
8	0.513	5.39%	10	0.00%	10	0.00%
9	0.367	3.86%	27700	0.11%	36100	0.14%
10	0.344	3.61%	31800	0.11%	32300	0.12%
11	0.054	0.57%	0	0.00%	0	0.00%
12	0.054	0.57%	588	0.00%	660	0.00%
Totals	9.52	100.00%		**1.56%**		**1.52%**
			Above 0.25% Lead		**Above 0.25% Lead**	

* Component 11 was not tested, O-ring was destroyed/lost during cutting of components. Minimal surface area does not alter overall findings.

Sample 20 - [Copper Tee]						
			Product 1		Product 2	
Component	Wetted Area inch^2	Percent of Wetted Area	Lead Content mg/kg	Weighted Average Lead Content	Lead Content mg/kg	Weighted Average Lead Content
1		100.00%	501	0.05%	508	0.05%
Totals		100.00%		**0.05%**		**0.05%**
			Below 0.25% Lead		**Below 0.25% Lead**	

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APPENDIX E

WETTED SURFACE AREA CALCULATIONS AND TESTING PROCEDURES

APPENDIX E – Wetted Surface Area Calculations and Testing Procedures [Full factsheet added to final report]

DEPARTMENT OF TOXIC SUBSTANCES CONTROL

Our mission is to provide the highest level of safety, and to protect public health and the environment from toxic harm.

Fact Sheet, August 2009

Testing and Evaluation of Lead Content in Plumbing Products, Materials and Components

Introduction

Examples of Plumbing Fixtures (other styles may vary)

This document outlines the test protocols the Department of Toxic Substances Control (DTSC) will use when testing drinking water faucets and other drinking water plumbing fittings and fixtures, pursuant to the authority set out in California Health and Safety Code Section 25214.4.3.

The test protocols provided in this document are designed for DTSC to assess the compliance of individual product samples acquired from locations that are readily accessible to the public at either retail or wholesale sources. DTSC's evaluation of product compliance may include review of product design information (e.g., component material specifications and description of wetted surface areas) and X-Ray Fluorescence (XRF) or other screening, along with lead content analysis of select components.

In addition, Health and Safety Code Section 116875 requires that independent certification of pipe, pipe or plumbing fittings or fixtures, solder or flux, at a minimum include testing of materials in accordance with DTSC's test protocols. This document outlines those test protocols, but does not address the certification process required in Health and Safety Code Section 116875.

The document is divided into three sections.

Section 1: lead content calculation
Section 2: Analytical procedures for determining percent lead content of materials
Section 3: Additional details in the determination of weighted average lead content

For additional information on the work being performed at the DTSC to evaluate the California's low lead requirement in plumbing products, please visit the following Web site:
http://www.dtsc.ca.gov/PollutionPrevention/LeadInPlumbing.cfm

Section 1: Weighted Average Lead Content Calculation

California law requires that DTSC annually select to the extent resources are available up to 75 drinking water faucets and other drinking water plumbing fittings and fixtures for testing and evaluation to determine compliance with the lead content standards set forth in Health and Safety Code Section 116875. (Health & Safety Code, Section 25214.4.3).

STATE OF CALIFORNIA

APPENDIX F

MANUFACTURER'S RESPONSES TO LEAD IN PLUMBING TESTING RESULTS FINDINGS

TRW
LAW GROUP

Business and Intellectual Property Legal Services

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June 19, 2012

VIA EMAIL: TSMITH@DTSC.CA.GOV
AND CERTIFIED MAIL

Mr. Andre Algazi
Consumer and Multimedia Products Section
Toxics in Products Branch
Office of Pollution Prevention and Green Technology
Department of Toxic Substances Control
1001 I Street
Sacramento, California 95812-0806

Re: California Lead in Plumbing Testing Program
Distributor: Plumb USA
Product: Water Filter Diverter Aerator Swivel ¼" 90063

Dear Mr. Algazi:

Further to your letter of June 6, 2012, we request that you include the following statement in the final annual report that you state you are issuing concerning the testing of the product referenced hereinabove:

> Plumb USA last purchased 300 units of the Water Filter Diverter Aerator Swivel ¼", Model No.: 90063, Vendor Model No.: D205, that the DTSC identified as purchased from Dave's Discount Ceramics from its supplier, Wen Sheng Fu Co., Ltd. ("Wen Sheng"), and imported it on or around March 24, 2005. A copy of Plumb USA's invoice dated March 24, 2005 is attached hereto. Plumb USA has no inventory of this product and has no intention of ever reordering this product. Plumb USA believes that the application of AB1953 does not have a retroactive effect on product purchases which introduced such products into commerce before such law's enactment. Plumb USA believes that the significant downturn in the housing and construction industry over the past four years have contributed to the lack of sell through by retail purchasers of older inventory held by wholesalers and retailers, hence this older, non-conforming product was available for retail purchase by the DTSC. Plumb USA has obtained certification for the replacement product from its supplier which is in compliance with

AB1953. A copy of the certificate issued by IAPMO Research and Testing, Inc. ("IAPMO") issued to Wen Sheng, dated August 2011 is attached hereto. However, to date, Plumb USA has not ordered any of the replacement product. Plumb USA has voluntarily cooperated and participated in the DTSC investigation to provide its assistance to the DTSC in fulfilling its responsibilities to the public.

We request that you include the above statement in your final report and in any publication of such report, printed or online. Feel free to contact us if you have any questions.

Very truly yours,

Tawnya R. Wojciechowski

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