

Groundwater Quality Report

A.R.S. §49-225.D

The groundwater quality monitoring program conducts ongoing monitoring of the state's groundwater resources to detect the presence of new and existing pollutants, determine compliance with applicable aquifer water quality standards, and evaluate the effectiveness of best management practices and control technologies. The data collected assist in answering the following questions:

- What is the condition of Arizona's groundwater?
- Are groundwater quality conditions changing over time?
- Where are the problems related to groundwater quality and what are their causes?
- Are programs to address problems effective?
- Is ADEQ meeting groundwater quality goals and standards?

This report is a summary of ADEQ's analyses of groundwater quality monitoring data. The results are from well samples collected between July 1, 2001 to June 30, 2002.

The information and data presented summarize water quality results for specific wells, but are not necessarily representative of areawide or regional groundwater conditions. Entities should research these data further with the assistance of ADEQ before using the data in site-specific or aquifer-wide water quality investigations.

Like in any database that compiles groundwater data, this database contains uncertainties, which are primarily due to variations in laboratory quality assurance procedures, well construction details, well depths, sampling conditions, and oral and spatial variability of groundwater quality. Since each sample is collected for specific purposes with its own limitations and restrictions, use of these data requires some assumption or understanding of these factors.

Groundwater Quality Sampling Results

[Table 1](#) (6.3 MB) summarizes groundwater quality data that ADEQ obtained from FY 2002 sampling activities including those of ADEQ's Water Quality Assurance Revolving Fund (WQARF, pronounced *wharf*) Program and the Arizona-Sonora Border Program. In FY 2002, the number of distinct wells sampled, samples collected and tested, and individual parameters tested was significantly higher than in FY 2001 because of the increase in sampling and testing activities at contaminated sites under the WQARF Program. The Arizona Department of Health Services' laboratory and other contracted laboratories analyzed the samples. Although previous reports include

data from contributors, including the Arizona Department of Water Resources and U.S. Geological Survey, format interface difficulties preclude these data from inclusion in this report.

ADEQ collected and tested 1,372 samples from 426 distinct wells in 14 of the state's 51 groundwater basins and Mexico in FY 2002. These basins include Duncan Valley, Little Colorado, Lake Havasu, Lower San Pedro, Phoenix AMA, Pinal AMA, Safford, San Bernadino, Salt River, San Rafael, Tonto Creedk, Tucson AMA, Verde River and Willcox.

Sampling Results

Distinct Wells Sampled	426
Samples Collected and Tested	1,372
Individual Parameters Tested	30,045

According to the Environmental Quality Act, which became law in 1986, all state agencies must submit to ADEQ the results of any groundwater sampling for pollutants and the results of any groundwater sampling that detects pollutants (A.R.S. § 49-225.B). This report is a compilation and summary of all data gathered by or provided to ADEQ between July 1, 2001 and June 30, 2002.

This report is submitted in accordance with the Arizona Revised Statute (A.R.S. §49-225.D) that requires the submittal of the following information for the preceding fiscal year ending June 30.

- The number of wells sampled for pollutants and their locations, well numbers (if available), and the agencies responsible for collecting and analyzing the samples
- The number of samples with detectable levels of pollutants and their locations, well numbers (if available), and the agencies responsible for collecting and analyzing the samples
- The number, nature and outcomes of enforcement actions taken, by category

[Table 1](#) contains data from July 1, 2001 to June 30, 2002, for the first two items listed above. The report entitled [Water Quality Enforcement](#), presents enforcement actions associated with the third item above.

The term *pollutant* is defined in A.R.S. § 49-201 as “fluids, contaminants, toxic wastes, toxic pollutants, dredged spoil, solid waste, substances and chemicals, pesticides, herbicides, fertilizers and other agricultural chemicals, incinerator residue, sewage, garbage, sewage sludge, munitions, petroleum products, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and mining, industrial, municipal and agricultural wastes, and any other liquid, solid, gaseous or hazardous substances.”

This definition includes substances derived from both anthropogenic and natural sources. Any detection of a volatile organic compound (VOC), pesticide or pathogenic bacteria in groundwater constitutes pollution. Major ions (dissolved minerals), metals and some physical parameters that occur in groundwater naturally are expected at some level in groundwater samples.

If an analyte, or water quality parameter, was detected but did not exceed an applicable aquifer water quality standard, the analyte is considered at a safe level. It may be present due to a naturally-occurring condition or due to anthropogenic influences.

The water quality standards used in this report are the Arizona aquifer water quality standards (AWQSs) and EPA's primary drinking water maximum contaminant levels (MCLs). ADEQ also uses secondary maximum contaminant levels (SMCLs) as reference standards for certain pollutants that do not have a AWQS or MCL. [Table 2](#) (55 KB) describes AWQSs, MCLs and SMCLs. A groundwater sample is typically analyzed for one or more parameter groups. [Table 3](#) (81 KB) identifies the parameter groups and individual chemical constituents comprising each parameter group.

The number of detections and exceedances of any of the water quality standards or reference levels described above in groundwater sampled in the 14 groundwater basins and Mexico from July 1, 2001 to June 30, 2002 (see [Table 1](#)) are shown in [Table 4](#) (229 KB) by basin. In FY 2002, the number of detections and exceedances of any of the water quality standards or reference levels was significantly higher than FY 2001 largely due to the increase in sampling and testing activities at contaminated sites under the WQARF Program.

<i>Number of Parameters Detected and Exceedances of Standards by Water Quality Parameter Groups</i>			
Detected		Exceeded	
VOCs	5,595	VOCs	476
Others	929	Others	9
Cations/Anions	2,063	Cations/Anions	18
Metals	547	Metals	50
Nutrients (NO ₃)	477	Nutrients (NO ₃)	12
Pesticides	109	Pesticides	–
Physical (e.g. pH)	1,888	Physical (e.g. pH)	58
Total	11,594	Total	623

[Appendix A](#) (9 KB) is a glossary of term definitions, term explanations and codes used in [Table 1](#), including primary water use, laboratory notations, groundwater basins and county code.

Water Quality Standards

According to the Environmental Quality Act of 1986, ADEQ must adopt AWQs “to preserve and to protect the quality of those waters for all present and reasonably future uses.” ADEQ may also adopt AWQs for other chemicals meeting the health impact justification required by EQA.

ADEQ uses federal drinking water and state aquifer water standards in interpreting groundwater sampling results. Water quality standards and guidelines are essential to help protect public health and the environment.

Federal primary MCLs are limits for contaminants in drinking water established under the Safe Drinking Water Act. 40 CFR Part 142 lists approximately 150 MCLs. EPA determines MCLs primarily based on the health effects of the contaminants and also considers analytical detection methods and economic factors in their development. Primary MCLs are federally enforceable drinking water standards that ADEQ adopted as enforceable drinking water standards under the Arizona Safe Drinking Water Program.

EPA also establishes SMCLs (40 CFR Part 143), which are set at levels that, in EPA’s judgement, protect the public welfare. Standards created by these regulations are those that may adversely affect the aesthetic quality of drinking water, such as taste, odor, color and appearance. Arizona does not enforce SMCLs as they are considered goals and are not federally enforceable.

ADEQ has also established narrative AWQs by rule (A.A.C. R18-11-405), which creates an environmental “safety net” that allow ADEQ to regulate pollutant discharges for which EPA has not assigned numeric standards. The narrative standards state:

- A discharge shall not cause a pollutant to be present in an aquifer in a concentration that endangers human health.
- A discharge shall not cause a violation of the surface water quality standard established for a navigable water of the state.
- A discharge shall not cause a pollutant to be present in an aquifer that impairs existing or reasonably foreseeable uses of water in an aquifer.

Summary of Groundwater Quality Data

ADEQ sampled a total of 426 distinct wells one or more times between July 1, 2001 and June 30, 2002, and collected 1,372 water samples, which were tested for a variety of water quality parameters. ADEQ entered the sampling results into its groundwater quality database and has generated 30,045 analyses.

For analytical purposes, water quality parameters are categorized into 11 groups. [Table 3](#) details the water quality parameters that compose each group.

ADEQ has defined 51 groundwater basins in the state that serve as a general geographical location for sampled wells. Groundwater quality data presented in this report were collected from 11 primary well use categories presented in [Appendix A](#).

[Table 4](#) shows basins, cadastral well locations, water quality parameters, concentrations and standard levels where analytical results exceed standard levels. [Table 5](#) (7 KB) summarizes the number of detections for each water quality parameter. Of the 30,045 parameters tested in FY 2002, 11,594 (38.6 percent) showed a value above detection. Of these 11,594 parameters, 623 (5.4 percent) showed an exceedance of an MCL or aquifer water quality standard.