

Health Consultation

ARIZONA WATER COMPANY

SUPERIOR, PINAL COUNTY, ARIZONA

Prepared by:

Arizona Department of Health Services

Office of Environmental Health

Environmental Toxicology Program

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Summary

INTRODUCTION

In the *Arizona Water Company*, the Arizona Department of Health Services' (ADHS') top priority is to ensure that the community and residents have the best information possible to safeguard their health.

This report was written in response to a request from the community members. This report addressed the chemicals in the public drinking water supply. It evaluated whether drinking water from sampled sources is harmful to residents' health.

CONCLUSIONS

Based on the available information, ADHS concludes the following for exposure to public drinking water:

- Residents are not likely to experience adverse health effects if they use the water for domestic purposes such as drinking or cooking.
 - Individuals who are restricted to a total sodium of 500 mg/day should not consume this water.
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BASIS FOR DECISION

None of the detected chemicals exceeded their comparison values. Comparison values are concentrations of contaminants that the current public health literature suggests are "harmless." These comparison values are quite conservative, because they include ample safety factors that account for the most sensitive populations.

NEXT STEPS

- ADHS will continue to attend additional public meetings, make presentations, and develop handout literature to address community concerns.
 - ADHS will conduct an evaluation of the health condition in the area.
 - ADHS will continue to review and evaluate additional data for this area.
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FOR MORE INFORMATION

If you have concerns about your health, you should contact your health care provider. Please call ADHS at 602-364-3128 and ask for more information on the Arizona Water Company health consultation.

Background/Statement of Issues

Superior is located in Pinal County, Arizona. The population of the town is about 3,000. In recent years, the Arizona Department of Health Services (ADHS) has received concerns from the community members about their health conditions. In a recent community meeting, many of them have expressed their concerns regarding the drinking water quality in Superior area. They wanted to know if their tap water provided by the Arizona Water Company (AWC) is in good quality for domestic purposes such as drinking, cooking or making beverages. AWC provides water to its customers from wells located near Florence Junction, AZ. Consequently, ADHS conducted an evaluation based on the water quality reports to see if any chemicals are at levels of public health concern.

Discussion

General Assessment Methodology

ADHS generally follows a three-step methodology to assess public health issues related to environmental exposures. First, ADHS obtains representative environmental data for the site of concern and compiles a comprehensive list of site-related contaminants. Second, ADHS identifies exposure pathways, and then uses health-based comparison values to find those contaminants that do not have a realistic possibility of causing adverse health effects. For the remaining contaminants, ADHS reviews recent scientific studies to determine if exposures are sufficient to impact public health.

Available Environmental Data

ADHS conducted the assessment based on the annual water quality reports from 2011 to 2013 (<http://www.azwater.com/ccr.html>). As stated on the website, the water samples were collected and tested by state-certified personnel and laboratories.

The water samples were tested for a list of chemicals which includes: arsenic, barium, chromium, fluoride, nitrate, alpha emitters, chlorine, haloacetic acids, total trihalomethanes, sodium, copper and lead. Detected levels are listed in Table 1.

Chemicals tested for but not detected include: total coliform bacteria, antimony, asbestos, beryllium, cadmium, cyanide, inorganic mercury, nickel, selenium, thallium, nitrite as nitrogen, benzene, carbon tetrachloride, chlorobenzene, o-dichlorobenzene, p-dichlorobenzene, styrene, xylene, 1,2-dichloroethane, 1,1-dichloroethylene, cis-1,2-dichloroethylene, trans-1,2-dichloroethylene, dichloromethane, 1,2-dichloropropane, ethylbenzene, tetrachloroethylene, 1,2,4-trichlorobenzene, 1,1,1-trichlorobenzene, 1,1,2-trichlorobenzene, chloroform, tri-chloroethylene, toluene, vinyl chloride, benzopyrene, methoxychlor, polychlorinated biphenyls (PCBs), pentachlorophenol, picloram, simazine, 2,4-Dichlorophenoxyacetic acid (2,4-D), 2,4,5-TP (Silvex), alachlor, atrazine, carbofuran, chlordane, oxamyl (Vydate), dalapon, di(2-ethylhexyl)adipate, di(2-ethylhexyl)phthalate, dinoseb, dibromochloropropane, diquat, endothall, endrin, ethylene dibromide, glyphosate, heptachlor, heptachlor epoxide, hexachlorobenzene, lindane, hexachlorocyclopentadiene, toxaphene, aldicarb, aldicarb sulfone, aldicarb sulfoxide, aldrin, butachlor, carbaryl, dicamba, dieldrin, 3-hydroxycarbofuran, methomyl, metholachlor, metribuzin, propachlor, bromobenzene, bromodichloromethane,

bromoform, bromomethane (methyl bromide), chlorodibromomethane, m-dichlorobenzene, o-chlorotoluene, p-chlorotoluene, chloroethane, chloromethane, dibromoethane, 1,1-dichloroethane, 2,2-dichloropropane, 1,3-dichloropropane, 1,1-dichloropropene, 1,3-dichloropropene, 1,2,3-trichloropropane, 1,1,1,2-tetrachloroethane and 1,1,2,2-tetrachloroethane, and combined radium.

Exposure Pathway Analysis

Identifying exposure pathways is important in a health consultation because adverse health impacts can only happen if people are exposed to contaminants. The presence of a contaminant in the environment does not necessarily mean that people are actually coming into contact with that contaminant. Exposure pathways have been divided into three categories: completed, potential, and eliminated.

There are five elements considered in the evaluation of exposure pathways:

- 1) *a source of contamination*: a chemical release, landfills, and others
- 2) *an environmental media transport*: the way chemical moves away from the source through air, soil, food chain
- 3) *a point of exposure*: a place where people come into physical contact with the chemical, e.g., soil, air, groundwater, surface water, sediment, food
- 4) *a route of exposure*: how people come into physical contact with the chemical, e.g., breathing, drinking, eating, touching
- 5) *a receptor population*: a group of people likely to come into physical contact with site-related chemicals.

Completed pathways exist when all five elements are present and indicate that exposure to a contaminant has occurred in the past and/or is occurring presently. In a *potential exposure pathway*, one or more elements of the pathway cannot be identified, but it is possible that the element might be present or might have been present. In *eliminated pathways*, at least one of the five elements is or was missing, and will never be present. Completed and potential pathways, however, may be eliminated when they are unlikely to be significant. ADHS identified three potential/completed exposure pathways: air inhalation, water ingestion and incidental soil ingestion.

Residents may uptake chemicals from using water for domestic purposes, which include: ingestion from drinking and cooking, skin contact from bathing and showering, and inhalation from showering. Metals tend not to be absorbed through the skin, and are not likely to be available to people as aerosol while showering. ADHS further evaluated the completed and potential exposure pathways to determine whether realistic exposures are sufficient in magnitude, duration or frequency to result in adverse health effects (Table 2).

Comparison to Health-based Comparison Values

Health-based comparison values (CVs) are screening tools used with environmental data relevant to the exposure pathways. The health-based CVs are concentrations of contaminants that the current public health literature suggests are “harmless.” These comparison values are quite conservative, because they include ample safety factors that account for the most

sensitive populations. ADHS typically uses comparison values as follows: if a contaminant is never found at levels greater than its CV, ADHS concludes the levels of corresponding contamination are “safe” or “harmless.” If, however, a contaminant is found at levels that are greater than its comparison value, ADHS designates the pollutant as a *contaminant of interest* and examines potential human exposures in greater detail.

Comparison values are based on extremely conservative assumptions. Depending on site-specific environmental exposure factors (e.g. duration and amount of exposure) and individual human factors (e.g. personal habits, occupation, and/or overall health), exposure to levels greater than the comparison value may or may not lead to a health effect. Therefore, the comparison values should not be used to predict the occurrence of adverse health effects.

The evaluation results showed that none of the detected chemical levels exceeded their respective comparison values (Table 1). Therefore, the detected chemical concentrations in water samples are not likely to result in adverse effects if the water were used for domestic purposes.

ATSDR Child Health Concern

ATSDR recognizes that the unique vulnerabilities of infants and children demand special emphasis in communities faced with contaminants in environmental media. A child’s developing body systems can sustain permanent damage if toxic exposures occur during critical growth stages. Children ingest a larger amount of water relative to body weight, resulting in a higher burden of pollutants. Furthermore, children often engage in vigorous outdoor activities, making them more sensitive to pollution than healthy adults. All health analyses in this report take into consideration the unique vulnerability of children.

Conclusions

This health consultation evaluated the health risks associated with exposure to public drinking water. None of the detected chemicals exceeded their comparison values. Therefore, residents are not likely to experience adverse health effects if they use the water for domestic purposes such as drinking or cooking. Individuals who are restricted to a total sodium of 500 mg/day should not consume this water.

Public Health Action Plan

- ADHS will continue to attend additional public meetings, make presentations, and develop handout literature to address community concerns.
- ADHS will conduct an evaluation of the health condition in the area.
- ADHS will continue to review and evaluate additional data for this area.

References/Information Sources

Agency for Toxic Substances and Disease Registry (ATSDR) (2007). Toxicological profile for arsenic. ATSDR, Department of Health and Human Services.

Institute of Medicine. Food and Nutrition Board. (1999) Dietary Reference Intakes: Calcium, Phosphorus, Magnesium, Vitamin D and Fluoride. National Academy Press. Washington, DC.

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REPORT PREPARATION

This Public Health Assessment/Health Consultation for the Arizona Water Company, Superior, AZ was prepared by the Arizona Department of Health Services under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with the approved agency methods, policies, procedures existing at the date of publication.

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TABLES

Table 1. A summary of the measured chemical concentrations in water samples from 2011 to 2013.

Chemical	Range of Detected Concentrations (µg/L)	Comparison Value (CV) (µg/L; pCi/L)	Source of CV	Is it a Chemical of Interest?
arsenic	6 – 7	10 11	MCL ¹ EMEG-c ²	No
barium	10	2,000 7,000	MCL EMEG-c	No
chromium	4	100 (total Cr) 32 (Cr 6 ⁺)	MCL EMEG-c	No
fluoride	400	4,000	MCL	No
nitrate	1,000 – 2,000	10,000 56,000	MCL RMEG ³	No
chlorine	500 – 1900	4,000	MCL	No
Haloacetic acid	8 – 11	60	MCL	No
Total trihalomethanes	51 – 53	80 180	MCL EMEG-c	No
sodium	74,000	1,150,000 20,000	DRI ^{4,5} DWA ⁶	No
Alpha emitters	3	15 (pCi/L)	MCL	No
copper	0.1 – 0.2	1,300	MCL	No
lead	2 – 3	15	MCL	No

- 1 MCL: EPA Maximum Contaminant Level
- 2 EMEG-c: ATSDR Environmental Media Evaluation Guide-chronic exposure
- 3 RMEG: ATSDR Reference Dose Media Evaluation Guide
- 4 DRI: Institute Of Medicine (IOM) Dietary Reference Intake: Tolerable Upper Intake Levels (IOM 2010)
- 5 DWA: EPA Drinking Water Advisory. This is developed for people who are restricted to a total sodium intake of 500 mg/day and should not be applied to the entire population

Table 2. Exposure Pathways Analysis

Exposure Pathway Elements					Time frame	Type of Exposure Pathway
Source	Media	Point of exposure	Route of exposure	Potentially exposed population		
Groundwater Wells	Groundwater	Residences, tap	Ingestion, skin contact, inhalation	Residents	Past	Completed
					Current	Completed
					Future	Potential