Sampling for Lead in Drinking Water in Priority Areas

MARINE CORPS INSTALLATIONS EAST-MARINE CORPS BASE CAMP LEJEUNE

16 October 2014

BUILDING TT84 - TARAWA TERRACE II ELEMENTARY SCHOOL REPORT

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ACRONYMS AND ABBREVIATIONS

AS	Marine Corps Air Station New River
BP	Braising pan
BS	Bathroom sink with spigot
CB	Courthouse Bay
CDC	Child Development Center
CS	Classroom sink with spigot
EPA	Environmental Protection Agency
HB	Outside hose bib
HNO_3	Nitric acid
HWD	Hot water dispenser
IM	Ice machine
IMW	Ice machine with water dispenser
K	Kettle
KS	Kitchen sink with spigot
MCASNR	Marine Corps Air Station New River
MCIEAST-MCB CAMLEJ	Marine Corps Installations East-Marine Corps Base Camp Lejeune
ml	Milliliter
MP	Midway Park
NSF	National Sanitation Foundation
OS	Other type of sink
PP	Paradise Point
ppb	Parts per billion
RIW	Refrigerator with ice and water dispensers
SDWA	Safe Drinking Water Act
SH	Sink with spray hose or stand-alone spray hose
SPHB	Standpipe with hose bib
TT	Tarawa Terrace
USEPA	United States Environmental Protection Agency
USMC	United States Marine Corps
WC	Water cooler drinking fountain
WF	Water fountain

1.0 BACKGROUND

1.1 INTRODUCTION AND PURPOSE

The United States Marine Corps (USMC) is committed to protecting the health of all our service members, retirees, civilian staff, and their families by providing safe drinking water. One way the Marine Corps monitors installation drinking water is by testing it for the presence of lead. The Marine Corps chooses to test for lead in priority areas according to U.S. Environmental Protection Agency (EPA) guidelines even though federal law generally does not require this testing.

The purpose of this Lead in Priority Areas sampling effort is to comply with USMC policy memo dated 24 February 2014. This memo requires Marine Corps installations to test for lead in drinking water from water fountains, faucets, and other outlets used primarily by children, as outlined in the US EPA (USEPA) publication *3Ts for Reducing Lead in Drinking Water in Schools: Revised Technical Guidance, October 2006* and *3Ts for Reducing Lead in Drinking Water from Child Care Facilities: Revised Technical Guidance, December 2005* (from here on referred to as USEPA 3Ts). These "priority areas" are defined as outlets in primary and secondary schools, Child Development Centers (CDCs), School Age Centers, and Youth and Teen Centers.

The EPA recommends a two-step sampling process be utilized for identifying lead contamination. First, initial samples are collected to identify outlets in priority areas that are providing water with elevated lead levels. Follow-up samples are taken from outlets initially identified as potential problem locations. Sample results are then compared to determine the potential sources of lead contamination and to determine appropriate corrective actions. Below is a brief explanation as to why lead is a concern in drinking water, followed by a brief description of sampling methodology used, sampling results, and any corrective actions required.

1.2 LEAD AND DRINKING WATER

Lead is a toxic metal that is harmful to human health and has no known beneficial value to the human body. The human body cannot distinguish between lead and calcium, which is a mineral essential for human health. Lead remains in the bloodstream and body organs like muscle or brain. What is not excreted is absorbed into the bones, where it can collect for a lifetime.

Children absorb lead more easily than do adults. Their nervous systems are still developing and thus are more susceptible to the effects of toxic contaminants. Children, particularly ages 6 and younger, are at a higher risk for lead exposure because they have

frequent hand-to-mouth activity and absorb lead more easily than do adults. Lead is also harmful to the developing fetuses of pregnant women.

Lead is distributed through the environment through both natural and man-made means and can get into drinking water in two ways: by being present in the source water, such as coming from contaminated runoff or water pollution and/or through an interaction between the water and plumbing materials containing lead, such as through corrosion. The second is the focus of this water sampling effort.

Most lead enters drinking water after the water leaves the water treatment plant and comes into contact with plumbing materials containing lead. Interior plumbing, lead solder, leaded brass fittings, and various drinking water outlets that contain lead materials are the primary contributors of lead in drinking water. Corrosion is the physical/chemical interaction that occurs between the water and plumbing. The extent to which corrosion occurs contributes to the amount of lead that can be released into the drinking water. Even though the water delivered to your facility meets all federal and state public health standards for lead, you may end up with too much lead in your drinking water because of the plumbing in your facility.

There are actions that you can take to reduce the amount of lead in your drinking water. Below are examples of best management practices that should be followed to prevent exposure to elevated levels of lead:

- Debris, which absorbs lead, can accumulate in faucet aerators. Aerators should be cleaned on a regular basis.

- Hot water will dissolve lead more quickly than cold water and is likely to contain increased lead levels. Use only cold water for drinking, cooking and making baby formula. If hot water is required, it should be taken from the cold water tap and heated on the stove or in a microwave.

- Flush outlets before use for at least 30 seconds if outlet has not been used for six hours or longer.

2.0 METHODOLOGY

2.1 PRIORITY AREAS

All priority areas aboard Marine Corps Installations East-Marine Corps Base, Camp Lejeune (MCIEAST-MCB CAMLEJ) and Marine Corps Air Station, New River (MCASNR) had to be identified prior to developing a sampling and analysis plan. These "priority areas" are defined as outlets in primary and secondary schools, CDCs, School Age Centers, and Youth and Teen Centers. Priority areas do not include on-base or off-base residences (e.g., Family Child Care Homes) used for child care purposes, out-patient medical centers, or schools that are not owned or managed by the Department of Defense. Since the June 2013 Navy Medicine Enterprise Nursing Procedures Manual mandates the use of sterile water to reconstitute powdered formula and as recommended by Bureau of Medicine and Surgery, hospital pediatric and maternity wards are not included in the priority area definition. Priority areas aboard MCIEAST-MCB CAMLEJ and MCASNR are shown in Table 2-1.

Table 2-1. Priority Areas Aboard MCIEAST-MCB CAMLEJ and MCASNR

Facility Name	Facility No.	Facility Type
Bitz Intermediate School	2028	School
Brewster CDC	631	CDC
Brewster Teen Center	780	Youth/Teen
Brewster Middle School	883	School
Heroes Elementary School	PP201	School
Heroes Manor I CDC	PP100	CDC
Heroes Manor II CDC	PP200	CDC
Johnson Primary School	2027	School
Lejeune High School	835	School
*Paradise Point Officer's Club	2615	Kitchen
Stone Street Pavilion Youth Center	842	Youth/Teen
**Midway Park CDC	LCH4007	CDC
**Midway Park CDC	LCH4011	CDC
Midway Park Community Center	LCH4014	Youth/Teen
Tarawa Terrace Youth Pavilion	TT19	Youth/Teen
Tarawa Terrace II Elementary School	TT84	School
Tarawa Terrace I CDC	TT86	CDC
Tarawa Terrace II CDC	TT113	CDC
Courthouse Bay CDC	BB353	CDC
Air Station Youth/Teen Center	AS612	Youth/Teen
Air Station CDC	AS1000	CDC
**Air Station CDC	AS207	CDC
Delalio Elementary School	TC1500	School

*The Paradise Point Officer's Club is not considered a priority area by definition. However, since they cater meals to the CDCs MCIEAST-MCB CAMLEJ included them in this sampling effort.

**Buildings are not currently occupied and were not included in this sampling effort. Sampling will be conducted at these facilities prior to occupancy.

2.2 FIELD INVESTIGATION

Contractors for MCIEAST-MCB CAMLEJ conducted site visits of the facilities listed in Table 2-1. During these site visits all interior and exterior water outlets were identified, given a fixture number, and were added to facility floor plans. All outlets were evaluated for likelihood of use by contractor observation as well as interviews with appropriate staff members. Outlets deemed to be used primarily by children for consumption were included in this sampling effort. Outlets not identified as primarily used by children for consumption, such as janitorial mop sinks and dish washing sinks in kitchens, were excluded from this effort.

2.3 SAMPLE COLLECTION

All drinking water samples were collected in accordance with the USEPA 3Ts guidance. Samples were collected in 250 milliliter (ml) plastic sample bottles which contained nitric acid (HNO_3) preservative. Sample bottles were provided by Element One, a privately held independent laboratory contracted for analysis.

Samples were collected after the water had been idle in the pipes and plumbing fixtures for at least 8 hours but not more than 18 hours. Since school and childcare facilities are not typically open overnight, allowing the water to remain idle for 8-18 hours showed lead levels that were typical with normal water use patterns at these facilities.

All collected samples were assigned a unique sample identification number to ensure that each sample could be tracked back to one particular outlet. Table 2-3 provides a more detailed look at the sample identification method.

Table 2-3. Sample Identification

Sample ID No.	Identifier Description	Example
AS-612-201H-KS-2-01/22/14	Specific Base Location	MCASNR
AS-**612**-201H-KS-2-01/22/14	Building Number or Abbreviated Name	Building 612
AS-612-**201H**-KS-2-01/22/14	Room Number	Hallway outside Room 201
AS-612-201H-**KS**-2-01/22/14	Water Outlet Type	Kitchen Sink
AS-612-201H-KS-**2**-01/22/14	Sample Number	Represents number of fixtures of that type in room
AS-612-201H-KS-2-**01/22/14**	Date	Date that sample was collected

3.0 RESULTS AND CORRECTIVE ACTIONS

3.1 WATER TESTING RESULTS

Samples were collected from Tarawa Terrace II Elementary School on 23 September 2014. Table 3-1 shows the initial sampling results received on 30 September 2014.

USEPA 3Ts guidance recommends that action be taken for samples that exceed 20 parts per billion (ppb).

Table 3-1. Tarawa Terrace II Elementary School, Bldg. TT84 - Initial Sampling Results

Sample ID No.	Lead Concentration (ppb)	Sample ID No.	Lead Concentration (ppb)
TT-TT84-A121-IM-1-09/23/14	< 3	TT-TT84-D110-WF-1-09/23/14	< 3
TT-TT84-A121-KS-1-09/23/14	< 3	TT-TT84-D111-CS-1-09/23/14	< 3
TT-TT84-A121-KS-2-09/23/14	< 3	TT-TT84-D111-WF-1-09/23/14	< 3
TT-TT84-A121-BP-1-09/23/14	< 3	TT-TT84-D112-CS-1-09/23/14	3
TT-TT84-A121-K-1-09/23/14	< 3	TT-TT84-D112-WF-1-09/23/14	< 3
TT-TT84-A120-WC-1-09/23/14	< 3	TT-TT84-F120-WC-1-09/23/14	< 3
TT-TT84-A120-WC-2-09/23/14	< 3	TT-TT84-F120-WC-2-09/23/14	< 3
TT-TT84-A103-OS-1-09/23/14	< 3	TT-TT84-F120-WC-3-09/23/14	< 3
TT-TT84-A109N-WC-1-09/23/14	< 3	TT-TT84-F120-WC-4-09/23/14	< 3
TT-TT84-A109N-WC-2-09/23/14	< 3	TT-TT84-F120-WC-5-09/23/14	< 3
TT-TT84-B101-CS-1-09/23/14	< 3	TT-TT84-F120-WC-6-09/23/14	< 3
TT-TT84-B101-WF-1-09/23/14	< 3	TT-TT84-F120-CS-1-09/23/14	3
TT-TT84-B102-CS-1-09/23/14	< 3	TT-TT84-F120-WF-1-09/23/14	< 3
TT-TT84-B102-WF-1-09/23/14	< 3	TT-TT84-F12A-KS-1-09/23/14	< 3
TT-TT84-B103-CS-1-09/23/14	< 3	TT-TT84-F123-CS-1-09/23/14	20
TT-TT84-B103-WF-1-09/23/14	< 3	TT-TT84-F123-WF-1-09/23/14	5
TT-TT84-B104-CS-1-09/23/14	< 3	TT-TT84-F124-CS-1-09/23/14	10
TT-TT84-B104-WF-1-09/23/14	< 3	TT-TT84-F124-WF-1-09/23/14	8
TT-TT84-B105-CS-1-09/23/14	< 3	TT-TT84-E101-CS-1-09/23/14	< 3
TT-TT84-B105-WF-1-09/23/14	< 3	TT-TT84-E101-WF-1-09/23/14	< 3
TT-TT84-B106-CS-1-09/23/14	5	TT-TT84-E102-CS-1-09/23/14	< 3
TT-TT84-B106-WF-1-09/23/14	< 3	TT-TT84-E102-WF-1-09/23/14	< 3
TT-TT84-B107-CS-1-09/23/14	< 3	TT-TT84-E103-CS-1-09/23/14	< 3
TT-TT84-B107-WF-1-09/23/14	< 3	TT-TT84-E103-WF-1-09/23/14	< 3
TT-TT84-B108-CS-1-09/23/14	< 3	TT-TT84-E105-CS-1-09/23/14	< 3
TT-TT84-B108-WF-1-09/23/14	< 3	TT-TT84-E105-WF-1-09/23/14	< 3

Table 3-1. Continued			
Sample ID No.	Lead Concentration (ppb)	Sample ID No.	Lead Concentration (ppb)
TT-TT84-B109-CS-1-09/23/14	3	TT-TT84-E106-CS-1-09/23/14	< 3
TT-TT84-B109-WF-1-09/23/14	< 3	TT-TT84-E106-WF-1-09/23/14	< 3
TT-TT84-C101-CS-1-09/23/14	< 3	TT-TT84-E109-CS-1-09/23/14	< 3
TT-TT84-C101-CS-2-09/23/14	< 3	TT-TT84-E109-WF-1-09/23/14	< 3
TT-TT84-C103-CS-1-09/23/14	< 3	TT-TT84-E110-CS-1-09/23/14	11
TT-TT84-C103-WF-1-09/23/14	< 3	TT-TT84-E110-WF-1-09/23/14	12
TT-TT84-C104-CS-1-09/23/14	< 3	TT-TT84-E111-CS-1-09/23/14	< 3
TT-TT84-C104-WF-1-09/23/14	< 3	TT-TT84-E111-WF-1-09/23/14	< 3
TT-TT84-C105-CS-1-09/23/14	< 3	TT-TT84-E112-CS-1-09/23/14	6
TT-TT84-C105-WF-1-09/23/14	< 3	TT-TT84-E112-WF-1-09/23/14	7
TT-TT84-C106-CS-1-09/23/14	< 3	TT-TT84-E114-CS-1-09/23/14	< 3
TT-TT84-C106-WF-1-09/23/14	< 3	TT-TT84-E114-WF-1-09/23/14	< 3
TT-TT84-C108-CS-1-09/23/14	< 3	TT-TT84-E114-CS-2-09/23/14	< 3
TT-TT84-C108-WF-1-09/23/14	< 3	TT-TT84-E114-WF-2-09/23/14	< 3
TT-TT84-D101O-WC-1-09/23/14	< 3	TT-TT84-E115-CS-1-09/23/14	< 3
TT-TT84-D101O-WC-2-09/23/14	< 3	TT-TT84-E115-WF-1-09/23/14	< 3
TT-TT84-D101-CS-1-09/23/14	< 3	TT-TT84-E118-CS-1-09/23/14	< 3
TT-TT84-D101-WF-1-09/23/14	< 3	TT-TT84-E118-WF-1-09/23/14	< 3
TT-TT84-D102-CS-1-09/23/14	< 3	TT-TT84-E118-CS-2-09/23/14	< 3
TT-TT84-D102-WF-1-09/23/14	< 3	TT-TT84-E118-WF-2-09/23/14	< 3
TT-TT84-D103-CS-1-09/23/14	< 3	TT-TT84-E119-CS-1-09/23/14	< 3
TT-TT84-D103-WF-1-09/23/14	< 3	TT-TT84-E119-WF-1-09/23/14	< 3
TT-TT84-D104-CS-1-09/23/14	< 3	TT-TT84-E121-CS-1-09/23/14	< 3
TT-TT84-D104-WF-1-09/23/14	< 3	TT-TT84-E121-WF-1-09/23/14	< 3
TT-TT84-D105-CS-1-09/23/14	< 3	TT-TT84-E121-CS-2-09/23/14	< 3
TT-TT84-D105-WF-1-09/23/14	< 3	TT-TT84-E121-WF-2-09/23/14	< 3
TT-TT84-D106-CS-1-09/23/14	**29**	TT-TT84-E122-CS-1-09/23/14	< 3
TT-TT84-D106-WF-1-09/23/14	< 3	TT-TT84-E122-WF-1-09/23/14	< 3
TT-TT84-D107-CS-1-09/23/14	< 3	TT-TT84-E123-CS-1-09/23/14	< 3
TT-TT84-D107-WF-1-09/23/14	< 3	TT-TT84-E123-WF-1-09/23/14	< 3
TT-TT84-D108-CS-1-09/23/14	< 3	TT-TT84-E123-CS-1-09/23/14	< 3
TT-TT84-D108-WF-1-09/23/14	< 3	TT-TT84-E123-WF-1-09/23/14	< 3
TT-TT84-D109-CS-1-09/23/14	< 3	TT-TT84-E124-CS-1-09/23/14	< 3
TT-TT84-D109-WF-1-09/23/14	< 3	TT-TT84-E124-WF-1-09/23/14	< 3
TT-TT84-D110-CS-1-09/23/14	< 3		

As shown in Table 3-1, 99% of all samples taken contained a lead concentration of 20 ppb or less. Only one sample exceeded the USEPA 3Ts guidance threshold of 20 ppb, and therefore required immediate corrective action.

3.2 CORRECTIVE ACTIONS

As outlined in the USEPA 3Ts guidance, only samples that exceed the 20 ppb threshold require any corrective action. At the Tarawa Terrace II Elementary School there was one sample that exceeded the EPA set limit; TT-TT84-D106-CS-1-09/23/14. In accordance with MCIEAST-MCB CAMLEJ's Sampling Plan for Baseline Sampling and Testing for Lead in Drinking Water in Priority Areas, any outlet that exceeds 20 ppb is immediately removed from service by notifying facility staff, securing the outlet, posting a sign directing that the outlet not be used, and closing the supply valve at the specific outlet. After the outlet has been secured follow-up sampling procedures can begin to determine the source of the lead contamination.

A discussion of each outlet that exceeded the 20 ppb threshold along with corrective action measures taken are below.

3.2.1 TT-TT84-D106-CS-1-09/23/14

Sample TT-TT84-D106-CS-1-09/23/14 was taken from a classroom sink faucet in Room D106. First draw sample results showed a lead concentration of 29 ppb which is in exceedance of the USEPA 3Ts 20 ppb threshold. Room D106 is not currently assigned a class and the room has been vacant for quite some time.

First draw sample results were received on 30 September 2014. The outlet was secured, the aerator screen was removed, cleaned, and replaced and follow-up sampling was conducted on 1 October 2014 to include a second first draw sample and a 30 second follow-up sample. Follow-up sample results were received on 3 October 2014. The results of the second first-draw sample and the 30 second follow-up sample were 26 ppb and < 3 ppb.

The fixture was replaced with a new fixture that is compliant with the current lead-free classification and that meets the National Sanitation Foundation (NSF) Standard on 7 October 2014. To verify the effectiveness of this corrective action a post-remediation sample was collected on 12 October 2014. Results for this post-remediation sample showed reduced lead concentrations at < 3 ppb confirming that measures taken were successful.

4.0 NEXT STEPS

MCIEAST-MCB CAMLEJ will continue to monitor for lead in drinking water in priority areas. In accordance with USMC policy memo dated 24 February 2014, sampling efforts will be conducted when any new priority area facilities are constructed. Outlets will also be sampled at existing priority area facilities when water treatment processes are added or modified in any way that has the potential to increase lead concentrations in drinking water. However, after January 2014, if the contractor of newly-constructed facilities can adequately demonstrate that all materials used in plumbing conform to section 1417 of the Safe Drinking Water Act (SDWA), which requires less than 0.25% lead, then the requirement to test new construction is waived.

Installations are also required to re-test priority areas every five years from the established baseline, or more frequently if required by regulatory agencies.