

Boron at Motorola 52nd Street Superfund Site September 2009

The Arizona Department of Environmental Quality (ADEQ) and the U.S. Environmental Protection Agency (EPA) developed this fact sheet to inform the community regarding boron as it relates to the Motorola 52nd Street Superfund Site located in the City of Phoenix in Maricopa County.

IS BORON DETECTED AT THIS SITE?

In 2007 and 2008, boron was detected in a few treated water samples from the Operable Unit 2 (OU2) treatment plant (see Figure 1). Boron levels greater than 5 milligrams per liter (mg/L) have been found and exceed the agricultural irrigation standard for surface water of 1.0 mg/L or 1.0 part per million (ppm). The agricultural irrigation standard is the most protective for the designated uses which are agricultural, livestock watering and irrigation. The OU2 treatment plant removes Volatile Organic Compounds (VOCs) from the water, but it is not designed to remove boron.

IS MY DRINKING WATER AFFECTED?

No. The community in the area of the Motorola 52nd Street Site receives its drinking water from the City of Phoenix public water supply system. This public system is closely monitored by the city to meet state and federal drinking water standards.

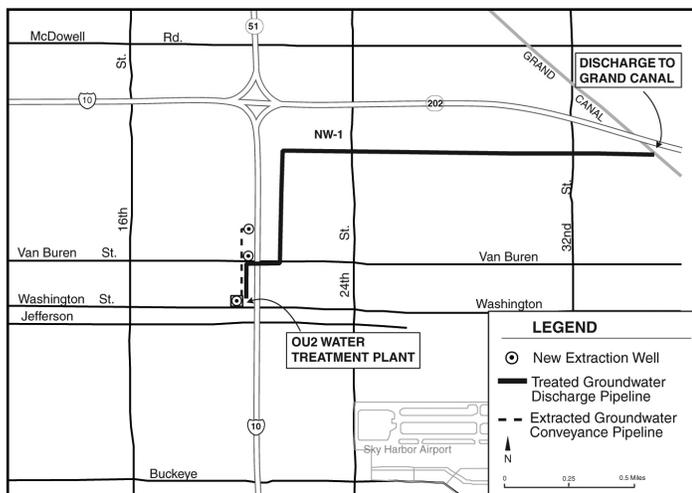


Figure 1: Map Showing Location of OU2 Treatment Plant and Discharge Locations in SRP Grand Canal.

HOW IS THE BORON DISCHARGE BEING ADDRESSED?

In October 2008, Motorola and Freescale (companies), which operate the treatment plant, applied for a variance from ADEQ which would allow the discharge to exceed the boron standard, up to 3.6 mg/L. However, in response to public and ADEQ concerns, the companies withdrew their request for a variance and decided to apply to ADEQ for a “mixing zone” in the Salt River Project (SRP) Grand Canal.

A mixing zone (see Figure 2) is an area where a body of water receives treated water. The intent of the mixing zone is to prevent any harmful impact on the aquatic environment and its designated uses, such as irrigation, fishing, or swimming. A mixing zone can be used as long as the integrity of the water body is not impaired. In the case of the OU2 treatment plant discharge, the proposal is to allow the treated water to be discharged at a specific point in the SRP Grand Canal. The level of boron will be mixed to below the 1 mg/L agricultural irrigation standard within a specified distance (number of feet) downstream after it meets the existing flow in the SRP Grand Canal. To document that effective mixing is occurring, water samples will be collected on a periodic basis from monitoring wells and at the downstream edge of the designated mixing zone. A mixing zone is more protective than a variance because it requires regular water sampling and if the boron exceeds the agricultural irrigation standard, then the discharge will be shut off until the exceedance can be controlled.

WHAT ARE THE NEXT STEPS?

The companies are currently working with ADEQ and EPA to establish a mixing zone for the purpose of continuous, long-term monitoring to ensure the boron levels remain low and thoroughly mixed. The companies operating the OU2 treatment plant will be responsible for monitoring the mixing zone and reporting the results to SRP and the agencies. The agencies will also work with the companies to further investigate the source and extent of boron in the groundwater.

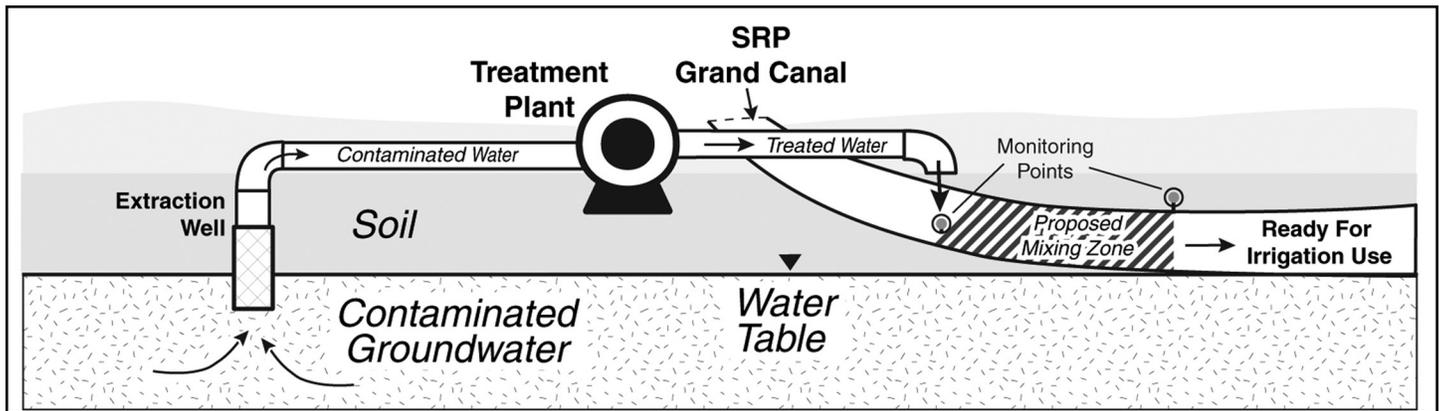


Figure 2: Conceptual Drawing of Treatment Process and Proposed Mixing Zone.

WHAT IS BORON AND WHERE IS IT FOUND?

Elemental boron is a non-metallic, naturally occurring element found in rocks, soil, and water as borate minerals and various boron-containing compounds such as boric acid, borax, and boron oxide. Most common boron-containing compounds are slightly soluble in water and have a low toxicity (similar to table salt). A commonly used boron salt, borax (sodium borate), is used in cosmetics, detergents, glazes, and as an insecticide.

Boron may be present in groundwater either due to its use and discharge from industrial sources or from naturally-occurring sources. Some areas in the western United States have naturally high levels of boron in soils, such as in salt deposits that are common within the Phoenix metropolitan area. As a result, elevated concentrations of boron, sodium chloride, and calcium sulfate are often found in the groundwater. Also, rocks in the Phoenix Mountains (Camelback and Mummy mountains) will break down and could potentially be a common source of boron in the sediments that find their way into surface water.

WHAT ARE THE HEALTHS EFFECTS OF A BORON DISCHARGE?

Humans consume about 1 mg of boron daily, mostly from fruit and vegetables. Boron could be toxic in very high doses; however, humans tend to rapidly excrete boron. Therefore, it does not generally accumulate in high levels. In the limited number of samples collected, the highest concentration of boron detected in the OU2 treatment plant effluent over the past two years was 2.4 ppm.

Boron is an essential nutrient for plant growth; however, some plants may experience leaf or fruit damage from dehydration if exposed to large amounts of boron. SRP and ADEQ have not observed any downstream impacts on plants or agriculture due to the boron in the canal. Also, there is no evidence that boron bioaccumulates in plants in a way that could adversely impact humans or animals who may ingest such plants.

The agencies are not aware of anyone drinking water from the SRP Grand Canal water in the vicinity of the OU2 treatment plant. Therefore, human exposure to the SRP discharge is not expected. However, even if someone were drinking water containing boron at 3.6 ppm (slightly above the Arizona drinking water standard of 1.4 ppm), the agencies would not expect any adverse health effects.

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WEB SITE INFORMATION

For more detailed site information, you may access ADEQ's Superfund Programs Web page at: www.azdeq.gov/environ/waste/sps.html

or EPA's waste information Web page at: www.epa.gov/region09/waste/sfund.