# *MUIR BEACH COMMUNITY SERVICES DISTRICT*

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**Monthly Public Meetings**
**Muir Beach Community Center**
**19 Seacape Drive**
**Muir Beach, CA 94965**
**June, 2015**

# Water Quality Report

– results through 2014 –

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Este informe contiene información muy importante sobre su agua potable. Tradúzcalo ó hable con alguien que lo entienda bien.

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## Section 1 REGULATED PUBLIC WATER SYSTEM

The Muir Beach CSD is your local governmental agency that owns and operates the Muir Beach Community Water System, California Public Water System # 2100508. The system is regulated by the State Water Resources Water Control Board, Division of Drinking Water ("DDW"), formerly under the California Dept. of Public Health.

As required by those regulations (and a good idea), we test the water according to schedule to identify and correct any problem. We provide water samples taken from two locations each month to a public health lab for testing for bacteria. Much less frequently, and according to approved schedule, we run full banks of tests for other measures of the quality of our water.

The purpose of this report is to present the results of those tests of our and your water. Because there is an overwhelming number of tests, almost all of which come back showing the absence of the possible contaminant, regulations require that we present in this report only those tests which produced detectable results. Information on those additional tests, or on anything else in this report, is available by contacting Harvey Pearlman, at 415-388-7804, harvey@muirbeachcsd.com.

## Section 2 WATER AT THE SOURCE

**Pure Water?** – Chemically pure water does not exist in nature for any appreciable time. Fresh water originates mostly from the oceans with approximately six vertical feet of ocean water evaporating into the atmosphere each year. When that evaporated water vapor falls as rain, or drifts as fog, it picks up small amounts of gases, ions, and particulate matter from the atmosphere. Then, as it flows over or through the surface layers of the earth, it dissolves and carries with it almost everything it touches, including that which is dumped by man.

We are lucky enough to live in a watershed that has no industrial plants, no gas stations, no sewer treatment plants, and long past historic use of agricultural chemicals. We also draw our water from groundwater, which is much less problematic than from reservoirs because of the extremely high filtering effects of natural soil.

**Location** – We draw our water from two wells (the 2002 Well and 2008 Well), both located at Santos Meadow at the Muir Beach BBQ grounds. The community's site is surrounded by California's Mount Tamalpais State Park and the Golden Gate National Recreation Area. The wells draw from an aquifer that flows parallel to Redwood Creek, flowing from Muir Woods to the ocean.

**Vulnerability** – Although this all sounds good, our wellsite is actually quite vulnerable to contamination should the wrong activities or practices take place. Marin County Environmental Health conducted a vulnerability assessment of our wellsite in 2002, and numerous safety improvements have since been completed. DDW inspected our system and our well sites in 2010. A current set of Source Assessments is now available at the Muir Beach CSD website (www.muirbeachcsd.com/about), or by contacting us directly.

## Section 3 WATER AT THE FAUCET

**Problems from Human Systems** – As you will see from the later tables, our source water starts out of high quality and is aesthetically pleasing. Our human systems then interfere with that. Because of possible intrusion of contaminated water into our water distribution lines – we are all on septic systems (plus some other reasons) – chlorine must be added to and maintained in the drinking water as a protective measure (in the form of sodium hypochlorite). Chlorine reacts with any organic vegetation present in the water and forms by-products that are known to be harmful (trihalomethanes and haloacetic acids). Luckily, our groundwater contains very little of the organic vegetative matter, so our level of these by-products is low.

**Corrosion of Copper Pipes** – The next human system to cause problems is the use of copper pipes in home plumbing (we don't use copper in the main system), and worse if it was assembled using lead solder. Our water is very good at dissolving things (naturally high on corrosive measures), so when the water sits undisturbed in your home's plumbing (like overnight) it dissolves copper, and lead from the joints if present.

Muir Beach used to be way over the recommended threshold for copper and close to the limit for lead (both due to corrosion of household plumbing). In May, 2006, however, we began adding dissolved silica (soluble sand) to the water and the results have been dramatically successful. Lead measurements have dropped such that none of the 10 homes have even detectable amounts of lead. Copper levels have dropped such that no homes in our samples are above the recommended limit (as 8 out of 10 had been). Accordingly, DPH has placed us on a reduced frequency of 3-years for testing for levels of lead and copper. Tests have continued to be excellent.

## Section 4 TABLES OF WATER RESULTS

**Substances Found Only** – The tables below show **ONLY** those substances actually found – the many, many tests that come back with no detections (for instance, no bacteria, no Roundup, no pesticides) are, by regulation, not presented in this report (for those interested, test results for the many substances are posted on the CSD's website).

A brief description of many of the various substances appears at Section 6 of this report.

TABLE 1. Substances Found Having a **Primary** Drinking Water Standard (set to safeguard health).

| | Trihalo methanes (ppb) | Fluoride (ppb) | Haloacetic Acids (ppb) | Gross Alpha (pCi/L) | Barium (ppb) |
|---|---|---|---|---|---|
| Level Found | 20 | 280 | 6 | 1.17 | 75 |
| Range (if more than single test or location) | | 190 & 370 | | 0.23& 2.1 | ND* & 150 |
| Public Health Goal (California) | 80 | 1,000 | 60 | 15.00 | 1,000 |
| Maximum Contaminant Level | 80 | 2,000 | 60 | 15.00 | 1,000 |
| Level Found as % of Maximum Contaminant Level | 25% | 14% | 10% | 8% | 8% |
| Under Maximum Contaminant Level? | Yes | Yes | Yes | Yes | Yes |
| Sampled | 2014 | 2014 | 2014 | 2014 | 2014 |
| Likely Sources | By-product of chlorine disinfection | Erosion of natural deposits (no fluoride added). | By-product of chlorine disinfection | Erosion of natural deposits. | Erosion of natural deposits. |

* Not detectable by lab at testing limit.

TABLE 2. Substances Found Having a **Secondary** Drinking Water Standard (set to protect taste and appearance).

| | Manganese (ppb) | Calcium (ppb) | Turbidity (N. Turbidity Units) | Specific Conductance (micro Siemens) | Total Dissolved Solids (ppb) | Iron (ppb) |
|---|---|---|---|---|---|---|
| Level Found | 145 | 24,000 | 2.60 | 410 | 250,000 | 60 |
| Range (if more than single test or location) | 190 to 100 | 14,000 & 34,000 | 2.7 & 2.8 | 330 & 490 | 190,000 & 310,000 | 120 & ND |
| Maximum Contaminant Level (Secondary Only) | 50 | 30,000 | 5.00 | 1,600 | 1,000,000 | 300 |
| Level Found as % of Maximum Contaminant Level | 290% * | 80% * | 52% * | 26% | 25% | 20% * |
| Sampled | 2014 | 2014 | 2014 | 2014 | 2014 | 2014 |

| (Table 2 continued) | Magnesium (ppb) | Chloride (ppb) | Sulfate (ppb) | Hardness (ppb) | Sodium (ppb) | pH (pH Units) |
|---|---|---|---|---|---|---|
| Level Found | 14,500 | 32,500 | 16,000 | 121,500 | 28,000 | 7.2 |
| Range (if more than single test or location) | 14,000 & 15,000 | 32,000 & 33,000 | 13,000 & 19,000 | 93,000 & 150,000 | 20,000 & 36,000 | 6.9 & 7.5 |
| Maximum Contaminant Level (Secondary Only) | 125,000 | 500,000 | 500,000 | No MCL | No MCL | 6.5-8.5 |
| Level Found as % of Maximum Contaminant Level | 12% | 7% | 3% | Moderately Hard to Hard | | |
| Sampled | 2014 | 2014 | 2014 | 2014 | 2014 | 2014 |

Note: All substances in Table 2 are likely present due to erosion of natural deposits.

* Please see Section 6 for a description of the various substances and their possible health effects. Please also note that in all instances above where two readings are provided, the first reading is from the 2002 Well (primary well) and second is from the 2008 Well (backup well).

## Section 5 DEFINITIONS (Included by regulation)

Maximum Contaminant Level (MCL): The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the Public Health Goals (PHGs) or MCL Goal (MCLGs) as is economically and technologically feasible. Secondary MCLs are set to protect the odor, taste, and appearance of drinking water.

Maximum Contaminant Level Goal (MCLG): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. Environmental Protection Agency.

Public Health Goal (PHG): The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency.

Maximum Residual Disinfectant Level (MRDL): of a disinfectant (in our case, chlorine) allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for the control of microbial contaminants.

Maximum Residual Disinfectant Level Goal (MRDLG): The level of a disinfectant added for water treatment below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

Primary Drinking Water Standard (PDWS): MCLs and MRDLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.

Regulatory Action Level (AL): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

Not Detectable (ND): Not detectable at testing limit.

Unit Abbreviations

ppm: parts per million or milligrams per liter (mg/L) (also percentage divided by 10,000).

ppb: parts per billion or micrograms per liter (ug/L) (also percentage divided by 10 million).

pCi/L: Picocuries per liter (a measure of radiation).

## Section 6 DESCRIPTION OF SELECTED SUBSTANCES

Barium – Barium is a naturally occurring metal found in many types of rock, such as limestones and sandstones, and soils in the eastern United States. Certain geologic formations in California, Arkansas, Missouri, and Illinois are known to contain barium levels about 1,000 times higher than those found in other portions of the United States. Acute exposure to barium in animals and humans results in a variety of cardiac, gastrointestinal, and neuromuscular effects. Barium exposure has been associated with hypertension and cardiotoxicity in animals. For this reason and because of the widespread occurrence of barium in drinking water, it is regulated.

Gross Alpha – Alpha radiation normally exists everywhere: in the soil, in the air, and also in water. As the radioactive elements decay, alpha radiation continues to be released into groundwater. Because the earth's bedrock contains varying amounts of radioactive elements, the amount of alpha radiation in water also varies. Tests are to confirm the absence of any unusual subsurface condition that could result in an unusually high concentration in water.

Haloacetic Acids – Haloacetic acids are a group of chemicals that form when chlorine is added to the water and reactions occur with organic and inorganic material in the water. Haloacetic acids are considered by the EPA as likely to be carcinogenic. Because of the high filtering effects of ground water, there is very little organic and inorganic material in our water, which likely accounts for the low level of haloacetic acids in the community's tap water.

Hardness and Calcium – Natural sources of hardness and calcium principally are limestones which are dissolved by percolating rainwater made acidic by dissolved carbon dioxide absorbed from the air. The concept of hardness comes from water supply practice. It is measured by soap requirements for adequate lather formation and as an indicator of the rate of scale formation in hot water heaters. A commonly used classification is calcium carbonate (CaCO3) (ppb): Soft-0-75,000; Moderately Hard-75,000-150,000; Hard-150,000-300,000; Very Hard-300,000+. Water softened to zero hardness is corrosive. It is therefore desirable to blend a proportion of non-softened water with extremely soft water. Muir Beach's water typically ranges between moderately hard to hard, being fairly rich in minerals.

Iron – Iron is one of the most abundant elements in the environment, making up approximately 5% of the earth's crust. As rainwater infiltrates the soil and geologic formations it carries dissolved iron into the underground aquifers that serve as sources for groundwater. Iron is not considered hazardous to health. In fact, iron is essential for good health

because it transports oxygen in blood. At levels in excess of the secondary MCL it can impart a bitter taste to water and can cause brown/reddish water that causes laundry problems. With the addition of silica to Muir Beach's water, however, the dissolved iron is protected from the oxidizing effects of chlorine and we no longer experience brown/reddish water (small particles of oxidized iron) or problems with bitterness.

Magnesium – The human body contains about 25 grams of magnesium, of which 60% is present in the bones and 40% is present in muscles and other tissue. It is a dietary mineral for humans, one of the micro elements that are responsible for membrane function, nerve stimulant transmission, muscle contraction, protein construction and DNA replication. Higher levels of water hardness in the form of magnesium and calcium have been associated with lower incidences of cardiovascular mortality. Approximately 10% to 25% of one's total magnesium intake typically is from consumption of relatively hard drinking water, as is Muir Beach's. As with most minerals, food is a more substantial contributor of dietary magnesium. It takes about 30 quarts of Muir Beach water to consume 1 gram of magnesium.

Manganese – Manganese is an essential nutrient for humans and animals, and is found in many foods (rich sources include pineapple, brown rice, and spinach) and is often found in well water – including ours at Muir Beach. Based on consumption of approximately two quarts of Muir Beach water per day, one would receive less than 10% of one's daily intake of manganese from water. Baby formula contains high amounts of manganese (breast milk does not), so those feeding infants formula may consider using bottled water in order to not provide an excessive amount of manganese. The elderly and those with liver disease should discuss the matter with their health care provider. The Secondary MCL (aesthetics) is set at a threshold where manganese may be just noticeable (it can cause reddish water, but does not in the case of our water). Health effects of manganese are not generally a concern until concentrations reach approximately 500 ppb, and Muir Beach water is less than half that amount.

pH – A measure of the acid-base balance in water. pH values below 7 units are regarded as acidic and pH values above 7 are regarded as basic. Muir Beach's water hovers around neutral (pH of 7).

Sulfate – High concentrations of sulfate in drinking waters have three effects: (1) water containing appreciable amounts of sulfate (SO4) tends to form hard scales in boilers and heat exchangers; (2) sulfates cause taste effects; and (3) sulfates can cause laxative effects with excessive intake. The laxative effect of sulfates is usually noted in transient users of a water supply because people who are accustomed to high sulfate levels in drinking water have no adverse response. Diarrhea can be induced at sulfate levels greater than 500,000 ppb. Muir Beach's water is low in sulfates.

Trihalomethanes – Chloroform, usually the trihalomethane found in the highest concentrations, is formed by the reaction of free chlorine with certain natural organic compounds in the water. Formation occurs during chlorination and can continue to occur as long as free chlorine is available. Other trihalomethanes are formed by the reaction of bromine or iodine with the same group of organic compounds. The effects of chloroform on the human body are still under study, but one test has found that high doses of chloroform can be carcinogenic to rats and mice. Therefore, the EPA considers chloroform a potential human carcinogen. The EPA also believes that the other trihalomethanes are implicated, by association, as potential carcinogens.

## Section 7 REQUIRED LANGUAGE

Regulations require us to include the following information and text. Because it is general information, it may or may not apply to you or to Muir Beach.

- "*Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the USEPA's Safe Drinking Water Hotline (1-800-426-4791).*

- *Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. USEPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by* Cryptosporidium *and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).*

- *The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.*

*• Contaminants that may be present in source water include:*

*Microbial contaminants, such as viruses and bacteria, that may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.*

*Inorganic contaminants, such as salts and metals, that can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.*

*Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.*

*Organic chemical contaminants, including synthetic and volatile organic chemicals, that are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, agricultural application, and septic systems.*

*Radioactive contaminants, which can be naturally-occurring or be the result of oil and gas production and mining activities.*

*• In order to ensure that tap water is safe to drink, the U.S. Environmental Protection Agency (USEPA) and the State Department of Health Services (Department) prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. Department regulations also establish limits for contaminants in bottled water that must provide the same protection for public health.*

*• If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The Muir Beach CSD is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead."*

**Note:** Much of the language providing descriptions of the various substances, as well as descriptions of the chemistry of water, comes from a Rutgers publication by T. B. Shelton, Ph.D., *Interpreting Drinking Water Quality Analysis – What do the numbers mean?*