California Environmental Protection Agency
DEPARTMENT OF TOXIC SUBSTANCES CONTROL

DTSC SAMPLING FOR LEAD CONCENTRATIONS IN CALIFORNIA PLUMBING PRODUCTS

2010 REPORT OF LEAD IN PLUMBING SAMPLING

For Sampling Results obtained
From DTSC Sampling conducted
January 1, 2010 through December 31, 2010

FIRST ANNUAL REPORT

Pursuant to Health and Safety Code section 25214.4.3

DEPARTMENT OF TOXIC SUBSTANCES CONTROL

The Mission of the Department of Toxic Substances Control is to provide the highest level of safety, and to protect public health and the environment from toxic harm.

Trina Gonzalez
Deputy Director
Office of Pollution Prevention and Green Technology

Tyrone Smith
Senior Hazardous Substance Scientist

EXECUTIVE SUMMARY

This report fulfills the requirements of Health and Safety Code section 25214.4.3, which requires the Department of Toxic Substances Control (DTSC) to issue an annual report on its plumbing monitoring and compliance testing program. In this report, the DTSC presents the results of its testing and evaluation of plumbing system products sampled in 2010. The report includes the following:

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

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

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

BACKGROUND

Recent revisions to requirements governing lead content in plumbing

In 2010, a California law took effect to protect the public from exposure to lead in drinking water. 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. Exposure to lead can cause serious health problems, including delays in physical and mental development.

Specifically, California 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," (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 (with respect to the wetted surfaces); 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;

(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 first 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 2010.

DTSC SAMPLING METHODS AND ANALYTICAL RESULTS

As required in Health and Safety Code section 25214.4.3, DTSC collected plumbing product samples from locations that are readily accessible to the public at either retail or wholesale sources. DTSC also obtained samples from internet locations. The products were obtained from three geographic areas within California. The samples were collected between April 27, 2010 and May 24, 2010. DTSC selected 15 distinct consumer plumbing system products intended for potable water use. In most cases triplicate samples were obtained for each product for a total of 44 individual plumbing product samples that were purchased.

In the 44 plumbing samples that were obtained, 301 individual components 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 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, which determines its compliance with the law.

Of the 44 individual plumbing samples tested:

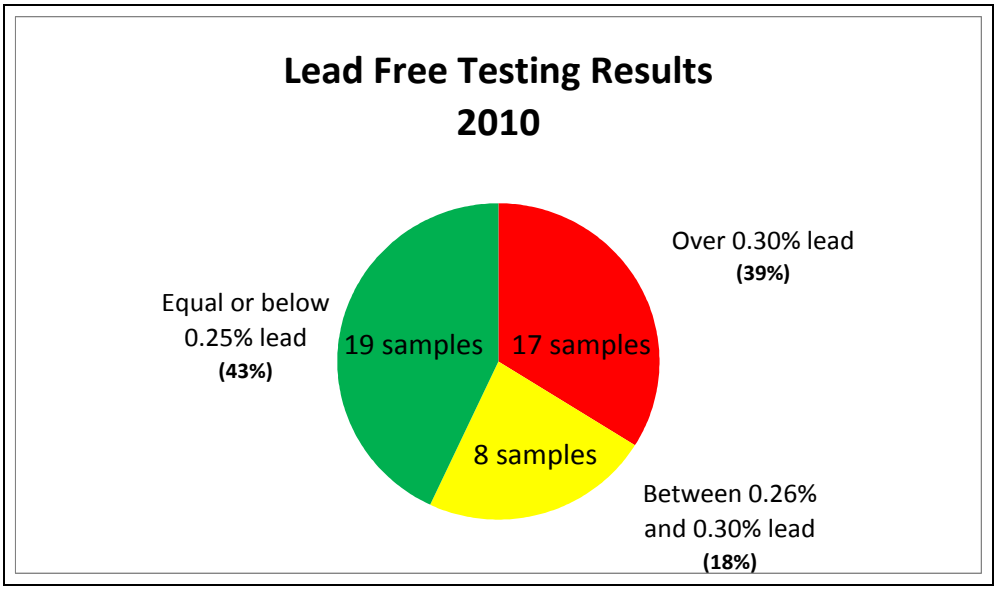
- Fifteen (15) were obtained from large retail locations;
- Twenty Six (26) were obtained from small/independent retail locations; and
- Three (3) were obtained through internet purchase.

Product samples by category were:

- Twelve (12) water control valves;
- Twenty six (26) plumbing pipes or fittings; and
- Six (6) drinking water faucets.

RESULTS SUMMARY

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



The products DTSC selected do not represent all products being offered for sale in California. However, DTSC's sampling and testing data presented in this report, provides some monitoring and compliance baselines. Such information may be useful to identify trends in product types that show a pattern of exceeding the 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 general breakdowns of sampling results by location purchased and by product type:

DTSC testing results by sales location:

- 57 percent of 14 samples obtained from large retail locations were determined to meet the "lead free" standard.
- 59 percent of 27 of samples obtained from small and independent retail locations were determined to meet the "lead free" standard.
- 100 percent of 3 samples obtained from Internet purchases provided for sale in California were determined to meet the "lead free" standard.

DTSC testing results by product types:

- Drinking water faucets: 100 percent of six samples tested were determined to be "lead free."
- Valves: 67 percent of 12 samples tested were determined to be "lead free."
- Pipes/Fittings: 50 percent of 26 samples tested were determined to be "lead free."

For purposes of this report, DTSC considered samples that tested within the range of 0.26% through 0.30% as conditionally meeting the lead free standard. This allows for findings that are determined to fall within the accepted realm of analytical error (variability of ± 20 percent is not unusual in analytical results) or within slight variations of the independent wetted surface calculations. These "conditional" results are included in the counts of "lead free" products summarized in the report. Actual 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 or a regulatory opinion of these products by DTSC.

TABLE OF CONTENTS

REPORT DESCRIPTION PAGE

Tables

Figures

Appendices

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 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 the water[1]. 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 originally 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, except manufacturers, engaged in the business of selling plumbing supplies 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).)

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

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;
- 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.

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, based on available resources, to annually collect up to 75 samples of plumbing products for testing and evaluation. The required samples (based on available resources) shall consist of drinking water faucets or other drinking water plumbing fittings and fixtures. The purpose of the testing and evaluation is to determine compliance with Health and Safety Code section116875. DTSC is required to post the testing results on the DTSC Web site and transmit them in an annual report to the California Department of Public Health (CDPH).

SECTION 2. MATERIALS AND METHODS

DTSC collected and analyzed plumbing products following procedures outlined in the 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). ECL initially screened the samples by X-Ray Fluorescence (XRF) spectroscopy, using a Bruker Tracer III-SD System. Only

components that had XRF readings above the detection Limit of 10-20 mg/Kg were processed for further analyses using EPA SW-846 Method 6010C.

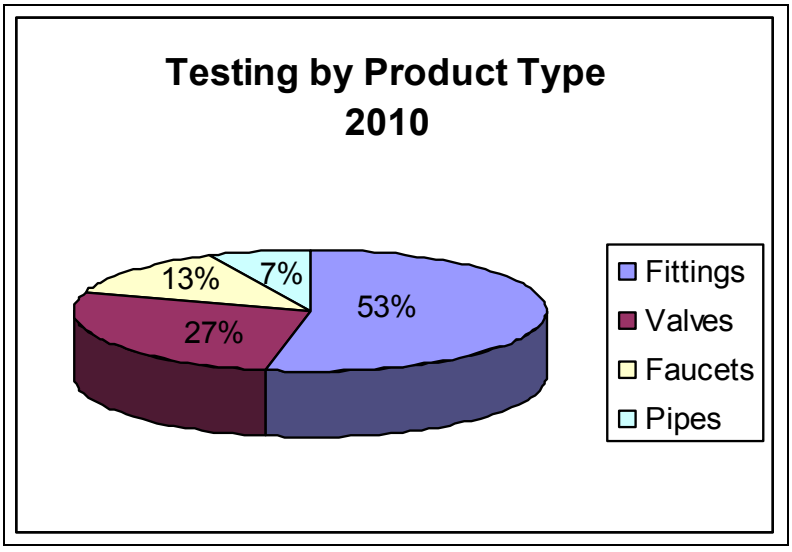
The analytical procedures described in the document were validated during DTSC's participation with the Lead Task Group of the National Sanitation Foundation (NSF) Joint Committee and in a 2009 inter-laboratory round-robin study that compared tests used by ECL and third-party testing laboratories for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

SAMPLING STRATEGY

Product Collection

DTSC collected all of the 2010 samples between April 27 and June 30, 2010. 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 301 individual components from15 products were separated, measured, and analyzed for lead.

Figure 2. DTSC Sampling by Product Breakout



Sample Preparation and Analytical Methods

DTSC released its testing protocols document in order 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 has 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 FAQs section with additional responses to questions and concerns raised by interested parties.

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, (See Appendix E). Section 2 of the Fact Sheet provides the details of the lead content analytical procedures. For the 2010 lead in plumbing samples, X-Ray Fluorescence (XRF) INNOV-X System was used as the initial screening at ECL. Components that had XRF readings above Method Detected Limit (10-20 mg/kg) for lead were processed for further analyses using EPA SW-846 Method 6010C.

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 also obtained samples from internet locations. DTSC purchased 44 plumbing products from three geographic areas within California: (1) Sacramento and north to Fort Bragg, (2) the Long Beach Area, and (3) Southern California desert communities. 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 were not available to collect and analyze a representative sample of the thousands of plumbing products for sale to the public.

DTSC collected 44 samples of 15 individual products from 11 different retail locations. Table 1 also provides a description of the sampling locations for the 15 products sampled. All but one of the retail locations where DTSC collected samples had "lead free" products for sale to consumers, and appeared to be aware of the new requirements. When asked by DTSC, 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 observed that many retail locations had signage informing consumers that only plumbing products marked as "lead free" should be used for potable water use, 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	Multi-turn Valve (LF)	5	West Sacramento
02	3/8" x ¼" Comp. Run Tee	3	Sacramento
03	½" x 3/8" Comp/elbow	2	Sacramento
04	½" x 3/8" Comp/elbow	2	Sacramento
05	½" Elbow	1	Sacramento
08	½" Nipple	1	Long Beach
09	½" Ball Valve (LF)	8	Long Beach
10	½" Gate Valve (LF)	5	Cerritos
11	Ice Maker Line Connector (LF)	5	Palm Desert
12	Ice Maker Line Connector (LF)	5	Ramona
13	¼" x ¼" Connector (LF)	2	Ramona
14	¼" Union (LF)	3	Ramona
15	½" x 5/8" Water Supply Valve (LF)	8	Fort Bragg
16	Kitchen Faucet (LF)	28	Chico
17	Bathroom Faucet (LF)	27	Internet Purchase

(LF) Denotes product samples marked or packaged as "lead free".

Sample numbers (6) and (7) were not analyzed for testing results when determined, after purchase, that the samples were not intended for human consumption through drinking or cooking.

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 fact sheet 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 has 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 FAQs 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.

Sample preparation of 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 initial laboratory screening of samples by X-Ray Fluorescence (XRF) spectroscopy, using a Bruker Tracer III-SD System. Components that had XRF readings above the detection Limit of 10-20 mg/Kg were processed for further analyses using EPA SW-846 Method 6010C. Quality control followed *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (SW-846) criteria, manufacturer manuals, and ECL's Standard Operating Procedures (SOPs).

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.

- **All components >0.25%**
  If all wetted components of a product had lead content of 0.25% or higher, 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 and triplicate 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 component containing lead. 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 formulation of the prescribed formula to calculate the weighted average lead content of plumbing products:

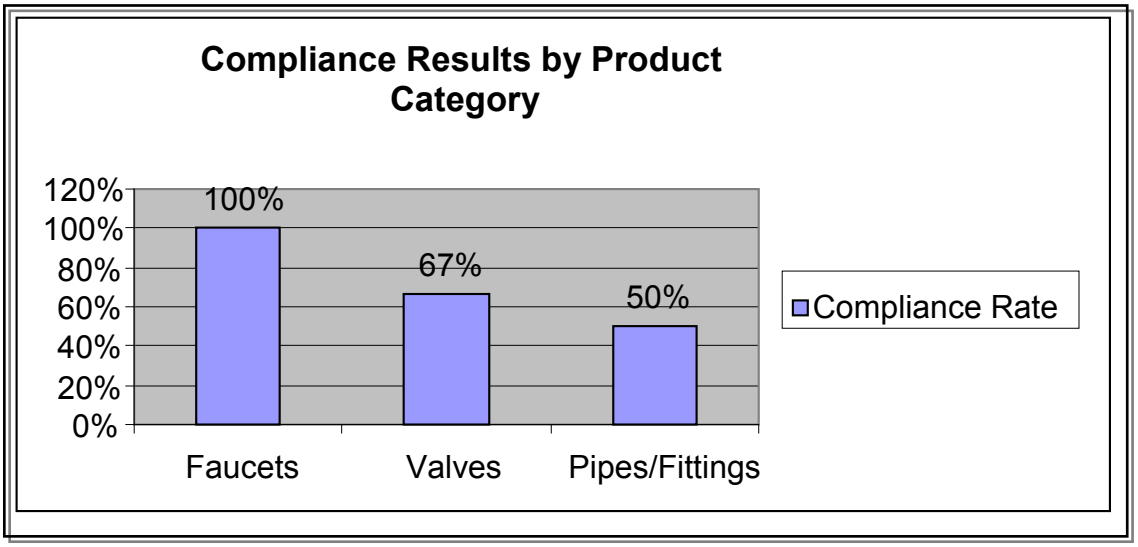
$$WLC = \sum_{c=1}^{n} \left(LC_c \, x \left[\frac{WSA_c}{WSA_t} \right] \right)$$

$WLC = weighted\ average\ lead\ content\ of\ product$
$LC_c = percentage\ lead\ content\ of\ component$
$WSA_c = wetted\ surface\ area\ of\ component$
$WSA_t = total\ wetted\ surface\ area\ of\ all\ components$
$n = number\ of\ wetted\ components\ in\ product$

DTSC Sampling Results:

A general breakdown of sampling results for products selected in 2010 is provided in Figure 3. and the information provided below. A detailed complete summary of wetted surface area calculations, laboratory analysis data, and weighted average lead calculations for all products sampled are provided in Appendix C.

FIGURE 3. DTSC Testing Results by Product Category



- Faucets [100% of 6 samples tested lead free].
- Valves [67% of 12 samples tested lead free].
- Pipes/Fittings [50% of 26 samples tested lead free].

Plumbing products selected with lead free statement provided:

- Plumbing products with lead free designation on packaging were 29 of 44 [66%] samples obtained.

- Potable plumbing products without lead free designation on packaging were 15 of 44 [34%] samples obtained.

Compliance rates for products by packaging statement:

- For products with “lead free” labeling designation, 24 of 29 [83%] were evaluated as “lead free”.

- For products without “lead free” labeling designation 3 of 15 [20%] 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 collected for sampling. The letters also requested submittal of third party certification documents or any additional information that would assist with the evaluation of their products.

Additionally, DTSC sent notification letters to manufacturers and distributors between March thru May 2011, notifying them of the preliminary testing results for samples collected during 2010. For those whose products were evaluated by DTSC to be above the 0.25% average wetted surface area limit, DTSC offered the manufacturer or distributor an opportunity to provide a response regarding their product to be included within the annual report. DTSC included the responses in Appendix F.

SECTION 5. CONCLUSIONS

This sampling effort provides a snapshot of several, randomly-selected, products that were offered for sale to the public. The products DTSC selected do not represent all products being offered for sale in California. However, DTSC’s sampling and testing data presented in this report, provides some monitoring and compliance baselines. Such information may be useful to identify trends in product types that show a pattern of exceeding the 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. This information can also assist DTSC in developing future sampling strategies.

Additionally, this information reveals that at the time the samples were collected (soon after the new standards took effect on January 1, 2010) some non-compliant products were being sold in California. A majority of the locations visited by DTSC were aware of the new laws and had implemented inventory controls to take older products off the shelf. In the few instances where DTSC evaluated some of the products to be not “lead free,” DTSC was informed that the reasons for non compliance were accredited to

ignorance of the law, or discrepancies with inventory controls. DTSC will continue to work with manufacturers, industry stakeholders, and the NSF Lead Task Force Group to discuss testing results and issues related to testing and certification affecting compliance of products in question.

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 types and amounts of minerals in the water, how long the water stays in the pipes, the amount of wear in the pipes, the water's acidity and its temperature. It is important to emphasize that the lead content of end point devices is only one factor that may affect the lead content in tap 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 reports provide customers with information about the quality of their drinking water supply over the past calendar year. Many CCRs for California water systems are available on the US EPA's web site.

For inquiries regarding findings or information provided in this report, please contact DTSC's Lead in Plumbing Program at (916) 445-5658 or leadinplumbing@dtsc.ca.gov. 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

Fact Sheet: Interim Drinking Water Plumbing Products Sampling and Evaluation Strategy and Procedures

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

---

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:

- Whether the plumbing product may be reasonably described as conveying drinking water through cooking or drinking using information accessible to the general consumer such as:
  - Labeling/packaging information (e.g., plumbing product descriptions)
  - Plumbing product display information at the retail or wholesale source
- Whether the retail or public wholesale sources, which may include internet sources, are readily accessible to California residents
- Geographic locations of the retail or wholesale sources
- Whether the plumbing product is likely to contain lead (e.g. brass or chrome-plated brass components) in wetted surface
- Consideration of portable X-ray fluorescence (XRF) equipment for preliminary screening in the field
- Plumbing product's certification status
- Other relevant information

b). Plumbing Product Sample Collection, Notification, and Initial Evaluation

Collection:

- Using chain-of-custody to ensure plumbing product sample integrity, obtain a minimum of two duplicate products for the same brand, model and barcode
- Obtain all product markings or labels that allow the identification of manufacturer, distributor, or importer
- Request and obtain from the retailer or wholesaler source any further contact information of manufacturer, distributor or importer of the collected product
- Document each sampling event with a narrative report in a uniform format to ensure statewide consistency

Notification:

- Make 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
- Include in manufacturer/distributor notification the labels and markings obtained during product collection
- Request from manufacturer and/or distributor any relevant product information

Initial Evaluation:

- Preserving the chain of custody, disassemble plumbing products and identify the components that directly contact water during use (aka, the "wetted components")

- Identify the wetted components of the disassembled plumbing product with a unique component number, linking the component to the specific disassembled plumbing product, and document
- Measure and calculate each unique wetted component's wetted surface area

c). Phase I Laboratory Screening

- ECL will conduct XRF screening for each unique wetted component
- Document XRF results in spreadsheet

Using professional judgment and the results from the Phase I screening, determine for each plumbing product collected whether its complete set of disassembled plumbing wetted components will be analyzed as part of the Phase II Laboratory Analytical Testing.

d). Phase II Laboratory Analytical Testing

- ECL will conduct analytical testing of lead using U.S. EPA SW-846 Test Methods 3050B, 3052, 6010C or equivalent testing methods as described in the DTSC August 2009 factsheet
- Document analytical results in spreadsheet

3. Evaluating Testing Results and Reporting

a). Evaluating Test Results:

- Compile and evaluate analytical data received from ECL
- Using the formulas outlined in DTSC August 2009 factsheet, calculate the weighted average lead content for each plumbing product collected
- Document any deviation from DTSC's specified procedures
- Compare the calculated weighted average lead content with the statutory threshold found in HSC Section 116875

b). Notification:

- 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 made on a case-by-case basis

c). Reporting:

- Document the testing and evaluation done for the monitoring program conducted in an annual evaluation report
- Transmit evaluation report to DPH
- Post evaluation report on DTSC Lead in Plumbing web site

APPENDIX B

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.

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.

APPENDIX C

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) (d)
3	(BrassCraft Multi -Turn Valve ½" Model # R1701LRX R1) **(LF)** Home Depot – West Sacramento	4/28/10	BrassCraft Mfg. [M]	Yes (All)
2	(3/8" cmp x ½" mpt) Orchard Supply Hardware - Sacramento	4/28/10	Orchard Supply Hardware [D]	No (All)
3	(½" x 3/8" compression elbow) Orchard Supply Hardware - Sacramento	4/28/10	Orchard Supply Hardware [D]	No (All)
3	(½" x 3/8" Comp/elbow) – Brothers Plumbing - Sacramento	4/28/10	Unknown	No (All)
4	(½" Elbow) Brothers Plumbing - Sacramento	4/28/10	Unknown	No (All)
3	(½" Nipple) Plumbing World – Long Beach	4/30/10	Smith Cooper [D]	Yes (All)
3	(½" Ball Valve) **(LF)** Plumbing World – Long Beach	4/30/10	Fortune Valve Co. [M]	No (All)
3	(½" Gate Valve) **(LF)** Home Depot Cerritos	4/30/10	Mueller [M]	Yes (2 of 3)
2	(Ice Maker Line Connector) **(LF)** ACE – Palm Desert	5/06/10	Fluidmaster [M]	Yes (All)
3	(Ice Maker Line Connector) **(LF)** Ransom Brothers - Ramona	5/07/10	Watts [M]	Yes (All)
3	(¼" x ¼" Connector) **(LF)** Ransom Brothers - Ramona	5/07/10	Anderson Metals [D]	Yes (All)
3	(¼" Union) **(LF)** Ransom Brothers - Ramona	5/07/10	Anderson Metals [D]	Yes (2 of 3)
3	(½" x 5/8" Water Supply Valve) **(LF)** Coast Hardware – Fort Bragg	5/16/10	Lasco [D]	Yes (All)
3	(Kitchen Faucet) **(LF)** Lowe's - Chico	5/24/10	Price Pfister [M]	Yes (All)
3	(Bathroom Faucet) **(LF)** Online Purchase	4/29/10	Delta [M]	Yes (All)

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."

(d) For purposes of this report DTSC considered samples that tested within the range of 0.26% through 0.30% as conditionally meeting the lead free standard. This allows for findings that are determined within the realm of analytical error or slight variations within the independent wetted surface area calculation performed by DTSC. In some cases surface area calculation data was not provided by manufactures or 3rd party certifiers to compare with DTSC's independent results.

(LF) Denotes product samples marked or packaged as "lead free"

Sample numbers (6) and (7) were not analyzed for testing results when determined after purchase that the samples were not intended for potable water usage.

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 wetted surface area components are above or below 0.25% wetted surface areas calculations not performed.

SAMPLE 1-1			**Home Depot - Brasscraft**	
Component No.	**wetted surface area (total = _in2)**	**% wetted surface area (total = 100%)**	**% lead content**	**Contributing % lead**
1	3.444	65.34	0.241	0.16
2	1.636	31.04	0.002	0.00
3	0.139	2.64	0.002	0.00
4	0.026	0.49	2.900	0.01
5	0.026	0.49	2.900	0.01
totals	**5.271**			**0.19**

SAMPLE 1-2		Home Depot - Brasscraft		
Component No.	**Wetted Surface Area (total = _in2)**	**% wetted surface area (total = 100%)**	**% lead content**	**Contributing % lead**
1	3.444	65.34	0.229	0.15
2	1.636	31.04	0.002	0.00
3	0.139	2.64	0.002	0.00
4	0.026	0.49	2.730	0.01
5	0.026	0.49	2.760	0.01
totals	**5.271**			**0.18**

SAMPLE 1-3		Home Depot - Brasscraft		
Component No.	**wetted Surface Area (Total = _in2)**	**% wetted surface area (total = 100%)**	**% lead content**	**contributing % lead**
1	3.444	65.34	0.269	0.18
2	1.636	31.04	0.002	0.00
3	0.139	2.64	0.002	0.00
4	0.026	0.49	2.690	0.01
5	0.026	0.49	2.710	0.01
totals	**5.271**			**0.20**

SAMPLE 2-1		Orchard Supply Hardware		
Component No.	**wetted surface Area (Total = _in2)**	**% wetted surface area (total = 100%)**	**% lead content**	**contributing % lead**
1	-	-	0.270	-
2	-	-	2.910	-
3	-	-	2.890	-
				>0.25%
*** All wetted surface area components analyzed > 0.25% lead**				

SAMPLE 2-2		Orchard Supply Hardware		
Component No.	wetted surface Area (Total = _in2)	% wetted surface area (total = 100%)	% lead content	contributing % lead
1	-	-	2.230	
2	-	-	2.820	
3	-	-	2.890	
				>0.25%
* All wetted components analyzed > 0.25% lead				

SAMPLE 3-1		Orchard Supply Hardware		
Component No.	wetted surface Area (total = _in2)	% wetted surface area (total = 100%)	% lead content	contributing % lead
1	-	-	2.190	
2	-	-	2.820	
				>0.25%
* All wetted components analyzed > 0.25% lead				

SAMPLE 3-2		Orchard Supply Hardware		
Component No.	wetted surface Area (total = _in2)	% wetted surface area (total = 100%)	% lead content	contributing % lead
1	-	-	2.28	
2	-	-	2.83	
				>0.25%
* All wetted components analyzed > 0.25% lead				

SAMPLE 3-3		Orchard Supply Hardware		
Component No.	wetted surface Area (total = _in2)	% wetted surface area (total = 100%)	% lead content	contributing % lead
1	-	-	2.22	
2	-	-	2.78	
				>0.25%
* All wetted components analyzed > 0.25% lead				

SAMPLE 4-1		Brothers Plumbing		
Component No.	wetted surface area (Total = _in2)	% wetted surface area (total = 100%)	% lead content	contributing % lead
1	-	-	2.46	
2	-	-	2.25	
				>0.25%
* All wetted components analyzed > 0.25% lead				

SAMPLE 4-2		Brothers Plumbing		
Component No.	wetted surface area (Total = _in2)	% wetted surface area (total = 100%)	% lead content	contributing % lead
1	-	-	2.12	
2	-	-	2.74	
				>0.25%
* All wetted components analyzed > 0.25% lead				

SAMPLE 4-3			Brothers Plumbing	
Component No.	wetted surface area (Total = _in2)	% wetted surface area (total = 100%)	% lead content	contributing % lead
1	-	-	2.44	
2	-	-	2.84	
				>0.25%
*** All wetted components analyzed > 0.25% lead**				

SAMPLE 5-1			Brothers Plumbing	
Component No.	wetted surface Area (total = _in2)	% wetted surface area (total = 100%)	% lead content	contributing % lead
1		100.00	7.430	7.43
*** All wetted components analyzed > 0.25% lead**				**7.43**

SAMPLE 5-2			Brothers Plumbing	
Component No.	wetted surface Area (total = _in2)	% wetted surface area (total = 100%)	% lead content	contributing % lead
1		100.00	7.930	7.93
*** All wetted components analyzed > 0.25% lead**				**7.93**

SAMPLE 5-3			Brothers Plumbing	
Component No.	wetted surface Area (total = _in2)	% wetted surface area (total = 100%)	% lead content	contributing % lead
1		100.00	4.980	4.98
*** All wetted components analyzed > 0.25% lead**				**4.98**

SAMPLE 5-4			Brothers Plumbing	
Component No.	**Wetted Surface Area (Total = _in2)**	**% wetted surface area (total = 100%)**	**% lead content**	**contributing % lead**
1	-	100.00	5.140	5.14
*** All wetted components analyzed > 0.25% lead**				**5.14**

SAMPLE 8-1		Plumbing World – Smith Cooper		
Component No.	**wetted surface area (Total = _in2)**	**% wetted surface area (total = 100%)**	**% lead content**	**contributing % lead**
1		100.000	0.209	
		total weighted average lead content		**0.21**
*** All wetted components analyzed < 0.25% lead**				

SAMPLE 8-2		Plumbing World – Smith Cooper		
Component No.	**wetted surface area (total = _in2)**	**% wetted surface area (total = 100%)**	**% lead content**	**contributing % lead**
1		100.000	0.171	
		total weighted average lead content		**0.17**
*** All wetted components analyzed < 0.25% lead**				

SAMPLE 8-3	Plumbing World – Smith Cooper			
Component No.	**wetted surface area (total = _in2)**	**% wetted surface area (total = 100%)**	**% lead content**	**contributing % lead**
1		100.000	0.169	
		total weighted average lead content		**0.17**
*** All wetted components analyzed < 0.25% lead**				

SAMPLE 9-1	Plumbing World – Fortune Valve Co.			
Component No.	**wetted surface area (total = _in2)**	**% wetted surface area (total = 100%)**	**% lead content**	**contributing % lead**
1	1.598	0.25	0.399	0.10
2	2.474	0.38	3.070	1.17
3	Not Wetted			
4	Not Wetted			
5	Not Wetted			
6	0.303	0.05	0.002	0.00
7	0.303	0.05	0.002	0.00
8	1.801	0.28	0.409	0.11
Totals	**6.479**			**1.38**

SAMPLE 9-2	Plumbing World – Fortune Valve Co.			
Component No.	**wetted surface area (total = _in2)**	**% wetted surface area (total = 100%)**	**% lead content**	**contributing % lead**
1	1.598	0.25	0.349	0.09
2	2.474	0.38	3.500	1.34
3	Not Wetted			
4	Not Wetted			
5	Not Wetted			
6	0.303	0.05	0.002	0.00
7	0.303	0.05	0.002	0.00
8	1.801	0.28	0.458	0.13
Totals	**6.479**			**1.42**

Sample 9-3		Plumbing World – Fortune Valve Co.		
Component No.	**wetted surface area (total = _in2)**	**% wetted surface area (total = 100%)**	**% lead content**	**contributing % lead**
1	1.598	0.25	0.332	0.08
2	2.474	0.38	3.080	1.18
3	Not Wetted			
4	Not Wetted			
5	Not Wetted			
6	0.303	0.05	0.002	0.00
7	0.303	0.05	0.002	0.00
8	1.801	0.28	0.405	0.11
Totals	**6.479**			**1.26**

SAMPLE 10-1		Home Depot - Meuller		
Component No.	**wetted surface area (total = _in2)**	**% wetted surface area (total = 100%)**	**% lead content**	**contributing % lead**
1	6.185	41.94	0.318	0.13
2	3.600	24.41	0.323	0.08
3	2.441	16.55	0.293	0.05
4	0.623	4.22	0.313	0.01
5	1.897	12.86	0.271	0.04
totals	**14.746**			**0.31**

SAMPLE 10-2		Home Depot - Meuller		
Component No.	**wetted surface area (total = _in2)**	**% wetted surface area (total = 100%)**	**% lead content**	**contributing % lead**
1	6.185	41.94	0.248	0.10
2	3.600	24.41	0.148	0.04
3	2.441	16.55	0.174	0.03
4	0.623	4.22	0.165	0.01
5	1.897	12.86	0.188	0.02
totals	**14.746**			**0.20**

SAMPLE 10-3			Home Depot - Meuller	
Component No.	wetted surface area (total = _in2)	% wetted surface area (total = 100%)	% lead content	contributing % lead
1	6.185	41.94	0.240	0.10
2	3.600	24.41	0.159	0.04
3	2.441	16.55	0.180	0.03
4	0.623	4.22	0.159	0.01
5	1.897	12.86	0.259	0.03
totals	**14.746**			**0.21**

SAMPLE 11-1			ACE Hardware – Fluidmaster	
Component No.	wetted surface area (total = _in2)	% wetted surface area (total = 100%)	% lead content	Contributing % lead
1	48.135	97.32	0.002	0.00
2	1.136	2.30	3.770	0.09
3	0.19	0.38	0.002	0.00
totals	**49.461**			**0.09**

SAMPLE 11-2			ACE Hardware – Fluidmaster	
Component No.	wetted surface area (total = _in2)	% wetted surface area (total = 100%)	% lead content	contributing % lead
1	48.135	97.32	0.002	0.00
2	1.136	2.30	3.660	0.08
3	0.19	0.38	0.002	0.00
totals	**49.461**			**0.09**

SAMPLE 12-1			Ransom Brothers - Watts	
Component No.	wetted surface area (total = _in2)	% wetted surface area (total = 100%)	% lead content	contributing % lead
1	1.27	10.96	1.040	0.11
2	10.061	86.85	0.002	0.00
3	0.2.54	2.19	0.002	0.00
totals	**11.585**			**0.11**

SAMPLE 12-2			Ransom Brothers - Watts	
Component No.	wetted surface area (total = _in2)	% wetted surface area (total = 100%)	% lead content	contributing % lead
1	1.27	10.96	1.070	0.12
2	10.061	86.85	0.005	0.00
3	0.2.54	2.19	0.002	0.00
totals	**11.585**			**0.12**

SAMPLE 12-3			Ransom Brothers - Watts	
Component No.	wetted surface area (total = _in2)	% wetted surface area (total = 100%)	% lead content	contributing % lead
1	1.27	10.96	1.090	0.12
2	10.061	86.85	0.008	0.00
3	0.2.54	2.19	0.002	0.00
totals	**11.585**			**0.12**

SAMPLE 13-1		Ransom Brothers – Anderson Metals		
Component No.	**wetted surface area (total = _in2)**	**% wetted surface area (total = 100%)**	**% lead content**	**Contributing % lead**
1	0.978	98.29	0.275	0.27
2	0.017	1.71	0.220	0.00
totals	**0.995**			**0.27**

SAMPLE 13-2		Ransom Brothers – Anderson Metals		
Component No.	**wetted surface area (total = _in2)**	**% wetted surface area (total = 100%)**	**% lead content**	**Contributing % lead**
1	0.978	98.29	0.282	0.28
2	0.017	1.71	0.252	0.00
totals	**0.995**			**0.28**

SAMPLE 13-3		Ransom Brothers – Anderson Metals		
Component No.	**wetted surface area (total = _in2)**	**% wetted surface area (total = 100%)**	**% lead content**	**Contributing % lead**
1	0.978	98.29	0.281	0.28
2	0.017	1.71	0.286	0.00
totals	**0.995**			**0.28**

SAMPLE 14-1		Ransom Brothers – Anderson Metals		
Component No.	**wetted surface area (total = _in2)**	**% wetted surface area (total = 100%)**	**% lead content**	**contributing % lead**
1	0.635	94.92%	0.347	0.33
2	0.017	2.54%	0.801	0.02
3	0.017	2.54%	0.133	0.00
totals	**0.669**			**0.35**

SAMPLE 14-2		Ransom Brothers – Anderson Metals		
Component No.	**wetted surface area (total = _in2)**	**% wetted surface area (total = 100%)**	**% lead content**	**contributing % lead**
1	0.635	94.92%	0.272	0.26
2	0.017	2.54%	0.168	0.00
3	0.017	2.54%	0.135	0.00
totals	**0.669**			**0.26**

SAMPLE 14-3		Ransom Brothers – Anderson Metals		
Component No.	**wetted surface area (total = _in2)**	**% wetted surface area (total = 100%)**	**% lead content**	**contributing % lead**
1	0.635	94.92%	0.274	0.26
2	0.017	2.54%	0.132	0.00
3	0.017	2.54%	0.136	0.00
totals	**0.669**			**0.26**

SAMPLE 15-1			Coast Hardware - Lasco	
Component No.	wetted surface area (Total = _in2)	% wetted surface area (total = 100%)	% lead content	contributing % lead
1	4.234	64.30%	0.435	0.28
2	0.283	4.30%	0.002	0.00
3	1.400	21.26%	0.002	0.00
4	0.551	8.37%	0.002	0.00
5	0.008	0.12%	0.002	0.00
6	0.043	0.65%	0.332	0.00
7	0.040	0.61%	0.185	0.00
8	0.026	0.39%	0.002	0.00
totals	**6.585**			**0.28**

SAMPLE 15-2			Coast Hardware - Lasco	
Component No.	wetted surface area (Total = _in2)	% wetted surface area (total = 100%)	% lead content	contributing % lead
1	4.234	64.298%	0.434	0.28
2	0.283	4.298%	0.002	0.00
3	1.400	21.260%	0.002	0.00
4	0.551	8.368%	0.002	0.00
5	0.008	0.121%	0.002	0.00
6	0.043	0.653%	0.287	0.00
7	0.040	0.607%	0.172	0.00
8	0.026	0.395%	0.002	0.00
totals	**6.585**			**0.28**

SAMPLE 15-3		Coast Hardware - Lasco		
Component No.	wetted surface area (Total = _in2)	% wetted surface area (total = 100%)	% lead content	contributing % lead
1	4.234	64.30%	0.404	0.26
2	0.283	4.30%	0.002	0.00
3	1.400	21.26%	0.002	0.00
4	0.551	8.37%	0.002	0.00
5	0.008	0.12%	0.002	0.00
6	0.043	0.65%	0.328	0.00
7	0.040	0.61%	0.174	0.00
8	0.026	0.39%	0.002	0.00
totals	**6.585**			**0.26**

SAMPLE 16-1			Lowe's – Price Pfister	
Component No.	**wetted surface Area (total = _in2)**	**% wetted surface area (total = 100%)**	**% lead content**	**contributing % lead**
1	1.235	1.63	2.550	0.04
2	1.260	1.66	0.002	0.00
3	1.260	1.66	0.002	0.00
4	1.260	1.66	0.002	0.00
5	0.829	1.09	0.002	0.00
6	3.564	4.70	0.002	0.00
7	0.479	0.63	0.002	0.00
8	37.547	49.47	0.144	0.07
9 metal	2.854	3.76	0.281	0.01
9 plastic	9.768	12.87	0.002	0.00
10	0.409	0.54	0.002	0.00
11	0.409	0.54	0.002	0.00
12	0.049	0.06	0.002	0.00
13	0.049	0.06	0.002	0.00
14	0.237	0.31	0.002	0.00
15	0.237	0.31	0.002	0.00
16	0.246	0.32	0.002	0.00
17	0.246	0.32	0.002	0.00
18	0.917	1.21	2.100	0.01
19	0.175	0.23	2.990	0.01
20	2.730	3.60	0.232	0.01
21	1.730	2.28	0.232	0.01
22	0.328	0.43	2.610	0.01
23	0.821	1.08	2.960	0.03
24	6.054	7.98	0.003	0.00
25	0.538	0.71	0.002	0.00
26	0.335	0.44	0.002	0.00
27	0.335	0.44	0.002	0.00
totals	**75.901**			**0.21**

SAMPLE 16-2			Lowe's - Price Pfister	
Component No.	**wetted surface area (total = _in2)**	**% wetted surface area (total = 100%)**	**% lead content**	**contributing % lead**
1	1.235	1.63	2.670	0.04
2	1.260	1.66	0.002	0.00
3	1.260	1.66	0.002	0.00
4	1.260	1.66	0.002	0.00
5	0.829	1.09	0.002	0.00
6	3.564	4.70	0.002	0.00
7	0.479	0.63	0.002	0.00
8	37.547	49.47	0.141	0.07
9 metal	2.854	3.76	0.282	0.01
9 plastic	9.768	12.87	0.002	0.00
10	0.409	0.54	0.002	0.00
11	0.409	0.54	0.002	0.00
12	0.049	0.06	0.002	0.00
13	0.049	0.06	0.002	0.00
14	0.237	0.31	0.002	0.00
15	0.237	0.31	0.002	0.00
16	0.246	0.32	0.002	0.00
17	0.246	0.32	0.002	0.00
18	0.328	0.43	2.630	0.01
19	0.175	0.23	2.680	0.01
20	2.730	3.60	0.221	0.01
21	1.730	2.28	0.222	0.01
22	0.917	1.21	2.890	0.03
23	0.821	1.08	2.770	0.03
24	6.054	7.98	0.003	0.00
25	0.538	0.71	0.002	0.00
26	0.335	0.44	0.002	0.00
27	0.335	0.44	0.002	0.00
totals	**75.901**			**0.22**

SAMPLE 16-3			Lowe's - Price Pfister	
Component No.	**wetted surface Area (total = _in2)**	**% wetted surface area (total = 100%)**	**% lead content**	**contributing % lead**
1	1.235	1.63	2.640	0.0430
2	1.260	1.66	0.002	0.0000
3	1.260	1.66	0.002	0.0000
4	1.260	1.66	0.002	0.0000
5	0.829	1.09	0.002	0.0000
6	3.564	4.70	0.002	0.0000
7	0.479	0.63	0.002	0.0000
8	37.547	49.47	0.141	0.0698
9 metal	2.854	3.76	0.170	0.0064
9 plastic	9.768	12.87	0.002	0.0000
10	0.409	0.54	0.002	0.0000
11	0.409	0.54	0.002	0.0000
12	0.049	0.06	0.002	0.0000
13	0.049	0.06	0.002	0.0000
14	0.237	0.31	0.002	0.0000
15	0.237	0.31	0.002	0.0000
16	0.246	0.32	0.002	0.0000
17	0.246	0.32	0.002	0.0000
18	0.328	0.43	2.580	0.0111
19	0.175	0.23	2.540	0.0059
20	2.730	3.60	0.217	0.0078
21	1.730	2.28	0.218	0.0050
22	0.917	1.21	2.770	0.0335
23	0.821	1.08	2.790	0.0302
24	6.054	7.98	0.003	0.0000
25	0.538	0.71	0.002	0.0000
26	0.335	0.44	0.002	0.0000
27	0.335	0.44	0.002	0.0000
totals	**75.901**			**0.21**

SAMPLE 17-1			Faucet Depot - Delta	
Component No.	wetted surface area (total = _in2)	% wetted surface area (total = 100%)	% lead content	contributing % lead
1	6.957	14.74	0.321	0.05
2	6.957	14.74	0.319	0.05
3	4.620	9.79	0.219	0.02
4	0.995	2.11	0.001	0.00
5	0.995	2.11	0.005	0.00
6	0.345	0.73	0.002	0.00
7	0.345	0.73	0.002	0.00
8	0.354	0.75	0.002	0.00
9	0.354	0.75	0.002	0.00
10	0.891	1.89	0.005	0.00
11	0.891	1.89	0.006	0.00
12	4.045	8.57	0.001	0.00
13	4.045	8.57	0.001	0.00
14	0.188	0.40	0.002	0.00
15	0.188	0.40	0.002	0.00
16	0.200	0.42	0.002	0.00
17	0.200	0.42	0.002	0.00
18	0.938	1.99	0.001	0.00
19	0.938	1.99	0.001	0.00
20	1.467	3.11	0.405	0.01
21	0.090	0.19	0.002	0.00
22	2.952	6.25	0.002	0.00
23	2.001	4.24	0.002	0.00
24	1.516	3.21	0.002	0.00
25	1.122	2.38	0.002	0.00
26	2.286	4.84	0.002	0.00
27	1.327	2.81	3.350	0.09
totals	**47.21**			**0.22**

SAMPLE 17-2			Faucet Depot - Delta	
Component No.	wetted surface area (total = _in2)	% wetted surface area (total = 100%)	% lead content	contributing % lead
1	6.957	14.74	0.346	0.05
2	6.957	14.74	0.343	0.05
3	4.620	9.79	0.220	0.02
4	0.995	2.11	0.001	0.00
5	0.995	2.11	0.005	0.00
6	0.345	0.73	0.002	0.00
7	0.345	0.73	0.002	0.00
8	0.354	0.75	0.002	0.00
9	0.354	0.75	0.002	0.00
10	0.891	1.89	0.005	0.00
11	0.891	1.89	0.006	0.00
12	4.045	8.57	0.001	0.00
13	4.045	8.57	0.001	0.00
14	0.188	0.40	0.002	0.00
15	0.188	0.40	0.002	0.00
16	0.200	0.42	0.002	0.00
17	0.200	0.42	0.002	0.00
18	0.938	1.99	0.001	0.00
19	0.938	1.99	0.001	0.00
20	1.467	3.11	0.406	0.01
21	0.090	0.19	0.002	0.00
22	2.952	6.25	0.002	0.00
23	2.001	4.24	0.002	0.00
24	1.516	3.21	0.002	0.00
25	1.122	2.38	0.002	0.00
26	2.286	4.84	0.002	0.00
27	1.327	2.81	3.390	0.10
totals	**47.21**			**0.23**

SAMPLE 17-3			Faucet Depot - Delta	
Component No.	**wetted surface area (total = _in2)**	**% wetted surface area (total = 100%)**	**% lead content**	**contributing % lead**
1	6.957	14.74	0.338	0.05
2	6.957	14.74	0.344	0.05
3	4.620	9.79	0.219	0.02
4	0.995	2.11	0.001	0.00
5	0.995	2.11	0.005	0.00
6	0.345	0.73	0.002	0.00
7	0.345	0.73	0.002	0.00
8	0.354	0.75	0.002	0.00
9	0.354	0.75	0.002	0.00
10	0.891	1.89	0.005	0.00
11	0.891	1.89	0.006	0.00
12	4.045	8.57	0.001	0.00
13	4.045	8.57	0.001	0.00
14	0.188	0.40	0.002	0.00
15	0.188	0.40	0.002	0.00
16	0.200	0.42	0.002	0.00
17	0.200	0.42	0.002	0.00
18	0.938	1.99	0.001	0.00
19	0.938	1.99	0.001	0.00
20	1.467	3.11	0.401	0.01
21	0.090	0.19	0.002	0.00
22	2.952	6.25	0.002	0.00
23	2.001	4.24	0.002	0.00
24	1.516	3.21	0.002	0.00
25	1.122	2.38	0.002	0.00
26	2.286	4.84	0.002	0.00
27	1.327	2.81	3.350	0.09
totals	**47.21**			**0.23**

APPENDIX D

Photographic Summary of Plumbing Sample Products

Sample 1.

Sample 2.

Sample 3.

Sample 4.

Sample 5.

Sample 8.

Sample 9.

Sample 10

Sample 11.

Sample 12.

Sample 13.

Sample 14.

Sample 15.

Sample 16.

Sample 17.

APPENDIX E

Fact Sheet: Wetted Surface Area Calculations and Testing Procedures

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).

On or after January 1, 2010, the maximum allowable lead content in "lead-free" pipes and pipe fittings, plumbing fittings, and fixtures intended to convey or dispense water for human consumption is a weighted average of 0.25 percent with respect to the wetted surfaces of pipes and pipe fittings, plumbing fittings, and fixtures. (Health & Safety Code Section 116875).

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 component containing lead. 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 Section 116875 (e)).

The following formulation should be used when calculating the weighted average lead content of products:

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

Where:

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

Section 2: Analytical Procedures for Determining Percent Lead Content of Materials

2.1 References

U.S. EPA SW 846 Test Methods for Evaluating Solid Waste, Physical Chemical Methods, Method 3050 B – Acid Digestion of Sediments, Sludges, and Soils

US EPA SW846, Method 3052 - Microwave Assisted Acid Digestion of Siliceous and Organically Based Matrices

U.S. EPA SW 846, Method 6010C – Inductively Coupled Plasma-Atomic Emission Spectrometry

2.2 Lead Content Analysis of Materials

2.2.1 Sampling of Components

Samples from components can be obtained by various methods, such as drilling, turning, sawing, or milling. Where possible, blend material from a minimum of three areas taken at random locations across the part, so as to obtain a sample that is representative of the properties of the entire component. Care should be taken not to include coating materials in the sampled material. With the exception of

very large parts, test pieces should be drilled or sawed completely through in order to avoid over- or under-representation of the center portion.

2.2.2 Sample Preparation

Dissolve a minimum of 1.0 gram of sample in accordance with U. S. EPA SW-846 Method 3050B, Method 3052, or equivalent. Other applicable sample preparation methods may be employed, provided that adequate performance can be demonstrated for the analytes and matrices of interest.

2.2.3 Analysis

Analysis for metals should be performed, except as otherwise provided for herein, in accordance with currently accepted EPA SW-846 Method 6010C, or equivalent. Other applicable chemical analysis methods may be employed, provided that adequate performance can be demonstrated for the analytes and matrices of interest.

2.2.4 Quality Control

Sample preparation and analysis procedures should be validated for the analytes and matrices to be tested. All the quality assurance/quality control protocols and other requirements specified in the method being used should be followed. If a specified protocol is not followed, a justification for the deviation should be explicitly addressed.

2.3 Lead Content Screening

Screening may be used to check the lead content in the following cases, but not limited to:

- Screening of components where no lead is expected (e.g. certain plastics, elastomers, coatings).
- Initial screening of components to prioritize items for further testing.
- Comparison to material specification information.

The results from lead content screenings may be used to identify or prioritize items for testing according to Section 2.2.

XRF (X-Ray Fluorescence), OES (Optical Emission Spectroscopy) Arc /Spark, SEM (Scanning Electron Microscopy) /EDS (Energy Dispersive Spectrometer) are acceptable methods for screening components, provided the instrument is calibrated to standard reference materials. Other applicable screening methods may be employed, provided that adequate performance can be demonstrated. The following should be taken into consideration with a screening method:

- Surface scanned should be clean, dry, and free of coating. Even slight overspray of coatings can significantly reduce lead content readings.
- Part finishes that remove surface lead, such as acid washes, will affect surface lead content readings and may affect the value of the screening analysis.
- Part size, shape, and condition of the surface can impact reading. Area analyzed should be no smaller than the instrument observation window. Shapes, such as curved surfaces, should be minimized.
- Lower lead content parts may require longer read times and the average of several measurements (3 or more) with different orientation to produce accurate results.

Section 3: Additional Details in the Determination of Weighted Average Lead Content.

3.1 Use of Liners

When lead-bearing surfaces have been excluded from water contact by use of a rigid liner (e.g. plastic sleeve) sealed with a permanent barrier, the lead content of the liner should be used.

3.2 Use of Coatings

When coatings are used, the lead content of the coated substrate should be used in the calculation of weighted average lead content.

3.3 Use of Lead Removal Technologies

For components where the wetted surface areas have been treated with a lead removal technology, the percent lead composition should be based on the bulk material used to manufacture the component prior to application of the surface treatment.

Additional Information

Please visit our Web site for additional information on "Lead in Plumbing" at: http://www.dtsc.ca.gov/PollutionPrevention/LeadInPlumbing.cfm.

We also maintain an e-mail list (ListServ) that you may sign up for, to receive updates from DTSC regarding Lead in Plumbing.

For more information, call DTSC's Regulatory Assistance Officers at: (800) 72TOXIC (1-800-728-6942) or (916) 255-3618 if you are calling from outside of California. You also may reach us by sending an email to leadinplumbing@dtsc.ca.gov.

APPENDIX F

Responses Provided to DTSC in Response to California Lead in Plumbing Testing Program Preliminary Results Letters

Samples # 2 and 3

Department of Toxic Substances Control

Linda S. Adams
Acting Secretary for
Environmental Protection

Leonard E. Robinson
Acting Director
1001 "I" Street
P.O. Box 806
Sacramento, California 95812-0806

Edmund G. Brown Jr.
Governor

Certified Mail: 7003 3110 0006 1187 2051

April 15, 2011

Merchandise Department
Orchard Supply Hardware
6450 Via Del Oro
San Jose, California 95119

To Whom It May Concern:

CALIFORNIA LEAD IN PLUMBING TESTING PROGRAM PRELIMINARY RESULTS

The California Department of Toxic Substances Control (DTSC) is writing you to follow up on our previous letter, with the subject: "CALIFORNIA LEAD IN PLUMBING TESTING PROGRAM," dated June 8, 2010, which concerns plumbing products purchased at the Orchard Supply Hardware located at 3350 Arden Way, Sacramento, CA 95825.

As of January 1, 2010, California law restricts the lead content of pipes, pipe fittings, plumbing fittings, and plumbing fixtures. As set forth in Health and Safety Code Section 25214.4.3, based on available resources, DTSC is required to annually select up to 75 drinking water faucets or other drinking water plumbing fittings and fixtures for testing and evaluate their compliance with lead plumbing standards set forth in Health and Safety Code Section 116875. In addition, DTSC is required to annually post the results from its testing and evaluation on its public web site and transmit the results in an annual report to the California Department of Public Health. After discussions with stakeholders and industry representatives, the Department decided to provide an opportunity for plumbing manufacturers and distributors to review testing and laboratory results prior to the publication of the final report. The Department anticipates the annual report will be posted on the Department's website in June 2011.

To this end, on April 28, 2010, DTSC purchased a product, which could be manufactured and/or distributed by your company. The product purchased was:

Product Name: 3/8 CMP x 1/4 MPT Comp Run Tee
Brand: OSH

Model: 9064619 (D36)
Bar Code: N/A
Store Name: Orchard Supply Hardware
Store Location: 3350 Arden Way, Sacramento CA 95825

The Department has analyzed the product in accordance with DTSC's fact sheet *Testing and Evaluation of Lead Content in Plumbing Products,* dated August 2009, and completed its independent wetted surface area calculations.

DTSC has determined that the weighted average lead content of the wetted surface of the product obtained **exceeds the statutory limit of** 0.25 percent set forth in Health and Safety Code Section 116875. The enclosure provides a table summary of the analytical results. If you have relevant or additional information that you feel should be considered regarding these results or applicability of your product, to Health and Safety Code Section 116875, please provide it to DTSC at your earliest convenience.

It is important to note that DTSC is authorized under Health and Safety Code Section 25173 to keep confidential any information which DTSC agrees meets the definition of "trade secret". "Trade secret" is defined in Health and Safety Code Section 25173 to include: process, tool, mechanism, compound, procedure, production data, or compilation of information, which is not patented, or which is known only to certain individuals within a commercial concern who are using it to fabricate, produce, or compound an article of trade or a service having commercial value, and which gives its user an opportunity to obtain a business advantage over competitors who do not know or use it. If you provide information to DTSC for which you assert a claim of "trade secret," please mark it as such.

If you have any questions, please contact Tyrone Smith of my staff at (916) 445-5658 or at tsmith@dtsc.ca.gov.

Sincerely,

Andre Algazi, Supervisor
Multimedia and Consumer Products Section
Department of Toxic Substances Control
(916) 324-3114
aalgazi@dtsc.ca.gov

Enclosure

cc's: see next page

Response Provided by Orchard Supply Hardware

In regards to your letter notifying OSH of the product 3/8 CMP x ¼ MPT Comp Run Tee exceeding .025% wetted surface area. This item as well as all product affected by AB1953 low lead law was removed from all OSH stores before January 1, 2010. This product was either missed our returned to our store and was unintentionally put back on the sales floor.

I will send communication to all stores to insure that all non compliant products have been removed from the stores.

Sample #9

Department of Toxic Substances Control

Linda S. Adams
Acting Secretary for
Environmental Protection

Leonard E. Robinson
Acting Director
1001 "I" Street
P.O. Box 806
Sacramento, California 95812-0806

Edmund G. Brown Jr.
Governor

Certified Mail: 7003 3110 0006 1187 2082

April 15, 2011

Mr. Robert Tripp
Smith-Cooper International
2867 Vail Avenue
Commerce, California 90040

CALIFORNIA LEAD IN PLUMBING TESTING PROGRAM PRELIMINARY RESULTS

Dear Mr. Tripp:

The California Department of Toxic Substances Control (DTSC) is writing you to follow up on our previous letter, with the subject: "CALIFORNIA LEAD IN PLUMBING TESTING PROGRAM," dated June 8, 2010, which concerns plumbing products purchased at the Plumbing World located at 6152 Cherry Avenue, Long Beach CA 90805.

As of January 1, 2010, California law restricts the lead content of pipes, pipe fittings, plumbing fittings, and plumbing fixtures. As set forth in Health and Safety Code Section 25214.4.3, based on available resources, DTSC is required to annually select up to 75 drinking water faucets or other drinking water plumbing fittings and fixtures for testing and evaluate their compliance with lead plumbing standards set forth in Health and Safety Code Section 116875. In addition, DTSC is required to annually post the results from its testing and evaluation on its public web site and transmit the results in an annual report to the California Department of Public Health. After discussions with stakeholders and industry representatives, the Department decided to provide an opportunity for plumbing manufacturers and distributors to review testing and laboratory results prior to the publication of the final report. The Department anticipates the annual report will be posted on the Department's website in June 2011.

To this end, on April 30, 2010, DTSC purchased a product, which could be manufactured and/or distributed by your company. The product purchased was:

Product Name: ½" Ball Valve
Brand: Smith-Cooper International
Model: 01728146GL

Bar Code: 20633 98247 0
Store Name: Plumbing World
Store Location: 6153 Cherry Avenue, Long Beach, A 90805

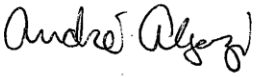
The Department has analyzed the product in accordance with DTSC's fact sheet *Testing and Evaluation of Lead Content in Plumbing Products,* dated August 2009, and completed its independent wetted surface area calculations.

DTSC has determined that the weighted average lead content of the wetted surface of the product obtained **exceeds the statutory limit of** 0.25 percent set forth in Health and Safety Code Section 116875. The enclosure provides a table summary of the analytical results. If you have relevant or additional information that you feel should be considered regarding these results or applicability of your product, to Health and Safety Code Section 116875, please provide it to DTSC at your earliest convenience.

It is important to note that DTSC is authorized under Health and Safety Code Section 25173 to keep confidential any information which DTSC agrees meets the definition of "trade secret". "Trade secret" is defined in Health and Safety Code Section 25173 to include: process, tool, mechanism, compound, procedure, production data, or compilation of information, which is not patented, or which is known only to certain individuals within a commercial concern who are using it to fabricate, produce, or compound an article of trade or a service having commercial value, and which gives its user an opportunity to obtain a business advantage over competitors who do not know or use it. If you provide information to DTSC for which you assert a claim of "trade secret," please mark it as such.

If you have any questions, please contact Tyrone Smith of my staff at (916) 445-5658 or at tsmith@dtsc.ca.gov.

Sincerely,



Andre Algazi, Supervisor
Multimedia and Consumer Products Section
Department of Toxic Substances Control
(916) 324-3114
aalgazi@dtsc.ca.gov

Enclosure

cc's: see next page

Smith Cooper (Distributor):

The valve pictured was manufactured, marketed as Lead Free and sold by Homeworks Worldwide of Wheeling, IL; www.homewerksww.com. Due to our low inventories we purchased this valve from a competitor of ours, Homeworks Worldwide to supplement our inventory. The valve was marketed to us as Lead-Free, marked as lead free.

California Assembly Bill No. 1953, section 1(b) states that "no person shall introduce into commerce any pipe, pipe or plumbing fixture fitting, fixture that is not lead free". In this transaction, it was Homewerks Worldwide that sold this valve to Smith Cooper International, a California company, and introduced it into commerce in the state of California. Therefore, it is our contention that the test results should be presented to Homewerks Worldwide, and they should be held accountable to respond to the results.

Homewerks (Distributor):

If we must be included on the list as an unavoidable consequence, then please include the following text as a rebuttal of sorts next to our company name:

"Homewerks Worldwide is not the manufacturer and believed in good faith that this product was compliant with California AB1953 as evidenced by IAPMO file 6175"

Fortune Valve Co. (Manufacturer):

Per our conversation, I would like to explain this situation to you as following:

1. Wetted Surface Area Calculation

Please note that our wetted surface area calculation is different from yours. When a ball valve is installed and in service, only the body, cap, ball, and seat will be in contact with water. The stem, packing, and handle nut will not contact the water. This is how we prepared our PMI and it was agreed by the third party lab we worked together.

2. Lead Content of the Ball

Please note Fortune became aware of AB1953 requirement in early 2008 and started the preparation since then. We prepared the document and submitted to a 3rd party lab for certification in Mar 2009 and we got our letter of compliance in Jun 2009. We prepared the material and samples in our best knowledge and they were reviewed and approved. As the ball is chrome-plated and this coating/plating is quite thick, it effectively insulates the ball so the ball will not leach any lead content to the water. As a

result, we considered and listed our ball's lead content as "0%" – this theory was recognized by the lab so we got the letter of compliance. It seems AB1953 had a revision in later part of 2009 and it specifically talked about coating. Fortune became aware of this new requirement and realized that we need to use "lead-free brass" for balls even they are chrome-plated and we made such change immediately in early 2010. Since that point, Fortune's products are in compliance with AB1953 standard again. We believe the samples you got and tested are from the old-batch of production and if you obtain and test the newer products, the balls are made of "lead-free" brass. Again, we are sorry about this issue but we were not aware of the regulation revision and we took immediate action after we became aware of it.