



A
TRAINING MANUAL
FOR

Reclaimed Water Site Testers



*City of Tucson
Tucson Water Department*



A Training Manual for Reclaimed Water Site Testers

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 that are registered to test in the Tucson Water Service Area, and Golf Course Managers in the Tucson Water Service Area irrigating with reclaimed water.

The Reclaimed Water Site Tester class is designed to strengthen the Tucson Water, reclaimed water site customer, and the Reclaimed Water Site Tester partnership as we work together to ensure that sites with reclaimed water are always in compliance. 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 six sections: 1) introduction to Tucson Water's reclaimed water system and reclaimed water regulations, 2) the responsibilities of Tucson Water, 3) the responsibilities of the reclaimed water site customer, 4) the responsibilities of the Reclaimed Water Site Tester, 5) the training required for reclaimed water site testers, and 6) reclaimed water site tester examination.

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

CONTENTS

Acknowledgments	1
Purpose	2
Figures	5
Appendices	6
Definitions	7

Chapter 1: TUCSON'S RECLAIMED WATER SYSTEM

Description of Reclaimed Water System.....	11
Tucson's Reclaimed Water Customer Characteristics	13
Reclaimed Water Quality.....	14
Reclaimed Water System Permitting and Regulatory Requirements	14
Arizona Department of Environmental Quality.....	15
Permits	15
Water Quality.....	15
Off-site Discharges of Reclaimed Water	15
System Design and Operating Requirements	16
Advisory Signs.....	16
Backflow Prevention Requirements	16
Arizona Department of Water Resources	17
Recharge	17
Groundwater Savings Projects.....	17
City of Tucson.....	18
Mayor and Council Water Policies	18
Extension of Reclaimed System	18
Uniform Plumbing Code.....	18
Use and Labeling of Reclaimed Water	18
Thermal Expansion Protection.....	18
Tucson Water	19
Advisory Signs.....	19
Backflow Prevention.....	19
Backflow Prevention Assemblies for the Potable Water System	19
Testing BPA on Tucson Water's Potable System	20
Location of BPAs.....	20
BPAs for Reclaimed Water Services	20
Identifying Reclaimed Water Pipe and System Appurtenances	21
Pipe Separation	22
Prohibited Appurtenances on Reclaimed Water Systems.....	22

CONTENTS (continued)

Chapter 2: TUCSON WATER'S RESPONSIBILITIES

Reclaimed Water Service.....	24
Availability of Reclaimed Water Service	24
Application for Reclaimed Water Service	25
Site Inspections	25
Customer Requested Inspections	25
Final Site Inspection	26
Separation of Systems Test.....	26
Dye Test Procedure.....	27

Chapter 3: RESPONSIBILITIES OF THE RECLAIMED WATER CUSTOMER

Site Design and Identification of Reclaimed Water System.....	30
Operation of Reclaimed Water Site	30
System Operation.....	31
Reporting Discharges.....	31
Maintenance of Reclaimed Water Site	31
Backflow Prevention and Cross-connection Control.....	31
System Modifications	31
Self Inspection	31
Record Maintenance	32

Chapter 4: RECLAIMED WATER SITE TESTER'S RESPONSIBILITIES

Working Safely with Reclaimed Water	34
N.I.I.O. for Reclaimed Water Site Inspections	34
Site Inspection.....	35
Pressure Testing.....	36
Pressure Test - Part I.....	36
Pressure Test - Part II.....	37
Cross-connection Control Procedures.....	38
Reporting Off-site Discharges of Reclaimed Water	39
Reporting Reclaimed Water Site Inspection and Pressure Test Results.....	39
Customer Service	39

Chapter 5: REQUIRED TRAINING FOR RECLAIMED WATER SITE TESTERS

Pre-requisites for Reclaimed Water Site Tester Training.....	41
Classroom and Field Training.....	41
Recertification Requirements.....	41

Chapter 6: RECLAIMED WATER SITE TESTER EXAMINATION QUESTIONS

Sample Questions for Site Tester Examination	43
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Figures

Figure 1	Tucson Metropolitan Effluent Allocations
Figure 2	Existing Tucson Water Reclaimed Water System
Figure 3	Reclaimed Water Production
Figure 4	Reclaimed Water Recharge and Recovery
Figure 5	Reclaimed Water use at Reid Park Zoo
Figure 6	Reclaimed Water Deliveries – Calendar Year 2011
Figure 7	Randolph North Golf Course
Figure 8	Reclaimed Water Quality 2008 Tucson Water
Figure 9	Reclaimed Water Impoundment Advisory Sign
Figure 10	Thermal Expansion
Figure 11	Reclaimed Water Advisory Signs
Figure 12	Reduced Pressure Backflow Assembly
Figure 13	Purple Pipes
Figure 14	Reclaimed Water Identification Tags
Figure 15	Reclaimed Water Surge Tank
Figure 16	Tucson Water Backflow Prevention/Reclaimed Water Section
Figure 17	Reclaimed Water Residential Application -Tucson Country Club Estates
Figure 18	Dye Testing Drip Irrigation System
Figure 19	Dye Test Jumper Assembly
Figure 20	Conceptual Site Map
Figure 21	Reclaimed Water off Site Discharge
Figure 22	Reclaimed Water Customer Information Display

Appendices

- A** AZ Revised Statutes R18-9-6 Reclaimed Water Conveyances
AZ Revised Statutes R18-9-7 Direct Reuse of Reclaimed Water
AZ Revised Statutes R18-11-3 Reclaimed Water Quality Standards
- B** AZ Revised Statutes R18-4-215 Backflow Prevention
- C** Uniform Plumbing Code Reclaimed Water Systems, UPC 2009
- D** Tucson Water Standard Details 1800, 1802, and 1805 - Air Gap, RP & DC
Assembly Installation
- E** Application for the Use of Reclaimed Water
- F** Reclaimed Water User Agreement
- G** Site Compliance Report
- H** Site Plan
- I** Reporting Reclaimed Water Discharges
- J** Customer Self-Inspection Checklist
- K** Site Tester's Reclaimed Water Site Inspection Checklist
- L** Guidelines for Working with Reclaimed Water
- M** Private Reclaimed Water System Labeling Requirements
- N** Reclaimed Water Site Test and Maintenance Report
- O** Frequently Asked Questions
- P** City Backflow Ordinance
- Q** Standard Detail 106
- R** Standard Detail 108

DEFINITIONS

ADEQ – Arizona Department of Environmental Quality

ADWR- Arizona Department of Water Resources

Appurtenances – 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, rainwater, or gray water

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

BPA - backflow prevention assembly

Cross-connection Control Specialist (CCC-Specialist) – a backflow prevention tester who has successfully completed 40 hours of intensive cross-connection training given by an entity recognized by ADEQ. ADEQ regulations 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 use of reclaimed water

iBAK system - website where backflow test results and reclaimed water site test results are submitted to Tucson Water by certified testers

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 in a puddle 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

Reclaimed Water User Agreement - a contract between Tucson Water and the reclaimed water site responsible party

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





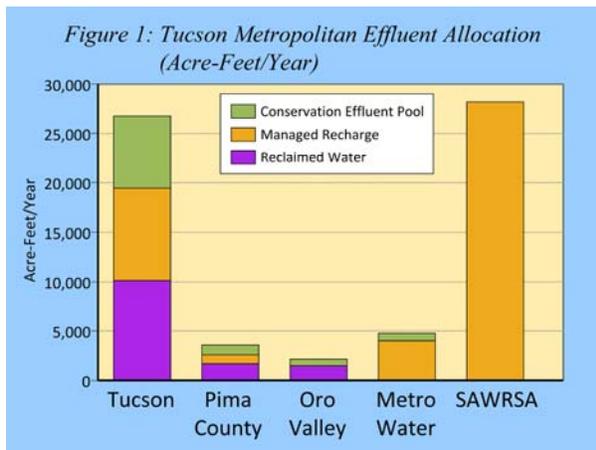
Chapter 1

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 of groundwater supplies. 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 replenished to delivering CAP water for more than 80 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 in Tucson 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 community supply that continues to grow as the population increases. Therefore, reclaimed water plays an increasingly important role in the water supply picture to offset potable water use. As part of its long-range water supply plan, the City has committed to the increasing use of effluent for non-potable and possible 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 more than 735,000 people which is about 61 percent of the metropolitan population. In 2011, the utility delivered approximately 100,000 acre-feet of potable water and 14,000 acre-feet of reclaimed water.

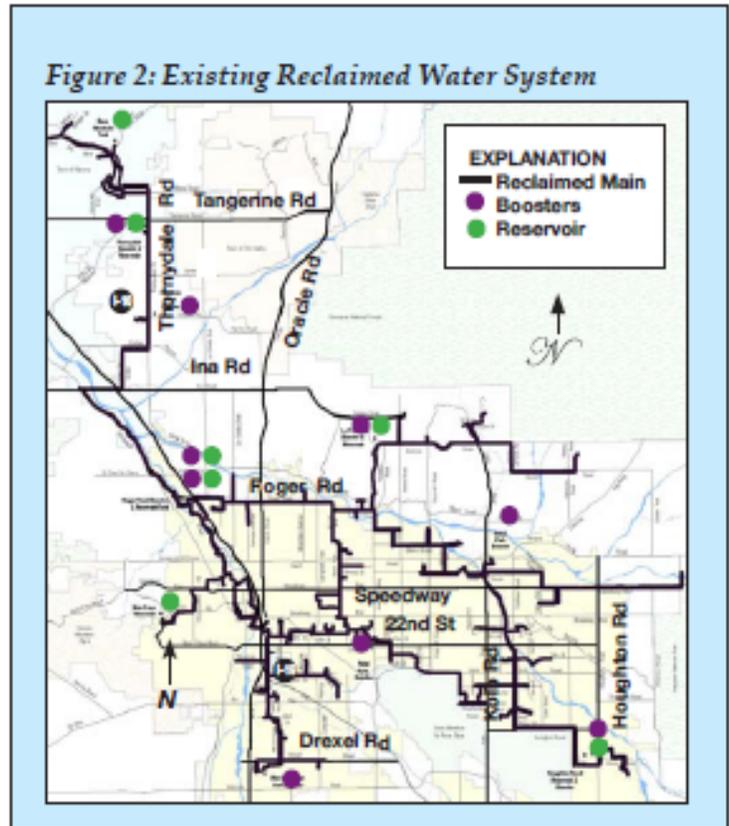
County owns and operates the regional wastewater collection system and treatment facilities. The effluent is allocated among various entities based on local intergovernmental agreements and the Southern Arizona Water Rights Settlement Act (SAWRSA). SAWRSA is entitled to approximately 28,200 acre feet of effluent. After SAWRSA takes its entitlement, the remaining volume is split among various agencies.

The 1979 Intergovernmental Agreement that transferred the City of Tucson’s sewer system to Pima County, allocates 90 percent of the remaining effluent generated from the metropolitan wastewater treatment facilities to the City of Tucson and 10 percent to Pima County. Tucson Water 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 2011 effluent volumes.

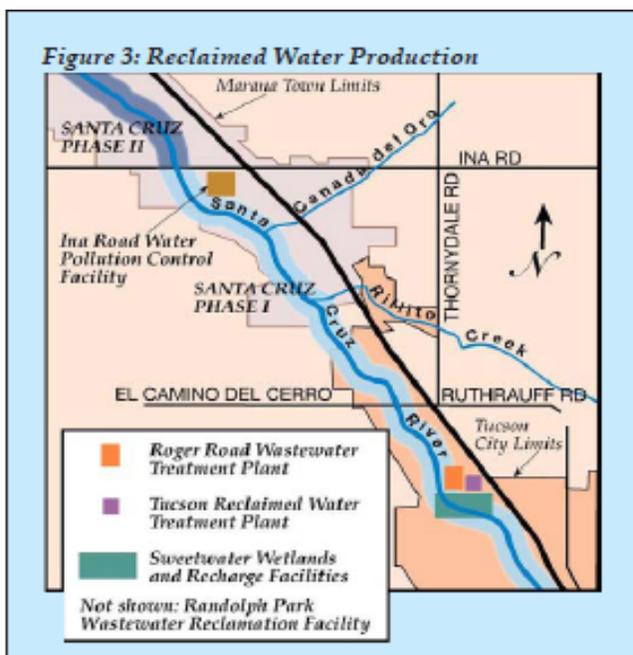
In 2011, about 64,000 acre-feet of effluent was produced in the metropolitan area. The City of Tucson owns approximately half of this effluent and uses about 40 percent of its entitlement in the reclaimed water system. The remainder is used to irrigate a city-owned golf course or is discharged into the Santa Cruz River, where it recharges the aquifer.

Description of Tucson's Reclaimed Water System

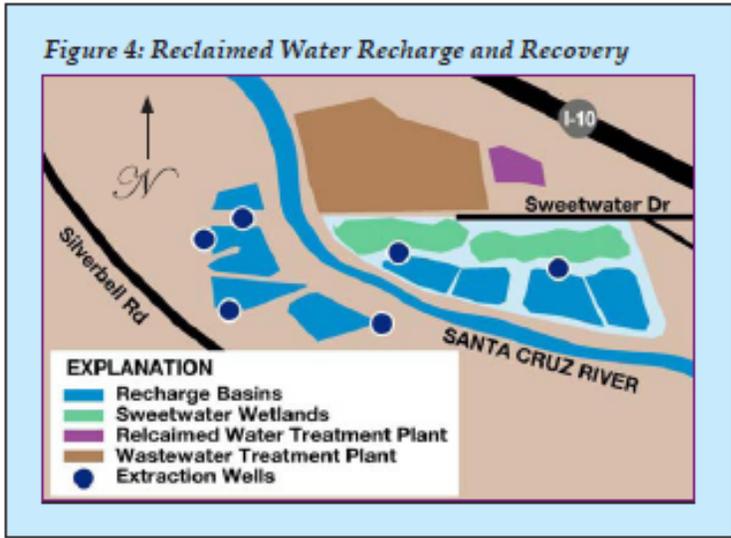
Since the first customer (a golf course located at the end of a 10-mile pipeline) received reclaimed water in 1984, more than 160 miles of transmission main pipe and 15 million gallons of surface storage have been added to the system. (Figure 2) The average day delivery is 15.4 million gallons and the summer peak day delivery is approximately 31 million gallons. Unlike the potable water system that has a peak day of 1.65 times the average day, the reclaimed system's peak day is 2.3 times the average day. The high peaking factor on the reclaimed system reflects the usage patterns of the irrigation customers; high usage during the hot months, low usage during the cool months. This pattern is also seen to a lesser extent on the potable system. In 2007, reclaimed water use accounted for 16.5 gallons per person per day (GPCD) that would otherwise have been potable water use.



Reclaimed water in Tucson is produced in four ways (Figure 3): at a filtration plant for secondary effluent, at a tertiary wastewater treatment plant, through recharge & recovery and also managed in-stream recovery via an extraction well (EW- 007). 1) The filtration plant further treats secondary effluent from the County's Roger Road wastewater plant and is permitted to produce up to 10 MGD. 2) The tertiary wastewater treatment plant located in Randolph Park, also owned by the County, treats about 2.5 MGD of raw wastewater to reclaimed water standards. This water is delivered directly into the reclaimed water system.



3) 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 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.



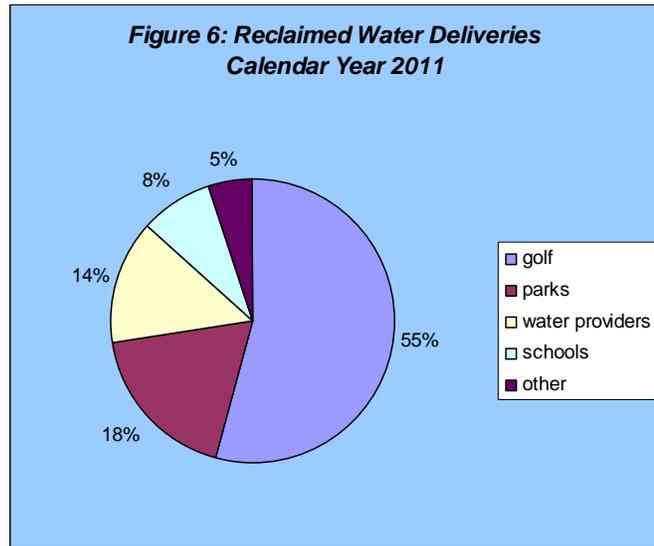
4) The Santa Cruz River Managed Underground Storage Facility is a “managed in-channel” project. (Figure 4) Secondary effluent produced at the County’s wastewater treatment plants is discharged into the river and ADWR calculates the “stored water credits’ that are earned. These credits are then used to recover effluent from EW-007 which delivers water into the reclaimed system.

The recovered water from the recharge facilities at the Managed Underground Storage Facility is of very good quality, less than one NTU turbidity with nitrogen levels below the 10mg/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 28mg/L range. The recharge and recovery operation provides further treatment called Soil Aquifer Treatment, which filters and de-nitrifies effluent to a higher quality water supply. 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.



Tucson's Reclaimed Water Customer Characteristics

In 2011, the utility delivered approximately 15,203 acre-feet of reclaimed water to more than 900 customers. As shown in Figure 6, 55 percent of this water was delivered to eighteen golf courses. Another 18 percent was delivered to 39 parks. (Figure 5) The remainder was delivered to schools (8 percent), other water providers (14 percent) and more than 700 single family homes, agriculture, commercial and multi-family (5 percent).



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.

Figure 7: Randolph North Golf Course, a City-owned Facility Using Reclaimed Water



There are a total of 39 golf courses (Figure 7) 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, 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. (ADWR) 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: Reclaimed Water Quality 2011	
Parameter	Reclaimed Water (1)
Inorganic Constituents (mg/L)	
Alkalinity (as CaCO ₃)	221.00
Arsenic	0.01
Boron	0.30
Cadmium (2)	<0.0025
Calcium	86.00
Chloride	146.00
Copper (2)	<0.025
Hardness (as CaCO ₃)	279.00
Magnesium	15.50
Phosphate (as P)	1.70
Sodium	151.00
Sulfate	164.00
Nitrogen Forms (mg/L)	
Ammonia Nitrogen	11.00
Nitrate (as N)	3.70
Nitrite (as N)	0.61
Organic Nitrogen (calc)	1.70
Total (calc)	17.06
Reuse Permit	
Turbidity	2.29
E. Coli (2)	1.00
pH	7.50
Other	
Total Dissolved Solids	761.00
Electrical Conductivity	1279.00
Residual Sodium Carbonate	-1.15
Sodium Adsorption Ratio (SAR)	3.94

(1) Annual Average. Source: Tucson Water's Water Quality Laboratory.

(2) Average is less than the detection limit.

Reclaimed Water Quality

The reclaimed water Tucson Water provides to customers is classified by the Arizona Department of Environmental Quality (ADEQ) as Class A water. Figure 8 provides the 2011 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 an unauthorized 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. Tucson Water customers will only need to sign a current Reclaimed Water User Agreement.

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 the use of 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/l 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 to Tucson Water. Customers and the public are encouraged to call (520) 791-2650 or use the electronic reporting form on the Tucson Water website at www.tucsonaz.gov/water/report_recl.htm.



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 runoff 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



Advisory Signs

Public Advisory signs are initially issued without charge to customers so that they may be posted on sites where reclaimed water is being used. (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 19.

Backflow Prevention Requirements

ADEQ regulations R18-4-215 (Appendix B) and City of Tucson Ordinance 9976 (Appendix P) requires 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. BPAs 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:

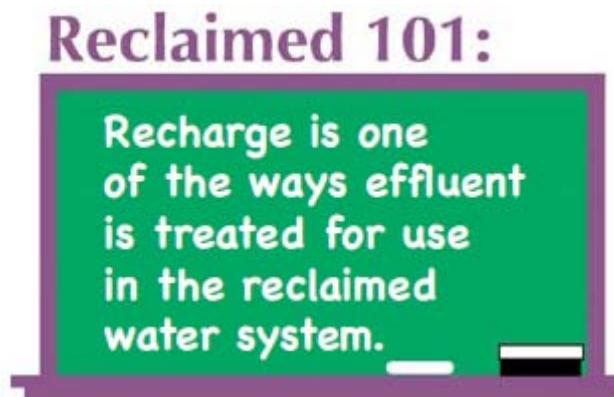
- regulations for the quantities of reclaimed water that can be applied to golf courses
- permits, including: underground storage facility permits, water storage permits, and recovery well permits

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 recycled water that is recharged. When credits are recovered, the full 100 percent of the volume recharged is available for recovery. 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.

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 for this stored water credit.



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 and regulatory compliance.

Uniform Plumbing Code

Use and Labeling of Reclaimed Water

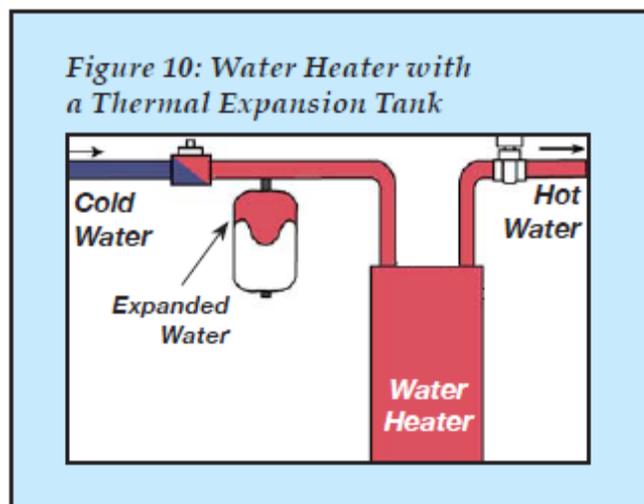
The 2006 Uniform Plumbing Code (UPC) and any modifications made by the City are adopted by the Mayor and Council (Appendix C). It addresses the use of reclaimed water for use in non-residential buildings and establishes the requirements for indoor plumbing where reclaimed water is being used, including 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 cross-connection control 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.

Figure 11: Examples of Reclaimed Water Advisory Signs



Backflow Prevention

Backflow Prevention Assemblies for the Potable Water System

The installation of a backflow assembly for service protection is to minimize any possibility of contamination of the potable water system if a reclaimed line is inadvertently connected to the customer's potable piping. The three backflow prevention methods for potable water systems that serve a reclaimed water site that are approved by Tucson Water are:

- 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 equal to 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 below) is used to protect the potable water system from any inadvertent high hazard cross-connections.

- 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. DCVAs 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 system, class IV and above would require the installation of a RP assembly.

Figure 12: Reduced Pressure Backflow Assembly On a Potable Water Service



Testing BPA's 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

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 via the iBAK system.

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 or marked. (Marked refers to the purple color identifier). This color system is required by the Uniform Plumbing Code (UPC).



- 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 and installed in a marked valve box
- Remote control valves (new and existing) - identification tags (Figure 14) on valve stems



- Identification tags are provided by Tucson Water
- Reclaimed meters – painted purple with an identification tag
- Reclaimed meter box (new) - purple, integral to box and lid
- Reclaimed water meter box (existing) - lid painted purple, identification tag inside
- Backflow prevention assembly on reclaimed system - painted purple.
- Valve box (new) - purple, integral to box and lid
- Valve box (existing) - lid painted purple, identification tag inside
- Reclaimed water surge tank (shock absorber) (Figure 15) painted purple and conspicuously marked with “RECLAIMED WATER – DO NOT DRINK” in black letters two-inches high on a purple background

Pipe Separation

Potable and non-potable waterlines must be separated in accordance with Tucson Water Standard Details 106 and 108 (Appendix Q & R). 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 the Tucson Water Backflow office regarding specific requirements.

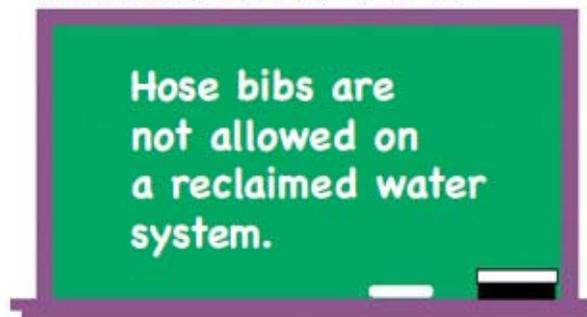
Figure 15: Reclaimed Water Surge Tank



Prohibited Appurtenances on Reclaimed Water Systems

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

Reclaimed 101:





Chapter 2

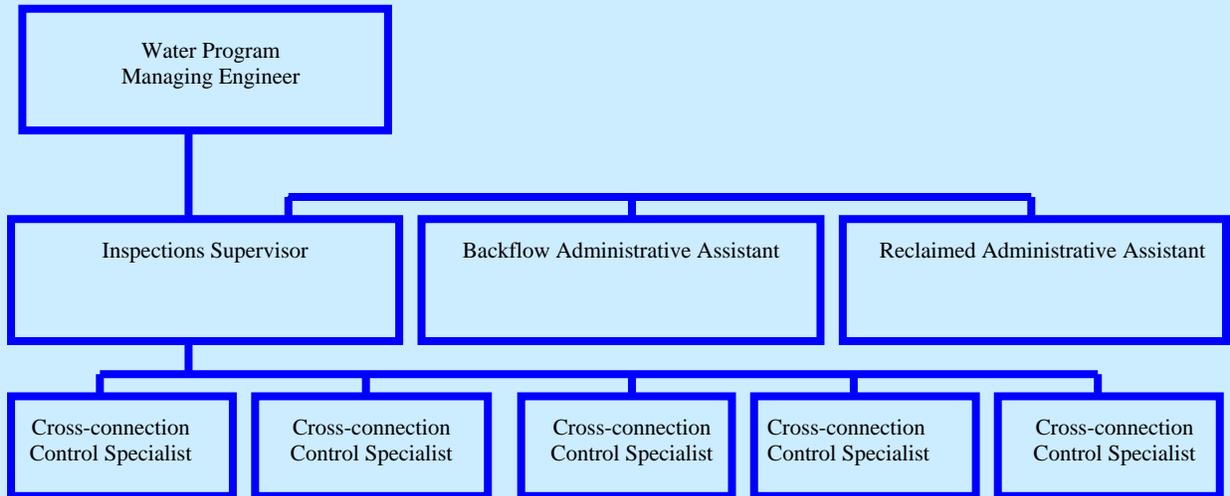
TUCSON WATER'S RESPONSIBILITIES

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 City of South Tucson, as well as customers in some parts of unincorporated Pima County and the Town of Marana.

Tucson Water has more than 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 (Figure 16) is part of the Department's Water Quality Division and has nine employees including five cross-connection control specialists and an inspections supervisor.

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 in exchange for 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.

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



If water service is available, the representative will provide the customer with a “Reclaimed Water Information Packet” and suggest that they contact a Tucson Water Cross-connection Control Specialist to schedule an initial site visit.

Application for Reclaimed Water Service

The administrative part of obtaining reclaimed water service consists of steps:

- 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 Installation Permit if there is not already a backflow assembly on the potable water service.
- Sign an acknowledgement of receipt, of the reclaimed water info packet. These forms are available online at www.tucsonaz.gov/water/info-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 an initial site inspection or if there is a question about the proposed use of reclaimed water, the Tucson Water Cross-connection Control Specialist (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 inspection, 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.

The customer may request additional inspections. These additional inspections 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 inspections 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.

Separation of Systems Test

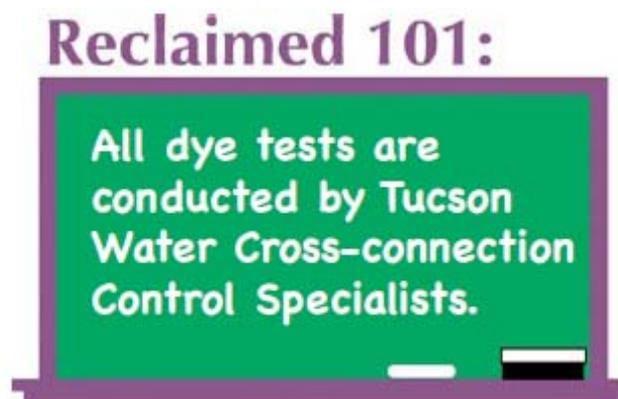
There are several ways of ensuring that the potable and reclaimed water systems are completely separated and that no cross-connections exist. Visual inspection, pressure testing and dye testing (Figure 18) can each, when used appropriately, be used to identify cross-connections. For sites that are converting 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.

Figure 19: Dye Test Jumper Assembly



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 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 above) The dye that is used is non toxic and is approved by the National Sanitation Foundation (NSF).
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 runoff, Tucson Water 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 runoff, 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 Tucson Water CCC Specialist, the reclaimed water meter is unlocked and turned on, ready for final connection by the customer.







Chapter 3

RESPONSIBILITIES OF THE RECLAIMED WATER CUSTOMER

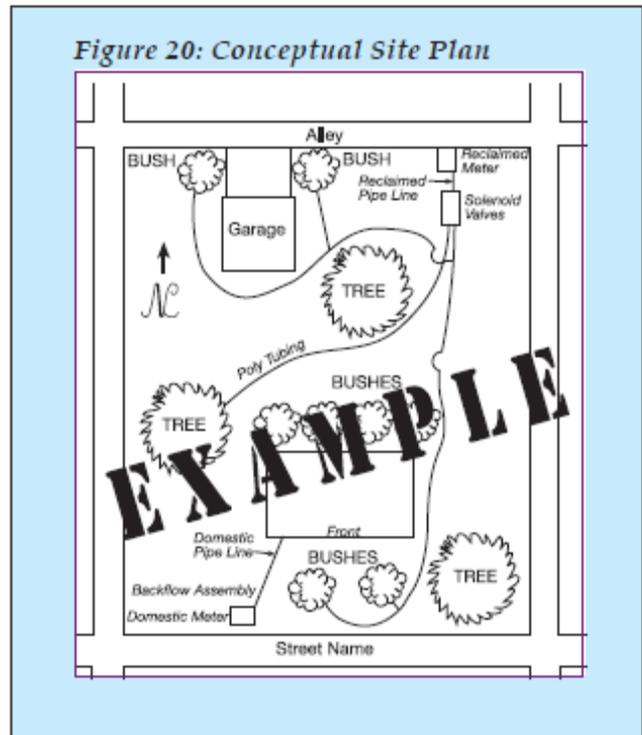
As a partner in ensuring that reclaimed water is used safely and in compliance with all State and local regulations, the customer plays an important role. The customer has many responsibilities related to the use of reclaimed water at their site. Primary customer responsibilities include: 1) site design and identification of reclaimed water system and appurtenances, 2) operation of the site, and 3) maintenance of the site.

These responsibilities are described in detail in the Reclaimed Water User Agreement (Appendix F) that every customer is required to sign as part of their application for reclaimed water service. This agreement is a contract between Tucson Water and the customer. If Tucson Water discovers that the reclaimed water customer is in violation of the User Agreement, then Tucson Water will issue the customer a Site Compliance Report describing the discrepancies, and the corrective action required to prevent the discontinuance of the reclaimed water service. (Appendix G)

Site Design and Identification of Reclaimed Water System

Reclaimed water systems must be designed to comply with all State and local regulations in chapter 1. All on-site reclaimed water systems must be identified with purple color integral to the pipe and appurtenances, or purple paint, sleeves, or tags. The customer is responsible for maintaining advisory signs in good condition on the site.

A conceptual site plan (Figure 20 and Appendix H) showing the location of all reclaimed and potable water meters, pipelines and control boxes must be readily available at the reuse site. This plan must be updated if the potable or reclaimed water systems are modified.



Operation of the Reclaimed Water Site

Before reclaimed water service is initiated, the customer or their designee shall perform the following duties, including, but not limited to:

- Being available to Tucson Water upon request and having the authority to carry out any requirements of Tucson Water
- Being familiar with all state and local reclaimed water use regulations, basic concepts of backflow and cross-connection prevention, system testing, and emergency procedures
- Supervising the installation, operation, maintenance and modification of the on-site reclaimed water system
- Preventing potential hazards on the reclaimed and potable water systems and ensuring the facility is in compliance with all regulations
- Reporting to Tucson Water all failures, violations and emergencies that occur involving the reclaimed or potable water systems
- Training all personnel on procedures for working with reclaimed water
- Coordinating site inspections and submit reports to Tucson Water
- Maintaining all site records
- Yearly testing by certified personnel

System Operation

Reclaimed water systems must be operated to reasonably preclude human contact. Irrigation systems should be operated during hours when the public is not present. For schools, parks and other open access facilities, the irrigation window is generally from 10:30 p.m. to sunrise. For golf courses and cemeteries, irrigating should be done when the facilities are closed.

Duration of irrigation must be set to prevent ponding and runoff. Irrigation schedules should be modified in response to weather conditions, i.e., irrigation should be turned off when it is raining.

Reporting Discharges

It is the customer's responsibility to report all off-site discharges to Tucson Water. (Fig. 21) A report can be made online, at www.tucsonaz.gov/water/report_recl.htm (Appendix I). Failure to report off-site discharges could result in the termination of reclaimed water service.

Figure 21: Off-site Discharge



Maintenance of Reclaimed Water Site

Backflow Prevention and Cross-connection Control

All backflow prevention assemblies should be visually inspected for leaks and other malfunctions.

All reduced pressure assemblies (RPA) and double check valve assemblies (DCVA) must be tested annually by a Tucson Water-registered Backflow Assembly Tester. A list of registered testers is available at www.tucsonaz.gov/water/testers.

System Modifications

Reclaimed water system modifications must be in compliance with all state and local regulations. Tucson Water encourages customers to discuss potential system modifications with them prior to commencing work. Modification of reclaimed water systems must also be reported whenever a site inspection is done.

Self Inspection

A regular preventive maintenance program is essential for ensuring that the reclaimed water site remains in compliance with the regulations. The customer should inspect the site on a regular basis and immediately correct any problems or deficiencies that are identified. To assist customers in doing a comprehensive site inspection, Tucson Water provides a Reclaimed Water Customer Checklist in the annual Reclaimed Water Newsletter which is also available at www.tucsonaz.gov/water/recl_news. (Appendix J)

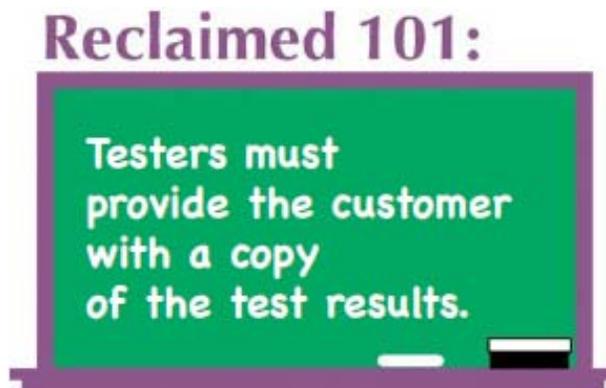
At a minimum, the customer should regularly inspect the following site features:

- the on-site reclaimed water system including sprinkler heads, spray patterns, lakes, piping and valves, pumps, storage facilities, controllers, etc.
- reclaimed water advisory signs for proper placement and legibility
- situations that could cause ponding, runoff and wind-blown spray

Record Maintenance

Record keeping is an important responsibility of the customer and should include records of the following:

- Reclaimed Water User Agreement
- Site plan
- Annual backflow assembly test reports
- Site inspection reports
- System maintenance records
- System modification records
- Record of discharges, verifications of reports to Tucson Water, and record of corrective actions
- Names of people with on-site responsibilities who received training





Chapter 4

RECLAIMED WATER SITE TESTER'S RESPONSIBILITIES

Tucson Water requires site inspections to be conducted periodically at various intervals ranging from one to five years depending on the use of the site with reclaimed water service. Sites with public use, e.g., parks and schools, must be inspected more often than private single family home sites. Some of these periodic inspections will need to be conducted by private certified Reclaimed Water Site Testers.

Reclaimed Water Site Testers have two primary responsibilities: 1) to conduct a thorough inspection of the reclaimed water site, and 2) to conduct a pressure test at the site to ensure that there are no cross-connections with the potable water system. Site Testers are also asked to report any off-site reclaimed water discharges. Upon completion of these tasks, the Reclaimed Water Site Tester enters the information into Tucson Water's database iBAK. Appendix K is a checklist for use by Reclaimed Water Site Testers in doing the site inspections and pressure tests.

Working Safely with Reclaimed Water

The reclaimed water Tucson Water delivers to customers is highly treated wastewater classified by the ADEQ as Class A. Reclaimed water is not for drinking or bathing. The Pima County Health Department advises that if you come in contact with reclaimed water, wash with soap and water from a potable (drinking) water faucet. If you have consumed some of this water, it is unlikely to cause ill effects. However, watch for signs of illness, such as gastrointestinal upset, for ten days after the reclaimed water has been consumed. If you do get sick, be sure to tell your medical provider that reclaimed water was ingested. They will be able to determine if the illness is related to the water and treat the condition appropriately.

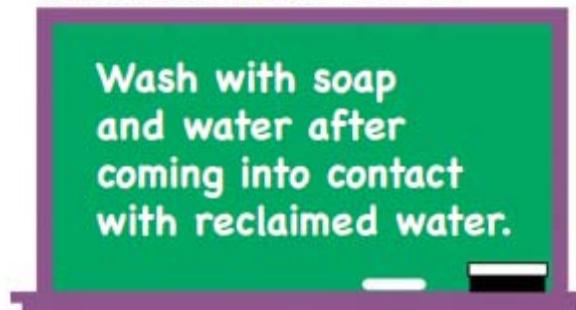
Additional guidelines for working with reclaimed water are provided in Appendix L and also on the Tucson Water website at www.tucsonaz.gov/water/reclaimed.

Notify. Identify. Inspect. Observe. (N. I. I. O.) for Reclaimed Water Sites

The N.I.I.O. procedures learned in the Backflow Testers certification class also apply to reclaimed water site inspection. Remember to always:

- **Notify**—Make an appointment with the customer. **Notify** the customer when you arrive at the site to conduct the reclaimed water site inspection. The customer or their representative must be present as access to all potable water outlets is required.
- **Identify**—**Identify** that you are at the correct reclaimed water site. Verify the address, and owner's name. Verify that the reclaimed water meter numbers are the same as on the reclaimed site annual inspection report.
- **Inspect**—**Inspect** all components of the site including fire systems, backflow assemblies on fire systems, and reclaimed water advisory signs.
- **Observe**—**Observe** the area carefully throughout the inspection. Look for signs of ponding, overspray, and runoff.

Reclaimed 101:



Site Inspection

Before you begin the site inspection, review the regulatory requirements and design standards in Chapter 1 of this manual and make a copy of the Site Tester's Site Inspection Checklist in Appendix K. Then begin the site inspection, following the steps below:

1. Ask Tucson Water to verify that there is a current Reclaimed Water User Agreement on file and to check if any hose bibs found on site have been grandfathered per the User Agreement.
2. Verify that all potable water connections to the property have the required backflow protection on pages 19-20 and that the assemblies are in compliance. If the customer does not have copies of the most recent backflow assembly tests, Tucson Water can provide the information.
3. Verify that the customer has a conceptual plan of the reclaimed water irrigation system and that it is readily available on-site. Professional plans are not required. If the customer does not have a conceptual plan, the tester will work with the customer to create one. (Appendix H).
4. Verify that there are no hose bibs on the reclaimed water system. There are a few sites which have hose bibs that were "grandfathered." Confirm with Tucson Water that existing hose bibs (if any) are grandfathered. Remove hose bibs that are not grandfathered.
5. Verify that reclaimed signs are in good condition and visible from all entrances to the reclaimed site and at other locations.
6. Ensure all above-ground reclaimed water pipes, meters and reclaimed water system appurtenances are colored, tagged, or otherwise marked (on pages 21-22) to advise the public that the irrigation water is reclaimed water and is not suitable for drinking. (Appendix M)
7. During the separation testing, look for signs of ponding, overspray, and runoff. If any of these conditions occur then corrective action is required. Corrective actions may include: adjusting the watering duration or frequency; adjusting the spray direction of the sprinklers; filling in any areas that may pond with dirt.
8. Verify with the customer that no off-site discharge has occurred. If off-site discharge has occurred, was it properly reported? See discharge report form in Appendix I.
9. When the inspection has been completed and any discrepancies have been corrected, fill out Reclaimed Water Site Test and Maintenance Report and file with Tucson Water. (Appendix N)

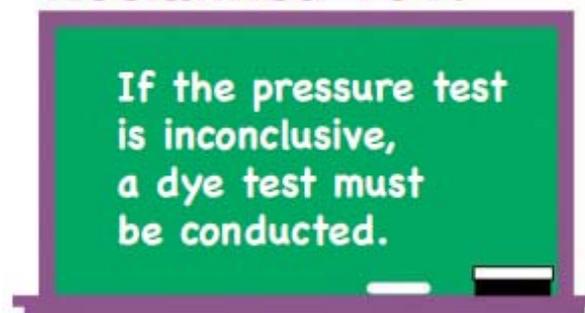
Pressure Testing

Verify separation of systems by performing the Shutdown Pressure Tests, Part I and II below:

Pressure Test - Part I – Reclaimed System Shutdown Test

1. Activate and pressurize the potable water system. The Tester will determine the length of time that all on-site potable water systems are to remain pressurized.
2. Shut down the on-site reclaimed water system at its point of connection to the distribution system and depressurize the reclaimed water system by manually bleeding a control valve and/or quick-coupling valve that is located at the lowest point of elevation in the on-site reclaimed water system. Divert or capture the reclaimed water to ensure it does not cause an off-site discharge. The Tester will determine the minimum period of time the on-site reclaimed water system is to remain depressurized on a case-by-case basis, taking into account the size and complexity of the potable water system and the on-site reclaimed water system.
3. Inspect all on-site reclaimed water system control valves and quick-coupling valves, impoundment inlets and all irrigation system outlets and stations for flow. Ensure that all stations of the reclaimed irrigation system have been turned on checked for flow and turned off. Continuous flow from any part of the on-site reclaimed water system indicates a cross-connection. If any cross-connections are discovered, follow the cross-connection response procedures on page 38. **DO NOT PROCEED WITH THE PRESSURE TEST.**
4. Inspect all interior and exterior potable water fixtures (faucets, hose bibs, drinking fountains, toilets and urinals, supply lines to decorative fountains, etc.) and test each one for flow. No flow from a potable water outlet indicates that it may be connected to the on-site reclaimed water system and should be treated as a cross-connection. If any cross-connections are discovered, follow the cross-connection response procedures on page 38. **DO NOT PROCEED WITH THE PRESSURE TEST.**
5. If no cross-connections are discovered, proceed with the second part of the test.

Reclaimed 101:



Pressure Test- Part II – Potable System Shutdown Test

6. Shut down the potable water system at its point of connection (usually the number one shut off valve on all potable water backflow assemblies) and depressurize it through the number four test cock on all potable assemblies. For multi-story buildings, the potable water system pressure may be reduced by the amount deemed necessary by the Tester and monitored with a gauge installed at a low point of elevation in the potable water system. The Tester will determine the minimum period of time the potable water system is to remain depressurized, or for multi-story buildings, at a reduced pressure.
7. Activate and pressurize the on-site reclaimed water system. The Tester will determine the minimum period of time the on-site reclaimed water system is to remain pressurized.
8. Inspect all interior and exterior potable water fixtures (faucets, hose bibs, drinking fountains, toilets and urinals, supply lines to decorative fountains, etc.) and test for flow. Water breaking loose from an air lock in an overhead water line may cause some flow; however, based on the volume and duration of the flow, the Tester will determine if it is of concern and could be a cross connection. Continuous flow from any part of the potable water system (in excess of the drainage generated by an air lock breaking free) indicates a cross-connection. If any cross-connections are discovered, follow the cross-connection response procedures on page 38. **DO NOT PROCEED WITH THE PRESSURE TEST.**
9. For a potable water systems in multi-story buildings, all fixtures may be tested or a pressure gauge (refer to Step No.6 above). If the potable water system has been completely shut down at its point of connection, then an increase in potable water system pressure viewed at the gauge over a period of time determined by the Tester indicates that there is a cross-connection with the reclaimed water system. If any cross-connections are discovered, follow the cross-connection response procedures on page 38. **DO NOT PROCEED WITH THE PRESSURE TEST.**
10. Inspect all reclaimed water system outlets and fixtures (hose bibs, all irrigation system stations, toilets and urinals, supply lines to impoundments, etc.) and test each one for flow. Verify that all stations of the reclaimed irrigation system have been turned on. No flow from an on-site reclaimed water system control valve, quick-coupling valve, or any other reclaimed water fixture indicates that it may be connected to the potable water system and should be treated as a cross-connection. If any cross-connections are discovered, follow the cross-connection response procedures on page 38. **DO NOT PROCEED WITH THE PRESSURE TEST.**
11. If no cross-connections are discovered, re-pressurize the potable water system.

Cross-connection Response Procedures

Despite the best and most conscientious efforts of Tucson Water and its reclaimed water customers, there may be occasional cross-connections. In the event that a cross-connection is discovered during the site inspection or the pressure test is inconclusive, immediate action by the reclaimed water site tester is required:

- 1) Immediately turn off the reclaimed water system.
- 2) Keep the potable system pressurized.
- 3) Confirm all backflow assemblies are properly working by testing each one.
- 4) Call the Tucson Water CCC Specialist for the area in which you are working. The CCC Specialist will immediately contact the Administrators of Tucson Water's Operations and Water Quality Divisions.

If a backflow assembly(s) has failed, Tucson Water will:

- 1) Collect water samples from the potable system and perform bacteriological analysis.
- 2) Assist in identifying the location(s) of backflow and eliminate the cross connection(s).
- 3) Conduct a dye test to verify that all cross-connections have been eliminated.
- 4) Flush and disinfect contaminated Tucson Water systems by maintaining a chlorine residual of at least 50 mg/L for 24 hours. Retest after 24 hours.
- 5) Work with customer to flush and disinfect contaminated private systems by maintaining a chlorine residual of at least 50 mg/L for 24 hours. Retest after 24 hours.
- 6) Report cross-connection to regulatory agencies as required.
- 7) Review causes of incident and develop procedures to avoid similar incidents in the future.

Reporting Off-site Discharges of Reclaimed Water

All off-site discharges of reclaimed water must be reported to Tucson Water. This is the customer's responsibility; however, if you observe reclaimed water being discharged from a site that you are inspecting, report it to the Tucson Water Backflow and Reclaimed Section at (520) 791-2650 or to the Tucson Water 24-hour Emergency Line at (520) 791-4133.

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, if a private irrigation system pipe breaks and reclaimed water runs into the adjacent public street, this is an unauthorized discharge.

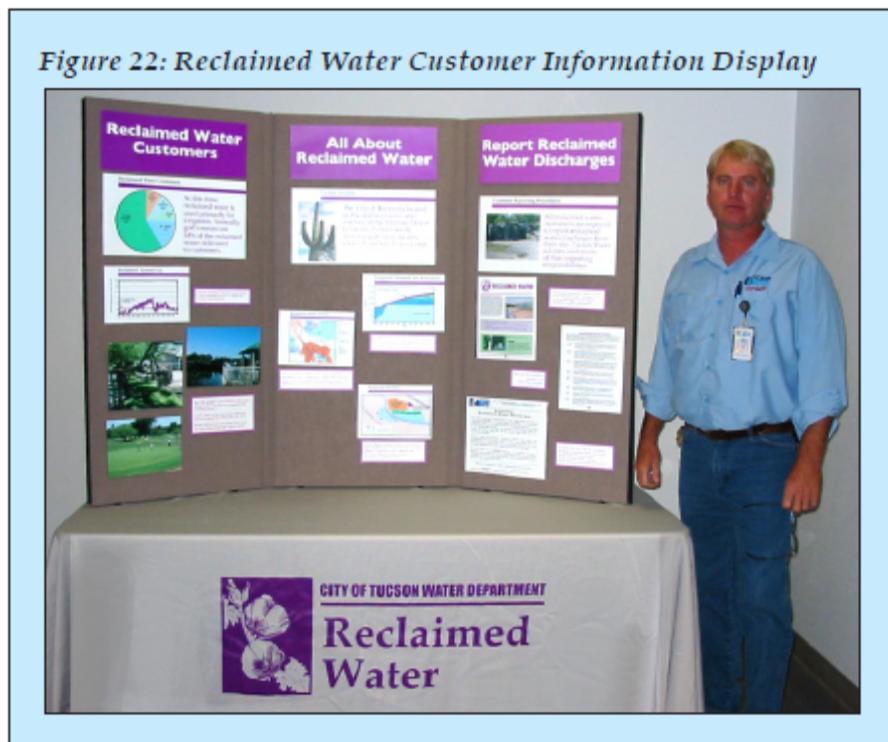
To make a report, go to www.tucsonaz.gov/water/report_recl.htm and answer each of the questions. Click on *submit* when you are finished. This will send a report to Tucson Water and a report will also be made to ADEQ.

Reporting Reclaimed Site Inspection and Pressure Test Results

Reclaimed site inspection results must be entered by the Reclaimed Water Site Tester into Tucson Water's iBAK database prior to the site's compliance date shown on the customer's "Notice of Test Due" and within 5 days of the completion of the inspection.

Customer Service

As a Reclaimed Water Site Tester, the customer may direct questions about reclaimed and backflow protection to you. Appendix O contains a list of frequently-asked questions with responses. If you are asked questions that you are not comfortable answering, suggest to the customer that they contact Tucson Water. Tucson Water will provide you with contact information cards that you may provide to the customer. (Figure 22)







Chapter 5

Required Training for Reclaimed Water Site Testers

Prerequisites for Reclaimed Water Site Tester Training

Tucson Water needs to have trained personnel to inspect sites where reclaimed water is used. In response to this need, or in the absence of State or reclaimed water organization based training programs; Tucson Water has developed a Reclaimed Water Site Tester's Certification program to meet its needs while ensuring regulatory compliance and protecting the public. Since in-depth knowledge of cross-connection control is an integral part of the site inspection, the pre-requisite to this course is certification as backflow tester by an ADEQ-recognized certification agency.

Classroom and Field Training

The Reclaimed Water Site Tester certification program consists of a minimum of eight hours of classroom and field training conducted by qualified instructors and a written examination. Upon successful completion of the examination, Testers will be issued a certificate allowing them to register with Tucson Water as a Reclaimed Water Site Tester.

Recertification Requirements

A review class and a recertification examination are required every three years. Contact Tucson Water for class dates.





Chapter 6

Sample Questions for Site Tester Examination

Following the classroom and field portions of the class, there will be a multiple choice examination that will include questions from the list below. In order to receive Tucson Water certification as a Reclaimed Water Site Tester, a minimum of 70% of the test questions must be answered correctly.

Reclaimed Water Site Tester certification is good for three (3) years from the date of issuance. Reclaimed Water Site Tester certification entitles certified backflow testers registered with Tucson Water to conduct inspections of sites with reclaimed water service provided by Tucson Water.

1. What is reclaimed water?
2. What quality of reclaimed water does Tucson Water deliver to its customers?
3. What are the benefits of nitrogen and phosphorus in reclaimed water?
4. Why is the use of reclaimed water important in Tucson?
5. What is the purpose of reclaimed advisory signs?
6. What responsibilities do reclaimed water customers have?
7. What responsibilities does the reclaimed water site tester have?
8. What practices ensure the safe use of reclaimed water?
9. Which governmental agency in the Tucson area is responsible for treating and delivering reclaimed water?
10. Which governmental agency regulates the reclaimed water provider to operate a reclaimed water system?
11. What type of treatment does reclaimed water in Tucson receive?
12. Which customers use the most reclaimed water on an annual basis?
13. What is reclaimed water off-site discharge?
14. How do you remediate a reclaimed water off-site discharge?
15. What is ponding?
16. Where are reclaimed water advisory signs posted?
17. How do you eliminate ponding?
18. What is overspray?
19. While inspecting the irrigation system you found a reclaimed water hose bib.
What do you do?
20. How do you eliminate overspray?
21. During the pressure test, the potable water system is pressurized and the reclaimed water system is off. There is water spraying out of the drip system. What do you do?

22. During the pressure test, the potable water system is off and the reclaimed water system is pressurized. There is water bubbling up out of the ground. What do you do?
23. During the pressure test, the potable water system is off and the reclaimed water system is pressurized. While checking the hose bibs you found pressure on one of the three. What do you do?
24. During the pressure test, the potable water system is off and the reclaimed water system is pressurized. Water is spraying into the pool. What do you do?
25. Your pressure test is inconclusive. What is your next step?
26. While testing the irrigation system, the sprinkler system fails to shut off and water is running down the street. What do you do?
27. Where do you locate a reclaimed water discharge report form?
28. While talking to the customer, you have learned that there was an unauthorized discharge last year. Where do you note this information?
29. During the site inspection, you discover that the backflow assembly is dripping from the relief valve. With the customer's permission, what do you do?
30. The customer does not have a conceptual site plan. What do you do?
31. Where can you get a sample of a conceptual site plan?
32. Where does a reclaimed water advisory sign need to be posted?
33. How long does your Reclaimed Water Site Tester certification last?
34. The customer says his water tastes funny. During the conversation, you find that this started after he did a modification to the irrigation system. What do you do?
35. When you arrive at the site, the sprinklers are on and water is running down the street and going into a drainage ditch. What do you do?
36. During your site inspection, the customer has you test the backflow assembly and it fails. What do you do?
37. If a customer tells you that they no longer want reclaimed water, what do you do?

38. During the site inspection, you cannot find a reclaimed water advisory sign.
What do you do?
39. Adjusting the watering time is a method to prevent what?
40. During the site inspection, the customer has authorized you to expose some irrigation piping to do repairs. Before you bury the piping, what do you do?
41. During the site inspection, you find that one of the control valve boxes is damaged and needs to be replaced. What type of box should the customer use?
42. You have finished the pressure test and the inspection is complete. What is your last step?
43. How many reclaimed water signs are required on each site?
44. Where should a reclaimed water customer keep their conceptual site plan?
45. What do you do if the customer does not have a current backflow assembly test report?
46. What should you do if the reclaimed advisory sign is badly damaged or faded?
47. Who needs to be onsite for the reclaimed site inspection?
48. When doing repairs on any reclaimed water system, what type of personal protective equipment must be used?
49. When you check the reclaimed water meter and there is no tag on the meter, what do you do?
50. What is tracer tape and what is it used for?
51. When checking inside the home, with reclaimed water on and the potable water off, you find water coming out of the shower. What do you do?
52. What should you do if the reclaimed water meter box is not colored purple?
53. What do you do when the potable water is off and there is reclaimed water flowing from an outside hose bib?
54. What is a dual plumbed site?
55. What do you do if you come in contact with reclaimed water?

56. Do water heaters on sites with reclaimed water service require thermal expansion protection?
57. Can reclaimed water be used for residential toilet flushing?
58. How does Class A reclaimed water differ from Class A+ reclaimed water?
59. Do impoundments containing Class A reclaimed water need to be lined?
60. What is the ratio of filtered to recovered reclaimed water in Tucson Water's reclaimed water distribution system?
61. What are the three ways reclaimed water is produced in Tucson?
62. ADEQ regulations require backflow prevention protection on sites that utilize what?
63. An underground recharge facility stores water in an aquifer. What mechanism is used to recharge the water?
64. What does the reclaimed site NIIO stand for?
65. If a reclaimed water customer expands their reclaimed irrigation system, who is responsible to check for cross-connections?
66. If a reclaimed water customer wants a hose bib next to their barbeque grill and the only water source is reclaimed water, what do you do?
67. What should you do if a customer asks you a question you can't answer?
68. If you are on a residential reclaimed water site and you come across a grandfathered reclaimed hose bib, what should you do?
69. While you are inspecting a reclaimed water site, you see water flowing out of the ground. What should you do?
70. How often does a reclaimed water user agreement need to be signed?
71. You notice a reclaimed hose bib on the system. The customer says they have had it for years. What do you do?
72. You have found a cross-connection during your test and are not able to immediately contact anyone from Tucson Water. How do you proceed?

73. After being used to work on a reclaimed water system, what should be done with the tools?
74. Twenty feet of pipe in the reclaimed water system needs to be replaced. What type of pipe should the person doing the repair use?
75. You are testing a reclaimed system on a parkway. What is the minimum distance between the reclaimed signs?
76. What three conditions are not allowed on reclaimed water sites?
77. What are you looking for when inspecting a reclaimed water site?
78. While testing the reclaimed water site you think there may be a cross-connection. What do you do?
79. While inspecting a reclaimed water site you come across a lush vegetable garden. Is this an allowable use of reclaimed water?
80. You found a cross-connection and have contacted Tucson Water. What is the next step?
81. After you have finished testing the reclaimed water site you notice that the customer pulls up the reclaimed sign and puts it into their garage. What do you do?
82. How can you tell the difference between reclaimed water and potable water?
83. What type of odor does reclaimed water have?
84. Is reclaimed water safe to drink?
85. If you come in contact with reclaimed water, what should you do?
86. What is the pantone color for reclaimed appurtenances?
87. When you arrive at a reclaimed water site, you notice that the homeowner has a reclaimed hose bib and is filling up a water bowl for his dog. What should you do?
88. While testing a reclaimed water site, you notice that the lawn sprinklers are spraying through a chain link fence and going into the neighbor's yard. What should you do?
89. While testing a reclaimed site, you notice that the cover on the reclaimed meter box is faded to a chalky whitish color. What should you do?

90. While testing a reclaimed water site, you notice that the customer has plumbed a decorative fountain with reclaimed water. What do you do?
91. While at a reclaimed water site, you notice a reclaimed hose bib. If you know that this is not the original customer, what do you do?
92. When you arrive at a reclaimed water site, the customer greets you with a check and tells you everything is okay and to just pass it. What should you do?
93. If a customer tells you that they no longer want reclaimed water, what should you do?
94. If your backflow tester certification has expired, but you still have six months left on your reclaimed site tester certification, do you meet Tucson Water's requirements to test reclaimed water sites?
95. While testing a reclaimed water site, the customer tells you that they want a new reclaimed sign. What should you tell them?
96. Who needs to be present while you are testing a reclaimed site?
97. When you arrive on a reclaimed water site, you notice that the customer has removed all of their reclaimed irrigation system piping. The customer tells you that they want the backflow assembly removed. What should you do?
98. You noticed that a customer has recently extended the reclaimed irrigation system from only the front yard into the back yard. What should you do?
99. Reclaimed hose bibs are not allowed on any reclaimed system after the grandfathered date. What is this date?
100. Should a fire sprinkler system on a reclaimed water site be checked during a reclaimed site test?

END