Phoenix Water Services Department

1999 Water Quality Annual Report

A Publication for the Citizens of Phoenix

Phoenix drinking water met health and safety standards during '99

(NOTE: This report contains important information about your drinking water. If you need the report in Spanish, call (602) 262-6251.)

(NOTA: Este informe contiene información importante sobre su agua potable. Si usted necesita el informe en español, llame (602) 262-6251.)

Throughout 1999, tap water delivered to the 1.2 million customers served by the Phoenix Municipal Water System met or surpassed all health and safety standards for drinking water. Achieving 100 percent regulatory compliance reflects the high standards set by the city's Water Services Department.

The record was nearly as good for the North Valley Water System, which serves only about 10,000 customers. Out of the many tests done in that area during the year, the system experienced only two compliance issues. Neither was believed to have caused a hazard for customers. The incidents involved one Maximum Contaminant Level (MCL) violation and one monitoring violation for total coliform. The city reported both instances to the Arizona Department of Environmental Quality (ADEQ), as required by law.

This report summarizes a year-end review of water quality tests for drinking water delivered from January 1 through December 31, 1999. During the year, the department conducted about 90,000 tests; generally, they showed the water quality to be much better than required by law. In most cases, the substances tested for could not be detected in the city's tap water, even though various levels are permitted by the health and safety standards for drinking water. In those instances where tests were positive, nearly all levels were considerably less than allowed. The tables at the end of this report show specific levels detected.

Phoenix regularly tests for 146 substances – almost 50 percent more than required – to ensure the city's drinking water meets every established standard. Most of the standards are set at the federal level and are required by the Safe Drinking Water Act (SDWA), administered by the U.S. Environmental Protection Agency (EPA). Some are set at the state, county or city level. The level for coliforms is set by EPA.

Coliforms are a family of bacteria, many of which are naturally occurring in people's digestive tract. The presence of coliforms in drinking water is common and not considered hazardous when the level is at or less than the established health and safety standard. For the North Valley Water System, the standard is that no more than one sample may be total coliform positive. During the month of July, two samples tested positive for total coliform. Staff members immediately followed regulations and collected repeat samples, all of which tested negative for total coliform. Following the testing, the city adjusted the level of disinfectant in the water main at the location of the failed samples and all those tests were well within the standard.

The monitoring violation for total coliform occurred during May. For the North Valley Water System, the standard is that a minimum of 10 water samples be collected and tested for total coliform each month. In May, the city collected only eight samples. Beginning in June, the city increased to 16 the number of samples collected and tested.

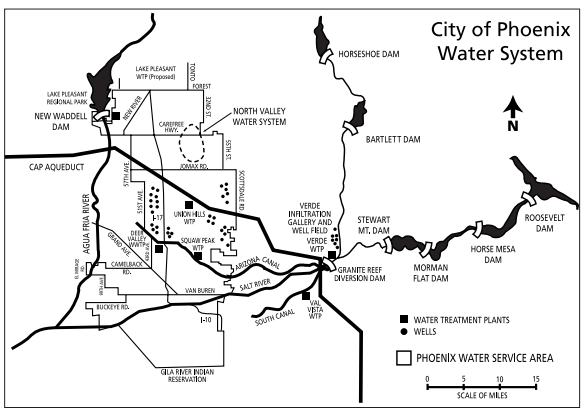
While meeting health and safety standards is a primary objective, other departmental objectives include making certain the water supply is reliable and affordable and that service is responsive. Water Services Department employees achieved those objectives through hard work and dedication to the concept that by any comparison, the department will be the best of class. During the year, out of our population of more than 1.25 million people, only a few hundred experienced an interruption of service – usually due to an accident that broke a water main. In addition to receiving reliable service, rates paid by customers remained among the lowest in the nation. Phoenix residents get an average of more than five gallons of water from their tap for only one cent.

Phoenix gets most of its water from rivers and canals

More than 96 percent of Phoenix's water came from rivers. The primary sources of raw (untreated) water are the Salt, Verde and Colorado rivers; some water from the Agua Fria River is mixed with water from the Colorado River.

The Salt and Verde rivers drain about 13,000 square miles of Arizona ranging from parts of the White Mountains near the New Mexico border to Big Chino Valley just south and east of Seligman. Water from the rivers is stored in lakes operated by the Salt River Project (SRP) and delivered to the city via SRP's canals.

The Colorado River drains portions of seven states (Arizona, California, Colorado, Nevada, New Mexico, Utah and Wyoming) on the west side of the Rocky Mountains. Water from the Colorado River flows to the Phoenix area through the Central Arizona Project (CAP) canal from Lake Havasu. The water can be delivered directly to Phoenix or stored in Lake Pleasant on the Agua Fria River, which drains an area south of Prescott on either side of I-17.



Regular testing of the water flowing into the city's water treatment plants helps ensure consistently high quality water is delivered to customers.

Deep wells that tap high quality aquifers produce the remaining three-to-four percent of the city's water. Wells are considered a source of drinking water primarily in case of serious drought. They also are used to supplement surface water supplies during times of high demand and to supply customers in areas where water mains have not yet been

installed to deliver surface water. The wells are tested regularly to make certain their water meets all health and safety standards.

During 1999, the Phoenix Water Services Department operated wells to supply a small system that could not receive surface water. Known as the North Valley Water System, it serves a very small area in northern Phoenix just east of I-17. Water in that system met all established health and safety standards, with the exceptions mentioned at the beginning of this report. By mid-2000, new water mains will have been installed and those customers will be receiving surface water. The wells will become part of the city's backup supply.

Phoenix's water treatment plants could provide about 630 million gallons per day (MGD) for customers while the wells could add about 50 MGD to the supply. In comparison, the greatest demand by customers was 436 MGD and the average daily demand was about 260 MGD. The excess capacity helped ensure all demands could be met even if some of the canals providing water to the plants or some of the plants had to be taken out of service for maintenance when demand was greatest. The city's distribution system, with more than 5,600 miles of water mains, connects all the water treatment plants to customers. Technically, the system can provide water from any plant to any part of town (except for the separate North Valley Water System). However, customers usually receive most of their water from the plant or plants closest to them.

Purification process cleans, disinfects water

Although some minor differences exist between the city's five water treatment plants, the purification process is fairly similar, emulating nature's way of cleaning water. Consequently, water quality throughout the city is relatively consistent.

The water is delivered to the treatment plants through canals. The first step in purification removes the largest of the particles such as sand, dirt, plant matter and other materials commonly found in river water. For this step the water's movement is slowed so heavier particles can settle to the bottom of a large basin. The small particles remaining in the water are too light to settle easily, so a carefully measured quantity of a chemical coagulant, such as alum or ferric chloride, is added to the water. The coagulant causes the tiny particles to cling together and become heavy enough to settle. Then, the clean water is decanted off the top and passed through filters of sand and gravel – and sometimes hard (anthracite) coal – to remove the last of the particulate matter.

With this filtering system, the water produced at the plants is of superior clarity, achieving the Water Services Department's self-imposed quality standards. The current federal standard for turbidity (cloudiness) is 0.5 Nephelometric Turbidity Units (NTU – a measure of clarity) in at least 95 percent of the measurements taken each month and must not exceed 5 NTU at any time. Not only did the city's water comply with the standards, it usually was much better. Clarity is particularly important because it is a good indicator the process is removing organisms and organic matter effectively.

In the final stage of water treatment, a small quantity of disinfectant (chlorine-related products) is added to kill bacteria that may be in the water. Chlorine, which has been used nationally since the early 1900s, has eliminated outbreaks of waterborne diseases, such as cholera and typhoid fever, throughout the U.S. and Canada. Unfortunately, these diseases still are common in many parts of the world.

Federal law requires specific levels of chlorine, or other disinfectants, to be in drinking water when it is delivered to customers. The minimum disinfectant level in water leaving a water treatment plant is 0.2 parts per million (ppm). In addition, there must always be a detectable level of disinfectant in all portions of the distribution system. The Water Services Department has set a target level of 1.0 ppm leaving the water treatment plants to help ensure compliance with EPA's requirements.

Research has shown disinfection by-products (DBPs) are formed when natural organic matter in water reacts with chemicals used for disinfection. Some DBPs, such as trihalomethanes (THMs) and Haloacetic Acids (HAAs), are suspected of having long-term health effects. The water used at treatment plants contains only small quantities of organic matter. Also, to help reduce the production of DBPs, the city's purification process emphasizes removal of organic matter before most disinfection takes place. This approach helped the city keep THMs well below the established level, minimizing the possible hazard. (See Distribution System Sampling table for details.)

Use of disinfectants presents an apparent paradox: it is essential to disinfect the water to prevent widespread outbreaks of serious diseases and comply with EPA standards, but the use of disinfectants can create DBPs. To help deal with this perplexing problem, EPA established the Information Collection Rule (ICR) and the Interim Enhanced Surface Water Treatment Rule (IESWTR). Under the ICR, Phoenix and other large water utilities in the country collected specific data about water quality and operations. Under the IESWTR, the utilities must monitor their operations to optimize disinfection and minimize DBP formation.

Also added during the final stage of treatment is a small quantity of fluoride to help prevent tooth decay. The target level for fluoride is 0.7 ppm, about one fifth the maximum allowed by EPA.

Cryptosporidium and your drinking water

For a number of years, Phoenix has tested its water for various microbiological hazards, including Cryptosporidium (often called Crypto, for short) and Giardia. Again this year, tests disclosed no evidence of these potentially hazardous organisms in the city's drinking water. However, both are known to exist in much of the world's surface water, including the rivers that supply water to Phoenix. Giardia can be killed by chlorine, but Crypto often is unaffected by it. The most common method of eliminating Crypto is filtration. While the filter system at the city's purification plants has proven effective in removing both organisms from water, this method does not guarantee 100 percent removal.

Crypto and Giardia are carried in fecal matter of various animals that live on the watersheds of the rivers. Much of the time the organisms are protected by a hard shell (called a cyst), allowing them to live outside the host's body. Once the cyst is swallowed by an animal, including people (as when drinking unpurified stream water), the organism emerges from its shell and infects the intestinal tract.

People who are infected usually have flu-like symptoms, including intestinal cramping, diarrhea, fever and dehydration. Crypto often is considered the more debilitating, although in otherwise healthy people, the diseases produced are self-limiting and the symptoms usually disappear in a week or two. However, infection can be extremely serious for people with compromised or suppressed immune systems, such as chemotherapy patients, organ and bone marrow recipients, or those with HIV or AIDS. People in these categories can develop life-threatening illnesses and should check with their health care provider to determine any protective measures they should take.

Crypto must be ingested to cause disease and it can be spread through means other than drinking water. There were no cases of the disease caused by either organism attributed to the public water supply in our service area.

For more information about Cryptosporidium, Giardia and other microbial contaminants, contact the EPA's Safe Drinking Water Hotline (800-426-4791).

Tests show city water met proposed level for Radon

Although no state or federal agency has set a limit for the quantity of radon that can be in drinking water, various levels have been discussed for years. Analysis of the city's drinking water indicates that in most cases little or no radon is present in water delivered to customers. Although water from city wells contains some radon, the amount of this naturally occurring substance is considerably less than the proposed Alternative Maximum Contaminant Level (AMCL) of 4,000 pico Curries per liter (pCi/l) that would apply to the city when the Arizona Department of Environmental Quality (ADEQ) adopts a multimedia mitigation program.

Radon is a natural substance found in the earth – usually associated with Basalt deposits. Water in that earth absorbs the radon. When the water is pumped to the surface, the radon comes with it. However, without being confined, the radon effervesces (bubbles) out of the water into the air. This is why radon is not found in surface water, which is the source of about 96 percent of the city's water.

When water from city wells is pumped into reservoirs, some of the radon evaporates into the air. By the time the water flows from the reservoir into the delivery system, the quantity of radon is reduced.

The AMCL under discussion that would be applicable to the city's water is 4,000 pCi/l. Levels found at the city's wells ranged from less than 100 pCi/l to a maximum of 1,070 pCi/l. The proposed rule says that the AMCL applies to the

annual average of data from four consecutive quarters, measured at each location where the water enters the delivery system. The 1999 averages are from three consecutive quarters and range from 113 to 850 pCi/l.

City works to improve industry practices

Phoenix's efforts on behalf of quality extend far beyond the city's water production and distribution system. For example, in 1995, Phoenix was a founding participant of the nationwide Partnership for Safe Water. The partnership is a voluntary program developed by the EPA, local water providers, various water industry organizations and governmental agencies to reduce potential risks that microbial contaminants may cause for drinking water consumers.

Since formation of the partnership, Phoenix has installed tens of thousands of dollars worth of monitoring equipment and devoted thousands of staff hours to increasing the water department's ability to monitor water quality and refine operating procedures. The knowledge gained is used to increase water quality here and the information is reported to health officials, regulators and the water industry so others may benefit.

Because the city modified its plants and operations, the city's water surpasses existing regulatory requirements and usually achieves the partnership's extremely stringent goal for clarity of filtered water – a critical indicator of the plants' performance.

More information about the Partnership for Safe Water is available from the American Water Works Association's website – http://www.awwa.org/partner1.html on the internet.

Phoenix's water met standards for lead and copper

In 1992, EPA ordered that water suppliers do periodic tests for lead and copper in household tap water. Tests in 1999 showed quantities of the metals in Phoenix tap water were much less than allowed. However, some customers' homes have hazardous quantities of lead that appears to come from either lead solder used to connect the homes' copper plumbing or fixtures that have lead in them. The lead is leached out of the solder or fixtures by the water.

Infants and young children are typically more vulnerable to lead in drinking water than the general population. Customers should be aware that lead levels in their homes could be greater than in most homes here due to materials used in the home's plumbing. Those concerned about elevated lead levels in their home's water, may wish to have a private laboratory test their water. (The test usually costs $15 - $25.) Running water from a tap for 30 seconds to two minutes before using the water can reduce concentrations caused by indoor plumbing. (Because water is so precious here, catch the flush water in a container and use it to water plants inside and outside the home.) It is wise to use only cold water for drinking, cooking or preparing beverages because hot water dissolves lead more quickly than cold water.

Tap water met or surpassed standards for bottled water

Some consumers choose to use bottled water or install filters in their homes. Such a choice is purely personal because the city's tap water meets or surpasses all health and safety standards. However, some facts should be noted when considering alternatives to using tap water for drinking.

Bottled water and water passed through home filtration systems may contain contaminants, as may tap water. The sources of drinking water (both tap and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs and wells. When traveling over the surface of the land or through the ground, water 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 water before it is treated include:

(A) microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.

(B) inorganic contaminants, such as salts and metals, which can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.

(C) pesticides and herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and recreational uses.

(D) organic chemical contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff and septic systems.

(E) radioactive contaminants, which can be naturally occurring or be the result of oil and gas production and mining activities.

To ensure that tap water is safe to drink, EPA prescribes regulations that limit the amount of certain contaminants in water provided by public water systems. Food and Drug Administration (FDA) regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

It is reasonable to expect drinking water, including bottled water, 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 Safe Drinking Water Hotline (800-426-4791).

With respect to filters, the EPA, Consumer Reports, Reader's Digest and a wide variety of organizations interested in consumer quality generally have stated that filters are not needed in most large cities to ensure safe drinking water. These consumer, regulatory and testing organizations point out the local water supplier in large cities has excellent equipment, well trained personnel and a high level of testing, resulting in water that meets health and safety standards. The reports also say filters are an appropriate way to change the aesthetics (taste, odor and appearance) of tap water and lower-cost charcoal filters often do an excellent job of altering these characteristics. Some types of filters also provide additional protection for members of the community with compromised immune systems.

It is important to note that when using a filter, following the manufacturer's instructions concerning cleaning and/or changing the filter is essential. Failure to do so can result in a serious potential for unsafe water.

Customers should understand that some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as those with cancer undergoing chemotherapy, people who have undergone organ transplants, those 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. EPA/Centers for Disease Control (CDC) guidelines about appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (800-426-4791).

Taste, odor and hardness are aesthetic properties of water

Aesthetics are one aspect of water quality that does not relate to health and safety standards, but that is often a topic of discussion. Customers sometimes comment that water in Phoenix tastes or smells differently than it does elsewhere.

Water is known as the universal solvent. Given enough time, it will absorb almost anything it contacts. Consequently, many of the contents of the city's water stem from the soils that form the watershed, streams, rivers and canals. Some of these cause the city's water to be considered "hard." Aquatic life in those waterways also can affect the aesthetics of the water.

Water hardness indicates the presence of certain minerals. In Phoenix, the two primary causes of hardness are calcium and magnesium. The degree of hardness is strictly an aesthetic parameter and has no relationship to health and safety standards. Hard water can require somewhat more soap or detergent to obtain suds and can cause some types of scaling on pipes, pots and water heaters. However, on the plus side, Phoenix's water is considered less corrosive than water in many other areas. For data about hardness and related aesthetic measures, see the table titled "Corrosivity Chemical Analysis" at the end of this report.

Algae that grows in the canals during the late summer and fall is a major source of a "musty" odor and taste detected by some customers. When the algae blooms, it produces a strong odor. Even though the algae is completely removed from the water during purification, the odor may linger. (The result is similar to removing a bouquet of fresh roses from a room. Even though the flowers are gone, the aroma remains.)

Although it does not affect the safety of the water, some customers dislike the odor. Some people can detect that odor in quantities as tiny as five parts per trillion. The problem usually goes away in December or January with the onset of our coldest weather, which stops the bloom.

It is possible to treat the water to remove the odor. However, the expense of such treatment would cause a major increase in the cost of water delivered to customers. Carbon treatment is the most economical way

of dealing with the odor problem. Unfortunately, the equipment for additional carbon treatment at the city's water plants would cost more than $325 million, and another $5-10 million a year would be needed to operate the facilities. Most customers find that high-priced alternative unacceptable. That's because people drink only about 1/2-of-one-percent of the water they buy; the rest is used to wash dishes, clothes and other things in our homes or to water lawns, trees and shrubs. Discussions with customers indicate they do not want a major rate increase to correct an odor problem when more than 99 percent of the water they buy is used for some purpose other than drinking.

There are a few low-tech approaches many customers say satisfactorily alter the taste and odor of their tap water.

1. Run water from your tap into a pitcher or wide-mouth jar. Leave the container – uncapped – on your counter for 30-60 minutes. Then, cap the container and place it in your refrigerator. The combination of exposing the water to air after it comes out of the tap and chilling the water often eliminates objectionable odors.
2. Run tap water into the pitcher and then pour the water back and forth between the pitcher and another container 8-10 times. This more rapidly exposes the water to the air and often helps eliminate odors. Then, refrigerate the water.

   (In both #1&2, some people like to add a thin slice of lemon or lime to the container before placing it in the refrigerator.)
3. Use additional filtration. Usually, an inexpensive carbon filter is all that's required. There are three basic types. One is installed on your tap and all the water that goes through the tap also goes through the filter. A second type that can be installed on your tap has a switch so you can filter water for drinking, but not for washing or cleaning. This type of filter usually lasts longer than the first type. The third type lets you pour the water through the filter into a container. Department stores, hardware stores and some drug stores usually carry one or more brands of each type. Costs range from about $5 to more than $50.

People who use a filter should be certain to follow the manufacturer's instructions for cleaning and/or replacing the filtering material. Substances that filters remove can build up and become hazardous if not eliminated at the proper times. More information about filters is available from the Arizona Water Quality Association at (480) 947-9850 or at 6819 E. Diamond St., Scottsdale, AZ 85257.

Although the city has not found a satisfactory solution so far, employees and consultants are continuing a global search for an economical way to eliminate this annual nuisance. The Water Services Department also is having research done by Arizona State University.

Testing shows Phoenix's water superior to standards

The following tables show substances for which the Water Services Department tests. There are two sets of tables: The first set shows the levels of substances found and the levels beyond which each thing is considered unsafe by the EPA, the ADEQ or other regulatory body. In every case for the Phoenix Municipal Water System and in all but one case for the North Valley System, tests showed the city's water contained less than the allowable amount of the substance in question. **Please note, the simple presence of a substance or contaminant in drinking water does NOT necessarily indicate the drinking water poses a health risk.** Certain quantities of some substances are essential to good health, but excessive quantities can be hazardous. Similarly, small quantities of some substances may have no effect on people, but large quantities can be harmful.

Recently, Phoenix conducted voluntary sampling of the city's groundwater and surface water sources for two substances found recently in some water in California and Nevada. Those substances are Perchlorate and Methyl Tertiary Butyl Ether (MTBE). There are no state of Arizona or federal standards for either substance. Tests during 1999 revealed no trace of either substance in the city's water systems.

Perchlorate is a strong oxidant used primarily in solid fuel rocket motors, fireworks and explosive devices. Perchlorate's primary human health concern is that it can interfere with the thyroid gland's ability to utilize iodine and produce thyroid hormones. The substance also can cause brain damage in fetuses and a potentially fatal form of anemia in adults. The California Department of Health Services has established a provisional "action level" for Perchlorate of 18 parts per billion (ppb). According to a California Department of Health Services news release, "Perchlorate levels below 18 ppb are not considered a health concern for the public, including pregnant women and children.

MTBE is an oxygenate used in gasoline to produce a cleaner burning fuel, thereby aiding air quality. Little health effects data is available regarding ingestion of MTBE. In December 1997, EPA released an advisory recommending levels of MTBE ranging of 20-to-40 ppb would provide a large margin of safety from exposure to toxic effects. EPA has not issued a final health advisory.

How to learn more about the quality of your water

The Phoenix Water Services Department regularly tests the water it purifies for its customers to make sure it complies with all applicable health and safety standards. This annual report summarizes the results of nearly 90,000 water quality tests done during 1999. Even more tests are being done this year to ensure customers that their tap water is safe. If you have questions about the quality of your tap water, or the information in this report, please call us at (602) 262-6251 during normal business hours (Monday through Friday, except holidays, from 8:00 a.m. to 5:00 p.m.) For alternate formats, contact the Customer Services Division at (602) 262-6251/V, or (602) 534-1113/TDD, or (602) 534-1192/FAX. You also can visit the city's web site at http://www.ci.phoenix.az.us for more information. Specific queries may be addressed to James C. "Bing" Brown, APR, at the Water Services Department, 200 W. Washington, 9th Floor, Phoenix, AZ 85003.

Or, you may contact the EPA Safe Drinking Water Hotline (800-426-4791) for information about the Safe Drinking Water Act or EPA's other drinking water programs.

World Wide Web sites that provide information about drinking water include (all web sites use the prefix, http://www.):

- American Water Works Association — awwa.org
- Arizona Department of Health Services — hs.state.az.us
- Maricopa County Environmental Services — maricopa.gov/envsvc
- U.S. EPA — epa.gov/ogwdw
- Centers for Disease Control — cdc.gov
- Arizona Department of Environmental Quality — adeq.state.az.us
- www.tapintoquality.com

Policies and procedures concerning the city's water supply, treatment and delivery are the responsibility of the Director of the Water Services Department and his staff, as authorized by the Phoenix City Council. Customers interested in providing input concerning the city's water supply, treatment and delivery, may contact the director at 200 W. Washington, 9th Floor, Phoenix, AZ, 85003, call the department's Customer Service Division at (602) 262-6251 or attend City Council meetings in the City Council Chambers, 251 W. Washington. Meetings generally are held as follows: Policy Sessions at 2:30 p.m. each Tuesday (to discuss policy, provide directives to staff, but not to take official action); Formal Sessions at 3:00 p.m. Wednesdays (to take official actions, including passage of ordinances); and Citizen Request Sessions immediately following the Formal Sessions. Items for Formal and Policy session agendas must be posted by the City Clerk 24 hours before the meetings and citizen comments at those meetings are restricted to agenda items. Citizens who wish to address the City Council about non-agenda items may do so at the Citizen Request Sessions. Also, citizens can apply to serve as a member of the unpaid Citizens Water and Wastewater Rate Advisory Committee by contacting the Water Services Department. That committee generally meets the second Tuesday of each month at 2 p.m. in the City Council Subcommittee Meeting Room of the Historic City Hall, 17 S. 2nd Ave., Phoenix.

Definitions of terms

The following are definitions of terms used to describe types of limits for substances that may be found in drinking water and the circumstances under which compliance with the limits may be excused.

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 allow for a margin of safety.

Maximum Contaminant Level (MCL) – The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLG as feasible using the best available treatment technology.

Alternative Maximum Contaminant Level (AMCL) – A level higher than the MCL. Community water systems are permitted to comply with the AMCL for radon in lieu of the MCL if there is a multimedia mitigation (MMM) program in place that has been approved by the EPA or ADEQ. MMM programs my use a variety of strategies, including public education, testing, training, technical assistance or other regulatory or non-regulatory measures

Variances and Exceptions – State or EPA permission to not meet an MCL or a treatment technique under certain conditions.

Treatment Technique (TT) – A required process intended to reduce the level of a contaminant in drinking water.

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

Part per million/part per billion – One part per million (1 ppm) is equal to one second out of 11.5 days, one inch in 16 miles or one drop of bubble bath in a whole bathtub full of water (about 50 gallons). One part per billion (1 ppb) is equal to one second in 31 years and eight months, one inch in 16,000 miles (1 inch out of 6.5 trips from New York to Los Angeles) or one drop of bubble bath in 1,000 bathtubs full of water (about 50,000 gallons).

1999 DETECTED Inorganic Substances at Points where Water Enters the Distribution System

				Phoenix Municipal Water System		North Valley Water System		
Substance	Units	MCL	MCLG	Lowest Detected Level	Highest Detected Level	Lowest Detected Level	Highest Detected Level	Major Sources in Drinking water
1. Arsenic	ppb	50	NA	ND	14	ND	18	Erosion of natural deposits; Runoff from orchards; Runoff from glass and electronics production wastes.
2. Asbestos	MFL	7	7	ND	0.5	ND	ND	Decay of asbestos cement water mains; Erosion of natural deposits.
3. Barium	ppm	2	2	ND	0.11	0.01	0.03	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits.
4. Beryllium	ppb	4	4	ND	0.9	ND	ND	Discharge from metal refineries and coal-burning factories; Discharge from electrical, aerospace, and defense industries.
5. Chromium	ppb	100	100	ND	55	4	14	Discharge from steel and pulp mills; Erosion of natural deposits.
6. Fluoride	ppm	4	4	0.3	1.1	0.4	0.6	Erosion of natural deposits; Water additive, which promotes strong teeth; Discharge from fertilizer and aluminum factories.
7. Nitrate (as N)	ppm	10	10	ND	8.8	0.6	1.4	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits.
8. Sodium	ppm	NA	NA	25	216	26	52	
9. Sulfate	ppm	NA	NA	6	238	10	23	

NOTE: Nitrate in drinking water at levels greater than 10 ppm is a health risk for infants of less than six months of age. High nitrate levels in drinking water can cause blue baby syndrome. Nitrate levels may rise quickly for short periods of time because of rainfall activity. If you are caring for an infant, you should ask for advice from your health care provider.

1999 DETECTED Radioactive Substances at Points where Water Enters the Distribution System

				Phoenix Municipal Water System			North Valley Water System			
Substance	Units	MCL	MCLG	Lowest Detected Level	Highest Detected Level	Highest Detected Average[2]	Lowest Detected Level	Highest Detected Level	Highest Detected Average[2]	Major Sources in Drinking water
10. Gross Beta / photon emitters	pCi/l	50[3]	0	ND	23	23	NA	NA	NA	Decay of natural and man-made deposits.
11. Adjusted Gross Alpha	pCi/l	15	0	ND	2.4	1.8	ND	2.3	1.3	Erosion of natural deposits.

NOTE: Gross Beta data are from 1998; the next sampling is scheduled for 2000.

1999 DETECTED Regulated Synthetic Organic Substances at Points where Water Enters the Distribution System

				Phoenix Municipal Water System			North Valley Water System			
Substance	Units	MCL	MCLG	Lowest Detected Level	Highest Detected Level	Highest Detected Average[2]	Lowest Detected Level	Highest Detected Level	Highest Detected Average[2]	Major Sources in Drinking water
12. 2,4-Dichloro-phenoxy(2,4-D)	ppb	70	70	ND	0.3	0.2	ND	ND	ND	Runoff from herbicide used on row crops.
13. Di (2-ethyl-hexyl) phthalate	ppb	6	0	ND	1.4	1.4	ND	ND	ND	Discharge from rubber and chemical factories.

1999 DETECTED Regulated Volatile Organic Substances at Points where Water Enters the Distribution System

				Phoenix Municipal Water System			North Valley Water System			
Substance	Units	MCL	MCLG	Lowest Detected Level	Highest Detected Level	Highest Detected Average[2]	Lowest Detected Level	Highest Detected Level	Highest Detected Average[2]	Major Sources in Drinking water
14. 1,2,4-Trichlo-benzene	ppb	70	70	ND	ND	ND	ND	0.6	0.2	Discharge from textile-finishing factories.

1999 DETECTED Unregulated Volatile Organic Substances at Points where Water Enters the Distribution System[4]

				Phoenix Municipal Water System			North Valley Water System		
Substance	Units	MDL	MCLG	Lowest Detected Level	Highest Detected Level	Highest Detected Average[2]	Lowest Detected Level	Highest Detected Level	Highest Detected Average[2]
15. Bromodichloro-methane	ppb	0.5	NA	ND	17	17	ND	ND	ND
16. Bromoform	ppb	0.5	NA	ND	2.6	2.6	ND	1.5	0.5
17. Chlorodibromo-methane	ppb	0.5	NA	ND	14	14	ND	ND	ND
18. Chloroform	ppb	0.5	NA	ND	14	14	ND	ND	ND

1999 Distribution System Sampling

Substance	MCL	MCLG	Phoenix Municipal Water System	North Valley Water System	Major Sources in Drinking Water
1. Total Coliform Bacteria	No more than 5% of the monthly samples may be total coliform-positive	0			Naturally present in the environment.
Highest monthly percentage of positive Total Coliform samples			2.22%	9.09%	
Highest monthly number of positive Total Coliform samples			8	2	
2. Fecal Coliform and E. coli	If a routine sample and a repeat sample are Total Coliform positive, and one is also Fecal Coliform or E. coli positive	0	0	0	Human and animal fecal waste.
3. Turbidity	TT (Turbidity of filtered water shall be less than or equal to 0.5 NTU in at least 95% of the measurements taken each month and must not exceed 5 NTU at any time)	NA			Soil runoff.
Lowest monthly percentage in which turbidity was less than or equal to 0.5 NTU			99.4%	NA	
Highest single turbidity measurement in any one month (NTU)			0.83	NA	
4. TTHMs (Total Trihalomethanes)	Running annual average of 100 ppb	0			By-product of drinking water chlorination.
Running annual system average (ppb)			66	2	
Lowest detected level (ppb)			1	0	
Highest detected level (ppb)			145	6	
5. HAAs (Haloacetic Acids)	NA – Not regulated at this time	NA			
Running annual system average (ppb)			20	NA	
Lowest detected level (ppb)			2.5	NA	
Highest detected level (ppb)			43	NA	

1999 Results of Lead and Copper Sampling from Residential Water Taps

6. Lead	90th Percentile not to exceed AL (AL = 15 ppb)	0			Corrosion of household plumbing systems; Erosion of natural deposits.
Total number of samples collected			146	NA	
90th Percentile (ppb)			3	NA	
Number of sampling sites which exceeded the Action Level (AL)			0	NA	
7. Copper	90th Percentile not to exceed AL (AL = 1.3 ppm)	1.3			Corrosion of household plumbing systems; Erosion of natural deposits; Leaching from wood preservatives.
Total number of samples collected			146	NA	
90th Percentile (ppm)			0.4	NA	
Number of sampling sites which exceeded the Action Level (AL)			0	NA	

1999 Results of Corrosivity Chemical Analysis from the Distribution System

Substance	Units	MCL	MCLG	Lowest Detected Level	Highest Detected Level
8. Alkalinity	ppm	NA	NA	112	218
9. Calcium Hardness	ppm	NA	NA	67	205
10. Langlier Index (measure of corrosivity)	NA	NA	NA	-0.8	0.7
11. pH[1]	NA	NA	NA	7	8
12. Temperature[1]	°C	NA	NA	12	38
13. Total Dissolved Solids (TDS)	ppm	NA	NA	310	770
14. Total Hardness	ppm grains/gal	NA NA	NA NA	170 10	337 20

Substances tested for and NOT DETECTED

Inorganic Substances

1. Antimony	2. Cadmium	3. Cyanide	4. Mercury (inorganic)	5. Nitrite (as N)	6. Selenium	7. Thallium

Regulated Synthetic Organic Substances

1. 2,4,5-TP (Silvex)	2. Alachlor	3. Atrazine	4. Benzo(a)pyrene (PAH)	5. Carbofuran
6. Chlordane	7. Dalapon	8. Di(2-ethylhexyl)adipate	9. Dibromochloropropane (DBCP)	10. Dinoseb
11. Diquat	12. Dioxin (2,3,7,8-TCDD)	13. Endothall	14. Endrin	15. Ethylene dibromide (EDB)
16. Glyphosate	17. Heptachlor	18. Heptachlor epoxide	19. Hexachlorobenzene (HCB)	20. Hexachlorocyclopentadiene
21. Lindane (g-BHC)	22. Methoxychlor	23. Oxamyl (Vyadate)	24. PCBs (Polychlorinated biphenyls)	25. Pentachlorophenol
26. Picloram	27. Simazine	28. Toxaphene		

Unregulated Synthetic Organic Substances[4]

1. Aldicarb	2. Aldicarb sulfoxide	3. Aldicarb sulfone	4. Aldrin	5. Butachlor	6. Carbaryl	7. Dicamba
8. Dieldrin	9. 3-Hydrocarbofuran	10. Methomyl	11. Metolachlor	12. Metribuzin	13. Propachlor	

Regulated Volatile Organic Substances

1. Benzene	2. Carbon Tetrachloride	3. Chlorobenzene	4. o-Dichlorobenzene	5. p-Dichlorobenzene
6. 1,2-Dichloroethane	7. 1,1-Dichloroethylene	8. cis-1,2-Dichloroethylene	9. trans-1,2-Dichloroethylene	10. Dichloromethane
11. 1,2-Dichloropropane	12. Ethylbenzene	13. Styrene	14. Tetrachloroethylene	15. 1,1,1-Trichloroethane
16. 1,1,2-Trichloroethane	17. Trichloroethylene (TCE)	18. Toluene	19. Vinyl Chloride	20. Xylenes

Unregulated Volatile Organic Substances[4]

1. Bromobenzene	2. Bromomethane	3. Chloroethane	4. Chloromethane	5. Dibromomethane
6. o-Chlorotoluene	7. p-Chlorotoluene	8. 1,1-Dichloroethane	9. 1,1-Dichloropropene	10. m-Dichlorobenzene
11. 1,1,1,2-Tetrachloroethane	12. 1,1,2,2-Tetrachloroethane	13. 1,2,3-Trichloropropane	14. 1,3-Dichloropropane	15. 1,3-Dichloropropene
16. 2,2-Dichloropropane				

Abbreviations/Superscripts used in tables

AL = Action Level

AMCL = Alternative Maximum Contaminant Level

MCL = Maximum Contaminant Level

MCLG = Maximum Contaminant Level Goal

MDL = Method Detection Limit

MFL = Million Fibers per Liter

mrem/year = millirems per year (a measure of radiation absorbed by the body)

NA = Not Applicable

ND = Not Detected (any value less than the MDL)

NTU = Nephelometric Turbidity Units

pCi/L = picocuries per liter (a measure of radioactivity)

ppb = parts per billion, or micrograms per liter (mg/L)

ppm = parts per million, or milligrams per liter (mg/L)

ppq = parts per quadrillion, or picograms per liter (rg/L)

ppt = parts per trillion, or nanograms per liter (hg/L)

TT = Treatment Technique

1 = Field Measurement

2 = All values below the detection limit were calculated as zeros for the purpose of determining the average.

3 = The MCL for Gross Beta is 4 mrem/year. EPA considers 50 pCi/L to be the level of concern for beta particles.

4 = Unregulated contaminant monitoring helps EPA to determine where certain contaminants occur and whether it needs to regulate those contaminants.