



A
TRAINING MANUAL
FOR

Reclaimed Water Site Testers



*City of Tucson
Tucson Water Department*



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Reclaimed Water Site Testers

Tucson Water
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ACKNOWLEDGEMENTS

This Training Manual for Reclaimed Water Site Testers was developed by the Backflow Prevention/Reclaimed Water Section of Tucson Water with the support and assistance of many at the Utility.

Tucson Water

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PURPOSE

Reclaimed water is treated wastewater, which, unless treated to potable water standards, requires special care to ensure its safe treatment, delivery and use. The Arizona Department of Environmental Quality (ADEQ) and the City of Tucson/Tucson Water have adopted reclaimed water rules, regulations, and procedures to ensure protection of the public when reclaimed water is in use. Inspection of reclaimed water sites, both prior to initiating reclaimed water service and at regular intervals thereafter, is an essential and effective management practice that ensures compliance with the regulations and the protection of the potable water supplies. Through our site inspection program, Tucson Water assures customers that protection of the public health and safety is our highest priority and that we strive for excellence in the operation of the reclaimed water program.

This Manual was prepared by the Tucson Water Backflow Prevention/Reclaimed Water Section for use in the Reclaimed Water Site Tester training class. This class is open to backflow testers certified by ADEQ-recognized agencies who are registered to test in the Tucson Water Service Area.

The Reclaimed Water Site Tester class is designed to strengthen the Tucson Water, reclaimed water site customer, and the Reclaimed Water Site Tester relationship as we work together to ensure that sites with reclaimed water are always safe and in compliance with regulations. The class provides the participants with a basic understanding of Tucson Water's reclaimed water program and teaches the participants the knowledge and skills needed to conduct reclaimed water site inspections. The class is divided into four sections: 1) introduction to reclaimed water use and regulations, 2) the responsibilities of Tucson Water, 3) the responsibilities of the reclaimed water site customer, and 4) the responsibilities of the Reclaimed Water Site Tester.

The Reclaimed Water Site Tester class emphasizes the concepts below:

- Ensuring that a reclaimed water site complies with all state and local regulations, including design, drainage, system operation, and system labeling
- Conducting pressure tests to identify potential cross-connections
- Reporting cross-connections when they are found to exist
- Entering the test results into the Tucson Water iBAK database
- Maintaining good customer relations

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DEFINITIONS

ADEQ – Arizona Department of Environmental Quality

ADWR- Arizona Department of Water Resources

Appurtenance – an accessory attached to the on-site reclaimed water system e.g. control valves, sprinkler heads, quick couplers, etc.

Auxiliary water supply – a water supply other than potable water, such as reclaimed water, rain water, or gray water

Backflow Tester - A person who has successfully completed training to test backflow assemblies and holds a general tester certificate which is recognized by ADEQ

BPA - backflow prevention assembly

Cross-connection Control Specialist (CCC Specialist) – A backflow tester who has successfully completed 40 hours of intensive cross-connection training given by an entity recognized by ADEQ. ADEQ regulations (R18-4-215 I.) require water systems serving more than 50,000 persons to have a backflow prevention program administered by a CCC Specialist

Customer – the person/business responsible for paying the reclaimed water bill

Direct reuse site – a site permitted by ADEQ for the nonpotable use of reclaimed water

Integral color – color is infused or otherwise added to materials as part of the manufacturing process

Non-potable water – water that does not meet the quality standards for potable water under the rules of the Safe Drinking Water Act

Off-site reclaimed water discharge - An off-site discharge is defined as any volume of reclaimed water that, for any reason, leaves the site where its use is permitted. For example, a private irrigation system pipe breaks and reclaimed water runs into the adjacent public street; this is an unauthorized discharge

Ponding - reclaimed water that remains on the ground's surface for more than 20 minutes after the watering stops

Potable water – water that meets the quality standards established under the rules of the Safe Drinking Water Act

Reclaimed water – wastewater that has been treated to a quality acceptable for beneficial uses other than discharge as a waste product

Reclaimed Water Site Tester- a person who has successfully completed Tucson Water's course on reclaimed water site testing

Water survey – an on-site survey that verifies all of the current and planned uses of potable water and the planned uses of reclaimed water to ensure that there are no conflicts between the uses and systems and that reclaimed water can be used safely



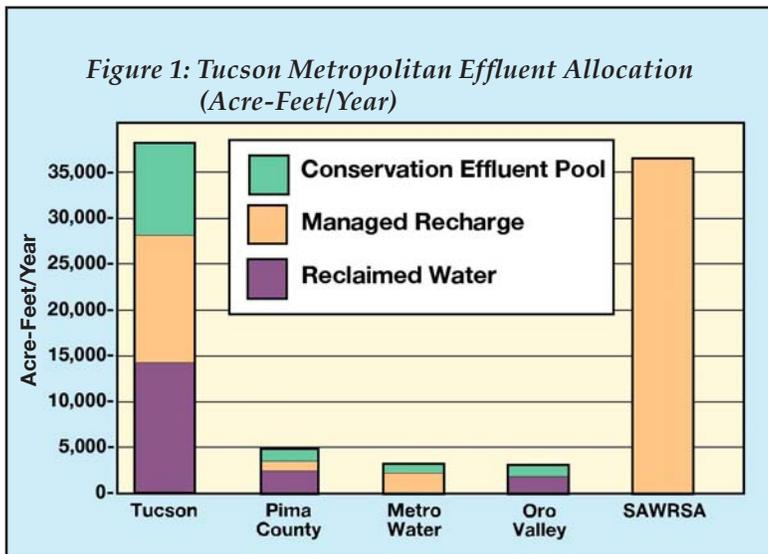
Chapter 1

Tucson's Reclaimed Water System

The City of Tucson is located in the northern semi-arid reaches of the Sonoran Desert in eastern Pima County, Arizona and receives only about 11 inches of rain a year. Very few surface waterways contain perennial flow and most of these are effluent-dominated streams located downstream from municipal wastewater treatment plants. Until the early 1990s, the Tucson community relied almost exclusively on pumped groundwater to meet water demand. Due to rapid growth in population and associated water demand following World War II, the groundwater system transitioned from an approximate state of equilibrium to one of accelerating depletion. Rapidly declining water levels in the metropolitan and surrounding areas had resulted in land subsidence, increased pumping costs, and the gradual loss of native riparian habitat. With the introduction of Colorado River water from the Central Arizona Project (CAP), the Tucson Water Service area has moved from pumping more groundwater than was being replenished to delivering CAP water for more than 60 percent of its potable water supply.

The Tucson area is growing at a rate of about two percent annually. The metropolitan area has a population of about 1,200,000 people. Potable water supplies are natural groundwaters from the Tucson and Avra Valley basins; as well as Colorado River water from the Central Arizona Project that has been recharged and recovered in Avra Valley. Non-potable water is provided through the reclaimed water system.

Tucson’s reclaimed water system is unique in several ways. Rather than a means to dispose of treated wastewater, it is an important and growing water supply for this desert community. Wastewater is the only supply the community has that will continue to grow as the population increases. Therefore, reclaimed water plays an increasingly important role in the water supply picture. As part of its long-range water supply plan, the City has committed to the increasing use of effluent for non-potable and possibly potable uses.



The City owns and operates a municipal water utility, Tucson Water, which provides potable and reclaimed water service in the Tucson metropolitan area. Tucson Water serves potable water to over 735,000 people, about 61 percent of the metropolitan population. In 2008 the utility delivered approximately 104,000 acre-feet of potable water and almost 16,000 acre-feet of reclaimed water.

Pima County owns and operates the regional wastewater collection

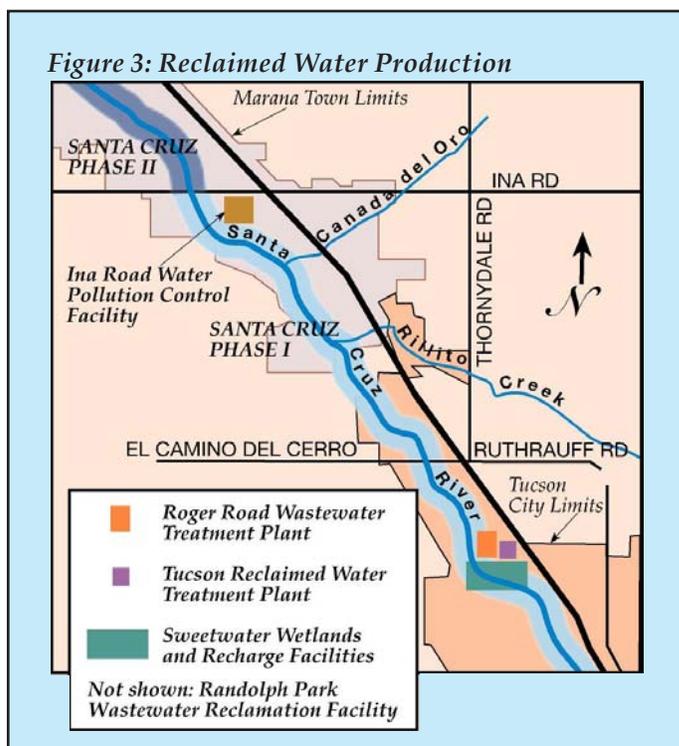
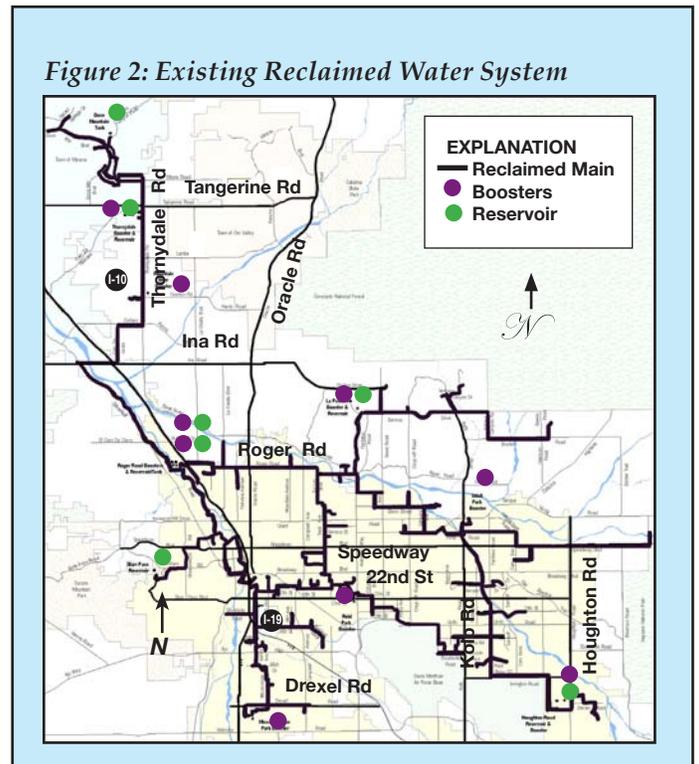
system and treatment facilities. The effluent is allocated among various entities based on local intergovernmental agreements and the Southern Arizona Water Rights Settlement Act (SAWRSA). The 1979 Intergovernmental Agreement that transferred the City of Tucson’s sewer system to Pima County allocates 90 percent of the effluent generated from the metropolitan wastewater treatment facilities to the City of Tucson and 10 percent to Pima County. Tucson Water then divides its share of this allocation (along with a proportional share of the SAWRSA obligations and the Conservation Effluent Pool) with Metro Water and Oro Valley according to a formula that reflects each water provider’s control of the effluent generated from within their water service area. Figure 1 shows the effluent allocations based on 2009 effluent volumes. It is anticipated that in 2010, Flowing Wells Irrigation District and Spanish Trail Water Company will also have effluent allocations.

In 2008, about 66,000 acre-feet of effluent was produced in the metropolitan area. The City of Tucson owns approximately half of this effluent and uses about 40 percent of it in the reclaimed water system. The remainder is used to irrigate a city-owned golf course or is discharged into the Santa Cruz River, where it recharges the aquifer.

Description of Tucson's Reclaimed Water System

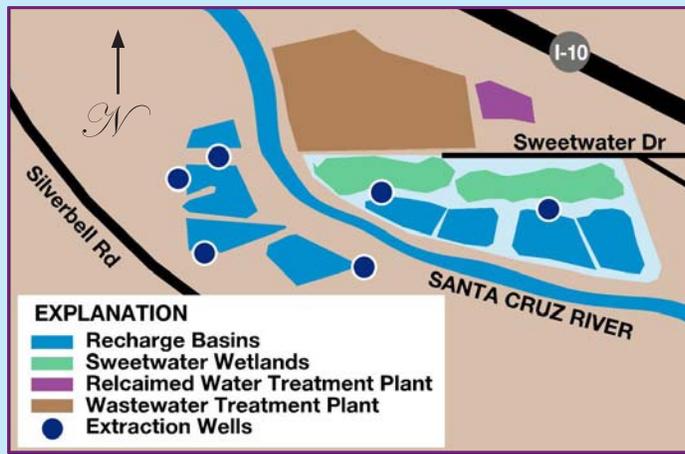
Since the first customer (a golf course located at the end of a 10-mile pipeline) received reclaimed water in 1984, more than 160 miles of transmission main pipe and 15 million gallons of surface storage have been added to the system (Figure 2). The average day delivery is more than 13 million gallons and the summer peak day is approximately 30 million gallons. Unlike the potable water system, the reclaimed system has a high peaking factor that reflects the use patterns of the irrigation customers; high use during the hot months, low use during the cool months.

Reclaimed water is produced in three ways (Figure 3): at a filtration plant for secondary effluent, at a tertiary wastewater treatment plant (Randolph Park Wastewater Reclamation Facility) and through recharge and recovery. The filtration plant further treats secondary effluent from the County's Roger Road wastewater plant and is permitted to produce up to 10 MGD. The tertiary wastewater treatment plant located in Randolph Park, also owned by the County, treats about 2.5 million gallons per day (MGD) of raw wastewater to reclaimed water standards. This water is delivered directly into the reclaimed water system.



Reclaimed water is also produced at two recharge and recovery facilities: the Sweetwater Recharge and Recovery Facility located south of the filtration plant and the Santa Cruz River Managed Underground Storage Facility (Figure 4). The Sweetwater facility consists of eight constructed basins which are used to recharge secondary effluent. It

Figure 4: Reclaimed Water Recharge and Recovery



is operated under an aquifer protection permit that allows 13,000 acre-feet/year of treated wastewater to be recharged and recovered annually. A constructed wetlands is also part of the Sweetwater facility. The wetlands were designed to treat the backwash water from the filters and are used as a public environmental amenity.

The Santa Cruz River Managed Underground Storage Facility is a “managed in-channel”

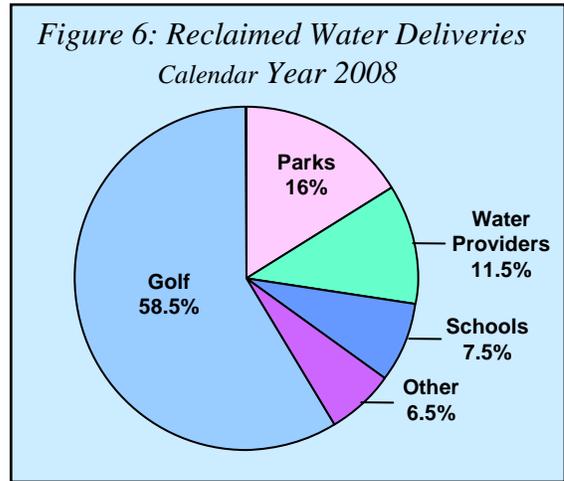
project (Figure 4). Secondary effluent produced at the County’s wastewater treatment plants is discharged into the river and ADWR calculates the “stored water credits” that are earned. These credits are then used to recover effluent from wells which pipe water into the reclaimed system. The recovered water is a very good quality, less than one NTU turbidity with total nitrogen levels below the 10 mg/L drinking water standard. This low nitrogen level is significant because the secondary effluent produced by the County is not denitrified and is typically in the 28 mg/L range. Recovered water from the recharge facilities is blended with water produced at the filtration plant to produce water that meets Tucson’s Reuse Permit requirements. The amount of recovered water blended with water produced at the filtration plant varies daily based on total system demand and the quality of the filtered water. On an annual basis, the blend is about 50 percent filtered water and 50 percent recovered water.

Figure 5: Reclaimed Water Use at Reid Park Zoo

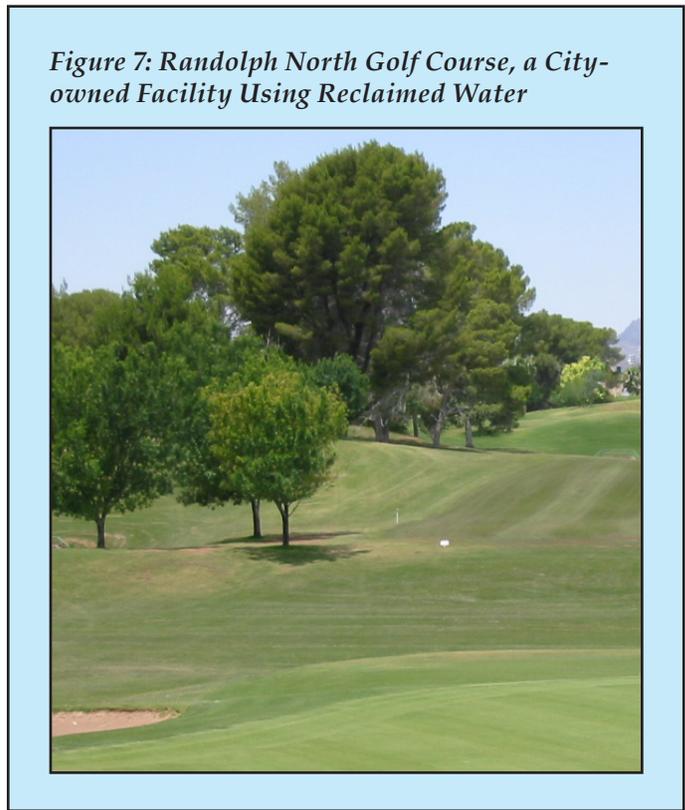


Tucson's Reclaimed Water Customer Characteristics

In 2008, the utility delivered almost 16,000 acre-feet of reclaimed water to more than 900 customers. As shown in Figure 6, 58.5% of this water was delivered to eighteen golf courses. Another 16% was delivered to 39 parks (Figure 5). The remainder was delivered to 52 schools (7.5%), water providers (11.5%) and 700+ single family homes (Figure 17), agriculture, commercial, multi-family, and street landscape (6.5%).



Although reclaimed water deliveries have increased by more than 50 percent since 1995, the percentage of deliveries in each customer category has remained relatively constant.



There are a total of 39 golf courses in Eastern Pima County, 23 of which are within the existing service area of Tucson Water. Of these 23, 18 use reclaimed water delivered to them through Tucson Water's system (Figure 7), one (Tucson Estates) uses potable water from Tucson Water and four, Quail Canyon, The Pines, El Dorado, and Rolling Hills, pump their own groundwater using grandfathered rights granted to them by the Arizona Department of Water Resources. The City of Tucson/Tucson Water has no legal authority to prohibit these right holders from pumping groundwater.

Reclaimed 101:

In Tucson reclaimed water is used primarily for turf irrigation.

Figure 8: 2008 Reclaimed Water Quality

	Reclaimed Water¹	Potable Water
Inorganic Constituents (mg/L)		
Alkalinity (as CaCO ₃)	202	109
Calcium	76	54
Chloride	127	42
Hardness (as CaCO ₃)	246	165
Magnesium	14	7.24
Phosphate (as P)	1.58	<0.2
Sodium	142	50
Sulfate	139	98
Nitrogen Forms (mg/L)		
Ammonia Nitrogen	8	
Nitrate (as N)	4.9	1.5
Nitrite (as N)	0.87	0.1
Organic Nitrogen (calc)	1.01	
Total (calc)	14.73	
Other		
Total Dissolved Solids (mg/L)	692.3	500
Turbidity (NTUs)	0.3	0.28
Fecal Coliform (cfu) ²	<2	
pH (SU)	7.4	7.82
Electrical Conductivity(μS/cm)	1153	
Residual Sodium Carbonate	-0.89	
Sodium Adsorption Ratio (SAR)	3.93	
¹ Annual Average. Source: Tucson Water's Water Quality Laboratory		
² Average is less than the detection limit		

Water Quality Abbreviations

CaCO ₃	calcium carbonate	N	nitrogen
cfu	colony forming units	NTU	nephelometric turbidity units
mg/l	milligrams per liter	P	phosphorus
meq/l	milliequivalents per liter	S.U.	standard unit
μS/cm	microSeimens/centimeter		

Reclaimed Water Quality

The reclaimed water Tucson Water provides to customers is classified by the Arizona Department of Environmental Quality as Class A water. Figure 8 provides the 2008 reclaimed water quality information with a comparison of selected parameters to values in the potable water system.

Reclaimed Water System Permitting and Regulatory Requirements

Tucson Water's reclaimed water system is regulated by ADEQ, ADWR, the City of Tucson Mayor and Council Policies, and the Uniform Plumbing Code.

Arizona Department of Environmental Quality (ADEQ)

Permits

The Arizona Department of Environmental Quality (ADEQ) regulates the City's reclaimed water system through permits which include a "Type III General Permit- Reclaimed Water Agent" and various aquifer protection permits. The Reclaimed Water System also operates under a Consent Order with the State of Arizona resulting from discharge of reclaimed water to the Pantano Wash in 2003. Because Tucson Water holds an "Agent" permit, reclaimed customers do not need to obtain their own permits or submit routine regulatory reports to ADEQ. Tucson Water's "Type III General Permit - Reclaimed Water Agent" classifies the reclaimed water as Class A.

Water Quality

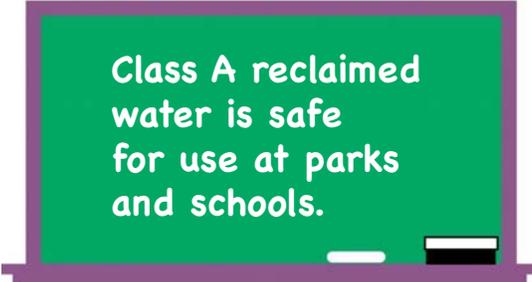
Class A reclaimed water is safe for use at public facilities such as parks and schools. It can be used for watering edible vegetables, orchards, and vineyards, toilet flushing in non-residential buildings, fire suppression, and livestock watering. In the 25 years that Tucson Water has operated a reclaimed water system, there have been no reports of documented illness or injury caused by reclaimed water.

Class A water is distinguished from Class A+ water by the total nitrogen concentration. Class A+ water must have a total nitrogen concentration of 10 mg or less (the drinking water and aquifer quality standard). Currently, Tucson Water's reclaimed water quality matches Class A+ standards during parts of the year. The Utility's long-term goal to provide Class A+ reclaimed water is dependent on Pima County's program to upgrade the wastewater treatment processes at the metropolitan wastewater treatment plants to remove nitrogen species from the wastewater.

Off-site Discharges of Reclaimed Water

ADEQ prohibits the discharge of Class A water under any circumstances from direct reuse sites. Tucson Water is required to report all off-site discharges to ADEQ within 24 hours of the discovery of the discharge. Reclaimed water customers are required and the public is encouraged to report discharges (Figure 21) to Tucson Water and may use the electronic reporting form on the Tucson Water website at: www.tucsonaz.gov/water/report_recl

Reclaimed 101:



**Class A reclaimed
water is safe
for use at parks
and schools.**

System Design and Operating Requirements

As the holder of a Reuse Permit from ADEQ, Tucson Water operates its reclaimed water system under a series of permit conditions which include compliance with Title 18, Chapter 9, Articles 6 and 7 and Chapter 11, Article 3 (Appendix A). These regulations include requirements for irrigation with reclaimed water that include:

- Use of application methods that reasonably preclude human contact with reclaimed water
- Prevention of standing reclaimed water (ponding) on open access areas during normal times the facility is in use
- Prevention of reclaimed water coming into direct contact with drinking fountains, water coolers, and eating areas
- Securing of hose bibs discharging reclaimed water to prevent use by the public (Tucson Water policy prohibits hose bibs at reclaimed water sites, with the exception of original owner permitted sites which had hose bibs prior to 1997. Hose bibs on these sites have been grandfathered. Subsequent owners will be required to remove these hose bibs.)
- Prevention of an off-site discharge of reclaimed water or reclaimed water mixed with stormwater from a direct reuse site
- Lining of ponds, lakes and other impoundments containing reclaimed water that discharge (leak) more than 550 gallons/acre/day

Figure 9: Advisory Sign at Impoundment Site



Advisory Signs

Advisory signs are posted on sites where reclaimed water is being used to notify the public (Figure 9). ADEQ regulations R-18-9-704 H. Table 1 (Appendix A) require signs in residential front yards, on school grounds, and on the backs of trucks dispersing reclaimed water. Tucson Water has additional sign requirements which are discussed on page 18.

Backflow Prevention Requirements

ADEQ regulations R18-4-215 (Appendix B) require Tucson Water to have a backflow prevention program to protect the public water system from contamination caused by backflow through unprotected cross-connections. The program must require the installation and periodic testing of approved backflow prevention assemblies (BPA). The regulations require the installation of backflow prevention assemblies on Tucson Water potable services when sites have an auxiliary water supply, e.g. reclaimed water. BPA's must be tested at least annually by testers certified by ADEQ-approved agencies.

Arizona Department of Water Resources

The Arizona Department of Water Resources (ADWR) regulates the City's reclaimed water system through the Tucson Active Management Area (TAMA) Management Plan which includes regulations for the quantities of reclaimed water that can be applied to golf courses and through permits, including: underground storage facility permits, water storage permits, and recovery well permits.

Recharge

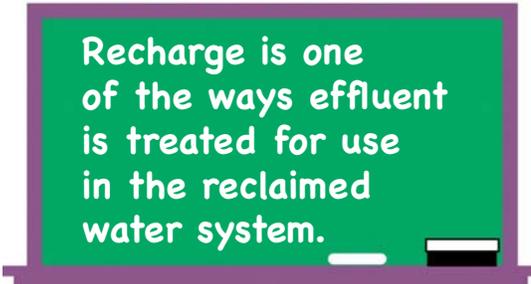
A constructed underground storage facility recharges water to be stored in an aquifer by using some type of constructed device, such as an injection well or percolation basin. Constructed facilities accrue credits for 100% of the water that is recharged. When credits are recovered on an annual basis, the full 100 percent of the volume recharged is available for recovery. Recovery of long-term storage credits results in 5% being deducted from the available recovery volume as a "cut" to the aquifer.

A managed underground storage facility allows for water discharged to a naturally water-transmissive area, such as a streambed that allows the water to percolate into the aquifer without the assistance of a constructed device. Managed underground storage facilities accrue credits for 50 percent of the water that is recharged. The same recovery restrictions for constructed facilities apply to managed facilities.

Groundwater Savings Projects

ADWR is also responsible for the groundwater savings programs in which approved facilities may replace groundwater use with reclaimed water use on a one-for-one basis. For each acre-foot of groundwater that is replaced with reclaimed water, a stored water credit is earned by the provider of the reclaimed water. This credit can be used to pump groundwater in the future and has a value that can be used towards offsetting the increased price of reclaimed water compared to groundwater. Groundwater savings programs could be a valuable tool in getting groundwater users to convert to reclaimed water; however, ADWR's position has been that groundwater users that have reclaimed water service readily available to them are not eligible.

Reclaimed 101:



Recharge is one of the ways effluent is treated for use in the reclaimed water system.

City of Tucson

Mayor and Council Water Policies

The Mayor and Council have adopted general policies governing the operation of the water and reclaimed water systems (Mayor and Council Water Policies). Policies relating to uses of reclaimed water are included in the Mayor and Council water policies:

- New turf facilities and golf course development shall use effluent or reclaimed water for irrigation purposes.
- The substitution of effluent and reclaimed water for potable source waters is an important element in achieving safe yield in the Tucson basin.

Extension of the Reclaimed System

Unless otherwise determined by special agreement adopted by the Mayor and Council, it is the City's policy that it is the responsibility of the customer/developer to extend reclaimed mains from Tucson Water's system to the property where service is desired. The customer is responsible for the purchase of the reclaimed water meter and all on-site work required for the delivery of reclaimed water.

Uniform Plumbing Code

Use and Labeling of Reclaimed Water

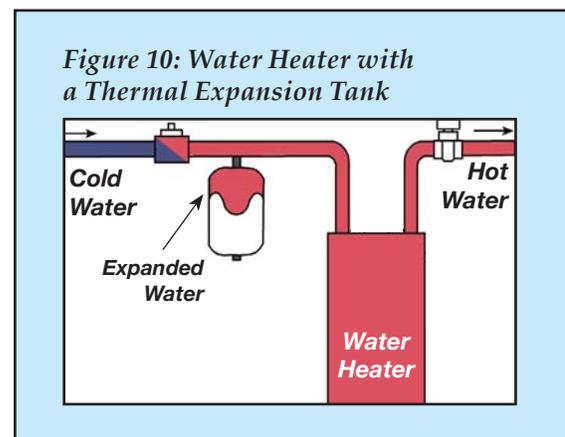
The 2006 Uniform Plumbing Code (UPC) and any modifications made by the City is adopted by the Mayor and Council (Appendix C). It addresses the use of reclaimed water for use in non-residential buildings and establishes the requirements for indoor plumbing where reclaimed water is being used, including annual cross-connection testing and advisory signs at all fixtures dispensing or containing reclaimed water.

The 2006 UPC prohibits the interior use of reclaimed water in residential structures.

The 2006 UPC states that no device, hose, pipe, meter, valve, etc. that has been used with reclaimed water shall be attached to the potable water system. No tank, pump, pipe, hose or device used for the distribution or storage of reclaimed water shall be used in a potable water system.

Thermal Expansion Protection

The installation of a BPA for service protection creates a closed system. When there is a closed system, the UPC requires installation of a thermal expansion tank (Figure 10) or other means to relieve excess pressure on internal plumbing when a mechanism to heat water is present.



Without thermal protection, increased pressure on internal plumbing can result in serious consequences such as a ruptured or distorted hot water heating tank or a collapsed flue within the tank which can lead to the release of toxic gases, such as carbon monoxide

Tucson Water

Advisory Signs

Tucson Water requires an advisory sign at the primary entrance to each direct reuse site. The need for additional signs is determined on a case by case basis by the Tucson Water CCC Specialist. Typically, signs are placed at the following additional locations: 1) water impoundments, 2) entrance to maintenance areas and secondary public entrances, and 3) pump stations, reservoirs, and other equipment.

Tucson Water provides the original signs at no charge to the customer. Replacement signs and signs for site expansions must be purchased from Tucson Water. Examples of the types of signs used on sites served by Tucson Water are shown in Figure 11.

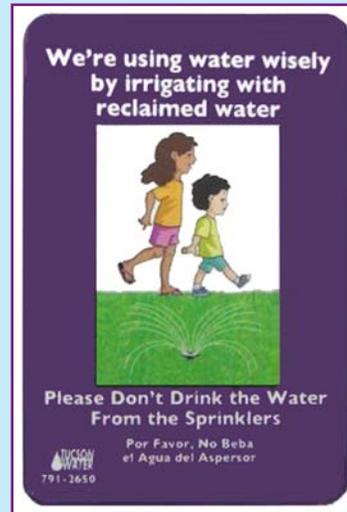
Backflow Prevention

Backflow Prevention Assemblies for the Potable Water System

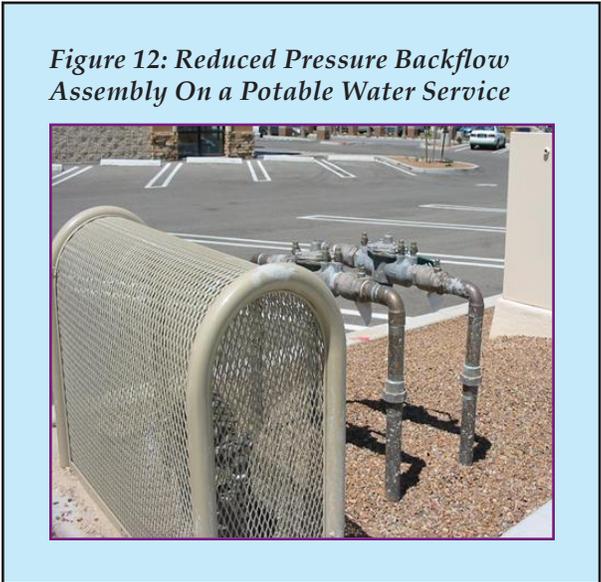
Three backflow prevention methods for potable water systems that serve a reclaimed water site are approved by Tucson Water:

- Air Gap (AG) - An air gap (Appendix D) is a physical separation between the free flow discharge end of a potable water supply pipeline and an open non-pressurized receiving vessel. The air gap must be at least double the diameter of the supply pipe measured vertically above the overflow rim of the vessel and shall in no case be less than 1 inch. An air gap must be used for any potable makeup water supplying a reclaimed water system.
- Reduced Pressure Principle Assembly (RP) - An RP assembly (Appendix D) contains two independently acting approved check valves together with a hydraulically operating, mechanically independent pressure differential relief valve located between the check valves. The unit shall include properly located resilient seated test cocks and tightly closing resilient seated shut off valves at each end of the assembly. An RP assembly (Figure 12) is used to protect the potable water system from any inadvertent high hazard cross-connections.

Figure 11: Examples of Reclaimed Water Advisory Signs



- Double Check Valve Assembly (DCVA)- A DCVA (Appendix D) contains two independently acting approved check valves. The unit shall include properly located resilient seated test cocks and tightly closing resilient seated shut off valves at each end of the assembly. DCVA's can be used on fire protection systems to protect against pollution hazards. A DCVA is used for protection on potable Class I, II and III fire protection systems, Class IV, V, and VI would require the installation of a RP assembly.



Testing BPAs on Tucson Water's Potable System

BPAs must be tested at least annually. Testing must be done by a backflow tester registered to test in the Tucson Water service area. Test results must be submitted online to Tucson Water via the iBAK system.

Location of Backflow Prevention Assemblies

The BPAs must be installed in accordance with Tucson Water Standard Detail SD-1800, 1802, 1805. (Appendix D)

Backflow Prevention Assemblies for Reclaimed Water Services

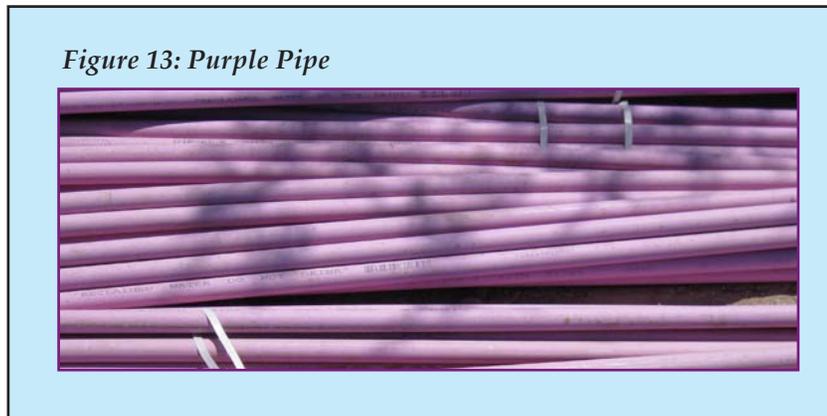
Backflow protection is required on the reclaimed water service when chemicals are added to the reclaimed water supply. BPAs that are installed on a reclaimed water system must be tested annually by a backflow tester registered to test in the Tucson Water service area. Testing must be done with a test gauge that is dedicated for use on reclaimed water system backflow assemblies only. Test results must be submitted online to Tucson Water.

Reclaimed 101:

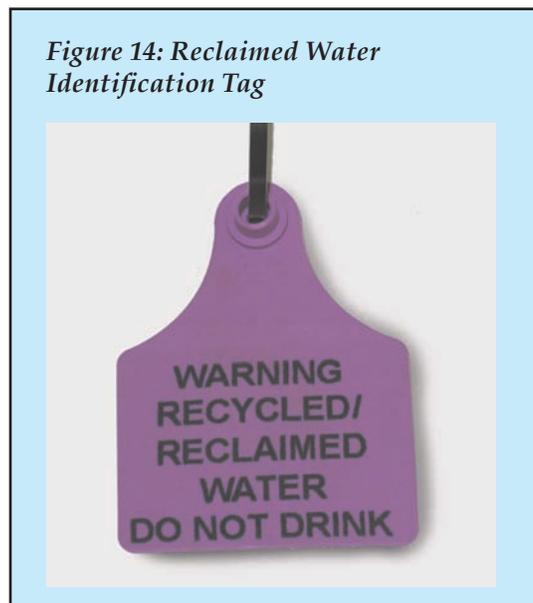
BPA and site inspection test results must be submitted within five days of the test.

Identifying Reclaimed Water Pipe and System Appurtenances

All pipes and other reclaimed water system appurtenances must be identified:



- Pipe (existing) - below ground piping need not be marked until it is exposed for any reason, then, it must be replaced with integral purple pipe or wrapped with purple tape or purple sleeve. All above grade pipe must be integral purple or painted purple.
- Pipe (new) - (Figure 13) integral purple with black lettering stamped on pipe “RECLAIMED WATER – DO NOT DRINK”
- Quick coupling valves (new) - purple rubber or vinyl covers with “RECLAIMED WATER” imprinted on the cover
- Quick coupling valves (existing) - identification tag (Figure 14) and installed in a marked valve box
- Remote control valves (new and existing) - identification tags (Figure 14) on valve stems



- Reclaimed water meters – painted purple with an identification tag
- Reclaimed water meter boxes (existing) - lid and inside of box painted purple, identification tag inside
- Backflow prevention assemblies on reclaimed system - painted purple.
- Reclaimed meter boxes (new) - integral purple lid and box with “Reclaimed Water” imprinted on lid

Figure 15: Reclaimed Water Surge Tank



- Reclaimed water surge tank (shock absorber) - painted purple and conspicuously marked with “RECLAIMED WATER – DO NOT DRINK” in black letters two-inches high (Figure 15)
- Valve boxes (new) - purple, integral to box and lid
- Valve boxes (existing) - lid painted purple, identification tag inside

Pipe Separation

Potable and non-potable waterlines must be separated in accordance with Tucson Water Standard Details 106 and 108. Tucson Water prefers a ductile iron pipe sleeve in place of

concrete encasement for continuously pressurized lines. Non-continuously pressurized lines may be sleeved with Schedule 40 PVC pipe. Contact Tucson Water regarding specific requirements.

Prohibited Appurtenances on Reclaimed Water Systems

- Hose bibs, except those that are “grandfathered”, are prohibited on the reclaimed water system.
- Quick couplers on the potable water system at sites having reclaimed water service

Reclaimed 101:

Hose bibs are not allowed on a reclaimed water system.



Chapter 2

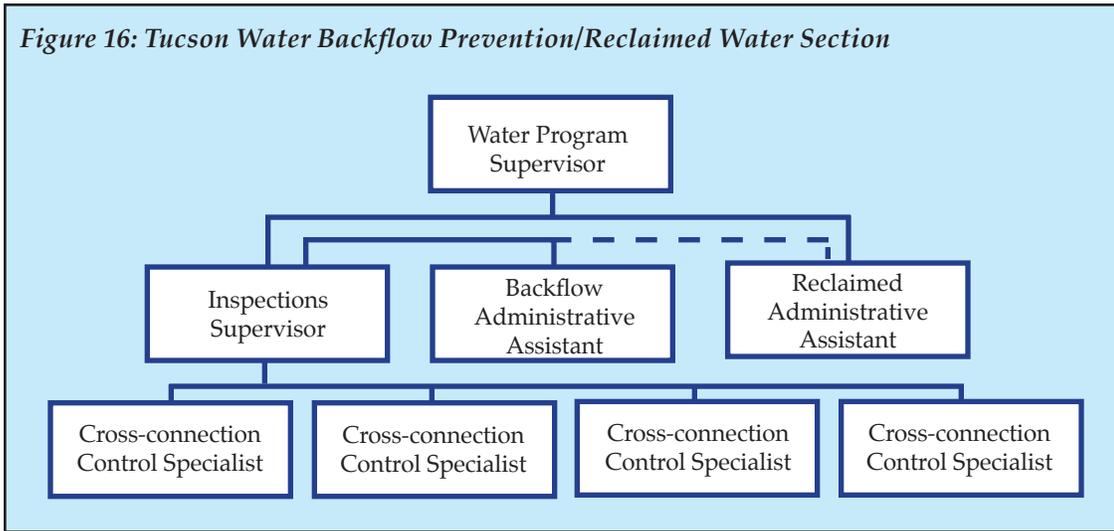
Tucson Water's Responsibilities

Tucson Water is a municipally-owned and operated utility. The Mayor and Council of the City of Tucson adopt the policies that govern the operation of Tucson Water and also adopt the water rates. Tucson Water serves customers who live in the City of Tucson and in the Town of South Tucson, as well as customers in some parts of unincorporated Pima County and the Town of Marana.

Tucson Water has 500 employees. The Director, who reports to the City Manager, is responsible for the day-to-day operations of the Utility. The Backflow Prevention/Reclaimed Water Section is part of the Department's Planning and Engineering Division and has eight employees including four Cross-connection Control Specialists (CCC Specialist) and an Inspections Supervisor (Figure 16).

Tucson Water is responsible for designing, constructing, operating, and maintaining the public reclaimed water system which consists of treatment facilities (a filtration plant and recharge and recovery facilities), pipelines, reservoirs, and booster pumps. On occasion, a developer or individual customer will design and construct a portion of the public reclaimed water system in accordance with Tucson Water standards and dedicate the system to the utility as a condition of reclaimed water service.

Figure 16: Tucson Water Backflow Prevention/Reclaimed Water Section



Tucson Water, as the holder of the ADEQ permit to operate a reclaimed water system, is responsible for ensuring that all reclaimed water use is in compliance with the regulations. One of the ways that Tucson Water ensures the safe use of reclaimed water is to partner with the customer. Tucson Water and the customer work together throughout the process of preparing the customer’s site for reclaimed water service.

Reclaimed Water Service

The process for the customer to obtain reclaimed water service begins at the Tucson Water New Services Counter.

Availability of Reclaimed Water Service

The customer meets with a Tucson Water representative who determines whether reclaimed water is available at the customer’s site. If service is not available, the Tucson Water representative will advise the customer of Tucson Water’s policy for extension of mains.

If water service is available, the representative will provide the customer with a “Reclaimed

Figure 17: Residential Reclaimed Water Use- Tucson Country Club Estates



Water Information Packet” and suggest that they contact a Tucson Water Cross-connection Control Specialist to schedule a pre-application site visit.

Application for Reclaimed Water Service

The administrative part of obtaining reclaimed water service requires the customer to:

- Complete the Application for a reclaimed water meter and pay for the meter
- Complete the Application for Use of Reclaimed Water (Appendix E)
- Sign the Reclaimed Water User Agreement (Appendix F)
- Purchase a Backflow Prevention Assembly Installation Permit if there is not already a backflow assembly on the potable water service
- Sign an Acknowledgement of Receipt for the reclaimed water information packet

Site Inspections

Tucson Water conducts one required site inspection as well as additional customer requested inspections prior to the initiation of reclaimed water service.

Customer Requested Inspections

The customer may request a site visit or if there is a question about the proposed use of reclaimed water, the Tucson Water CCC Specialist will visit

the site. A water use survey to determine if reclaimed water can be used safely and in compliance with all ADEQ, City of Tucson, and Tucson Water rules is conducted. During the visit, the CCC Specialist will pay close attention to the site's compliance with current plumbing codes, backflow prevention regulations and cross-connection control issues as they relate to the delivery of reclaimed water.

The CCC Specialist will provide the customer with a list of all requirements that must be met before the site can receive final approval for reclaimed water service.

Figure 18: Dye Testing Drip Irrigation System



The customer may request additional site visits. These additional visits might have any of the following purposes:

- To verify that all of the requirements and recommendations identified in the initial site visit have been addressed.
- To conduct a pre-construction meeting to inform all personnel involved with the site (property owners, on site personnel, contractors and all authorities having jurisdiction) of the requirements and recommendations identified in the initial site visit.
- To inspect during construction/retrofit process for pipe identification, pipe crossings, and general construction requirements including the installation of any new piping.

Final Site Inspection

The customer contacts Tucson Water when their site is ready for the final inspection. Upon receipt of all permits and backflow assembly tests, Tucson Water will schedule a date for the final site inspection which includes a site inspection and a separation of systems test. During the final site inspection, the Tucson Water CCC Specialist will verify that the site meets the regulatory requirements of ADEQ and Tucson Water, including: verification that compliance issues and recommendations made during customer requested visits have been addressed, the reclaimed water system and appurtenances are identified, signs are correctly located, and the conceptual site plan is readily available on-site. GPS readings of the site's location will be taken by the CCC Specialist.

Figure 19: Dye Test Jumper Assembly



Separation of Systems Test

There are several ways of ensuring that the potable and reclaimed water systems are completely separated and that no cross-connections exist. Visual inspection, pressure testing, and dye testing (Figure 18) can each, when used appropriately, be used to identify cross-connections. For sites that are converting existing plumbing and irrigation systems to reclaimed water and for all schools and parks, Tucson Water uses a dye test to ensure that the systems are totally separate. For sites with new plumbing that Tucson Water has inspected during its installation, a pressure test may be used. All dye tests are conducted by Tucson Water CCC Specialists.

Dye Test Procedure

A Tucson Water CCC Specialist will conduct a dye test following the steps below:

1. Check all site and as-built plans for any existing on-site piping as well as any public water mains on-site. The CCC Specialist will verify any questionable water mains to ensure no unknown connections are present.
2. Verify that potable water is available to use for the separation of systems testing and that it is protected by an approved backflow prevention assembly
3. The CCC Specialist will instruct site personnel/ contractor to shutdown the potable water service and drain all residual pressure.
4. The reclaimed water system will be charged with potable water and dye (Figure 19).
5. All irrigation stations will be turned on, one at a time, to determine whether reclaimed water is being applied in a safe manner. At the same time, all potable water outlets will be checked for pressure and the presence of dyed water. If there are cross-connections, over-spray, ponding or off-site discharge, the CCC Specialist will stop the test and advise the customer that the problem must be corrected before the test can proceed. If there are no cross-connections, over-spray, ponding or off-site discharge, the test will proceed to the next step.
6. The reclaimed water system will be shut down and drained of all pressure and the potable water system will be turned on. All irrigation stations will be turned on one at a time to check for water flow which, if present, indicates a cross-connection. If there are no cross-connections, the testing is complete.
7. After the successful completion of the dye test, all potable water supply connections to the reclaimed water system, except air-gap separations, are permanently severed. After final approval from the CCC Specialist, the reclaimed water meter is unlocked and turned on, ready for final connection by the customer.



