# *MUIR BEACH COMMUNITY SERVICES DISTRICT*

19 Seacape Drive ♦ Muir Beach, CA 94965 ♦ 415·388·7804 ♦ www.muirbeachcsd.com

Monthly Public Meetings
Muir Beach Community Center
19 Seacape Drive
Muir Beach, CA 94965
June 26, 2006

## Water Quality Report

– results through 2005 –

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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 California Dept. of Health Services, which has delegated its supervisory responsibilities to the Marin County Dept. of Environmental Health Services (EHS).

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 the County 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 measurable results. Information on those additional tests, or on anything else in this report, is available by contacting Leighton Hills, at 415-388-7804, leighton@muirbeachCSD.com.

### Section 2 WATER AT THE SOURCE

**Pure Water?** – Chemically pure water does not exist for any appreciable time in nature. While falling as rain, or drifting as fog, water 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 little historical 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 (drilled 1996 and 2002), 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.

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**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 found that contaminants could be introduced to the relatively shallow groundwater from the surface fairly easily – bypassing the filtering effects of the soil.

Since that time we have taken steps to better isolate the groundwater from the surface, such as by adding concrete pads at the tops of our wells and fully sealing off former abandoned wells. The 2002 Source Assessment is available on the Muir Beach CSD website (www.muirbeachCSD.com/about), or by contacting us, or by contacting Scott Callow at Marin County Environmental Health, 3501 Civic Center Dr., Rm. 236, San Rafael, CA 94903, tel. 415-499-6907.

## Section 3 WATER AT THE FAUCET

**Problems from Human Systems** – As you will see from the later tables, our source water starts out of extremely 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. Once chlorine (in the form of sodium hypochlorite) is added, however, it reacts with the natural minerals in the water, mostly iron and manganese, and causes visible particles that come and go in the water – not a health problem, but not very aesthetic when present.

The second effect of chlorine is to react with any organic vegetation present in the water, and form byproducts that are know to be harmful (trihalomethanes). Luckily, our groundwater contains very little of the organic vegetative matter, so our level of these byproducts is very 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 slightly acidic and high on other 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). Volunteers from 10 homes in the community provide us with samples of this undisturbed-overnight water (called first-draw samples), and we have it tested for levels of copper and lead.

Lead is never good, but tests show the amounts to be somewhat below the regulatory thresholds. Copper is an essential nutrient, but given too much, is thought to be potentially harmful. The exact numbers appear in Table 3 of this report. The first-draw samples have levels of copper well above the thresholds – such that the water system is required to take steps to attempt to reduce the nature of the water to dissolve/corrode copper.

**Treatment and Reporting of Corrosion Levels** – It is easy to avoid the high levels of copper in the first-draw water simply by running the faucet long enough before drinking so that fresh cold water replaces the water that has remained undisturbed in copper pipes overnight. Nevertheless, regulations require that the water system take steps to reduce the corrosive nature of the water, and we began such a treatment in early May, 2006. We now add dissolved silica (soluble sand) via meter into the water as it comes out of the well. The silica lays down a very thin layer of glass-like silica wherever it encounters corroding metal, such as in copper pipes, or at joints connected with lead solder, and seals them off from further contact with the water. The silica is in the form of sodium silicate.

It is too early to tell if or how well this works (it takes approximately 2 months for the layer of silica to form), but future first-draw tests will show the degree of effectiveness. In other water systems adding silica (mostly in Canada where naturally acidic waters also occur), copper and lead levels have dropped typically 5-fold. We were remiss in not previously taking steps to reduce copper corrosion, and our previous water quality reports incorrectly presented the

amount of copper that is naturally present in our well water (very little), rather than, as would have been correct, the substantially higher levels from the first-draw tests. We now properly comply with regulatory requirements.

## 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 (contact us directly if you want more info). Additional tests have also been performed in 2006, but are not yet back from the lab – moreover, regulations require that this report cover tests through 2005 only.

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).

| | Antimony | Gross Alpha | Fluoride | Trihalo-methanes | Aluminum | Barium | Nickel |
|---|---|---|---|---|---|---|---|
| | (ppb) | (pCi/L) | (ppb) | (ppb) | (ppb) | (ppb) | (ppb) |
| Level Found | 2 | 1.17 | 130 | 5 | 54 | 47 | 2 |
| Range (if more than single test) | | | | 2.4-7.0 | | | |
| Public Health Goal (California) | 20 | 15.00 | 1,000 | 80 | 1,000 | 1,000 | 12 |
| Maximum Contaminant Level | 6 | 15.00 | 2,000 | 80 | 1,000 | 1,000 | 100 |
| Level Found as % of Maximum Contaminant Level | 32% | 8% | 7% | 6% | 5% | 5% | 2% |
| Under Maximum Contaminant Level? | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Sampled | 2003 | 2005 | 2003 | 2005 | 2003 | 2003 | 2003 |
| Likely Sources | Erosion of natural de-posits. | Erosion of natural de-posits. | Erosion of natural depos-its (no fluoride added). | By-product of chlorine disinfection | Erosion of natural depos-its. | Erosion of natural depos-its. | Erosion of natu-ral deposits. |

TABLE 2. Substances Found Having a Secondary Drinking Water Standard (set to protect taste and appear-ance).

| | Calcium | Iron | Aluminum | Specific Conductance | Total Dissolved Solids | Magnesium | Turbidity |
|---|---|---|---|---|---|---|---|
| | (ppb) | (ppb) | (ppb) | (micro Siemens) | (ppb) | (ppb) | (N. Turbitity Units) |
| Level Found | 14,300 | 92 | 54 | 402 | 176,000 | 12,300 | 0.37 |
| Maximum Contaminant Level (Secondary Only) | 30,000 | 300 | 200 | 1,600 | 1,000,000 | 125,000 | 5.00 |
| Level Found as % of Maximum Contaminant Level | 48% | 31% | 27% | 25% | 18% | 10% | 7% |
| Sampled | 2003 | 2003 | 2003 | 2003 | 2003 | 2003 | 2003 |

| (Table 2 Secondary continued) | Chloride (ppb) | Sulfate (ppb) | Copper (ppb) | Zinc (ppb) | Hardness (ppb) | Sodium (ppb) | pH pH Units |
|---|---|---|---|---|---|---|---|
| Level Found | 32,500 | 5,850 | 7 | 12 | 87,000 | 10,100 | 6.2 |
| Maximum Contaminant Level (Secondary Only) | 500,000 | 500,000 | 1,000 | 5,000 | No MCL | No MCL | 6.5-8.5 |
| Level Found as % of Maximum Contaminent Level | 7% | 1% | 1% | 0.2% | (Moderately Hard) | 20,000 if severely restricted diet | N.A. |
| Sampled | 2003 | 2003 | 2003 | 2003 | 2003 | 2003 | 2003 |

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

TABLE 3. Lead - Copper Tests of Water at the Faucet

Twice during 2005, samples of tap water were taken from 10 homes in Muir Beach after standing undisturbed overnight (at least 6 hours) in copper pipes.

| | Lead (ppb) | | Copper (ppb) | |
|---|---|---|---|---|
| Level Found (in highest 10% of tested homes) | 14 | 10 | 5,400 | 2,600 |
| Public Health Goal (California) | 2 | 2 | 170 | 170 |
| Action Level | 15 | 15 | 1,300 | 1,300 |
| Above Action Level? | No | No | Yes* | Yes* |
| No. of Homes above Action Level | 0 out of 10 | 1 out of 10 | 7 out of 10 | 9 out of 10 |
| Month Tested | Feb 2005 | Oct, Nov 2005 | Feb 2005 | Oct, Nov 2005 |
| Source | Internal corrosion of household plumbing systems. | | Internal corrosion of household plumbing systems. | |

* Muir Beach began treatment of water to reduce corrosion of copper (and lead) on May 6, 2006. See Section 3.

Note: "Copper is an essential nutrient, but some people who drink water containing copper in excess of the action level over a relatively short amount of time may experience gastrointestinal distress. Some people who drink water containing copper in excess of the action level over many years may suffer liver or kidney damage. People with Wilson's Disease should consult their personal doctor."

## Section 5 DEFINITIONS (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)**: The level of a disinfectant added for water treatment that may not be exceeded at the consumer's tap.

**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 are set by the U.S. Environmental Protection Agency.

**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.

**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 unit of radiation).

## Section 6 DESCRIPTION OF SELECTED SUBSTANCES

Aluminum - Aluminum is one of the most abundant elements found in the environment. Certain aluminum compounds have been found to be an important component of the neurological damage characteristics of Alzheimer's Disease. The average human intake comes primarily from foods, drinking water, and pharmaceuticals. Based on an MCL of 1,000 ppb for drinking water, less than 1/4 of the total intake would come from water. In the case of Muir Beach water, it has 1/20th of the allowable MCL, so our total intake of aluminum from water is less than 2%. Processed cheese and cornbread are two major contributors to high aluminum exposures in the American diet, as are some common over-the-counter medications such as antacids and buffered aspirin.

Antimony – Antimony occurs naturally in soils, groundwater and surface waters and is often used in the flame retardant industry. It is also used in ceramics, glass, batteries, fireworks and explosives. It may get into drinking water through natural weathering of rock, industrial production, municipal waste disposal or manufacturing processes. This element has been shown to decrease longevity, and altered blood levels of cholesterol and glucose in laboratory animals such as rats exposed to high levels during their lifetimes. EPA has set the drinking water standard for antimony at 6 ppb to protect against the risk of these adverse health effects. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to antimony.

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.

Hardness – Natural sources of hardness principally are limestones which are dissolved by percolating rainwater made acidic by dissolved carbon dioxide. 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 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.

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.

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.

Trihalomethanes (Total) – 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 USEPA considers chloroform a potential human carcinogen. The USEPA 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. Immuno-compromised 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 byproducts 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."*

**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?*