

SECTION 6

DRINKING WATER SECTION

INTRODUCTION

Water resources will continue to be a key factor in the continued residential and industrial development of a semi-arid region such as the SouthEastern Arizona Governments Organization (SEAGO). In a desert environment, water is a precious resource and new management efforts are being developed by the state to ensure long-term, basin-wide safe yields for existing ground and surface water in the region. The SEAGO region is fortunate to have plentiful supplies of groundwater, and this, combined with new water conserving agricultural practices and artificial recharge procedures, should ensure long-term water availability to foster growth and development in the future. The purpose of this section is to provide an overview of the existing drinking water systems in the SEAGO region, the compliance history, and discuss issues related to compliance and system viability.

As stated, drinking water is a precious resource, that people take for granted. People often assume that clean, clear water will always come out of their kitchen tap and that it will always be drinkable. The behind-the-scenes players with the municipal or private water company get water from its source to the consumer's tap, either by pumping it out of the ground, or diverting it from a stream. The removal of harmful contaminants, and pumping the water through miles of pipes are also taken for granted by consumers, but all of this **costs money**. Water in the ground or in the stream may be free, but getting it from its source to people's homes and ensuring it is safe to drink when it gets there costs money, and unfortunately for many consumers, that cost is going up.

FEDERAL AND STATE REQUIREMENTS

Safe Drinking Water Act

The Safe Drinking Water Act (SDWA) was passed by Congress in 1974, and has been amended several times since adoption. The purpose of the Act was to make sure that drinking water supplied to the public was safe and wholesome. The Environmental Protection Agency (EPA) accomplishes this by setting national drinking water quality standards which all water supplied to the public must meet. The SDWA does not provide funds for construction of new water systems or ongoing operation and maintenance.

The requirements for the SDWA apply to all **public** water systems. Arizona, through the Arizona Department of Environmental Quality, has been given primacy for the safe drinking water program. The EPA provides guidance, technical assistance, and some funding to run the program.

Classification

Arizona defines a "water system" as "all facilities which are used for collecting, pumping, treating, storing, or distributing to four or more residential service connections or to nonresidential service connections for any of the following uses: drinking, producing, processing, storing, handling, serving, or transporting food or drink and the washing of related utensils, equipment, or food contact surfaces; bathing or personal hygiene; or washing clothes. A water system does not include a system which delivers water solely for irrigation purposes."

Drinking water systems in Arizona can be classified based on the number of people served by the system and whether the system operates year-round. Systems with less than three connections are considered "domestic" or "private agricultural systems." Systems with three (3) to 15 connections are classified as semi-public systems, but are only monitored and regulated on an exception basis when a problem occurs. A "system that serves at least 15 service connections or serves an average of at least 25 persons per day for at least 60 days a year" is considered a "public water system." The Arizona Department of Environmental Quality regulates all the types of systems listed in Table 6-1 except for domestic water

systems and private agricultural systems. Public systems are further categorized as follows:

Community water systems - a public water system that serves at least 15 service connections used by year-round residents, or serves at least 25 year-round residents.

Noncommunity water system - a public water system that is not a community water system.

Transient noncommunity water systems - a noncommunity water system which is not a nontransient, noncommunity water system.

Nontransient noncommunity water system - a noncommunity water system that serves at least the same 25 persons for more than 6 months per year.

Table 6-1 shows the water supply matrix. The Arizona Department of Environmental Quality regulates all the types of systems listed in the table except for domestic water systems. Private agricultural, public, and semi-public systems are required to comply with drinking water standards. Additional requirements may be imposed if a standard is violated or a threat to public safety and health is identified. Depending on the type of systems, there may be additional requirements for certain types of public water supply systems.

Standards and Monitoring

There are two types of drinking water quality standards, primary and secondary. Primary standards are health-based and enforceable while secondary standards are based on the aesthetic quality of the water and are non-enforceable guidelines.

Primary standards may be either Maximum Contaminant Levels (MCLs) or treatment techniques. A Maximum Contaminant Level Goal, (MCLG) is a numerical contamination level with no adverse health effects. Theoretically, a person should be able to drink water with this level of contamination for a lifetime, with no ill effects. As implied by the name, this level of contamination is a goal, not an enforceable standard. All recognized carcinogens have an MCLG of zero, as there is no safe level of consumption. A MCL, on the other hand, is an enforceable standard. The EPA has set MCLs as close to goals as practical, while taking costs and technology into consideration. The MCL is the numeric standard against which compliance or noncompliance is measured. Treatment technique requirements are set for contaminants which are too difficult or costly to measure. For these contaminants, specific water treatment requirements such as filtration, corrosion control, or chlorination are required to protect public health.

Secondary standards for drinking water include Secondary Maximum Contaminant Levels (SMCL) and are associated with the aesthetic quality of the water e.g. taste, odor, color, or clarity of the water.

In Arizona, state water quality standards (MCLs) apply to public, semi-public, and private agricultural water systems. Community systems must monitor for inorganics, synthetic organics, radionuclides, total coliform and Volatile Organic Compounds (VOCs). Noncommunity systems are only required to sample for coliform and nitrates. All public systems using surface water supplies must monitor for turbidity.

The SDWA requires sampling and reporting, recordkeeping, and public notification for reported violations in all public drinking water supply systems. The type and frequency of sampling varies by type of system and parameter. The frequency of a sampling program depends on whether the water supply source is ground or surface water. Monitoring frequency also varies dependent on the number of people served.

The 1986 amendments call for standards and monitoring requirements for increasing numbers of contaminants each year. These additional requirements are implemented in Arizona as ADEQ implements new rules. The EQA requires that Arizona adopt new standards within one year after the final federal regulations have been adopted.

There are three requirements mandated by the SDWA when a violation of the standards has been determined. These are:

a. Sampling and Reporting

Water suppliers must collect samples from their water systems, take them to the lab for analysis, and send the results to the regulatory agency (ADEQ). The type of analysis performed, the sampling frequency and location of the sample points varies from system to system and are also dependent on the chemicals or contaminants being tested for.

b. Recordkeeping

Laboratory results, name of person drawing the sample, dates and locations of sample points, corrective actions taken, sanitary survey reports, and other information must be kept on file for a specified (time) period by the water provider.

c. Public Notification

Any time there is a violation of a requirement, the public must be notified. Violations are divided into two categories, depending on the seriousness of the violation. Violation of a water quality standard, indicating contamination in the system, is more serious than a failure to meet a compliance schedule. A Tier 1 violation is the more serious of the two categories; Tier 2 violations are usually more administrative in nature. There are certain minimum requirements for the content of the public notice and the way in which the information about the violation is disseminated.

The owner/operator of the system is responsible for meeting these requirements and standards, or he/she will be found to be out of compliance with the SDWA.

Operation and Maintenance (O&M)

Operation and maintenance (O&M) requirements for drinking waters systems have changed significantly in the past several years. Public drinking water supply systems are required to obtain approval to construct and approval of construction from ADEQ or the delegated review agency before they begin operation and service. New system requirements include use of backflow prevention devices on all new systems and the retrofitting of older systems by 1994. Amendments to the SDWA require the filtration and disinfection of surface water supplies or for groundwater under the direct influence of surface water. New treatment technique requirements are expected to control corrosion in distribution systems to protect against lead and copper contamination.

Public water supply and distribution systems must be operated by a certified operator, with the grade and training dependent on the type and size of the system. The ADEQ is required to conduct sanitary surveys every five years for community systems and every ten years for noncommunity systems. Community systems are also required to have emergency operation plans in effect by January 1994.

Planning Implications, Operation and Maintenance of Smaller Systems

Compliance with new monitoring requirements will become increasingly difficult for smaller systems as the cost and number of regulatory requirements increase. Smaller operators may be forced to cease operations if they cannot increase rates to cover the additional cost of operations. At some point in time, it may not be profitable for the smaller providers to stay in business and providers may have to be subsidized by a county or other local government if they are to remain in operation.

DRINKING WATER SYSTEMS IN THE SEAGO REGION

The Arizona Department of Environmental Quality's (ADEQ) Water Compliance Unit currently monitors 249 public drinking water systems in SEAGO. Twenty-one of these are major systems which serve approximately 75 percent of the population in the region. These systems are listed in **Table 6-3** Community Water Systems.

There are approximately 220 active public drinking water systems in the SEAGO region, of which about 90 percent are public systems. A breakdown of the active drinking water systems by type of system and by number of customers in the region is included as **Table 6-4(a)**. The table shows that Cochise County has the most systems with 130, followed by Santa Cruz County with 44 systems, Greenlee County with 24 systems, and Graham County with 22 systems. The greatest proportion of system type is the community system. Cochise County also has the most community systems, with 60. Santa Cruz County has 16 active community systems while Graham and Greenlee Counties have nine and eight active systems, respectively. The next most prevalent type of system is the transient noncommunity system.

Table 6-4(b) also provides a breakdown as to number of water systems by population served. It is important to note here that 60 percent of the systems in the region serve less than 100 customers, with only 25 or (11 percent) of all systems serving a population of over 1,000 customers. The large number of small systems in the region has a direct relationship to the viability of these systems and their ability to handle the cost of compliance with new regulations and monitoring requirements. It stands to reason that the per capita cost of compliance is much higher for the smaller systems. For example, new regulations require that surface water sources of drinking water be filtered before use. This will be a significant extra expense for any systems using surface water as a supply source, but the proportionate cost, per person, is significantly higher for the smaller systems with less customers to spread these added costs over. Fortunately, in the SEAGO region, most of the drinking water comes from groundwater sources. The only member entities using surface water sources are the City of Tombstone and the City of Safford. However, this heavy dependence on groundwater sources underscores the need for protection of groundwater resources serving as drinking water supplies in the region, and will be discussed under the Wellhead Protection Program section.

SYSTEM COMPLIANCE

Each year, ADEQ's Drinking Water Compliance Unit compiles the data for each system in the state. Each system is rated as being either in full compliance, substantially in compliance, or out of compliance with applicable rules and regulations. A system is considered to be in "substantial compliance" if it has only minor deficiencies. "Noncompliance" indicates a system had one or more major O&M violations during the past year.

A review of the compliance data for the years 1990-1992 shows that certain types of violations appear to be on the rise while others are falling. **Table 6-2** show drinking water compliance by count for the region during the period 1990 to 1992. Across the region, quality violations appear to be declining while operator certification violations are on the rise. Operation and Maintenance violations appear to be fairly stable while sampling and monitoring violations are increasing, especially in the more populated counties e.g. Cochise and Santa Cruz Counties). These two counties have a higher proportion of community systems which, in turn, have more monitoring and sampling requirements. **Tables 6-5, 6-6, and 6-7** provide additional information on the compliance status of drinking water systems in the region for most recent years.

A review of the 1992 compliance data shows that regionally, almost 80 percent of the water systems were out of compliance with the requirements of the Safe Drinking Water Act and Arizona's rules and regulations. Approximately 14 percent of the remaining systems were in substantial compliance 7 percent considered to be in full compliance. The most frequent violation, regardless of type of system, was lack of certified operators followed by sampling violations. Operation and maintenance of the system was the third most frequent violation for the 1992 period. This same breakdown of violations occur when comparing the frequency of violations to size of the system. While the breakdown for types of violations seem to be similar regardless of type of system or size, the percentages are different. It appears that the smaller systems have higher percentages of operator and O&M violations. On the other hand, the larger systems seems to have higher percentages of sampling violations. This may result from the fact that there are more community systems in this grouping and they have more monitoring and sampling requirements.

In 1992, ADEQ compiled data on 115 water systems in Cochise County of which 89 (77.4 percent) were out of compliance, 26 (13.8 percent) were in either full or substantial compliance. Graham County had 23 water

systems of which 20 (86.9 percent) were out of compliance, with 3 (13.1 percent) in compliance. Greenlee County had 18 water systems of which 12 (66.7 percent) were out of compliance, and 6 (33.3 percent) were in compliance. Finally, Santa Cruz County had 40 water systems of which 34 (85 percent) were out of compliance, and 6 (15 percent) were in compliance.

WELLHEAD PROTECTION PROGRAM

With the dependency in the SEAGO region on groundwater as a supply source for drinking water, attention must be given to a way to protect this resource. One particular program, required under provisions of the SDWA, is the Wellhead Protection Program.

The Wellhead Protection Program (WHP) established with the 1986 amendments to the SDWA, is intended to protect groundwater supplies from contamination and to prevent the need to treat water withdrawn from wells to meet drinking water standards. The WHP program is a non-regulatory program which relies on local level development and implementation of land use controls to address a variety of potential contamination sources. Arizona's program is designed to try and improve groundwater protection through voluntary, cooperative efforts with municipalities and other agencies. Local governments are encouraged to develop local Wellhead Protection Programs and delineate Wellhead Protection Areas with technical assistance from ADEQ.

A Wellhead Protection Area (WPA) is an area which has significant importance as a drinking water supply source and is identified on a site-specific basis. These may be near wellheads or in major recharge areas. Delineation of these zones requires expertise in hydrogeology. Both ADWR and ADEQ should be available to provide technical assistance to local governments in these areas.

The benefits of WHP programs can include the avoidance of cleanup costs that would be incurred if contamination were not prevented. The EPA has issued technical guidance documents that include a number of management tools which can be used at the local level to protect drinking water supplies. These include zoning and subdivision ordinances, regulations prohibiting certain activities in certain areas, (e.g. placement of Underground Storage Tanks), and public education and outreach programs.

In the SEAGO region, the Environmental Protection Agency (EPA) has recently expressed interest in doing a wellhead protection project around the City of Nogales and Santa Cruz County. These concerns about protecting the aquifer are also expressed by Mexican governmental officials and the Mexican counterpart to the EPA, SEDESOL. The ADEQ, EPA, and the IBWC are currently doing a groundwater monitoring survey along the transboundary aquifer, and feel that public outreach and education about wellhead protection would benefit the residents on both sides of the border. If sufficient interest in the program can be generated during the groundwater monitoring survey, a formal Wellhead Protection Program will be initiated in and around Nogales. This would serve as a pilot program for other border communities in southern Arizona.

SYSTEM VIABILITY

A "viable" public water supply system is one that "is self-sustaining, has a reliable water supply, has the commitment and has the managerial, technical, operational and financial capabilities to reliably meet performance requirements applicable to that system, on a long-term basis." As new regulations become more numerous and costly to implement, it will be increasingly difficult for many systems, especially the small ones, to remain viable.

Certain requirements must be complied with regardless of type of system or system size. This means the cost of complying with the regulations is significantly higher for the small systems, which have a small rate base over which to spread the costs. Many small systems lack the managerial, technical, operational, or financial capabilities to keep a system viable.

The region needs to begin examining strategies to deal with this pending issue. As with waste water systems, regionalization of certain functions can help defray certain costs. Consolidation is another strategy for very small systems in close proximity. Counties may need to begin looking towards the long-term planning for provision of drinking water. The ADEQ may need to look at adopting rules that would require a basic level of managerial and financial stability prior to allowing a system to operate. Lastly, regional efforts toward providing public education to these existing systems may help bring systems to a higher level of viability.

Recommendations, Drinking Water Systems

- As with wastewater treatment facilities, monitoring and sampling requirements should be "batched" or grouped by the smaller providers and a "circuit rider" system set up in order to reduce transportation costs. A system is currently in effect with some of the operators, but it can be expanded.
- The Arizona Department of Environmental Quality (ADEQ) should compile a database of all compliance inspection results, in order to provide local government officials current, accurate information about systems in their jurisdiction.
- The ADEQ should require demonstration of financial and managerial capability prior to giving approval for the construction of new water supply systems.
- The ADEQ, in cooperation with local governments, should stress the formation of special taxation districts in order to ensure that drinking water supplies are adequate to serve the public.
- Where economic conditions are such that a system's viability is in question, ADEQ and local government officials should push for regionalization and/or consolidation of water supply systems in order to ensure an adequate, safe supply for the public.
- The ADEQ must continue to provide technical assistance to the smaller providers when required, and ensure compliance with existing regulations through technical assistance and inspection visits.
- The ADEQ should encourage the establishment of regional labs to reduce cost of analyzing samples and associated transportation costs.
- ADEQ should look at adjusting monitoring and sampling requirements based on the system's size, past sampling performance, and source of supply.

**TABLE 6-1
WATER SYSTEM SERVICE TYPE**

	AVERAGE POPULATION SERVED BY SERVICE CONNECTION			
	0-3	3-15	15-25	25+
Primary Service Area				
RESIDENTIAL Houses, mobile home parks with at least 25 annual residents.	DO	SP	CO	CO
SEMI- RESIDENTIAL Schools, institutions, hospitals, industrial, agricultural and day care centers.	DO	SP	NN	NN
TRANSIENT Recreation areas, service stations, summer camps, restaurants, bars, highway rest areas, hotels and motels.	DO	SP	TN	TN
OTHER Interstate carrier, wholesaler, bottled or vended water with no distribution.	DO	SP	OT	OT

LEGEND:

DO = DOMESTIC WATER SUPPLY
 SP = SEMI-PUBLIC WATER SUPPLY
 CO = COMMUNITY PUBLIC WATER SYSTEM
 NN = NONTRANSIENT NONCOMMUNITY WATER SYSTEM
 TN = TRANSIENT NONCOMMUNITY WATER SYSTEM
 OT = OTHER PUBLIC WATER SYSTEM

**TABLE 6-2
DRINKING WATER COMPLIANCE LEVELS BY COUNTY
1990 - 1992**

COUNTY	OUT OF COMPLIANCE	SUBSTANTIAL COMPLIANCE	FULL COMPLIANCE
REGION	155/196 (79%)	27/196 (14%)	14/196 (7%)
COCHISE	89/115 (77%)	20/115 (17%)	6/115 (5%)
GRAHAM	20/23 (87%)	2/23 (8%)	1/23 (4%)
GREENLEE	12/18 (67%)	1/18 (6%)	5/18 (28%)
SANTA CRUZ	34/40 (85%)	4/40 (10%)	2/40 (5%)

SOURCE: Arizona Drinking Water System Compliance Status Report, Arizona Department of Environmental Quality.

TABLE 6-3

**COMMUNITY WATER SYSTEMS IN THE SEAGO DISTRICT
SERVING GREATER THAN 1,000 PERSONS
BY COUNTY**

Water System Name	Population Served	Water Source	Overall Status
COCHISE COUNTY			
Arizona Water Co.- Bisbee	12,000	Groundwater	Compliance
Arizona Water Co.- Sierra Vista	4,950	Groundwater	Compliance
Benson Water Dept.	4,400	Groundwater	Compliance
Clear Springs Utilities- Sunsites	1,230	Groundwater	Compliance
Bella Vista Water Co.- Sierra Vista	18,000	Groundwater	Noncompliance
Douglas Water Dept.	17,300	Groundwater	Substantial Compliance
Huachuca City	1,800	Groundwater	Substantial Compliance
East Slope Water Co.- Sierra Vista	1,890	Groundwater	Compliance
Tombstone Water Dept.	1,800	Groundwater and Surface Water	Noncompliance
City of Willcox	3,387	Groundwater	Substantial Compliance
St. David Water Assoc.	1,200	Groundwater	Substantial Compliance
Pueblo del Sol Water - Sierra Vista	2,100	Groundwater	Substantial Compliance
U.S. Army - Ft. Huachuca	14,664	Groundwater	Noncompliance
GRAHAM COUNTY			
City Utilities Co.- Graham County Electric Coop/Pima	2,118	Groundwater	Noncompliance
City of Safford	14,000	Groundwater and Surface Water	Noncompliance
GREENLEE COUNTY			
Morenci Water and Electric	2,760	Groundwater	Substantial Compliance
Morenci Water and Electric	3,850	Groundwater and Surface Water	Compliance
SANTA CRUZ COUNTY			
Citizens Utilities	1,162	Groundwater	Compliance
Nogales Water Dept.	15,750	Groundwater	Noncompliance
Valle Verde Water Co.	1,790	Groundwater	Noncompliance
Citizens Utilities - Rio Rico	3,118	Groundwater	Substantial Compliance

SOURCE: Arizona Drinking Water System Compliance Status Report, Arizona Department of Environmental Quality, 1992.

TABLE 6-4(a)
DRINKING WATER SYSTEMS IN THE SEAGO REGION

DRINKING WATER SYSTEMS BY TYPE					
COUNTY	SEMI-PUBLIC	COMMUNITY	NON-TRANSIENT	TRANSIENT NON-COMMUNITY	TOTAL
COCHISE	15	60	19	36	130
GRAHAM	0	9	2	11	22
GREENLEE	6	8	2	8	24
SANTA CRUZ	5	16	7	16	44
TOTALS	26	93	30	71	220

TABLE 6-4(b)
DRINKING WATER SYSTEMS IN THE SEAGO REGION

DRINKING WATER SYSTEMS BY POPULATION										
COUNTY	<25	26-50	51-100	101- 500	501- 1000	1001- 2500	2501- 5000	5001- 10 K	> 10K	TOTALS
COCHISE	17	39	18	30	9	9	4	0	4	130
GRAHAM	0	8	4	4	4	1	0	0	1	22
GREENLEE	7	9	1	4	1	0	2	0	0	24
SANTA CRUZ	6	18	5	8	3	2	1	0	1	44
TOTALS	30	74	28	46	17	12	7	0	6	220

**TABLE 6-5
DRINKING WATER SYSTEM VIOLATIONS BY TYPE**

VIOLATION TYPES	1990			1991			1992		
	F	S	N	F	S	N	F	S	N
SAMPLING									
COCHISE	14	17	17	7	10	47	14	67	34
GRAHAM	3	7	6	0	10	6	5	5	13
GREENLEE	1	2	3	1	2	6	6	10	2
SANTA CRUZ	6	11	13	5	3	20	11	13	15
QUALITY									
COCHISE	13	15	20	42	15	7	41	68	2
GRAHAM	4	9	3	8	6	2	20	2	1
GREENLEE	1	1	4	9	0	0	16	0	2
SANTA CRUZ	0	13	17	19	9	0	33	5	0
CERTIFIED OPERATOR									
COCHISE	25	0	23	26	17	21	28	10	76
GRAHAM	14	0	2	15	0	1	4	0	19
GREENLEE	3	0	3	4	0	5	8	0	10
SANTA CRUZ	12	0	18	7	5	16	4	2	33
OPERATION AND MAINTENANCE									
COCHISE	18	9	21	43	3	18	18	83	13
GRAHAM	15	1	10	3	2	11	10	3	10
GREENLEE	1	2	3	1	5	3	10	2	5
SANTA CRUZ	9	5	15	12	5	13	19	13	7

LEGEND:
F = FULL COMPLIANCE
S = SUBSTANTIAL COMPLIANCE
N = NON COMPLIANCE

**TABLE 6-6
VIOLATIONS BY TYPE OF SYSTEM**

	COMMUNITY			TRANSIENT NON-COMMUNITY			NON-TRANSIENT NON-COMMUNITY		
	1990	1991	1992	1990	1991	1992	1990	1991	1992
CERTIFIED OPERATOR	20	24	62	16	17	55	10	8	21
O&M	24	25	19	17	12	19	8	8	4
SAMPLING	18	48	28	17	17	28	4	11	3
QUALITY	24	8	0	17	0	0	5	0	0
TOTAL SYSTEMS	49	58	72	37	44	72	14	15	30

**TABLE 6-7
VIOLATIONS BY SYSTEM SIZE**

	< 100		100 - 500		500 - 1000		1000 - 10 K		> 10 K	
	1991	1992	1991	1992	1991	1992	1991	1992	1991	1992
CERTIFIED OPERATOR	33	82	7	37	3	11	0	6	0	2
O&M	30	26	10	6	3	3	1	0	0	0
SAMPLING	44	40	12	14	9	5	7	3	2	2
QUALITY	1	0	1	2	1	2	0	0	1	1
TOTAL SYSTEMS	70	103	23	50	11	17	8	19	3	6