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## CHAPTER 5

### Legal and Institutional Issues

Although specific laws vary widely, most states have adopted a number of rules and policies that both support and challenge the development of reclaimed water projects. Since public health regulations are reviewed in detail in Chapter 4, this chapter focuses on other issues that emerge during the various stages of planning and implementing water reuse projects, including relevant rules promulgated by federal, state, and local jurisdictions.

Laws, policies, rules, and regulations that affect project **planning** include water rights laws, water use, and wastewater discharge regulations, as well as laws that restrict land use and protect the environment. Included in project **implementation** issues are policies that guide the development of reclaimed water rates and agreements between reclaimed water producers, wholesalers, retailers, and customers, as well as rules affecting system construction and liability for water reuse.

Some legal matters are quite technical, and the body of statutory and case law in the area of water reuse is relatively small. The majority of the rules and policies are focused on areas where water reuse has been practiced, and expansion to other areas might raise issues not discussed here. Therefore, managers should carefully consider the legal and institutional aspects of a new reuse project, and obtain counsel to help weigh alternatives and risks. However, even a review of the basic issues should allow reuse planners to identify the most important questions early in the planning process where they can be most effectively addressed.

This section also expands upon the following guidelines that can assist managers in addressing legal and institutional issues during the planning and implementation phases of a reuse system:

- Identifying the legal and institutional drivers for reuse
- Developing a public education program

- Forging and maintaining contact with the appropriate agencies
- Developing a realistic schedule
- Assessing cash flow needs
- Considering institutional structure
- Identifying steps to minimize liability
- Preparing contracts

#### 5.1 Water Rights Law

A water right is a right to use water – it is not a right of ownership. In the U.S., the state generally retains ownership of “natural” or public water within its boundaries, and state statutes, regulations, and case law govern the allocation and administration of the rights of private parties and governmental entities to use such water. A “water right” allows water to be diverted at one or more particular points and a portion of the water to be used for one or more particular purposes. A basic doctrine in water rights law is that harm cannot be rendered upon others who have a claim to the water. Water rights are an especially important issue since the rights allocated by the states can either promote reuse measures, or they can pose an obstacle. For example, in water-limited areas, where water reuse might be most attractive, water rights laws might prohibit the use of potable water for nonpotable purposes, while at the same time restricting the use of reclaimed water in a consumptive fashion that prevents its return to the stream.

State laws allocate water based on 2 types of rights – the appropriative doctrine and the riparian doctrine. These will be described in general terms, after which there will be a brief analysis of their application to water reuse projects.

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### 5.1.1 Appropriate Rights System

The appropriate rights system is found in most western states and in areas that are water-limited. (California has both appropriate and riparian rights.) It is a system by which the right to use water is appropriated – that is, it is assigned or delegated to the consumer. The basic notion is first in time, first in right. In other words, the right derives from beneficial use on a first-come, first-served basis and not from the property's proximity to the water source. The first party to use the water has the most senior claim to that water. The senior users have a continued right to the water, and a "late" user generally cannot diminish the quantity or quality of the water to the senior user. This assures that senior users have adequate water under almost any rainfall conditions, and that later users have some moderate assurance to the water. The last to obtain water rights may be limited to water only during times when it is available (wet season). The right is for a specific quantity of water, but the appropriator may not divert more water than can be used. If the appropriated water is not used, it will be lost.

Generally, appropriate water rights are acquired pursuant to statutory law; thus, there are comprehensive water codes that govern the acquisition and control of the water rights. The acquisition of the water right is usually accompanied by an application to state officials responsible for water rights and granted with a permit or license. The appropriate rights doctrine allows for obtaining water by putting it to beneficial use in accordance with procedures set forth in state statutes and judicial decisions.

The appropriate water rights system is generally used for groundwater throughout the U.S. Water percolating through the ground is controlled by 3 different appropriate methods: absolute ownership, reasonable use rule, or specific use rule. Absolute ownership occurs when the water located directly beneath a property belongs to the property owner to use in any amount, regardless of the effect on the water table of the adjacent land, as long as it is not for a malicious use. The reasonable use rule limits groundwater withdrawal to the quantity necessary for reasonable and beneficial use in connection with the land located above the water. Water cannot be wasted or exported. The specific use rule occurs when water use is restricted to one use.

During times of excess water supply, storage alternatives may be considered as part of the reuse project so that water may be used at a later date. A determination of the ownership or rights to use this stored reclaimed water will need to be made when considering this alter-

native.

### 5.1.2 Riparian Rights System

The riparian water rights system is found primarily in the east and in water-abundant areas. The right is based on the proximity to water and is acquired by the purchase of the land. A riparian user is not entitled to make any use of the water that substantially depletes the stream flow or that significantly degrades the quality of the stream. Such riparian use can only be for a legal and beneficial purpose. The right of one riparian owner is generally correlative with the rights of the other riparian owners, with each landowner being assured some water when available.

Water used under a riparian right can be used only on the riparian land and cannot be extended to another property. However, unlike the appropriate doctrine, the right to the unused water can be held indefinitely and without forfeiture. This limits the ability of the water authority to quantify the amount of water that has a hold against it and can lead to water being allocated in excess of that available. This doctrine does not allow for storage of water.

### 5.1.3 Water Rights and Water Reuse

In arid parts of the western U.S., reclaimed water often constitutes a more reliable supply than rights to surface water or groundwater granted by a water authority. This is particularly true when a user has low-priority rights that are curtailed or withdrawn in times of shortage. (Such subordinate rights are sometimes referred to as "paper water" as opposed to "wet water" which refers to the possession of an actual supply.) Because of the difficulty in obtaining an uninterrupted supply, reclaimed water has simultaneously become an attractive alternative water source and the largest block of unappropriated water in the West. Consequently, it is important to understand who retains control of the reclaimed water among the discharger, water supplier, other appropriators, and environmental interests. For example, in Washington State, the municipal corporation of the City of Walla Walla was taken to court by a local irrigation district that wanted the city to continue to discharge wastewater effluent into Mill Creek, a natural channel, for irrigation use. The court decreed on 2 occasions that the city must discharge all of its wastewater effluent, at all seasons of the year, into the creek (Superior Court of the State of Washington, 1927 and 1971).

According to Colgne and MacLaggan (1995) the downstream water user's right to reclaimed water depends on the state's water allocation system:

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Some states issue permits to the owners of reclaimed water or to appropriators of it when discharged into a natural water course. These states granting permits to the appropriators of reclaimed water do so treating such discharges into a reclaimed watercourse as if it has been abandoned and thus available for appropriation. Other states issue appropriation permits containing a provision that clarifies that the permit does not, in itself, give the permittee a right against a party discharging water upstream who may cease to discharge the water to the watercourse in the future.

In other words, state law can either promote or constrain reuse projects depending on how its system of water rights regards the use and return of reclaimed water. In general, the owner of a wastewater treatment plant that produces effluent is generally considered to have first rights to its use and is not usually bound to continue its discharge. However, when a discharger's right to reuse is constrained, such restrictions are usually based on issues resulting from one of the following scenarios:

- **Reduced Discharge** – Reduction or elimination of effluent discharge flows due to certain types of reuse (e.g. evaporative cooling, groundwater infiltration) could result in legal challenges from downstream users, especially when the reduced flow results in serious economic losses or negative impacts on the environment. When the use of reclaimed water reduces or eliminates the discharge of wastewater to the watercourse, downstream users may make claim damages against the owner of the reuse project. The nature of the legal challenge would depend on the water rights system used. These issues are less well defined for groundwater than for streams and rivers.
- **Changes in Point-of-Discharge or Place-of-Use** – Occurs in states with appropriative rights where laws are designed to protect the origin of the water by limiting the place-of-use or by requiring the same point of discharge. In riparian states, the place-of-use can also be an issue when reclaimed water is distributed to users located outside the watershed from which the water was originally drawn.
- **Hierarchy of Use** – Generally with water reuse, the concepts of “reasonable use” and “beneficial use” should not present an obstacle, particularly if such reuse is economically justified. Nevertheless, a hierarchy of use still exists in both riparian and ap-

propriative law, and in times of water shortage, it is possible that a more important use could make claim to reclaimed water that, for example, is being used for industrial process water.

- **Reduced Withdrawal** – A water reuse program that reduces withdrawals from the water supply will probably pose no third-party conflict with water rights issues, but the impact of such reductions on project-proponent water rights should be evaluated. In some instances, such as when water rights or allocations are based on historic usage, reductions could jeopardize the amount of water a customer is entitled to, especially during times of drought. This has a negative effect on the marketing of reclaimed water. Therefore, where possible, assurances should be made that historic allocations will not be reduced to the point that the customer will suffer damage during periods of shortage.

#### **5.1.4 Federal Water Rights Issues**

Although most water rights issues are decided according to state law, in certain cases federal water laws may impact the planning of water reuse projects. This most often occurs when the project augments, reduces, or otherwise impacts the supply of water to more than one state, to protected Native American tribes, or to other countries. In addition to these areas of federal involvement, the federal government also has the right to adequate water from sources on or adjacent to its own property to meet the required needs of the land. Some of the water rights laws that may apply to this situation are listed below.

- **Multi-State and Federal Water Allocations** – The federal government may claim jurisdiction in disputes between states regarding the allocation of limited water supplies. This has been particularly true in the West where 5 states (Arizona, California, Colorado, Nevada, and Utah) are served by the Colorado River where the flow is not always sufficient to supply all the nominal allocations. A federal interest may also be invoked when water owned by the federal government is allocated to various parties within the same state. In such cases, the federal government may serve as the “honest broker” between parties. Or, in instances where the federal interest is strong enough, the government may support the implementation of an appropriate solution to allocation conflicts by funding recommended improvements. In either situation, the availability of alternative water supplies (e.g. reclaimed water) may constitute an important factor in determining water rights and entitlements. (This is also discussed in

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## Section 5.2 “Water Supply and Use.”)

- **Native American Water Rights** – Although there have been many court decisions relating to the water rights of Indian reservations and other federal lands, there is still a great deal of uncertainty as to how these decisions should be interpreted. If there is a possibility that a water reuse project will conflict with the federal reserved water rights, either from an Indian reservation or other federal reserve, a very careful legal interpretation of such water rights should be obtained.
- **International Water Rights** – Another area of federal interest with respect to water rights is in the distribution of water supplies across state lines, or in international or boundary waters (e.g. the Great Lakes, the Tijuana River). In such situations, where the use of reclaimed water might reduce the access to water supply between states, or to another nation, federal jurisdiction may be imposed.
- **Water Rights on Federal Property** – Referred to as federal reserved water rights, the quantity of water reserved by the federal government does not have to be established at the time of the land’s acquisition. In addition, these water rights are not lost due to non-use or abandonment and can be designated for purposes other than that which they were originally intended, as long as consumption does not increase. These rights may be set aside by executive order, statute, treaty, or agreement (Weinberg and Allan, 1990). Water may also be appropriated by the federal government for purposes established by Congress and carried out on non-reserved lands. Like the water rights associated with federal reserves, this right to water for non-reserved lands may not cause harm to other water users and the appropriation may not take priority over already existing appropriations. There is some question as to whether there is sufficient legal basis for claiming water under the non-reserved rights scenario.

## 5.2 Water Supply and Use Regulations

Water supply and use legislation in the context of the *Guidelines* is distinct from water rights law in that it covers policies and regulations, which determine how an agency or entity with water rights may decide to distribute that supply to various parties. Over the past decade, it has become increasingly common for federal, state, and even local entities to set standards for how water may be used as a condition of supplying water to its customers, including the extent to which it must be con-

served or reused. Often these standards serve to promote reuse by requiring water users to reduce their total or per capita water use as compared to an established baseline. In some cases, certain uses of potable water (i.e., irrigation, power plant cooling) are considered “unreasonable” and are prohibited unless other, nonpotable sources have been determined to be “environmentally undesirable or economically unsound” (California Water Code Section 13550).

There are 3 main types of water supply and use rules discussed here:

- Water supply reductions
- Water efficiency goals
- Water use restrictions

### 5.2.1 Water Supply Reductions

Water supply reductions are often imposed during periods of drought. For example, Florida has identified water conservation goals for the water management districts to implement (FDEP, 1999). To meet these goals and to help ensure that enough water is available to meet anticipated potable water demands, Florida issued a water shortage order in 2001 to limit the number of irrigation days per week. Where water shortages are common, cutbacks may be imposed by statute, or they may be written into water allocation agreements between the various parties, (e.g., Colorado River Agreement, Monterey Agreement). During such times, appropriate water rights may be invoked so that the senior rights-holders receive their full allocations, or have their allocations reduced less than those with more junior rights. Whatever the cause, water shortages often provide a powerful incentive to implement water reuse projects to augment supplies, especially where reductions are frequent and other less costly methods (e.g., water conservation) have already been implemented.

When the supply is curtailed by the federal or state government, local water agencies may adopt tiered rates, priority categories, and other pricing and allocation strategies to minimize the impact of drought on customers by making sure that water is available for firefighting, public health, and other critical purposes. One side effect of such restrictions is an increased public awareness of the cost associated with water supply—costs that water reuse projects can help to avoid. The frequency of restrictions can also help planners evaluate the risk of such shortages, which in turn can increase the calculated value of the reuse projects.

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## 5.2.2 Water Efficiency Goals

Water efficiency goals can be either mandatory or voluntary. When voluntary goals (or targets) are promulgated, public support for conservation and reuse are usually stimulated by advertising or outreach campaigns designed to underscore the importance of protecting limited supplies. When mandatory goals are set, however, compliance is related to fees and availability of service. On a local level, the consequences for failing to meet mandatory goals can range from higher use fees (e.g. tiered water rates, surcharges) to termination of service. Where water efficiency is required on a state level, incentives are frequently used to encourage compliance, and meeting certain targets is a prerequisite for qualifying for grants or loans or even for receiving a greater percent of an agency's normal allocation.

When water reuse projects are planned in areas where voluntary or mandatory goals are in place, project managers should be sure that the proposed reuse types qualify as water efficiency measures so that reclaimed water customers can take advantage of the resulting benefits.

## 5.2.3 Water Use Restrictions

Water use restrictions may either prohibit the use of potable water for certain purposes, or require the use of reclaimed water in place of potable water. Ordinances requiring water reuse, however, generally allow otherwise prohibited and "unreasonable" uses of potable water to occur when reclaimed water is unavailable, is unsuitable for the specific use, is uneconomical, or when its use would have a negative impact on the environment.

On a federal level, there have been discussions in recent years on encouraging the passage of federal water use restrictions as part of a "green building" regulation, such that all federally-sponsored projects must evaluate the use of reclaimed water during the planning process. However, no such rules have yet been proposed. On a state level, water use restrictions are important because they give local jurisdictions a legal foundation for regulating local use. They may also be effective in promoting water reuse, particularly when such rules also require state agencies to evaluate alternative supplies for all state-funded projects.

Local water use restrictions can help to encourage reuse when the practice is generally accepted and readily available at a cost below other supplies. However, an important consideration in evaluating the implementation of such restrictions is deciding what type of penal-

ties or consequences result from non-compliance. In the case of local water restrictions, it may not be necessary to test the enforceability of the statutes, since the potential consequences of non-compliance may be sufficient to persuade most customers to use reclaimed water for appropriate purposes. Otherwise, penalties should be specified at a level adequate to deter violation. Such penalties may include disconnection of service and a fee for reconnection with fines and jail time for major infractions (e.g., Mesa, Arizona and Brevard County, Florida). However, other regulations designed to protect water customers from termination may mitigate or even neutralize that particular penalty option.

Where local ordinances require the use of reclaimed water, they may also include a variety of other requirements regulating its supply and use, including rules for customer connection, inspection, and facility management. Many cities require customers within a given distance of existing or proposed reclaimed water pipes to connect to the reclaimed water system. This may be coupled with restrictions on the use of potable water for nonpotable purposes, such as irrigation. Some cities have gone as far as to prohibit the use of other nonpotable water (i.e. groundwater or surface water) where reclaimed water is available. These rules are examined more closely in a later section, 5.5.3 Customer Agreements.

## 5.3 Wastewater Regulations

Both federal and state agencies exercise jurisdiction over the quality and quantity of wastewater discharge into public waterways. The primary authority for the regulation of wastewater is the Federal Water Pollution Control Act, commonly referred to as the Clean Water Act (CWA) (Public Law 92-500). While the legislative origin of the CWA stretches back to the Rivers and Harbors Act of 1899, the 1972 CWA assigned the federal government specific responsibilities for water quality management designed to make all surface waters "fishable and swimmable" (Cologne and MacLaggan, 1995). The CWA requires states to set water quality standards, thus establishing the right to control pollution from wastewater treatment plants, as long as such regulations are at least as stringent as federal rules. Primary jurisdiction under the CWA is with the EPA, but in most states the CWA is administered and enforced by the state water pollution control agencies.

Wastewater discharge regulations mostly address treated effluent quality—specifically the removal of chemical pollutants and biological pathogens that could have a deleterious effect on receiving waters. Even in regions of the U.S. where rainfall is plentiful (i.e., Florida),

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regulations that establish criteria for discharged wastewater water quality can provide a powerful incentive to reuse treated effluent. Although less common, discharge permits may also restrict the quantity of effluent discharged to a receiving body to limit its effect on the local ecosystem. Such regulations may be continuous or seasonal, and may or may not correspond to a period when reclaimed water is in demand. As with water quality limits, it is important for those planning reuse projects to meet with treatment plant managers to understand the extent of discharge limitations and how they may be alleviated by supplying treated effluent for reuse.

### **5.3.1 Effluent Quality Limits**

The CWA regulates discharge of pollutants into navigable waters through permits issued pursuant to the National Pollution Discharge Elimination System (NPDES). Under the CWA, the term “navigable waters” means waters of the U.S. The federal courts follow the Tenth Circuit Court’s conclusion that this definition is an expression of congressional intent “to regulate discharges made into every creek, stream, river or body of water that in any way may affect interstate commerce” (United States vs. Earth Sciences Inc., 1979).

The goal of the CWA is to “restore and maintain the chemical, physical and biologic integrity of the nation’s waters.” The CWA sets forth specific goals to conserve water and reduce pollutant discharges and directs the EPA Administrator to assist with the development and implementation of water reclamation plans, which will achieve those goals. Major objectives of the CWA are to eliminate all pollutant discharges into navigable waters, stop discharges of toxic pollutants in toxic amounts, develop waste treatment management plans to control sources of pollutants, and to encourage water reclamation and reuse. Pursuant to this goal, the EPA has evaluated major waterways in the U.S. to determine which ones fail to meet federal water quality standards. Waterbodies listed as “impaired” according to Section 303(d) of the CWA are protected by strict limits on the discharge of the specific pollutants of concern that could further degrade their water quality.

In addition to limits on the concentration of specific contaminants, discharge regulations may also include limits on the total mass of a pollutant discharged to the receiving stream – known as total maximum daily load (TMDL) limits – and on the quality of the water in the receiving stream itself (e.g. minimum dissolved oxygen limits). These regulations are usually the result of extended negotiations between federal, state, and local agencies.

Wastewater discharge regulations are important to water reuse managers for a number of reasons. First, reuse projects can be implemented as an alternative to high levels of treatment when discharge regulations require advanced treatment methods, such as nutrient removal. Second, the level of treatment required by the NPDES permit may be adequate to meet most health regulations, reducing the investment needed to meet reuse standards. By the same token, the level of reliability required by NPDES standards may be less rigorous than what paying customers expect, so that supplementary treatment systems are needed to ensure continuous production. These issues should be thoroughly explored by those planning water reuse projects prior to project design and implementation.

### **5.3.2 Effluent Flow Limits**

Although less common than water quality regulations, the quantity of treatment plant effluent discharged to a receiving body may also be limited by regulation, such as the Endangered Species Act (ESA). Such regulations may be continuous or seasonal, and may or may not correspond to periods associated with reclaimed water demand as required by the NPDES permit. For instance, state regulators in California required the San Jose/Santa Clara Water Pollution Control Plant (serving the Silicon Valley area of northern California) to reuse treated effluent as an alternative to limiting discharge into the south end of San Francisco Bay during the summer dry-weather period (May through October). In this instance the limitation was due not to contaminants, but to the fact that the point of discharge was a saltwater marsh which was made brackish by the discharge of relatively fresh treated effluent. The salt marsh in question is home to 2 endangered species (Rosenblum, 1998). Further discussion of the Endangered Species Act is in Section 5.4.2.

Effluent quantity may also be limited due to the demand for the reclaimed water by communities in the area. In a 1984 decision by the California State Water Resources Control Board, the Fallbrook Sanitary District (a wastewater discharger near San Diego) was enjoined to show cause why their treated effluent was discharged to the Pacific Ocean rather than made available for reuse by the local community. As discussed in the citation above, the foundation of this ruling (which has not been tested by the courts) lies with that state’s prohibition against wasting water and the “unreasonable” use of potable water when reclaimed water is available. This case also illustrates a trend towards viewing water of any quality suitable for some type of reuse, such that its discharge may be limited for the sake of preserving a scarce public resource.

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## **5.4 Safe Drinking Water Act – Source Water Protection**

In 1996, the 104<sup>th</sup> Congress reauthorized and amended Title XIV of the Public Health Services Act (commonly known as the Safe Drinking Water Act). One of the amendments included was Section 132, Source Water Assessment, which requires that the EPA administrator publish guidance for states exercising primary enforcement responsibility for public water systems to carry out directly or through delegation, (for the protection and benefit of public water systems and for the support of monitoring flexibility), a source water assessment program within the state's boundaries. The program requirements include: (a) delineating the boundaries of the assessment areas in such state from which one or more public water systems in the state receive supplies of drinking water, using all reasonably available hydrogeologic information on the sources of the supply and the water flow, recharge, discharge, and any other reliable information deemed necessary to adequately determine such areas; and (b) identifying contaminants regulated under this title for which monitoring is required under this title or any unregulated contaminants which the state has determined may present a threat to public health. To the extent practical, the origins of such contaminants within each delineated area should be determined so that the susceptibility of the public water systems to such contaminants can be decided.

A state may establish a petition program under which a community water system, municipal or local government, or political subdivision of a state may submit a source water quality protection partnership petition requesting state assistance in the development of a voluntary, incentive-based partnership to reduce the presence of drinking water contaminants, and to obtain financial or technical assistance necessary to set up the source water of a community water system. A petition may only address contaminants that are pathogenic organisms for which regulations are established, or for which regulations have been proposed or promulgated and are detected by adequate monitoring methods in the source water at the intake structure or in any community water system collection, treatment storage, or distribution facilities at levels above the maximum contaminant level (MCL), or that are not reliable and consistently below the MCL.

## **5.5 Land Use and Environmental Regulations**

Land use policies regulate the development and use of property which might be served by reclaimed water systems. Unlike water and wastewater laws that are pro-

mulgated and enforced by federal and state governments, most land use regulations are developed and enforced by local jurisdictions. But while they are generally considered to be local matters, land use decisions are always made in the context of federal environmental laws and state planning regulations that also influence their determination. The following section reviews the key elements of local land use planning, as well as the underlying environmental regulations and their effect on planning reclaimed water projects.

### **5.5.1 General and Specific Plans**

Most communities in the U.S. engage in some type of structured planning process whereby the local jurisdiction regulates development according to a general plan. A general plan is designed to serve as “a basis for rational decisions regarding a city's or county's long-term physical development [and] embodies public policy relative to the distribution of future land uses, both public and private” (State of California, 1998 and State of Florida, 2002). General plans can be adopted by ordinance and are sometimes reinforced with zoning regulations and similar restrictions. In some states, communities are legally required to adopt these general plans, and projects that significantly deviate from them must be rejected, modified, or permitted by variance.

The cost of extending utilities into undeveloped areas is an important criterion when deciding where to permit development in a community, as is the availability of resources. Even after a general plan is adopted and an area is planned for a particular type of development, developers may be required to prepare specific plans that demonstrate sufficient water supply or wastewater treatment capacity to meet the needs of their developments. Several western states have also adopted laws that require communities to adopt water management plans and identify additional supplies to support new developments. Such rules actually encourage the implementation of reuse projects that reduce the use of limited resources. In chronically water-short or environmentally sensitive areas, use of reclaimed water may even be a prerequisite for new developments.

However, the local planning process can also pose a challenge to reuse projects by subjecting them to the scrutiny of a public that may have many misconceptions about reclaimed water. Federal and state environmental assessment regulations (which are often included in the local planning process) require public notice of published plans and advertised hearings to solicit opinion from all parties potentially affected by the proposed project. It is not unusual at such hearings to hear opposition to the use of reclaimed water for rea-

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sons ranging from health effects to growth inducement to environmental justice. These concerns often mask underlying worries about growth or political issues that may be hard to deal with directly. However, unless the specific concerns are thoroughly addressed in the planning process, it is unlikely that the project will proceed to the point that the underlying issues can emerge to be dealt with. Furthermore, failure of a reuse project to conform to general plan guidelines and local requirements will render the project vulnerable to challenge in the courts or to appeal before the regulatory bodies even after the project is approved.

### 5.5.2 Environmental Regulations

A number of state and federal environmental regulations promote the use of reclaimed water by limiting the amount of water available to communities or restricting the discharge of wastewater into receiving streams. The ESA in particular has been applied to require water users to maintain minimum flows in western rivers to protect the habitat of various species of fish whose survival is threatened by increases in water temperature and restricted access to breeding grounds. Similarly, as noted previously, the provisions of the CWA can impose limits on both the quality and quantity of treated effluent an agency is allowed to discharge. A community with limited water supply or wastewater treatment capabilities has a real incentive to build a reclaimed water project that augments existing sources and reduces discharge.

Broader in scope, the National Environmental Policy Act (NEPA) requires an assessment of environmental impacts for all projects receiving federal funds, and then the mitigation of all significant impacts. Many states also have equivalent rules that mandate environmental assessment and mitigation planning for all projects prior to construction. Combined with other laws that protect biological, scenic, and cultural resources, these laws can result in a *de facto* moratorium on the construction of large-scale water diversions (by dams) that flood the habitat of protected species or inundate pristine canyons or areas of historical significance.

Even where such projects are allowed to go forward, they may be less cost-effective than water reuse projects that provide a comparable supply with fewer and less expensive mitigations. Both federal and state environmental assessment regulations generally require an economic analysis of alternatives, including the “no project” alternative in which nothing is built. A number of guidance documents are available suggesting approaches to evaluating both the costs and benefits of water projects, including water reuse alternatives. It is par-

ticularly important when evaluating the economics of reuse projects to consider how reclaimed water serves to augment water supply and divert wastewater from impacted waters, and to include both direct and indirect benefits. The evaluation should include the consideration of preserving a habitat that might be depleted by importing surface water supplies or the avoided cost of mitigating such an impact. A steady stream of research has appeared in the literature during the past decade suggesting appropriate methods of contingent valuation for environmental benefits (Sheikh *et al.*, 1998).

On the other hand, environmental assessment regulations also require the careful assessment of any negative impacts of reclaimed water projects. Examples of common environmental impacts include the visual impact of tanks and reservoirs and the disturbance of underground cultural resources and hazardous materials by underground pipelines. Less common, but equally significant, projects that provide reclaimed water for irrigation over unconfined aquifers are sometimes required to demonstrate that use of nonpotable water will not contribute to the degradation of underlying groundwater. In such cases, mitigation may include a monitoring program or even additional treatment to match groundwater quality. Rules to protect aquifers from infiltration by reclaimed water may also be adopted.

The manager of a reclaimed water project must be familiar with not only the federal and state regulations guiding the environmental assessment process, but also their interpretation by the local jurisdiction. For example, the federal NEPA process requires a public scoping, dissemination of a Notice of Intent, and at least one public meeting preceding the solicitation and consideration of public comments on project impacts and their mitigation. By contrast, the California Environmental Quality Act (CEQA) mandates specific periods during which project information must be published and encourages—but does not require—formal hearings during project review. However, many lead agencies do conduct public hearings on environmental assessment reports, either independently or in the course of their own public planning process (California Department of Water Resources, 2002 and State of Florida, 2002).

Public review requirements have a significant effect on project schedules. In addition to the time required to assemble site information and assess the potential impacts of the project, there are mandatory public review periods that range from 1 to 6 months depending on the nature of the impact and the type of permit required. A comprehensive implementation schedule should be

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developed and periodically revised, including lengthy review procedures, the timing of any public hearings that must be held, and the time needed to enact any required legislation. It is especially important to identify any permit review procedures and whether they can occur concurrently or must occur consecutively, and in what order.

### 5.5.2.1 Special Environmental Topics

In addition to the assessment of environmental impacts commonly encountered by construction of all types of water projects, there are some topics of special concern for the evaluation of reuse projects that reflect the safety of reclaimed water use, including growth inducement, environmental justice, and detection of emerging pathogens. Because the project proponent or lead agency must, by law, address all material questions raised during the assessment process, these topics should be considered at some point during project planning—if only to note that they do not apply.

One environmental impact associated with reclaimed water projects is the potential for growth inducement. Indeed, where communities are constrained by a limited water supply, the availability of a reliable source of reclaimed water can allow more growth than might otherwise occur. However, there are many other factors that contribute to the increase in population in an area, and substitution of nonpotable for potable water may only reduce the negative impact a community's existing water use has on the neighboring environment. In any case, the question of growth inducement must be addressed in evaluating the overall impact of reclaimed water projects.

The question of environmental justice may come up during the permitting of water reuse projects. The term “environmental justice” refers to the historic pattern of siting undesirable environmental facilities (e.g. wastewater treatment plants, landfills and transfer stations, solid waste incinerators) in or adjacent to economically depressed neighborhoods, whose populations may have a proportionally large percentage of people of color or ethnic minorities. An environmental justice policy attempts to ensure that all such facilities are distributed equally throughout the community, so that no one segment bears a disproportionate share of the impact. This policy is reinforced by a number of federal rules pertaining to environmental review of federally-funded projects, the ultimate source of which is the constitutional right to equal protection under the law. While it is reasonable to argue that reclaimed water distribution facilities should not be grouped with other more noxious facilities, and that the use of reclaimed water rep-

resents a clear benefit to the neighborhoods where it is available, the population at large does not always share this view. The project manager of a water reuse program should discuss project plans with representatives from all affected communities to gauge their sensitivity to this issue, and provide additional information about reclaimed water to help alleviate neighborhood concerns.

## 5.6 Legal Issues in Implementation

Just as there are many laws and policies that influence the planning and overall design of water reuse projects, their detailed design, construction, and implementation is also governed by a number of rules and regulations. For example, state health departments may require minimum setback distances between potable and nonpotable pipelines (addressed in Chapter 4), while dual distribution facilities at the customer's site may have to be constructed to meet Uniform Plumbing Code standards. Similarly, a value engineering study of the system design may need to be performed in order for the project to qualify for state or federal funding, which may add to the time required for project review and impact the ultimate construction schedule.

Following construction, various parties need to coordinate their efforts to produce, distribute, deliver, and pay for reclaimed water. Each of these parties must be organized to comply with their contractual obligation, with appropriate legal agreements between the parties to clearly spell out and enforce responsibilities. Indeed, there are a range of legal agreements that may be necessary in order for reclaimed water to be delivered to the end customer for reuse.

The following section examines laws and regulations pertaining to **project construction** (both system wide and on-site), agreements between water **wholesalers and retailers**, and **customer agreements** to ensure payment and proper handling of reclaimed water by the end user.

### 5.6.1 Construction Issues

In general, there are 2 types of regulations associated with construction of reuse projects:

- 1) Rules governing system construction, including large-diameter mains, pump stations, reservoirs, and other appurtenances required to deliver reclaimed water to groups of customers
- 2) Rules for on-site construction, specifically separation of existing pipelines into potable and

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nonpotable systems, or the installation of new reclaimed water pipelines separate from the potable system

As noted in Chapter 4, state health departments often promulgate regulations for both system and on-site construction, but these rules may be administered by county or even local health departments. State agencies may also take the lead in ensuring that project designs meet the requirements for grant funding, but their rules are frequently adopted from existing federal grant or loan programs. Local agencies may adopt their own special rules incorporating state regulations with additional requirements specific to local jurisdictions.

### 5.6.1.1 System Construction Issues

Chapter 4 includes a detailed analysis of water reuse regulations and design guidelines in various states. These issues are included here only to provide a comprehensive picture of the overall legal context in which reuse projects are developed and built.

Regulations impacting system construction include both rules governing utility construction in general and rules specifically aimed at water reuse projects. Regulations governing general utility construction include requirements to observe and maintain proper easements for pipelines and facilities, local codes with respect to acceptable building materials and construction practices, as well as all applicable contract and labor laws (which is beyond the scope of this chapter). Prior to and during design of any system construction project, the project manager should become familiar with state and local construction regulations and obtain all necessary permits from local agencies, utilities, and other parties so as not to delay project construction.

In addition to these general rules, many states have rules specifically pertaining to the construction of reclaimed water systems. These regulations frequently designate physical separation distances between reclaimed water and potable and wastewater lines, as well as details for pipeline crossings (e.g., nonpotable below potable). Where it is not practical to maintain minimum distances, some states allow construction of nonpotable pipelines adjacent to potable lines provided that they are cased in suitable materials.

From a legal perspective, federal and state grant and loan programs are established by statute and often establish construction-related rules that projects must meet to qualify for funding. Typically these include:

- Formal review of all designs to ensure that they meet professional standards and present the most “cost-effective” solutions to engineering problems. This review often includes value engineering of the project by professionals who were not involved in the original design.
- Institution of a revenue program identifying additional sources of funds to pay for the initial construction. This is especially true when grant funds are provided for construction on a reimbursement basis, to ensure that the project sponsor will be able to afford the project without the support of grant funds.
- Identification of customers, with some evidence that they will individually and collectively use a specific quantity of reclaimed water once it is supplied.

Early in the process, agencies that accept grants or loans should be aware of the requirements of their particular programs with respect to project design and funding.

### 5.6.1.2 On-site Construction Issues

Like system construction regulations, standards for constructing distribution pipelines on a customer’s site (e.g. irrigation systems) are usually a combination of state regulations and local ordinances specifically regarding the use of reclaimed water. State regulations generally focus on requirements to prevent accidental or intentional cross-connection of potable and nonpotable systems by separating the pipelines, requiring clear identification of nonpotable facilities, and installing backflow prevention devices, where appropriate. Local agencies may adopt individual regulations by ordinance, or they may adopt general regulations like the Uniform Plumbing Code, whose Appendix J includes special rules for installing reclaimed water lines inside buildings where potable water is also served. Once again, the manager of a reuse project should become familiar with all pertinent regulations during the design phase to ensure that the system meets state and local codes. See Chapter 4 for a detailed discussion of regulations that have been adopted in various jurisdictions throughout the U.S.

Once on-site facilities have been constructed, state and local regulations often require that cross-connection tests be performed to ensure complete separation between potable and nonpotable systems. Depending on the quality of the water provided and the type of use, agencies may also restrict the times of use and require periodic inspection and reporting on system operation, even after the on-site system has been installed and

approved. This topic is addressed more closely in Section 5.5.3 Customer Agreements.

## 5.6.2 Wholesaler/Retailer Issues

One of the first steps in implementing a water reuse program is the identification of roles and responsibilities for the production and wholesale and retail distribution of reclaimed water. Many different types of institutional structures can be utilized for implementing a water reuse project and responsibility for reclaimed water production and wholesale and retail distribution can be assigned to different groups depending on their historical roles and technical and managerial expertise (Table 5-1).

The various departments and agencies within a government may come into conflict over the proposed reuse system unless steps are taken early in the planning stages to find out who will be involved and to what level. Close internal coordination between departments and branches of local government will be required to ensure a successful reuse program. Obtaining the support of other departments will help to minimize delays caused by interdepartmental conflicts.

A good example of integrated authority is the Irvine Ranch Water District in California, an independent, self-financing entity responsible for all phases of reclaimed water production and distribution. Under its original enabling legislation, the district was strictly a water supply entity; but in 1965, state law was amended to assign it sanitation responsibilities within its service area. This put the district in a good position to deal directly, as one entity, with conventional potable water and nonpotable water services. Such a position contrasts markedly with other institutional arrangements in the Los Angeles area, where agency relationships are often more complex. For instance, the Pomona Water Reclamation Plant is operated by the Sanitation Districts of

Los Angeles County, which sells reclaimed water to several purveyors, including the municipal Pomona Water Department, who then redistributes it to a number of users.

### 5.6.2.1 Institutional Criteria

In evaluating alternative institutional arrangements, responsible managers should determine the best municipal organizations or departments to operate a reclamation and reuse program. For example, even if the municipal wastewater treatment service is permitted by law to distribute reclaimed water, it might make more sense to organize a reuse system under the water supply agency or under a regional authority (assuming that such an authority can be established under the law).

Among the criteria that should be considered in developing a viable arrangement is the ability of the proposed entity to finance the project and enter into the following types of agreements:

- Financing Power – The agency responsible for financing the project should be able to assume bonded indebtedness, if such financing is likely, a determination should be made as to what kind of debt could be assumed, how much, and how debt must be retired. In addition, the evaluation should include the method for recovering the costs of operating the water reclamation facility and any restrictions placed on them by virtue of the institutional structure, including kinds of accounting practices to be imposed upon the entity.
- Contracting Power – Any constraints on how and with whom services can be contracted should be identified, as well as the method of approving such agreements. For example, if contracts are required with other municipalities, they may have limitations on the nature of the corporate structure or legal au-

**Table 5-1. Some Common Institutional Patterns**

Type of Institutional Arrangement	Production	Wholesale Distribution	Retail Distribution
Separate Authorities	Wastewater Treatment Agency	Wholesale Water Agency	Retail Water Company
Wholesaler/Retailer System	Wastewater Treatment Agency	Wastewater Treatment Agency	Retail Water Company
Joint Powers Authority (for Production and Distribution only)	Joint Powers Authority	Joint Powers Authority	Retail Water Company
Integrated Production and Distribution	Water/Wastewater Authority	Water/Wastewater Authority	Water/Wastewater Authority

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thorization of entities with whom they enter into agreement.

### **5.6.2.2 Institutional Inventory and Assessment**

It is necessary to develop a thorough understanding of which organizations and institutions are concerned with which aspects of a proposed reuse system. This understanding should include an inventory of required permits and agency review requirements prior to construction and operation of the reuse system, economic arrangements, subsidies, groundwater and surface water management policies, and administrative guidelines and issues. The following institutions should be involved or at a minimum, contacted: federal and state/regulatory agencies, administrative and operating organizations, and general units of government.

On occasion there is an overlap of agency jurisdiction. For example, it is possible for one agency to control the water in the upper reaches of a stream and a separate agency to control the water in the lower reaches. Unless these agencies can work together, there may be little hope of a successful project.

One of the best ways to gain the support of other agencies is to make sure that they are involved from the beginning of the project and are kept informed as the project progresses. Any potential conflicts between these agencies should be identified as soon as possible. Clarification on which direction the lead agency should follow will need to be determined. By doing this in the planning stages of the reuse project, delays in implementation may be avoided.

### **5.6.3 Customer Issues**

Finally, a key link in the chain of institutional arrangements required to implement water reclamation projects is the relationship between the water purveyor and the water customer. Again, there are 2 dimensions to this arrangement:

- 1) The legal requirements established by state and local jurisdictions defining the general responsibilities of the 2 parties to protect the public
- 2) The specific items of agreement between the parties, including commercial arrangements and operational responsibilities

The legal requirements are usually stipulated in state laws, agency guidelines, and local ordinances designed to ensure that reclaimed water is used safely and with

appropriate regard for public health. In fact, the agency responsible for reclaimed water distribution should consider adopting an ordinance requiring customers to meet these standards of performance as a condition of receiving reclaimed water. Or, if that is not appropriate, the agency should encourage the jurisdictions where the customers are located to pass such ordinances. In some cases, the requirements for customer performance have been delegated by the state to the reclaimed water purveyor, who in turn is empowered to delegate them to their customers. For instance, where reclaimed water is still statutorily considered effluent, the agency's permit to discharge wastewater may be delegated by the agency to customers whose reuse sites are legally considered to be distributed outfalls of the reclaimed water, with concomitant responsibilities.

The second group of agreements, those agreements made between parties, are more variable and reflect the specific circumstances of the individual projects and the customers they serve. These include rates and charges, fees, rebates, terms of service, and other special conditions of use between reclaimed water suppliers and customers.

Not all reclaimed water systems require development of a reclaimed water ordinance. This is particularly true where there are a limited number of users. For example, it is not uncommon for a reclaimed water supplier providing service to a small number of large users, such as agriculture or industrial customers, to forego development of a reuse ordinance and rely instead on user agreements. In other instances, such as water intensive activities, a single user may well encumber all of the water available from a given reclaimed water source. Where such conditions exist, it is often more appropriate to deal with the customer through the negotiation of a reclaimed water user agreement. However, all of the customer issues discussed should still be addressed in developing customer agreements.

#### **5.6.3.1 Statutory Customer Responsibilities**

Protective measures are required to avoid cross-connection of reclaimed water lines with potable water lines. In the event that these responsibilities are codified in a local ordinance, the ordinance and its provisions should be clearly spelled out in the customer agreement. (Local ordinances may, in turn, reference state regulations on this subject, in which case they should provide specific citations, in addition to general references, for the sake of clarity.)

As noted in Chapter 4, required protections may include the mandatory backflow preventers, use of color-coded

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pipes for the reclaimed and potable water, and periodic inspection of the system. Inspection is recommended to determine if there are any illegal connections, violations of ordinances, or cross-connections. It is important that the ordinance or agreement state which party is responsible for inspection, under what conditions and with what frequency inspection may be required, as well as the consequences if users refuse to perform or allow inspection (i.e., disconnection of service).

A customer agreement (or the corresponding local ordinance) might also specify the type of irrigation system required in order to receive reclaimed water. This could include the requirements for system design (e.g., a permanent below-ground system) or construction details (e.g., specific pipe materials or appurtenances like quick disconnect fittings on hose bibs used for hand watering). The requirements for an irrigation system timer may also be included.

The customer agreement may also include details on financing on-site construction to separate potable and nonpotable piping systems. It is not uncommon for local agencies to fund all or part of the cost of retrofitting a customer's existing system in order to defray the overall cost of reclaimed water use. In such instances, the agency may provide grant funds to the customer to cover the cost of construction or may even construct the facilities at the agency's expense after obtaining a right-of-entry from the customer. In other cases, the cost of the construction may be covered by reductions in the normal rates over a period of time.

Although not included in a customer agreement, a local ordinance might also define when property owners will be required to connect to the reuse system. Examples include the requirement for turf grass facilities (e.g., parks, golf courses, cemeteries, schools) to connect when the system becomes available, requirements for new developments to connect prior to being inhabited, and requirements for all properties to connect as the reuse system becomes available. These agreements might also specify what equipment is available to the customer and how it can be used. For example, Florida allows hose bibs on the reclaimed water system but they must be placed in below-ground, locking boxes.

Local ordinances may also contain requirements for public education about the reuse project, including information on the hazards of reclaimed water, the requirements for service, the accepted uses, and the penalties for violation. In Cocoa Beach, Florida, reclaimed water applicants must be provided an informative brochure to explain public safety and reuse in accordance with the

City's ordinance. A detailed discussion of public information programs is provided in Chapter 7.

### **5.6.3.2 Terms of Service and Commercial Arrangements**

Any reclaimed water connection fees and rates associated with service should be addressed in an appropriate rate ordinance passed by the local jurisdiction. Reclaimed water rate ordinances should be separate from those regulations that control reclaimed water use, and may include an "escalator clause" or other means of providing for regular increases proportional to the cost of potable water in the local area. (See Chapter 6 for a discussion of the development of the financial aspects of water reuse fees and rates).

In addition to these considerations, it is often helpful to establish various other terms of service that are particular to the water reuse program and its customers. For example, the customer agreement may specify a certain level of reliability that may or may not be comparable to that of the potable system. When reclaimed water is used for an essential service, such as fire protection, a high degree of system reliability must be provided. However, if reclaimed water use is limited to irrigation, periodic shortages or service interruption may be tolerable. The reclaimed water supplier may also wish to retain the right to impose water use scheduling as a means of managing shortages or controlling peak system demands.

## **5.7 Case Studies**

### **5.7.1 Statutory Mandate to Utilize Reclaimed Water: California**

Underscoring the fact that potable water resources are strained and in many cases reclaimed water represents the next best supply, some states have integrated reclaimed water into the codes and policies that govern water resources in general. An example of such a case from California is Article 7, Water Reuse from the California Code of Regulations, Section 13550, Legislative Findings and Declarations; Use of Potable Water for Nonpotable Uses Prohibited.

- a) The Legislature hereby finds and declares that the use of potable domestic water for nonpotable uses, including, but not limited to, cemeteries, golf courses, parks, highway landscaped areas, and industrial and irrigation uses, is a waste or an unreasonable use of the water within the meaning of Section 2 of Article X of the California Constitution

if reclaimed water is available which meets all of the following conditions, as determined by the state board, after notice to any person or entity who may be ordered to use reclaimed water or to cease using potable water and a hearing held pursuant to Article 2 (commencing with Section 648) of Chapter 1.5 of Division 3 of Title 23 of the California Code of Regulations:

- (1) The source of reclaimed water is of adequate quality for these uses and is available for these uses. In determining adequate quality, the state board shall consider all relevant factors, including, but not limited to, food and employee safety, and level and types of specific constituents in the reclaimed water affecting these uses, on a user-by-user basis. In addition, the state board shall consider the effect of the use of reclaimed water in lieu of potable water on the generation of hazardous waste and on the quality of wastewater discharges subject to regional, state, or federal permits.
  - (2) The reclaimed water may be furnished for these uses at a reasonable cost to the user. In determining reasonable cost, the state board shall consider all relevant factors, including, but not limited to, the present and projected costs of supplying, delivering, and treating potable domestic water for these uses and the present and projected costs of supplying and delivering reclaimed water for these uses, and shall find that the cost of supplying the treated reclaimed water is comparable to, or less than, the cost of supplying potable domestic water.
  - (3) After concurrence with the State Department of Health Services, the use of reclaimed water from the proposed source will not be detrimental to public health.
  - (4) The use of reclaimed water for these uses will not adversely affect downstream water rights, will not degrade water quality, and is determined not to be injurious to plant life, fish, and wildlife.
- b) In making the determination pursuant to subdivision (a), the state board shall consider the impact of the cost and quality of the nonpotable water on each individual user.
- c) The state board may require a public agency or per-

son subject to this article to furnish information, which the state board determines to be relevant to making the determination required in subdivision (a).

HISTORY: Added by Stats.1977, c. 1032, p. 3090, Section 1, eff. Sept. 23, 1977. Amended by Stats.1978, c. 380, p. 1205, Section 148; Stats.1978, c. 894, p. 2821, Section 1, eff. Sept. 20, 1978; Stats.1991, c. 553 (A.B.174), Section 1.

### 5.7.2 Administrative Order to Evaluate Feasibility of Water Reclamation: Fallbrook Sanitary District, Fallbrook, California

In 1984 the California State Water Resources Control Board considered a complaint filed by the Sierra Club to enjoin an unreasonable use of water by a wastewater discharger (California State Water Resources Control Board Order 84-7). At issue was a permit issued by the Board authorizing the Fallbrook Sanitary District to discharge up to 1.6 mgd (6000 m<sup>3</sup>/d) of treated wastewater to the ocean. The Sierra Club alleged that under the circumstances, the discharge of the district's wastewater to the ocean, where it cannot be recovered for beneficial use, constitutes a waste of water.

Before a wastewater discharger can be required to reclaim water, a determination must be made whether the particular discharge constitutes a waste or unreasonable use of water. Water Code Section 13550, with its focus on prohibiting the use of potable water for nonpotable applications, provided no guidance to the State Board in this instance. Thus, in making its determination, the State Board sought guidance from the state's constitutional prohibitions on waste and related case law.

In keeping with the case law, which indicates that a reasonable use of water today may be a waste of water at some time in the future, the State Board ordered the district, and all future applicants proposing a discharge of once-used water into the ocean, to evaluate the feasibility of reclaiming its wastewater. The State Board insisted that water reclamation be carefully analyzed as an alternative, or partial alternative, to the discharge of once-used wastewater to the ocean in all water-short areas of the state. In adopting its order, the State Board recognized the requirements were consistent with the Board's authority to conduct investigations and prevent

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waste of water (California Water Code).

Information provided by Cologne and MacLaggan (1995) “Legal Aspects of Water Reclamation” in Wastewater Reclamation and Reuse.

### **5.7.3 Reclaimed Water User Agreements Instead of Ordinance: Central Florida**

While most reclaimed water systems with multiple users will require the adoption of a reclaimed water ordinance, there may be cases where an ordinance is not required, particularly when there are a limited number of users in the system. An example would include the provision of reclaimed water to several large agricultural users where the need for control extends to only a few parties. In such cases, it may be entirely appropriate to handle the requirements of the supplier and the users through a user agreement.

Orlando, Florida’s reclaimed water program (in concert with Orange County, Florida) began with about 20 citrus growers under the Water Conserv II Irrigation Program in 1986. Orlando/Orange County entered into a 20-year agreement with each of the growers, with the agreement specifying the responsibilities of both the supplier and the user. Each of these agreements was identical except for the volume of flow provision. The agreement covered suppliers’ contractual requirements including “no cost” provision of reclaimed water, water quality limits, minimum pressures, volume of water and delivery schedules, and indemnity provisions for third party claims. From the users’ side, the agreements addressed issues such as requirements to take a certain volume of water, transfer of land allowances, inspection requirements, and buyout provisions if the agreement was terminated prior to the 20 year term. As Orlando’s reclaimed system grew, each of the users, either agricultural or commercial, were required to enter into a user agreement. For the commercial users, an agreement was developed similar in some respects to the grower agreement. These commercial agreements evolved over time, but all contained the same basic requirements. For example, each of them stated that the customer would pay the user fee for the reclaimed water when such a rate was established by the City. It was not until 2002 that the City elected to adopt monthly user rates with the growth of the reclaimed system for single-family residences. These rates were implemented shortly after the adoption of a reclaimed water ordinance, which governs all aspects of the reclaimed water system within

the city boundaries.

Clearly there are other examples of the need for a user agreement when dealing with a larger customer. Orange County, Florida, provides over 10 mgd (438 l/s) of make-up water from its water reclamation facility to the Curtis Stanton Energy Center. The Curtis Stanton Energy Center, located on the east side of Orlando, is owned by the Orlando Utilities Commission and provides electric power to the greater Orlando area. There are unique aspects to the relationship between these 2 entities with respect to the supply of reclaimed water for cooling purposes including stringent water quality requirements, delivery schedules, fees, and means for handling the blow-down water.

### **5.7.4 Interagency Agreement Required for Water Reuse: Monterey County Water Recycling Project, Monterey, California**

The Monterey County Water Recycling Project (MCWRP) consists of a tertiary water recycling plant and water distribution system. Since beginning operation in the spring of 1998, over 14 billion gallons (53 million m<sup>3</sup>) of reclaimed water have been produced for irrigation of food crops such as artichokes, lettuce, cauliflower, celery, and strawberries. The project was designed to reduce seawater intrusion along the north-west portion of Monterey County (California) by using reclaimed water instead of groundwater.

The reclaimed water is supplied by the regional wastewater provider, the Monterey Regional Water Pollution Control Agency (MRWPCA). However, the responsibility for water planning rests with the Monterey County Water Resources Agency (MCWRA). Thus, 2 types of agreements were required. The first was a contract between MRWPCA and MCWRA for the sale, disposition, and operation of MCWRP. The second was a series of ordinances between MCWRA and the growers that governed the providing of water for the end user. The focus of this case study is on the contract between MRWPCA and MCWRA.

The base agreement was signed in 1992 and contained the following key provisions:

- A. Project Ownership, Operation, and Maintenance
  - The project will be owned and operated by MRWPCA
  - MRWPCA will be reimbursed for the actual

cost of its operation

- MRWPCA will supply water on a daily basis except for infrequent shut-downs
- Water will be provided in accordance with a specified demand schedule

B. Maintenance of Water Quality

- Water produced will be suitable for irrigation of food crops
- MRWPCA will monitor water quality
- Water Quality Committee, which includes local growers, will be formed

C. Records and Audits

- Accounting system required that allocates project costs
- Annual project audit required

D. Project Repairs and Maintenance

- Reserve for replacement established
- MCWRA will cover uninsured costs

E. Indemnification and Insurance

- Each party will hold each other harmless from damages
- Types and amounts of project insurance are defined

F. Term of Agreement/Dispute Resolution

- Provisions for extension of the Agreement are defined
- Options to cancel/terminate are described
- Requirement to meet and confer in the case of disputes

Three amendments to the agreement have been negotiated in order to clarify the details of the agreement. Overall, this contract has worked well.

**5.7.5 Public/Private Partnership to Expand**

**Reuse Program:  
The City of Orlando, Orange County  
And The Private Sector – Orlando,  
Florida**

The Orange County National Golf Center (OCNGC) is a unique and innovative public/private partnership formed by Orange County, the City of Orlando, and Team Classic Golf Services, Inc. The Orange County National is one of the largest golf centers in the State of Florida, devoted solely to golf and golf instruction.

The Orange County National Golf Course project represents an expansion of the successful Conserv II reuse program jointly owned and operated by the City of Orlando and Orange County, Florida. (See the case study, 3.8.6 Water Conserv II Chapter 3 for additional details.) The County and City purchased 660 acres (270 hectares) of additional land adjacent to 2 of its original rapid infiltration basins (RIB) sites in the rolling hills of west Orange County, originally intended solely for the construction of new RIBs. Large RIB sites in this area typically consist of a series of basins interspersed across the site with large areas of open land between them. In fact, RIBs typically occupy as little as 15 percent of the site, with the remaining area being available for other uses. Hoping to achieve multiple uses on the new lands, the County commissioned a study to determine the feasibility of building a municipal golf course. The results of the feasibility study were very encouraging, and the County and City agreed to pursue this option with the County acting as the lead-contracting agency.

During a subsequent regulatory and permitting delay in the RIB expansion program, an internationally renowned golf instructor and course developer, Mr. Phil Ritson, approached the Orange County Parks Department and the Orange County Convention Center in search of land to construct a public golf course. After considerable debate, all parties agreed to investigate the feasibility of co-locating RIBs and golf facilities on Conserv II property owned jointly by the City and County.

Project planning for the golf course began in 1991. Using a four-step process, the team completed the following before construction started: (1) a business feasibility plan; (2) a request for interested golf course developers; (3) a leasehold agreement; and (4) a capital-financing plan. Each step was crucial and built on the work of the previous steps.

The business feasibility study showed excess demand for golf and high potential for a golf course development. This analysis, along with the primary environmental concerns, such as protection of on-site wetlands

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acreage and a preliminary survey of threatened and endangered species, was used to develop a request for business proposals. In September 1993, after the City and County had selected and approved Team Classic Golf Services, Inc. as a partner, the difficult work began – negotiating terms for the long-term lease, securing financing for the deal, and setting up a team which would work to the mutual benefit of all the partners. The major breakthrough in the project came when Team Classic acquired private sector financing totaling \$51.5 million. A public/private partnership was established through a 55 year leasehold agreement. Forming a partnership with the municipal government and private sector parties took 6 years from its conceptual and planning stages until the start of construction.

In addition to RIBs, the OCNGC incorporated several other environmental benefits. The site includes a number of isolated wetland areas that had been degraded through lowered water tables and invasion of undesirable plant species. The combined golf course RIB and surface water management system was designed to restore and maintain more desirable water elevations, and the invading plant species were removed and replaced by hand-planted native species appropriate to the wetland type. The site was developed in a low-density layout, leaving natural upland habitat areas between the golf holes.

Today, 54 holes of golf are open along with a 42-acre (17-hectare) practice range and a 9-hole executive course. The facilities also include a 33,000 square-foot (3,070- m<sup>2</sup>) clubhouse, 50-room campus lodge, a Pro Studio with 5,000 square feet (465 m<sup>2</sup>) of instructional space, and an institute housing classrooms and administrative offices. It is estimated that private sector investment will exceed \$100M at completion.

Accessibility has been increased through a multi-tiered fee structure that provides reduced rates to Florida residents and even greater reductions for Orlando and Orange County residents. Rent is paid to the City and County in tiered lease payments tied to time and financial performance of the golf course development. As the golf center is more successful, the lease payments will increase.

University of Florida Institute of Food and Agricultural Sciences (IFAS) is using the site as part of a study, which is co-funded by the County and City. The study is examining the effects of reclaimed water use on golf courses, including the effects of fertilizer and pesticide applications. The study results are being used to develop best management practices for golf courses irrigated with reclaimed water.

### **5.7.6 Inspection of Reclaimed Water Connections Protect Potable Water Supply: Pinellas County Utilities, Florida**

Few things are more important than a safe, potable water supply. Therefore, cross connection control must be taken seriously and comprehensive inspections are absolutely necessary to ensure the public's health. In addition, state and local ordinances and policies must be thoroughly and uniformly enforced. This has become even more important considering the potential threats to our drinking water.

Pinellas County, Florida, began its Cross Connection Control and Backflow Prevention Program in 1977. Major improvements to the inspection process were implemented in 1994 and 2002. Inspections have uncovered remote hose bibs (to docks, etc.), hidden and/or forgotten valves, and interconnections between the potable and well systems with inexpensive and leaking ball or gate valves.

Pinellas County requires that the reclaimed water connection remain in the locked position and that the irrigation system be separated until the day of inspection. The owner, or their legal representative, must sign an application (see copy following this case study) agreeing to use the reclaimed water for its intended purpose and agreeing to inform future owners of these conditions. Owners must schedule an inspection and are to be present to operate the entire system. First, the inspector verifies that the backflow prevention device is installed on the potable meter. Pinellas County inspectors check all zones for potential cross-connections and overspray into public waters, sidewalks, and roadways. A "dry" run, with the potable source on and the reclaimed source off, is then conducted. This helps to limit the possibility of reclaimed water entering the building. Certainly, it is far less intrusive and more cost-effective than flushing the potable plumbing system if a cross-connection occurs. Then the "wet" run, with the reclaimed water connected and the potable water supply turned off at the meter, begins. This uncovers any remote connections and any cross-connections under the reclaimed pressure. A 1-page report (see copy following this case study) with a "point of disconnect" (POD) sketch is completed by the inspector. A reclaimed water curb marker is glued to the curb indicating that the property has passed the inspection. This information is then entered into a database.

Initially, contractors who are unfamiliar with this process have minor concerns about the length of time for this inspection. A typical, well-prepared residential property


## **Pinellas County Utilities – STANDARD OPERATING PROCEDURES**

### **FOR RECLAIMED WATER CROSS-CONNECTION INSPECTIONS**

1. The Pinellas County Utilities Inspector briefly explains the inspection procedure.
2. The Inspector asks the questions necessary to complete the Reclaimed Water Cross-Connection Inspection form, and records the information on the form.
3. The Inspector checks to see if the reclaimed service line has been connected to the irrigation system and checks to make sure that the reclaimed service valve is locked off.
4. The Inspector walks around the building, checking to make sure that all hose bibbs have water flowing from them, and to see if a pressure relief valve is attached, that all reclaimed valve box covers and exposed pipes located above ground (except risers for bush spray heads) are purple in color from the factory or painted with Pantone Purple 522C (Florida Building Code - Plumbing 608.8; DEP 62-610.469(7)(f)) using light stable colorants, and that all sprinkler heads are attached.
5. The Inspector asks to see the Point of Disconnect (POD) from the potable, well, or other water source.
6. The Inspector starts the Dry Run by having the Contractor or Homeowner operate each of the solenoid valves, one zone at a time, and then checks to see if any other water source is being used for irrigation.
7. The Inspector asks the Contractor or Homeowner to connect the irrigation system to the reclaimed service line, and then unlocks the reclaimed water service valve.
8. The Inspector starts the Wet Run, by opening all hose bibbs and then closing the potable water at the water meter and letting the hose bibbs completely drain. Next, the reclaimed water service valve and the Homeowner's shut-off valve are opened, and each irrigation zone on the property is run, one zone at a time. When each zone is fully pressurized, the Inspector checks each hose bibb to make sure no water is coming out of them and also checks for over spray.
9. The Inspector turns the potable water back on and then turns off all of the hose bibbs.
10. The Inspector installs a Reclaimed Water curb marker on the curb or road edge.
11. The Inspector makes a drawing on the form, depicting the locations of buildings, streets, driveways, sidewalks, POD, Pinellas County water meter, and the reclaimed box. Any areas with no irrigation present are identified, and each component of the drawing is labeled. The location of the POD is referenced by measurements taken at right angles to the building's walls.
12. The Inspector returns to the office and enters the information into the MAXIMO Work Management computer program.

**Pinellas County Application for Reclaimed Water Service and Cross-Connection Inspection Forms**

As reclaimed water service becomes more common, utilities create the forms required to keep track of customers and address concerns critical to distribution of nonpotable water. The following forms present the application for service and cross-connection inspection forms currently used by the Pinellas County Utilities in Florida.

<h1 style="margin: 0;">Reclaimed Water</h1> <h2 style="margin: 0;">CROSS CONNECTION INSPECTION</h2>			<b>PINELLAS COUNTY UTILITIES</b> 6730 142 <sup>nd</sup> Ave. N. Largo, Fl. 33771 (727) 464-5849	
CITY / SUB		MP	B) CROSS CONNECTION	
OWNER/BUS. NAME			RESOLVED	YES <input type="checkbox"/> NO <input type="checkbox"/>
SERVICE ADDRESS			CC FORM	YES <input type="checkbox"/> NO <input type="checkbox"/>
OWNER / BUS. PHONE			TYPE OF CC	
RESIDENTIAL <input type="checkbox"/>	COMMERCIAL <input type="checkbox"/>	VACANT LOT <input type="checkbox"/>		
Permit #		WO #	C) Reclaimed Meter Information NA <input type="checkbox"/>	
<b>A) POTABLE METER INFORMATION</b>			1) NUMBER / SIZE	
1) METER NUMBER / SIZE		# OF METERS	2) MANUFACTURER	
2) BACKFLOW DEVICE YES <input type="checkbox"/> NO <input type="checkbox"/> TYPE:			3) READING BEFORE INSP.	
3) PRESSURE RELIEF VALVE INST YES <input type="checkbox"/> NO <input type="checkbox"/>			4) READING AFTER INSP.	
4) PRV GIVEN TO CUSTOMER or CUSTOMER HAD YES <input type="checkbox"/> NO <input type="checkbox"/>				
5) PRV PRE- DISTRIBUTED BY AREA <input type="checkbox"/>				
<b>D) RECLAIMED WATER</b>		RECLAIMED WATER CONNECTED PRIOR TO INSPECTION	YES <input type="checkbox"/>	NO <input type="checkbox"/>
1) RECLAIMED CONNECTION TO / IRRIGATION SYSTEM <input type="checkbox"/>		IRRIGATION SYSTEM / HB <input type="checkbox"/>	HOSE CONNECTION ONLY <input type="checkbox"/>	
2) IRRIGATION SYS / EXISTING <input type="checkbox"/>		NEW <input type="checkbox"/>	/ NUMBER of ZONES / RAIN SENSOR INSTALLED <input type="checkbox"/>	
3) OWNER INSTALLED/ MASTER CONTROL VALVE YES <input type="checkbox"/>		NO <input type="checkbox"/>	NA <input type="checkbox"/>	
4) WELL DISCONNECT: YES <input type="checkbox"/>		NO <input type="checkbox"/>	NA <input type="checkbox"/>	
5) RECLAIMED PIPE AND APPURTENANCES PAINTED PURPLE: YES <input type="checkbox"/>		NO <input type="checkbox"/>		
6) POTABLE WATER DISCONNECT: YES <input type="checkbox"/>		NO <input type="checkbox"/>	NA <input type="checkbox"/>	
7) CONTRACTOR <input type="checkbox"/>		OWNER <input type="checkbox"/>	PH #	
NAME :		SECOND SOURCE OF WATER FOR IRRIGATION		
E) PRE- INSPECTION		YES <input type="checkbox"/>	NO <input type="checkbox"/>	
INSPECTOR :		YES <input type="checkbox"/> NO <input type="checkbox"/> TYPE:		
TIME BEGIN		TIME ENDED		
<b>F) FIRST INSPECTION</b>		TIME		
1) APPROVED : YES <input type="checkbox"/>		NO <input type="checkbox"/>	BEGIN	
REASON :		END		
3) INSP. SIGN		DATE CALL #		
<b>G) SECOND INSPECTION</b>		TIME		
1) APPROVED YES <input type="checkbox"/>		NO <input type="checkbox"/>	BEGIN	
REASON :		END		
3) INSP. SIGN		DATE CALL #		
H) POD	YES <input type="checkbox"/>	NO <input type="checkbox"/>	FROM	

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inspection is completed in 45 to 60 minutes. Approximately 8,000 inspections have been conducted and contractors work successfully with the County's experienced inspectors.

Information provided by the Pinellas County Utilities Department – Cross-Connection Control and Backflow Prevention Program, 1998, Clearwater, Florida.

### **5.7.7 Oneida Indian Nation/Municipal/ State Coordination Leads to Effluent Reuse: Oneida Nation, New York**

The Oneida Indian Nation is in a period of strong economic growth. The cornerstone of its economic development is the Turning Stone Casino Resort, the only casino in New York State. The casino and other Nation enterprises are located in an area of central New York with limited water resources. The viability of future enterprise development is linked to the Nation's ability to adequately meet its water supply and wastewater treatment needs. For the Nation's planned golf course complex, reclaimed water has been identified as a viable water resource for irrigation water. Implementing water reclamation required inter-governmental cooperation between the Nation and the reclaimed water supplier, the City of Oneida. Regulatory or jurisdictional cooperation between the New York State Department of Environmental Conservation (NYSDEC) and the Nation also was required because the Nation, being sovereign, is free to establish its own environmental standards for its lands, while the City is regulated by the NYSDEC. The project was further complicated by the fact that the NYSDEC does not have reclaimed water quality or treatment standards for unrestricted reuse.

An estimate of the peak irrigation demand for the Nation's proposed golf course complex is 670,000 gpd (2540 m<sup>3</sup>/d), which is well in excess of the potable water allocation available to the Nation (150,000-250,000 gpd, 570-950 m<sup>3</sup>/d). Investigation of the area's water resources identified the City of Oneida's wastewater treatment plant as a water source. The City subsequently agreed to support the Nation's concept for a water reclamation project.

Reclaimed water use is not a common practice in New York State. In fact, the state does not have reclaimed water quality or treatment standards for either restricted or unrestricted urban reuse. In the initial stages of the project, a stakeholders meeting was held with representatives of the Nation, the City, and the NYSDEC. The environmental benefits of the project were discussed at this meeting – the reuse of a water resource,

the conservation of existing potable water supplies, and reduced pollutant loads into Oneida Creek and, ultimately, Oneida Lake, which is part of the Great Lakes watershed. The Nation also made its position clear that the NYSDEC had no jurisdiction over activities on Nation land. The NYSDEC concurred with the Nation and City's reclaimed project concept plan, and expressed its basic support of the project. It outlined for the Nation and the City the regulatory framework and procedural steps for expediting the project.

To formally commit the City to the project, the City Council and Mayor needed to pass a resolution to authorize the technical staff of its Public Works Department to proceed with the project. The project team elected to use one of the City's semi-monthly council meetings as the forum to present the benefits of the project. Informational fact sheets were prepared for the meeting, which described in simple terms what reclaimed water is, the current uses of reclaimed water by other communities, and the environmental benefits of reclaiming highly treated wastewater. The fact sheets were distributed before the meeting so that elected officials, the public, and the news media could prepare questions before the council meeting. Factual and candid information was presented on water reclamation – its need in the overall growth plans of the Nation, its environmental benefits and, through its use, the conservation of limited potable water supplies. The City Council unanimously approved a resolution pledging the City's support and commitment to cooperate with the Nation on this project.

The implementation phase of the project included the following major milestones:

- Preparing a draft reuse agreement between the Nation and the City
- Completing the State Environmental Quality Review (SEQR) process to demonstrate the project's environmental benefits and lack of significant negative impacts
- Obtaining approval from the NYSDEC for a State Pollutant Discharge Elimination System (SPDES) permit modification to allow the city to deliver its treated water to the Nation's irrigation pond
- Completing a preliminary design of the project.

Each of these project aspects is discussed below:

**Reuse Agreement** – The agreement addresses reclaimed water quality and characteristics. The City of Oneida will be responsible for delivering to the Nation

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reclaimed water of sufficient quality to meet the requirements of the City's SPDES permit and target water quality conditions identified in the reuse agreement. While the entire cost of constructing the project will be borne by the Nation, the planned treatment and pumping systems will be installed at the City's wastewater treatment plant site. The City will be responsible for operating the reclaimed water system. As needed, the Nation will contract with a third party for major maintenance and repair work for the facilities and pipeline.

Other provisions of the agreement include easement and usage rights to allow the City access to Nation land to operate and monitor the reclaimed system, standard conditions regarding good faith commitments, a limited waiver of sovereign immunity for the purpose of implementing and enforcing the agreement, indemnification, notices, and amendments and assignments.

**SEQR Review Process** – The first step in the SEQR process was for the City to formally request “lead agency” status. This required sending a letter of notice, along with a basic project description, to the potentially interested agencies (including NYSDEC, County Departments of Health, EPA, Army Corps of Engineers, and New York State Department of Transportation). After a required 30-day public comment period, during which no other agency challenged the City's lead agency request, the City became lead agency for SEQR purposes.

An environmental assessment of the project was completed and resulted in a recommendation to the City Council that a “negative declaration” (akin to the “finding of no significant impact” under NEPA) be declared. As an “unlisted action,” the project's SEQR conclusion did not need any additional public comment period after the City's negative declaration.

**SPDES Permit Modification** – To deliver water to an outfall location other than its permitted discharge point (Oneida Creek), the NYSDEC required that the City complete a SPDES permit modification request. Currently, the permit application is under review by the NYSDEC. It is anticipated that the City will obtain the permit modification with few exceptions to the proposed plan. Early involvement and open communication with the NYSDEC was a key success factor in preparing the application based on specific guidance from the NYSDEC.

**Preliminary Design** – The design report addressed the preliminary design criteria and basis of design for the needed reclaimed water system components, including operation and control strategies. The system design includes a provision that would allow the City to process

a portion of its secondary treated effluent through the reclaimed system filter (i.e., providing tertiary treatment) for discharge to the creek outfall in the event there is no demand for reclaimed water. This provision would allow the City to discharge a higher quality water to the creek, but it would not obligate the City to provide a higher level of treatment than is now required by its existing permit. This provision is a secondary benefit, not the driving force behind the project or future permit requirements.

In New York State, where water reclamation is not commonly practiced, the Nation, the City of Oneida, the NYSDEC and other local agencies collaborated in an inter-governmental and multi-jurisdictional effort to make this project possible. A key reason for the successful collaboration was effective communication among all project stakeholders. All involved parties shared the conviction that the project was a win-win proposition for the Nation, the City, and the environment. Early, two-way communication that consistently focused on the project's benefits resulted in full and unanimous support of the project at each of the legal decision-making junctions.

### **5.7.8 Implementing Massachusetts' First Golf Course Irrigation System Utilizing Reclaimed Water: Yarmouth, Massachusetts**

For the first time in the Commonwealth of Massachusetts, reclaimed water is being used as the source water to irrigate a golf course – The Links at Bayberry Hills, which is owned and operated by the Town of Yarmouth. This project required a team effort on the part of everyone involved and many years to successfully implement.

The town developed a landfill closure/reuse plan that provided for a 9-hole expansion of the adjacent town-owned Bayberry Hills Golf Course with 7 of the 9 holes located over the capped landfill. However, since the town already needed additional drinking water supplies to handle peak summer demands in this tourist community, in the spring of 1996, the town began discussions with the Department of Environmental Protection (DEP) about utilizing the effluent from the adjacent Yarmouth-Dennis Septage Treatment Plant (STP) as the source of irrigation water.

The Yarmouth-Dennis STP had an existing biological treatment process followed by sand filtration and ultra-violet (UV) light disinfection. The original facility was not designed to meet stringent reclaimed water standards. After evaluating several options it was determined that the installation of an ozone treatment system prior to

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filtration was the most efficient option to meet the proposed standards.

A reclaimed water sampling plan was developed in discussions with the DEP. A two-phase sampling program was required. The phase 1 preliminary sampling program was performed in conjunction with the start-up of the new ozone treatment system and consisted of daily fecal coliform testing and continuous turbidity monitoring of the final effluent from the UV channel. Results of the sampling indicated that the proposed fecal coliform and turbidity standards could be attained. The phase 2 program consisted of comparing the results of influent septage samples from the equalization tanks and final effluent samples from the UV channel for the following parameters: Enteric Viruses, *Giardia* and *Cryptosporidium*, Heterotrophic Plate Counts (HPC), Coliphage (Male-specific and Somatic), and *Clostridium perfringens*. Results for these parameters indicated similar log removals with and without the ozone treatment.

#### **Development of Groundwater Discharge Permit to Use Reclaimed Water**

The sampling programs were developed to convince DEP that utilizing reclaimed water in Yarmouth was viable and that the interim guidelines could be attained. However, there were several steps necessary to acquire the revised groundwater discharge permit for the project. In total, it took 4 years to acquire the permit that finally allowed the reclaimed water to be utilized. The first step, which began in 1996, involved working closely with the DEP to develop a means for permitting this type of facility; Massachusetts was one of the remaining states that did not have guidelines or regulations for permitting reclaimed water facilities. Ultimately, DEP issued a set of "Interim Guidelines on Reclaimed Water" in May 1999 (Revised January 2000). These guidelines provided a mechanism for permitting reclaimed water projects under the DEP's groundwater discharge permit regulations.

A site hearing process allowed for a public comment period regarding modifications to the existing Yarmouth-Dennis STP groundwater discharge permit so that it would include the reclaimed water and new application site. Based on all the work that had been done leading up to these events, there were very few comments received and the new groundwater discharge permit was issued on June 28, 2000.

DEP added some additional monitoring parameters to the reclaimed water portion of the permit to help develop a historical database of viral and pathogenic values. The MS2 Coliphage, a viral indicator, will be sampled twice per month for the March through Novem-

ber use period, and can be tested using a fairly inexpensive means.

*Giardia*, *Cryptosporidium*, and *Clostridium perfringens* will be sampled 4 times during the use period, which involves expensive testing procedures that take weeks to conduct. Although the reclaimed water is not to be ingested, it is believed that DEP will utilize this data in the future to develop an even greater confidence level that the current stringent reclaimed water standards are protective of public health.

#### **Groundwater Protection Management Plan**

Because of the unique way in which the reclaimed water portion of the groundwater discharge permit was written, the implementation of reclaimed water requires close coordination between the treatment plant staff and the golf course staff. Therefore, a Groundwater Protection Management Plan was developed to address these coordination issues. The overall purpose of the plan is to protect the area groundwater. To achieve that purpose, the plan provides an understanding of the issues involved and defines the responsibilities of the various parties. The treatment plant staff are responsible for the groundwater discharge permit compliance, which includes the reclaimed water applied as well as the water collected in the underflow from the golf course. The golf course staff are responsible for the operation and maintenance of the Links at Bayberry Hills. Thus, without close coordination between the 2 parties, permit compliance would be difficult.

Based on the coordination requirements and the uniqueness of this golf course, there were 4 basic elements addressed within the Groundwater Protection Management Plan. The first element deals with the schedule for using the reclaimed water. Town water will be used during the spring months when the golf course staff will be "waking the course up" with different fertilizer applications depending on the previous winter weather conditions. This is also a period when the town can use its own potable water supply. However, in the summer months, when town water supplies are stretched, reclaimed water will be used on the golf course. It is anticipated this will occur beginning in July and will continue until November, or until the reclaimed water supplies of up to 21 million gallons by permit are depleted.

The second element deals with the requirement for the use of slow release fertilizers. The third element deals with the need to reduce the quantity of commercially-applied fertilizer when reclaimed water is in use. The

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fourth element addresses the coordination between the treatment plant staff and the golf course staff so that the above 3 elements are being done. Thus, an approval form requiring the signature of both parties has been developed for use prior to any fertilizer application on the golf course.

It is believed that the Groundwater Protection Management Plan addresses the key issues between the treatment plant staff and the golf course staff so that, over time, as personnel change, the Town of Yarmouth will have an adequately maintained golf course and adequately protected groundwater supplies. It will also provide the ability to comply with the reclaimed water permit limits. Implementation of the reclaimed water project for the Town of Yarmouth has been a challenge for all parties involved due to its innovative nature for the Commonwealth of Massachusetts. However, all parties worked together to find a way to get this project implemented without compromising public health issues.

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