Groundwater Quality

Groundwater can be affected by the presence of elevated concentrations of inorganic and organic constituents that make the water unacceptable for potable use due to health concerns or due to negative aesthetic characteristics. The elevated concentrations of these constituents are derived from human activity and natural sources. In some cases, this water may be acceptable for non-potable uses in place of potable groundwater.

In the Phoenix AMA, large volumes of groundwater are unsuitable for use due to elevated concentrations of hazardous substances such as volatile organic compounds, petroleum hydrocarbons, and pesticides. Groundwater contaminated above Maximum Contaminant Levels cannot be delivered for drinking water use.

Non-point source contamination, or contamination that has not originated from one single source, has also rendered large volumes of groundwater unsuitable for most uses. Contaminants such as nitrate, sulfate, and dissolved solids are present in elevated concentrations due to waste waster discharge, septic tanks, agriculture, urban storm water, and other causes. Although many non-point source contaminants such as sulfate and total dissolved solids are not regulated for drinking water use, their presence in groundwater can cause significant service problems for water providers and other water users.

Most groundwater supplies in the Phoenix AMA are of acceptable quality for most uses. However, human activity and natural processes have resulted in the degradation of groundwater quality in some areas to the extent that it is unusable for many purposes. The extent and type of contamination varies by location and land use activities. In general, contaminated groundwater has degraded the upper aquifers throughout a large part of the Phoenix AMA with dissolved solids, nitrates, and other contaminants. Well locations and pumpage practices can and do influence the migration of poor quality water in many areas of the AMA at identified groundwater contamination sites (such as WQARF, CERCLA or DOD sites).

Water Quality Trends in the East Salt River Valley Sub-basin:

Water quality in the study area is generally acceptable for municipal uses. However, some use limitations exist resulting from high concentrations of naturally occurring constituents. Additionally, because of human activities, such as agriculture and industry, additional water quality challenges exist.

Total Dissolved Solids: Total dissolved solids, or TDS, is a measurement of all dissolved constituents (salts) in water. EPA has established an SMCL of 500 mg/L for TDS. Elevated TDS concentrations can be naturally occurring, but in central Arizona are generally found in developed areas and caused by human activities. TDS is either measured directly in water samples or is calculated from field measurements for electrical conductivity. Existing data indicate that TDS concentrations within the area are often higher in those areas that were developed earlier.

Chromium: Chromium occurs in two natural forms, a hexavalent form and a trivalent form. EPA has established an MCL of 0.1 mg/L for total chromium. As with arsenic, naturally occurring chromium does occur at elevated concentrations in some parts of Arizona. Chromium concentrations above the MCL have been detected in groundwater within the East Salt River Valley; however, these areas appear to be very localized and often depth-specific. Elevated concentrations of chromium, and other heavy metals, can also be present resulting from human activities.

Nitrate: Nitrate is a salt of nitrogen for which an MCL of 10 mg/L of nitrate as N has been set by EPA. Nitrate may be present due to the use of nitrate-based fertilizers, discharge of wastewater, septic tank leachate, or concentrated animal feeding operations. It may also occur naturally. Elevated levels of nitrate have been identified in East Salt River Valley groundwater.

Fluoride: Fluoride is a naturally occurring salt that is found at elevated levels in some areas in Arizona. Fluoride, which may also occur in elevated concentrations due to human activities, has an MCL of 4.0 mg/L. While elevated concentrations of Fluoride have been found in the East Salt River Valley, no identifiable patterns to fluoride concentrations have been identified.

Arsenic: In 2001, EPA established a new MCL of .01 mg/L with a compliance date of January 23, 2006. Because elevated concentrations of naturally occurring arsenic are common in Arizona, the lower arsenic MCL resulted in blending and/or treatment by many water providers. There appear to be general trends trend toward higher arsenic associated with specific geologic formations, but the trends are sometimes not pronounced. The majority of the arsenic present is assumed to be naturally occurring.

Radiochemicals: In Arizona, radiochemicals such as radon can be present in groundwater due to the decomposition of crystalline rocks. EPA has set an MCL for gross alpha particle activity at 15 picocuries per liter (pCi/L). In the East Salt River Valley, gross alpha activity levels ranged have been problematic in some, usually localized, areas.

Sulfate: An SMCL for sulfate of 250 mg/L has been established by EPA. Sulfate may occur naturally or may be caused by human activities such as agriculture, mining, or other activities. Elevated concentrations of sulfate have been encountered in the East Salt River Valley.

Volatile Organic Compounds (VOCs): Volatile organic compounds (VOCs) are substances such as fuel components (benzene, xylenes, toluene, ethylbenzene) and halogenated solvents (for example, trichloroethylene [TCE] and tetrachlorethylene [PCE]) that can be released to groundwater by improper disposal, accidental spills, or leaking underground storage tanks. Multiple detections of VOCs in groundwater in the East Salt River Valley have been identified. Most VOC problem areas are generally localized and have been relatively well defined.